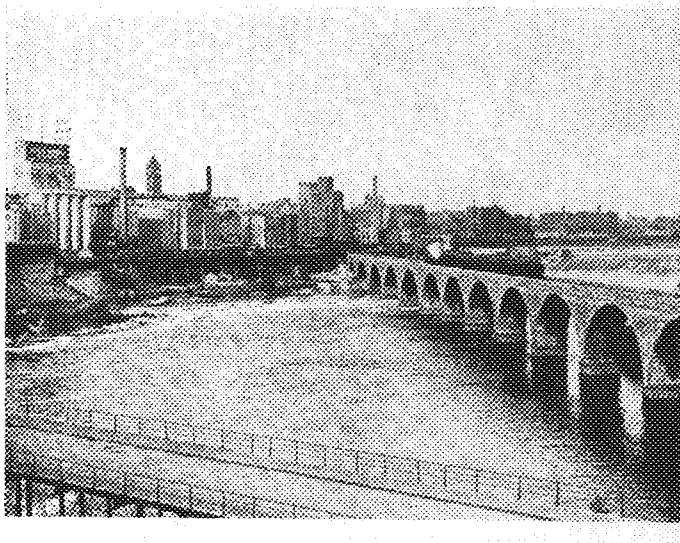
The MINNESOTA TECHNO-LOG



OCTOBER
Volume XV

193
Number

At The Desk

New cover this month. It is a type of cover which you have not seen before on the *Techno-Log*. The picture you will all recognize as a view of the Minneapolis milling district from the Tenth Avenue Bridge. Incidentally, if in the evening you have never strolled across the old bridge which shows in the foreground, you do not know how attractive Old Man River can be. As dusk is deepening over the water it helps to hide the disgraceful excrescence from the sewers. Some day it may be possible to float a canoe on the same stream without a gas mask as necessary equipment.

In Glacier National Park a new highway has been completed recently. It is known as Going-to-the-Sun Highway, and our frontispiece shows one picturesque spot along the trail. Those are real mountains, sometimes called the American Alps, and some think them more interesting than the famous European range itself. Anyway, it's a fine place for a scenic highway, and the planners did a good job. A little admixture of beauty to engineering makes the product much more pleasing, no matter what it may be.

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Minnesota Techno-Log

37 ELECTRICAL BUILDING ... U of M

OCTOBER 1934

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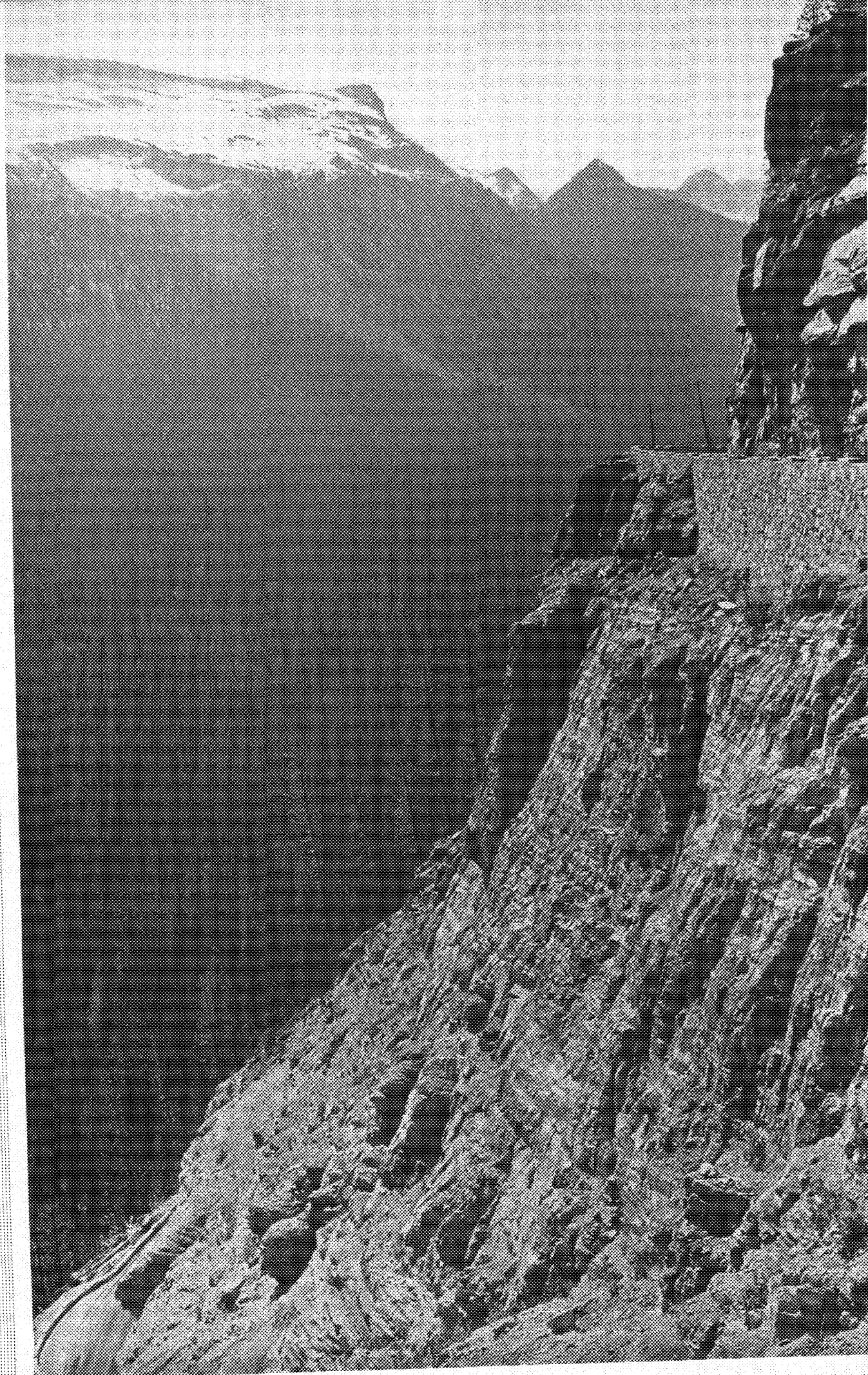
This Month



Courtesy Civil Engineerin

Going-to-the-Sun

adhere to university style in constructing

New Indoor Sports Plant

By THOMAS TUDOR, ARCH. '35

A new building on this campus always makes good news. While the steel of construction is going up, every student is conscious of the widening and growth of the institution. From the first excavations to the dedication ceremony he can watch the new building's progress. Soon he will see it filled with activity, accepted as a fixture of the campus.

For financial reasons, the present building program of the University was temporarily suspended last year and, seemingly to make up for this respite, there are two additions to the campus this fall, a new dormitory and an indoor sports building. The construction of a new building is of technical interest to students of many departments of the Engineering College for the procedure can be a practical supplement to the class work in architecture and in civil, electrical, and mechanical engineering. At first aware of the nearness of the new indoor sports building because the building activity allowed a shortcut through Northrop Field, students later spent much time in the spring and summer watching the construction. It would be a valuable bit of practical education to peruse the plans and specifications for that building. Students of reinforced concrete and steel design were pleasantly surprised to see so much of the work done exactly as they had learned it should. The placing and bending of the reinforcement steel, the laying of concrete slabs, the erection of columns and beams, and the riveting could all be seen and studied, and the student engineer could see if they were done according to "Hoyle."

After several years of promotion, procrastination, and discussion on its behalf, the indoor sports building nears completion and a great athletic plant is realized on this campus. The athletic department and athletic minded students have long bemoaned the lack of better facilities for participation in various indoor sports. Much of the criticism centered about that part of the plant housed in our decrepit armory. Not even desirable for practice purposes, the armory pool was entirely inadequate for inter-school meets. There was also a genuine demand for a well equipped gymnasium, and a number of basketball courts for varsity practice and intramural competitions. An important reason for a new building was to concentrate adequate athletic department offices, ticket offices, and class rooms near the stadium and field house.

In spite of the need, many believed there would be no funds for such a building for years. With its establishment about a year ago, however, the Public Works Administration announced that educational institutions were included in the classifications of buildings for which it would provide funds. The Honorable Frank W. Murphy, regional director of the P.W.A. and a member of the Board of Regents, suggested to that body that it make an application for money for the proposed athletic building. The request was made and the Board of Regents commissioned C. H. Johnston, prominent St. Paul architect, to draw up plans and specifications for the proposed appropriation of $350,000. In the meantime, the request was approved by the P.W.A. and the government granted $86,000. The rest of the required money was obtained by a loan and from funds on hand in the athletic department. Late last spring the Paul Steenberg Construction Company received the general contract for $255,000, heating, plumbing, and electrical contracts were let, and work started immediately. It was expected that the work would be completed by the time school started, but the two truck driver strikes necessitated the extension of the completion date to November 19.

THE selection of the site for the new building was the result of some discussion by the architects and University officials. The possibilities necessarily brought up questions regarding the future of the stadium and the adopted scheme is definitely related to that edifice. The building faces on the stadium and between the structures will be a walk which connects University Avenue with Harvard Street, providing an access to Washington Avenue, a long needed means of circulation. While there is no symmetrical correlation of the new building and the main mall of the campus, it forms a group with the field house and stadium and is related to all the recent buildings by its types and colors of materials. Architecturally, it represents no specific style, but one might say its character approaches that of the near-by stadium or the music building. The exterior brick was specified to match in color range, surface texture, and size that on the stadium adjoining, and sometime in the future the brick wall around the field will be carried across the open end of the stadium to form a retaining wall for a terrace in front of the new building. The interior sports building facade is one of the most beautiful on the campus. The entrance is elegant and impressive. The exterior expression of the types of rooms has effected the excellent proportioning of the wall areas and openings, and the restrained detail has been designed and executed with sympathetic feeling for the combined use of brick and limestone.

The plan is well organized in regard to the functions of the building, the administration and business of the department, and the participation and witnessing of indoor

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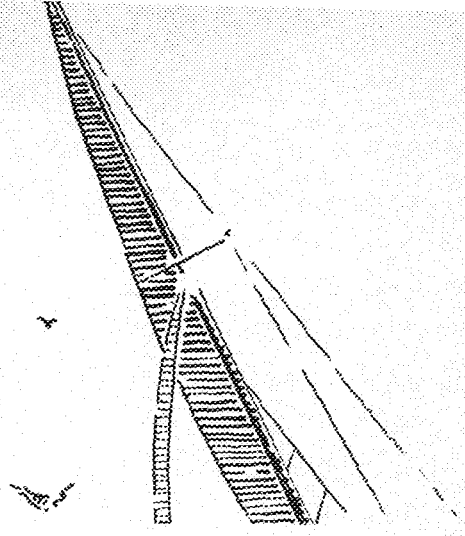
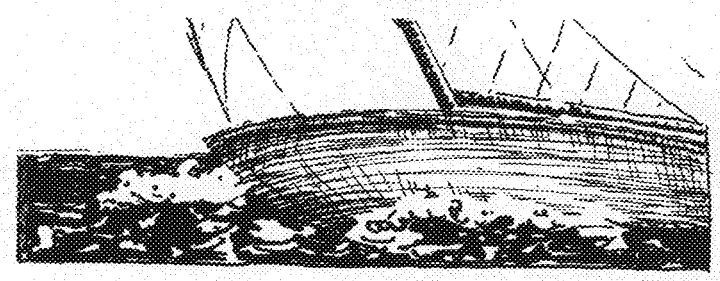


cruising and racing

On Great Lakes Waters

By **Wayne Stone, M. E. '36**



WE sailed from Duluth at ten o'clock on the morning of June 22. I was at last off on the most glorious adventure that I had ever experienced. We had been planning this trip all spring and my Dynamics and Thermodynamics books were lined with drawings of boats, lists of supplies, and memorandums of things to be done. During my finals, I saw green water, white-tipped waves, and bellying sails, instead of square root and integral signs. But now we were off on our great adventure.

The crew was made up of Captain Jefferson; four fellows of university age: Cy and Arch Cochrane, Dick Hanna, and myself; and the Captain's son, Jim. The boat, named *Vanure*, was a two-masted sailboat, ketch-rigged, fifty-five foot over-all-length, and twelve foot beam. The cabin accommodations consisted of an after cabin, with two bunks, a dresser, and a closet; the main cabin, with four bunks, a table, two chests of drawers, a closet, a chart cabinet, and a radio; the galley, with an ice box, stove, table with the auxiliary motor under it, an electric generator, and shelf space for dishes; forward of the galley was the fo'c'sle, with two pipe berths and storage space, and in the "eye" of the ship, forward of the fo'c'sle, were the cabin and sail lockers.

There was a total of ten sails for the ship. They were the mizzen, the main, the working jib, two jib topsails, a Genoa jib, a spinnaker, a mizzen staysail (nicknamed "The Curse," for excellent reasons), a storm jib, and a storm trysail. These sails were used in different combinations, depending on the direction of the boat relative to that of the wind, and on the strength of the wind.

After leaving the dock in the Duluth Harbor, we ran out under power through the inner harbor, exchanging whistle salutes with several other boats. We had a hard time convincing the tender of the Interstate Bridge with our horn that we wanted him to open for us. The only horn we carried with us was a small fog horn, which, if plenty of lung power was applied, might be heard fifty yards distant on a calm night. I nearly blew a gasket in my lungs attempting to blow a six hundred foot ore boat out of our way in the outer harbor. Luckily, for we probably would have had to send up a flare to make ourselves noticed, we were able to sneak through the aerial lift bridge under the stern of an outgoing ore boat.

A stiff northeaster must have left Nipigon Bay about two days before and swooped down the two hundred and fifty miles of Lake Superior, picking up a peculiarly nasty twirl around Isle Royale, just for the express purpose of greeting us as we left the protection of the Duluth breakwater, for the wind blew, the waves rushed, the boat careened, and we froze. We got the working sails on, however, and started to beat to windward up the north shore toward Two Harbors.

When we finally passed our lines to the dock at Two Harbors that night we were a wet, cold, and tired crew. We had found out that Lake Superior really was a mean old stretch of water. We held a conference down in the main cabin that night and unanimously, except for Jim, who was curious to see where all that weather had come from up at Nipigon Bay, decided to leave the north shore and head as far south as possible.

Two days later we ran through the worst day of tough luck and weather of the entire cruise. It started at three in the morning. A swarm of mosquitoes, fully armed, attacked us without warning as our hatches were rumbling like a boiling teakettle cover from our contented snores. We were vastly outnumbered and soon beat a hasty retreat by casting loose from the dock and sailing. The sky was cloudy and overcast, not a breath of wind was blowing, and it was cold and drizzly. We ran under power, crawling along at the five miles an hour that our motor would do and scanning the horizon for wind until suddenly, at about nine-thirty, one of Lake Superior's famous wind squalls, coming from the northeast, found us. We hurriedly battened down the hatches, cleared the deck of anything that

might be washed overboard, and sat tight, moving slowly under power. The squall soon passed over, leaving a fresh breeze blowing, and we hoisted the working sails.

At ten-thirty another wind and rain squall came up from the northwest. This time we took off all sails and hoisted the mizzen and storm jib. We intended to run under both power and sail, but just before the storm struck, Jim came running up on deck with, "The oil was low in the motor so I put four quarts in, and it isn't full yet."

That worried us, as we naturally thought that something serious was the matter with the motor. Later we found that Jim had poured the oil into the wrong hole, and that it had run into the bilge. We left the mizzen and storm jib on after that squall and at eleven-thirty, the third storm in three hours struck from the northeast.

We kept barometer readings all of the time and the records for that morning showed that the needle wavered like a band leader's baton. It went up, however, before a storm and down after it. The barometer just wasn't fast enough to keep up with that rapid weather. The hot soup and spaghetti we had for lunch was the best that I have ever tasted. In the afternoon the weather was at least steady, steady fog and a very light breeze. We didn't want to use the motor because of the oil, so we finally drifted in to Ontonagon, Mich., the fog lifting just enough so that we could see our way into the harbor. To top it off, we ran aground in the middle of the harbor on a mud flat and had to take a line in the dinghy to shore and pull ourselves in by the hand-winch, back-breaking work. The warmest it was all that day by the thermometer in the cockpit was 42 degrees F., and the date was June 25.

Tuesday, July 3, we locked through the Soo Locks and that night, with appropriate ceremonies, we carefully folded the Lake Superior chart and stowed it away. We were finally off Lake Superior and glad of it.

After leaving the Soo, we cruised down the St. Mary's River and around Neebish and St. Joseph's Islands into the North Channel. After doing a little hunting and fishing for two days at Milford Haven in St. Joseph's Island, we proceeded down the North Channel, north of Drummond Island, Cockburn Island, and Manitoulin Island, stopping at Gore Bay, and Little Current. After leaving Little Current, we turned south through Georgian Bay.

One night we stopped on a little island named Club Island. It was uninhabited and very peculiarly shaped, round, about 200 yards in diameter, with a circular bay in the center about 100 yards in diameter. The entrance to the bay was about 40 yards wide. The whole effect was of a doughnut with a bite taken out.

From Club Island we continued south to Tobermory Harbor at the entrance to Georgian Bay. We intended to continue on the next day, but when we tried to get supplies in the morning, we found that that day, July 12, was a Canadian holiday, Duke of Orange's birthday, or something about Orange, so we stayed over that day. In the afternoon we had nothing to do so we went sailing, taking a short run of about ten miles around Flowerpot Island. (The postman taking a walk on his day off.)

Three days later we arrived at Detroit. We found that in a few days a fleet of boats similar to the *Vamare* was going to race from Port Huron up the length of Lake Huron to Mackinac Island. We were invited to enter and accepted. After spending a few days in painting and rubbing down the bottom of the boat and signing on three other fellows for crew, we left Detroit, going up the river to Port Huron. The race was scheduled to start from a point a little way out in the lake at 4:00 p. m., Saturday, July 21. Just before the start, Cy, who was the cook of the crew, dished up a good steak dinner and it was the last warm food we had until after we crossed the finish line.

The Captain twisted the wheel and shouted orders in such a manner as to put us over the starting line in first place. We didn't hold it long though, because the *Baccarat* (winner of the Bermuda Race, spring 1934) was right on our tail and traveling fast. The wind was from the northeast and we set out, closehauled on the starboard tack, carrying mizzen, main, jib, and jib topsail, on the long run of 240 miles to Mackinac Island. Shortly after dark, we picked up the Port Sanilac Light and then the Harbor Beach Light, from which we got bearings to fix our position, as we would be out of sight of land for some time.

That night we sighted lightning off in the west. It worked around into the northwest, north, and finally the northeast. I had crawled into a bunk at three in the morning to catch a few winks of sleep, but at five, the call, "All hands on deck!" came, for the storm had struck. It soon cleared off, however, leaving a strong wind of about thirty miles per hour blowing. All that day we roared along under an increasing wind, rail down, and pitching like a cork. One of the fellows that we had picked up at Detroit couldn't quite stand the effect of the fifteen foot waves rolling and hung with his head over the rail most of the time.

A sailboat of that size is about the roughest riding thing there is on water. It is rather hard walking around or eating in a cabin when it is tipped at about forty degrees and pitching like a wild steer. It was really easier to crawl, hands and knees, on the floor than to walk. You may say, "Joe, get the wagon," to these sea stories of riding over a breakwater on a wave, or of such a large wave coming over a boat that one can see fish swimming overhead through the skylight in the hatch, but it's a fact that we slept in the upper bunks because we could lift one edge of them so that when the boat was on one tack we were sleeping level on the bunk and when on the other we were sleeping on the wall.

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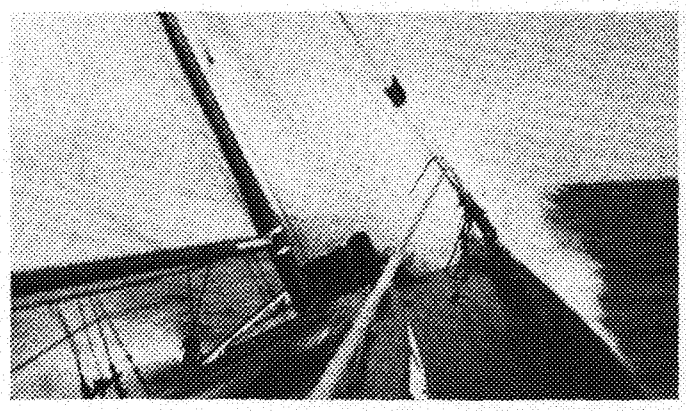

Heeled over to leeward, Vamare ships spray as she takes a wave on her starboard bow

New Soap Manufactured From Complex Alcohols

Production of soap had changed little in basic principles since Rome

By HOWARD KAHN, CH. E. '35

IN its present form soap is a comparatively recent development, having been in general use for a mere one hundred years. However, as far back as the first century, very crude soap had been formed from goat's tallow and beechwood ash leachings; the product, while possessing detergent properties, was used rather for a hair pomade by the Roman galliants.

Soap came into use for laundry purposes in the 18th century, but its manufacture was in no sense organized. Much of the soap was made in the home; larger scale production was carried out by itinerant soap makers who journeyed from house to house collecting fat scraps from which both soap and candles were made. However, large scale production was impossible, for both the supply of caustic and the supply of fats were inadequate. The problem of caustic supply was solved by Le Blanc, a French chemist, in 1791, by a process making use of common salt. Since that time the Solvay and electrolytic processes have been developed to afford a more extensive supply. The scarcity of fats was overcome with the development of the packing industry and subsequent extensive supply of animal fats, together with the introduction of various vegetable oils. With these difficulties removed, the manufacture was made possible on a larger scale, but was yet conducted by hit or miss methods because of the ignorance of the chemical reactions involved. In 1811 Chevreul, the Frenchman, conducted extensive research on the structures of the reagents used and on the actual reactions involved, thereby making possible a scientific control of the process.

Soap is a mixture of the sodium or potassium salts of various fatty acids, which are long-chain aliphatic organic acids. Soap is formed by the reaction of caustic with a fat or oil, which are the glyceryl esters of fatty acids,—i. e., a compound of glycerine and a fatty acid. In the reaction between the caustic and the fat, known as saponification, soap and glycerine are formed, the latter being removed or incorporated into the soap according to the process. The saponification reaction can be represented as follows: Fat + Alkali = Soap + Glycerine. The finished soap is a mixture of sodium, stearate, oleate, and palmitate.

The raw materials used in soap manufacture are fats, caustic, and fillers. The fats used most extensively are tallow, which is the fat of cattle and hogs; cottonseed oil, coconut oil, and rosin, the latter not strictly a fat but soap upon saponification. Both caustic soda and caustic potash are used as the alkali, the potash giving soft soaps. Its use is necessarily restricted by its relatively higher price; it finds its use in the textile industries. Fillers such as soda ash, which is sodium carbonate, and silicate of soda are mechanically admixed with the soap, and serve as water softeners. Their use is recommended within certain limits, which may or may not be exceeded according to the discretion of the manufacturer.

SOAP may be classified as domestic, toilet, and industrial, the latter being used in the laundry and textile industries. It may be either hard or soft, depending upon the alkali used. There are three distinct processes of manufacture, cold, half boil, and boil; each may produce one or more types of soap.

The cold process makes no use of artificial heat, although some heat is developed during the reaction. The fat, known as soap "stock," and a chemically equivalent amount of alkali are kept in intimate contact at a temperature of 70-110°F, depending upon the type of soap stock. The filler is added during the saponification. Also, it is possible to add perfume to the soap during this process, in contrast to the other processes, in which the high temperature of the saponification mass would cause the perfume to volatilize. This process is used largely for the manufacture of soap for steam laundries. The product cannot be used as a toilet soap, for the saponification is incomplete, and free fat and alkali remain. The factors which make this process desirable are low cost, simplicity of plant lay-out, and the ease and rapidity with which the operation can be carried out. It is to be noted that the by-product glycerine is not recovered but is incorporated in the soap.

The semi-boil process is used for the production of all types of soaps. The reaction is carried out at about 160°F, and requires the addition of heat. Efficient agitation is likewise necessary. Also in this process, the glycerine is not separated, but is blended into the soap. The glycerine adds to its desirability for toilet purposes. The cost through the loss of the glycerine is too great to permit its general use as a laundry soap.

The boil process is by far the most important method and is in the most widespread use. In it the fat is saponified with an excess of alkali, with the addition of heat, and with efficient agitation. When saponification is complete, the soap is salted out, or "grained." A strong brine solution is added to the melt. The soap, insoluble in the salt solution, floats to the

top, while the excess alkali, the glycerine, and the various impurities settle to the bottom. This aqueous solution is drawn off and is further treated by distillation and recrystallization for the recovery of glycerine and salt. The soap "curds" remaining are further washed with salt solution and water.

If the soap is being made from tallow alone, a certain amount of rosin soap is added at this point to improve the lathering qualities. The rosin is saponified in the same kettle or is made up separately and added in the soap form.

WATER is now added to the soap and the mass is allowed to stand for approximately a week. The remaining alkali and impurities in the soap settle out at the bottom in an aqueous solution. This is known as the "nigre" and is drawn off.

The molten soap mass is run into a crutcher, a large mixing or agitating machine, where the filler, soda ash or sodium silicate, is added, and the soap is given a uniform consistency. From the crutcher the soap is run into frames, large moulds with removable sides, in which it is allowed to solidify. After three or four days, the sides of the moulds are removed and the blocks of soap are cut into slabs and then into bars, and are dried by artificial heat to harden the bar surface. The bars are pressed, wrapped, and stamped by machinery.

The manufacture of toilet soap follows these processes closely. Vegetable oils are used entirely, and no rosin soap is added. After saponification, the soap is allowed to harden in the frames and is chipped up for further treatment, or is allowed to run in a thin stream directly from the boiling pot onto a belt, with the production of a thin ribbon. In either case, the perfume and color are added to the soap pieces in an amalgamator which distributes them evenly throughout the mass. The soap is then milled in a series of rollers for the complete incorporation of the perfume and dye. The mass is then subjected to a great pressure in the plodder. The soap emerges from the plodder in a solid form and can be cut into shape as desired.

AN interesting plant making use of the semi-boil process is located in Des Moines, Iowa, and is known as the Prouty Bowler Soap Company. The raw materials used are cottonseed oil and coconut oil, sodium hydroxide and sodium silicate. The materials are stored in bins and tanks on the second floor of the plant. This facilitates the charging of the cookers which extend from the second floor through to the basement. The charge consists of chemically equivalent amounts of oil and caustic, the oil being 50 per cent coconut and 50 per cent cottonseed. Sodium silicate is added to the extent of 20 per cent of the final product. The saponification pots are three in number and have a capacity of seven thousand gallons each. They are equipped with a propeller type agitator and are steam jacketed. The saponification is carried out at about 160°F and requires three hours. The soap mass, containing the glycerine thoroughly distributed, is discharged into the frames, approximately four feet long, one foot wide, and five feet tall, mounted on rollers. These are wheeled to the drying room where the soap is allowed to stand for some three or four days, depending upon the season of the year. The sides of the frames are removed and the slabs are sent to the cutter which, by the use of fine piano wire, cuts the slab into bars of the desired shape. The bars are allowed to dry on racks for four to five days, in order to allow the surface of the soap to harden. The bars are stamped with the company mark in a machine for the purpose. From the stamper the bars pass on a conveyor belt to a wrapping machine with a capacity of ninety bars a minute. The soap is boxed by hand. This plant, operating under a seven hour day, produces 35,000 bars per diem.

The plant also produces a shredded soap. The scraps from the cutter are fed to a rotary shredder, from which the shreds are passed to a continuous warm air, shelf-type dryer. The shreds pass along each shelf on belt conveyors and fall to the shelf below, finally being discharged at the bottom. The boxing is carried out manually, since the production of chips is in its experimental stages, although this phase of the work can be carried out mechanically.

The plant produces a toilet soap. Since only vegetable oils are used and since the glycerine is incorporated into the soap, an excellent toilet soap is produced by following the same steps of manufacture with the omission of the sodium silicate. The soap is not perfumed, and therefore no amalgamation, milling, or plodding operations are necessary.

While this plant is much smaller than those of Procter and Gamble or the other large companies, the principles and equipment in use are very similar. The difference lies in the size of equipment used.

Through the agency of over-zealous and over-imaginative advertising agents, soap has come to be regarded as an aid to beauty, an antidote to body odor, and a panacea for many ills. As a matter of fact, the first and only requirement for a good toilet soap is that it be mild and pure, and that it contain no free alkali or adulterants. A simple test for mildness can be carried out by touching the soap with the tip of the tongue. A biting sensation indicates the presence of free alkali and therefore the undesirability of the soap for toilet purposes. No amount of French perfume or rose dye will change its harsh action on the skin.

SOAP itself has antiseptic power in its ability to wash away dirt and bacteria. However, soap is recognized as a poor vehicle for medications of any kind. Many of the germicides incorporated in popular soaps are so volatile that they have evaporated completely before the soap has reached the consumer, leaving only a medicinal smell, popularly known as "m.s." Other germicides actually react with the soap so as to destroy the value of the disinfectant and to impair the detergent properties of the soap itself.

Similarly the popular conception that a floating soap is purer than the heavier types is fallacious. Floating soap is produced by blowing air thru the molten soap mass during the process of manufacture. The entrapped air serves to lower the specific gravity of the soap to the point where it will float in water, but the air serves little other purpose. Likewise, the superior purity of clear soaps is not definitely established. This property is induced by the addition of adulterants, which in some cases are harmful.

Many soaps are designated as castile, but the name has lost its significance. Strictly castile soap is that made from pure olive oil. The same cannot be said for popular soaps bear-

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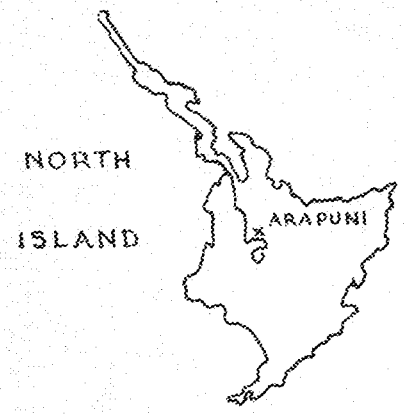


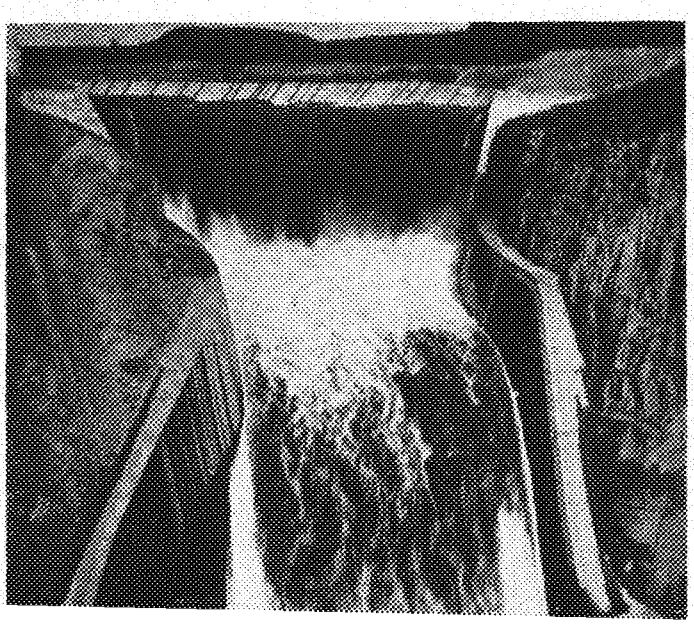
Engineering Difficult At Antipodes

By JOE EDESKUTY, M. E. '35
and EUGENE PRICE, E. E. '35

NEW ZEALAND is particularly well equipped with opportunities for the production of hydro-electric power. Down the steep backbone of mountains on the two islands run many streams, whose plentiful energy offers great possibility for development. So abundant is water-power in this corner of the world, that the ranchmen and farmers living there never think of using pumps to raise water up a hillside. Instead, they simply install a hydraulic ram under a few feet of head and let the stream push itself up to the desired height. On North Island there are three developments which tap the store of latent electrical energy. These are the Mangahao, Arapuni, and Waikaremoana plants. Of the three, by far the largest is the Arapuni development, located at the town of Arapuni on the Waikato River. The power house is placed in a great gorge cut by the river in ancient times and the even hum of the turbines alone replaces the restless roar of the torrent which once whirled through the cut. These turbines supply nearly half the power used on North Island. The plant is a fine example of the developments which have taken place on the other side of the earth and of some of the obstacles met with in the engineering profession there.

For many years the site had been regarded by the ambitious eyes of individuals and of the Dominion government, as an ideal spot for a power plant. It has been the policy of the New Zealand government to take the development of natural resources into its own hands, rather than to intrust them to individual exploitation. Accordingly, in 1914 the government began the exploration and survey of the site preparatory to the construction of a dam. Then came the outbreak of the World War and all peaceful plans went glimmering. After the war, everything dragged with the readjustments necessary at the end of the conflict, and not until 1921 was a plan set forth by a special commission and adopted by the government.

This view of the completed spillway shows the concrete sheathing in use.



To get a clear picture of the site selected, we must consider the geologic history and the present state of this part of the island. All of the surrounding territory is of volcanic origin. Earth tremors are common, and the country is dotted with extinct and dormant volcanoes. Ever since the first land pushed up from the South Sea, volcanic eruptions have been altering the face of the island with lava flows and ash deposits. The Waikato river has been the plaything of these eruptions, and its course has been many times changed. At one time the river ran along the top of the table and there cut for itself a channel, not very deep, but extending half a mile downstream from the present powerhouse site, where it found a lower level through a cataract. During one of the many eruptions, this channel was closed off and the river took a new course, crossing the old channel at one point, and paralleling it for some distance. Here it carved the deep gorge we have seen.

site is chosen for power house

The government engineers who came on the job in 1914 found what seemed a fine spot for a power house some distance downstream from the crossing point and a dry waterfall terminating the old channel, which, above the bluffs, paralleled the new course below. They decided to dam the gorge at the point where it intersected the old channel and raise the water level until it reached the height of its ancient course. This they would use as a headrace and drive their penstocks down through the cliff to the powerhouse. From the plant the new channel would serve as a tailrace. Just downstream from the penstock entrances, a spillway weir would be placed across the old bed. The ancient channel would receive the spilled water and conduct it to the falls, which would lower it to the tailrace level. The government engineers were well satisfied with this site. They liked the river itself because the water level fluctuates little more than one foot. The stream is fed by Lake Taupo in the interior and the large size of the lake helps to maintain an unusually even flow throughout the year.

The plans finally selected called for a gravity type dam of a curved shape, convex in an upstream direction. The height of the dam was to be 192 feet and the length 305

feet. It was estimated at the time that some 100,000 cubic yards of concrete would be required to construct the dam. The spillway weir had to be made 732 feet long, its effective length being 682 feet.

In order to make possible the construction of the dam, placed as it was across the gorge, a diversion tunnel was dug through the wall of the ravine. This tunnel was nominally 24 by 24 feet with filleted lower corners and an arched ceiling. In it was placed a gate valve, operated from a pit on top of the bluff through which the tunnel passed. At each end of the tunnel, some earth was left to close off the mouth of the bore and when it was completed, these were dynamited.

Two auxiliary dams were then constructed, one above the site of the dam and below the entrance to the diversion tunnel; the other below it, above the mouth of the tunnel. The damsite was thus protected from above and from water backing up below it. Construction on the main dam was then begun.

The dam was nearly constructed when the engineering firm balked. They decided that the site for the power house had been poorly selected. In the end, they agreed to build only the remainder of the dam and to leave the construction of the rest of the works to the government. Accordingly, the New Zealand government constructed the spillways weir and penstock basin. There were eight penstock entrances provided, leading to three penstocks. They were made 12 feet in diameter and about 400 feet long. Hydraulic sluicing was used to clear out and deepen the old river bed for a headrace channel.

government finishes work

By late November in 1927 they were ready to try out the dam and spillway works. On the second day of December the gate valve in the diversion tunnel was closed and the water began to rise behind the dam. A reservoir was formed, stretching back from the damsite a distance of 18 miles.

An interesting anecdote is told about an engineer who was somewhat of an opportunist. Before the construction began, he quietly purchased several plots of ground far back from the damsite. On these he erected small buildings. When the water had reached its full height, the shore was but a few feet from these huts. His intentions then became plain, for he began selling them for fishing huts. New Zealand is famous for rainbow trout, which reach record size in the lakes of this country. The huts sold like hot cakes!

A year ago last summer Joe Edeskuty took a long trip through the South Seas, and he was especially interested in New Zealand. Here on the other side of the earth is a very modern country, progressing rapidly in industrial development. One of their projects is discussed here.

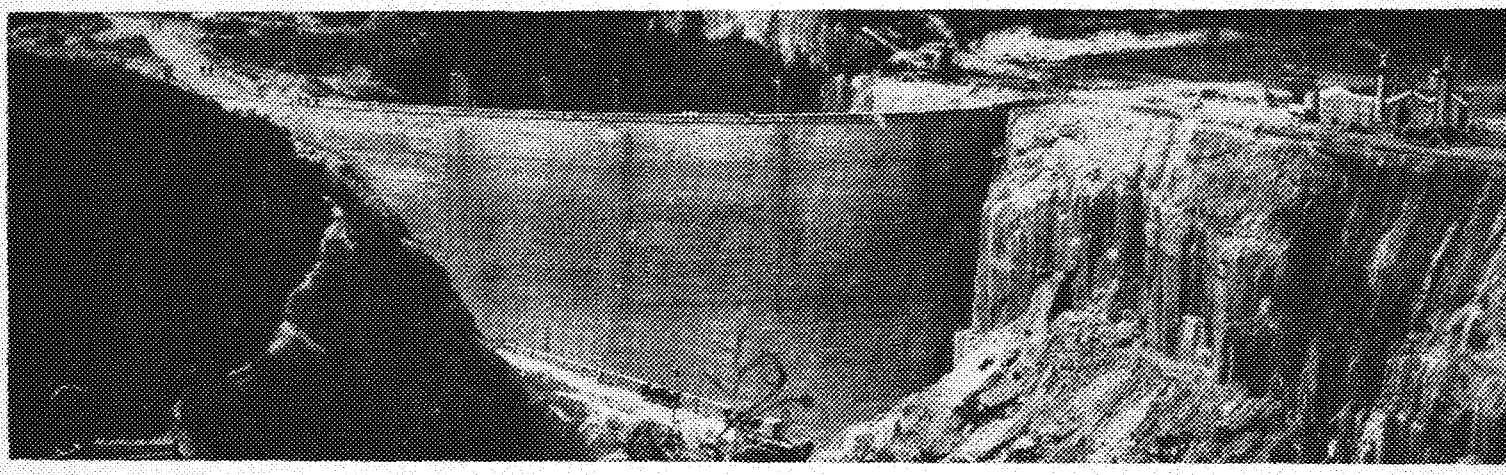
During the first week of January the waters lapped the spillway and poured over. Down the sloping channel they raced to the dry falls and, for the first time in centuries, a cataract leaped there. But the earth at the falls was a soft volcanic ash and the rushing waters tore at it and washed it down. Terrific erosion carried the crest of the falls back at a rate of 30 to 40 feet per day. Reluctant to release the impounded waters, the engineers let the water run, hoping that the crest would eventually reach more solid ground. At last, however, after much scratching of heads while the ground quaked to the thunder of the falls and the crest moved surely back, the diversion tunnel valve was opened and the destruction was checked. Still they did not know how to remedy the trouble.

Right here is where members of Minnesota's most abundant race should take especial note. It seems that at the Antipodes, nearly all machinery is of Swedish manufacture. The Arapuni plant had been built with Swedish tools, and the equipment was of the same make. Naturally the Swedes have a good reputation as engineers and finally a geologist of Svensk extraction was called in. His name we do not know, but he strolled around a bit and then sat down on a knobby bit of tufa and pondered.

"Ay tank," he said, after a time, "that if you take and fix it so water falls on water it will not erode."

He went on to say that they should cover the face of the falls with concrete in the form of aprons and basins, two in number. The water would first fall into one basin and from that would drop into a second basin, this one

(Please turn to page 22)



In the upper right-hand corner of this view can be seen the station from which the gate valve in the tunnel is controlled. The dam is under construction.

The Minnesota
TECHNO-LOG

EUGENE PRICE
Managing Editor

DAVID BUCK
Business Manager

A Comment Column

ANOTHER summer vacation has passed and school days have rolled around to their accustomed place on the calendar. To some of us these first days are the prelude to a long, hard grind; to others they precede a round of fun and good times; to the majority, we hope, they are the beginning of a well-balanced blending of the two extremes. But, whatever our personal reactions to the beginning of another year of college, we find ourselves entering into it for whatever may be there. A lot of things will be going on this year. Researches will be conducted and new facts discovered about matters of engineering interest. Engineering societies will be meeting and taking trips. Students will be itching to tell of interesting things they have done and seen during the summer. Changes will be made in school and organization policies. The engineering campus will teem with news.

The Techno-Log will be with you during the coming year, reporting what your neighbors are doing, serving up articles which we hope to make appetizing and filling, tickling your fancy with some bits of the spontaneous humor that springs up on the campus, and presenting editorials which we intend to make meaty and thought-provoking. Our greatest desire at the beginning of this year is that you engineers who must, perforce, take the Techno-Log, will regard it, not as something which clutters up your P. O. box, but as your magazine, its content chosen for your consumption and edited for your approval. We would like for you to take an interest in the Techno-Log, tell us of our good points if you wish, but above all things, criticize the things you do not like.

We suggest that you put your comment into the form of a short letter, asking any questions about anything in the magazine, correcting us if you find a mistake. We will print as many as we can, answer your questions if possible, admit our mistakes gracefully, and, if enough of our readers agree with your criticism, we'll mend our ways. Please sign your name, so that we can verify any information you may put in your comment. We will not print your name if you do not want it printed, but we must have it on your letter so that we can check on the accuracy and also as evidence that the letter is a bona fide comment and not merely a "crank" complaint.

Well, as we said before, we will print the genuine comments as space permits and answer them to the best of our ability.

Is it a bargain?

To Pun or Not to Pun?

"The humor column is lousy!"

"Your humor column is fine!"

"I enjoy your humor column very much and think it should be continued."

"The *Techno-Log* would be much better if the humor column were left out."

Just a few of the comments on last year's humor column Kaho-Notations. We have heard both the pro and the con of it, and they are about equal in number. There is none this month because not much is available at the beginning of the year to put in such a column. The editor is definitely bewildered. He does not know whether to continue the column or to omit it. He is putting it up to you. Drop us a line and give us your vote on whether a column in the style of last year's humor page should be included this year. Don't be afraid to express your opinion. We will welcome it.

Changing Texts

There has been a growing tendency among those who arrange courses of study in the College of Engineering and Architecture to change texts with entirely unnecessary frequency. Despite the condition of economic depression which we have been undergoing, this business of changing and revising has been continued in the old way.

Joke about the "depression" as you will, it is a very difficult period for the student who is not affluent. He has two avenues of escape, both of which are affected by the changes in texts. First, he buys second-hand books; second, he tries to sell his books after use. To many of us, these steps are not just ways to get by more cheaply but are vitally needed economies. Substitution of one text for another makes these savings impossible.

We do not wish to go on record as disapproving of all changes of text-books, but we do think that the custom of using a different text each year should be discarded. There are obviously many subjects in which there is constant development and expansion of knowledge. In the more advanced studies in chemistry, electricity, and aerodynamics, for a few examples, there may be a very rapid advance in research and theory. In courses involving these higher studies we can readily see why changes in texts are necessary.

On the other hand, there are the great majority of subjects which are not affected by these changes, simply because they state only the well-grounded principles and do not deal with the up-to-date researches into details. There are also the studies which are static, in which there is little or no development over a very long period of time.

Another reason which is sometimes advanced for book changes is that of trying to find a suitable book for use in the course. In other words, experimentation. This may be necessary, but it is hardly fair to use the student's pocket book as a laboratory and in addition make him stand the entire cost of the experiment. If this is to be done, some method should be adopted whereby the student can turn in his books after use and receive a fair refund, equal to the probable resale value of the book. This may seem very harsh, but it is true that the student is much more pressed for money than is the department or the writer of the text. This system could be extended to all changes in books, including those where only infrequent changes are made. In the latter, the expense involved would be covered over a period of time by the sales of new books.

Of all the abuses which book sales engender, none is worse than the revision racket, for racket it is. How many times have you heard the statement: "No, you'll have to get the revised edition. I have added a chapter and some problems to the present imprinting"? Afterward you find that the new chapter deals with something to which the instructor gives two sentences, the last sentence containing the clause, "this has not yet been verified." The new problems are used as a whip to compel the student to purchase the new book. Not all, or even the majority of professors stoop to such practices, but many do. For these, the most drastic methods are not too severe. The plan just mentioned would stop such profiteering immediately if the professor-author who stands to benefit by the sale were charged with the refund.

We should like to hear from our readers on this problem. We believe, that in cases where the department is experimenting with texts, the department should carry its share of the burden. Where the professor turns author and insists on frequent revisions, he should be made to call in the books discarded. Of course, not all the books bought would be turned in, for not all students are interested in selling their second-hand books.

Students and faculty alike should consider this problem and try to devise some scheme for making a fair disposition of it. We know that the application of the suggested plan would be difficult if administered fairly. Perhaps you can suggest a better plan.

The New College Year

The opening of a college year may seem, at first thought, to be a routine matter, occurring year after year in the same manner and for the same purpose. The fact is that no two are alike—each presents new problems arising out of changed conditions.

First of all, there are the new procedures relating to the induction of students into the University and the College which result from the constant effort to bring about improvements. These have for their purpose the elimination of unnecessary steps in the admission process, to reduce the number of errors, and to assist the student in preparing for the work of the year.

Then there are the economic conditions which vary from time to time and affect large groups of people, including students and their parents. The question of being able to attend the University at all confronts many more high school graduates in hard times than under normal circumstances, as also that of continuing to completion the course already begun. Special plans for the assistance of worthy but needy students constitute an important administrative problem in times of economic stress, although there are always those who are well equipped mentally for college work but cannot obtain the necessary funds except through part-time employment while attending the University.

This year the choice of a professional course seems to have introduced a larger question in the minds of the prospective freshmen and their parents than is usually the case, particularly the choice among the different branches of engineering. The idea is prevalent that following the depression everything will be different, in industry, business, agriculture, and the various professions, in general, and some people seem to question the very existence of activities which have become established in our national life. Will there be any need of engineers in the future, and if so, in what lines of work will their greatest opportunities be? This question is asked seriously and probably results from the discussions of the past few years relating to what is known as technological unemployment.

Fortunately, a careful consideration of the subject leads to the conclusion that one depression will not destroy the national characteristics of the people nor permanently retard the advancement of our civilization. Recovery, as in the past, is inevitable. Engineering ability, inventive genius, and research in the fields of technology will be fully as important in the future as they have been, and leaders must be even more outstanding than heretofore as the general level of knowledge and ability rises with the increase of educational advantages.

The engineering student should keep in mind the fact that in every one of the technical courses there is a broad foundation of applied science which will enable him to fill a useful position in almost any branch of the profession or industry so that he is not limited in any sense, to a narrow field. Many opportunities exist in other lines of endeavor for the man with engineering training, as shown by the wide range of occupations represented in the directory of our graduates.

—*O. M. Leland.*

These firms who designed,
ted the Indoor Sports Buil
Techno-Log reader enjoy

Assorted Poems — and the St. Lawrence Plan

By RODERICK WILLIAM SILER
ASSISTANT PROFESSOR OF MATHEMATICS

IT IS pretty well agreed that there is nothing like poetry to soothe the aching heart and cheer the faltering beginner. Let me then, at this opening of the college year of 1934-35, present the following to our freshmen:

"He had the girl,
He had the flat;
She felt his chin,
And that was that."

Poetry, the sort that has humor, pathos, and brevity as this has, also has a meaning. The message here is this, boys: no matter what ill luck the football team meets with, no matter how annoying the profs may prove to be, no matter how distressing your economic condition may become, keep your chests out, your whiskers in.

This summer I followed a stretch of road, lying along the St. Lawrence from Kingston, Ontario, to Montreal, which offers very pleasant driving.

politics enter st. lawrence plan

There is no river so constantly clear, broad, and interesting as the St. Lawrence. At least, not in my experience. But such is human nature that anyone from this part of the country making this drive is likely to grow a bit melancholy at what he sees, remembering that in this distance lies the greatest obstacle to the ambition of Minnesota to have a seaport. In other words, if this stretch of river could accommodate ships of 27 foot draft, which includes the great majority of ocean going vessels, Duluth would be about ready to advertise summer excursions by boat from that port to Paris.

As a matter of fact, it is the first hundred miles of the St. Lawrence after it leaves Lake Ontario wherein lies the problem which up to the present has appeared beyond solution. This stretch of river is international water, requiring the consent of both the United States and Canadian governments if any work is to be done on it. The Canadians have agreed to the deepening of the river channel, now sufficient only for boats of 14 foot draft, but the United States has not. Or perhaps I should say, New York City has not. New York having a great desire to keep all mid-west products, from wheat to tourists, passing thru that city on the way abroad. Actually, that which prevents Minnesota and the mid-west having direct access to the sea is now less an engineering than a political problem. Engineers say that the waterway can be completed in less than ten years, President Roosevelt and former President Hoover have advocated the work, and economists agree that for this part of the country it will be beneficial. In the fact that it is as cheap to ship ten thousand miles by water as a thousand miles by land lies the reason for belief that mid-west products, now without a market, can be sold abroad. What transportation costs do to industry and agriculture can be shown in the case of Minneapolis. At the beginning of this century the export of flour from Minneapolis was not far from five million barrels a year. Thirty years later it was less than five thousand barrels.

Facts of this sort affect no profession so directly as engineering. Where manufacturing and industry lag there is no place for engineers. To feel that by the completion of the waterway, ocean-going ships will find it profitable to sail direct from Duluth, Minnesota farmers and manufacturers will find a market for their products, and engineers will find jobs, is an entrancing thought. With the added advantage which many entrancing thoughts lack, that this one can be brought into being. Engineering students often ask what they can read that will give them a broader view of their profession than routine courses do. Well, during the coming year why not read something of the great mass of material dealing with this waterway? Not the least to be learned by doing so is that engineering problems are as much social and political as technical.

I stayed for several days during the summer in New Brunswick on the Baie de Chaleur, at the place of an old gentleman whose ancestors had been located on that coast since 1840.

universal remedy for sailing men

He had a great collection of antiques, among which was the medicine chest of an old time sea captain. A century ago a captain doctored his crew as well as sailed his ship. This medicine chest was not large, but very formidable. Besides a dozen bottles of various drugs, a scales, and a pestle and mortar, it contained a lancet. There was also a small book of directions, dated 1828, which told the captain when and how to dose his crew. I was most interested in reading the description of bleeding, here advised for severe falls, pleurisy, apoplexy, and other ailments; in fact, for almost everything but a broken leg. The operation was given as follows:

"Pass bandage round arm, 2 inches above elbow, so as to bring superficial veins into view. Of these choose that which is most prominent, provided no pulsation can be felt underneath, and the vein does not roll under the finger. Let the patient extend arm, clenching the hand; then holding the lancet between forefinger and thumb of right hand (whilst thumb of left keeps vein steady) make puncture through the skin and upper side of vein, in a somewhat oblique direction, raising the lancet upwards, so as to make the incision sufficiently large. The blood is then suffered to flow freely into a basin. When a sufficient quantity has been drawn (from 6 to 12 ounces) the bandage is to be slackened, and the lips of the wound drawn together. A bit of linen rag, folded, is to be laid over them, and then secured by the bandage passed round the arm, above and below elbow."

Here is certainly a simple and economical treatment for pleurisy, apoplexy, etc. All that is necessary for using it is to know how to sail a boat.

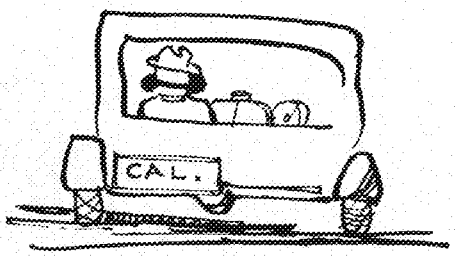
"From Frisco Bay To the Rock-Bound Coast of Maine"

One of the most interesting methods of worming news out of our graduates is through personal contact with them. The Alumni Department would be overwhelmed with joy if every grad that dropped in at the Campus would look in at Room 37 and give us the latest.

The boys were pleased and not a little awed, therefore when a burly cop came in, not to hand out a parking tag, but to make the astounding revelation that "Jobs are doggone hard to find." He was Minnesota Highway Patrolman, **Laurence Hendrickson,** graduate of Electrical Engineering in 1932. Hendrickson is still single and is working in the vicinity of St. Cloud.

To any who might doubt the value of work on the *Techno-Log,* we cite the case of **Lawrence Clousing,** E. E. 28, who was editor-in-chief of this magazine in 1927. Larry is now teaching courses in Mechanical and Aeronautical Engineering at Northwestern University. Soon after he graduated, he joined the air corps of the United States Navy, and his experiences there were more than interesting. While a student here, he was excellent in journalism and literature, and many honorary societies listed his name on their rosters.

It seems that Minnesota boys are having quite a get-together out in sunny California. The Aeronautical Department recently received a letter from **William Sears,** Aero '34, and one time president of the University Council, who received an assistantship at Cal Tech. Bill's address is 12 Blacker Hall, California Institute of Technology, Pasadena, Calif. Bill got himself a dinner invitation at the home of **Thurman**



Erickson, also Aero '34, and reports that Mrs. Erickson (formerly Elizabeth Burch) is a very good cook. Erickson lives on Foothill Boulevard, Azusa, California, and is working on a dansite near there. While the boys were rambling around Los Angeles, they ran into **Reynold Caleen,** another Aero '34. Caleen was on a little vacation from the Boeing School of Aeronautics where he has been furthering his education relative to the lofty heights. Sears also writes: ". . . been swimming in the Pacific, eating oranges and figs off the trees, and playing tennis in shorts."

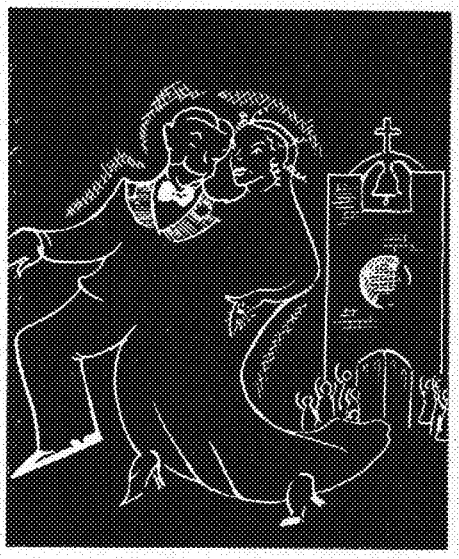
Professor O. S. Zelner had an interesting visitor recently in the person of **Theodore Vallacher,** a 1920 graduate of civil engineering. Following is a note which Mr. Vallacher left for the *Techno-Log*:

". . . had a hand in developing the country club district in Minneapolis. Then helped Florida boom itself into a subdivision stomach-ache with lots of — oh so many — pains. Planned on buying off Henry Ford, but Florida paper profits don't make the best long-time securities. Like California fine except for the unusual climate. Will recommend that anyone out adventuring give a sharp eye to Leadville, Colorado. Somebody's going to make money up there. It may as well be you."

So take the tip, boys, and get yourself a pick and shovel. That's gold in them thar hills!

News from **Benedict Cohn,** Aero '34, indicates that he has an assistantship at New York University. He writes that his work is on the new seaplane towing basin at that university, and that his address is 1809 Phelen Place, New York City.

From Professor Richardson, we learn of **Dayu Doon,** who graduated from Civil Engineering in 1924 and then received his master's degree later. Mr. Doon has returned to his native country and is connected with the City Planning Commission in Shanghai. His job is architect in charge of the Greater Shanghai project, a newly planned civic center which will include the public buildings, large docks, and all that goes to make up the municipal nucleus of a great city. One of the buildings has already been completed, and it is said to be a beautiful revivification of early Chinese architecture. The *Techno-Log* hopes to present an article describing this project very soon.



When it seemed as though **Bob Cerny,** Arch. '32 had gathered up enough achievements for three men, he adds to the list by finding himself a wife. Cerny received a traveling fellowship in Europe, so he obtained a leave of absence from the Tennessee Valley Project and married the home town girl friend to keep him company. We surely wish Bob lots of luck and a good time on his honeymoon-scholarship tour.

Wright Builds A "Magnum Opus"

By GERHARD BRANDHORST, ARCH. '37

Elsewhere on this page you will find a sketch of a house. Mark it well, for it is no ordinary house, but the product of architecture's contemporary genius, Frank Lloyd Wright. This house is in process of construction at the southern end of Bedford St., S. E., Minneapolis and is being built for Dr. and Mrs. Willey of the University staff. In its design we find a reflection of the creative genius of Wright's early period, his best. It was in this period that he evolved the now famous "prairie style" house, in which the horizontal feeling of the Mid-Western prairies was continued by strong horizontal lines in the design. The Willey house has the horizontality, the low-lying masses contrasted with skillfully placed voids, the finely sculptural proportions that have become Wright's style-marks.

This house is probably the strangest and most radical in this region, in that masterly advantage has been taken of the site, which is on the brow of a bluff overlooking the Mississippi River and the city beyond. The house takes the form of a long, narrow block stretching all the way across the lot at right angles to the street. It is but one room deep so that all rooms may enjoy the outlook and the southern exposure. The garage is placed closest to the street, followed in order by the kitchen, a combination living and dining room, a study, two bedrooms, and a bath. The study and bedrooms are served by a long, narrow corridor along the back of the house, beginning from the living room. A small vestibule leads from the main entrance into the living room. Wright's planning for utility and function is evident in the relative positions of the rooms and particularly in the fenestration. The major window area is concentrated in the living room, which one would expect to be the most used. In the bedrooms the windows are relatively small and high for, after all, the functions of a bedroom require ventilation and not outlook.

The house is built of brick with natural colored cypress used sparingly for door and window trim. The interiors are consistent with the best Wrightian tradition. They eliminate useless ornamentation and mouldings, depending entirely upon proportion and the textures of the materials, brick and tan plaster.

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Architectural Society

In the fall of 1913 the architectural students at Minnesota formed an organization known as the Architectural Society. The purpose of this society was, and still is, the promotion of good fellowship and added interest in architecture and the allied arts. To this end the society will this season continue its annual activities, which include the Freshman Mixer in the fall quarter, the Costume Ball or Jubilee in the winter quarter, and the publication in the spring of the yearbook, containing outstanding examples of student work during the past year. Lectures by eminent men in architecture and allied fields, whenever possible, are also sponsored by the society. Freshmen and transfer students unfamiliar with the society are especially invited to join.

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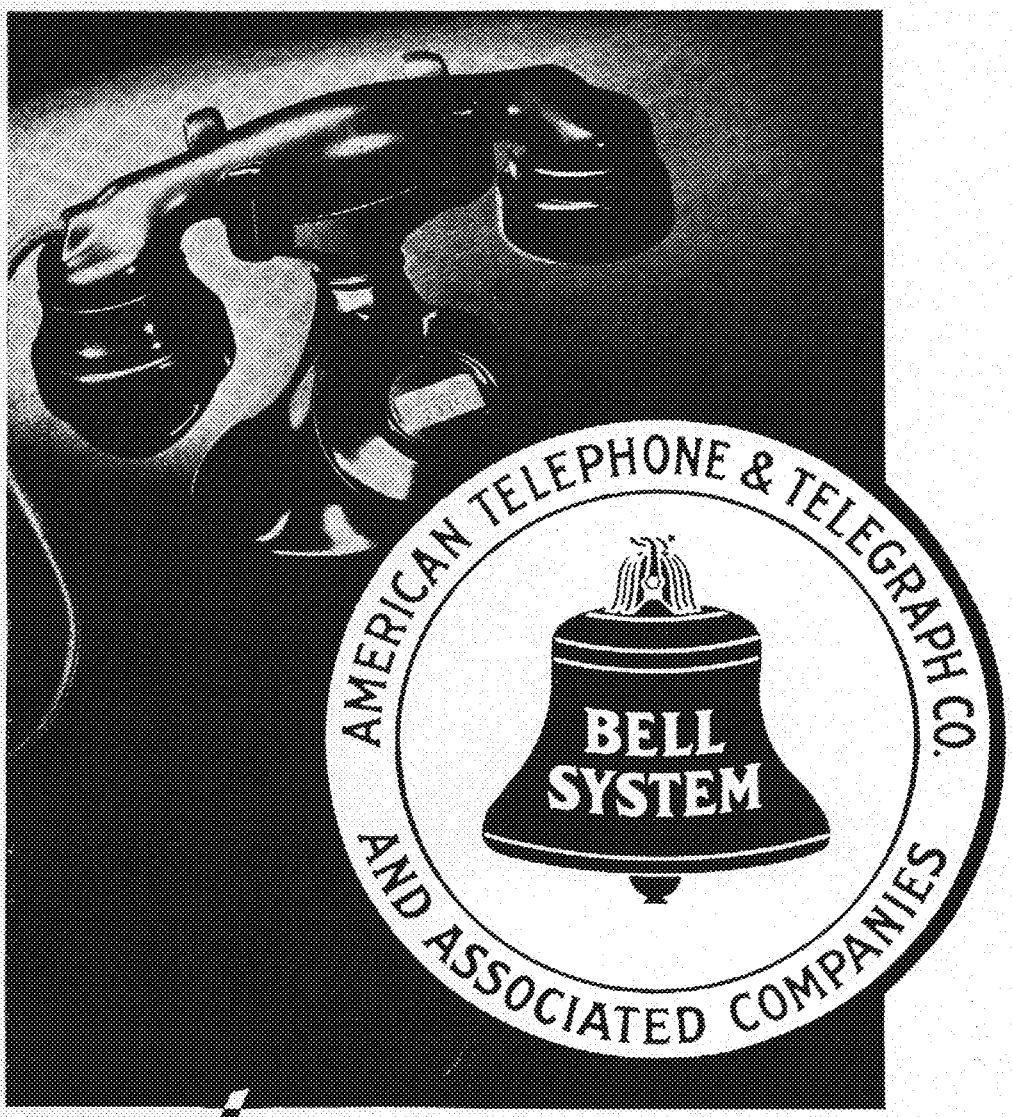
Jones on Leave; Holien Appointed

R. T. Jones, professor of building construction, is at present on a year's leave of absence and has taken over the position of Regional Reconditioning Supervisor under the Federal Housing Administration. He has charge of the remodeling activities in eight states, maintaining headquarters in Minneapolis.

Edward Holien, who received his degree in architecture from Minnesota in 1923, has been appointed to take Mr. Jones' place. Mr. Holien followed his work at Minnesota with graduate work at M.I.T. and travel abroad. He was a finalist in the Paris Prize Competition of 1926. Since the completion of his academic career, Mr. Holien has worked in various offices about the country, including the one responsible for Radio City.



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In line with this broad plan, we find real opportunity in addressing messages to college and university people in their own publications, just as we also vary our advertising for women's magazines, farm papers and so on. 1934-35 is the fifteenth year during which the Bell System has published advertisements which take college men behind the scenes of Bell Telephone service.

New Indoor Sports Plant

(Continued from page 3)

sports. The center of circulation from the first floor entrance is the well proportioned trophy hall lobby with walls of brick of the same color as on the exterior. Here at last will be found a suitable resting place for trophies of University teams. Those tokens of past victories which have been rather inadequately displayed in the Union will be moved to the new building. The ticket window opens onto this lobby and behind it are offices for the ticket business staff. Directly opposite the entrance is access to the exhibition pool arena. Every one of the 1,200 seats will be a good one in this three-sided gallery. The rest of this floor is arranged with offices, toilets, and a conference room.

Stairs on either side of the trophy hall lead to the basement level where users of the pool pass by a control desk into the immense locker room. This room, which will hold 3,000 to 4,000 lockers, is connected by tunnel to the stadium and the field house. This room will not be used by varsity squads, who will retain their former locker rooms. The exhibition pool room is beautiful in simplicity with its glazed block and ceramic tile walls, and floors gleaming with the light from the high Western windows. The large pool, 40x75 feet, is ample for all kinds of swimming meets, and the good size "practice" pool, 30x75 feet, at the South end of the building will be put to much use. Both of the pools will be built with the finest of equipment and fixtures.

Mechanical engineers may be interested in some of the technical descriptions in the specifications. In the larger pool, the chlorinator, an important essential of the equipment, is of the type termed "manual-control, solution-feed, visible-vacuum equi-scale," in which the chlorine is metered under a partial vacuum. The chlorinator has a capacity of twelve pounds every twenty-four hours. The specified pump for this pool is called a "horizontal, split-casing, single-stage, double-suction, 1750 r.p.m. centrifugal type, with stainless steel shaft, bronze impeller, and water-sealed stuffing boxes." The capacity is 335 gallons per minute against the resistance of the filters, piping, and static head. The pool will be kept at desired temperatures by a heater with a capacity of heating 9600 gallons of water per hour from forty to eighty degrees. The practice pool will be equipped in a somewhat similar manner. Connected with the pools are the rooms for visiting teams, a toweling room, shower rooms, and a squad room.

Much of the second floor is designated for the teachers' training department of the College of Education. The two hundred fifty students who are in the physical education work will have five classrooms and a small library. The rest of this floor is given over to offices and minor rooms.

There are four basketball courts, a gymnasium, and locker rooms on the third floor. The central room of this floor, which supplies room for three of the courts, is provided with floor inserts so that it may be used for boxing, wrestling, tennis, and volley-ball.

The Pillsbury Engineering Company of Minneapolis made out the specifications for the mechanical equipment for the building. The scope of this work was made up of the three divisions of heating and ventilating, plumbing, and electricity.

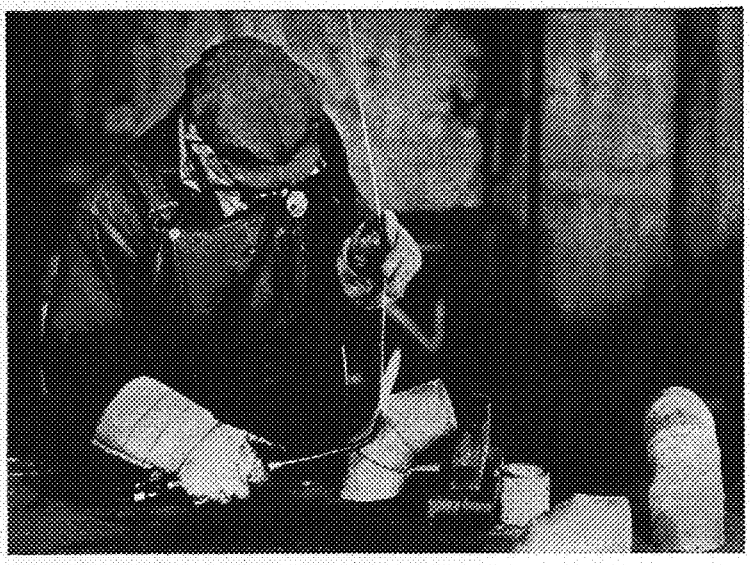
The work in the heating and ventilating division included: (1) A direct radiating system for the building, except the third floor basketball courts and gymnasium which are heated by overhead units. (2) Fresh air supply and exhaust systems for the locker room, varsity pool, and practice pool, including fans, motors, vento-heaters, casings, air filters, ducts, dampers, diffusers, and other details. (3) Exhaust systems for the toilets and certain inside rooms.

The second important division of the mechanical equipment was plumbing and covered the complete furnishing and installation of the plumbing and draining systems as follows: (1) Complete sanitary sewer with all waste and vent connections. (2) Complete rain water sewer with all inside and outside down-spouts and area drains. (3) Complete cold, hot, and recirculating hot water systems. (4) Complete fire protection system. (5) Connections to all special equipment. (6) Complete swimming pool equipment and connections.

The third division was the electrical construction work and included the complete installation of the light and power system, the public telephone system, and the clock system.

It is perhaps irrelevant for the architectural student to consider the new building from the critical point of view. He often believes that he is steeped in the essence of modernism. All his creations affect the "moderne" slant and he tries to understand and design for functional architecture. At first thought, therefore, it is with a little dismay that he sees his elders sanction a new building on the campus which has a very obvious traditional influence.

(Please turn to page 22)



FEATHERWEIGHT PIPING—made by welding aluminum tubing. These fittings are to be used in a chemical plant.

If Your Product Must Weigh Less

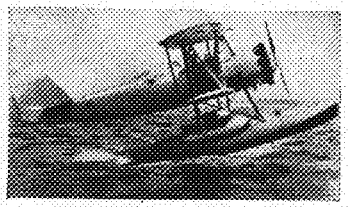
Oxy-Acetylene welding will eliminate heavy joints and give throughout—greater sturdiness with less weight and bulk.

By **F. J. KING***

The trend in modern product design has been toward lightening weight. Manufacturers wishing to make their metal products lighter are building them of light weight alloys and metals with welded joints. Products so fabricated utilize the superior features of welded joints to attain lightness with strength, ruggedness, and attractive appearance.

Welding Is Strong

Lightness is gained in welding because each joint is a smooth union of two metal parts into one. No lapping or flanging is needed for making the joint. Corners are not bulky or cumbersome. Invisible seams give a smooth surface for painting and enameling. And in strength the joint is 100 per cent efficient—as strong as the metal it joins.



BAFFLING CORROSION—resistance to the action of salt water can be effected with special alloy metals. Welding is used to give light weight joints in all commercial metals and alloys.

In Modern Automobiles

In automobiles, for instance, lightness has been attained by designing many motor and body parts for welding. The resulting light weight car has less tire wear, less gas consumption, fewer repairs. Its welded seams have smooth contours and streamlines, offering less wind resistance and providing an even surface for fine finishes.

On the Airways

Safe, speedy flying was next to impossible until the aircraft industry adopted the welded joint for airplane fuselage construction. With other means of joining it would hardly be possible to carry a profitable pay-load. Welded light alloy fuel tanks for aircraft are safer, lighter, stronger and more compact.

In the chemical and food industries, also, welding contributes to lighter weight. Light alloy piping and containers can be used—welded to give a smooth, even surface inside and out. Welding leaves no rough spots for corrosion or germs to attack.

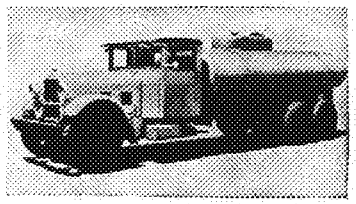
Saves Tons of Weight

A prominent example of weight saving is in the use of welded piping on the new treaty cruisers. Reduction in tonnage through the use of welded piping made it possible to mount an additional 8-in. gun and still conform to treaty weight limits.

These many cases drawn from actual experience show the advantages of building products from light weight metals and alloys by welding. Welded joints are most efficient and economical for modern metals and designs.

For The Future

Industrial executives interested in making their products lighter can obtain further data on the use of welding in their own operations through The Linde Air Products Company. This company, in addition to utilizing the facilities of Union Carbide and Carbon Research Laboratories, Inc., has had wide experience drawn from over 20 years in pioneering and developing oxy-acetylene applications. Advice and assistance to manufacturers on how best to use oxwelding and cutting for their needs is available without charge through sales offices of The Linde Air Products Company located in Atlanta, Baltimore, Birmingham, Boston, Buffalo, Butte, Chicago, Cleveland, Dallas, Denver, Detroit, El Paso, Houston, Indianapolis, Kansas City, Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Phoenix, Pittsburgh, Portland, Ore., St. Louis, Salt Lake City, San Francisco, Seattle, Spokane and Tulsa. Everything for oxy-acetylene welding and cutting—including Linde Oxygen, Prest-O-Lite Acetylene, Union Carbide and Oxweld Apparatus and Supplies—is available from Linde through 126 producing plants and 859 warehouse stocks.



BIGGER PAY-LOADS—are possible when welded aluminum truck bodies and chassis are used. By welding the body the useful load of a 10-ton truck is increased on the average 1500 lb.

*Chief Engineer, The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation.

—This being a Business-News Advertisement.

51-AS

Malkerson National A. S. A. E. President

At the National Convention of the American Society of Agricultural Engineers held in Detroit last June, L. A. Malkerson, Ag. E. '35, president of the local student branch, was elected national president. A. W. Carpenter, Ag. E. '35, was also a delegate to the convention.

At the meeting of the local chapter, held last Thursday in the Union, a new advisory system was proposed and adopted. The advisors of the chapter will consist of two men, one professional and one educational, who will advise the members on both the theoretical and practical aspects of agricultural engineering. A. W. Lavers, of the Minneapolis-Moline Power Implement Co. and A. J. Schwantes, associate professor of agricultural engineering, have been selected.

A joint meeting with the local senior society is being planned to take place in March. Different phases of student work will be demonstrated to professional men. Prominent business men have been scheduled to speak at future meetings.

The present officers of the local student chapter are: L. A. Malkerson, president; Leonard Larson, vice-president; Willis Swanson, secretary-treasurer, and A. W. Carpenter, scribe.

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Akerman, Flying Club Honored

Professor John D. Akerman, head of the Aeronautical Engineering department and member of the National Association of State Aeronautical Commissioners, has been chosen vice-president of the state group composed of the following states: Wisconsin, Minnesota, North Dakota, South Dakota, Montana, Wyoming, Nebraska, and Iowa.

Professor Akerman has also been appointed by the president of the Society for Promotion of Engineering Education to prepare a report for the Federal Aeronautics Commission which was appointed by President Roosevelt.

The Minnesota Flying Club has won first prize in the Loening Collegiate Awards. This contest is open to all colleges and universities in the United States and is judged by the number of flying hours put in by the students. Second prize was won by the William and Mary Flying Club, and the third prize was divided between the Harvard and Dartmouth clubs.

Jean Barnhill, senior in Aeronautical Engineering, and the only girl registered in that subject, was accepted and initiated last summer by a national women's flying group known as the "Ninety Niners."

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A. S. C. E. Begins Membership Drive

The officers of the student chapter of the American Society of Civil Engineers are planning to make this year an active one in which semi-monthly meetings and monthly lectures will be held. Interesting speakers will present the lectures, many of which will be illustrated.

The drive to secure new members was begun last week. The chapter is anxious to have both freshmen and sophomores become members of the organization. The regular membership fee is $1.00 plus $1.00 for a pin if it is desired. Freshmen may become associate members and assume all privileges except that of wearing the pin. The associate membership fee is 50 cents.

Belonging to a student chapter of the A.S.C.E. has a number of benefits. The member comes in close contact with fellow civil engineers and he is offered the opportunity to hear the special lectures sponsored by the chapter. When he graduates, every member is eligible for the annual award which the society makes to the outstanding civil engineering graduate of each section of the country. He can also make use of the employment bureau which the society keeps for its members.

Mines Station Tests Cast Iron Pavement

Considerable research has been done in Europe during the past few years on a pavement made up of cast iron blocks. Particularly in England, and in France and Germany as well, numerous experimental roads of this material have been laid. One stretch in England has been in use for some two years and in that time has shown no signs whatever of wear. Highway engineers abroad are quite enthusiastic over the cast-iron road, and their reports claimed the interest of E. W. Davis of the Mines Experiment Station to such an extent that he induced the Department of Buildings and Grounds to lay an experimental section on State Street. It is the first unit of iron-surfaced pavement to be laid in the United States. The section is 30 feet long, and is situated on the grade just south of the School of Mines. Here it is expected to prove the worth of the new surface in winter driving conditions.

The pavement is built up of blocks, in the form of equilateral triangles about 11½ inches on a side. They are one and seven-eighths inches in depth, and, for lightness, are hollowed out from the lower side, leaving a wall approximately five-sixteenths of an inch thick around the outside of the block. The corners are filleted and project slightly below the rest of the wall, so that the block is supported at three points only. Supporting the blocks in this manner prevents tipping, which might result if the blocks were suspended from four or more points. On the upper surface of the block are projections in the form of lozenge- or diamond-shaped knobs. These are about three-eighths of an inch in height and resemble the non-skid tread of a tire. Their function is to provide a rough surface for the tires to grip. Reports from England indicate that the blocks used there have been found much safer than the usual concrete and brick pavements. Iron Roads, Ltd., of Liverpool, made the first blocks of this type, and the blocks now being made for the University by Jeffrey Quist Foundry in Minneapolis are copies of the English block.

Concrete is used as a base for the roadway and is covered with a thin coat of asphalt mastic. The blocks are set in this and jointed with more of the asphalt. This type of construction is about one-third again as expensive as a brick-surfaced roadway, but the life of the cast iron is expected to more than make up for the difference.

Some of the advantages which are claimed for the cast iron pavement are long life, non-skid properties, ease of laying and replacement, cleanliness, imperviousness to grease and oil, and distribution of concentrated loads over a large area of concrete.

Story of a Barber Pole

The populace of Cass Lake, Minnesota, was treated to a colorful spectacle of dance and song this summer by the civil engineers who have their summer camp there. It seems that a mysterious whirlwind lifted the striped pole from the front of the town's barber shop and deposited it in the center of the civil engineers' camp. The engineers, being honest young fellows, decided that the pole must be returned. That evening a strange procession came wending its way into town. Sure enough, the engineers were doing a snake dance that ended in front of the barber shop. Then amid songs, cheers, and speeches of ceremony, the pole was presented to the barber.

A. S. M. E. Holds Open Meeting

Over one hundred mechanical engineering students attended the first meeting of the Minnesota student branch of the American Society of Mechanical Engineers. Wednesday evening, October 17. The meeting was held in the Union at 8 o'clock.

J. A. Colvin, Chief of the Generating Division, Northern States Power Co., spoke on "My Experiences as a Mechanical Engineer." Doughnuts, apples, and cider were served and entertainment was furnished.

The new officers of the society are: Edgar Howard, president; Joe Edeskuty, vice president; Malven Olson, secretary; Wayne Stone, treasurer; and J. J. Ryan, honorary president.

Make New Soap From Alcohols

(Continued from page 7)

ing that name. Further, a green color may be pleasing to the eye, but does not indicate an olive oil content. Pure sodium oleate is white.

The basic principle of soap making, saponification of a fat with an alkali, has remained the same since the time of Pliny, the Roman. However, in recent years a superior soap has been produced by an entirely different principle. The impetus to research was given by the World War. Germany, separated from her raw materials, was forced to find an adequate substitute, and while not completely successful, made the first important steps in the new field. The new soap is of two types, the sulfated alcohols and the Igepons. The former are made from the straight-chain fatty alcohols. A formula for one of the most common is $CH_3(CH_2)_{11}CH_2OSO_3Na$, and is known as sodium lauryl sulphate. Igepon T is produced from oleic acid and isethionic acid derivatives.

The chief point of superiority is the action of the soap in hard water. The action of the fat base soaps in hard water has been seen by all. The hard constituents of the water react with the soap to form an insoluble curd, which clings to fabrics and is highly troublesome. The new products are not affected by hard water under moderate temperature conditions and so obviate this trouble.

Also these soaps can be used in acid solutions, in contrast to fat soaps, which makes them valuable to the textile trade. Other special advantages have applications to particular industries.

At present the cost of the product is the determining factor in its widespread use. They will undoubtedly assume a place of importance in the industrial and home spheres.

New Indoor Sports Plant

(Continued from page 18)

Does conformity to the rest of the buildings on the campus justify continuance of this style?

There is a partial answer concerning these doubts and criticisms. From a functional point of view the plan works excellently. Surely the symmetrical scheme used to conform with the site was the only possible decision and it has been carried through logically. In respect to the construction, the new building is modern down to the smallest fixture, and heating, ventilating, and lighting are up to the minute new. The design or style is nothing to place a name on, but it is perfectly adapted to the material with traditional details used to make the whole beautiful.

Engineering at Antipodes

(Continued from page 9)

being at the base of the cataract. In this way, the soft earth would be protected from the water and the concrete too would be safe from erosion. They then told him that water was percolating through the columnar rhyolite above the dam and at the spillway works. Under his direction, they filled the worst cracks above the dam with concrete grout under pressure and tiled the penstock basin and the headrace channel for several hundred feet above the spillway weir. The falls were also fixed according to his directions and in May, 1929, the first unit was put into operation.

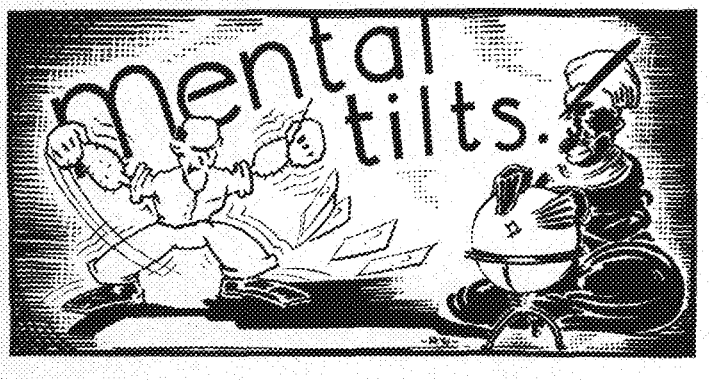
In 1930 more trouble was encountered. Part of the headrace channel collapsed due to percolation. It was repaired with concrete and since then the plant has been supplying nearly one-half of the power used on North Island. Its total capacity of 60,000 kilowatts has never yet been required. Of the eight penstock entrances, five are now in use, supplying water for three turbines. The rest can be put into use whenever the increasing power load makes it necessary.

The terrific erosion at the falls disclosed some interesting facts. It showed several ancient river beds buried below the volcano-deposited table. In one of these abandoned beds, the stumps of a whole forest of trees were uncovered by the scouring waters. All of the stumps were *burned* off along the same plane, mute evidence of what had happened so many times in this area. We can picture the flow of glowing, molten rocks, ponderously pouring out over a green forest, which melted everywhere before it. It took many such eruptions to prepare the ground for the power plant which now lies there.

erosion uncovers forest of stumps

The whole arrangement at Arapuni is a fine example of the much-vaunted "floating power." The soft, porous, volcanic residue underlies dam, powerhouse, and spillway works. In fact, the whole island below the old and new beds rest on such a foundation. Water constantly percolates through the permeable stuff, and the whole thus rests on a semi-liquid base. The ground moves sluggishly with the frequent earth tremors and the powerhouse trembles gently in the rhythm of the turbines. Putting a large building on such a foundation was a real engineering feat. The construction of the building was kept as light as possible and the weight of the machines distributed over a large foundation.

The authors are indebted to Superintendent Marchbanks, in charge of the plant, for the greater part of the information used in writing this article. Other facts, comprising some dates and dimensions, are matters of public record, and were secured from various publications.



Guess who dropped in at the office the other day? None other than our old palsy-walsy, P. D. Q. Quackenbush, Professor of Theoretical Insanity. The prof started talking about his projected trip into the fourth dimension, but he was shushed and someone asked him whether he wanted any problems solved this month. He pulled a sheaf out which would choke a musk-ox, and said: "Vell, ve can pegin on dis." So three layers were peeled off the stack and here is what he wants to know.

The Business Manager says that the *Techno-Log* can afford to give one buck ($1.00) to the person who turns in the first correct solution to these problems of the Professor's. So put on your thinkin' caps and go to work.

Stormy Weather

During the rainy weather the prof put a flower cup outside the house. The cup was in the form of a right circular cone 10" in height, and 5" in diameter. The axis of the cone was inclined at an angle of 60° to the ground and the apex of the cone was 3" vertically below the surface of the ground. The rain dropped vertically, and filled the cone to the surface of the ground. How many inches of rain fell?

Horses, Horses, Horses

The prof has succumbed to the depression and has given up his Model T for a hoss. He does not wish to have the horse eat too much at first as it now is rather lean and he fears it will founder. He has a rope 100 feet long, tied to the corner of a barn 40 feet square, and wants to know how many square feet of ground the horse will graze over.

Stringin' Along

He has another rope he considers using, but it is coiled up. The coil is in an even layer, one rope thick. The end is 4 feet from the center point about which the hemp is coiled. What he cannot figure out is the length of the rope, though he knows that its diameter is one-half inch. Can you?

Minnesota Techno-Log
SEAL OF ACCEPTANCE

displayed at these firms who are advertising in the TECHNO-LOG because they cater to its readers and have something worth advertising—something a little better than the average.

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PRINTERS

COLWELL PRESS, 405 South Sixth St.

On Great Lakes Waters

(Continued from page 5)

Pandemonium was chasing itself that day from the fo'c'sle to the after cabin. The table, which we had neglected to fasten down, was standing upside down in one bunk, well protected from scratches, however, by clothes, which had slipped their moorings in the closet and had gone wandering. A few cans of food had jumped off from the shelves and now were playing tag in the galley, and worst of all, in the eyes of the kitchen police for the day, or galley slaves, as we called them, was the regatta being held by the cups and saucers in the galley sink, drain board, and shelves, in the lake formed by the water which had backed up the sink drain, the valve of which we had neglected to shut. To add to the mess someone had spilled a box of Grapenuts on the floor. All this, added to the piles of wet clothes strewn around, made navigation through the cabins rather difficult.

The matter of eating was also one of our problems. It was impossible to drink anything out of a glass. The difficulties of getting the liquid safely from the container into the glass and from the glass into one's mouth were practically insurmountable. The problem was solved with the help of beer. By clamping our mouths around the necks of beer bottles we kept our throats wetted. It was entirely too dangerous to eat with any tools. We were as liable to poke a fork in an ear or an eye as our mouths. Sunday noon Arch demonstrated the ideal method of staving off starvation. I found him huddled up in a corner of the cockpit, with half a loaf of bread in one hand and a bottle of beer in the other, from which he would take a swallow between nibbles on the bread.

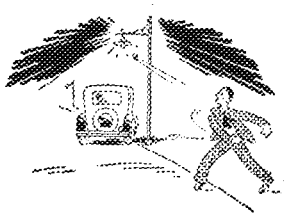
That night I was very lucky to get sleep between eleven at night and one in the morning. The next morning the wind was light and dead astern. We struggled with the spinnaker, mizzen staysail, and Genoa jib, trying to get every square inch of sail to draw, for we were near the finish and two boats were in sight a short distance ahead of us. We didn't know how many boats were around the point ahead of us and across the finish line. We finally rounded the point and pounded across the finish line at 8:19 a. m., Monday, July 23, to find that the two boats we had seen ahead of us earlier were the only two yet in and that we had finished third.

The *Baccarat*, a sloop, had finished first in 39 hours and 4 minutes, with the *Trident*, a yawl, second in 39 hours and 43 minutes. *Vamare* had placed third in 40 hours and 19 minutes. The course record of 40 hours and 3 minutes was broken by the two leading boats and we had missed it by only 16 minutes.

Just as we docked, a man came up, introduced himself, and asked us to come aboard his power yacht for breakfast. We accepted the invitation greedily and the hot cakes and coffee we had that morning slipped down about as easily as anything I have ever tasted.

We stayed over at Mackinac Island several days, resting and enjoying solid ground before sailing across Lake Michigan to Sturgeon Bay, where we bid the *Vamare* a regretful farewell and turned homeward.

G-E *Campus News*



STONE-THROWING ROMEOS

The engineers of the General Electric Company have been asked to solve some unusual problems, but never before have they had to work against Cupid. This is how it came about: Some of the swains who did their courting in parked cars along certain lighted roads in New England found that the lamps crimped their style. With simple but destructive logic they decided to extinguish the lamps with stones. Their aim was so good that repairmen of the utility which serviced the lights could hardly keep up with their depredations. Finally, G-E illuminating engineers were called in to design a fixture to foil the stone-throwing Romeos. These engineers produced a cast-aluminum guard, which looks very much like a baseball catcher's mask. It protects the lamp, and at the same time helps to concentrate light on the roadway.

HURRY! HURRY!

A flood had crippled three important electric motors in the refinery of a large oil company on the island of Aruba, 50 miles north of the coast of Venezuela. The plant had to be shut down until new coils could be installed. Losses caused by the shutdown ran into thousands of dollars a day. An order for the coils and word of the refinery's predicament reached General Electric in Schenectady, N. Y., on a Sunday morning. Work began immediately, and by dint of night shifts and a great concentration of efforts, the two-and-one-half-week job was completed in three days. The 808-pound shipment of coils, conveniently packed in small cartons, was flown in a chartered plane from Schenectady to the Newark airport, where it was transferred to an Eastern Air Lines plane bound for Miami. On Wednesday morning the cartons were transferred to a Pan-American Airways ship at Miami for the hop across the Caribbean to Kingston, Jamaica. From there, they were flown directly to Aruba in a specially chartered plane. They arrived Saturday morning, just six days after the order had been received by General Electric.

J. A. H. Torry, Union College, '11, and G. H. Magner, Acadia College, Nova Scotia, '09, of the International General Electric Company, Inc., made the arrangements for filling the order.

FAT SPARKS

The artificial lightning boys have beaten natural lightning in one regard, at any rate. Engineers in the General Electric high-voltage laboratory have produced discharges of a quarter of a million amperes, which is greater than the current of any direct lightning stroke yet recorded. This current is discharged at a pressure of 150,000 volts.

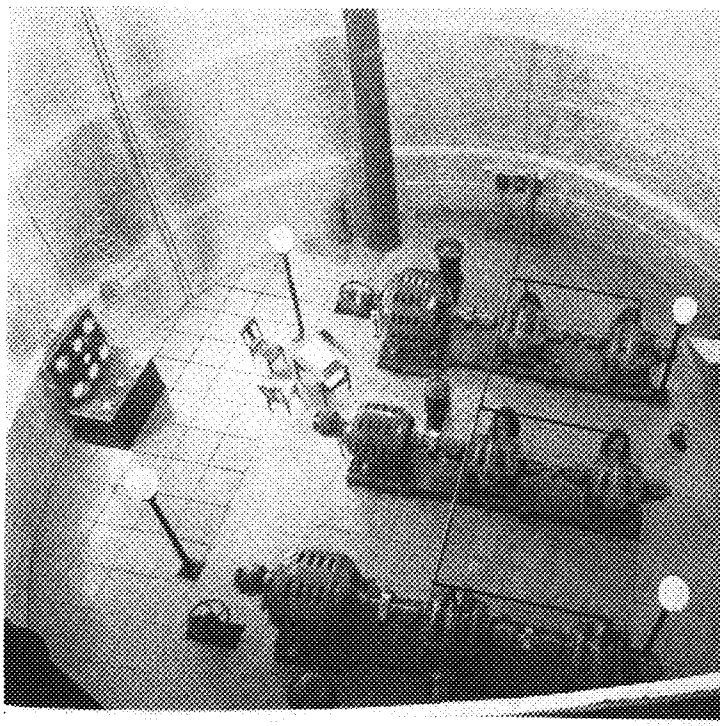
Just as natural lightning, with amperage almost as great, destroys that which it strikes, so does the laboratory discharge; and just as natural lightning is accompanied by thunder, the laboratory bolts have their ear-splitting crashes. A copper wire a tenth of an inch in diameter is completely vaporized. A similar piece of iron wire is "exploded," the remaining ends continuing white hot for several seconds. A section of reinforced concrete is broken into bits. The handle of a silver-plated ice cream spoon vanishes with a shower of sparks, leaving behind only the bowl discolored by the heat.

These engineers were the first to produce 10,000,000-volt artificial lightning discharges, and they are continuing their studies through these high-current discharges, in order to find better means of protecting electric distribution systems. K. B. McEachron, Ohio Northern, '13, Purdue, '20, M.S., is director of the laboratory, and associated with him in these tests are: W. L. Lloyd, Rensselaer Polytechnic Institute, '18; J. L. Thomason, U. of Idaho, '29; G. D. Harding, U. of Arizona, '29; and J. R. Sutherland, Yale, '29.

96-71DH

GENERAL ELECTRIC

The MINNESOTA TECHNO-LOG



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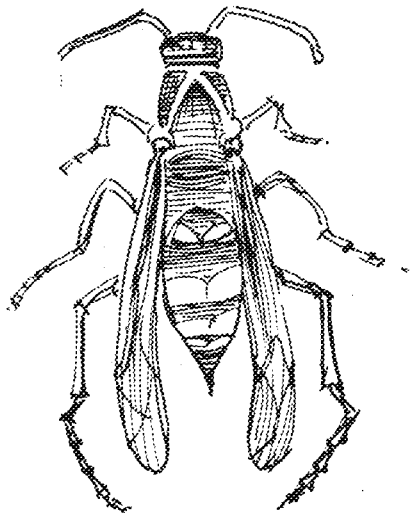


HORNETS were the first paper makers

TRADITION has it that the study of a wasp's nest suggested the possibility of the use of wood for making paper. . . . The history of paper making by man is that of study, experiment, and invention. It is typical of civilization that such a commodity is now accepted with little curiosity or interest. . . . Five thousand years ago the ancient Egyptians recorded their feelings and deeds on papyrus, the first substance for such a purpose invented by man. . . . The Chinese manufactured paper at least two centuries before the birth of Christ and passed on their secret to the Arabs who introduced the art into Spain in the twelfth century. Two hundred years later the use of paper was general in Western Europe though none was manufactured in England until the sixteenth century. . . . The first paper mill in this country was set up in 1690—and today, America leads the world in the manufacture of this great product with a half billion dollar invested capital.

THE ENGINEERS' BOOK STORE

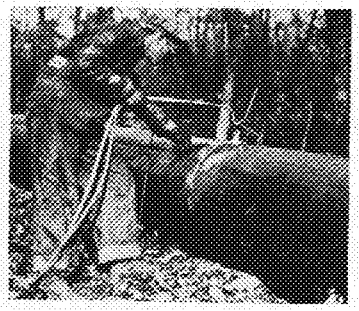
Cooperatively maintained by Architects, Chemists, and Engineers

In A Jointless-Minded World

Welding would prevail—and old methods of joining could not be restored to favor.

By **E. A. DOYLE***

If welding had become the standard method of manufacture before mechanical types of joints were introduced, it would be difficult, indeed, to convince manufacturers that they should re-design their metal products to use mechanical methods of joining.



NO RETREAT—pipe line constructors would never consent to a change from simple, portable welding equipment to the complicated devices essential to other methods.

Welding Gives Strength

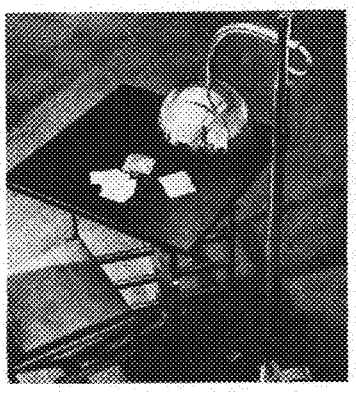
Strength would be a talking point for welding. The welded joint is strong as or stronger than the metal which it joins. The cutting of holes for screws or bolts would naturally weaken the structure. Appearance gives welding another vote. Joints made by welding are smooth in contour and have no depressions, bosses, projections or attachments as is often necessary in mechanical means of joining metals.

Costs Less to the User

Cost would be another argument for welded joints. The greater amount of material necessary with mechanical joints, the increased weight, and the decrease in pay load or performance-to-weight ratio, would make welding the preferred method. Nobody would consent to a joint in piping, which might, through a tiny leak cost much more than the permanently leakproof welded joint. Nor should it be necessary to buy expensive machinery to make mechanical joints which welding can equal in performance, economy and adaptability with a minimum investment in metal fabricating equipment.

Modernizes Automobile Design

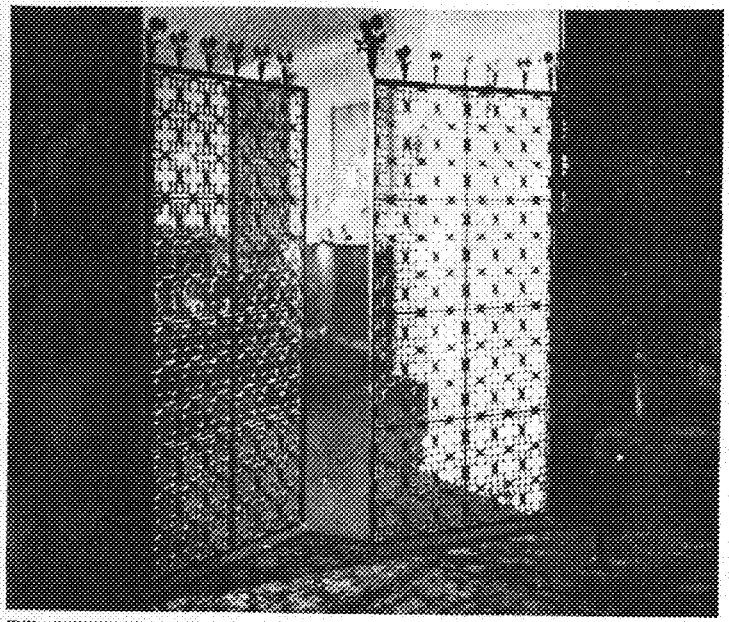
Automobile manufacturers would insist on welding rather than consent to a return to the design limitations imposed by mechanical joints. In face of a change from "teardrop" designs to the old boxlike bodies, with the attendant discomforts, with higher cost due to increased gas consumption and increased tire wear, with the fear of accidents increased by the lack of confidence in the joints, with appearance impaired and lacking the smooth surface for fine paint and lacquer finishes,—the automobile manufacturer would hesitate long before any but welded joints would even get a hearing.



METAL FURNITURE—The welded joints in metal beds, chairs and other similar furniture assure a sturdy and rigid assembly.

In the Future

Farsighted industrial executives can appreciate that a completely "welding-minded" industrial world is not far off. They should use in their own manufacturing operations as many of the advantages of welding as possible. The welding engineers of The Linde Air Products Company can advise how oxy-acetylene welding could best be used in your plant. This service is obtainable without cost or obligation by application to any of the sales offices of The Linde Air Products Company located at Atlanta, Baltimore, Birmingham, Boston, Buffalo, Butte, Chicago, Cleveland, Dallas, Denver, Detroit, El Paso, Houston, Indianapolis, Kansas City, Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Phoenix, Pittsburgh, Portland, Ore., St. Louis, Salt Lake City, San Francisco, Seattle, Spokane, and Tulsa. Everything for oxy-acetylene welding and cutting—including Linde Oxygen, Prest-O-Lite Acetylene, Union Carbide and Oxweld Apparatus and Supplies—is available from Linde through plants and warehouse stocks, everywhere.

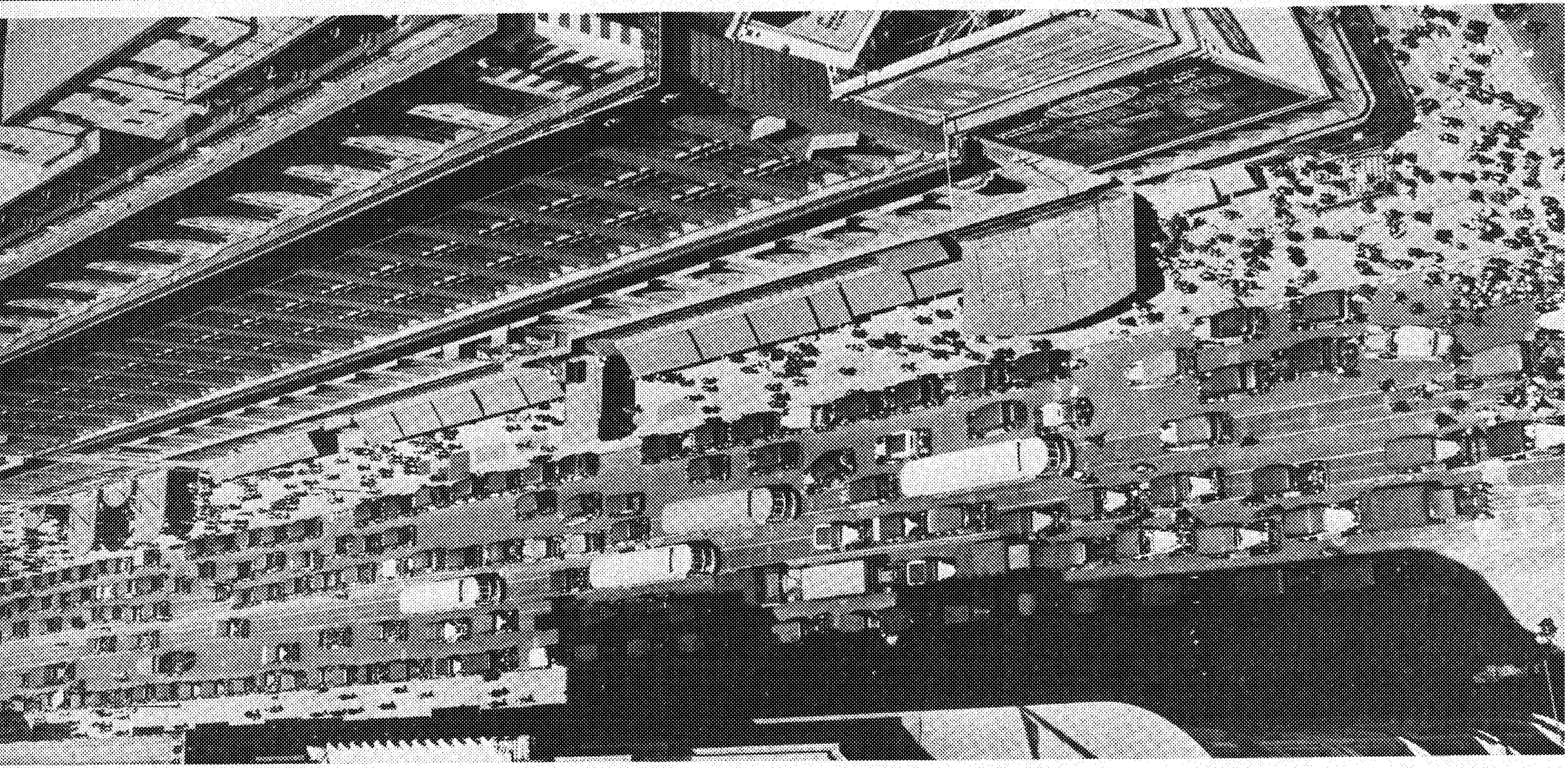


BEAUTIFUL USEFULNESS—typified in this welded ornamental iron gateway. Every joint is strong, sound and was made inexpensively.

*Chief Engineer, Development Section, The Linde Air Products Company, New York. Unit of Union Carbide and Carbon Corporation.

—This being a Business-News Advertisement.

TRANSIT JOURNAL



A CITY STREET

At The Desk

How do you like the picture opposite? We think it is rather nice from a photographic standpoint. It also presents some of the achievements and problems of the engineer. The engineer built the structures. He made the street cars and autos. He is now faced with the necessity of continually improving them. He erects bigger and more beautiful buildings. He streamlines his cars. And Arnold Cohen tells us the engineer is replacing street cars with trackless trolleys. You may have heard of them; they are described fully beginning on page 30.

The cover cut was graciously loaned us by the Electric Machinery Co. It shows the pumping room of a water works. The three motors—you can judge their size by the chairs and table—have a total of 1,550 hp. The spotless tiling of this interior is typical of new industrial plants of all kinds. A clean uncluttered plant is much more pleasant and efficient than a more chaotic one. There is more to engineering than drawing curves and diagrams. You must think about efficiency and utility.

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MINNESOTA TECHNO-LOG

37 ELECTRICAL BUILDING . . . U. *of* M.

NOVEMBER, 1934

Eugene Price
MANAGING EDITOR

David Buck
BUSINESS MANAGER

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Volume XV **Number 2**

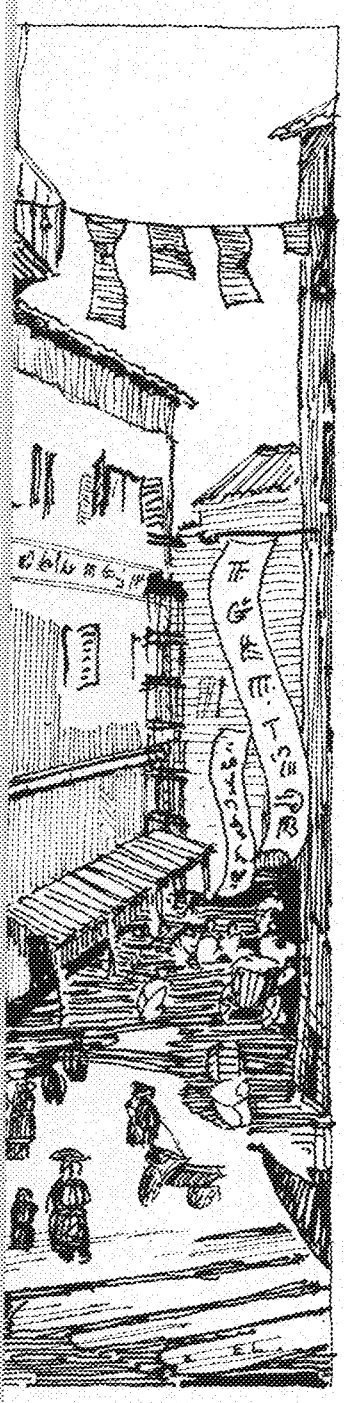
This Month

chinese create city of ancient beauty in

Greater Shanghai Plan

By CHARLES SWEATT, M. E. '35

Illustrated by Edward Lofstrom



OF THE many hundreds of Minnesota graduate engineers who wander to foreign fields in search of work and adventure, probably none has found a more interesting, more romantic, or more inspiring job than that of Dayu Doon, former student in architectural engineering. He is one of a group of men who plan to build a city—not a small city of a few thousand inhabitants, but a municipality to replace one of the greatest shipping and industrial centers of the orient—Shanghai.

Mr. Doon is a Chinese who came to America for an education that he might return to his own country fitted to help carry on the great progressive program that has risen out of a once backward nation. He graduated from the University of Minnesota in Architectural Engineering in 1924 and later received his master's degree. Upon the completion of his study in this country, he returned to China to practice engineering. In 1929 he was appointed Advisor to the City Planning Commission of Shanghai, which was created to work out a plan for the future physical expansion of the city.

The latest official census indicates that Shanghai has a population of three million. In 1920, this figure stood at one million, five hundred thousand; and in 1930 it had increased by eighty-six per cent, a record probably unparalleled by any other city in the world. Although the city is the most important port in the orient, its industrial standards are far from modern, and its facilities are inadequate to handle the trade that has grown up within it.

The ancient city was enclosed in walls, the streets were narrow and poorly drained, the housing facilities were insufficient, and the population soon overflowed the municipal boundaries. In 1843, Shanghai was established as one of five treaty sea ports; and a foreign settlement began to grow outside the boundaries of the city proper. At the present time, this large international settlement has a population of from twenty-five to thirty thousand and is governed independently of Chinese authority. Property around the settlement also developed until today Shanghai is composed of the districts of Chapei and Nantao, separated by the International Settlement and operating under two distinct municipal governments. This separation has made mutual improvements very difficult if not impossible.

shanghai lies on whangpoo river

The largest and most important of China's several rivers, the Yangtze, flows into a vast bay of the Pacific Ocean called the East China Sea. Two islands divide the estuary of this river into the North Channel which flows eastward into the ocean, and the South Channel which flows southward for some twenty miles between the mainland and the island of Tsung Ming. Into this channel, which is more than large enough to accommodate ocean traffic, flows the Whangpoo River, at the mouth of which is located the village of Woosung. The city of Shanghai is situated on the Whangpoo about twelve miles above Woosung.

The geographical location is one of the principal factors which held up the development of Shanghai. These factors have been summed up by the Planning Commission as follows:

1. The existence of three separate municipalities with no unification of policy or plan.
2. The lack of direct connection between the harbor and the railways.
3. The inadequacy of shipping facilities.
4. The unusually rapid growth of population resulting in high rentals and congestion.
5. With the rapid increase of population, the existing means of communication have become inadequate.

The purpose of this plan, therefore, is to provide for the proper expansion of a fast-growing industrial community, and to improve the facilities for handling trade.

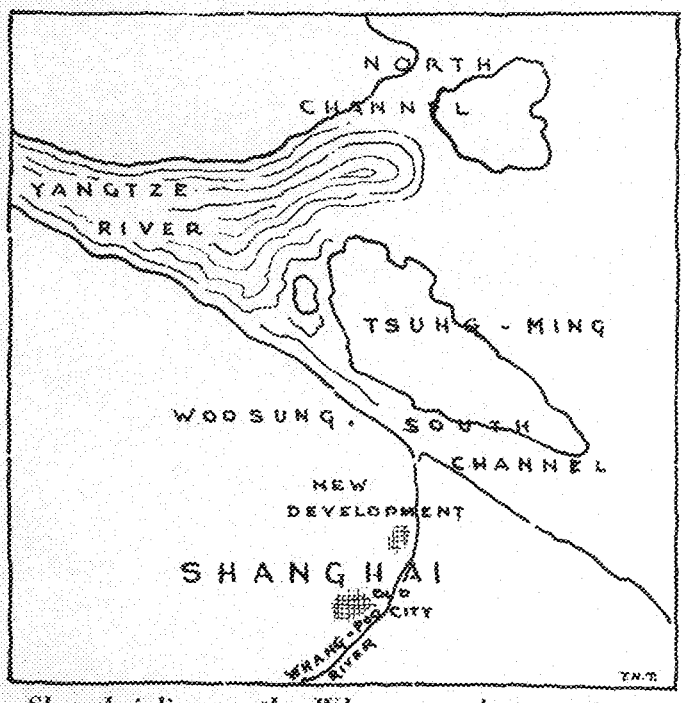
The idea that Shanghai is not situated in the most logical place for an ocean port is not a new one. In fact, plans for the development of a harbor at Woosung date back thirty years when Liu Jun-Yi, then Viceroy of Kiangsu province, believed that the river front should gradually be moved northward. He thought that if factories and business houses were built up near the mouth of the Whangpoo, the residential district would eventually follow. This plan was not practical, however, and it became evident that the city could be moved only by organized planning.

In 1927, the Nationalist government made Shanghai a special district, and created the Government of Greater Shanghai. The City Planning Commission of Greater Shanghai was organized in 1929 under Mayor Chang Chun.

The site chosen by the Commission for the new project lies on the Whangpoo river between Woosung and the International Settlement. It is bounded on the north by Woosung and the southern channel of the Yangtze; on the east by the Whangpoo; on the south by the International Settlement; and on the west by the Shanghai-Woosung railway. Geographically, the site lies at the center of the District of Shanghai. Its greatest asset is the nearness of the Yangtze river. Since the harbor is to be built at Woosung, the new city will form a convenient link between the harbor and present Shanghai.

selected site is centrally located

The plans for the project begin with the building of a Civic Center to be surrounded by parks and residential districts. In 1929, the Planning Commission announced a prize competition for the design of this Civic Center. It was to be located at the intersection of two boulevards two hundred feet wide. One of these was to run north and south and form the main stem of communication with the present city and the new harbor. The other was to run east from the new railway station to the Whangpoo river. At the close of this competition, Dayu Doon was appointed Chief Architect to study and plan the new Civic Center.



Shanghai lies on the Whangpoo river, a stream tributary to the Yangtze.

Final plans were submitted in May of 1931 and the Commission immediately let contracts for the Mayor's building, the first of the group to be constructed.

The city is to be zoned so that each area of land will be used with especial regard to its character and suitability. The northern district will be used for the harbor and shipping facilities. Toward the northwest will be the industrial center located near the harbor and with the prevailing winds carrying the smoke and dust away from the city. The west and south will be residential districts, including provisions for education and recreation. The eastern section near the river will be occupied by docks and parks, and a scenic boulevard along the water front. The Civic Center, of course, will be located in the approximate middle of the development with easy access to each surrounding district.

The elevation of the future city will be about five feet below the highest recorded surface of the Whangpoo and Yangtze rivers. For this reason, protection against floods is of the utmost importance. Many years ago, a road for military purposes was built along the Whangpoo, forming a dike about five feet higher than the ground elevation. It is planned to extend this road northward along the southern bank of the Yangtze, and thereby form a parkway patterned after Riverside drive along the Hudson river in New York City.

railroads and docks to be built

In order that the existing volume of shipping may be properly taken care of, there must be new docks, warehouses, and railway communications. All these will be amply provided by the new harbor at Woosung. The long water front with a depth exceeding thirty feet will accommodate vessels of all sizes and tonnage, and a simple expansion plan for present railways will eliminate delay and expense in handling ship-to-shore cargo.

Believing that a network of railroads will assure the rapid development of future Shanghai, the Commission has planned for several belt lines and stations to serve the new city. A small town west of the city will be made into a railway junction. One line will take passenger trains eastward to the Grand Terminal, another will extend westward to Nanking, a third branch will join the city with Woosung and the harbor, while a fourth will be built southward to Hangchow.

It is believed that the territory across the river will also experience rapid growth, and crossings more ade-

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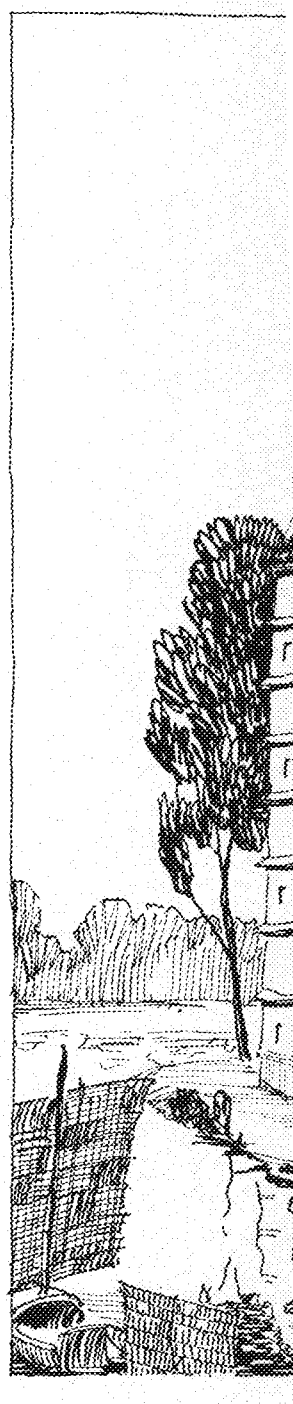


traffic problems solved by

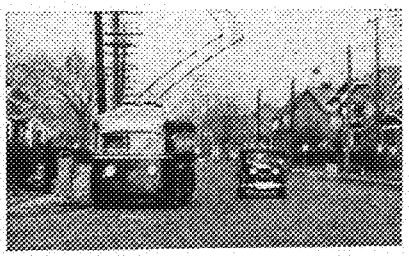
Trackless Trolley Coaches

By ARNOLD COHEN, E. E. '35

ROLLING silently toward you down the wide pavement comes a vehicle. It would resemble a street car of the modern type were it not for its rubber tires and two trolleys. Its white roof and chromium headlights gleam in the sunshine. You signal with a motion of the hand. It draws up to the curb, its twin trolleys reaching far out into the street so as not to leave the pair of stout copper wires overhead. The doors open, you get on, pay your fare. You are hardly seated when you feel yourself gently but firmly pressed against the back of the soft leather-cushioned seat. It is the swift acceleration of the car, absolutely smooth and conspicuously devoid of jerking.

You find you are gliding easily through traffic. You feel no vibration. You smell no gas fumes. You hear nothing save the soft singing of the electric motors below. This vehicle certainly is not like anything you have ever ridden in before.

The car draws smoothly to a stop at a cross-street where the traffic light is red. You gaze out of the window at the shiny new automobile alongside, whose



driver's eye is on the semaphore. He is ready to be off at the change of the light. "Go," says the signal. Away you go, but the auto is left behind. And before you've had a chance to scan the morning sports page you are at your destination.

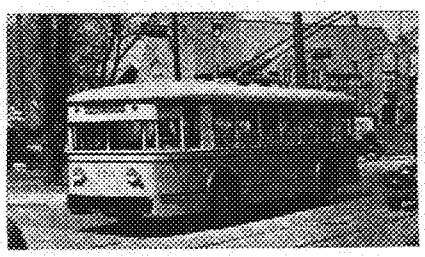
This amazing conveyance you have ridden on is the modern trackless trolley coach, the latest word in urban transportation.

Recognizing the adaptability of the trolley coach to the class of service demanded by the riding public of Duluth, the Duluth-Superior Transit Company is undertaking an extensive modernization program in which the trackless trolley will ultimately supersede the street railway throughout the city.

Introduced to the city in 1931, when a trial run of 16 blocks using two coaches was installed in Lester Park, the system was not long in proving its worth. The company then decided on a gradual extension of service to other parts of the city, additions to be made whenever opportunities should arise. The letting of several extensive paving contracts under PWA early this year afforded an excellent opportunity, as street car rails could be omitted from the new pavements at a tremendous saving. Consequently, last August sixteen new balloon-tired, electric coaches rolled silently and swiftly over smooth, wide pavements unbroken by steel rails. The eighteen coaches now operate on one large system serving several important sections of the city.

duluth installs trolley coaches

The 40-passenger trolley coach, the size used in Duluth, is powered by two 50-horsepower, 600-volt, direct current motors developed especially for use in trolley coaches and new type street cars where maximum capacity with minimum weight is requisite. Fabricated of rolled plate, each motor weighs but 785 pounds. The motors are mounted longitudinally and are separately geared to the rear wheels by means of a pair of worm drives. Since each motor independently drives one wheel, differential gears are unnecessary. The worm drives reduce



the high speed of the motors—3500 r.p.m. maximum permissible — by a ratio of about 10:1, giving the coach a top speed of about 45 m.p.h.

Because of the absence of track contact for the negative side of the voltage supply, two current collectors, or trolleys, are needed. These are not in the form of wheels, as used on street cars, but are grooved brass shoes which slide along the overhead wires. Occasional lubrication of the wire with graphite reduces friction to a minimum. The ample length of the trolley poles, together with a heavy upward spring tension, permits the coach to travel freely from side to side in the street over a path about 25 feet wide without breaking contact with the trolley wires.

A huge radio frequency choke coil in series with each collector keeps radio interference originating in the electrical equipment of the car from being transmitted out over the line to neighboring radio sets. The choke coils, mounted on the coach roof at the bases of the trolleys, are resonant at approximately the center of the broadcast band.

For slowing and stopping the car effectively, pedal operated, four-wheel air brakes are used. A light-weight aluminum alloy compressor with a 10

cu. ft. per min. pumping capacity supplies the air pressure for the braking system. The pressure built up in the four brake chambers is dependent on the position of the brake pedal and varies smoothly from zero to maximum. This makes possible high rates of smooth deceleration with little effort on the operator's part, advantageous from a standpoint of safety as well as of comfort.

The city of Duluth is built on the side of a hill. Consequently, the coaches must be capable of providing safe, speedy service on the long, steep grades. Ascending these hills speedily offers no problem, as trolley coaches have plenty of power at their disposal. They take the hills at high speed with ease. Descending is another story. Use of the air brakes on a long grade would cause undue wear, to say nothing of the somewhat jerky ride which would result and the very low speed which would be necessary for safety and comfort. And in the winter, skidding due to wheel locking would be another hazard.

electrodynamic braking for hills

To overcome these difficulties, a simple but effective device was specially installed on the Duluth coaches — electrodynamic braking. This is merely the shunting of a low resistance across the two motors, with the power off and the fields reversed, so that the motors act as a pair of heavily loaded generators. With this arrangement an opposing torque will be exerted by the motors dependent upon their speed.

Apply this to the case of a trolley coach descending Piedmont Avenue—a mile-long, steep grade — with the electrodynamic braking on. Starting from rest, the coach quickly and smoothly reaches a limiting speed, dependent on the degree of braking used, and will go no faster. Or suppose the car is coasting along at a rate faster than the limiting speed and the electric braking is thrown on. It will quickly and smoothly slow down to the proper speed. There is little danger of skidding, as the wheels cannot possibly lock; for at zero velocity there is no opposing torque. This braking is operated by a special selective control, which by cutting in different values of resistance makes possible four degrees of braking.

It has been pointed out that the trackless trolley is capable of high rates of acceleration. How the trolley coach is accelerated so swiftly and yet so smoothly is perhaps the most interesting of its mechanical and electrical features. The secret of it all is "automatic multipoint control," a new development in the art of electric transportation. In order that the merits of this system of control be fully appreciated, the conventional type of street car control will first be considered.

Since motor current decreases as speed rises, and accelerating torque depends on the current, it follows that for a smooth pick-up—one where the acceleration is nearly constant—some means is necessary for keeping the current approximately constant. On a street car with two motors, there is used a manually operated controller built in such a way that motor connections may be changed step by step as the speed arises. For starting, when the motor voltage must be kept down to avoid excessive current, the two motors are connected in series with each other and with an additional resistance. As the speed rises, the current drops, and so to keep the current up the motorman cuts out the resistance by steps until all the resistance is out, at which point each motor is subjected to half the trolley voltage. The connections are then changed so that the motors are in parallel with one another and in series with the resistance. The full running position is reached when this resistance is all out, and trolley voltage applied to each motor.

multipoint speed control

It is clear, then, that the accelerating current will dip and rise as the motors gain speed and as the controller is advanced, producing a more or less jerky pick-up. The greater the number of controller steps, the more uniform will be the acceleration. As the motorman must be able to judge just when to advance the controller, his skill is a highly important factor in producing a smooth ride.

Now in a vehicle equipped with automatic multipoint control, this human factor is eliminated. The operator merely selects the acceleration rate he wants and the device automatically changes connections at the proper rate. The control consists of two main parts: (1) The master controller, composed of a shaft to which are keyed a number of cams which snap electric contacts open and shut as the shaft is turned. Located under the car floor, the master controller is actuated directly by the operator's pedal. (2) The control group, con-

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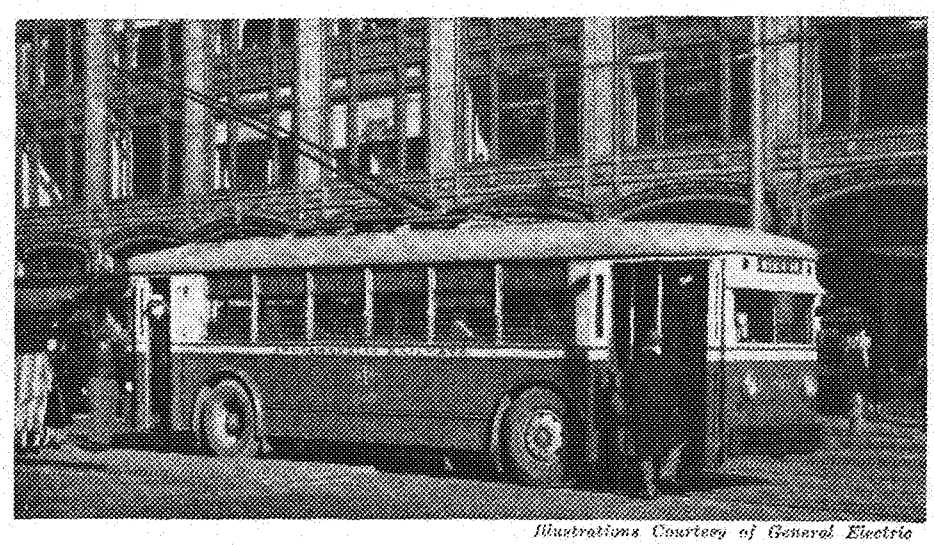

Illustrations Courtesy of General Electric

Because the new coach has no tracks, it must have two trolleys. Contact is made by means of sliding shoes instead of the usual wheels.

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Class Scrap is Dead

THOSE of you who take an interest in engineering activities probably have noticed that there has been no freshman-sophomore scrap this year. For the past few years there has been a gradually increasing lack of interest in the scrap. Sophomores in particular have shown little enthusiasm. Last year, however, was a banner year for the sophs. For the first time in a good many years they organized strongly enough to defeat the first-year men. We, who like to see engineers active in everything, took heart and expected to see another good year. But, unfortunately, faculty support was withdrawn. And the scrap died. If any student wants to resuscitate it he must not count on its friends among the faculty men for support. Their hands are tied.

We believe that the scrap ought to be continued. Its enemies say that it is a small-school tradition, outmoded in a large university. We feel that it is just the thing needed to give a little unity to the engineering group. There is nothing brutal about the scrap; the games are rough, but not more so than football or any other of a dozen sports. True, there is no permanent benefit in this one event. Neither is there any permanent benefit from playing one game of football. But both have amusement and exercise on their side, and if the student plays lots of football, or joins into other engineering activities, there is a decided benefit, physical in one, social in the other. Engineers' Day, the Scrap, the Tech Frolic, all together represent an important part of engineering life at Minnesota. Take away any one and you lose something.

You must consider all these things before you decide on the fate of the scrap. We have presented the case as we see it. We believe that the scrap might well be made a part of Engineers' Day if it is decided to save it. The *Techno-Log* will act as clearing-house for suggestions. Give us your ideas.

Spring Senior Finals Out

Each senior maintaining an average of C or better in any of his engineering courses during the quarter preceding his graduation will be excused from taking the final examinations in these courses. This is the privilege, effective immediately, that has been granted seniors in the College of Engineering and Architecture by action of the college faculty.

Since graduation from college generally comes but once in a man's lifetime, he naturally desires to make the most of it. There are various social functions held in the spring especially for him. The conflicting of these affairs with examination week has always removed most of their zest, producing a really serious problem the solution of which had never been attempted.

Last spring the Technical Commission circulated a petition among engineering seniors which asked that spring finals be eliminated according to the conditions stated above. By the time a student completes his last year, they pointed out, his instructors are well enough acquainted with him to know the quality of work of which he is capable, without going through the formality of examining him.

The petition was presented to the faculty, who, while expressing some favor, voted the resolution down. This fall, the heads of the several engineering societies each submitted a letter to Dean Leland, asking that the plan be reconsidered. At the last faculty meeting the resolution was passed, with the result that seniors may now attend the traditional pre-commencement functions with complete peace of mind.

The *Techno-Log* takes pleasure in congratulating the engineering faculty, the Technical Commission, and others who helped put the idea successfully across, upon this fine piece of work, representative of the liberal trend toward substitution of workable educational methods for time worn, unfounded dogmas.

The Ancient Game of Football

By RODERICK WILLIAM SILER
Assistant Professor of Mathematics

THIS is the season of the year when those of us who are growing a bit stiff and deaf with age are always likely to be asked, "Say, Pap, do you remember when the first game of football was played?" Though personally I prefer "Grandpaw" to "Pap" as a more elegant form of salutation, that does not prevent me sympathizing with a thirst for knowledge, no matter where evidenced, and I am glad to give here what I have been able to gather as to the origin of the game.

If my source of information is correct, it seems that football, in the beginning, was an almost childish sport. It appears that towards the close of the last century the collegians at one of the Eastern schools fell into the habit of putting a ball on the back campus and moving over there in a body each evening to frolic with it. Taking off their coats, but not their high collars and hard hats, they would boot the ball and each other about for half an hour or so, to work up an appetite for the evening meal. However, this ideal conception of sport did not last long. On account of the wear and tear on their shins the boys before long placed the game in the hands of picked teams, and got their exercise by standing on the sidelines and betting on the score. From such simple beginnings comes our present day football.

Coming down to 1934, I imagine that there are always students among the thousands in the stands at football games who become somewhat discouraged over the fact that all they can do at such big moments is to give the college yell when the home team gains, or bite their nails when the opposite happens. Well, that's the way the world goes. We can't all be leading men. Not at the same time, anyway. But if facts are worth considering in this matter, I must say that they indicate that there is a remarkably large number of men now leading in the affairs of the world who suffered from such handicaps as thin legs and flat chests in their youth. While I would not want to say that success in later life is assured to anyone showing a sixteenth of an inch chest expansion in college, there does seem reason for suspecting that every dog has his day. A book going the rounds just at present, entitled "Life Begins at Forty," seems to suggest the same thing. Probably a young man, hearing the ancients chattering this stuff about life beginning at forty, is inclined to suspect that the old folks past two score are just whistling in the graveyard. And maybe the young man isn't so far wrong, at that. But whether or not life begins at forty it certainly doesn't end at twenty. If I remember rightly, the average length of life is fifty-seven. Thus, after all, there seems no good reason why a college man at a football game should let any depression of spirits, due to a feeling of worthlessness at such a mighty moment, restrict his vocal output. Because it looks as if he would have a splendid chance to even up matters by the time he is forty and bald.

"life begins at forty"

It is interesting to speculate as to the effect upon a man, say of before the year 1800, if he could be brought into the presence of one of our football games. What would most impress him? The beautiful ladies, the haberdashery of their escorts, the mighty stadium, the referee's whistle? Not as much as one might think. For the old gentleman could truthfully say, "There is nothing here we could not have duplicated in my day."

One thing remains—the football, the prolate spheroid vulgarly known as "the pigskin." If he were so arrogant as to demand, "What is there here to show that you moderns are superior to us?" we could put the pigskin under his nose and watch him wilt. And, astonishing to say, it would be more effective deflated than inflated. He might possibly blow it up by pure lung power. He might duplicate the leather cover, for he was clever with his hands. But—observe closely, boys: this is of tremendous import!—when we drew forth the rubber bladder, that he could not duplicate. That bladder would floor him. To show his superiority he would no doubt produce physical proofs of what he had done: his Venus de Milos, his Gothic Cathedrals, his stained glass, his Stradivarius violins, his Taj Mahal of India, and Heaven knows what else. To which we could proudly reply, "This is all okay. But duplicate that bladder." Poor devil, he could not do it.

ours has a rubber bladder

So after this, boys, when you hold a football in your hands, look upon it with respect, not untouched by reverence. For remember, it contains a rubber bladder.

alumni everywhere ——

Sometimes Meet in Strange Places

Last month we issued the request for visits by alumni. This past month our fervent hopes and fears were rewarded by a visit from a former editor of the *Techno-Log*. Our guest was **Paul Nelson,** E.E. '26. *Techno-Log* editor, '25-'26. He is now Publicity and Advertising Manager of Travel Guild, Inc., Chicago. He writes a column for the Minnesota Alumni Weekly entitled "Minnesota Alumni in Chicago." According to Paul there are about one thousand Minnesota alumni in Chicago and of that number about one hundred belong to the Minnesota Club of Chicago, of which he is president.

Paul gave us some interesting sidelights about some who were on his staff while he was editor. He was in New Orleans and while there, prowling the streets, entered a tiny French restaurant and there met **Stuart L. Bailey,** who was on his editorial staff. Stuart is now the junior partner of Jansky & Bailey, Radio Engineers, 922 National Press Building, Washington, D. C. Stuart graduated from Electrical Engineering in 1927 and in 1928 obtained his M.S.

Paul Nelson's business manager was **A. Stanley Bull,** A.E., '27. He is now sales manager for the Insolite Company. He was married in Paris, September, 1929, and lives at 404 West 35th street, Minneapolis, Minn.

Professor Shoop received an interesting letter from **Phillip Dey,** M.E., '29. He first worked for the Ingersoll Rand Company but in 1931 lost his job. About the tenth of July, 1931, he went to work for the Baldwin Locomotive Works in the Diesel engine department. He left the Baldwin company after eight months to work for the Electric Boat Works in the engine department on Diesel engines. He writes: "During the five short years since my graduation I have been through all the phases and forms of Diesel transportation. I have been up in the air with the things, to say nothing of two hundred feet below the surface in Block Island Sound last January."

The Civil Engineering Department reports that **Carl Markham,** C.E. '32, is attached to the U. S. Forest Service; Lake States Forest Service, at Duluth, Minn. He is doing various kinds of work on timber survey, forest mapping, and office work. He enjoys his work and he tells us that his forester co-workers are real fellows. He lives in Duluth and his address is 17 North 15th Avenue, East. He says, "Nope, not even close to married!"

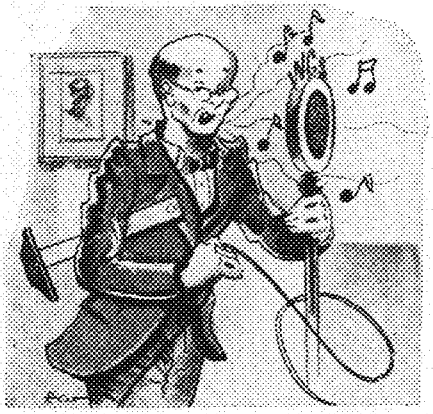
Two more civils that have stopped to say "Howdy" are **Hershel Engler,** '34, and **Le Roy Engstrom,** '28. Engler has been with the State Highway Department, but he says he's going down to Lynxville, Wisconsin to help the U. S. Engineers on a dam project there. Up until May 15 of this year, Engstrom was connected with the Water Resources Branch of the U. S. Geological Survey at Albany, New York. At present, however, he's taking a year's vacation to "study and decide on future work."

One of the lucky fellows to receive a fellowship at M.I.T. is **Lawrence Hovik,** graduate of the Architectural Department in 1929. Hovik's was the Carnegie Research award in City Planning.

The Supervising Engineer of Construction for Chicago District of the Illinois State Highway Department is **K. A. Johnsen,** C.E. '27. He married Miss Edith Peterson in Elgin, Illinois, on October 6, 1934, and his address is Box 246, R. R. 3, Elgin, Illinois.

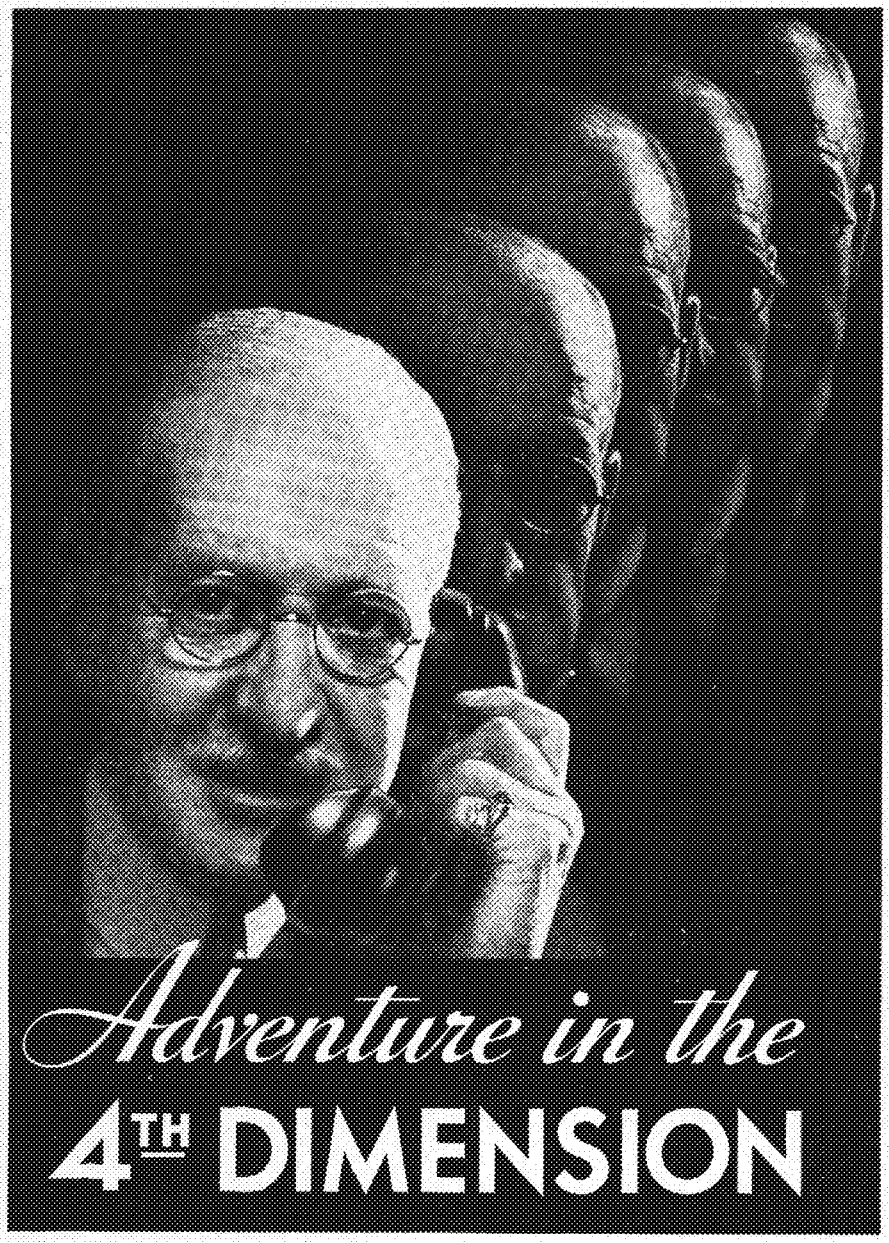
Recent reports indicate that **Monroe Hanover,** C.E. '06, has been working with the Minneapolis-Moline Power Implement Company since his graduation. His present address is 933 Chapman Bldg., Los Angeles, California.

G. W. Peter Halliday, E.E. '33, of 1696 Iglehart Avenue, St. Paul, Minn., is leaving the Minnesota Highway Department to make an attempt at a musical career by traveling through the East with a musical show. We wish him good luck.



Believe it or not, a whole Engineering class of Civils is working on the Nine Foot Channel, according to **Clarence E. Johnson,** C.E. '32, of 515½ Huff Street, Winona, Minnesota. He is a surveyman with the U. S. engineers on lock 5A.

If a word to the wise is sufficient take **J. O. Julson's,** Arch. Eng. '33, advice and make connections with Eastern firms. Julson lives at 35 Clinton Ave., Apartment 20, Plattsburgh, New York. He works for the Bust Forster Dixfield Company and they are doing a tremendous business.



You speak into the telephone. Your voice, your personality, part of *you* is projected far and wide. In effect you are in two places and times at once—evening in New York, afternoon in San Francisco. Or you're in Washington today and in Sydney, Australia tomorrow—at one and the same time!

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BELL TELEPHONE SYSTEM

Cupid Scores as Sather Weds Girl Friend, Brunette Coed

Orville Sather, senior in Electrical Engineering, was married Saturday, October 20, to Miss Elizabeth Netherly. The ceremony took place in the First Methodist Church, after which a reception was given them at Windsor Hotel.

The couple first met at the University, which, incidentally, is a point in favor of attending college which the proponents of higher education have apparently overlooked. Mrs. Sather is from Minneapolis and graduated from the University of Minnesota in 1933. Orville is one of the radio operators of station WLB. He is deeply interested in radio and hopes to twiddle the dials of his own umpteen tube supergadget transmitter some day. When asked how he enjoyed married life, he replied with a spontaneous grin, "It's Grand!" It is our belief that the officials of WLB are secretly worried for fear the operator, in his dazed condition, might plug in a symphony concert during a football game.

The senior class of Electrical Engineers presented the couple with an electric chime clock—just to remind them that time does go on, even when it appears to have stopped. Mr. and Mrs. Orville Sather have taken up residence at 427 Fifteenth Avenue, South East.

A. I. Ch. E. Will Visit Sugar Plant

Over two hundred members of the students and faculty of the school of chemistry attended the first meeting of the American Institute of Chemical Engineers held October 9 in the Minnesota Union. The meeting was the most successful of those held in the past few years, with 139 members signed up. Dr. C. A. Mann, head of the department of chemical engineering; Dr. S. C. Lind, director of the school of chemistry, and Dean Leland of the engineering colleges made welcoming addresses, and Harry Cottingham, president of the organization, outlined the aims and activities of the society for the coming year. Entertainment was provided by Prof. C. F. Shoop of the department of mechanical engineering, who performed tricks of magic and sleight of hand. Cider and doughnuts was served.

Members of the student branch and others who are interested will visit the plant of the American Beet Sugar Co. at Chaska on November 24. The party will leave the Union between the halves of the Wisconsin game in radio equipped busses, listening to the game enroute.

A. I. E. E. Meets, Plans Big Year

The Minnesota chapter of the American Institute of Electrical Engineers held its first meeting of the year Oct. 17 in the Engineering Auditorium. Officers were introduced and plans for the year discussed.

The officers are Leonard Ostergren, president; Edward Tangen, vice-president; Carl Pennig, secretary-treasurer; and Professor J. H. Kuhlmann, Counselor.

Plans for the year include trips of inspection, talks by prominent electrical engineers, and the annual prize paper contest. In addition, the Minnesota chapter will send delegates to the national convention at Purdue.

Fliers Get Prize, Add 30 Members

Miss Jean Barnhill, senior in Aeronautical Engineering, will go to Washington, D. C., soon to accept the Loening Contest Award which will be presented by Mr. Loening to the Minnesota Flying Club.

The club has recently added thirty new members, including two women, Ellen Church and Carolmay Morse. Miss Church is a graduate nurse and former air hostess on one of the air transport lines.

Housing — The Problem of Today

By CARON CARLBERG, ARCH. '35

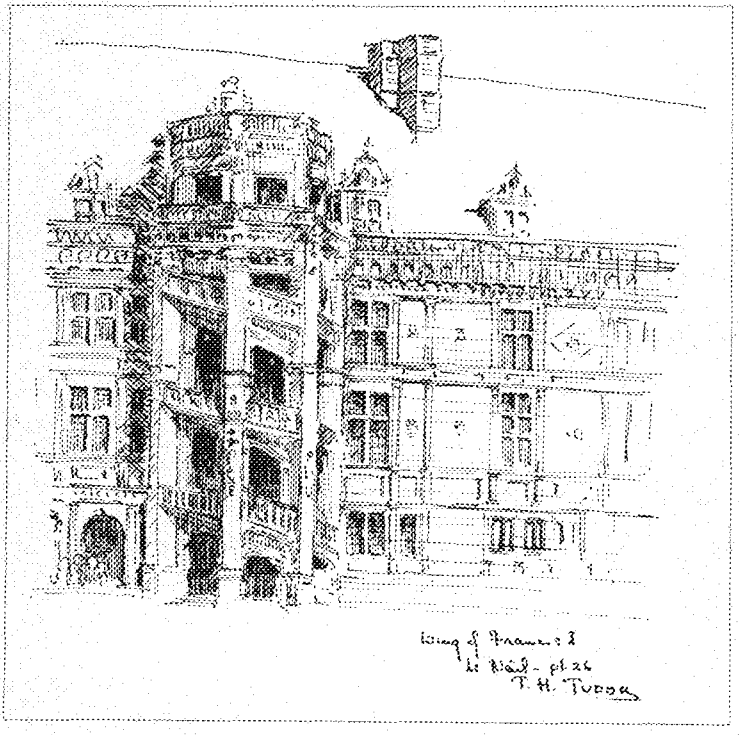
FROM the standpoint of the architect, housing presents some interesting possibilities for professional achievement and for profit, when and if it can be financed. Better design, simplification of construction methods, and provision for adequate financing are worthy aims for this timely work. Of all the various problems involved, financing appears to be the most difficult of solution, and architects can no longer say, "Let Bill figure it out." They must help in finding "Bill."

Widespread interest has been awakened not only in this vicinity, but all over the country on the subject of housing by a realization of the fact that here is one field of construction in which there has been no overbuilding so far as the needs of a majority of the population of our country are concerned. The federal government, through the agency of the Reconstruction Finance Corporation, has made funds available for low cost housing and slum clearance projects under certain conditions of state or municipal control. The specified conditions involve complete supervision of limited dividend corporations organized to provide limited rental housing. The RFC funds constitute a new opportunity to accomplish slum clearance. The real problem will be to obtain these so-called "blighted areas" at a price that will permit demolition of the existing structures and construction of new housing with a density per acre that will not exceed that which the surrounding local conditions will determine to be reasonable. Until this underlying problem is solved, consideration of the details and cost of the contemplated new housing units is somewhat academic. Concentration on this problem should be the first concern of the organized study of slum clearance and low cost housing not only in the Twin Cities but elsewhere.

In the city of Minneapolis extensive surveys have been made since 1920 in regard to property and housing conditions along with a study of population trends. These studies were made because of the direct relation which population movements have upon land utilization and proposed housing. The work has been carried on by the City Planning Commission recently, utilizing the opportunity presented by the work program of the Federal Civil Works Administration. The most pertinent job of this commission has been to determine whether or not Minneapolis needs a re-housing project. Herman E. Olson, City Planning Engineer of Minneapolis and lecturer in the School of Architecture, says in his "Minneapolis Property and Housing Survey," "We need a further study of these conditions; we need to know our resources and to understand the opportunity which these resources present. We need to plan for legislation to properly authorize and guide future developments. Given sufficient encouragement and some assistance, private initiative can be organized to reconstruct the blighted areas of our cities."

In St. Paul there is a tentative program for slum clearance and the erection of low rental houses designed to meet the need of families in the lower wage-earner groups. The area approved for this project is a tract of land commonly termed a "blighted area" consisting of 131 acres lying to the northeast of the State Capitol building between Jackson and Mississippi streets with Minnehaha street to the north and University avenue to the south. It contains 560 houses, many of them shacks and others in a state of deterioration. The proposed development will involve the housing of 1100 families in various types of structures, including two, three, and four family units.

Why is it that mass-housing is so slowly becoming an actuality? Truly, the land cost factor is most responsible for holding up the programs. If housing is to be anything more than the dream of the sociologist and the architect or but another fad of the depression years, its promoters must soon show it can clear the obstructions in the way of success.



Chateau Blois

This pen and ink sketch made from a photograph is of the type required for Architectural History. If for no other reason, such an exercise is valuable for the practice of technique, the intangible ingredient of a good sketch.

Greater Shanghai Plan

(Continued from page 29)

quate than the present ferries and sampans will be necessary. Although the planning of bridges for this purpose is probably somewhat previous, the choosing of sites for these improvements will greatly simplify the work later. Two points have been selected for bridge sites. One of these is to be at the river end of the east and west thoroughfare and the other farther south at the Nantao road.

The most outstanding feature of the plans for Greater Shanghai is the Civic Center which will be built according to the "Chinese Renaissance" architecture. The unit will be in the form of a cross with the long arm on a north and south axis. The central point will be marked by a pagoda one hundred sixty-five feet high. The Mayor's building is located five hundred feet north of this pagoda and is flanked by eight other buildings housing the eight bureaus of the city government. The pagoda will be approached from the south by two impressive boulevards flanking a pool two thousand feet long. The eastern and western approaches are marked by two similar but smaller pools. Directly behind the Mayor's building will be a municipal auditorium accommodating three thousand persons. Located symmetrically around the cross are the Library, Museum, Art Gallery, Court House, and other public buildings.

civic center is feature of plan

The Mayor's building, first of the Civic Center group to be completed, was opened on October 10, 1933. This structure combines the beauty and charm of Chinese architecture with the efficiency and convenience of modern design. The building is four stories high with a peaked roof, curving widely and terminating in broad eaves. The main portion has slightly more than one-third the total mass of the whole structure, being higher and wider than the two symmetrical wings. The front elevation is marked by long sweeping white stairs that lead to the main entrance on the second floor. These stairs pass over an arched passageway designed to allow vehicle traffic to approach the first floor

entrance directly underneath. The stairs open onto a porch or balcony passing completely around the building at the second floor level, both of which are protected by a highly carved stone railing. The windows and doors are set in high panels extending from the balcony level to the roof and decorated with a series of geometrical designs which stand out in relief from brightly colored backgrounds. The walls of the first story are white stone in contrast to the colors of the upper walls and roof.

Inside, there are great halls with massively timbered ceilings, supported by shiny black cylindrical pillars. The Mayor's office is furnished with a heavy wooden desk and table, covered with carvings and metalwork. Chairs and divan are of the same massive construction, upholstered with leather and similarly carved. The walls of the many council chambers are covered part way up with wooden panels, dark and shiny with deep geometric designs carved in them. The ceiling timbers are set off by a solid mass of bright color and design typical of Chinese art. The rooms are lighted by heavily barred, cylindrical chandeliers suggestive of ancient ornamental iron lanterns. The accommodations are supplemented by two temporary annexes which house the various governmental bureaus until the permanent structures can be completed.

Trolley Coach

(Continued from page 31)

sisting of magnetically operated switches and another drum of switching cams, rotated by a small air-driven engine. The air engine is stopped and started by an electro-magnetically operated valve.

The series-parallel scheme of motor connections is used, as in the street car, but with the control drum replacing the hand-operated controller. When the motor current drops to a certain value, an accelerating relay in the motor circuit energizes the control circuit and the magnet valve opens, permitting the air engine to notch the control drum up to the next step. This automatic operation is repeated for each step of the entire sequence. By an ingenious arrangement of motor and resistor connections, the control drum rotates in one direction to cut out the resistors during the series acceleration of the motors; and after the change-over from series to parallel motor connections by magnetic switches, reverses and rotates in the opposite direction to cut out again the same resistors. This scheme makes possible a large number of accelerating steps—nine series and nine parallel, eighteen in all—the current change on each step being very small.

The operator's master foot controller has six steps: Power off position, switching or holding position, and four positions giving four different rates of acceleration. It is not necessary for the operator to push his pedal in gradually; if he wants top acceleration he throws the pedal in all the way and the automatic control takes care of the rest. If he wants to hold up the progress of the air engine temporarily, he lets the pedal drop back to the holding position. Or if he desires, he may notch up the control at will, as with a manual controller. This flexibility of operation is made possible by an intricate control circuit governing the operation of the cam controller and magnetic switches. The automatic multipoint control system can be adjusted to as high a rate of acceleration as is comfortable to passengers. This is usually about 3 miles per hour per second.

Trackless trolley systems have been shown to be economically superior to either street cars or gasoline busses on lines where the demand is suited to 40- or 30-passenger vehicles operating on headways of from three to fifteen minutes. For heavier traffic, street cars are better prepared because of their size to handle the load, while for lighter traffic the gasoline bus is more practical because of the smaller investment required. Economies are effected in the operation of the trolley coach because (1) there is no cost of track installation or maintenance; (2) its schedule speed is 10 to 15 per cent faster than that of the same size gasoline bus, and 10 to 25 per cent faster than that of the street car; (3) its power cost is cheaper than that of either the gasoline bus or street car; (4) its maintenance is cheaper and reliability greater than that of the gasoline bus; and (5) it has a useful life estimated to be 50 per cent greater than that of the gasoline bus.

trackless coach is economical

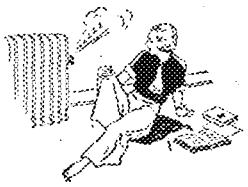
There is every reason to believe that the average passenger prefers the trackless trolley to other forms of city transportation. It offers him a speedy, comfortable ride minus vibration, noise, and odors. It is not necessary for him to wade out into a perilous thoroughfare to board the coach; it meets him at the curb. In the evening he is provided with excellent illumination and in the winter with abundant heat.

When he is out driving in his own automobile, he finds that the absence of car tracks gives him more driving space; there are no rails to bump over or to skid on. In traffic he finds no slow street cars to follow, none to wait for at car stops. The trolley coach steps right along with the best of traffic, and does its stopping at the curb. When he is sleeping at night, there is no pounding of wheels on steel rails to wake him as a car passes his home; all is silent.

G-E *Campus News*

TWO POLES IN ONE

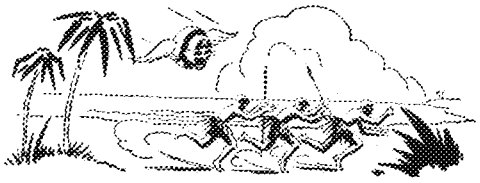
Radio entertainment and "airmail" have been sent to the Antarctic through General Electric's short-wave station W2XAF, ever since Rear Admiral Byrd arrived there last year. Recently, in conjunction with a Byrd program, another was sent out to Rockwell Kent and his son in the Arctic region—thus linking simultaneously Americans who are, in the matter of latitude, farthest apart. Governor McNutt of Indiana and other prominent Hoosiers spoke to the Byrd Expedition from Indianapolis in a program sponsored by the *Indianapolis Star*. Immediately afterward, the Coffee House Club, an organization of artists and writers to which Rockwell Kent belongs, sent music and greetings from New York to him on the island of Ubekjent, just off the coast of Greenland, 600 miles within the Arctic circle. Features of this program were special greetings from Mrs. Kent and her daughter, and a talk in the Eskimo language by Vilhjalmar Steffanssen, Arctic explorer, for the benefit of the natives. Both programs were broadcast over a coast-to-coast NBC network as well as by short waves.



GOOD-BYE, SMOKESTACK

For many years, the old central heating plant at Mt. Holyoke College in Massachusetts, with its tall, unsightly smokestack, barred the way to certain necessary improvements and landscape developments on the campus. This summer the old boilers and the smokestack were torn down. In one of the buildings of the old plant stand 120 General Electric oil furnaces arranged in circular groups of five. Fifty-two more G-E oil furnaces are installed in the smaller or more isolated buildings of the campus, operating singly, in pairs, and, in one instance, in a battery of 10. In the central plant, only as many groups of furnaces will operate as are necessary to maintain the required steam pressure. The remainder will be shut down, avoiding stand-by losses. The individual furnaces and small groups in distant buildings permit the abandonment of some of the longer runs in the underground steam-distribution network. The high efficiency of the system is expected to produce savings which will pay for the installation in five to seven years. In addition, as a result of the more careful regulation of temperature, it is expected that health conditions at the college will be considerably improved.

The main plans for the system were drawn up by C. W. Colby, consulting engineer. D. W. McLenegan, Wisconsin, '21, assistant engineer of the Air Conditioning Department; W. O. Lum, and H. R. Crago, Penn State, '18, both of the same department, handled engineering details for General Electric.



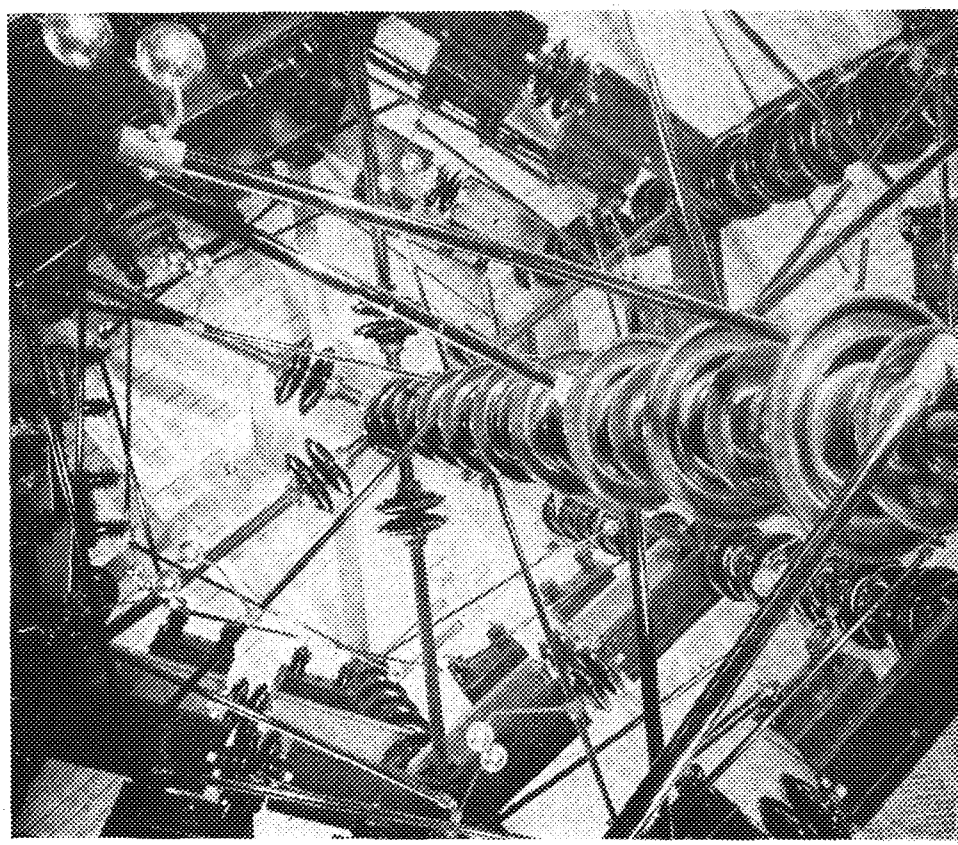
FLYING POWER PLANT

Gold was discovered in 1925 along the Bulola River in New Guinea, an island just north of Australia. Prospectors worked the richer veins by hand methods, and packed their "take" on the backs of natives through 40 miles of cannibal-infested and nearly impassable jungles to Lae on the coast. After the best veins had been worked out, it became apparent that placer operations on a large scale would pay if the necessary dredges and other machinery could be brought to the location. Land transportation was impossible, so a plane was sent in. The pilot found a spot to land, and a flying field was cleared off.

Four 875-kv-a. General Electric waterwheel generators were among the equipment ordered. When they arrived at Lae, they were transferred to huge all-metal Junkers freight planes and flown to the location piece by piece. The largest single pieces had a net weight of 6545 pounds. As the load limit of the planes is 7000 pounds, it was a tight squeeze. D. B. Gearhart, Iowa State, '27, of International General Electric, Inc., handled the order for the Company.

96-83DH

The MINNESOTA TECHNO-LOG



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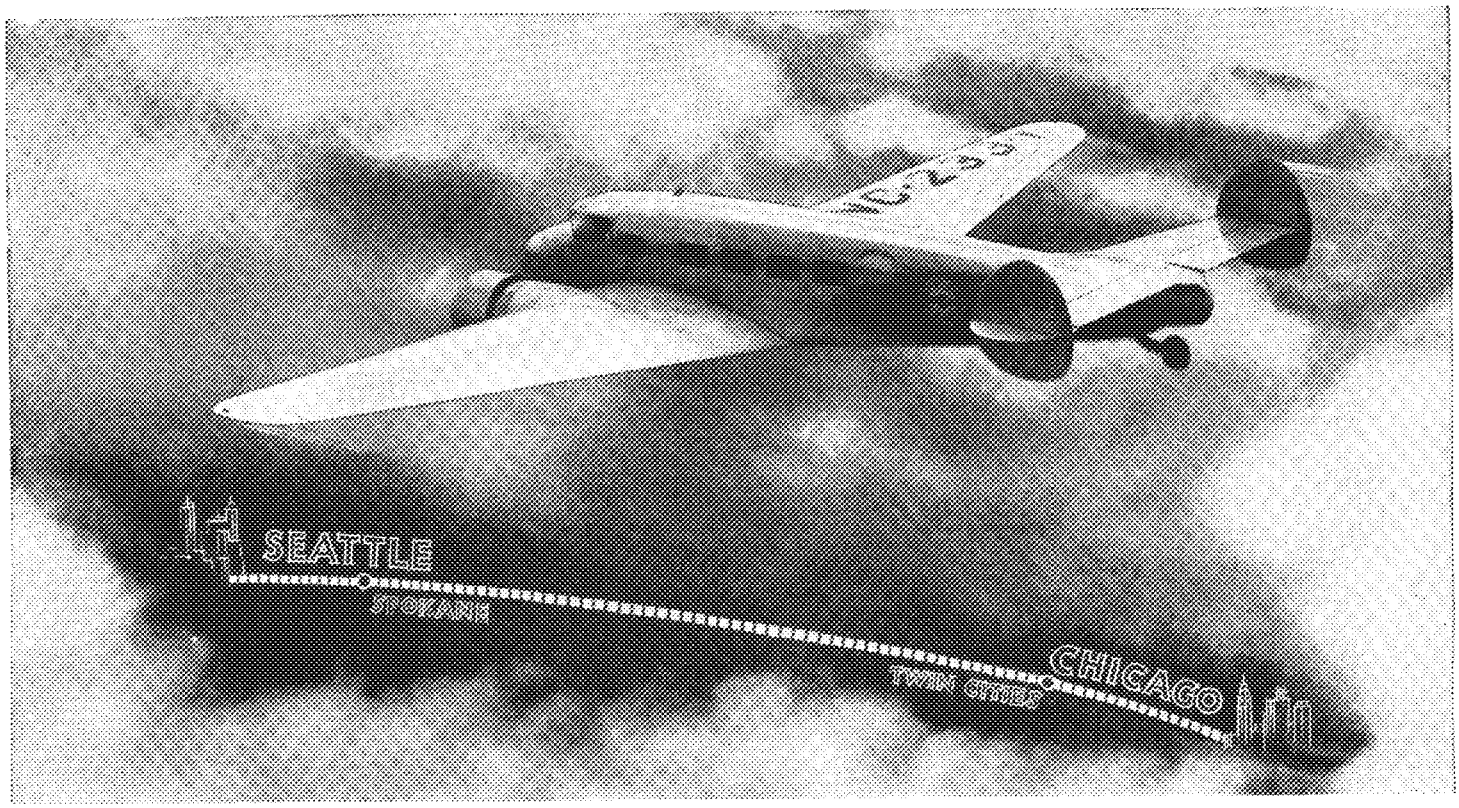

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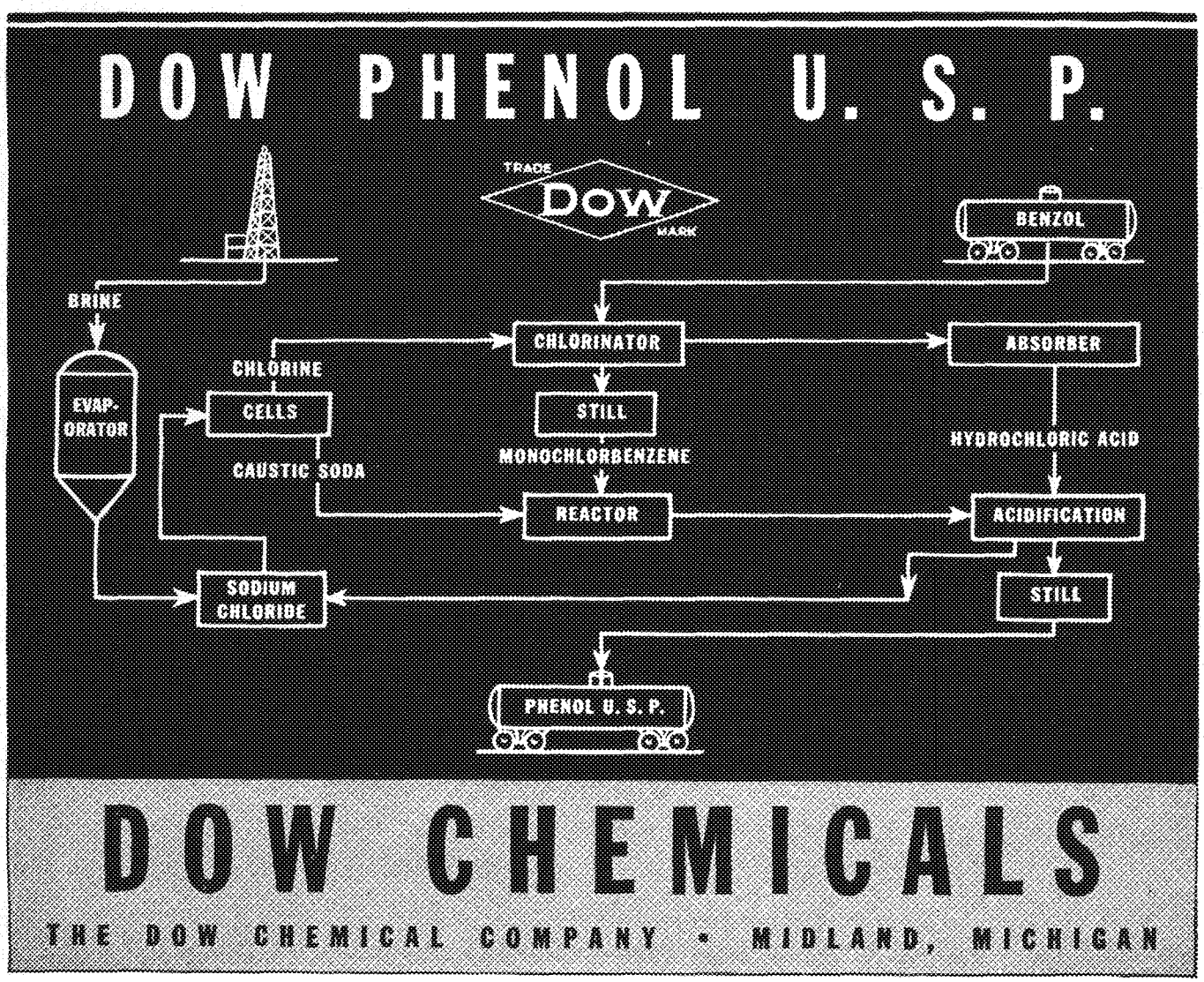

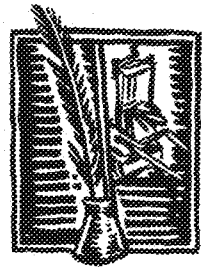

At The Desk

The cover isn't very appropriate for Christmas, except possibly the colors. You have probably been wondering what the picture represents. It is a view of the inside of an impulse generator, used to develop a potential of 3,000,000 volts for a high tension testing laboratory. It is owned by the Ohio Brass Co., Barberton, Ohio, and the electrotype of the picture was loaned to Techno-Log by "Electrical Engineering."

The Romans were civil engineers too. They are famous for their roads, their great buildings, and their aqueducts that carried water many miles from the sources to their cities. Not only in Italy, but wherever they went the Romans left their engineering monuments. The frontispiece is an old Roman aqueduct near Smyrna, Turkey. Until recently it carried water, but has now been broken.

This aqueduct enforced the flow of water through gravity; today we would pump it through a pipeline. But that is the way engineering goes. Progress and engineering are almost synonymous terms.

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37 ELECTRICAL BUILDING . . . U. of M.

DECEMBER, 1934

Eugene Price
MANAGING EDITOR

David Buck
BUSINESS MANAGER

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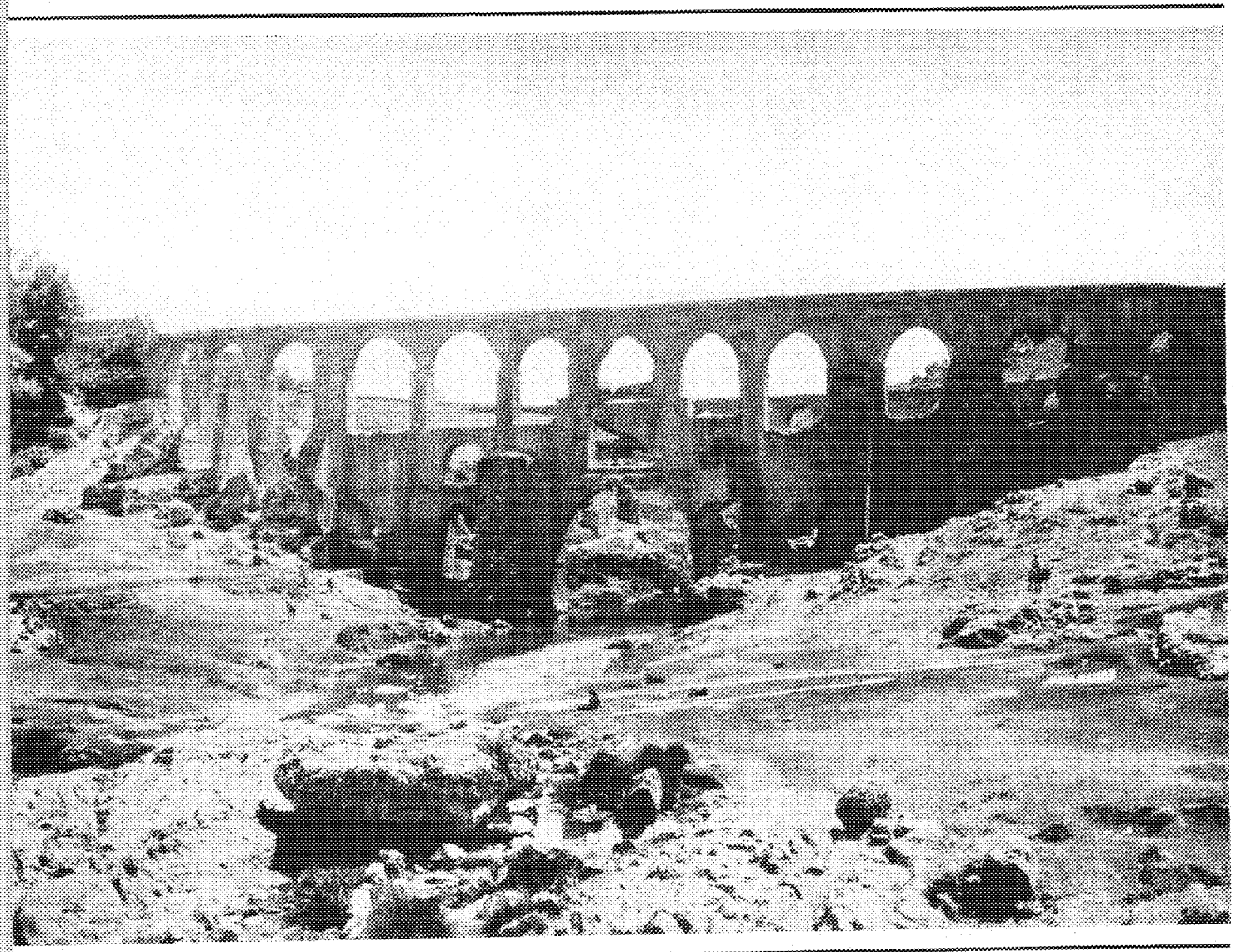
Volume XV — Number 3

This Month

OSMAN AGA AQUEDUCT



COURTESY CIVIL ENGINEERING

we spend a summer day

At Cass Lake Civil Camp

By WILLIAM BURGUM, C. E. '35

THE time: a Monday morning in mid-September in the year 1934 at exactly twenty minutes to six; the place: the interior of Tent No. 5 on the shore of Cass Lake; the action: the loud unpleasant noises made by one Vance (Bluenose) Johnson as he lies, dead to the world. In such a fashion might a visitor be introduced to the 1934 camp if he should happen down the tent line just five minutes before the first call.

Now, however, it is five forty-five and the first bell goes off. We see signs of half-hearted activity up and down the line as the early risers move about. As the hour approaches six o'clock, rapid action begins down around Tents 5 to 10 as the one man that happened to miss the free show in town and go to bed early, attempts to get the remaining men out of bed in order to answer roll-call at six o'clock sharp.

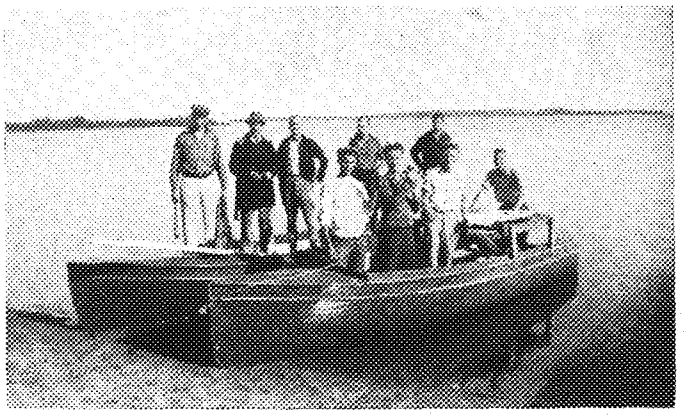
Breakfast follows roll-call instantaneously, and 50 seniors with appetites like lumberjacks (not to mention the faculty men, who don't seem to be turning anything down) tear through a bill-of-fare with but a single thought in mind. To see to it that the man sitting next to them doesn't eat more than they do. The men leave the tables and wander up to the bulletin board to see what assignment they drew. That is, all except Sutton, who says he knows he is on a railroad survey of some kind, without looking at the board.

Seven o'clock and the parties begin to assemble to go into the field. The chiefs of parties are dashing around getting the necessary equipment and lining up transportation for their party. The transportation is really important as the work extends over an area of some 80 square miles with parties often being ten miles or more from camp. We see John Healey over in the doorway of the instrument tent handing out the transits, levels, tapes, etc. How come? Well, John is Camp Assistant (also known as K.P., Bell-Hop, or Boy) today, and must rise in time to read the various gauges and thermometer at six, check out and check in all equipment, keep the water barrel filled, (wonder what happens to the fellow that gets this job on Saturday) the wood box supplied, and be a general help to the camp. It looks like a mighty big job to us.

camp assistant takes life easy

Our old friend Sutton is chief on a R.R. preliminary survey and begs us to go out and watch his outfit work, so we soon find ourselves out southwest of town in country covered with second growth jack pine. It seems that some time back (the chief claims it was in early spring, anyhow), the original party branched off from an existing railroad line and began this preliminary line which will go across about four miles of this rough cutover country till it reaches the "K" branch of the Great Northern. The party we are watching goes along choosing their direction, measuring angles where they change direction, and driving stakes every 100 feet and at the points where they change direction. When Sutton's party has finished a party will come through, running profile levels, then a two-man, hand-level party taking topography. From the data secured a map is drawn and the paper location platted with the curves located. The location party and cross-section party come last, running in curves and figuring earthwork quantities, respectively.

This railroad problem takes practically the entire camp period with every man getting in on some phase of the work. It is the practical application of the project Professors Boon and Cutler lectured about in the junior railroads.



A sounding party gets all ready to explore the lake's ups and downs.

Taking leave of the railroad party, we just hear the first of an argument as to whether the axeman (Ned Saxton) should cut down the dead pine which is right on line. Saxton seems to feel that perhaps the instrument man can bend the line of sight around the tree, and besides, he forgot to sharpen the axe.

Back at camp we run in to see the computers and plot-

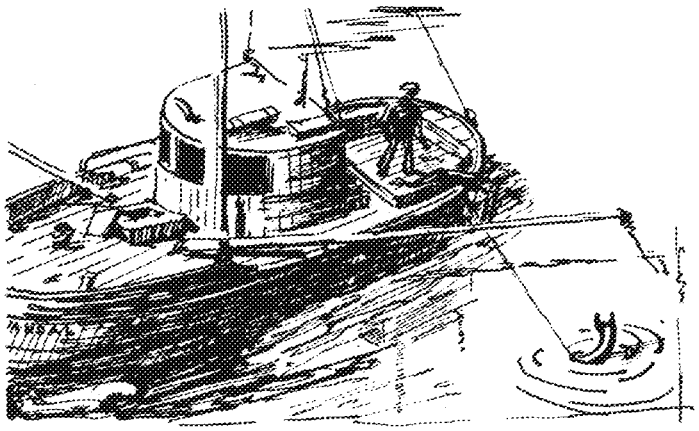
(Please turn to page 63)

I troll for salmon—

Around Vancouver Island

By MARVIN WALSETH, AERO. E. '36

Illustration by R. H. Hose



LAST summer, a few days after the spring quarter was over, I picked up a job through an advertisement in the *Minneapolis Journal*, driving Mr. A. Ohlson, Manager of the Tacoma Glass Co. to Puget Sound. While I had always considered myself lucky, this chance was far beyond all my dreams.

We left the morning of June 27, traveling on U. S. Highway 10. This took us through Fargo, Bismarck, Miles City, Billings, and Livingston. From there we went down to Gardner and spent a day and a half going through Yellowstone National Park. Then back to Livingston, crossing the Continental Divide, and on to Butte. Here we saw the greatest copper mines in the world. Immense mountains of ore virtually being torn down and undermined. Everywhere we looked there was activity.

From Butte we crossed the Bitterroot Mountains and came to Spokane. From there we traveled through the Columbia River Valley, which is now being developed by one of the largest Federal Irrigation Projects ever undertaken, the Grand Coulee Dam.

Leaving the valley we went up over the Cascade Mountains and began the descent to Puget Sound and sea level. Coming down the mountains to Seattle was for me the climax of a beautiful seven day trip. This was in the late afternoon of July 3.

I hadn't been in Seattle very long before I found that a longshoremen's strike had been going on for some time and that no boats except local ferries and fishing boats were moving. This information lowered my spirits as I had hoped to ship on a boat to Alaska.

I visited a few days with some friends and at the same time took in as much of the city as possible. It was suggested that I might be able to see some of the Pacific by getting a job on one of the local fishing boats.

With this idea in mind I started making the rounds of the fishing boats along Wharf 4, and to my astonishment, on the first boat I tried, the old man I talked to said, "Why sure we'll take you along; my son here is the owner of the boat." Such luck! I could hardly believe it. His son wasn't quite so willing, and it took considerable persuasion on my part to get his consent. He asked me if I had ever been on a boat before. "Of course," I said, "lots of times," but neglected to say that the boats were all moored to the piers in Seattle harbor.

As I left them to get my things the old man told me to bring plenty of warm clothes as we would be out more than two weeks and would need dry clothes if the weather turned bad.

It didn't take long to dash back to my friend's home, gather some things together, say goodbye, and drop a card home, telling the folks what I was going to do.

Arriving back at the boat I found them all ready to cast off. We left at 5 p. m., July 9, and headed up the Sound toward Vancouver Island. It was rather delicate work to maneuver the boat out of the harbor as it was filled with boats from every part of the world, lying in enforced idleness because of the strike.

The boat *Vandal* was a little forty-two foot trolling vessel with a crew consisting of Captain Hendry Beck and his father. It had just two bunks in the forecastle and a short bench in the pilot-house, which was to be my bunk.

the boat is ready for the fishing

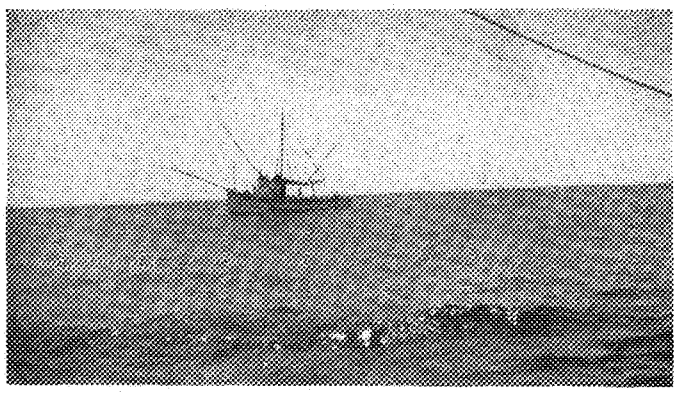
Equipped with a 30 hp., two-cylinder marine engine and a leg-o-mutton sail, its maximum speed was about seven knots. The sail was of little use except to steady the boat during heavy winds. In the forecastle I found a little coal stove and cupboards filled with food, mostly canned goods except for about five dozen eggs. In the rear hatch, buried in the five tons of ice in which we were to pack the fish, was a good supply of fresh vegetables, milk, bread, and meat. There were two forty-foot fishing poles fastened at the base of the mast and held vertical with it while traveling, and two bow poles fastened forward of the pilot-house; these angled back and rested in hooks on the mast. Altogether with these poles and the guy ropes, the boat was quite a sight.

That first night I went to sleep in Hendry's shoulder-wide bunk as he stayed in the pilot-house while traveling

at night, but I didn't sleep long. About 1 o'clock I woke up with a most peculiar sensation of nausea, headache, and apparent drunkenness when I tried to get up. The boat was tossing around something terrible. First on one end, then the other, and in between times, clear over on its sides so that one instant I would smash against one wall and then be thrown over against the other side. I managed to get out of the bunk and to the floor without damage, but there I immediately took a spill in the slippery mess of our five dozen eggs which we had failed to stow away. The old man, who had also fallen in the mess, was wanting to know "who the hell had stowed those eggs away," so I thought it was time to get out, and the way my stomach was feeling right then I thought it better to get clear out. I staggered up to the pilot-house and the Captain said it was nothing except the tide rips. The current was so strong we couldn't make any headway, and had to anchor up behind a point until slack tide. I never realized what a tide was like before, but now I can see what a tremendous volume of water must pass through these straits in order to raise and lower the water level of the sound from twelve to sixteen feet.

About four o'clock in the morning we got under way again and headed across the Straits of Juan de Fuca which separates Vancouver Island from the United States. The water was still very rough, and as I was feeling dizzy, Hendry had me do the steering so as to give me some exercise. In about an hour all traces of sea-sickness had left me and I felt as good as any old seaman. I hadn't developed my sea legs yet so I staggered around considerably when moving about the boat.

The rest of the trip was so beautiful and pleasant I can not begin to describe it. We traveled up the inside passage between Vancouver Island and the mainland. In places the passage was very narrow and then again it would widen out to fifteen or twenty miles; but all the time there were islands, rocks and trees rising straight up from the water's edge, towering hundreds of feet above us.



Trolling lines are held out from the boat by tall poles hinged to the deck.

The narrowest part of the channel, called Seymour Narrows, was no more than a block wide. Here the tide is terrific, at times reaching a velocity of fifteen or twenty knots. Boats are supposed to wait for the fifteen minute period of slack water before passing through these narrows, but that would have been several hours for us so we put on full speed and, with both Hendry and his father at the wheel, headed in. What an experience and sight! On one side the water was rushing out, and on the other side the tide was coming in, but coming much faster than that going out. The incoming water was piled up two feet higher than that going out, and the water meeting at this rip made grand waves; sharp, quick, and broken, that all but covered the boat; giant whirlpools turned and tossed us around like a chip. We made four complete revolutions before we could get out of one. At times we were almost dashed on the rocks and then would be thrown out with a rush, only to be pulled back again. The boat seemed powerless, and with both Hendry and his father at the wheel it seemed to have no effect whatever. It seemed for a time as if God had forsaken us, but then, gradually, we began to draw past the worst of it and were soon speeding along in comparatively smooth water. It took just a few minutes to pass through the mile and a half of narrows, but it seemed like a lifetime.

through the narrows at high tide

After passing the Narrows, the day took on a new meaning to me. It was a glorious day with great white clouds floating above me and I was lazy as I have ever been. On each side of us a beautiful forest stretched for unbroken miles. Though uninhabited except for an occasional lighthouse keeper, it seemed full of life, love and friendliness. The air was glorious, exhilarating, divine in its effect, and the ice cold spray brought dreams of those who had first sailed the seas.

We traveled steadily day and night, and of course I took my four hour watch at the wheel as if I were an old experienced hand. At night we had to follow the chart very closely and keep the compass exactly on the bearing as the channel was so narrow, though nearly always there was a light ahead of us; never over a half hour after passing one before picking up the next.

We arrived at the fishing grounds early Thursday morning, July 13. This was off Cape Scott at the northern end of Vancouver Island. I had thought it would be lonesome out there in the ocean, but for a few days there were fifty or more fishing boats in sight and then one morning all but five had moved on. The morning we arrived the sea was smooth as glass, and except for the eternal rollers, looked like a gigantic mirror.

Our first day of fishing was a great success, and with twenty-five hooks out all three of us were kept busy pulling in, cleaning, and packing the fish away in the hold. By noon my arms and shoulders were so tired I could hardly move, and I positively couldn't straighten out my fingers. To pull in the lines, we used rubber mittens made from old innertubes. A line I was holding slipped once and before I could stop it, it had burned through the rubber and deep into my fingers.

We had out six lines with four hooks each, and one line, the "jigger," with one hook. This got its name because it was always getting tangled up with the other lines and caused a lot of trouble; however, it caught more fish than any of the others so it was well worth while. The four main lines were one-eighth inch in diameter, and from this the four hooks were attached with about forty feet of line and a six-foot leader for each. At each leader was fastened a twelve to fourteen pound lead sinker, making about fifty pounds on the main line without any fish.

(Please turn to page 60)

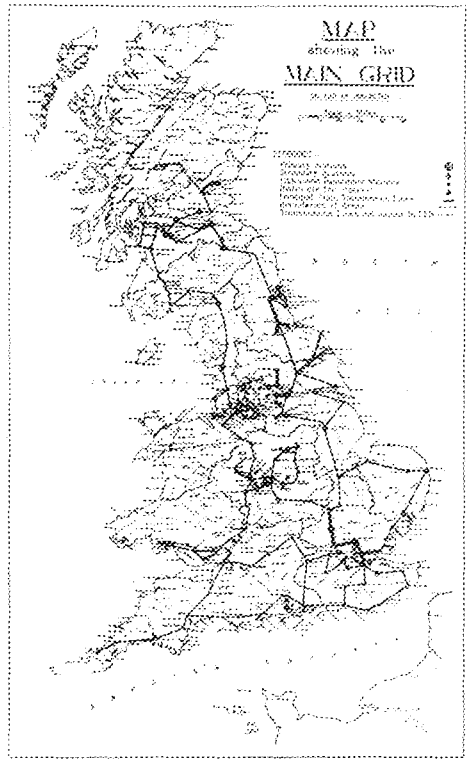
grid unifies

British Distribution System

for economy of transmission

By GEORGE KRAUCH, E. E. '35

After the World War, Great Britain found herself rather backward in electrical development, and was, at the same time, faced with an unemployment problem for which electrical construction would be a relief. To remedy the existing conditions, the English Parliament authorized the development of a new electrical transmission system. This system was intended to replace many suppliers of electric energy in England with a single supply system. The enormous variations in voltages, frequency, and rates were replaced by a common organization with standard electrical generation and supply throughout the country.



The main grid involves a linking up of specially selected stations throughout the country, and is divided into seven major regions. In each region generating plants and transmission lines are established to wholesale electric power to existing distributing agencies. Each region will be coordinated with the others.

The main grid is so placed that all points between the parts of the grid are within economical transmission distances. The map shows the main grid scheme and how the system covers the whole of Great Britain. The whole system covers slightly more than seventy-five per cent of the entire electricity production of the country, the north coast being the only area of importance that is omitted. This region is supplied by the Newcastle Electric Company, which is highly organized.

The main grid is divided into seven parts. Each of the subdivisions is a system of its own and the smaller grids feed into, or feed from, the main grid. Each of the smaller systems is named after the locality which it serves.

The many smaller generating companies have closed down, but the small distribution centers are continuing to operate. Instead of generating their own power, the small companies buy power from the grid system and then resell the power to the consumer. Under this system of distribution, local distributing lines did not have to be replaced.

The Central Scotland subdivision was the first undertaken. The plan for this region involved the interconnection of thirteen supply stations situated in three main districts, of which Glasgow, Edinburgh, and Dundee may be considered to be the centers. The transmission line system consists of two ring mains, one east, and one west of Glasgow, with a branch line from Bonnybridge to Dundee. The area included is 4,980 square miles, the population of the area is 3,700,000. The transmission lines extend to 220 miles of single-circuit and 33 miles of double-circuit sections. The total transformer capacity provided is 195,000 kva.

North Scotland is very sparsely populated and, although it has some important water-power developments, they have been linked up with the Great Scotland to form one project. The main part of the South Scotland plan is the series of four hydro-electric generating stations in the eastern part. The generation on the west is steam-electric. The district covers 4,308 square miles of sparsely populated country, and is entirely agricultural with a population of 251,702. The transmission lines are short and are used mainly to feed the generated electricity from the hydro-electric plants into the main grid.

The Northwest England electricity division is one of the most important of the plan. The power is used in the cotton industry, for shipping, and in rubber and chemical manufacturing centers. Many small generating stations that were running before were closed down. Some of the old stations were used and some new stations were built. The main generating plants are steam plants. The area supplied by this section is 9,082 square miles. Only 72 miles of lines were used because the transmission distances between the manufacturing centers are short.

The Mid-East England plan is not of any special importance. In this part, the main grid is used as a feeder with only three major generating stations in the area. The three main stations are steam plants and are located at Lincoln, Hull, and Blackburn.

The primary use of the Central England electricity project is to connect other divisions to form one grid. The sections that are connected by the Central England project are the Southeast England, Northwest England, Southwest England, and North Wales. The Central England covers 5,000 square miles. The main industries to be supplied are coal mining, ship building, production of iron and steel, and chemical trades. The total length of transmission lines is 102 miles.

The Southeast England area is important because of its industrial character. Electric supply is more highly developed in this area than in other regions, and a different procedure had to be followed. All of the electrical equipment had to be transformed to the standard frequency. It was necessary that the transmission lines in this area be different from the others as most of the generating plants are in London. In most cases, the transmission lines had to be underground. One of the London stations is the largest in the grid and has seven lines radiating from it. The overhead lines caused considerable trouble because they had to be exceptionally high, and the ground that they were built on was not very solid. A great deal of piling had to be done to obtain a solid foundation.

Along with the largest generating station in England, this area has the largest towers in the world. The towers at the Thames crossing at Dagenham are 487 feet high. The area covered is not very large but the population is the largest of any of the divisions.

The Southwest England and Wales area does not have resources for any large generating plants and therefore the area is almost completely supplied by the main grid. The transmission lines are long, and the costs are greater than in any other area. The 107 stations that were in the area were shut down with only 6 selected stations kept in use. Two new stations were erected. The system supplies 17,237 square miles and the total length of transmission lines is 673 route miles. The area is quite densely populated and has several industrial centers. The main industries are colliery districts, important seaports, china-clay, and tin mining.

Almost all high power transmission systems are used for transmitting large blocks of power from sources of energy to remote consuming points. In Great Britain, the sources of energy are comparatively close to the users and to each other, and the functions of the grid are, therefore, to enable the most efficient stations to operate at the highest possible load factor and to raise the plant utilization factors by reducing the amount of spare plants required in individual stations.

central stations standardized

Over the whole of Great Britain, there were any number of small gener-

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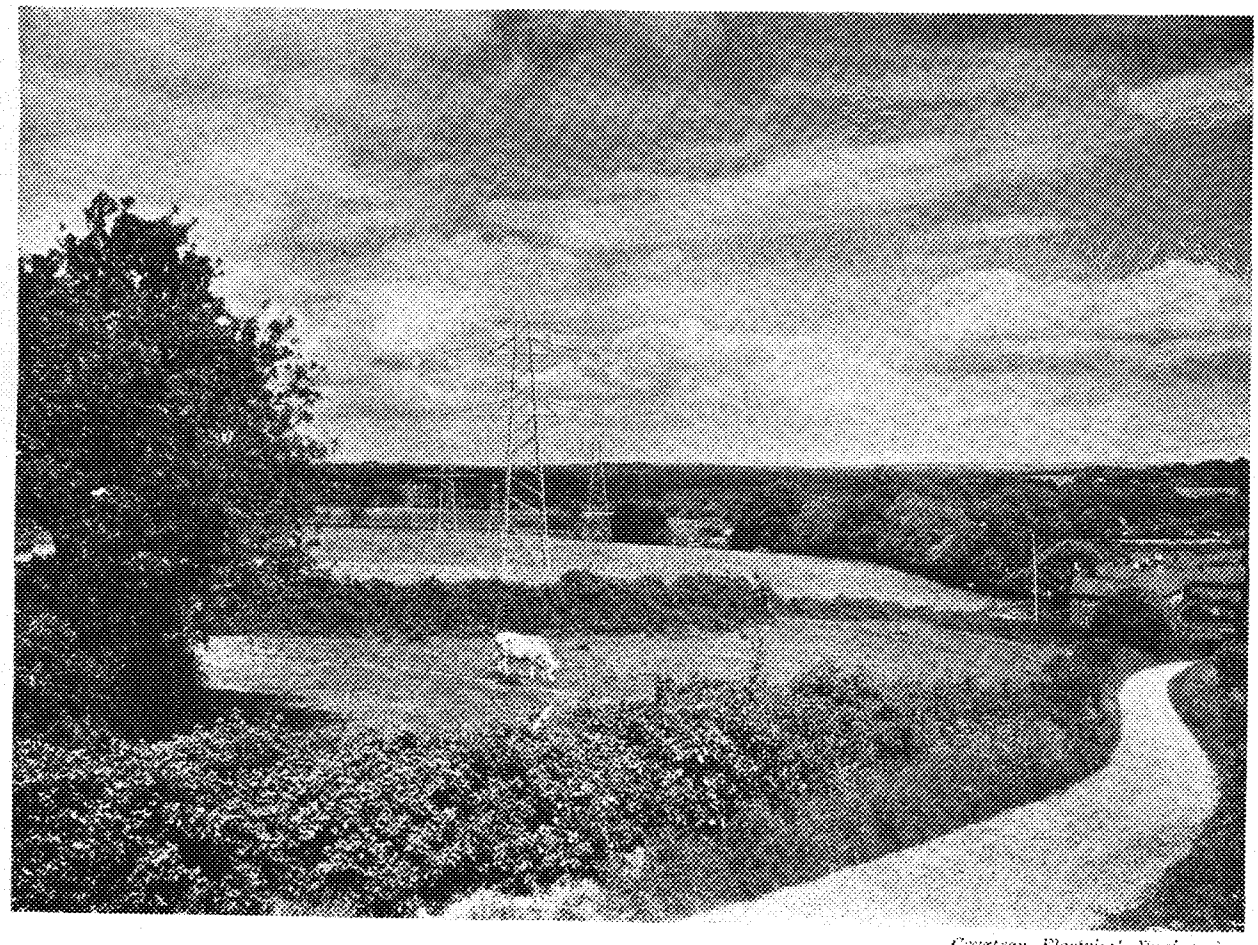

Courtesy Electrical Engineering.

The tall towers of the British distribution system carry power to all parts of England.

art of navigation develops from

Lodestone to Gyrocompass

By WAYNE STONE, M. E. '36

> 'This (polar) star does not move. They (the sea-'men) have an art, which cannot deceive, by virtue 'of the *manete*, an ill-looking brownish stone, to 'which iron spontaneously adheres. They search 'for the right point, and when they have touched 'a needle on it, and fixed it on a bit of straw, they 'lay it on the water, and the straw keeps it afloat. 'Then the point infallibly turns toward the star; 'and when the night is dark and gloomy, and 'neither star nor moon is visible, they set a light 'beside the needle, and they can be assured, that 'the star is opposite to the point; and *thereby the 'mariner is directed in his course*. This is an art, 'which cannot deceive.' (Guiot, ap. Fauchet, Recueil de la langue et poesie Francaise, From Macpherson, "Annals of Commerce.")

This rather quaint quotation of a sailor during the twelfth century describes the first use of a magnet to indicate direction at sea. The principle of operation was the same, however, as is used in the compasses that direct our modern liners across the oceans. There were many inaccuracies present in the earlier compasses that have been either eliminated or compensated. Probably the greatest is variation. The fact that the north magnetic pole does not coincide with the north geographic pole introduces this variation. Local conditions, such as iron deposits or magnetic disturbances, also introduce errors. These variations have been very carefully determined for all locations and charted so that the present day mariner may know exactly what the local variation is and may correct for it on his compass. The sailor must know the date of the chart that he is using and the rate of change of variation of the locality as the position of the magnetic poles is constantly changing. This rate of change also varies for different localities.

The advent of steel ships introduced another error in the compass. This error, caused by the magnetism of the ship itself, is known as deviation. The steel vessel will possess a permanent magnetism induced by the pounding to which the structure is subjected in the process of construction. The direction of this magnetism depends on the angular position of the ship relative to the direction of the earth's magnetic field in the locality in which it was built and is permanent. An additional magnetism is induced in the ship by the magnetic lines of force of the earth. This magnetism is variable in direction and depends on the heading of the vessel at the moment. These deviations may be permanently corrected by means of bar magnets placed below the compass. Quadrantal deviation is caused by the distortion of the lines of force of the earth's magnetism as it passes through the ship's steel when the vessel is on a heading at an angle to the north-south or east-west direction. This deviation is corrected by means of the induced magnetism in two hollow spheres of soft iron placed one on either side on the compass on the athwartship line through the compass.

There are slight errors in the compass due to difference of latitude, heeling of the ship, temporary magnetism acquired when the ship keeps a certain course for a length of time, and different cargoes. These are not permanent and cannot be permanently corrected. Correction charts of these errors are made before each sailing and the correction applied when the compass is read.

If the sailor knows, by means of his compass, the direction sailed, he has then only to find the distance traveled from a known location in order to find his present position. This method of finding position by direction and distance traveled is known as dead reckoning.

navigation by dead reckoning

The first method of finding the distance traveled was by dropping a chip of wood or other floating material overboard at the bow and measuring the time necessary for the chip to pass a definite length on the boat's side. This method of speed measurement was very crude and inaccurate. The chip log was later

invented. This device consisted essentially of a triangular board, weighted at one point, and fastened by a line at the three corners. This was thrown overboard at the stern and the amount of line to run out during a certain time was measured. The name "knot" for nautical mile per hour came from this chip log. A knot was tied at intervals of 47 ft. 3 in. along the line and the number of knots that was drawn off the stern of the boat while a 28-second sand glass ran out was the number of "knots" the vessel was making.

The taffrail log (so called because it is fastened to the taffrail of a vessel) consists of a rotator with spiral fins, the rotation of which is transmitted, through the log line by which it is towed, to a meter that is calibrated to register miles. Modern ships compute distance traveled by a counter on the propeller shaft.

But even with a log and compass, corrected and compensated to eliminate as many errors as possible, small errors creep in and accumulate so that the captain may not find himself where he expected to be at the end of a long voyage. The necessity arises to find his position when he is at sea and far out of sight of land. It is a comparatively simple procedure to find latitude (distance north or south of the equator). An observation of a star or the sun is made to determine the altitude of it when the body observed is on the meridian of the observer. The declination or angle of the body above the equator may be found from the nautical almanac and from these two angles the angle of the vessel from the equator may be found. This angle is the same as the latitude in degrees and may be converted into miles.

It was the invention of the sextant that made position finding at sea possible. The sextant is a complicated appearing instrument and is considered by many persons to border on "black magic" in its operation. In reality a sextant is most simple in construction and operation. It consists of a movable mirror which catches the rays of the sun, reflecting them onto another glass that is half silvered. The observer looks through a small telescope at the half silvered glass, centering the horizon as it appears through the unsilvered half, and adjusting the upper mirror so that, in the silvered half of the lower glass, the sun appears to lie on the horizon. The angle of the sun above the horizon is obtained from the angle of the upper movable mirror. Correction is applied to the sextant for parallax and refraction.

sextant permits position finding

The problem of finding longitude (distance east or west of the prime meridian) was for many years unsolved until John Harrison invented in 1761 a timepiece of far more accuracy than had before been used. This timepiece was not a chronometer, as the word chronometer describes a type of movement in a timepiece that has since been developed. By using the dead reckoning latitude and noting the time of observation, the position may be calculated. This observation, however, must be taken when the body observed is on or near the prime vertical (due east or west of the observer) or the errors in the dead reckoning latitude will make a large error in the longitude.

In 1837 Captain Thomas Sumner made a discovery which added much to the advancement of navigation. He was making a voyage across the Atlantic and ran into cloudy weather for several days preventing all observations until he was near the coast of England. One morning the sun was visible long enough for a sight to be taken. His position was computed with this sight and his dead reckoning latitude. He realized that his dead reckoning latitude might be in error and as he was near a dangerous coast he figured another position using the observed values of time and altitude but making use of a latitude ten miles farther north than his dead reckoning latitude. A third computation was made using another latitude ten miles farther north than the second computation. When these three positions were plotted on the chart they were found to lie on a straight line. He correctly surmised that his ship was somewhere on this line.

If a person should stand at a distance from a pole of known height and measure the altitude, a circle may be drawn around the pole with a radius equal to that computed from the altitude and height of the pole, and it is evident that the observation must have been taken from some point on this circle. If the observer obtains the altitude of another pole from the same place, another circle may be drawn around the second pole intersecting the first circle at the observer's position. Thus the observer's position may be found relative to the two poles. The method of finding position by the Sumner Line of Position

cap'n sumner's line of position

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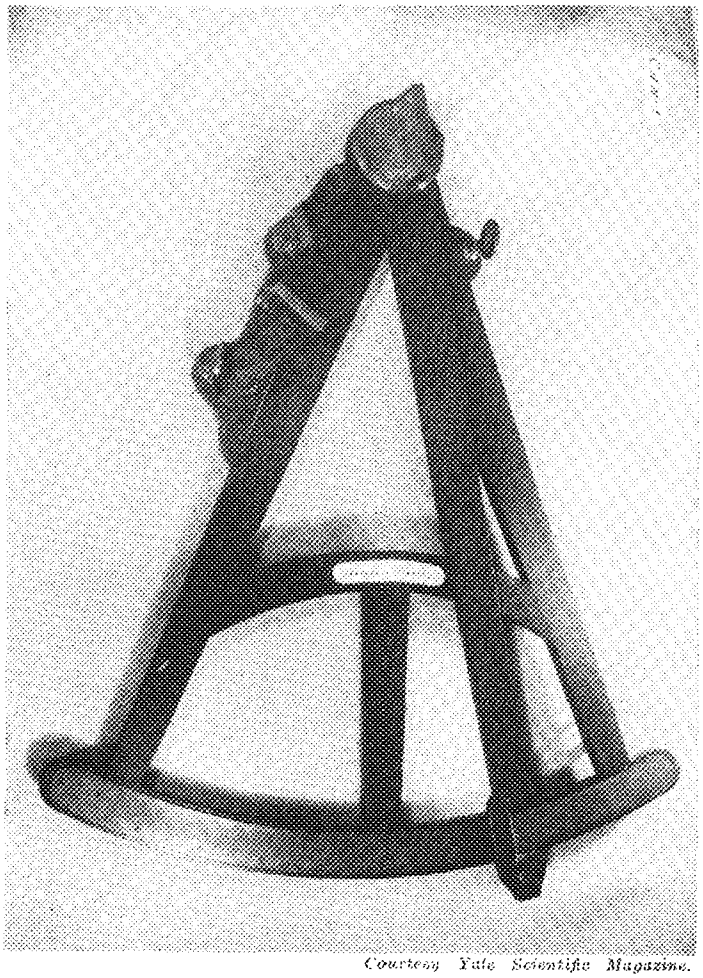

Courtesy Yale Scientific Magazine.

The octant, one-eighth of a complete circle, was an early forerunner of the sextant.

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Finding a Job

MR. SAMUEL L. BOARD, a placement specialist of New York, wrote a very interesting article for the November "Mechanical Engineering." In it he discussed that subject most important to the engineer, "Getting a Job." He took up the problem thoroughly, analyzing each step in the process.

Getting work, especially in these times, has become one of the most important things which the engineer must consider. It is not enough to merely have something that an industry needs in order to obtain work with it, you must sell your services. Real salesmanship is required to overcome the sales resistance of the personnel manager who can employ only a few men each season. Not all engineers can take courses in selling, but they can take the time to read the advice of men who are experts in placement and follow the precepts which those men have found useful in job-finding.

We advise that when you have a little time you go up to the engineering library and read the article. It presents a complete plan for getting work. Mr. Board traces each step, from self-appraisal to the personal interview with the prospective employer. The engineer simply cannot afford not to know this and Mr. Board's article tells how it should be done.

Are Engineers Busy?

Engineers are always complaining that they have so much work to do that they have no time for anything but study. While it is true that engineering is an extremely exacting course, it is not less true that many engineers find time to participate in school affairs.

Probably the best example that we can offer just now of an engineer who has time to get into extra-curricular activities is Glenn Seidel. In addition to getting good grades as a mechanical engineer, he finds time to call signals for a National Championship Gopher football team. Neither accomplishment is one that can be overlooked. We have an idea that a good many other engineers could do as well, not in football, perhaps, but in things which interest them.

Seidel isn't the only example. The University band has a large percentage of engineers. The technical college has representatives on the hockey team. An engineer edits the 1935 Gopher. In the past, engineers have excelled in many sports and other activities. And most of them have made good showings on the grade-books.

It doesn't seem possible that there is something about engineers that makes them uninterested in activities. It is more probable that they have simply convinced themselves that they are too busy to do the things they would like.

Twenty-five cents each will be given to the first four men bringing copies of the January, 1934, Techno-Log to our office. They are needed to complete our files.

Honoraries Hold Fall Initiations

TAU BETA PI

Fifteen upperclassmen were initiated in Tau Beta Pi, honorary engineering fraternity, at the formal initiation ceremonies held at the Commodore Hotel in St. Paul, Wednesday, December 5. The informal initiation was held Wednesday, November 28 in the Mechanical Engineering Bldg.

Sherman Pease ..... **Mines '36**
Harry Baker ..... **C.E. '35**
Arnold Cohen ..... **E.E. '35**
Earl Diekhoff ..... **E.E. '35**
Frank Govze ..... **Ch. E. '35**
Stuart Harrison ..... **Ch. E. '35**
Edwin Hartzmann ..... **M.E. '35**
Donald Ingvolstad ..... **Mines '35**
Howard Kahn ..... **Ch. E. '35**
Leonard Ostergren ..... **E.E. '35**
Herman Pusin ..... **Aero. E. '35**
Clayton Rasmussen ..... **Mines '35**
Albert Savage ..... **Ch. E. '35**
Boyd Stephens ..... **Aero E. '35**
Leonard Willis ..... **M.E. '35**

CHI EPSILON

The banquet and formal initiation of Chi Epsilon, honorary civil engineering fraternity, was held Thursday, December 6, at the Andrews Hotel. The Minnesota Union was the scene Saturday, December 1, of the informal initiation.

Thomas Ruth ..... **'36**
Gene Cutts ..... **'36**
Frank Kempe ..... **'36**
John Gislason ..... **'36**
Chester Hanson ..... **'35**
George Perham ..... **'35**

ETA KAPPA NU

Eight juniors and seniors were initiated into Eta Kappa Nu, honorary electrical engineering fraternity, at a formal banquet and initiation held at the Curtis Hotel, Monday, December 10.

William Bradstad ..... **'36**
Russell Nielson ..... **'36**
John Wentz ..... **'36**
William Smith ..... **'36**
Arnold Cohen ..... **'35**
Justa Erickson ..... **'35**
Frank Kokesh ..... **'35**
Lyle Scott ..... **'35**

PHI LAMBDA UPSILON

Phi Lambda Upsilon, honorary chemical fraternity, held an initiation party and banquet Thursday, December 13. Dr. W. M. Sandstrom, assistant professor of biochemistry, was toastmaster. The speaker of the evening was Dr. R. A. Gortner, chief of the division of biochemistry, who talked on "Scientific Genealogy."

Associate
Dr. C. O. Rost, Assoc. Prof. of Soils
Actives
Reginald Beckwith ..... **Pharm. '35**
Milton Desnick ..... **Pharm. '35**
Herbert Roufs ..... **Pharm. '35**
Nathan Shapiro ..... **Pharm. '35**
Ralph Frederickson ..... **Ch. E. '35**
Frank Govze ..... **Ch. E. '35**
Stuart Harrison ..... **Ch. E. '35**
Howard Kahn ..... **Ch. E. '35**
Kenneth Ray ..... **Ch. E. '35**
Albert Savage ..... **Ch. E. '35**
Allen Martin ..... **Chem. '35**

PI TAU SIGMA

The fall banquet of the Minnesota student chapter of Pi Tau Sigma, honorary mechanical engineering fraternity, was held Wednesday, December 12 at the Radisson Hotel. Prof. Hugh B. Wilcox was the toastmaster for the evening.

William Weber ..... **'35**
Wallace Andeen ..... **'36**
Milo M. Bolstad ..... **'36**

Chemistry, Physics Groups Experiment On Heavy Water

Experiments in the concentration of heavy water have been started in the School of Chemistry, following a suggestion of Dr. H. C. Urey, winner of the 1933 Nobel award in Chemistry. Heavy water is a compound of oxygen and deuterium, the newly-discovered isotope of hydrogen. Doctor Urey spoke recently on the subject of isotopes and heavy water before the Minnesota division of the American Chemical Society, the local chapter of Sigma Xi, and the regular colloquium of the Chemistry school.

A preliminary apparatus is being used by the physics department to ionize deuterium. The ionized atoms of the isotope are used to bombard light elements such as lithium and beryllium. The impact disintegrates the light elements and the products are identified either in a cloud track chamber or an air chamber. If the air chamber is used the particles are counted by amplifying the surge of air accompanying the disintegration.

Construction of a larger apparatus has been begun under the direction of Dr. J. T. Tate, Dr. William Wells, and J. H. Williams. The apparatus operates on the principle of an X-ray machine and will require a 700,000 volt condenser. With the larger apparatus greater charges will be possible and heavier targets can then be used.

Glee Club Ready For Engagements

Under the direction of Jack Griebenow, president of the University Singers, the Technical Glee Club is building a repertoire of songs and specialty acts such as double piano, trio, and quartet numbers for their coming engagements. The glee club has a very interesting program this year including engagements off, as well as on, the campus.

Membership is unrestricted and the executive committee, headed by William O. Johnson, the glee club's president, urges anyone interested to come to the weekly practice, which is held in the auditorium of the Main Engineering building at 7 p.m., on Wednesdays.

The advisers of the glee club are Otto Zelner of the Civil Engineering department and Earle Killeen, head of the Music department of the University.

Malkerson Speaks At Chicago Meet

Agricultural engineers make better salesmen of farm implements than do other engineers, Lester Malkerson told the national convention of the Power and Machinery division of the American Society of Agricultural Engineers in Chicago, Tuesday, December 4. They know the problems of the farmer better, he explained, and their engineering training is thorough enough so that they also have the mechanical knowledge necessary. Malkerson, who is national president of the A.S.A.E. student division, was accompanied to Chicago by Prof. William Boss.

The convention was held in conjunction with the national convention of the Tractor and Industrial Power division of the Society of Automotive Engineers. Monday and Tuesday were devoted to the A.S.A.E. and Wednesday and Thursday to the S.A.E. A. W. Lavers, Chief Engineer of the Minneapolis-Moline Tractor division, and professional adviser to the Minnesota branch, was chairman of the A.S.A.E. convention.

E. E.'s to Make Club of Museum

The A.I.E.E. and Eta Kappa Nu are working together to transform the "museum" in the Electrical Engineering building into a club room for electrical engineers. At a meeting of all E.E. students it was voted almost unanimously to assess each E.E. a sum of fifty cents to help pay for this project. Letters will be mailed to alumni in an effort to enlist their support. It is expected that work will be started on this room during Christmas vacation.

British Grid Plan

(Continued from page 49)

ating plants, each plant operated to satisfy its own small part of the large consumption of electricity. Therefore, many different types of generators were used, developing as many kinds of electricity. As the consumer's equipment was designed to fit the kind of electricity available in the locality, this same kind of electricity had to be generated at all times.

In order to have all of the consumers use electricity from the grid system, the generating stations had to be standardized in the kind of electricity generated. Many generating plants were put out of use for this reason. Also, many of the generating stations were in poor localities and the cost of generation was high. One of the reasons for the grid was to place the generating plants in the most economical locations. This also put many of the old stations out of use.

Large generating stations were installed at the best generating localities, and some of the old stations that complied with all requirements were kept in use. The results finally obtained are, that the generating stations are standard in the kind of electricity they produce, and the stations are located in the most economical localities.

With a new grid system being installed in Great Britain, it was necessary to install new transmission lines. Under the old system of many small generating plants, transmission lines were not needed. The towers used throughout were the standard type. Standard extension pieces of 10 ft., 17 ft. 6 in., and 25 ft., were provided for each type in order to meet the irregularities of ground contour. Foundations of the concrete-ball type were used for the suspension towers, and single-circuit, medium-angle towers where the ground conditions permitted. Normal concrete foundations were used whenever the ground was unsuitable for excavating the holes for the concrete ball

type, and in all classes of ground for the heavy-duty towers.

The transmission towers are composed of galvanized-steel angle irons and plates, and all joints are secured by means of bolts. The British design of the towers is semi-flexible as opposed to the rigid structures commonly

(Please turn to page 61)

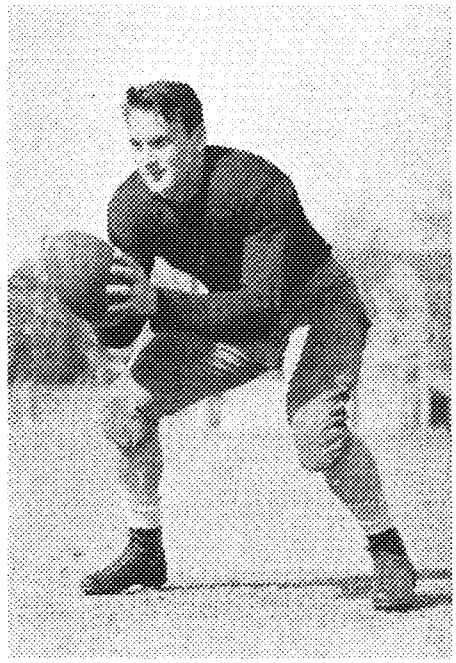
Electricals Inspect Minneapolis Beer

On November 14 the A.I.E.E. sponsored an inspection trip through the Minneapolis brewery in Minneapolis. The tour was for scientific purposes even if free beer was advertised as an added attraction. At any rate, some fifty or sixty electrical engineers feel that they know something about the delicate art of brewing that golden beverage known as beer.

Bob Clifford won the membership drive which ended November 30 by signing up 23 new members. The A.I.E.E. is planning a smoker and membership drive for freshmen to be held at the beginning of the next quarter. There is some prospect of reduced rates as an inducement for freshmen to join for the remaining two quarters.

Seidel, Mechanical Engineer, Captains '35 Gopher Eleven

Glenn Seidel, junior mechanical engineer, has been chosen captain of the 1935 football team. The awarding of the honors and the naming of the new captain took place November 27 at the annual football ceremonies held in Northrop Auditorium. Pug Lund, incumbent captain, passed the symbolic torch of leadership to Seidel as part of the ceremonies.



Seidel is a capable quarterback whose brainwork in calling signals aided the Minnesota team in acquiring the United States Championship for 1934. He is well liked by both his teammates and associates. Bernie Bierman, head coach of the team, cast aside his usual reticence and said, "Glenn Seidel is the smartest quarterback in the United States." Pug Lund stated, "I have no doubt that Glenn has the qualities of leadership and the friendship and respect of his teammates, all of which will enable him to be one of the finest Gopher captains Minnesota has known."

Chem. Engineers Visit Sugar Works

On November 24 the mysterious processes of sugar making unfolded themselves before the student chapter of the American Institute of Chemical Engineers when they visited the Chaska plant of the American Beet Sugar company. The entire process from raw beets to finished sugar was observed. Transportation of the beets from the bins to the sugar juice extractors; carbonation and liming of the raw juices; filtration and sulfitation of the pure liquor; concentration of the liquor in quadruple effect evaporators; crystallization of the sugar in vacuum pans; and finally, separation of the sugar crystals from the mother liquor by centrifuging were observed. Banks of rotary driers, both of the direct fired and of the heated air types, were seen in operation. Other interesting chemical engineering equipment inspected was a vertical lime kiln and a sulfur burner. The group was very fortunate in having as its guide Mr. Francis Calton, Ch.E. '31 and former president of the chapter.

Al Novak and Harry Cottingham created a sensation by appearing at the end of the trip with steaming kettles of hot dogs, buns and cake.

Three Societies See Movies Of Boulder Power Project

Under the sponsorship of the Minnesota Chapter of the American Society of Civil Engineers, a joint meeting with the A.I.E.E. and the A.S.M.E. was held November 27 in the Chemistry Auditorium. The purpose of the meeting was to present five reels of motion pictures and a number of slides on the Boulder Dam project.

A near-capacity audience of about five hundred people attended the meeting. At a previous showing before graduate engineers the subject proved of such interest that Prof. Alvin S. Cutler of the civil engineering department sent a special telegram to Chicago to book the films for presentation before the student organizations.

Mr. A. J. Leighton, representing the Babcock and Wilcox Company, which furnished the films and the slides, was introduced by Everett Enns, president of the local chapter of A.S.C.E. Mr. Leighton explained the features of the Boulder Dam project as the slides were presented, after which the motion pictures were shown.

A complete tour of the Boulder Dam project, together with a visit to the steel fabrication plant of the Babcock and Wilcox Company, were included in the film. Every phase of engineering on the project was shown.

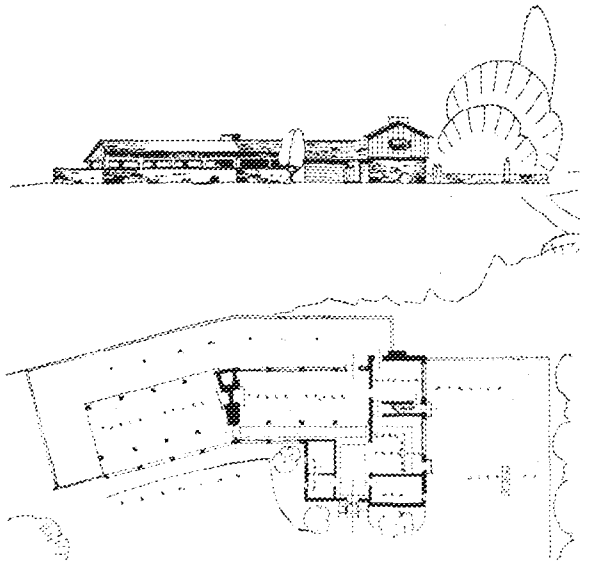
The membership drive of the Minnesota Chapter of the American Society of Civil Engineers has been nearly completed, and the roll shows the largest membership the local chapter has ever enjoyed, according to officers of the organization. The seniors have responded 100 per cent and the juniors over 70 per cent. A large percentage of the lower classmen have signed up also, but the total has not been announced to date.

"From Rameses to Rockefeller"

By Gerhard Brandhorst, Arch. '37

THE latest to join the long line of architectural histories is Charles Harris Whitaker's "From Rameses to Rockefeller," published as Random House's first effort along professional lines. The ordinary histories usually concern themselves with a very technical discussion as to the mathematical proportion of a column and methods of piling one stone upon another. They do not generally attempt to find the degree of relation between architecture and contemporary life, economics, sociology, religion, and so forth. Mr. Whitaker, on the other hand, approaches his subject from this angle.

Probably because of his long study of the effects of land speculation upon architecture, Whitaker blames what he calls "landlordism" for the decay, which began with the Renaissance, of the art of architecture. With the Renais-



sance there began a new interest in man as himself instead of part of a mob. This naturally led to the individualism we know today.

But the real cause of the disappearance of the type of architect and craftsman that reached its height in the building of Gothic cathedrals was probably something different. The cathedrals were a product of faith which gave them their deeply emotional quality. The knowledge which the designers must have had to construct, for instance, their great vaults, was only a means to an end. The buildings of the Renaissance were, on the other hand, motivated not by any such feeling, but by what seems to have been a mere desire to display, while attending the needs of man, the period's new found knowledge.

It is more to the fall of the emotional concept than to the rise of "landlordism" that the decay of architecture is due, I feel, contrary to Mr. Whitaker's thesis. But after all, this entire art or business of architecture is so relative that one man's opinion may be as worthless as another's. Regardless of opinion, one must admit the excellence of the illustrations and the usual high standard of Random House typography.

Seniors to Compete With Armour, Cornell

The architectural department of the University has just begun a practice prevalent among Eastern architectural schools, that of holding inter-school competitions in design. The competition between M.I.T., Harvard, and Princeton are traditions of long standing. It is an excellent idea in that by it one may compare the trends of thought in schools throughout the country.

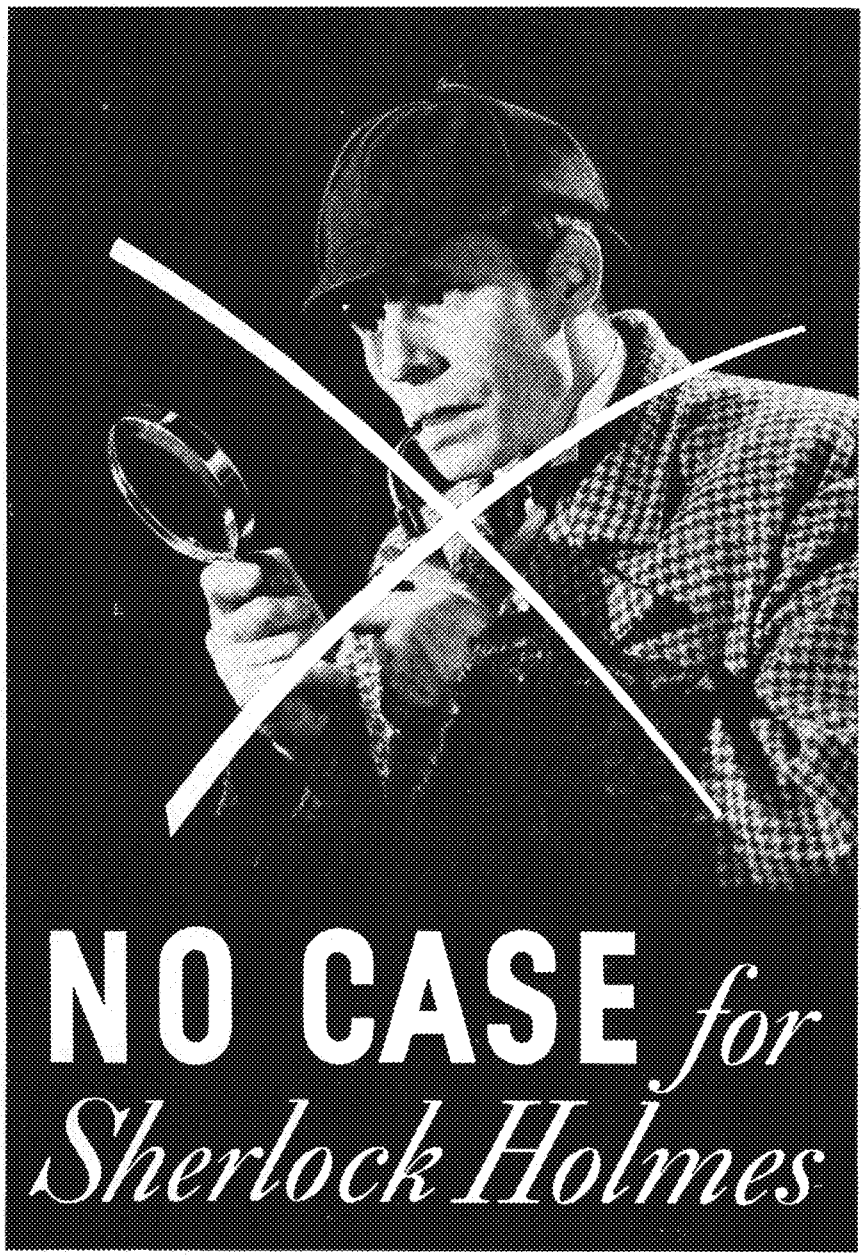
The problem which was given out here on December 3, 1934, will be given at the Armour Institute of Technology at Chicago and the Cornell School of Architecture at Ithaca, New York. The problem, given as a regular major *projet*, is the design of an Agricultural Exhibition Building at a World's Fair, to be situated on a peninsula overlooking a lagoon. It includes an auditorium and exhibition space for eight divisions of agriculture.

The rendu is to be finished by January 19, 1935. The problems will be judged in each school according to individual methods of selection. Each school will send the two best problems, two average ones, and one poor one in an exhibition which will be hung in each of the three schools.

Grade II Designs A Roadside Tavern

Proof that the study of architecture is not always confined to elaborate and formal buildings is given by the problem illustrated here. This "Roadside Tavern," the first short *projet* in Grade II design, is a structure of the most informal character, with few limitations set upon the designer's imagination by the program. On a site between the edge of a bluff and an important scenic highway there was to be built an attractive place dispensing refreshment to both the tourist and his automobile. The eating arrangement was to include both table and counter service. Almost every designer took advantage of the site by providing some sort of outdoor dining space overlooking the magnificent panorama of mountains and valleys. Since the choice of the location of the site, and the type of architecture and materials was a matter of personal preference, the final designs ranged all the way from modern concrete and glass extravaganzas to Southwestern adobe buildings.

The problem illustrated here, done by Gerhard Brandhorst, was commended for its simplicity, both in scheme and in presentation.



NO CASE *for* *Sherlock Holmes*

No detective work is needed in locating the dealer who sells what you want. Just look in the "Where to Buy It" section of your telephone book!

There, local dealers are listed beneath the trade marks of many advertised products —such as Philco, Greyhound Lines, Willard Batteries, Buick and Goodyear. Besides helping you find easily and quickly the brand you want, this service helps manufacturers check substitution, helps dealers increase sales.

"Where to Buy It" is just one of many services pioneered by Bell System men to increase the value of telephone service.

Why not say "Hello" to Mother and Dad tonight? Bargain rates on station-to-station calls after 8:30 P. M.

BELL TELEPHONE SYSTEM

Depression is Over, Say Alumni

Just as it is news when a man bites a dog, so is it news when we hear that someone is looking for an engineer who wants a job. **Emil F. Norelius** M.E. '08, writes that he is looking for two "A" students of mechanical engineering to work with him at the Allis-Chalmers Manufacturing Company in Springfield, Illinois. And more depression-is-over news. "There is no unemployment in the life insurance business," writes **F. A. McCartney,** M.E. '13 whose address is 1400 Union Guardian Building, Detroit, Michigan.

But every silver lining has a cloud. Here's bad news for it may happen to all of us. "Curly" Lund is gone: he is just plain **Earl H. Lund,** C.E. '23 now, for he says "My hair is getting slightly thin. The curls are all gone so 'Curly' Lund of 12 years ago is no more." And more bad luck. **Robert Ludlum,** E.E. '25 has just returned to work after a three months absence due to a fractured vertebra and temporary impairment of vision as a result of a fall from a second story deck at the plant of the Douglas Aircraft Corporation at Santa Monica, California.

Harold Mattlin, C.E. '34 is working on the new national park being built east of Hinckley on the St. Croix River. This is the same country Prof. Zelner tells some of his famous stories about. Another government worker is **James Ringwood,** C.E. '28 who is working with the United States Coast and Geodetic Survey at Stillwater, Oklahoma. His home is at 2095 Dayton Ave., St. Paul. Another surveyor, **George A. Nelson,** C.E. '25, is engaged in the Aleutian Islands survey in Alaska. His office is 601 Federal Office Building, Seattle, Washington.

Among those who attended the Chicago game was **Edward Leach,** C.E. '10, who is now manager of the Minnesota mines for Pickands-Mather and Co. Mr. Leach is married and has seven children; three boys and four girls. He began his career as a civil engineer on the Mesabi range for Butler Brothers Contractors of St. Paul in 1913, and in 1914-15 he branched off into municipal work, later going back into mining and now he operates eleven mines on the Cuyuna, Mesabi, and Vermillion ranges. He has a son, Edward P. Leach, who is a sophomore in the School of Mines.

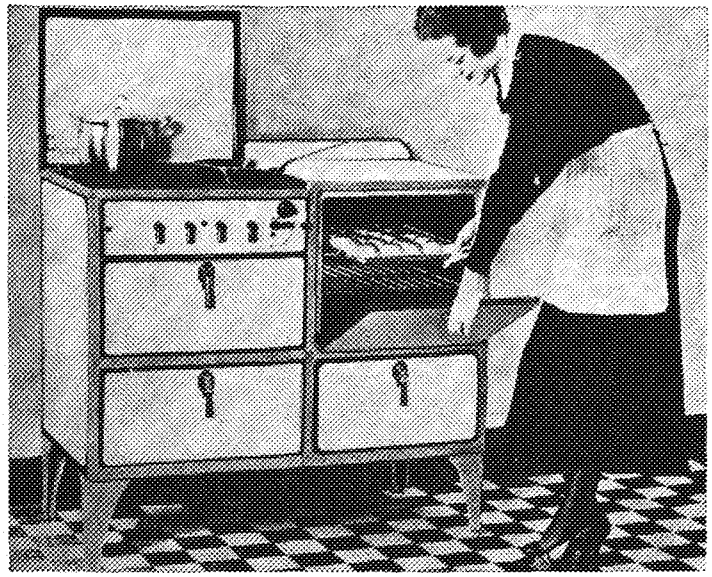
Harley R. Langman, M.E. '24 says that the Procter and Gamble Co. is the best company on earth to work for. He has been with the company since his graduation. He lives at 907 North Hills Drive, Normandy, Mo.

Erling B. Saxhaug has turned barrister on us. He recently graduated from the Georgetown Law School in Washington, D. C. Erling is an E.E. of the 1929 class. His address is 1524 Monroe St.

In February, 1934, **Clare C. Stout,** C.E. '33, began working for the Hardware Mutual Casualty Company. He has been promoted recently to divisional sales correspondent.

The chief draftsman for the J. Clark Company is **Sidney L. Stolte,** Arch.E. '27, of 397 Third Avenue South, St. Cloud, Minnesota. He is working on a million and a quarter dollar court house in New York City.

E. M. Ostland, E.E. '31, has just returned from Soviet Russia and now lives at 84 Mount Pleasant Avenue, Newark, New Jersey.



MOTHER USED TO MAKE THEM—You expect good things to eat from the modern gas range that combines beauty with convenience and economy in cooking.

Progress Means Change

Oxy-acetylene Welding Helps Stove Manufacturers and Others Overcome Initial Factory Costs of New Models

G. O. CARTER*

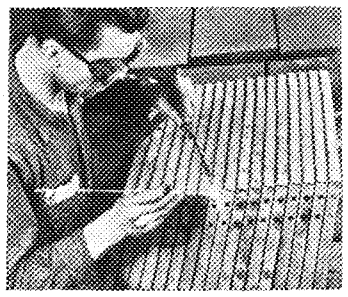
Once, there were no other means of fabricating metal products except through huge investments in patterns, dies and special tool equipment. Naturally, it was logical for the plant to resist Sales Department pressure for too frequent design changes. Capital investment had to be amortized first.

Now, it is no longer necessary to place this handicap on the sales organization and keep it fighting for sales counter to consumer demands.

Welding Lowers Cost of Stoves

Modern gas ranges, for example, are assembled from a considerable number of enameled sheet steel panels of different sizes. Former manufacturing methods required a set of dies for each panel. The total investment in dies for an ordinary stove in many cases involved several thousand dollars. With such a large investment factories were naturally reluctant to make any change involving the scrapping of dies until enough stoves of a particular model had been manufactured to absorb their cost.

Many large gas range manufacturers now use welding in the fabrication of stove panels and eliminate the necessity for dies. The sheet steel is cut to required size on standard shears; the corners punched out on standard machines; the edges turned up on standard brakes and—the corners are welded.



INVISIBLE JOINTS — Welded corners make a sturdier stove — eliminate chipping of enamel in assembly and in use.

Welding Is Modern

By adopting welding and cutting these manufacturers have largely eliminated factory resistance to consumer change. This flexible means of production easily permits improvement in current models, or redesign without serious breaks in plant operation, or increased capital investment.

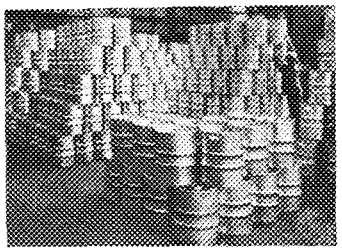
The total cost of operation by the new method is not only lower but it is now possible to follow consumer demand quickly without the necessity of scrapping expensive equipment.

Used in Many Industries

The experience of the stove manufacturer is duplicated in many industries. Redesigning metal products and equipment for welded construction has resulted in increased strength, utility and permanence. It has been adopted for metal furniture, loud speakers, refrigerators, display signs, sheet metal desks, stainless steel barrels, hoes, truck bodies, and numerous other articles. Welding is applicable to the widest range of materials—steel and the ferrous alloys—aluminum, brass, bronze, and practically all other non-ferrous metals and alloys. Welding is ideal for applications where smooth, invisible joints are necessary for enameling.

Wealth of Experience

The application of oxy-acetylene welding and cutting to your production problems need not be deferred because it may seem difficult. Linde Development Engineers will work with you and offer valuable engineering assistance in product design—or redesign. The Linde organization can focus upon the problems of one user the combined experience of thousands and day-by-day discoveries of a large research staff. It may be able to help you. Consult the nearest Linde Sales Office—without obligation. Linde Sales Offices are located at Atlanta—Baltimore, Birmingham, Boston, Buffalo, Butte—Chicago, Cleveland—Dallas, Denver, Detroit—El Paso—Houston—Indianapolis—Kansas City—Los Angeles—Memphis, Milwaukee, Minneapolis—New Orleans, New York—Philadelphia, Phoenix, Pittsburgh, Portland, Ore.—St. Louis, Salt Lake City, San Francisco, Seattle, Spokane, and



JOINTLESS AND STAINLESS — Welding makes stainless steel barrels practical in more ways than one. It assures strong joints, resists corrosion, and does not affect the contents.

Tulsa. Everything for oxy-acetylene welding and cutting—Linde Oxygen, Prest-O-Lite Acetylene, Union Carbide and Oxweld Apparatus and Supplies—is available from Linde through producing plants and warehouse stocks in every industrial center.

*Consulting Engineer, The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation.

Around Vancouver Island

(Continued from page 47)

One morning while Hendry and I were eating breakfast the old man called to us to come and help him as he thought the lines were caught in a mass of kelp. We dashed out to find the port bow pole bobbing back and forth on the verge of breaking. Hendry was just in the act of cutting the line when two giant salmon threw themselves clear of the water astern of us, each with a hook in his mouth. What a sight! What an inspiration for a fisherman! All three of us laid hold of that line, but for some time we had all we could do to hold our own, much less pull it in. Those fish were fighting hard and soon began to tire. As we pulled the line in, there was a fish in air almost constantly and we could see that every hook had a large fish on it. By this time two more of the poles were bobbing, but we had our hands too full to bother with those. We finally got the first fish up alongside the boat, and both the old man and I grabbed it, as it was too large for one to handle. Each fish in turn came in the same way; then out with that line and in with the others, one at a time. Each of these lines had two fish.

salmon come in two at a time

After the third day of fishing we noticed the barometer was dropping quite rapidly, and the sky turned a dirty grey; but we kept on fishing as there were good harbors in the near-by islands. That foolish idea was almost the end of us, for all of a sudden a terrific gust of wind struck and all but laid us over. Hendry held the boat into the wind while his father and I tried to pull in the lines. What a job that was; it was hard work just to stay on deck hanging on with both hands. To pull in the lines we had to wrap our legs around ropes and cables and nearly lie flat. We finally got the lines in, but in an awfully tangled mess. By this time the wind was so strong we couldn't make headway even under full power, so there was nothing to do but turn and ride with it. In just a few hours the waves were piling up fifty and sixty feet above us; that was better for us as we could ride up and over the big ones while the smaller ones crashed all over us. After riding before the wind all that night we managed to pull in behind a small island, Cox Island by name, and were sheltered from the wind enough so we could pull up close and let go the anchor. By evening the wind had changed and the anchor was dragging so we had to hoist it and move around to another point in closer. The ocean was quite calm here, but on each side we could see the giant waves crashing on the rocks, sending up towering fingers of spray as if in their fury they intended to tear the island apart to get at us.

We lay at anchor for two days with nothing much to do except pump out the bilge water every four hours and watch the crashing waves. The third day the barometer rose as promptly as it had dropped, the wind died down, the sun came out, and all that remained were the towering waves which soon turned into smooth rollers.

We fished off Cape Scott one more day and then started back towards Seattle along Vancouver Island, moving at night and fishing during the day. We always started fishing at 4 a. m. and quit at 9 p. m.

After heading into the Strait of Juan de Fuca we stopped a few minutes at the most northwest town of the United States, Neah Bay, and then headed for Seattle.

That night I stood watch from one until five. Hendry had told me to keep close inshore as there was a strong tide setting out, and then he went to sleep on the bench beside me. About three-thirty I was headed straight for our light; probably getting a little drowsy, when all of a sudden I saw a long row of piling right in front of me. There wasn't time to ask questions. I just jerked the reverse lever up, put on full speed, and swung hard to port. Having a reversible propeller the boat can stop in almost its own length. Hendry, of course, woke up but we were safe by that time. The row of piling was a fish trap that extended out into the strait a quarter mile or so. Hendry had expected to wake up before we got there. However, we missed the trap by about a hundred feet so everything was fine.

We docked in Seattle about noon the next day, July 26, and after an excellent restaurant dinner, Hendry sold the fish to one of the warehouses and we unloaded them. There were almost five thousand pounds of nice salmon, with a few halibut and various other fish. The king salmon brought fourteen and a half cents a pound and the silvers, eight cents.

After unloading we went through the government locks, the second largest in the world, and into Lake Washington where Hendry had his private dock. Here I bid a regretful goodbye to my new friends, Hendry, his dad and the boat *Vandal*, and headed for the Y.M.C.A. and a much needed cleanup and rest.

British Grid Plan

(Continued from page 55)

adopted for similar work. The design of the towers also shows a considerable saving of material.

Along the grid, many transforming stations are used to distribute the power from the main grid to the smaller transmission systems. Some of the transforming stations are the largest in the world.

The great weight and bulk of the transformers and oil switches constituted a problem of transport between the places of manufacture and the substations. In many cases, the transforming sites have no railway facilities. The British railway system did not have sufficient clearances and the bridges could not stand the weights of the large transformers. Therefore, for the time being, the transformers are limited to three-phase and 30,000 kva. capacity. This type of transformer was designed for transport on the existing type of car and to comply with the railway company's requirements as to axle weight and loading gauge. This type of transformer can be easily handled on special trucks which were designed for railway transport and for the short road journeys from railhead to substation sites. In some cases, the transformer banks were divided into two sections in order to meet the requirements of the frequency standardization program.

The new standard electricity, in the supply system, is three-phase, at pressure of 132 kilovolts between phases, and a frequency of 50 cycles per second. The factors governing the choice of voltage were the load requirements, transmission distances, degree of security obtainable, and cost.

Many of the generating stations were changed from 25 and 41⅔ cycles to 50 cycles. None of the plans could be carried out before first standardizing the frequency of the system. Many changes of the machinery had to be made. On the 25 cycle networks, all motors were replaced by either new or second-hand motors having twice the number of poles. On the 41⅔ cycle networks, all motors were kept in service in most cases, and the mechanical units to which they were connected have been adapted to deal with a twenty per cent increase in speed.

The construction of the grid was authorized by a Parliamentary Act in 1926, and the entire grid system is in the hands of a Parliamentary Commission. A board known as the Central Electricity Board was appointed to design and construct the grid system. District Engineers are in general control, and all operations are done by local operating engineers in accordance with their decisions. There is a control point in each district from which all operations of the district are carried out or supervised.

grid controlled at central points

The Central Electricity Board was authorized by the Parliamentary Act of 1926 to borrow money up to £33,500,000 ($167,000,000) to carry out the proposed plan. When the project was completed, the cost was £27,000,000 ($135,000,000).

The project provides for cheaper electricity to the consumer. The Board purchases all electricity developed at the selected generating stations, and then sells to authorized utilities which will distribute the power to consumers. From this financial control of the power, the Board will receive revenue to pay for the cost of the new grid system in a period of years.

The British grid system was completed in September, 1933 requiring five and one-half years to build. The last link in the overhead network, and covering a length and breadth of the country, was that at Fordingbridge. There are 4,000 miles of transmission lines, supported by 26,265 towers, 2,894 miles operating at 132,000 volts, and the remainder at 33,000 and 66,000 volts. There are 273 transforming and switching stations in the grid with a transforming capacity of 11,000,000 horse power. The grid system is now loaded at 70 per cent, and in 1940, the output is expected to be 25,000,000 kw.-hr.

system completed september, 1933

Lodestone to Gyrocompass

(Continued from page 51)

is exactly analogous to this. The position of the observed body is known from the time and nautical almanac, and the distance from the observer to the spot directly under the observed body may be calculated from the altitude. Thus a circle of position may be drawn. In actual practice it is only necessary to draw a very small portion of this circle. Since the portion of the circle used is so small, the line may be taken as straight with negligible error.

If, as in the daytime, only one celestial body is visible, two sights on the same body may be taken at intervals of several hours and the line of position, computed from the first observation, carried forward by dead reckoning to the time of the second observation. The errors in the dead reckoning would be negligible during the short interval between observations.

The chronometer is simply a correct time measurer, differing from an ordinary watch in having the force of its mainspring rendered uniform by means of a variable lever. It is also furnished with an expansion balance to compensate for temperature changes. As the accuracy of the navigator's work is largely dependent upon the accuracy of the chronometers, they are treated with great care. They are mounted in gimbal rings so that they remain horizontal as the ship rolls and pitches, and are kept in a permanent position in a special box which is heavily padded as protection against shocks and changes of temperature. Usually three are carried on the larger ships so that a change of rate in one of them will be readily noticed. In spite of the skill in construction and the great care exercised in the use of them, they are not perfect timekeepers; they lose or gain a small amount each day. The amount of this daily loss or gain is known as the chronometer rate. It is more important that the chronometer have a constant rate rather than the rate be small. Even with compensators built into the chronometer, different variations in rate in individual chronometers occur with changes in temperature. This rate is plotted on a chart and the correct allowance is made for the temperature of the chronometer at the time that it is read. Such great care need not be taken with chronometers on ships carrying a radio as the time may be checked at frequent intervals by means of radio signals.

Aviation has induced many developments in instruments because of the special requirements of aircraft. These include computing devices, such as a special slide rule, earth inductor compass, gyrocompass, bubble sextant, second-setting watch, radio direction finder, and radio beacon. Many of these devices have been applied with advantage to water craft. The radio direction finder has been very useful in establishing a position when a short distance from, but out of sight of land. The gyrocompass, with the automatic steerer, is capable of sailing a truer course than the most skilled wheelsman. The pitotmeter log is a device that shows speed, operating on the principle of velocity pressure as indicated by a meter attached to a pitot tube projecting from the bottom of the boat. Weather maps are reproduced on the ship from shore stations by radio. Two new types of depth finders have been invented, one measuring depth by recording the time for a sound wave to travel to the ocean bottom and back, the other measuring the angle of reception at the bow of the ship of a sound wave that is sent from the stern and reflected from the bottom of the ocean. And finally, the sailor's greatest enemy, fog, has, at least partially, been conquered by the infra-red camera which is able to take pictures through fog at a distance far greater than the human eye can see. These pictures are developed, printed, and ready for the pilot to examine before the ship has advanced more than a few feet from its position when the picture was taken.

modern devices for navigation

A Day at Civil Camp

(Continued from page 45)

ters. Essen and Roger Harring are working on their triangulation quadrilateral and whereas the final results may not be the best, we suspect that the men will be greatly improved in their work with seven place logs. Over at the drafting table sits O. K. Wright who is making the final tracing of the proposed Boys' Camp map. The Civil camp was asked to map this land up the east shore of Cass Lake so that it might be studied for the location of the buildings, swimming beach, etc., of the proposed Boys' Camp. The draftsman is just putting the final touches on what looks to be a fine piece of work in both field and office. Over in one corner sits our friend Johnson, (remember him early this A.M.) who seems depressed. It seems as though the same Mr. V. A. Jobuson came in one afternoon a week ago, loudly boasting of the fact that he closed a thirty sided traverse, thirty seconds. Which is really good work as a closure in minutes would have been allowable. Why is he feeling discouraged then? Well, for all of a week now, he has been attempting to make the traverse close in latitudes and departures and it is reported on good authority (although no one can get near him) that he is still off 150 feet.

angles o. k., but those departures

The men in camp are getting ready to eat lunch in the mess hall and, as the field parties take their lunches with them, we had better stay here. Anyhow we always did like to make our own sandwiches.

The lake is as still as glass and the word comes that there will be a sounding party this afternoon. The equipment: two boats lashed together, the 12 hp. Johnson motor, a drafting board, two sextants, a three-arm protractor, sounding rod and line, and eight or nine men going out for more than just the boat ride. We are told that the party was to have started in the morning, but that the location of some of the shore signals was incorrect on the map (you can bet the map-maker spent a bad morning), thus delaying action till now. The idea is to plot on the map your position and the depth of the lake at that point. The position is located by using sextant angles and the three arm protractor. The depths up to twelve feet are read with a rod, from there on with a sounding line.

We are getting ready to go now and the timer has just called his first "sound." The soundings are taken every thirty seconds and the angles read every two minutes so the

(Please turn to page 64)

A Day at Civil Camp

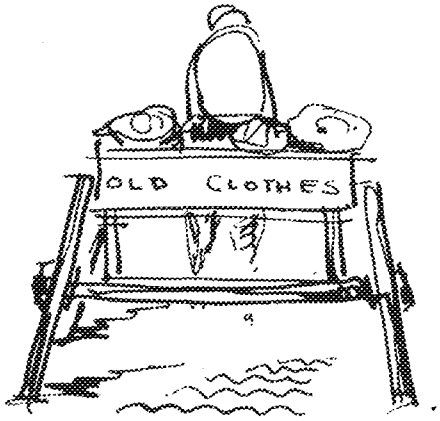
(Continued from page 63)

timer chants as follows: "sound"—"sound"—"sound"—"read." Oscar ("Nail-bender") Englund is playing cowboy with the sounding lead, and if you think it's any joke to throw the lead into about fifty feet of water, pull it up, and have it ready to throw again in thirty seconds, you're dead wrong. Wow! Oscar threw the lead that time but forgot to let the rope out and was almost jerked in. Everything is going all right now and the boat's course appearing in a series of dots on the map assures us that we are going in the right direction. The afternoon draws to a close and we head back for camp with a map proving that the lake has its ups and downs, too.

oscar almost takes a bath

After supper two teams go to work on each other on the volleyball courts; each hoping to be in shape to play teams one or six which are both unbeaten. (Note: The author will be glad to supply the information as to who won the championship.) The Polaris parties have been listed as having the night computations. It seems as though "Back to Health Week" has been proclaimed and the camp settles down for a quiet evening—but no—men come streaming out of Tent 5. They tell of a terrible odor within! Things finally quiet down and we get the story from "a man from Fergus Falls." The men in No. 5 had lit the stove in the tent to take the chill off the air, but soon this unpleasant odor appeared. Now one of the inmates (on the Union Board of Governors, too) being a gentleman and perhaps having somewhat of a guilty conscience, picked up his socks and hung them outside on the line. However, the odor seemed to be getting stronger so the aforementioned politician looked rather sheepishly about, picked up a bar of soap, took his socks off the line, and went down to the lake and washed them. Re-entering the tent a few moments later he sat down with a sigh of relief, but wait, this terrible smell seemed to originate near the stove. Yes, perhaps under it. Upon investigation a large whitefish was discovered that had been very, very dead for at least two weeks. The worst thing was, our friend's socks weren't really dirty, having been worn only two weeks.

The camp turns in and all is quiet (relatively so). Fifty men are spending six weeks that they have looked forward to for three years and will have happy memories of for many more. They are working and studying hard in an effort to achieve some of that practical experience that makes an employee valuable.



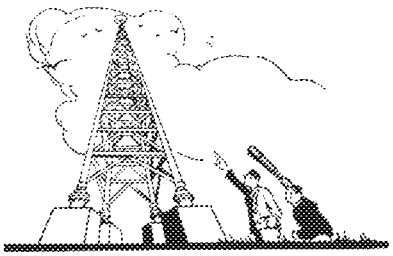
RAGS!

The PRINCIPAL INGREDIENT OF A GOOD PAPER . . . . . .

The finest writing and bond papers are made from new rags, the waste of shirt and garment factories, or old rags from discarded clothes. Cotton and linen fibres alone are usable. Many papers, including newspapers, are made principally of sulphite pulp, a manufactured product of the pulp mill. It is the percentage of cotton or linen used with sulphite that determines the quality and grade of a paper.

Papers made from rags are strong and lasting. They will preserve records despite the ravages of time and rough usage. The paper currency of the United States is printed on rag paper. The priceless historical documents that have lived for centuries also have all been on paper made from rags. The ruggedness of rag papers is due to slow, careful manufacture, quality ingredients, and the inherent strength of the rag fibers from which they are made.

G-E *Campus News*



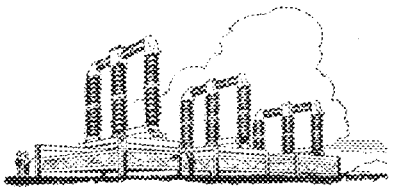
TALKING TOWER

The highest self-supporting tower in the United States used as an aerial is now in operation at General Electric's radio station KOA at Denver. The tower, standing 470 feet high, is a departure from the customary type of radio antenna, where copper wires are stretched in "clothesline" fashion between two towers. It will act as a vertical radiator of radio waves.

With the "clothesline" antenna, a large part of the electric energy released flows directly upward and is lost in space, whereas with the new type of radiator at KOA, a larger quantity of the broadcast waves radiate parallel to the earth's surface.

Slender compared with others of its kind, the tower is but 35 feet square at the base and tapers to two feet square at the top. It will withstand a wind of 125 miles an hour, and its 50-ton weight is carried by four huge porcelain "eggs," which insulate it from the ground.

The new antenna was installed this summer in connection with a new 50,000-watt General Electric radio transmitter.



RECORD-BREAKING BREAKERS

The 287,500-volt transmission lines from Boulder Dam to Los Angeles will be protected by eight General Electric super-speed impulse oil circuit breakers—having higher ratings than any other circuit breakers so far developed. In appearance, the breakers are completely different from previous breakers. They resemble great "E's" lying on their faces. They will be used at a higher voltage than any other breaker. They are rated to interrupt the circuit in slightly more than one-third the time required by previous high-voltage breakers. The most startling fact about the breakers, however, is that the complete units will weigh less than the oil which would be required by a unit of conventional design.

The impulse type of breaker, in which a piston drives streams of oil into the arc paths when the contacts separate, was developed by General Electric engineers at first for electric railway service, where it has proved highly successful.

COFFIN FELLOWSHIPS

Eight technical graduate students resumed their studies this year with the reassuring thought that a good part of their expenses will be taken care of by fellowships granted them by the Charles A. Coffin Foundation, which was established by General Electric in honor of its first president.

The fellowships were granted to: Russell Charles Buehl, Brooklyn Polytechnic Institute, '32, M. S. at Massachusetts Institute of Technology, to study at M.I.T.; Milton G. White, U. of California, '31, to continue study there; Bascom Henry Caldwell, Jr., U. of Texas, '30, to study at Yale; Thomas Benjamin Jones, Johns Hopkins, '33, to continue study there; Sidney Kaufman, Cornell, '30, to continue study there; Leonard Trainer Peckman, Stanford, '33, to continue study there; Arnold Byron Steiner, Stanford, '33, to continue study there; and Clark C. Stephenson, U. of Kansas, '32, to study at the U. of California. All the fellowship winners are carrying on investigations in electrical phenomena; two are specializing in high-voltage research.

In addition to these fellowships, the Charles A. Coffin Foundation annually grants awards for the highest achievements in the utilities and electric railway fields, and honors G-E employees who have made outstanding contributions to the progress of the Company and the industry.

96-85DH

GENERAL ELECTRIC

The MINNESOTA TECHNO-LOG

JANUARY 193
Volume XV Number

Fly to MIAMI
Via CHICAGO

to LOS ANGELES
Via BUTTE and SALT LAKE CITY

A revelation in speed and luxurious travel. Leave the Twin Cities in the morning and arrive at Miami 11 P. M. the same day. California bound, leave in the morning and arrive at Los Angeles next day at 5:50 A. M. Enjoy a fast, smooth trip in large, luxurious, multi-motored ships, with heated cabins, all the way . . Electra to Chicago . . Douglas to Miami . . or Electra to Butte . . Boeing to Salt Lake City . . Douglas to Los Angeles.

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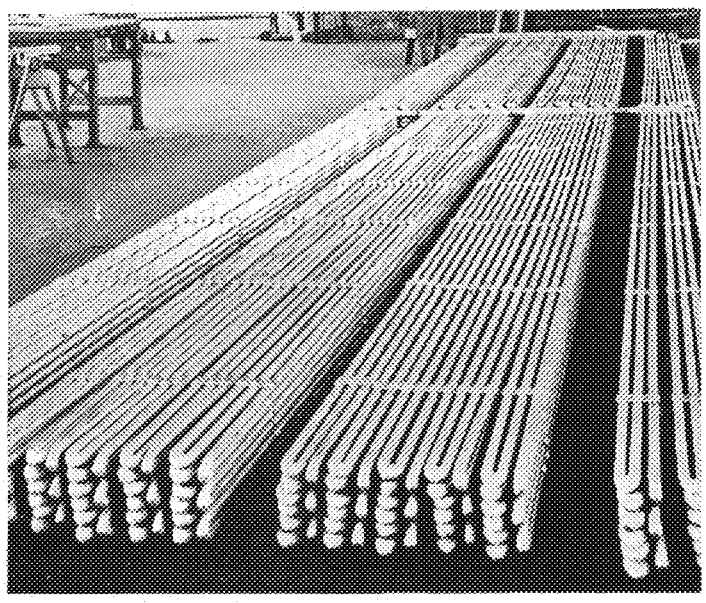


SEVEN HUNDRED WELDS—were needed to make this assembly of aluminum piping.

New Metals Emphasize Desirability of Jointless Design

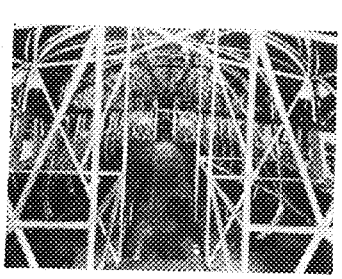
Welding Preferred Method for Fabricating Jointless Designs from New Materials

By H. E. ROCKEFELLER*

Welding is an important aid in securing the full benefit of the newer light weight alloys, corrosion- and stain-resistant steels and other ferrous and non-ferrous metals. Jointless welded designs in these new metals make the finished product attractive in appearance, efficient and economical to use and enable it to be priced salably.

In All Industries

Fabrication by welding can be undertaken without heavy capital expenditures and carried out at low cost. Welding is used in every industry for maintenance, for construction and for the fabrication of many products. The welding of mechanical refrigerators and gas ranges is typical of its production applications. Other typical applications include welding of chromium steel for resistance to sea water corrosion on seaplane pontoons, welding aluminum fuel tanks for airplanes, welding of the frame work of alloy steel on the new high speed railroad trains, welding of stainless steel beer barrels and innumerable other familiar products.



HERE'S HOW—the framework of the light weight, streamlined rail cars for high speed is Linde-welded from chrome-molybdenum steel tubing.

Welding is Simple Production Tool

Welding is the preferred method of fabricating almost every design in modern metals. Jointless welding can be done rapidly with a minimum of preparation of the pieces to be joined. Under procedure control providing jigs for positioning pieces, production can be as rapid and as free from rejections as any highly developed factory process. From the plant equipment standpoint it is easy to adopt welding. From the personnel standpoint the welding technique is quickly acquired through instruction by competent engineers.

For Jointless Strength and Safety

Products fabricated by welding are jointless, leakproof, permanent and safe. Improved methods of testing make it possible to tell exactly what stresses or loads a jointless welded assembly can take. Metals of different compositions, providing the most suitable material for the service it is to perform, can be welded into sound unified assemblies forever free from any of the losses which occur from joint failures.

Specialized Welding Assistance

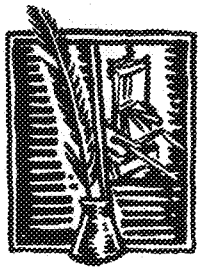
To utilize the new alloys and metals fully, the advice of competent engineers in welded design is advisable. The Linde Air Products Company, a unit of Union Carbide and Carbon Corporation, has for many years specialized in the development of new ways to use oxy-acetylene welding. Linde Engineers will gladly consult with you without obligation, and help you use welding and

IN JIG TIME—using jigs, welded joints can be made quickly in any commercial metal or alloy.

organize for welding production. This assistance can be secured by a telephone call to any Linde Sales Office. They are located at Atlanta — Baltimore, Birmingham, Boston, Buffalo, Butte—Chicago, Cleveland — Dallas, Denver, Detroit—El Paso—Houston—Indianapolis—Kansas City—Los Angeles—Memphis, Milwaukee, Minneapolis—New Orleans, New York—Philadelphia, Phoenix, Pittsburgh, Portland, Ore.—St. Louis, Salt Lake City, San Francisco, Seattle, Spokane and Tulsa.

Everything for oxy-acetylene welding and cutting—including Linde Oxygen, Prest-O-Lite Acetylene, Union Carbide and Oxweld Apparatus and Supplies—is available from Linde through producing plants and warehouse stocks in all industrial centers.

*Engineer, Developments Section, The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation.



At The Desk

The cover picture this month works in with one of our feature articles. It is a picture of a Japanese plane flying over the coastline of one of Japan's islands. Japan is a very modern country, but there are still some bits of ancient life remaining. Professor Richardson tells about that country, China, Manchukuo, and Hawaii in a very interesting article. He took a trip through the Orient this summer and this article tells what he saw there.

The illustration was borrowed from *Asia* magazine.

The frontispiece ought to interest architects. It is a unique photographic study of a circular staircase. We borrowed it from *American Architect*. Many of the newest houses of modern design are using this type of stairway to conserve space.

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MINNESOTA TECHNO-LOG

37 ELECTRICAL BUILDING . . . U. of M.

JANUARY, 1935

Eugene Price
MANAGING EDITOR

David Buck
BUSINESS MANAGER

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Volume XV **Number 4**

This Month

A Circular Staircase

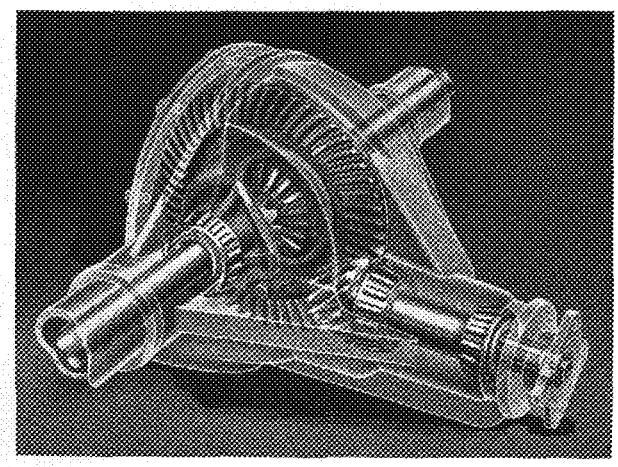
Autos Have Battleship Bows in 1935

By Wayne Stone, M.E.'36

BATTLESHIP bow radiators, plump balloon fenders, and slender feather springs feature 1935 automobiles.

To the casual observer the new models have changed little. However, radiators appear narrower and are more rounded, fenders are larger with more of a true streamline shape, many windshields are V-shaped, louvres are generally horizontal extending nearly the length of the hood, the spare tire has disappeared into a compartment in the rear, windshields are placed at a greater slant, and the general lines of the body are longer and sleeker, giving a general effect of speed. The new cars in general seem to be a composite of several of last year's models. Oldsmobile fenders, Ford ventilation, LaSalle radiators, and Chrysler windshields are predominant.

But, it is difficult to see the benefit of a streamlined tail light on the total performance of a car when the underbody, with its levers and rods, clutch housing and drive shaft, crankcase, battery, springs, and all the other doodads against which the garage mechanic rubs his nose, is left free to irritate the flow of air in the neighborhood. Even Alfred P. Sloan, Jr., president of General Motors, in an advertisement published in the Minneapolis Tribune, Sunday, January 6, said, "The broadest possible gain that can be expected [from streamlining] is a somewhat higher top speed or perhaps at top speed an inconsequential saving in fuel, all other things being the same. Except for a negligible part of motor travel the contribution of streamlining is definitely limited to the question of styling."

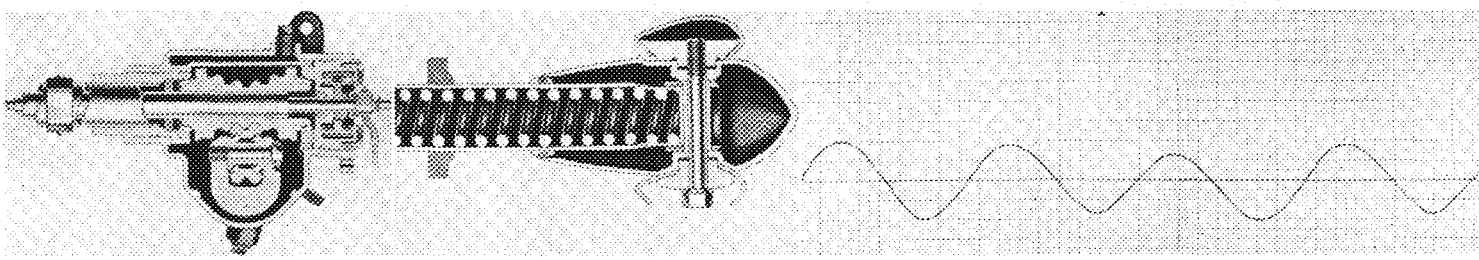


Courtesy Hupp Motor Corp.

Nearly every maker this year has done something to improve riding qualities. The greatest tendency has been to balance the car and eliminate the pitching and bouncing common to older models. This has in most cases been accomplished by moving the engine several inches forward, giving a better weight balance and allowing the passenger compartment to be moved forward so that the passengers in both the front and rear seats ride in between the axles. Many of the manufacturers have employed springs with thinner and more leaves. Ends of the spring leaves have been tapered to increase the working area between the individual leaves. Nothing radically new has been introduced in the way of engines, but numerous refinements have been added. Most common are: exhaust valve-seat inserts are used more extensively, compression pressures have been increased, the use of aluminum cylinder heads and pistons has become more popular, and attempts have been made to reduce the temperature of the exhaust valves by piping cold water from the radiator to jets directed against the valve seats. More efficient crankcase ventilating systems have become prevalent and more models are using stabilizers, either on the front or rear springs. Individual front wheel suspension systems are not being used as extensively as last year.

springs balanced for easier riding

The sales departments as usual have employed even more of the Buck Rogers type of names to describe the accomplishments of the engineering departments. A few of these are "Aeroform," "Aerodynamic Styling," "Hidden Quality," "Miracle Ride," "Airstream," "Center Poise," "Flying Power," "Land Cruiser," "Electric Hand," and (first prize?) "Levelator Controlled Synchronatic Suspension."



Chevrolet is evidently attempting to capture the lowest price field by introducing the Standard Six. The car has the same engine and sturdy construction of the larger Master Six, but such refinements as individual front wheel suspension, synchro-mesh transmission, and ultra-streamlined body have been left off. The Master Six, however, is built on a 113 inch wheelbase and has all of the above mentioned details plus the new all-steel top, V-windshield, and balanced weight distribution.

The body lines of the Ford have followed the general trend with horizontal louvres, greater windshield slant, and a crease running the length of the fenders very similar to the press in a pair of trousers. Probably the greatest change in the new Ford has been in the redistribution of weight and changes in the spring suspension system. The engine has been moved forward 8½ inches as has the passenger location, placing the passengers nearer the center of the chassis. Both of the springs have been lengthened, particularly the front, which is 7⅝ inches longer than previously. Both springs are flat and the deflection rates have been lowered to approximately 290 and 190 pounds per inch for the front and rear, respectively. The front spring has been placed ahead of the axle, increasing the spring base to 123⅛ inches. Double-acting hydraulic shock absorbers of the orifice-type have been included, wherein the principle of uniform flow through an aperture in a thin disc is utilized to prevent variable action due to changes in viscosity of the fluid resulting from changes in temperature. The drag link has been placed substantially parallel with the front axle and runs to the right front steering arm in place of the left. A new type of clutch has been added in which centrifugal force is utilized to supplement the normal spring pressure. At low speeds (up to 750 r.p.m.) the pedal pressure is reduced approximately 15 per cent, increasing as the engine speed increases until at 4000 r.p.m. the pressure is somewhat greater than normal.

The clutch disc is fitted with a mechanical dampener of the spring and friction type to eliminate noise due to synchronization of vibrations in the drive system. A new "Directed-Flow" system of crankcase ventilation has been included in the engine. Air enters through a scoop replacing the oil filler cap and is conducted downward into the crankcase, flowing upward through openings into the valve chamber, whence it passes downward out of the engine through a port located in the right front corner of the crankcase pan. Ford is to be commended for providing safety glass all-around on all of his models as standard equipment.

Henry Ford must have chuckled when he saw that Plymouth, Dodge, the Airstream Chrysler and DeSoto, Nash, Reo, Terraplane, and Studebaker have adopted a ventilation system very similar to that introduced by Ford last year.

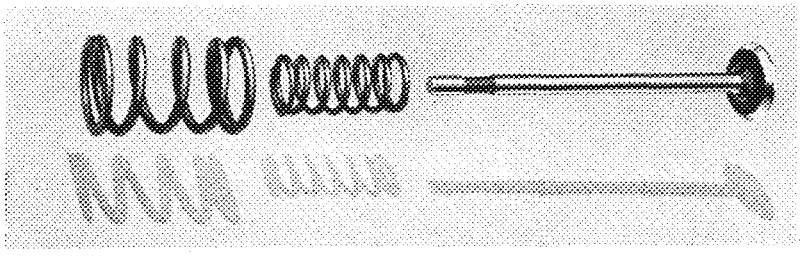
Plymouth has, as have the rest of the Chrysler manufactured cars, added a torsion stabilizer to eliminate sidesway. It has been put on the front axle rather than the rear as there, it is claimed, the sidesway starts. Plymouth is again stressing its hydraulic brakes, valve seat inserts, and "Floating Power." A new ventilated clutch, ventilated generator, full-length water jackets, equal weight distribution, and exhaust valve cooling are other innovations.

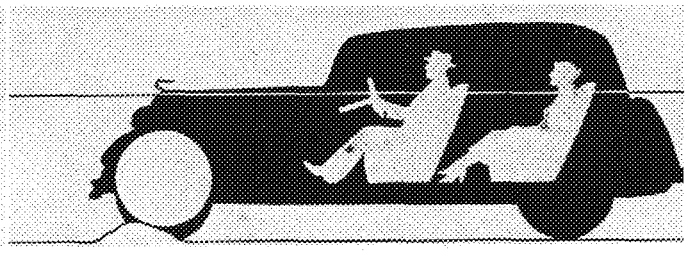
Oldsmobile is somewhat more streamlined than last year. It has a very narrow radiator, enormous fenders, and V-type windshield. "Knee-Action" front wheel suspension, hydraulic brakes, and ride stabilizer have been retained. An innovation in the Oldsmobile is the directed-flow water circulation which directs cool water from the radiator against each valve seat.

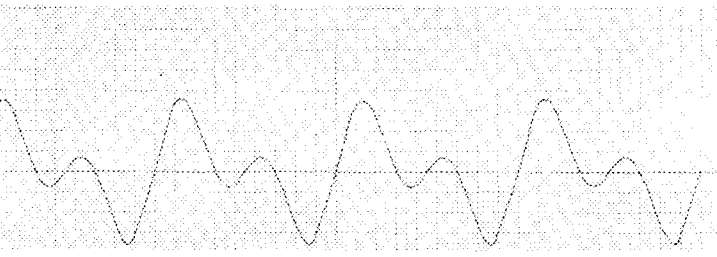
The most noticeable feature of the Pontiac is the chromium plated frontal grille the midsection of which is carried along the top of the hood to the windshield. Opinion is that the new Pontiac is as beautiful as any of the new cars but it seems probable that in bright sunlight the chromium on the hood would produce a glare in the eyes of the driver. In addition to the all-steel top, V-type windshield, and other features common to General Motors cars this year, Pontiac offers hydraulic brakes, a cross-flow radiator, silver-alloy bearings, and individual exhaust valve cooling.

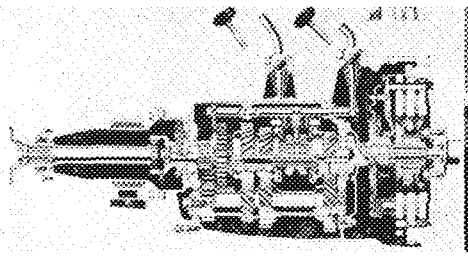
The other General Motors cars, Buick, Cadillac, and La Salle will not be introduced until next July or August.

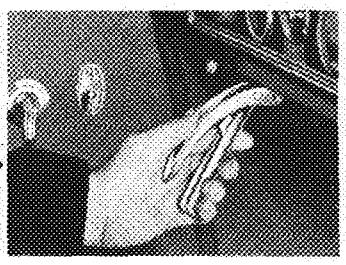
The Chrysler-made cars, Dodge, DeSoto, and Chrysler have several new features in common, among which are front torsion stabilizer bar, exhaust valve cooling, full length











water jackets, ventilated clutch and generator, balanced weight distribution, and thinner springs in addition to their now standard hydraulic brakes and "Floating Power." The DeSoto and Chrysler Airflow models are practically the same as last year's models with the exception of a slight protrusion on the rounded part of the radiator.

Chrysler has a color engineer, W. A. Lindberg, who selects colors for the Chrysler cars by higher mathematics. Mr. Lindberg says, "The average per cent of color power units of these (any) two colors were taken and set up in an equation. To balance this equation, a constant or coefficient must be used which can be termed a color contrast area coefficient. It is further noted if the frequency is kept perfectly constant by the use of synchronous colors the accenting colors can only deliver an increased output by increasing their chroma and value."

Both Chrysler and DeSoto are introducing Airstream models which are more conventional in design than the Airflow. The Airstream models employ the same engine with the exception of a cast iron cylinder head in place of an aluminum head but are smaller in wheelbase and less luxurious in appointments.

Walter P. Chrysler must have been very satisfied to have pioneered in moving the engine forward over the front axle to improve weight distribution, because the swing in this direction is quite noticeable this year. The theory behind the redistribution of weight and changed spring frequencies as explained by the Cadillac Engineering Department is as follows:

pitch and bounce of autos changed

The conventional automobile has a spring deflection ratio, front to rear, of about 1.5 to 2.5. This brings the center of pitch about ¼ of the wheelbase length forward of the rear axle and the bounce center about ¼ of the wheelbase length forward of the front axle. Due to the stiffness of the front spring, pitch is a relatively rapid motion. Because of its rapidity and because of the location of the pitch center which gives a large horizontal component, pitching is uncomfortable.

Furthermore, pure pitching or bouncing motions never occur singly, but nearly always in combination. Because of the widely different frequencies of the two motions "interference kicks" are developed. The resultant action is shown in the graph at the right.

Upon striking a bump that lifts the front end, the initial motion is primarily about the pitch center (which is normally between the axles) thus dropping the rear seat and compressing the rear springs. Then when the rear wheels arrive at the bump, the springs are compressed and hard with less available travel before bottoming and the direction of motion of the rear seat passenger, which has been downward, will be suddenly reversed.

The new cars have remedied this condition by moving the engine and passengers forward so that the distance from the center of gravity of the car to the center of gravities of the front and rear half of the car is greater. Also the deflection rates of the springs have been made nearly equal. These changes have moved the bounce center to just aft of the front axle and the pitch center approximately as far behind the passengers as the bounce center is in front. This has affected both the direction of motion and acceleration of the passengers. As both the bounce center and pitch centers are at approximately equal distances from the passengers, the passengers' motion is nearly vertical at all times, whatever the combination of pitch and bounce. Bounce frequency is slightly lower, pitch frequency much lower so that as far as pure pitch or pure bounce is concerned the rapidity of oscillation has been greatly reduced. Furthermore, because of the nearly equal frequencies, front and rear, "interference kicks" no longer exist, the resultant motion becoming very nearly pure harmonic motion. This is shown in the graph on the left.

Upon striking a bump with the front wheels, the initial motion is pure pitch as before. As the pitch center is some distance behind the rear axle, the back seat is lifted and the rear springs extended. The passenger is slowly started upward before the rear wheels strike the bump. When the rear wheels strike, the rear springs are extended and soft, with more than normal travel for cushioning the blow.

A feature of the new Nash is the "Automatic Cruising Gear," a fourth speed gear which is automatically engaged at speeds higher than 40 miles per hour. Nash has followed the general trend this year by building an all-steel body.

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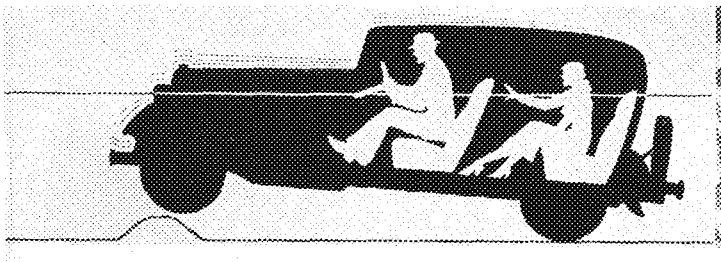

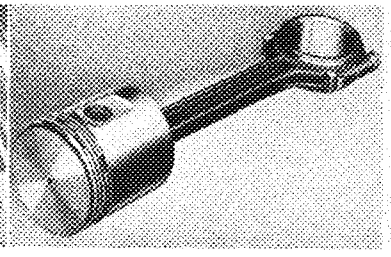

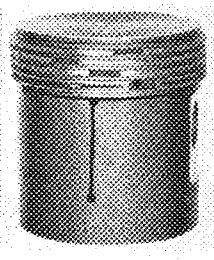

Cuts on these pages courtesy Cadillac Motor Car Co.

old and new rub elbows

In China and Japan

By HARLOW C. RICHARDSON
ASSISTANT PROFESSOR OF ENGLISH

OUR decision to go to the Orient last summer was an abrupt one.

Shortly before the end of the spring quarter, my friend, Dr. John Turner of the Department of Zoology, informed me that he was seriously considering going to Japan—and that I was going with him. The suggestion was alluring and a hurried investigation of the cost of such a trip made it seem possible of realization. A round trip ticket, second cabin, from San Francisco to Yokohama via Honolulu and return by way of Vancouver or Seattle was to be had for $198.50. This reasonable rate settled the matter. We bought the tickets and made a few hurried plans.

Rural scenes like this contrast with the one on the opposite page.

(Cut courtesy Asia magazine)

The sailing date that best fitted in our vacation time was that of the *Taiyo Maru* of the Nippon Yusen Kaisha or, more familiarly the N.Y.K. Line. This seasoned Japanese liner, a former German boat which came into Japan's possession as a result of the World War, was scheduled to leave San Francisco on June 25 for Yokohama. We reached the Bay City on the morning of that date. As the longshoremen's strike was on, it was problematical whether we should get away or not; but our taxi-driver evidently was on friendly terms with the leader of the pickets, for signs were made, nods were given and we were deposited with slight delay at the pier. Apparently passengers were not to be interfered with and we were soon aboard. The freight did not fare so well. From an upper deck we watched a new Ford being hoisted aboard from the pier to the hold. The strike breakers doing the loading evidently had not operated the winches before and the car landed with some force on the deck instead of in the hold, with the fenders considerably the worse for the unexpected landing. We sailed nevertheless, about on time—at 3:15 p. m. Out in the bay we counted thirty-two freighters lying idle, held up by the strike.

As our ship passed through the Golden Gate, the two huge steel piers that are to support the bridge over this famous waterway brought out every camera and many exclamations about this latest marvel of engineering. On board the *Taiyo* were forty or more students from various American colleges and Universities. They were bound for Japan to take part in the first Japan-America Student Conference. They informed us that a similar group would sail from Seattle and join them in Japan. This party of young people adopted the other passengers, and the voyage became a series of rollicking good times. The weather was perfect. There even was a full moon!

Hawaii is in truth the Paradise of the Pacific. We had expected flowers but not in such profusion. Not only were the shrubs and vines ablaze with color but almost all the trees seemed to be in bloom. There were the flaming poincianas and the shower trees—some yellow, some pink—that looked as if they had been drenched with color from above and would soon begin dripping it to the ground. Over a thousand varieties of hibiscus were in bloom. Dr. Turner aptly described the scene as "Color on a spree." Besides the well-known palms and magnolias, trees of interest were the banyan tree—that sends some of its branches to earth to take root and become trunks of new trees—and the monkey pod, or rain tree, dense of foliage and compact of shape. And on the University grounds we found the sausage tree hob-nobbing with the bread fruit!

hawaii is blaze of colorful flowers

As the guests of Professor Gregg Sinclair of the Department of English, University of Hawaii, we toured the island of Oahu. Diamond Head, the Pali, or towering precipice over which Kamehameha drove his enemies when he conquered the country, the thatched hut where Robert Louis Stevenson

wrote, the Dole pineapple ranch where standing in the open we ate long slices of the fresh fruit with so much avidity that the excess juice settled the dust at our feet, the University, the grandeur of mountain and valley—all these remain vividly in the memory. And Waikiki beach, with the white rollers coming in from the bluest of oceans, invited us to a swim and we accepted! There, just as advertised, were the outrigger canoes, and the surfboards, topped by animated bronze figures riding the breakers.

off to japan after an hawaiian farewell

The hour of departure brought one of the customs of which we have all heard. Leis, or ropes of fresh flowers, heavy with fragrance, were placed about the necks of the travelers. The flowers were of many colors and artistically arranged. Imagine a rope of gardenias and maidenhair ferns? That was one of our prized adornments. As the boat was about to leave, native boys dived gracefully from the highest decks into the water for coins thrown by the passengers; streams of many-colored confetti stretched from boat to pier; and the orchestra played "Aloha" as the boat put slowly out to sea. As the land receded from view, the leis, according to custom were dropped into the sea, the belief being that, as the flowers return on the waves to the island from which they came, so the traveler will some day find his way back to Hawaii.

The journey from Honolulu to Yokohama was supposed to take ten days. Actually it took only nine. We had no July 5, for we crossed the international date line on what should have been that date. We arrived at Yokohama late in the afternoon of July 11 and were met by Dr. Turner's brother, Mr. William Turner, Secretary of the American Embassy in Tokyo, who became our host while we were in that city.

From a short distance, the green islands of Japan look exactly like the landscapes of a Japanese color print. This impression is heightened when the interior of the country is reached and on every side appear the scenes that inspired Hokusai and Hiroshige. Not so Yokohama and Tokyo. Since the great earthquake and fire which destroyed these cities, the Japanese have built modern cities to replace them. The main streets are wide and well paved. The buildings in the business part are large structures of steel and concrete, many of them modernistic enough in design to suggest some of the buildings at the Chicago Fair. There is electric power in abundance. Tokyo has electric trains on its Elevated and in its brilliantly lighted and well ventilated subways. All of these things are well known to most of us but the actual sight of them is impressive. One thing that emphasizes the modernity of these cities is the contrast afforded between the architecture and conveniences of today and the appearance and habits of many of the people themselves. Although, at a guess, possibly fifty per cent of the people have adopted Western dress, the rest, fortunately, cling to the picturesque

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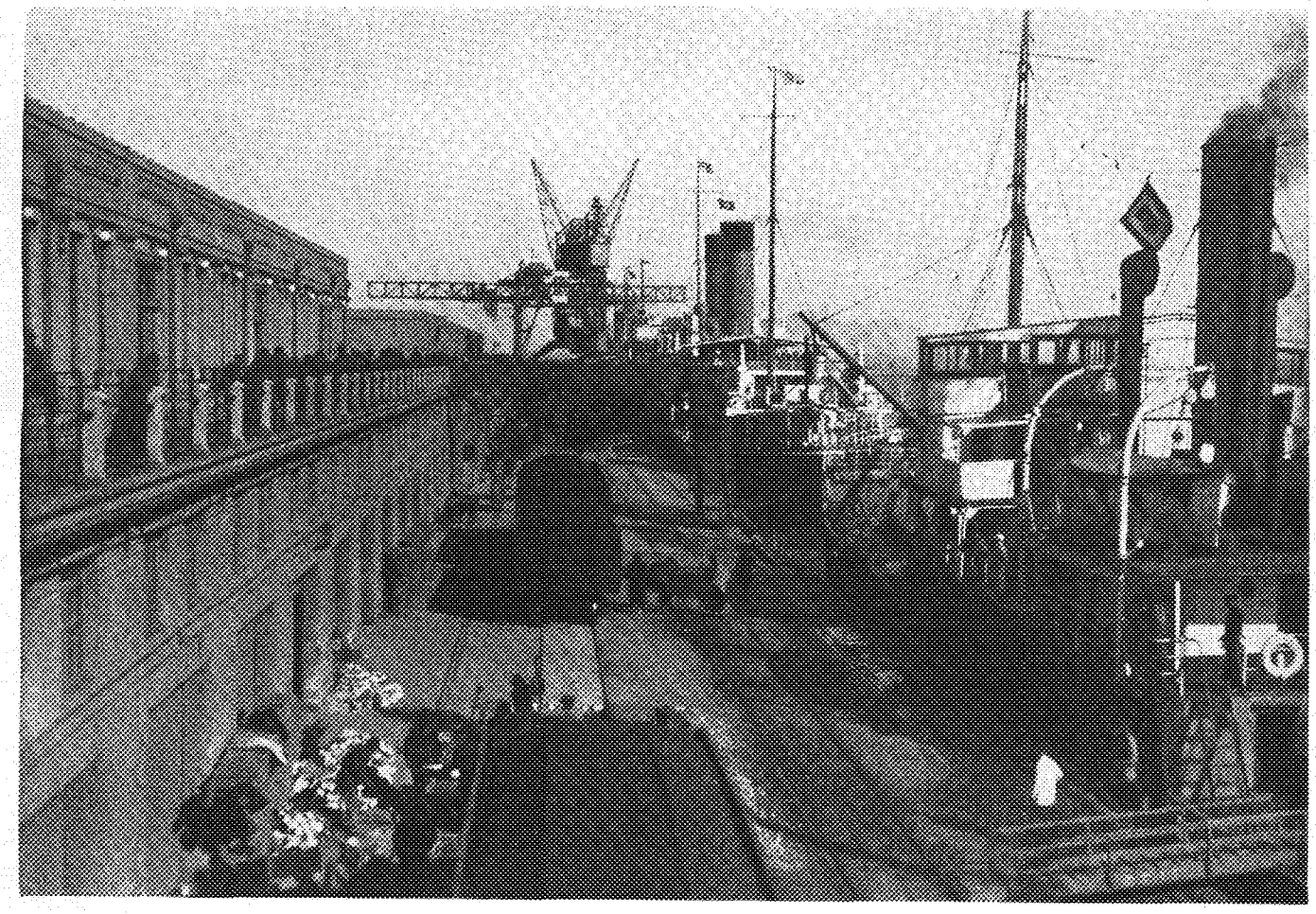


(Cut courtesy South Manchuria R. R., and Asia magazine)

In Manchukuo Japanese influence is doing much to modernize the country. This seaport scene is from Dairen, principal port of Manchukuo.

Will Movies Film "Hero of the Suez"?

By RODERICK WILLIAM SILER
Assistant Professor of Mathematics

Illustrated By Professor Hugh B. Wilcox

IT IS surprising to me that the movies, now in the throes of delivering to the world numerous historical plays, have not seized on the material which I am going to give here. Perhaps they will when this issue of the *Techno-Log* reaches Hollywood. How is this for a knockout on the screen?

The time: November 16, 1869. The place: Port Said on the coast of Egypt, land of the sheik and the siren. History informs us that at this time, at this place, there was present a number of tremendous personages: to wit, the Empress Eugenie of France, the Emperor Francis Joseph of Austria, the Crown Prince of Prussia, Prince Oscar of Sweden, the Prince and Princess of the Netherlands, the Grand Duke Michael of Russia, the Viceroy of Egypt. There was, besides, a host of ambassadors, generals, admirals, and lesser fry. Throughout the day the royalties visited from ship to ship lying off Port Said, the fleet of English and Austrian ironclads—the battleships of that time—fired deafening salutes, the sailors manned the yards, the merchant shipping in the harbor was bedecked with flags. Ashore, later in the day and evening, there were reviews of troops, fireworks, and feasting. The Viceroy, it is said, imported 500 French and Italian cooks to serve his 6,000 foreign guests. It was all done in the magnificent manner in which such events were staged in that era. The moment when the beautiful Eugenie stepped on board the *Mahrousa*, yacht of the Viceroy and said to be the finest craft in the world, with cannon booming, bands playing, pennants flying, must have been worth seeing. This is great movie stuff.

Moreover, there was a hero for this occasion. No, he was not a handsome, young, able bodied seaman on the *Mahrousa* who had caught the eye of the Empress, though he may be that when the movies work the story up. This being the formal opening of the Suez Canal, the hero was the man who had directed that work. For the movies this hero has a very good name, Ferdinand de Lesseps, but a bad age. He was sixty-five at the time. But what a man at sixty-five!

De Lesseps had been fifty years old and retired from the French diplomatic service when he decided to promote and build a canal connecting the Mediterranean and Red Seas, thereby proving not only that people do actually begin life at forty but, what is more, can do engineering work after having wasted a lot of good time as diplomats. For five years De Lesseps labored to get his canal under way, with such effect that work was begun on it in 1859 and completed on that fine November day ten years later when the Empress, the ironclads, the *Mahrousa*, and the rest came into the picture. In the light of later events this was the great day of De Lesseps' life, and if he had then retired to a villa on a bank of the Nile he might have been happier for it. But at sixty-five he was too young to retire.

From the East De Lesseps turned his eyes to the West. The Isthmus of Panama enticed him. Again he got into action, traveled, formed a company, raised funds, and on February 1, 1881, when he was only seventy-six years old, his French Panama Company formally began operations, with Sarah Bernhardt, the great actress, imported for a gala performance in the Panama Opera House, to give a flourish to the event. Bernhardt finally got away from the Isthmus fairly sound in reputation, health, and fortune, wherein she was better off than almost anyone else connected with the venture.

For at Panama De Lesseps' luck seems to have deserted him, and incompetency, graft, and disease cursed the attempt to complete the canal. Writing of conditions on the Isthmus at the time, the author Froude said: "In all the world there is perhaps not now concentrated in any single spot so much swindling and villainy, so much foul disease, such a hideous dungheap of moral and physical abomination." Evidently the Isthmus was not, just at the time, a nice place to live. Yellow fever was then a scourge unidentified with the mosquito, *Stegomyia Fasciata*, carrier of it. As a result the mortality among employees of the company was fearful, the annual death rate at some periods running as high as 60 per cent. M. Dingler, the director

general, lost by it his wife, son, and daughter. In 1887 an outbreak of the fever killed 2,000 Chinese laborers at Matachin, a town of the Isthmus.

Thus the career of De Lesseps becomes the most tragic in engineering history. At completion of the Suez Canal in 1869 he was famous the world over. In 1884 he was elected to the French Academy. On December 13, 1888, his French Panama Company went into bankruptcy. After an investigation in 1893 De Lesseps, then eighty-eight years old, was sentenced to five years imprisonment. December 7, 1894, he died, a broken and discredited man.

Despite his misfortunes De Lesseps was a remarkable and, in many respects, a great man. Poor fellow. I have a feeling that, sooner or later, that scene off Port Said will get him into the movies—just as soon as the movie play writers read down to the year 1869 in the encyclopedia. Well, here's hoping that when we of the Engineering College go to see the "Hero of the Suez" we will find him depicted as an engineer, and not as a sheik.

For the illustration accompanying this article Mr. Wilcox has dug into the files of the *Illustrated London News* of 1869, and come out with actual scenes from the Suez Canal opening. Note the canuls, the Turkish ships, tents, trousers, and pipes. And last, but not least, there is the Empress Eugenie's hat. Only three or four years ago it was that no Minnesota coed felt complete without at least one Eugenie hat. Remember? Those hats provide the only pleasant memories of the first years of the depression.

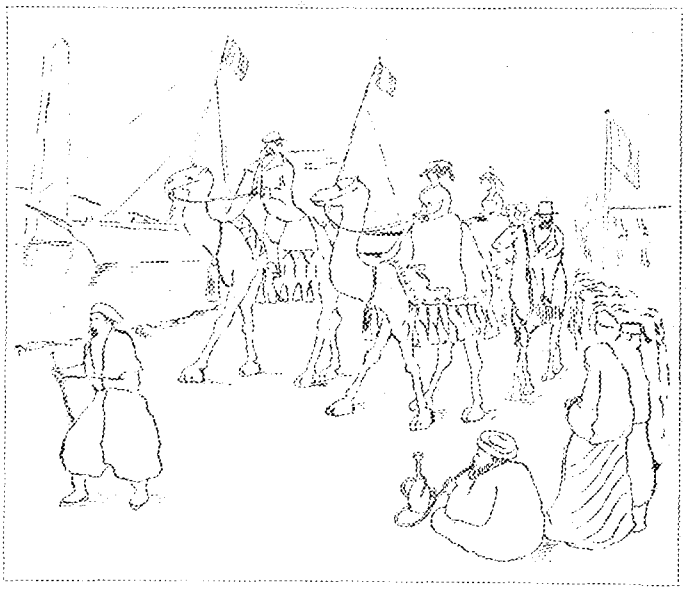
The difficulties of the French at Panama illustrate the hardships frequently met with by engineers of years gone by. In a former article in the *Techno-Log* I told of the murder of a mine superintendent in Arizona by Apaches many years ago. That was taken from the experiences of an American mining engineer named Raphael Pumpelly, who wrote an extremely interesting book, published in 1870. Worth reading are Pumpelly's experiences in a ride by stage from the Missouri River to Tucson, Arizona, in 1860.

engineer led life of danger in '60

The stage, he tells us, had three seats, intended to accommodate nine passengers. Accommodated is hardly the word, for the front and middle seats were so close together that the passengers, facing one another, had to interlock knees, and of the twelve legs two always had to hang out of the coach at the sides. For sixteen days and nights, except when changing horses at the stations, the stages went at a headlong gallop, the almost completely exhausted passengers hanging on as best they could. If a passenger could hang on no longer he was dropped off at one of the lonely stations, to wait a week for the next stage. The six horse teams were unbroken, being brought out blindfolded, hitched up, and the blinds removed, when they would start off at a wild gallop for the next station, twelve miles away, the driver able to do very little but hold the reins. Stages frequently upset, and Pumpelly passed one in which all the passengers had bandaged heads or arms in slings. In addition to this there was the constant danger of attack by Indians towards the last part of the journey, with the threat of loss of baggage and scalps. Not losing their scalps the travelers did lose their hats, and as this universal loss of headgear was said to accompany every stage journey Pumpelly calculated that 1,500 hats were dropped along this route per year. Also, a sheriff's posse stopped the stage and searched for a man who had killed another the day before. The murderer was not present, because of which the passengers missed seeing a man hanged to a mesquite tree, it being the sheriff's intention to execute immediate justice in this prompt and economical fashion. Thus Pumpelly, a young engineer of twenty-three, after a journey of more than two weeks reached Tucson. And though there were beds in Tucson at that time, I doubt if there was a bathtub.

Some say these modern days are the greatest the world ever saw. Perhaps so, but not for young engineers who like their meat raw.

Mr. Siler is with us again after an absence of a month. We are glad to have him back, and we are fortunate in having found an illustrator for his articles. Professor Wilcox, although it is not generally known, is quite an amateur artist. He put in quite a bit of study on this drawing and turned out a picture which is authentic in its local color.



***"No, he was not a handsome, young, able-bodied seaman on the* Mahrousa."**

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Job Outlook Not Bright

OUR attention has been called to an article reprinted in the *Bent* of Tau Beta Pi from the Stevens *Stute*, published at Stevens Institute. The writer, President Harvey N. Davis, of Stevens, painted a very hopeful picture for engineering graduates. He said in part:

"Is engineering overcrowded? General Rees of the American Telephone and Telegraph Company put that question to his statistical staff a few weeks ago. Their answer was that from 1927 to 1933 the number of graduates in the United States was probably somewhat in excess of the trend curve of demand, but that the tide has turned. From 1934 to 1937 there will be a marked deficiency of engineering graduates as compared with the normal requirements. The class of 1938 will probably find the current accumulated deficiency of engineers considerably in excess of any previous accumulated oversupply."

He goes on to say that it is his belief that by 1938 or earlier, industry will face an actual shortage of skilled workmen and engineers. He ends by saying, "For men entering college next fall the profession of engineering . . . will be far from overcrowded."

We wish that we might share President Davis' rosy outlook, but we cannot help but see many obstacles to its fulfillment. We think that he has overlooked several salient points in formulating his argument.

One statement which he makes says that there will be a marked deficiency compared with normal requirements. We take exception to the phrase "normal requirements," for we feel that what General Rees' statistical staff called normal were the abnormal requirements of the boom years. Industry had been tremendously over-organized and overmanned in the years of expansion. Business, drunk with the great developments of the first quarter of the century and the stimulus of the World War, had developed far beyond any justifiable activity. The completeness of the depression which followed it shows to what abnormal heights it had risen.

We feel that it will take many years of slow building before demand can naturally reach the peak of the years of expansion. We cannot depend upon a second World War to artificially stimulate another such mushroom growth. Demand for several years will be below supply, and therein lies a great argument against the optimistic outlook.

Still another blow lies in unemployment. With depression came the necessity to balance the topheavy structure of overmanned industry, held up in the "good years" by unlimited credit. Balancing was effected by discharging, among others, a great number of technical employees. Two things tell us that those men will be employed before newly trained men can get work. First, the companies feel that they owe it to their laid-off employees to reemploy them, and second, those men have experienced qualifications which recent graduates cannot meet.

Much as we would like to believe as President Davis does, we think it better to present the true state of affairs as it appears to us. Truth, someone has said, is better than fiction, no matter how much it hurts.

Does Science Cause War?

The raising of one more voice in the now general discussion of war and its prevention may seem to be a little useless. We have good precedent for it though, and think that as engineers there are angles to the problem that particularly concern us. It is of no practical value to repeat the obvious arguments against warfare. Hardly anyone, we believe, really thinks that war does any permanent good, or even that it can ever be waged without permanent harm resulting.

It seems that we should fix the responsibility for war before beginning to discuss plans for curbing it. The thing that brings engineers and scientists into the picture is the often-expressed belief that the rapid increase in scientific knowledge is responsible for most of our present troubles, chief among which are unemployment and the danger of war. Since as engineers we are the instruments by which the findings of scientific research are applied to society, we immediately are drawn into the discussion at this point.

We would like to present the views of one of the foremost scientists of our time, Sir James H. Jeans, famous physicist and mathematician. The speech in which he gave his views was delivered several months ago, and a copy of excerpts from it has been lying in our desk for some time.

Speaking of war as the result of scientific research and invention he says:

"Science has given man control over nature before he has gained control over himself. The tragedy does not lie in man's scientific control over nature but in his absence of moral control over himself."

Sir James believes that there is a reason for this lack of control in matters of emotion. He goes on to say that scientific knowledge is transmitted from one generation to another but acquired characteristics are not. "Thus," he says, "in respect of knowledge, each generation stands on the shoulders of its predecessor, but in respect of human nature, both stand on the same ground."

We believe that Sir James was correct in shifting the blame from scientific knowledge to human nature. Man as he exists today has a historical past numbered in thousands of years while his animal ancestors existed for millions of years before he first appeared. He is still close enough to the beast so that, like the beasts, he lets his emotions and desires color his better judgment.

Must we then wait millions of years before we can outgrow or learn to control our animal natures? Are we limited by our recent rise from the beast? We don't think so. For even in the recency of that differentiation, in the short time which has passed since Homo Sapiens began to carve his first letters, there is a cheering message. If in so short a time we have been able to get so far, may we not expect even greater improvement in the next century? Since the fall of the Roman Empire little more than ten centuries ago, we have seen the people of the North, Vikings and Teutons, change from wild warriors who fought for the animal love of battle to more civilized nations. But man still has enough of the rough barbarian, but one step removed from the animal, that his emotions and his desire for power get away from him and he wages war.

There is the problem and the answer. With the record of our rapid rise from the jungle, our even more rapid rise in knowledge, and our lingering lack of emotional control all in mind we must work to gain that power over our natures that we need.

Now Here's A Book

By Clifford I. Haga

INSTRUCTOR IN ENGLISH

A GENERATION ago Santayana, in "Reason in Society," described war in these terms: "It is war that wastes a nation's wealth, chokes its industries, kills its flower, narrows its sympathies, condemns it to be governed by adventurers, and leaves the puny, deformed, and unmanly to breed the next generation." Although we may feel as strongly about war as Santayana did, most of us realize that the war problem is about as complicated as any we now face in imminent danger of destruction should we base our attempted solutions on scattered guesswork. We must recognize war as only one of the special problems growing out of modern life; we must fix its place in the larger picture of modern civilization. Let us turn to Dr. E. C. Eckel's "Coal, Iron, and War" and see what this engineer and geologist has to say.

He divides his book under four self-explanatory heads: "The Growth of Modern Industry," "The Material Bases of Industrial Growth," "The Causes and Effects of Industrial Growth," and "The Future of Industry." Statistics of world mineral resources and historical analysis furnish the material of his discussion which can be summarized in the statement that modern industry depends upon three factors: materials, technology, and markets, the first and third of which, particularly the first, have quantitative limitations. Because of those limitations we get competition and competition generates friction. When this friction grows too great, a smash comes and we call it war. Then we start all over again. In other words: Peace—when there are not too many strong nations struggling for raw materials or markets, or both; war—when "in the interests of peace" some bumptious nation must be disciplined by its brothers. War is, then, only one of the tactics in that progress called industrial and commercial expansion, just as in the Reformation it was the most speedy and energetic way of settling a theological dispute.

But what is perhaps even more valuable in "Coal, Iron, and War" than its ideas and conclusion is the feeling for calm, objective analysis conveyed by the author. Such a controversial subject as war, so bound up as it is with passion and prejudice, is seldom treated as judiciously as he treats it. Long after the reader has forgotten particular groups of statistics or definite events presented in the book, he will remember the justness, the fairness, the conclusive authority of Eckel's *method*. In reading "Coal, Iron, and War," I was reminded of Thouless' interesting popular survey of some elementary principles of logic, "Straight and Crooked Thinking" (which, by the way, I heartily recommend). Eckel is not crooked.

(Please turn to page 87)

Architects Plan Annual Jubilee

THE Jubilee, nineteenth annual department affair sponsored by the Architectural Society, is being themed, schemed, and publicized by committees totaling sixty students. It is traditional that every member of the student body and the faculty takes part in the all-day program, and there are no classes in architectural courses.

Tea and open house will be held in the afternoon for friends of the department, and there will be an exhibit of the year's best work in painting, drawing, and architectural design. The day's activities will be merely a prelude to the glamorous costume party planned for the evening modeled after the famous Beaux Arts balls of New York. The uninitiated can expect to see the engineering auditorium transformed into some exotic scene, gay, colorfully garbed throngs, and entertainment well toned to architectural students' appreciation. Highlights in the evening's program will be the presentation of a farce traditionally played by members of the grade one design class and the grand march which precedes the announcement of costume awards.

Rex Galles is chairman of the general arrangements committee whose members are Robert Hansen, Robert Anvinen, Kenneth Sperry, and Jack Frost. Victor Gilbertson is president of the society.

Willows by Fountain Pen

Pen and ink drawings have been very popular in the department for the past two or three years. Perhaps the interest in this medium was enhanced by the extremely successful renderings of one student. There has been, anyhow, an obvious turn to pen and ink, and often in recent judgments, the simple pen drawing has rated above smoother presentations in water color and "sauce." Handled with spontaneity, suggestiveness, and restraint, pen and ink is an excellent medium for sketching. Out of doors no medium is more convenient and easy than a fountain pen, which was used in the above sketch.

Rococo

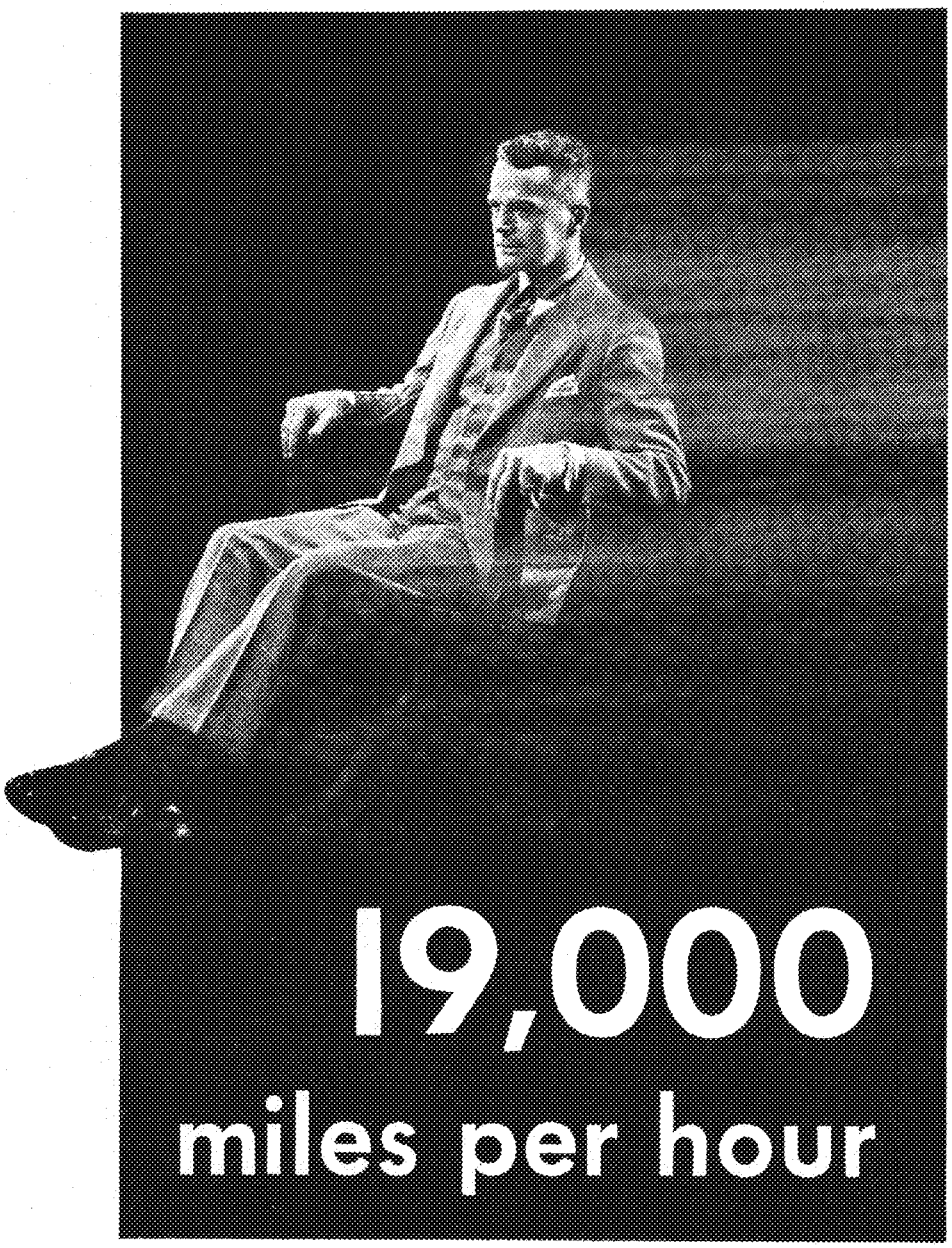
Thomas Craven, artist and critic, comes to the University February 21 to lecture on his pet interest, contemporary American art. The author of several books he is known by the ordinary lowbrow for his "Men of Art" and "Modern Art." Though a debunker of much modern art and especially the French school, Craven's aid and loyalty to American art have been much. He said recently, "American artists depicting aspects of American life and divorced from European standards for the first time in our history have placed art within the reach of the people." The last year saw a notable awakening of popular interest in American talent and a marked improvement in standards of appreciation. Craven's talk, then, can be most timely, and if up to the style of his books should be very entertaining.

\+ + +

School gossip in other technical magazines suggests that drafting room life is as mad in one architectural school as in another. Informal supervision of the drafting rooms, all-night sessions of work, and the architectural student's idea of a good time seem about the same in all sections of the country. The Pennsylvania *Triangle* tells of a "classic" sink-bath for the freshmen, an extinct Minnesota tradition. It seems only yesterday that the watery footsteps of the last victim, Paul Franke, trailed beatenly up to the third floor haven of the Elements room.

\+ + +

The long-heralded publication of Louis Sullivan's "Kindergarten Chats" edited by Claude Bragdon appeared in the latter part of December. Frank Lloyd Wright says of the book, "These talks were long ago of today and are still as 'today' as ever they were long ago. If every young architect so reads them that he will understand them, he will do more than the modernists can do—those, I mean, who are now streamlining and stylizing the thing, hoping for a new academic that will profit them." Robert Hansen has charge of the sale of the edition at the University.



By Long Distance telephone, a sales executive recently "covered" more than 153,000 miles in three business days. He spent a total of eight hours in talking with his agents in 194 cities—using Sequence Calling Service.

This service enables subscribers to place with the Long Distance operator any number of calls on which they wish to talk consecutively. Connections are completed rapidly with a minimum wait between calls.

Sequence Calling is just one of the many services developed to gear the telephone more and more closely to business needs.

Why not visit your folks tonight . . . by telephone? For a lot of pleasure at bargain rates, use station-to-station service after 8:30 P. M.

BELL TELEPHONE SYSTEM

minnesota men are

Engineering With the CCC

Some time ago an old pal of ours, **Steve Gadler,** E.E. '32, dropped in at the office to swap a few words and see how things were going with the *Techno-Log*. Steve used to be business manager of the *Techno-Log* back in the year 1931-32. In the course of the talk Steve disclosed the fact that he is working with the CCC in Brimson, Minn., and that he knew of a lot of other Minnesota engineers who were working with that branch of Roosevelt's alphabet soup. We prevailed upon him to send us some alumni notes about those men and what follows is practically word for word as he wrote it. Incidentally, before we forget it. Steve has also promised to write us an article describing the work of the CCC for a future number of *Techno-Log*.

Udert Hella, C.E. '31, is with the Department of the Interior as engineer in the Scenic state park CCC camp at Big Fork. "Judge" is the lucky or unlucky owner of a pet deer, which he has appropriately named "Tau Bete" because of the deer's ability in getting candy from the CCC boys. **Al Swanstrom,** Arch '31, who was also at Big Fork, claims that the deer should have been named "Tappa Nu Keg" in honor of the well-known civil group. Al has been transferred to the main office in St. Paul, where he O. K.'s all the blue prints.

Speaking of architects recalls that **C. E. Berzelius,** Arch. '29, was construction engineer for the Chippewa Falls sub-district. Carl had fourteen CCC camps under construction at the same time scattered over an area of several hundred square miles. He stated that inspecting was the hardest part of the job, due to the condition of some of the roads.

Scott Linsley, E.E. '32, and one time national advertising manager for the *Techno-Log* (in the days when national advertisers advertised) was until recently with the Department of the Interior as engineer of a CCC camp at Poplar Lake. He has been transferred temporarily to the main office. Beaver Bay holds the attention of **Harry Bolnick,** C.E. '30, who is the engineer at the state camp located at Finland. The frequency of his visits would seem to indicate that Harry is attending night classes in Beaver Bay. Oh, yeah!

The new superintendent of schools in Itasca county is **Hugo Zaiser,** E. '07, who also is superintendent of the Scenic State Park camp at Big Fork. **George Schroeder,** C.E. '31, located at Deer Lake near Effie, finds the snow very deep and will patent, in the near future, snow shoe fixtures for his transit.

Probably the man most responsible for the work of all CCC camps is the Commissioner of Conservation, **E. V. Willard,** E. '06. He recently went on an inspection trip through the north woods. **Wesley Gray,** E.E. '30, engineer with the erosion camp at Chatfield, was in the Twin Cities recently. Wes is an aviator, a golfer, and formerly was advertising manager of the *Techno-Log*. He fully believes in the old saying that it is better to have loved and lost than never to have loved at all. It was our pleasure to attend a wedding dance at Palo where we met the lady in the case. We will state that for once a medic won in the game of love and war.

Lieutenant Homer Thomas, C.E. '31, is the sub-district quartermaster with headquarters in Rochester. **M. F. Mullin,** E.E. '31, is on erosion control at Chatfield. His main interest is still in electrical engineering and he wishes to let every one know that he studies his E.E. texts every night. He further states that the fair sex no longer interests him.

Roy Wiprud, E.E. '31, saw a good deal of the United States as an engineer with the CCC camps. He recently took a position with the state highway department. Roy, who also was connected with the *Techno-Log*, was recently married. Good luck Roy, on the turbulent seas.

Marvin Fergstad, Arch. '30, is employed by the United States Forest Service with headquarters in Duluth. His educational work takes him to all of the camps in the northern part of Minnesota. Week-ends find him in the Twin Cities. **L. J. Snell,** C.E. '31, is located at Lake Itasca and does all of the engineering work for the CCC camp in the park. **Carl Lanander,** C.E. '30, is also with the U. S. F. S., at Tofte. We have been told that he has an interest in a gold mine on the Canadian border.

B. R. Colby, Arch. '31, is junior engineer with the erosion camp at Lanesboro. **W. L. Hammerquist,** Ch.E. '31, is with the army at the Dunnigan Lake camp near Ely. The venison that was furnished the camp during the deer season was a gift from Lieutenant Hammerquist. **Scott McDermott,** E.E. '32, is in charge of traffic lines with the telephone company at Virginia and in this capacity contacts many of the engineers in the various CCC camps in the northern part of the state.

We were very pleased to have the opportunity to read a letter written to **Robert Kutzler,** E.E. '32, by **Walter Schiebe,** E.E. '32, and bearing the postmark of Bolivia, S. A. Walt is located 17 days' journey (by mule) from the coast across a treacherous chain of mountains. He is studying Spanish, which is essential, and in spare time he hopes for a little southern romancing. Walt is electrical engineer with a mining firm.

1935 Automobiles

(Continued from page 71)

moving the engine and passenger compartment 8 inches forward of their conventional position, and providing thinner and more leaves in the spring. The deflection rates of the front and rear springs have been made nearly equal and friction controlling inserts have been placed under the leaf tips. Hydraulic brakes have also been added.

The new Hupmobile was introduced earlier last fall and no additional changes have been made. A new model, smaller but similar to the larger car, has been put on the market. The Hupmobile is ultra-streamlined with three-piece windshields and the headlights blended into the hood and front fenders. The engine and passenger compartments have been moved forward, longer and more resilient springs have been used, and automatic thermostatic shock absorbers have been added.

Reo is continuing as the only manufacturer using an automatic shift. The Reo has a small lever on the dash that is used to shift from neutral into forward, reverse, or an infrequently used low-speed forward. There are two speeds in the forward gear, the high being engaged automatically at speeds higher than approximately ten miles per hour. The engine and body have been moved forward and the spring action has been softened. The car is equipped with valve seat inserts and hydraulic brakes.

Packard introduced their 1935 models early but brought out a new smaller line known as the Packard 120 at the recent New York Auto Show. The new car has a unique method of independent front-wheel suspension. Torque arms take the braking action and hold the wheels in proper alignment, while coil springs between these arms carry the weight of the car. The system, which also employs shock absorbers, is said to give unusual freedom from steering trouble. There is also a ride stabilizer. The clutch, supplemented by a system of centrifugal weights, requires only a slight foot pressure. The engine is of the straight-eight type and has 110 horsepower. It is built on a 120-inch wheelbase.

The big feature on the Hudson and Terraplane is the "Electric Hand." It is a semi-automatic shift allowing pre-selection of the gear. The gear ratio desired is selected by moving a small switch under the steering wheel and when the clutch is disengaged an electric circuit is made that operates a valve allowing vacuum power from the intake manifold to shift the gears into the ratio selected. Hudson and Terraplane also offer an all-steel roof and a new rotary brake equalizer that rotates with the application of either the hand or foot brake lever applying an equal pull to each of the brake cables. Improved valve tappet design, a voltage regulation device, a ventilated generator, and a re-designed combustion chamber are other advances in design added.

The Studebakers, first shown in December, have a new type of front wheel suspension which uses a single transverse leaf spring aided by upper and lower guide links. Free-wheeling and automatic key switch starting are standard on the President and Commander series and optional at additional cost on the smaller car. An automatic overdrive that engages at 57 miles per hour is available on the President series. The body design is streamlined without becoming radical. The radiator is narrow, the fenders are wing-like at the front, and the rear has been tapered.

Auburn offers a new series of supercharged eights with a certified speed of 100 miles per hour. These supercharged models are built on a wheelbase of 127 inches and have 150 horsepower. The Speedster is the leader of the line and has a torpedo-like shape with exposed exhaust pipes. The new models use a perfected form of the "dual ratio" axle providing an overdrive at higher speeds.

The Lincoln is showing eighteen body types, twelve of which are custom built by Brunn, Judkins, LeBaron, and Willoughby and built in their workshops, on a wheelbase of 145 inches and powered by a V-12 engine of 150 horsepower. The engine has been improved in operation by the use of a re-designed camshaft with larger cams. An oil filter has been added and a larger muffler dissipates heat more quickly.

The new models are said to have greater ease of control by an improvement in the transmission synchronizing mechanism and the use of improved vacuum power brakes.

China and Japan

(Continued from page 73)

costumes of old Japan. To see an up-to-the-minute department store thronged with men and women, most of whom, perhaps, are dressed in the beautiful kimonos designed for other days and other ways is to witness a startling study in contrasts. To hear the noise made by the *geta*, or wooden clogs worn on the feet, as they strike a modern floor or pavement is, for a newcomer in Tokyo, a constant source of interest. I shall not soon forget the clatter they make during a rush hour in the subway.

Other cities in Japan that we visited have much of the flavor of the past. Nikko is beautifully located in the mountains with rushing rivers and nearby lakes and waterfalls. It has been a religious center for countless generations. Its famous shrines are in an excellent state of preservation. They are gorgeous in their elaborate carvings and colorings and exquisite in detail.

Kyoto, at one time the capital, is a day's ride by train from Tokyo. The scenery was beautiful and varied all the way. On one side was the sea, on the other mountains, vividly green because of plentiful rains. Between were cultivated valleys in which were rice fields in small, irregular patches, and at different levels. The rice plants, six or more inches high, were growing in water with which most of the fields were covered. Men and women in big, broad straw hats, and many of them with matting on their backs to keep off the hot sun, stood in the water and bent over the plants as they worked. Suddenly we had our first view of Fujiyama. It was just like its pictures as it rose clear-cut against the blue sky. Then a cloud came, obscured its summit, and finally moved away.

tokyo to kyoto is beautiful trip

We arrived in Kyoto after dark and called a taxi to take us to our hotel. We had not gone far when suddenly every light in the city went out. In the darkness ahead a policeman in white shouted at us through a megaphone. Our driver stopped at once and turned our our lights. Crowds assembled in the streets and began to surround the car. Suddenly a machine gun started popping. At this we jumped out of the car and tried to find out what was happening. We couldn't understand anybody and nobody could understand us. Finally a young man who could speak some English informed us that a bombing plane was passing over Kyoto. "It is mimic war," he said. Then we realized that the people were being given a practical demonstration of what might happen in case of war and what to do in the emergency. After a half hour or more, lights were turned on and we were allowed to proceed.

Pages might be written about the charm of Kyoto. It is beautiful for situation, historically very important, has been for centuries the home of skilled artists and craftsmen who have produced some of the finest art in Japan. Not far away is Nara, another ancient capital, where are some of the sacred shrines and temples, the sacred deer, and the largest Buddha within a building in Japan.

Our plan had been to go through Korea on our way to Manchukuo and China. Floods which washed out the tracks prevented our traveling by rail through that country. The alternative was to go by boat from Moji, Japan, to Dairen, the seaport of Manchukuo. This we decided to do. We passed close to Korea and saw much of its coast line but did not set foot in the country. From Dairen we visited his-

toric Port Arthur by bus and then went on by rail to Mukden. Wherever we went in Manchukuo we saw the results of Japanese enterprise in new buildings, paved streets, and improved roads. The fine train we took on the Southern Manchuria R.R. from Mukden to Peiping was well guarded by Japanese soldiers. The train had been bombed the week before and no chances were being taken. At each station the soldiers were the first to get off. Other soldiers guarded the station platforms and the many bridges along the route. At the Chinese boundary, the Japanese guards and the train crew left and were replaced by Chinese who brought the train into Peiping.

Peiping is inexhaustible. An adequate list of the things to see in and near it would be impossible here. The Great Wall, the Ming tombs, the Forbidden City, the various palaces, the universities, the city itself with its multitudes, its shops, its theatres—all are beyond description. The rickshaw boys, who run singly and in droves and are still the most important means of transportation in the city, are a constant source of interest. The sense of the past is very strong in Peiping. I actually felt myself on terms of intimacy with Confucius, Marco Polo, and Kublai Khan!

Nanking, the new capital, and Shanghai, the great international city, are, one the surface, the new China rather than the old. Mayor Wu, of Greater Shanghai, this year has two sons in American colleges. One of them is in the University of Pennsylvania and the other in Massachusetts Institute of Technology. Mayor Wu is heart and soul in the movement to build a center for a new and greater city. The beautiful new central building, the Mayor's building, is now complete, and a University of Minnesota graduate, Dayu Doon, Arch. '24, is the active architect in charge of the city project.

It was not easy to leave China; but we still had Fujiyama to climb and we still had to catch that day we lost on the outward voyage. We did so on Sunday, Sept. 9, when we lived through the day only to get up the next morning to find it was still Sunday, Sept. 9, and that we must live it all over again. The northern passage which took us close to the Bering Sea and the Aleutian Islands was stormy and cold. We didn't see the sun between Yokohama and Vancouver. This was not pleasant, but perhaps it was just as well, for the shores of the home land looked pretty good to us and we were content to be back from the Orient.

KAHN-NOTATIONS

By Howard Kahn, Ch. E. '35

Yes, it's here again. After two months of hopeful though vain waiting for comments anent the colyum, the editor decided it didn't make much difference anyway, and besides the back pages are always hard to fill. So suffer!

This little story concerns Mr. K. Ray, famed editor of the Gopher and senior in the School of Chemistry. It seems that one day K. and a friend were waiting for the elevator to take them to Dayton's Tent, a local food and style center,—no unusual procedure for Ray—when along came three or four girls with similar intent. When the elevator door opened the friend, impatient, stepped into the car, but was pulled back and chided by Ray who insisted that it was not the act of a gentleman. When the elevator reached the proper floor, Ray and friend, being now closest to the elevator door, stepped out first, at which point K. remarked in a loud voice, "See! They get on first. We get off first. We get the best seats!"

* * *

Although it was given little publicity, the resolution passed by the All-U Council condemning the idea of the cadet colonelette was not phrased just so, but, in fact, condemned the student affairs office for approving the same. Much to the surprise of all, Dean Nicholson, faculty member of the Council and Dean of Student Affairs, voted against the resolution, but in spite of his own vote, the resolution was passed, and he was condemned to his very face.

* * *

The A.I.Ch.E. has a membership of 150 . . . and mostly paid up, which is something else again . . . due to good work of Cottingham, Frederickson, and Lewis . . . why not have a joint meeting and smoker of all the engineering societies next quarter ? ? ? If you ever feel in the need of a rest, try a cot in the students' ward at the Health Service for a day or two . . . soft beds, deep silence, pleasing nurses . . . of course you have to be slightly sick . . . Why doesn't the University have accurate information as to the jobs obtained by graduates during the last ten or fifteen years, and the fields in which they are working ? ?

* * *

CURIOUS—

He drank the nectar from her lips
As under the moon they sat.
And he wondered if ever a man before
Had drunk from a mug like that.

QUOTES

THORNTON WILDER—*Convocation Speaker:*

"As lethargic as a boa constrictor who had just eaten a cow."

PROFESSOR ANDERSON—*Political Science:*

"Here we have two opposite statements which are both equally true."

FROSH THEME:

"He debouched from his horse and viewed the wide celebrity."

PROFESSOR MACDOUGALL—*Physical Chemist:*

"Now we have distance over time. Yes! That might be a velocity."

WALTER WINCHELL:

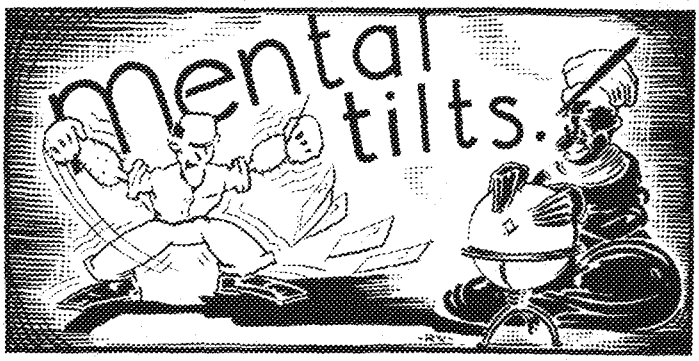
"Garbo is coming to town with the usual fanfare of secrecy."

* * *

Per capita consumption of chewing gum has a retail value of one dollar yearly . . . $125,000,000 to keep those jaws active . . . Glenn Seidel is an engineer . . . Dean Leland has a poor memory for faces . . . Why don't you freshmen and sophomores who must come back early to register, try to do something about it . . . work through the technical commission, the class officers, or through an organized group of some sort . . . Why are honorary societies so very expensive ? ? ? perhaps the old idea that if something doesn't cost a lot, it will not be properly appreciated . . . although perhaps some of us might be able to see the true value without having to pawn our watches in order to join . . . Max Moulton won $17.50 in the Chemistry School jack-pot on the Minnesota-Wisconsin game . . . his normal color is just returning . . . Hats off to Les Malkerson, national president of A.S.A.E., member of Alpha Zeta, honorary Ag fraternity, member of All-U Council, former class president, and member of hockey squad. . . .

* * *

Try these on your piano. A bottle and a cork cost $1.10. The bottle a dollar more than the cork. How much does the cork cost? And this one. The three sides of a triangle are 18, 20, and 2. Find the area. They may seem simple, but several Tau Beta candidates are still puzzling.



Anything that stumps the old professor is just too hard for youse guys, I can see that. Only two persons turned in solutions for the Prof's brain-ticklers, and both of them were wrong. So we have shelved the Professor for this month and started on a new series. The FERA has been employing some men, as you know, and they ran into difficulties when it came to time-cards and wages. They have referred some of their problems to us.

Like Father Like Son

A father and his son work together and are paid at different rates. The other day they turned in their time-cards and just wrote down the amount each was to receive. The father has $72 coming to him, while the son has earned only $50. He has worked 5 days less than his father. Had he worked five days more, and his father five days less, they would have received the same amount. How long has each worked and for what wage?

A Techno-Log?

Three fellows, having cut down a tree and trimmed it, are to be paid in wood. The sum of their wages comes just to the value of the tree. The log is 40 feet long and tapers from 4 feet diameter at the bottom to 2 feet diameter at the top. The timekeeper wants to know into what lengths the log must be cut to pay them equally.

The Musical Fruit

At the store where this particular camp purchases its provisions, the storekeeper has a faulty balance. Last Saturday the chef came in and bought 20 pounds of white beans and 20 pounds of red beans, the price per pound being the same for both. The storekeeper weighed the red beans on the left hand pan, placing the weights on the right hand pan. When he weighed the white ones he reversed the process, putting the beans on the right hand pan. The chef wants to know whether the grocer gypped himself or the camp and by what percentage of the total. The ratio of the right arm of the balance to the left is 9:10.

Be sure to include the solution; don't just give the answers. The problems must be done correctly all the way through. If you get the right answer by the wrong method and a large dose of luck, we cannot accept the solution. Incidentally, the one buck offer still stands. The first engineer to get these three problems right wins the simoleon.

Answers to October Tilts

Stormy Weather

.1651 inches of rain fell.

Horses, Horses, Horses

The professor's nag grazed over 28,853,286 sq. ft. of ground.

Stringin' Along

The coil contained 1206 ft., 4.75 inches of rope.

Now Here's A Book

(Continued from page 77)

His statistics may require revision in one or two points. Certainly his estimate of the future of our petroleum resources has become sadly out of date as a consequence of technological progress in the fifteen years since he wrote. For the criticism of such points, a recent more detailed and exhaustive special study, E. W. Zimmermann's "World Resources and Industries," is the best compact reference. But as to the historical soundness of his correlation of industrial expansion with war one cannot object. A recent study of modern Germany, Ernst Henri's "Hitler Over Europe," by its emphasis upon the industrial centers of the Ruhr and the Saar as the source of political and military tension, vividly, even sensationally, underscores Eckel's statements. J. M. Keynes' "The Economic Consequences of the Peace," of the same year as Eckel's book, tells the same story by concentrating on the special economic problems that grew out of the political hugger-mugger at the peace conference. Another book, this one as new as yesterday, Lloyd George's "War Memoirs," tells how the war was won by mineral resources—though he confesses it took the contestants nearly three years to realize that minerals and chemicals were the only basis for victory. And yet, according to Eckel, the cause of the war was contention for these materials and for markets! Apparently we are no better than those Irish bogtrotters who were always taking unsuccessful potshots at their landlords. Said an old woman, "'Tis the whiskey makes ye shoot at 'em and 'tis the whiskey makes ye miss 'em."

$10.00 CASH GIVEN

First Prize - - - - -	$5.00
Second Prize - - -	3.00
Third Prize - - - -	2.00

OPEN TO ALL ARCHITECTS, ENGINEERS, AND CHEMISTS

Except Techno-Log Staff Members'

This is all there is to it:

All but three of the following campus concerns which advertise frequently in the MINNESOTA TECHNO-LOG are displaying at their places of business the TECHNO-LOG SEAL shown in the upper left-hand corner of this page. You are to find the three concerns from the list below that do not display this seal. The MINNESOTA TECHNO-LOG will pay $5.00 to the first, $3.00 to the second, and $2.00 to the third student turning in the three correct names to the TECHNO-LOG office, 37 Electrical Building.

It should not be hard to find the three concerns not displaying the seal. The seal is printed in maroon and gold on 8 by 11 inch cardboard. If you do not see the seal in the merchant's window or store ask him if he has one. He will gladly show it to you if he has. If he does not have one and his name appears below, he is one of the three. Find the other two, turn in the names, and if you are the first the $5.00 is yours.

This contest is sponsored by the MINNESOTA TECHNO-LOG for the purpose of further acquainting its readers with the advertisers who make possible a bigger and better magazine.

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U TRADING POST, 525 Washington Ave., S. E.

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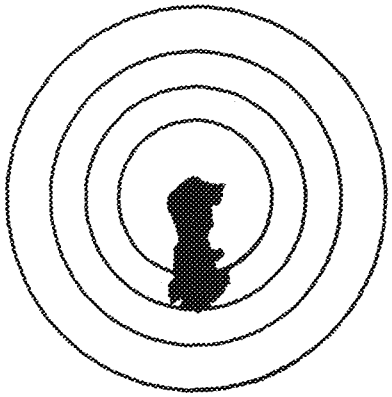


SPOILED? OR WILL IT ERASE?

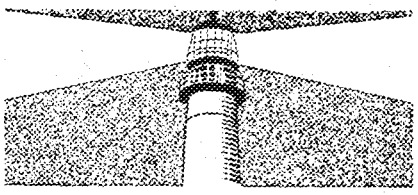
The erasing quality of a drawing paper is of first importance, and no paper is suitable for ink drawing that does not permit redrawing after repeated erasures. The usableness of a paper in respect to its ability to erase is, of course, dependent on the proficiency of the draftsman. In a smooth paper like Whatman's "hot pressed" erasing takes off the gloss and leaves a blemish, for the paper can't be glossy beneath the surface. A finely grained paper, however, which has a uniform texture and composition is excellent for use where erasing is expected. If the fibers of a paper are closely knit, dense, and compact, not only will the ink "work" well, but absorption will be such that erasing will not be difficult.

Kueffel and Esser Company suggests the following test for the erasing quality of a paper: Draw fairly heavy lines and fill a space of about one inch. Erase with a sharp knife under even and low pressure and redraw the lines. Repeat on the same spot until the last layer of the paper fibers has been reached. If the redrawn lines remain sharp and the erased surface smooth in every instance the erasing quality is perfect.

G-E *Campus News*

SEDAN TO SYDNEY

Radio Engineers were up bright and early not long ago to make a two-way radio-conversation test between the General Electric short-wave station W2XAF near Schenectady and station VK2ME at Sydney, Australia, 10,000 miles away. It was 6:30 a.m. in Schenectady and 10 o'clock at night in Sydney. Everything was in readiness, but C. H. Lang, U. of Michigan, '16, manager of the Company's Publicity Dept., who was to talk to officials in Australia, was delayed at his home. On a chance, the radio police test car, which G-E engineers had equipped for two-way radio communication for the Boston Police Dept., was sent to pick up Mr. Lang. From the car, Mr. Lang's voice was sent by ultrashort waves to the G-E plant and from there by land wire to W2XAF for transmission to Australia. Conversation from Australia was picked up at the short-wave station, sent by land wire to the plant, and from there by the special police transmitter to the moving car. So successful were the results, despite the complicated hook-up, that the small sedan continued to cruise about the Schenectady streets for 15 or 20 minutes more, Mr. Lang carrying on his part in the conversation through an ordinary French-type telephone.

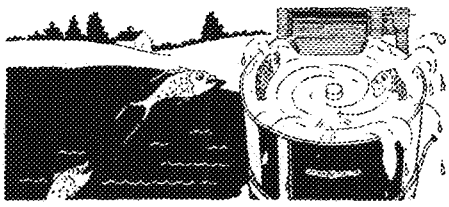


YELLOW LIGHT ON CAPE MAY

The orange-yellow light of General Electric sodium-vapor lamps now illumines roadways in more than 50 installations. It is also being used to light the façades and towers of buildings.

But now this light has another application—in the lighthouse at Cape May, N. J., at the entrance to Delaware Bay. The Cape May Lighthouse was erected in 1859. Its light source is 165 feet above mean high water and can be seen for approximately 19 nautical miles under clear atmospheric conditions. The lens is a first-order, 16-panel, flashing lens rotated by motor drive so that the beam of light has a four-second flash and a 26-second eclipse. The lamp itself does not flash—the rotation of the lens causing the alternate flash and eclipse.

In this test with the sodium-vapor lamp, all equipment has been supplied by the General Electric Company, and the installation was made by the Fourth Lighthouse District.



FISH GYM

The patrons of Joe Medway, a restaurateur up in New York State, literally fished for their dinners. They chose and netted their trout from a large pool. But what made Mr. Medway and his patrons unhappy was that the trout, presumably because of the treacherous refinements of effete pool life, became sissies. They just nosed around listlessly.

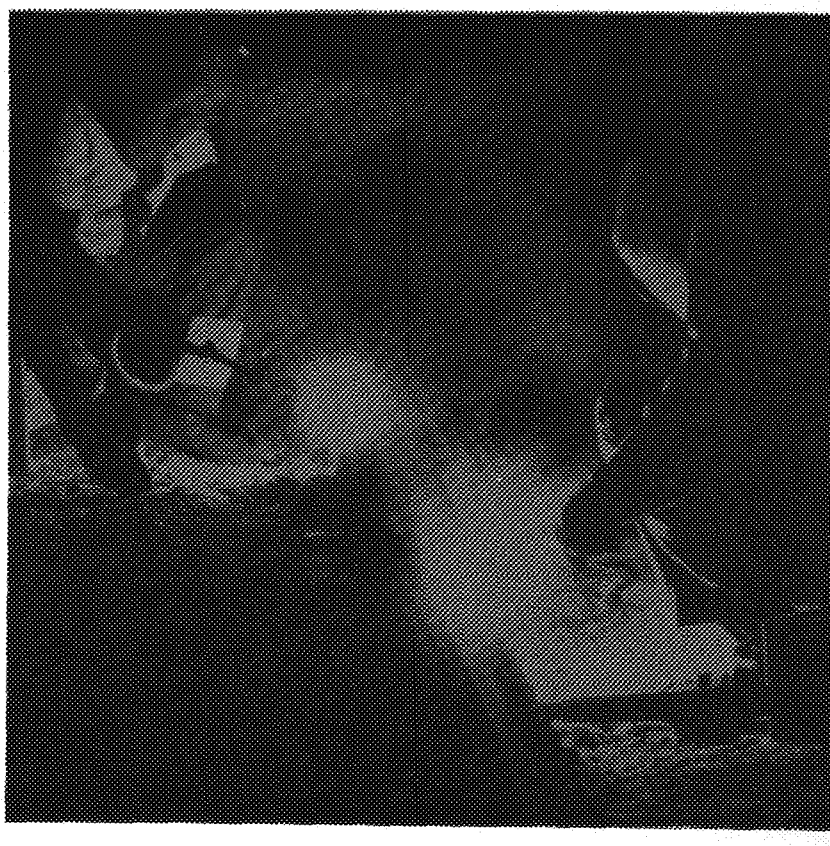
One day Mr. Medway gathered up a batch of netting by the pool and placed it in his General Electric washing machine for a rinsing. When he removed the net, there was a trout jumping about the machine in a most sprightly fashion. It exhibited such joyous abandon, in comparison with its sluggish brothers in the pond, that he turned on the activating element again to give it real satisfaction. The trout then accelerated its speed and leaped about in the swirling currents as though it were swimming for life or love in a mountain stream. Mr. Medway threw it back in the pond. It was off like a flash, and had soon churned up the placid waters into a sea of tiny whitecaps with its capers. Then, says Mr. Medway, the bit of spotted dynamite swished in to shore, came to a spray-raising stop, and with wiggles and flops implored its owner for another turn in the washer.

Well, Mr. Medway bought six more General Electric washing machines, and now all the trout are systematically exercised. Mr. Medway is willing to bet that there isn't a single speckled trout from the wildest streams in the country that could last a half a round with his trout. "Because," he says, "they're scientific trained."

96-91DH

GENERAL ELECTRIC

The MINNESOTA TECHNO-LOG



FEBRUARY 1935
Volume XV Number 5

DOW ACETPHENETIDIN U.S.P.

TRADE DOW MARK

THE flow sheet at the right is published for the purpose of illustrating the various steps in the manufacture of Dow Acetphenetidin U. S. P., showing that all the basic materials used in this process, with one exception, are Dow manufactured. Many of these basic materials involve almost as many manufacturing steps as the final product itself, insuring maximum control of quality and maintenance of standards.

The uniformity of Dow Acetphenetidin U. S. P. is the result of such operation. Meeting all of the requirements of U. S. Pharmacopoeia X, its melting point of 134.5° to 135.5° C. is significant of its exceptional purity. It is in the form of white, fine, crystalline powder of about 200 mesh.

It is our purpose to maintain the very highest standards of purity for all Dow products.

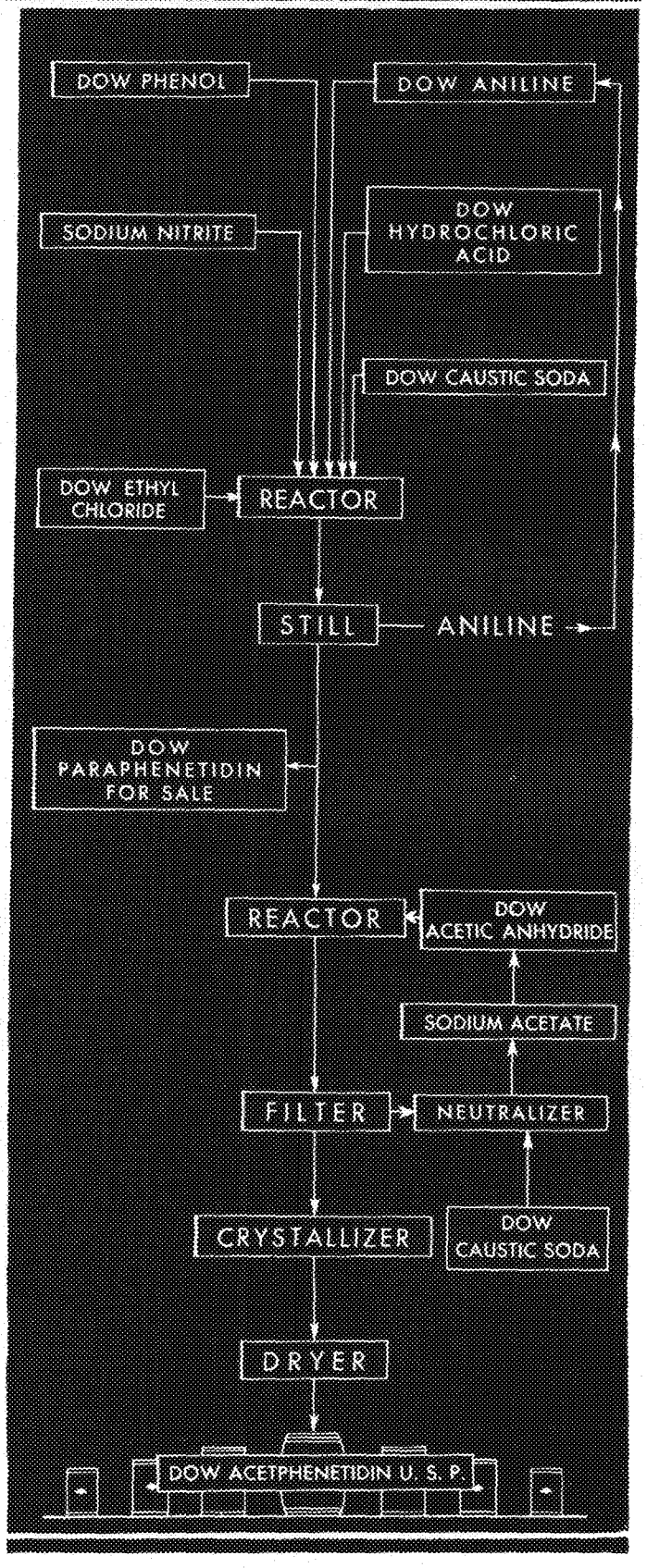
Dow Chemicals Include:

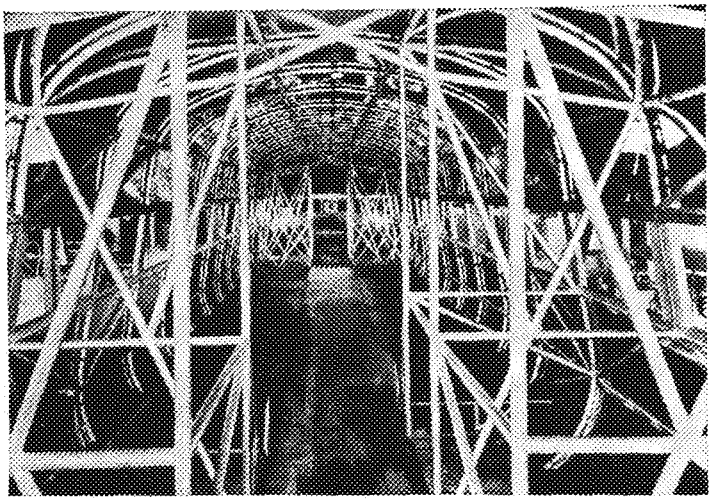
Bromides	Epsom Salt
Calcium Chloride	Ethylene Dichloride
Carbon Bisulphide	Insecticides
Carbon Tetrachloride	Iodine
Caustic Soda	Paradow
Chloroform	Phenol
Dyes	Salicylates

and over 250 other chemical products, as well as Dowmetal, the world's lightest structural metal.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

TRADE DOW MARK





HERE'S HOW—the framework of the light weight, streamlined rail cars for high speed is Lindewelded from chrome-molybdenum steel tubing.

Mastery over all Metals

Welding Makes Jointless Structures Possible in Practically All Commercial Metals and Alloys

By A. B. KINZEL*

One great advantage of using welding is that practically every commercially available metal and alloy can be made by this means into a jointless assembly.

Contributes to Home Comforts

Numerous articles fabricated by welding are found in most homes. Familiar ones cover a wide range of metals—kitchen ware and furniture of aluminum, copper and stainless steel; copper tubing in refrigerators, sheet metal in refrigerator boxes; kitchen cabinets and gas ranges; water pipes of copper, brass, iron and steel; furnaces and hot water tanks of strong heat-resisting irons and steels. Even the tiny alloy wire elements in radio tubes are welded.

Simplifies Automobile Maintenance

Automobile manufacturers use welding for innumerable assemblies where your safety and comfort depend on permanent strength and tightness. The modern automobile repair man also uses welding. With welding he quickly restores broken parts to use again. Steel bumpers, fenders, frames are readily made jointless by welding—as strong as or stronger than the original piece. Cracked cylinder blocks and broken aluminum crank cases are welded. Valves and valve seats are made service free by welding a thin coating of Haynes Stellite to the wearing surfaces to give longer life and added thousands of low cost miles.

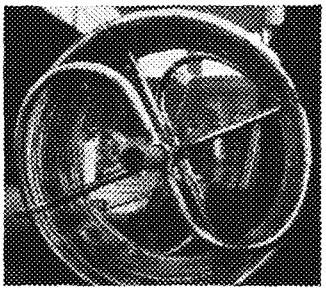
Aids Industrial Users

In industry—for tanks, containers, piping and a wide variety of other machinery and equipment of all sizes, shapes and metals—the use of welding is even more extensive.

Welding Marches Ahead

The wide-spread use of welding for various metals and alloys has been due largely to constant advances in technique and materials. Typical among these is the development of Lindewelding, a procedure for the rapid welding of steel pipe and plate. Speed increases of 50 to 65 per cent and material savings of 25 to 50 per cent over previous methods have been made.

Bronze-welding, welding with a bronze welding rod, is widely used for both repair and production. Smooth joining of metals or alloys of different compositions can be accomplished by bronze-welding. Steel can be bronze-welded to cast iron, bronze and copper can be joined, brass and steel plate can be united.



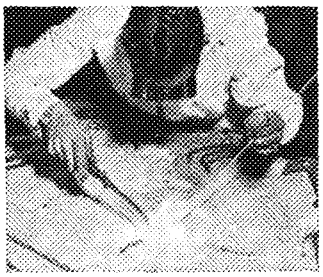
EVERY METAL—responds to the oxy-acetylene blowpipe. This stainless steel coil for cooling milk has welded joints.

Makes Modern Metal Designs Jointless

Exact procedures for the welding of corrosion-resistant steels and alloys have been developed. Welds so made are sound, strong and ductile. Resistance of the welded joint to corrosion makes it valuable also for use in joining special alloys such as Monel Metal and Everdur. Welded aluminum alloy chairs, tables and other furniture have been made possible through the development of special aluminum welding rods.

At Your Command

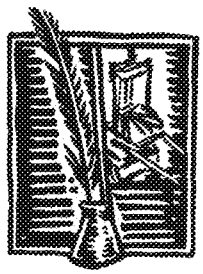
Modern welding technique, plus the great variety of metals and alloys on the market today provide many new possibilities for your products. Information and data which will help you use welding to wider advantage may be had from the nearest Sales Office of The Linde Air Products Company, a unit of Union Carbide and Carbon Corporation. These are located at Atlanta—Baltimore, Birmingham, Boston, Buffalo, Butte—Chicago, Cleveland—Dallas, Denver, Detroit—El Paso—Houston—Indianapolis—Kansas City—Los Angeles—Memphis, Milwaukee, Minneapolis—New Orleans, New York—Philadelphia, Phoenix, Pittsburgh, Portland, Ore.—St. Louis, Salt Lake City, San Francisco, Seattle, Spokane and Tulsa.



WELDING ALUMINUM—an architectural plaque, modern in design, is repaired by a modern method.

Everything for oxy-acetylene welding and cutting—including Linde Oxygen, Prest-O-Lite Acetylene, Union Carbide and Oxweld Apparatus and Supplies—is available from Linde through producing plants and warehouse stocks in all industrial centers.

*Chief Metallurgist, Union Carbide and Carbon Research Laboratories, Inc., Unit of Union Carbide and Carbon Corporation.



At The Desk

There is an important editorial on page 100 entitled "Take it to the Board." Read it!

The cover illustration is another industrial picture, showing a steam turbine. The turbine is one of the principal prime movers now in use in this country and in other countries. We would like for you to notice the air of spic-and-span efficiency of this picture. *Power* magazine loaned us the cut.

Go back and look at that frontispiece again before you look at the Contents page to find out what it is. Try to guess what it represents. You can't? Well, that is the roof of the concourse of the Grand Central station in New York. We borrowed the electro from which it was printed from *American Architect*. We'll bet the photographer who took the picture was dizzy afterwards.

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MINNESOTA TECHNO-LOG

37 ELECTRICAL BUILDING . . . U. of M.

FEBRUARY, 1935

Eugene Price
MANAGING EDITOR

David Buck
BUSINESS MANAGER

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Volume XV **Number 5**

This Month

southern industrialism encouraged by

Tennessee Valley Authority

through inexpensive power

By CONDIT BEVIER, M. E. '36

THE Tennessee Valley Authority is perhaps the largest peace-time engineering project in history. Volumes could be written on the enterprise now while it is still in its infancy and probably volumes will be written in the future about its political, sociological, agricultural, and industrial effects. The Tennessee valley may be called the "American Ruhr." Its development by the present administration will in all events have a marked national effect, and it is not beyond the scope of the imagination that it will have world-wide influence.

Under the present set-up the towns in this region will soon have cheap water power. Tupelo, Mississippi, was the first to get TVA electricity and this improvement has, on the average, reduced the electric bills by two-thirds. This of course suggests an overwhelming majority in favor of the enterprise. The dissenters are the stockholders and people who are in the employ of the public utilities. Under the new arrangement the towns sell bonds to buy or build a distributing system and these bonds are paid off over a ten year period from the profits resulting from the increased consumption.

The average citizen is in reality helped two-fold, directly by reduced power rates, and indirectly by city improvements resulting from the additional revenue. A very good example of this last mentioned item is Fayetteville, Tennessee. In this situation there is as yet no TVA power and as it is, the power rates are excessively high and the consumption is low. At the same time there is not enough money to sponsor everyday city improvements. If these people had the benefit of TVA cheap power these improvements could be made, and more power would be consumed and a lower rate would exist. This project could be sponsored by the people by buying a distribution system, selling bonds, selling the power, and paying off bonds and making improvements.

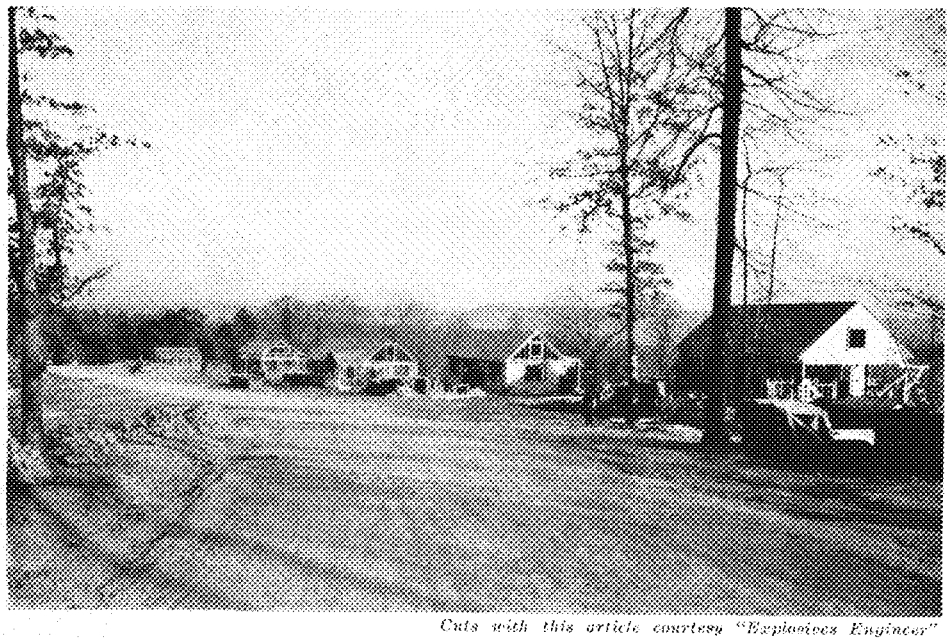
The history of Muscle Shoals legislation falls naturally into two periods, the first from 1828 to 1899, dealing with the improvement of navigation only, and the second from 1899 to the present, primarily concerned with the production of electric power.

In 1824, John C. Calhoun, then Secretary of War, urged a survey of the Muscle Shoals section of the Tennessee river, and in 1828 the first survey of the section was made, resulting in recommendations for the construction of a canal around the shoals. In 1831 work was begun, and in 1836 the canal was opened. It was soon abandoned, however, as it was inadequate.

John C. Calhoun urges survey

Congress began consideration of measures for general river and harbor improvements in 1867, and in 1871 a survey by army engineers for another canal around Muscle Shoals was begun. The second canal was completed in 1890 at a cost of $3,191,700. It was closed upon completion of the Wilson dam which was built by the army for munitions manufacture during the World War.

During the late nineties the government began consideration of proposals advanced by power companies to construct a dam at Muscle Shoals for



Cuts with this article courtesy "Explosives Engineer"

When the Authority has finished its work the natives of this region will be housed in modern bungalows, with all modern conveniences.

navigation purposes. The companies would handle hydro-electric power which would be a by-product of the dam. The proposal was finally accepted by the War Department, and in 1899 Congress passed an act authorizing the development of Muscle Shoals for navigation and power. The Muscle Shoals Company was granted authority to do this, but never availed itself of the privilege.

Again in 1905 the Senate requested the appointment of a commission to study the shoals with respect to power development, but the Secretary of War did not appoint one. Special boards of army engineers were appointed to make surveys in 1907, 1908, and 1909. In each case they did not recommend the enactment of a bill permitting the investigation on the grounds that the investment of the Muscle Shoals Hydro-Electric Power Company was relatively small.

In 1916 President Wilson was empowered to investigate the production of nitrates by water power, and in 1917 he chose this site. In 1918 work was begun on the dam, later named Wilson Dam, and in the same year the first nitrates were produced. From then until 1933 bills were passed to allow the government to lease the dam to private enterprises for nitrate production and power, but the privilege was not used. The Norris Bill was passed in 1933 authorizing the government to produce power at Muscle Shoals.

President Wilson chooses site

The plan comprises three main projects: the Wilson, Norris, and Wheeler dams. The object of the entire undertaking is to provide electric power, to prevent soil erosion, provide better housing conditions, and to procure a nearly uniform flow of water in the Tennessee river.

The Wilson dam forms the cornerstone of the TVA program to utilize the entire resources of the Tennessee water head for production of cheap hydro-electric power for the people of the valley. It is a combined hydro-electric, flood control and navigation project, comprising the dam with regulating gates, reservoir, power house, switch yard, and lock, situated on the Tennessee River, 259 miles from the mouth and 1½ miles from Sheffield, Alabama.

The Norris Dam, now under construction on the Clinch River approximately six miles down stream from its confluence with the Powell river, will be a combined hydro-electric and flood control project with regulating gates, reservoir, power house, and switch yard and will have an installed generating capacity of 100,000 kilowatts. The Norris dam is unique in that the manufacture of all the aggregate for concrete in permanent structures is quarried at the site. The quarry is 120 feet long and is located about a quarter mile from the dam. Two three-yard electric shovels load the rock in ten-yard dump trucks. The rock is then deported to an upper 42 inch gyratory primary crusher. The crusher is located at the edge of the quarry.

Cement is delivered in box cars at Coal Creek, 4½ miles from the dam site. It is dumped by two portable cement dumps from the cars into a 6,000-barrel capacity steel silo. Four trucks with trailers and aluminum tank vaults of sixty-barrel capacity transport cement from Coal Creek to a support standing beside another silo located in the dam.

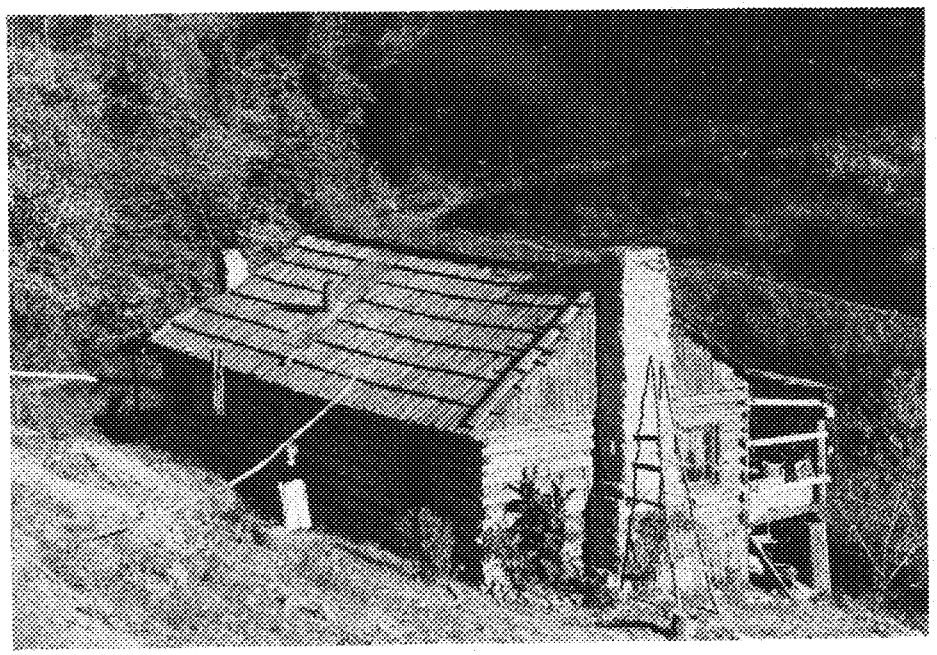
The General Joe Wheeler dam will be a combined hydro-electric, navigation, and flood control project, comprising a dam with regulating gates, reservoir, power house, and one single-lift lock. It will have an ultimate installed capacity of 288,000 kilowatts.

The dam site is on the Tennessee river, 275 miles from the mouth and 50½ river-miles above the Wilson dam. At this point the total approximate drainage of the Tennessee river, is 29,600 square miles. The dam, the axis of which lies in a north-south direction, will be 6,335.5 feet wide and will include between the two points of the Tennessee river a single navigation lock, a gravity type dam, and a power house.

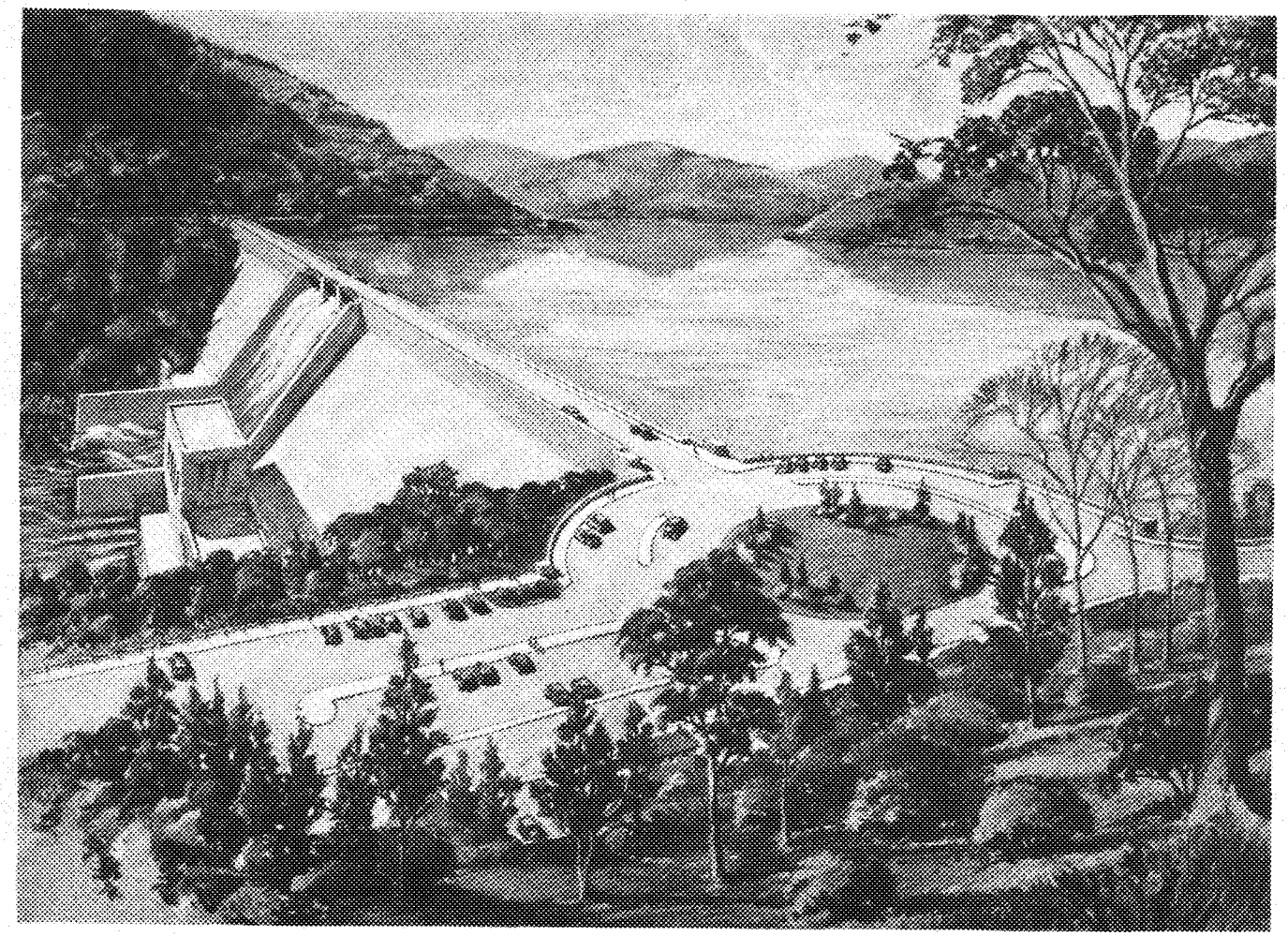
A lake which will cover the upper reaches of the Muscle Shoals rapids will be created by Wheeler dam. The lower reaches of the rapids will be buried by Lake Wilson. These two lakes connected with a lock at Wheeler dam will remove the greatest barrier to river transportation on the Tennessee and provide a waterway for which the country has waited for more than a century.

The Muscle Shoals section of the river extends a distance of approximately thirty-four miles. The shoals are a series of rapids with a total fall of about 137 feet, of which the greatest fall is in the last seventeen miles. The area has been flooded since building the Wilson dam.

Besides the production of cheap hydro-electric power the projects will



For decades the inhabitants of the Tennessee Valley have been living in rustic cabins.



The Wheeler dam will produce 288,000 kilowatts, and provide a lock for navigation purposes. It will also be instrumental in flood control.

make possible the prevention of soil erosion, and rehabilitation. Soil erosion may be prevented by flood control and scientific methods of planting. Erosion in this area is bad and is becoming worse. If any agriculture is to be carried on in the future, soil erosion must be prevented.

Soil erosion is problem

The rehabilitation program is an extensive project to house the men working on the numerous projects, to build permanent towns, and to furnish the people living there with decent, respectable abodes. Bunk houses may be used to provide shelter for the people working on a project, but a larger undertaking that requires more time and planning, necessitates the building of a permanent town. Accordingly the town of Norris is being built beside the Norris dam. Unlike most planned towns, a comparatively small number of standard house plans have been used. Each house is equipped with water, sewage disposal, and electrical service. As might be expected, the houses have electric kitchen ranges and hot water heaters. The streets are laid out in easy curves to suit the topography, and they are surfaced with macadam which has a bituminous topping.

The housing of the farmer is a somewhat different problem. The farms in this valley are practically non-productive, largely because of soil erosion. This erosion has led to reduced acreage and poorer crops which in turn results in reduced incomes, lower standards of living, and poorer living facilities. Using his own devices, the farmer's outlook was practically hopeless. Thus an engineering and a social problem had to be met.

The industrial problem that must be faced by the authority is probably most interesting. The Valley is rich in natural resources. Fuels, present in abundance, include coal, lignite, petroleum, and natural gas. Iron ore, manganese, chromium, nickel—all are found in the valley. Raw materials for the production of cement, fertilizers, ceramics, and chemical products are found here. Adding to these, low cost electric power and adequate transportation facilities, the foundations of a society are present in the valley.

It is apparent that some industries will be relocated in the South. The logical question is "What will be the result?" The TVA board is not passive, and is willing to stimulate industry in this area. But the pertinent point is this—will the removal of industry from one part of the country where labor laws are strict and wages high, to a new area where there are lax labor laws and labor is cheap, lower the standards of living? This question is beyond the scope of this article but is one of vital importance to the nation and especially to the college student. This drive for Southern Industrialism may bring about unemployment and decay in the North and not appreciably raise the standards of living in the South.

heating, cooling and air conditioning provide

Home-Made Weather

By DOUGLAS KUEHN, M. E. '35

Doug wrote this originally as a paper for Mechanical Engineering seminar. We prevailed upon him to prepare it for publication. In it he discusses modern trends in air-conditioning, and incidentally looks into the future a little. Heating and ventilating are fields in which developments are far in advance of general practice. This article will give you some insight into what is being done along those lines, and what you may expect in the near future.

THE climatic conditions of the Hawaiian Islands may be brought to your home of the future by means of proper heating, cooling, and air conditioning. Maintaining these conditions will require no more attention than an electric clock. In the winter the house will be heated, sufficient water will be added to the air to sustain proper humidity, and the air will be cleaned and circulated. In the summer the air will be cooled, cleaned, and circulated, and water will be removed from the air to reduce the humidity to a comfortable degree. In order to fulfill these requirements it is necessary to consider the three main factors: heating, cooling, and air conditioning.

The fuels in use today are coal, oil, gas, and electricity. Coal is now the source of heat in the majority of homes, and it is estimated that it will be available for another 100 to 150 years. Coal is a practical fuel to use and provides proper heat at a lesser cost than any other source of energy. With the advent of the mechanical stoker further economies have been experienced in the use of this fuel.

Gas is the truly automatic fuel as the burner is entirely automatic in operation and the flow of the fuel is uninterrupted from the manufacturing plant to the burner. Manufactured gas is more expensive to use than oil. With the extension of natural gas pipe lines and its use in the pure state or mixed with manufactured gas, the cost will be about the same as oil or somewhat less. With gas no motors nor mechanical devices are necessary and, therefore, no electricity is needed and maintenance of equipment is reduced to a minimum. It is the ideal fuel to use.

Natural gas will be cheaper

The oil burner has been in use for nearly twenty years and is now perfected to a degree that is considered to be reasonably efficient. Generally speaking, the cost of oil for fuel is slightly more than coal, but this is offset by the fact that the burner is automatic in operation and requires no attention from the owner beyond ordering oil when the tank is nearly empty.

Electricity would be the ideal fuel for heating but at the present time the cost is prohibitive.

There are two methods of heat distribution in the home; piped and warm air systems. Piped systems, which include hot water, vapor, and steam, have many advantages but they are relatively unimportant in small homes. Warm air systems possess the distinctive advantage of being much more readily adapted to air conditioning as the warm air may be treated before it is delivered to the rooms.

Automatic controls must be used with these heating systems in order to maintain a comfortable temperature within the home with variable weather conditions. This is accomplished by means of a thermostat placed at a strategic position in the house. Safety-factor instruments must be connected to the system to prevent dangerous situations that might arise from failure of any part of the equipment. Individual room temperature controls are on the market, but are rather expensive as yet.

Proper air conditioning must include air cleaning and humidity correction. Air purity is one of the most important factors in air conditioning both from the standpoint of comfort and health. Impurities in the air may be in the form of solids or gases. The solid particles may consist of earth, sand, ash, rubber, leather, stone, wood, pollen, soot or carbon, and practically every known material. These dust particles may find their way into the air from wind, soot from chimneys, disturbances created by passing vehicles, or any process that agitates the air. Dust will remain suspended for varying lengths of time depending on the size, weight, and shape of the particles.

The gaseous impurities may come from various manufacturing processes. They do not settle out and are very hard to remove.

Impurities may be taken out of the air by several different methods, such as settling, centrifugal fans, washing, and filtering. The method to be selected depends upon the particular circumstances.

According to the A. S. H. and V. E. Standard Code, air cleaners are rated by:

(1) Capacity in cu. ft. of air handled per minute.

(2) Resistance in inches of water at rated capacity.

(3) Dust arrestance, the percentage relationship expressing dust removal efficiency at rated capacity.

(4) Reconditioning power, the energy necessary to operate the mechanism of an automatic air cleaning device.

(5) Dust holding capacity, the amount by weight of standard dust which a non-automatic air cleaning device will retain before reconditioning is necessary.

Air cleaners for ventilation problems are usually either air washers or air filters. The filters may be either dry or viscous.

In air washers the dust is removed either by wetting down while passing through a water spray, or by contact with wet baffle plates. These latter are a series of metal plates, curved in such a manner as to cause a sudden change in direction of the air flow. The inertia of the dust particles causes them to be thrown against the wet plates from where they are removed by means of a water spray. Soot or oily materials are difficult to remove with the air washer.

Dry air filters eliminate dust by impinging it or filtering it through screens made of felt, cloth, and various other materials. This type of filter has a definite length of life, due to the nature of the material, and must consequently be replaced periodically. The velocity of air through this type of filter is usually somewhat lower than in the viscous type of filter due to the filtering media. It is not possible to maintain a constant resistance with this type of filter, cleaning or replacement usually being necessary after a predetermined resistance has been reached.

The viscous filter operates on the principle of adhesive impingement. Spun glass is customarily used for the filter. This is impregnated with a viscous oil which retains a part of the foreign material in the atmosphere. The viscous material used in such a filter should be odorless, fireproof, have low variation in viscosity, low evaporation, and be germicidal in action so as to prevent development of bacteria. The resistance of these filters depends upon several factors, such as density of material, velocity of the air passing through the filter, and the amount of dust which has been accumulated since the filter was last replaced. It has been learned that these filters will remove from 80 to 85 per cent of the solid impurities in the air.

Viscous filters made of spun glass

As dust particles carry disease germs, a high percentage of it in the air is conducive to the spreading of disease. By elimination of 80 per cent of the dust an accomplishment of considerable merit is obtained. It is known to be a definite fact that cases of hay fever and asthma have been ameliorated to a considerable extent by the use of air cleaning.

A characteristic of most man-made heating systems heretofore employed is the lack of maintenance of the proper amount of moisture in the heated air. No heating system, be it warm air, hot water, steam, or vapor, meets this deficiency unless humidifying apparatus is used. Proper humidity is desirable both for health and comfort.

The amount of water that can be added to increase the humidity of the air is dependent upon the outside temperature. It has been found that 40 to 50 per cent humidity is practicable in weather down to zero deg. F., but below zero it must be cut down to about 30 per cent or frost and condensation in excess amounts will accumulate upon the windows.

Air washers have been used to some extent but these have not proven very successful. Two types of washers have been developed, one with spray nozzles and the other with a spinning disc. In both cases a fog spray was generated in a chamber set between the air blower and the furnace with a set of eliminator plates to prevent the actual water from entering into the furnace chamber proper. In the winter city water has a temperature of about 36 deg. F., and this has a tendency to dehumidify rather than to increase the humidity of the air. Further, as the spray is introduced into the return air, the temperature of which is about 65 deg. F., the absorption is slight and the resulting test rarely shows more than 30 per cent.

Proper air conditioning may bring into your home of the future the climatic conditions of the Hawaiian Islands.

"ASIA" magazine

A type that has given satisfaction is known as the "Automatic Spray Humidifier." This is a spray nozzle of the self-cleaning type placed inside of a small aluminum pan with a piece of vitreous porcelain set at an angle against which the water impinges resulting in a fog spray. As this is placed in the bonnet or warm air plenum chamber of the furnace where the temperature is from 110 to 200 deg. F., 75 per cent of the spray is absorbed and forced through ducts into the rooms. A disadvantage of this type of humidifier is that with the use of extremely hard water a white dust will be thrown into the rooms. Under these circumstances some type of evaporating pan must be used even though it be less efficient.

Dehumidification is desirable in the summer to reduce the water content of the air. There are two methods of accomplishing this; by lowering the temperature of the air to below the dew point in order to condense out some of the moisture and reheating the air to a comfortable temperature, and by passing the air over certain substances such as silica-gel and activated alumina which absorbs a certain part of the air borne moisture.

The most precise manner of maintaining constant humidity is the use of a thermostat controlling the temperature of the air leaving the spray chamber before it is reheated or mixed with warm and circulating air. This control is exact because the air leaves the spray chamber 80 to 90 per cent saturated and at substantially the temperature of the water; hence by governing the temperature of the leaving air and by the use of thermostatic controls on the reheaters or mixing dampers, both the final temperature and the final humidity are readily controlled. Automatic controls have not come into common usage for residences because of the high cost.

If we compare the heat loss of a house at 100,000 B.t.u. per hour for 90 deg. temperature rise, and then consider cooling and the desire to reduce the temperature 15 deg., we find that we must eliminate 200,000 B.t.u. per hour.

Cooling is more difficult

Therefore, it is twelve times as difficult to cool as it is to heat. As such, the expense is proportionate, but the average layman does not grasp this.

Up to the present time cooling has been accomplished by the use of a blower in forced air heating units by forcing air into the rooms. The return air in this case is dampered off and the fresh air taken from the basement, which is usually considerably cooler. This has met with the satisfaction of home owners and a temperature reduction of 15 to 20 deg. has been reported.

The use of city water for cooling purposes in the summer is not practical because its temperature is from 75 to 80 deg. and no effective cooling is obtained. In rural districts where well water at a temperature of about 47 deg. is used, actual cooling has been obtained by this method.

Mechanical refrigeration units may be used and are on the market, but it is estimated that in the average residence it would require a 10 hp. motor to operate it. Thus, the maintenance expense in addition to the original cost is rather high.

Much has been said about the future house with its artificial illumination and air conditioning eliminating the need for windows. It is not probable, however, that this will soon be seen, for the art of heating, cooling, and air conditioning has not yet advanced to the point of producing the proverbial "day in June" at the flip of a switch.

Great Eastern Versus Sulu Sea

By **Roderick William Siler**

Assistant Professor of Mathematics

FOR those who after a three months diet of snowflakes are becoming a bit groggy I submit by way of stimulant an extract taken from the travels of Bayard Taylor, an American, who in the year 1853 sailed the Sulu Sea, which lies between the Philippine Islands and Borneo. Says Taylor:

"Our voyage the next day was still more delightful. From dawn until dark we went slowly loitering past the lovely islands that gem these remote seas, until the last of them sank astern in the flush of sunset. Nothing can be more beautiful than their cones of verdure, draped to the very edge of the waves, except where some retreating cove shows its beach of snow white sand. On the larger ones are woody valleys, folded between the hills, and opening upon long slopes, overgrown with the cocoa-palm, the mango, and many a strange and beautiful tree of the tropics. The light, lazy clouds, suffused with a crimson flush of heat, floated slowly through the upper heavens, casting shifting shadows upon the masses of foliage, and deepened here and there the dark purple hue of the sea. Retreating behind one another the islands grew dim and soft as clouds on the horizon, girdled by the most tranquil of oceans. . . . The breeze fell nearly to a calm at noonday, but our vessel still moved noiselessly southward, and island after island faded from green to violet, and from violet to the dim pale hue that finally blends with the air."

Only an Eskimo, it seems to me, could read these lines in the month of February and not feel at least a momentary desire to pack up his duds and start wandering in search of some such place as the Sulu Sea. And there was a time,

scarcely a quarter of a century ago, when a young engineer, craving a sight of sun kissed seas, mellow moons, and all that sort of thing, could have attained his desire if his nerve were equal to his inclination. Arriving at the tropical shore he would have found no one objecting to his disembarking. Ashore, he might have found work. On the other hand, he might not, in which case he might have found some difficulty in finding enough to eat. But the point is, he would have satisfied his longing for travel. Besides, you know how it is in the tropics: a man can always shin up a cocoanut tree and get a meal. Today all this is impossible. The shimmering seas, the waving palms, the cocoanuts are still there, but no longer do young American engineers come to enjoy them. For every country has now put up bars keeping out all except its own people. The wandering American engineer of a few generations ago is a thing of the past, I am afraid. The best I can advise for any engineering student still determined to see the Sulu Sea is for him to study his mathematics in college, work hard for the next forty years, and when he gets his Townsend old age pension have his grandchildren take him on a visit down there.

There are persons who, in commenting on the why and the wherefore of the present restrictions upon men's privilege to go where they will, blame it on the development of means of transportation and communication. In 1853 the oceans remained comparatively free. No cables had then been laid. Steam was coming as motive power for ships, and had been coming for more than thirty years, but the largest steamers were of only three or four thousand tons, and sail still ruled the seas. Suddenly someone in England suffered an inspiration to build a ship that may fairly be called the first of the great ocean liners, the first of those machines which have succeeded in bringing the nations of the world so close together that to keep themselves apart they have erected artificial barriers where formerly the natural barriers of time and distance sufficed. The ship was the famous *Great Eastern*.

From 1854 to 1857 the *Great Eastern* was being put together at Millwall, near London, and it is a fact that no ship has ever so set the world agog as did this one. And no wonder. At one step her builders contemplated creating a vessel three or four times as large as the mightiest craft yet built. Indeed, she was to be the largest ship built for more than forty years after her coming. In all that time she provided a topic of conversation that could be guaranteed to start tongues wagging. The *Great Eastern* offered something besides her size as matter for debate. She offered that eternally interesting problem—Would she make money? She did not make money. As a financial investment the *Great Eastern* proved to be the great frost.

A contemporary correspondent of a London paper who went down to look her over while building wrote quite excitedly of what he saw. Almost 700 feet long, she was to have five funnels and six masts, he reported, four decks, carry 4,000 people, 8,000 tons of cargo, and 11,000 tons of coal. This last because she was intended for the Australian run, and to be able to make it without refueling. This destiny she never realized. The correspondent also wrote that "the deck is as wide as Pall Mall," and her paddle wheels, 56 feet in diameter, "are larger than the circus at Astley's." Of her several saloons "the largest is as spacious as the saloon at Drury Theater." We must not misjudge the *Great Eastern* here: a "saloon" in 1857 did not necessarily mean a place which people enter thinking only of beer. Language changes, and "saloon" was once a very nice word. But the correspondent also writes, that when the *Great Eastern* went to sea she "would be provided with the never-to-be-forgotten comforts of an excellent cuisine and a well-stocked cellar." She may have had a saloon, at that. Also, "weather permitting, the ladies, sheltered by bulwarks six feet high, may display the newest Parisian and London fashions with as much effect as in Regent Street or the Esplanade at Brighton." All of which seems to indicate that ships change, but the ladies never.

If ever there was a time when thoughts of tropic isles were more appropriate, we are mistaken. Mr. Siler's article will be approved by suffering students who are tired of battling snow, ice and wind for the past two months, and are ready to get a vicarious thrill from reading of sea-kissed isles and waving palms.

That men propose and the fates dispose seems to have become evident when the men tried to launch the *Great Eastern*. She showed a disinclination to take to the water, and it required four more months of work and an extra quarter of a million dollars to get her off the good dry land. There had been many prophecies as to what she would do when afloat, some optimistic, some dire, and the usual number wrong. For instance, there were people of the hopeful sort who opined she wouldn't roll; being so large the waves would no more disturb her than they would a continent. But she did roll. I have read somewhere the number of degrees she rolled in rough weather, and seen in degrees it doesn't look bad. But history records that she, like all her descendants, could on occasions roll enough to make the passengers lose their lunches and all interest as to whether or not she rolled clean over. Seasickness is one human affliction that remains with us.

It was decided to run the *Great Eastern* between the United States and England, rather than to Australia. The day in 1860 of her first arrival in New York harbor was a gala one. Never in history have the New Yorkers been so agitated by mere size, except possibly when P. T. Barnum's renowned elephant, the mighty Jumbo, stalked down Broadway a few years later. Too large for the traffic of that day the *Great Eastern* was then used as a ship to lay cable during 1864-65-66. Back into the New York-Liverpool run she went in 1867. In the period 1869-74 she was again laying cable. With that her voyages ceased. She became a coal hulk. In 1887 she was broken up. And thus she ended.

The *Great Eastern*, it seems to me, is significant as marking an epoch; an epoch of great mechanical inventions and improvements which it was inclined to believe would bring the world to perfection. That was the age of anticipation. Ours, perhaps, is the age of realization. Realization that the anticipations have not been quite justified. Human history seems to indicate that that is the usual result. It seems impossible for men to have their cake and eat it, too. We have many *Great Easterns* now. But where are those regions, remote, mysterious, yet accessible to young fellows with strong stomachs and sound nerves? Where are the Sulu Seas of 1853?

The Minnesota
TECHNO-LOG

On Scientific Living

THE complacent attitude of students to most of the things around them appears to be quite well spread. It is a sad commentary on contemporary student life, perhaps youth in general, that it holds to such purposeless endeavor. In this, as in most things that are said, the people we are dealing with are the average, not the exceptional ones. The usual case is that most of the things of this sort are written in general, not in particular.

It may be the natural result of being born into things as they are, that we accept so many things without question. It might be said that it is a protection to society that this be so. Surely in recent years it becomes apparent that if young people had considered more seriously some of the folkways and customs that they have accepted blindly we should have seen distinct changes in present day culture.

A word of counsel here might be timely. As you are in a technical school pursuing studies that are scientific or quasi-scientific why not adapt the scientific method to your life? Not your school studies alone, but to your human relations as well. Be scientific. As science is objective, analytical, unmoral, unbiased, and unprejudiced, so pattern your life. Criticise the things around you on standards that will stand up under scientific attack and then treat most of the things you do in the same manner.

Take It to the Board

Above on this page you will see the names of men on the *Techno-Log* board. Those men are your representatives. It is their duty to incorporate your wishes into the *Techno-Log*. In short, they perform exactly the same duties as Congress does in American government. They *are* your representatives.

Did you know that you are one of the publishers of the *Minnesota Techno-Log?* You are, and what you say goes! If, of course, you make your wishes known to the board. Sometimes you may have a kick to register. Take it to your representatives. As a stockholder in the *Techno-Log* it is your right to demand that it measure up to your standards.

The men on the board are elected (you elect them) one from each school in the college. Their only purpose is to interpret your wishes to the editor and business manager. Of course, they can do nothing unless you stockholders express your individual opinions to them.

Now get this straight. If you don't give your comments to your representative you have no right to gripe about the *Techno-Log!* We cannot run this magazine without criticism and hope to satisfy even a small number of you readers.

Encyclopedic Engineers

Since 1929 fifty per cent of the research workers released by the Westinghouse Electric Co. have been lacking in aggressiveness, only 15 per cent in technical training. Second in the list of factors against the men was lack of ability to sell themselves. Approximately 43 per cent of the men were deficient in that quality. Unimpressive personality and failure to improve themselves technically, each worked against 35 per cent of the engineers.

The human factor is a most important one to the engineer. Less important is the amount of technical information soaked up by the man at college. Thomas Spooner, who reported the five-year survey in the December number of *Electrical Engineering*, says, "A man who has an encyclopedic type of mind is likely to be weak in other desirable traits, particularly ingenuity. . . . If a man knows that certain information is available and where to find it, that is all that is essential."

That may come as quite a shock to some of you underclassmen; you probably have gotten the impression that the man who memorizes the most makes the best engineer. That is the penalty we pay for our system of education. We will not discuss that here, however. The important thing to note is that the engineer needs to learn how to get along with fellow-engineers, superiors, and people in general. He needs, moreover, to learn how to sell himself and to push his own stock.

The best time to get that training is right now, when you are free from the necessity of earning a living. When you get out of college you get into a world where, figuratively, you have to use tooth and nail to get ahead. There isn't time to get personality training in the struggle. Here, in the shelter of college walls, you have a chance to join in activities. They are easy to get into; try them. Go after your training. Don't be in that weak 50 per cent.

Now Here's A Book

By Clifford I. Haga

INSTRUCTOR IN ENGLISH

THE great popular success of Alexander Woollcott's "While Rome Burns" proves, if nothing else, that we all like a good yarn well-told. His collection of anecdotes and gossip illustrates what a skillful raconteur can do with the neglected by-products of other people's lives: he adds a bit of his own way of looking at life and makes these rags and tags take on a lustre and color that we would not at first suspect they possessed. But what happens when, instead of yarning about other people, a man writes his autobiography by this method and takes us through the pleasures and pains of a long and busy life. Axel Munthe's "The Story of San Michele" works out such a problem and states its answer in terms of human character.

Informal autobiography though the book is, it claims by title, opening chapter, and conclusion to be the story of Munthe's adventure in discovering the ruins of Tiberius' summer villa on Capri in the Bay of Naples and out of them creating a strangely beautiful and satisfying structure part palace, part cloister, part museum—a refuge and a solace. As a matter of fact (take a deep breath!), the book is a variegated, tumultuous cascade of impressions of men and events, successes and failures, raptures and heart breaks that Munthe saw, endured, or shared from his medical-student days in Paris in the 70's, through spectacular success practicing in Paris and in Rome, and ending with his retirement, half-blind, to a tower near his great villa, his death and his triumphal appearance before the judgment bar of heaven. These stages of his progress are interrupted by flights to Lapland, Switzerland, Capri, Egypt—and even (this more than once) into the supernatural. As a consequence, out of all these experiences and their relating the reader can pick and choose, sure of finding every kind of story except the excessively pious and the excessively profane. But within those limits he has a rich selection.

Should his taste run to the gruesome, there is the story of Mamsell Agata, the sister of Lazarus; but if he wants the gruesome and the comical interwoven, there is the adventure of the Russian general and the Swedish student, a story better called "The Corpse Escort." Or if gruesomeness alone is not enough, there are the macabre accounts of the earthquake at Messina and the cholera at Naples—such heaps of dead and such hordes of rats! In fact the story of plague-stricken Naples is almost as terrifying as J. P. Jacobsen's "The Plague in Bergamo," one of the most horrifying stories I have ever read. Ghost stories, too, and even more far-fetched supernatural episodes, such as the search for the granite sphinx, take us into the land that lies beyond death. Melodrama?—then he can read of John and the Colonel's wife, or follow the account of Munthe's kidnaping, by remote control, an unfortunate inmate of an insane asylum. Fairy stories?—then to Lapland and Munthe's visit with a kobold. Animal stories?—the Lapland bears and what they are like, or the adventures of Billy, the Boozing Baboon, who "took the cure" but had a relapse. Drawing room intrigue?—then listen to the tinkle of the Countess' teacups and go on to duelling, honor, and a great triumph of luck in avenging a dog and a meadowlark. Why did Munthe's blood run cold when he found boozing Dr. Campbell singing and dancing with the boozing baboon, Billy? What happened when an avalanche on the Matterhorn hit Dr. Munthe on the head? Or if the reader wants the ludicrous let him read of the Reverend Jolnathan's widow and the hotel-servants' jack-pot.

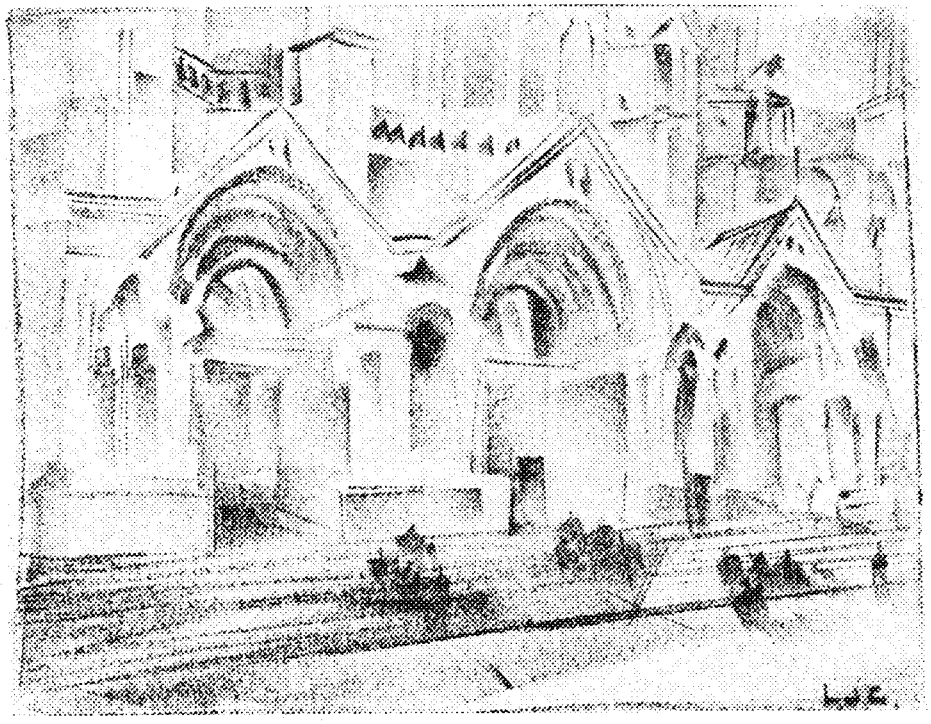
But such snippets as I have given tell of less than half the book. The rest is Munthe—a man of great physical strength and psychic power, energetic beyond belief, and with a world of sympathy in his heart to supplement the power of his mind and hands and nerves. Emperors and grand dukes, nobles and knights, millionaires and artists, streetsweepers and fishermen, criminals and prostitutes, lions, dogs, baboons (ranked by ordinary standards)—the list of his patients is endless, so endless that suddenly we realize how in such multitude they all take the same rank, leveled by the same fear—Death—and each has an equal claim on the great doctor's skill. In the end, therefore, "The Story of San Michele" becomes more than merely a collection of yarns like "While Rome Burns"; it becomes the story of the endless struggle between a great hope and a great fear, in which the anecdotes serve to illuminate the crises of the tug of war.

Beaux Arts Ball to be March 1

MEXICO, the romantic land of Montezuma, of Cortez, "Viva Villa," and "Death Comes to The Archbishop" is to inspire the theme of this year's Beaux Arts Ball, La Fiesta De La Cucaracha which is to take place March 1 in the Curtis Hotel. It has been several years since the Architectural Society sponsored an all-University costume party, and there has been much interest in plans for the affair. The Beaux Arts Ball promises to take its place among the major social affairs of winter quarter. It has been decreed that no one will be admitted who is not in costume inspired by the Mexican theme, and a colorful grand march with announcement of costume awards will climax the evening.

The Society would have difficulty in finding a country better suited than Mexico for colorful and artistic simulation. Art is the very essence of Mexican life and is seen in the humblest object the peasant uses. The ever present sense of beauty among the people and the wealth of homely beauty in their crafts are the result of centuries-old Aztec and Zepotec influences. With its Spanish and Indian heritages, Mexico offers stimulating diversity in motifs for decoration and costumes.

Tickets for the affair may be procured from members of the Architectural Society who are primed with suggestions on Mexican dress. It is considered half the fun to design and make one's own costume.



NORTH PORCH, CHARTRES

This is Currie technique—forceful, free, and inspired. It is an excellent example of the possibilities of lithographic crayon.

Too Many Architects?

The trend analysts have been worrying about an overproduction of graduates by architectural schools. They have discovered that a large number of these diploma mortgagees have the fortune not to follow the profession of architecture, choosing or forced to make money instead. Of course it is too bad that all who so desired cannot find work as architects; some day, indeed, an enlightened society may consider it profitable to subsidize these pursuers of truth and beauty rather than allow them to degenerate into "bankers, storekeepers, or, in rare cases, through the tireless machinations of evil, into engineers." The analysts would have it that each of these fallen, having secured a degree in architecture and not thereafter practicing it, represent four to six years — depending upon the school as well as student — of wasted studying and teaching effort. A canard in both respects.

The graduates have received an education more liberal in important aspects than they could have found in almost any other course, no matter how many electives it might offer. They have learned to work upon a problem night and day for weeks, to receive in the end, perhaps, no award from the jury, consequently no credit from the University. It is liberalizing to learn that long, hard, even intelligent work will not necessarily result in a tangible reward. These students have developed in themselves a power of imaginative reasoning. They have learned to simplify those problems which appear complex and to discover underlying complexities in those ostensibly simple.

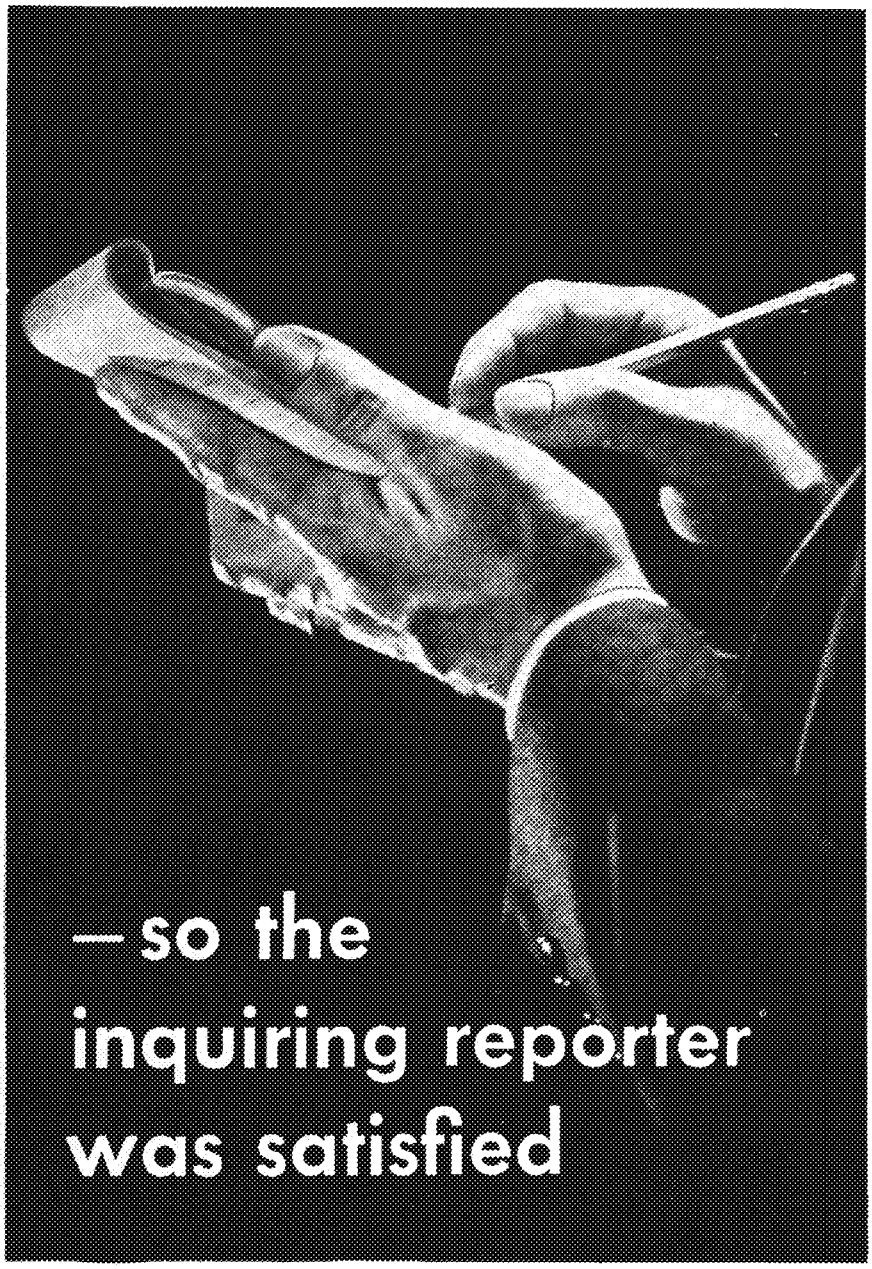
In seeking to design buildings to house activities in many spheres our graduates have acquired a fund of collateral knowledge in those spheres, for only one who has studied architectural design can know how surely must the form of a structure follow its function. Finally, these graduates have associated during their school years with a group of students having very probably a wider range of knowledge in the liberal and mechanic arts and sciences than is to be found in any other department of a University. And all of these are in addition to the benefits, not entirely insignificant, acquired through the pursuit of the courses in the curriculum.

If the teachers of architecture have contributed to this education of their graduates, their time can hardly be said to have been wasted, even though their bright young men never do wrangle with owners and contractors.

—*Gordon M. Comb.*

●

Of the many magazines written for architects the *Architectural Forum* rates first in student popularity. Particularly worth reading in the February issue is the "Architects' Committee Report on Columbia's School of Architecture." The straight-forward analysis of architectural school and the presentation of the changes in Columbia's methods of teaching give the student much to think about.



A reporter for a metropolitan daily asked a number of persons on the street, "What is the biggest buy for a nickel?" Two-thirds promptly replied, "A telephone call."

Why not telephone home one night each week? For bargain rates, call by number after 8.30 P. M.

Americans throughout the country evidently agree with this judgment of value received from the telephone. For each day they hold more than 57,000,000 conversations over Bell System wires.

Year after year Bell System planning extends the telephone's reach—increases its speed—makes it more convenient, more *valuable* to everybody.

BELL TELEPHONE SYSTEM

Minnesota

Engineers See the World

in line of duty

YOU don't have to "join the navy to see the world." According to some of our alumni all you have to do is become an engineer. **Basil C. Maine,** E.E. '21 is with the Cerro de Pasco Copper Co. at Cerro de Pasco, Peru, after working at Dnieprostroy, Ukraine. Since graduation he has also been employed in Mexico and Chile. It was not until 1933 when he was unemployed that he found time to "take unto himself a wife," which, as usual, was one from his home town (possibly his boyhood sweetheart?).

Karl Sommermeyer, E.E. '31, of 174 Woodland Avenue, Winnetka, Illinois, has received a law degree from the John Marshall Law School of Chicago.

The University is represented in the Philippine Islands by **Epitacio Villalon Sobejana,** AeroE. '32. He is an instructor of physics at the Manila Trade School and he says, "Aviation is progressing rapidly in the Islands."

Harold D. Messer, M.E. '23, who lives at 1113 East 61 St. Chicago, received a medal for saving a student's life in November. He is employed by the Commonwealth Edison Electric Company.

Minnesota is well represented at the Division of Management, United States Bureau of Roads, Department of Agriculture by **Bob Zeeze,** C.E. '30, who is working near Schenectady, New York, and is engaged in cost studies. **J. B. Hanson,** C.E. '29, who is situated in Butler, New Jersey, and is working on concrete tests, and **N. T. Rykken,** C.E. '29, who was engaged by the bureau at Troy, New York, and is now located at Cook, Minnesota.

R. L. Bevan, C.E. '24, is a construction engineer for the U. S. Treasury Department on new post offices. He has been on the new St. Paul Post Office since the work was begun.

We hear that **Sheridan E. Farin,** C.E. '31 is married and has a baby girl. He is working for the Bureau of Public Roads with his headquarters at the South 4th Chicago Post Office Bldg., at Chicago.

It must be a picnic for **Roy F. Warner,** C.E. '32, **Martin E. Nelson,** C.E. '24, **Donald Alderson,** C.E. '29, **Marvin J. Webster,** Arch.E. '31, **Fred H. Brockman,** C.E. '32, and **Robert Kreiss, C.E.** '33, for all of them are working on hydraulic research for the Corporation of Engineers at Iowa City.

We wonder if **Kenneth W. Pederson, C.E.** '32 has found it possible to catch fish and "topograph" at the same time. He is making topographic surveys of proposed dam-sites and water diversion projects throughout the state with his headquarters at the old Post Office Bldg. in St. Paul.

There comes sage advice from **A. Dean White,** C.E. '22, who says, "Tell all the students to take the advice of the Dean of M.I.T. to marry a woman who can get you a job with the government."

Victor H. Carlson, E.E. '20 is another one of our roving engineers. He is at present on his way to Colombia to work for the Compania Minera Choco-Pacifico at Andagoya Via Buenaventura.

Among the grads who find it necessary to earn their bread and butter by teaching is **Frank A. Tebo,** C.E., '28 who is giving the students at Penn State the low-down on Engineering Drawing and Descriptive Geometry. He says, "I can roll a plug score in any alley." Keep out of ours though, Tebo, old boy. We have a shot gun for marauders prowling around after 10 p. m. His address is 908 W. Beaver Ave., State College, Penn. **Walter Huchthausen,** Arch. '28 is teaching Applied Design at the Boston School of the Boston Museum.

Roger E. Amidon, C.E. '28 must have a very soft job with Uncle Sam because he is "getting a little heavy in the middle." Perhaps a little field work with the Geological Survey for which he is working will help take a few inches off his waist. Incidentally he also is married.

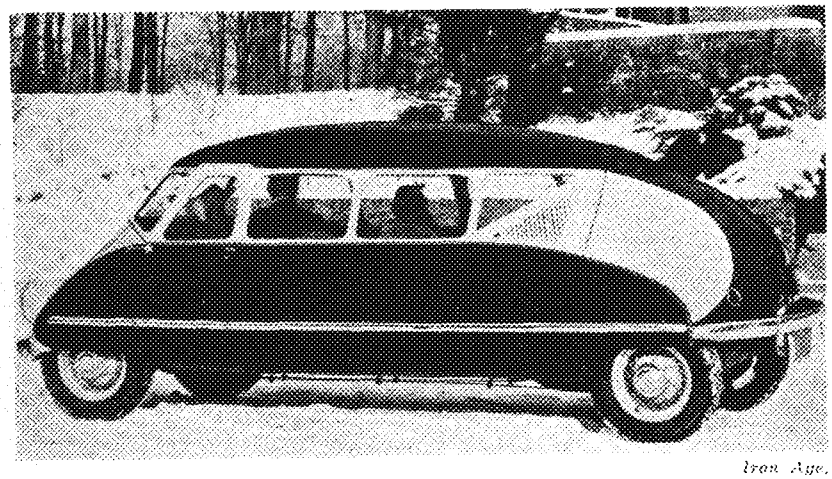
It must be rather rough work for **Norbert J. Sternal,** M.E. '34 for he is testing sandpaper for the Minnesota Mining Co. at St. Paul.

Several of our grads are still going to school. **George B. Brinhall,** Aero. '33 and **Harris Moe,** Aero. '34 are taking an air transport operators course at Boeing School of Aeronautics. They will be finishing their course in a few months. **Reynold L. Caleen,** Aero. '34, who has just finished this course with the highest grades in his class, is now working with United Airlines at Iowa City.

Gerhard C. Peterson, Arch. '30, has recently been granted a scholarship at Harvard effective in September. He will continue his architectural studies.

Among the Aero's who are not twiddling their thumbs for lack of work are **Powell Grady,** '33 who is with the Douglas Aircraft Co., **Walter A. Stivak,** '33 who is with the Kellett Autogiro Co., **John Kenney,** '33 who is with the Sperry Gyroscope Co. in New York, and **Richard Nelson** '34 who is with the Boeing Aircraft Co. at Seattle.

Bill Stout, Former Minnesotan, Designs Streamline Automobile



Iron Age.

Last week William B. Stout, former Minnesota engineer, announced his latest venture, a stream lined automobile. It is known as the Scarab, because it resembles the Egyptian beetle in shape.

Since designer Stout left the engineering college 33 years ago he has designed buses, aerodynamic pullman cars, and the Stout all-metal airplane. The new auto has its engine in the rear. The interior resembles a living-room, with card table, davenport, and movable chairs.

One hundred cars will be built. The price has not yet been announced, but it will be high. The auto is powered with a 100 h.p. Ford V8 engine which occupies the usual trunk space. The frame is made of alloy-steel tubes, its strength figured as airplane stresses plus crash strength.

The machine has lots of headroom. Since placing the motor in the rear eliminated the drive shaft it was possible to drop the floor 5 inches, adding that much headroom and making running boards unnecessary.

The driver's seat is in the usual place, but is adjustable to all angles and directions. The other front seat is movable. The center of gravity is below the supports, giving the car a tendency to bank on turns. Springs of the airplane type eliminate quick road shocks. These are coil springs with oil cylinders to absorb the shock. In tests a light ash tray on the table was undisturbed while driving over a rough road.

The owner will not have to learn to drive the car, as all controls are conventional. It is the same length as a Ford and weighs 1,800 pounds. Power brakes are standard equipment.

Chemistry School Gets Pulp Beater

A five-pound experimental pulp beater of the Hollander type has been added as regular equipment in the chemistry department. O. P. Pracher, graduate student, has recently completed the machine after many months of work on it in the Mechanical Engineering shops. The casting for the machine weighs nearly half a ton and some difficulty was encountered at times in finishing it because of its weight and size. The machine requires a 2 horsepower motor for operation and has a top speed rating of 488 r.p.m. With the aid of the pulp beater, the chemists will be able to make pulp of any degree of fineness desired.

Jack, Engineering Janitor, Saves School from Disaster

Jack, the dark-eyed little janitor in the Engineering building, might well say to himself about this time, "Little man what now?" Twice he has emerged from the prosaic duties involved in keeping our building ship-shape to become the man of the hour when dire catastrophe threatened.

Some weeks ago, someone noticed that several square yards of plaster were becoming loosened from the vestibule ceiling at the main entrance and threatened to descend suddenly upon the heads of students scurrying in and out.

But little Jack was not one to lose his head in such an emergency, and he answered the hurry call by locking the doors on each side of the vestibule, thereby eliminating possible injury to life and limb. He then got a crow bar and worked feverishly until all the plaster had crashed harmlessly to the floor. When the dust had settled, inspection revealed that twenty-two years of wear and tear had been too much for the bolts that held the plaster on the vestibule ceiling.

But an even more hair raising experience was in store for little Jack a week later. Coming to work at 6:00 a. m. our hero found the Engineering Building filled with dense smoke. With unerring suspicion he rushed to the fan room and was met at the door by a burst of smoke and flame. From that point on, Jack describes his activities modestly as "just what anyone else would have done."

"I went upstairs," he said, "and called the fire department. Then I went down and got two chemical guns. It was while I was shooting chemicals at the fire that the two fire companies arrived. They had to use more chemicals and the building hose line before the flames were put out."

When the fire department left, the building was full of smoke, and Jack opened and closed a lot of windows to get it all out before students began to show up. By eight o'clock, the only evidences of the conflagration were a faint odor of burnt wood and an awful mess in the fan room.

Fortunately the damage was not great. A large wooden air duct, part of an obsolete ventilating system, was destroyed, and an electric motor which drove the fan was badly burned. The net result was the riddance of a good deal of rubbish that would have been destroyed by more conventional methods anyway. If the fire had started earlier, or if it had not been discovered so promptly, the consequences would have been much more serious. The history of the University is dotted with disastrous fires, and perhaps we owe the very existence of our Engineering Building to Jack the Janitor because he "came a little early that morning."

Lucky Aero Party Goers To Win Free Airplane Ride

The eve of Washington's birthday has again been selected as the date for the annual Aeronautical dance. This will be the fifth affair of its kind sponsored by the Minnesota Society of Aeronautical Engineers and the Minnesota Flying Club, and the third time that it has been held on February 21 in the Minnesota Union. Since the first dance was held five years ago at the Municipal Airport, the popularity of the tradition has steadily increased.

Guests will have an opportunity to win one of the free airplane rides being offered as usual, and a special effort is being made to increase the number of alumni present. With a holiday the next day, the committee in charge plans a get-together that will long be remembered by aeronautical students and grads alike.

A. S. A. E. Holds Two Meetings

On January 22, Mr. H. B. Dinneen, vice-president of the Minneapolis-Moline Power Implement Co., spoke on the subject, "What We Expect of Graduate Engineers," during the last regular meeting of the Minnesota Student Branch of the American Society of Agricultural Engineers. Mr. Dinneen stressed the importance of engineers using social intelligence in their business contacts.

The meeting, February 13, was a joint meeting with the Senior A. S. A. E. The students furnished a portion of the program with a "dual dialog" on problems of current interest among Agricultural Engineers. The main topics in this organized discussion were Modern Farm Machinery, Erosion Control, Some Recent Advances in Farm Building Design, and Electrification of Agriculture.

The Student Branch is competing for the silver loving cup to be presented to the most active Student Branch of the A. S. A. E.

A. S. M. E. Plans Future Meetings

The Minnesota Student Branch of the A. S. M. E. held two meetings during January. On January 16 William Weber, senior mechanical engineer, read his seminar paper on "Industrial Taxation in Minnesota." Two films were shown, one on deep sea life and the other on carbon monoxide poisoning.

Charles Sweatt read his seminar paper on "Commercial Color Printing" at the meeting on January 30. A film-illustrated lecture on Telephone Communication was presented by Mr. Evarts of the Bell Telephone Co. Both of these presentations were highly instructive and entertaining.

John D. Peterson, senior mechanical engineer, presented his seminar paper on "History of Steel" at the meeting on February 13.

Present plans call for a inspection trip through the Bell Telephone Building on Tuesday, February 19, and the Waldorf Paper Co. on Wednesday, February 27.

A. I. Ch. E. Holds Banquet Meeting

A banquet meeting of the American Institute of Chemical Engineers was held in the Minnesota Union ballroom on Wednesday, February 13. Following the toasts by Howard Kahn, Dr. Clyde H. Bailey, director of research for General Mills, spoke on "Chemistry in the Milling Industry."

The chapter has had many and varied activities thus far during the quarter. Lectures have included "Chemistry in the Packing Industry" by Dr. H. O. Halvorson of the department of bacteriology; "Theory and Practice of Filtration" by Dr. E. F. Ruth of the department of chemical engineering; "Chemistry in Sewage Disposal" by C. C. Willar, chief engineer of the new Minneapolis-St. Paul sewage disposal plant; and several student papers. Over sixty members of the organization turned out for the trips to the Waldorf Paper Co. and to the Minneapolis Brewing Co. A complete schedule has been drawn up for the remainder of the quarter.

Arrangements are being made with the A. S. Ch. E. for a joint meeting early in March. An illustrated lecture will be given by a representative of the Flax Co. on "Boiler Feed Water" and a film "Coal is King" from the Diamond Coal Co.

E. E.'s Plan Electrical Party Burton Appoints Committees

With committees lined up and preparations well under way, the Eleventh Biennial Electrical Party is off to an early start. Carlyle Burton, electrical engineering senior, is manager of the show, which will be held Friday and Saturday, April 26 and 27. Both upper and lower classmen are busily at work planning "spectacular" exhibits which, they promise, will amaze even the best-posted of technical men. Manufacturers will exhibit the latest developments in the field. Arrangements have been made to display a number of exhibits which were shown in the much-talked-of Electrical building at the World's Fair.

One of the party's bright spots is the dance to be held in the Minnesota Union Friday evening, after the close of the show's first session.

Manager Burton anticipates a large attendance this year, since automatic counters have shown each party to be more successful than its predecessors. Two years ago, at the last show, the count was approximately 7,000.

Leonard Ostergren will represent the A. I. E. E., while Kenneth Iverson, senior; Charles Steinmetz, junior; Orville Becklund, sophomore; and Donald Erickson, freshman, will represent their respective classes on the executive committee. David Kerns is electrical engineer for the show.

Chairmen of the various committees are: Frank Pellegrino, student exhibits; John Reusch, manufacturers' exhibits; Carl Pennig, finance; Arnold Cohen, publicity; Elmer Bernard, programs; Edward Laakso, reception; Sylvester Laskin, dance; Homer Hagstrum, communications; Robert Clifford, signal corps; Baldwin Hallaway, decorations; Charles Shortley, illumination; William Boese, radio; Robert Haygarth, general arrangements.

A. I. E. E. Views Football Movies

The American Institute of Electrical Engineers held its first winter quarter meeting Wednesday night, January 16. The All-American football hero, Clarence Munn, presented a movie summary of the highlights of the 1934 Minnesota football games. Freshman Electricals were extended personal invitations to this meeting in order to acquaint them with the organization. Doughnuts and cider were served as refreshments.

The second meeting was held on January 28, and was a joint meeting of the Minnesota Section and the Student Branch. Dr. H. E. Hartig gave a very interesting demonstration lecture on electronics.

Tech. Glee Club Elects Officers

New Technical Glee Club officers elected for this year are: Tom O'Brian, president; Paul Rossiter, business manager; and Carl Pennig, secretary. The office of business manager was created this year for the purpose of arranging all meetings and engagements.

University Tests New Iron Paving

First experiments on the stretch of experimental cast iron paving installed last fall were begun Monday, January 14. The tests, intended to determine the coefficient of friction of the paving, will be continued during the next few months.

The apparatus used to determine the coefficient is simple. A winch is placed at the bottom of the hill and an automobile with locked wheels is dragged down the slope across the paving under test. A dynamometer in the towing line records the force required, and from it, the weight of the car, and the angle of the slope the coefficient of friction is determined.

Two or three tests will be made each day under all weather conditions. The concrete pavement of the ordinary type adjoining the cast iron roadway will be tested at the same time and under the same conditions.

The Minnesota state legislature will be asked for funds to continue with cast iron paving experiments. The paving now under test is an English type, and was fully described in the October *Techno-Log*. The pavement is built up of triangular blocks which have a "tire-tread" pattern on the upper face. The main object in developing the paving is the reduction of skidding, which, E. W. Davis, superintendent of the Mines experiment station who is in charge of the tests, declares is responsible for 25 per cent of all auto accidents.

KAHN-NOTATIONS

By Howard Kahn, Ch. E. '35

D. A. W. in "Off the Cuff," in the Minneapolis Journal, professes himself to be baffled by this one: "If it were zero and twice as cold tomorrow, what would the temperature be tomorrow?" Although the question as stated has no meaning, we still wonder if D. A. W. ever heard of absolute zero. If he meant half as warm, the temperature would be 230° below zero, Fahrenheit scale, quite cold indeed.

* * *

She was only an optician's daughter but one glass made her a spectacle.

* * *

The *Daily* erred: Professor Barlow cut off only the tips of his moustache . . . We of the staff, feeling that Professor Barlow lacked the moral courage to cut it off completely, hereby offer $1.00 for the complete remains . . . and six-bits for those of Professors Kuhlmann and Haga . . . The contest is open to all but members of the barber college . . . In the spirit of scientific research, a student glued together two sheets of a laboratory report before submitting . . . and received it with a grade affixed . . . and the glued pages undisturbed . . . The *Daily's* editorial puns stink . . .

We Only Heard—

By Lee Whitson, M. E. '35

When the ultimate plans for the new Boulder Dam hydro-electric development are realized, the total output of the plant will be sufficient to light a string of 100 watt lamps encircling the world at the equator and spaced one foot apart, provided of course that line losses are neglected. This represents the total output of the contemplated 15 generators of 82,500 kva capacity and two of 40,000 kva.

The immediate installation consists of four 82,500 kva units and one unit of 40,000 kva. These immense generators are the world's largest, both electrically and physically, other large units being the U.S.S.R. 77,500 kva, and Niagara Falls, 65,000 kva. The Boulder Dam generators will have an overall diameter of 40 feet and a height of 32 feet above the floor and will weigh more than 2,000,000 pounds.

* * *

The lightning protection system of a modern skyscraper protects not only the building itself but also smaller structures in the vicinity, according to a recent bulletin issued by the General Electric Company. A lightning rod 100 feet in height will protect a surrounding flat area within a radius of 400 feet from the base of the rod when the altitude of the storm cloud is not less than 1000 feet, and a 500 foot rod will protect an area 650 feet in radius. All structures within an imaginary cone whose base is the protected area and whose apex is at the top of the rod are afforded protection.

* * *

A novel type of coal moving apparatus which has been in operation for more than a year consists of a smooth metal conveyor which carries the coal forward about seven inches and then jerks backward, the coal remaining stationary on the backward stroke because of its inertia. The cycle is repeated 65 to 70 times a minute and the coal is jerked along the conveyor almost continuously.

The device is made possible by a new type of direct-current motor which runs at 400 r.p.m. for the forward stroke and accelerates to 1000 r.p.m. for the backward stroke. It drives through a mechanical linkage to produce the reciprocating motion.

* * *

Because friction in dynamometer bearings may have a very serious effect on the accuracy of power measurements made with the machine, a new type of bearing has been devised to eliminate static friction. It consists essentially of two ball bearings, one within the other. The innermost race is attached to the rotating shaft and the outer race to the bearing pedestal. The intermediate race is rotated at high speed by a small motor and since the intermediate races at either end of the shaft are rotated in opposite directions, the effect of static friction is eliminated.

Here's one that keeps plenty engineers guessing . . . A man travels from Omsk to Tomsk, a distance of 50 miles. On the way he travels at a speed of 75 miles per hour; on the return at a speed of 25 miles per hour. What is his average speed?

★ ★ ★

The boys in Koepke's Industrial Management class miss nothin' at all . . . In a recent plant inspection trip, one bright eyed lad noted the item "Handling Equipment" and wrote: Blonde, streamlined, low transmission, good paint job . . . (It's a good story even if it isn't true.) . . . Hats off this month to Dave Buck, an engineer who made good . . . Member of Board of Publications, Wedge, Phoenix, Alpha Tau Sigma, Pi Tau Sigma, former class president, and business manager of the *Techno-Log* . . . *and* a nice guy . . . The new political party wants to do away with class officers . . . and a good thing, for the officers have no function, and the glory is empty . . . Pronounce "apices" . . . and then define it . . . That poll concerning the new chemical R.O.T.C. unit was not instituted by the A.I.Ch.E., as the *Daily* would have us believe . . . no official sanction has as yet been given by that organization . . . In 1931 there were 1,000,000 marriages and 183,000 divorces, a ratio of 183 per 1,000 . . .

★ ★ ★

Try this on your friends: Multiply your age by 2, add 5, multiply by 50, add the amount of small change under a dollar which you possess, and subtract 365. If you add 115 to this number, the first 2 digits of the resulting number will be your age, and the last two the amount of change. (Such a smart boy, and only 6.)

★ ★ ★

Doc Ruth has a slide rule four feet long . . . which is so accurate that once he multiplied four by four and obtained 16.001 . . . Last year the suckers paid $637,000,000 for cigarettes . . . We recommend a short course in English for the athletic department. A refuse box in the Athletic Building displays on one side "Waist paper please" and on the other "Wast paper please." Please, my nerves . . . According to James W. Johnson, dancing is either graceful, ungraceful, or disgraceful . . . The *Daily* scoop story of the year, that of the proposed $700,000 armory, was more or less accidental, for the Major was not speaking for publication . . . Henry Knoblauch, until recently quite an imbiber, so it is rumored, has been assigned an investigation of the alcohol industry . . . like being with the home folks . . . unfortunately, the topic is to cover only the producing phase.

★ ★ ★

I only heard, but it is sworn to, that in a recent questionnaire, the instructor pointed out that if the student were male, he was to write M in the space, and if female, she was to write F. A loud voice from the rear proclaimed: "If you can't make up your mind, write Chi Psi."

Professor M. V. Charnley of the journalism department tells of a unique industry in Japan, that of scientifically growing pearls. A grain of foreign material, usually sand, is injected into the baby oysters, which are then hung in baskets in the sea for three years, at which time they are deemed old enough to shift for themselves, and are placed on the ocean bed near the shore in perhaps twenty feet of water for an additional four years. At the end of that time they are brought to the surface by diving girls (ha-cha), and X-rayed to test the presence of the pearl. In case of absence, they are sent to market; if a pearl is present, they are opened forthwith. Over three million oysters are in some state of cultivation at all times. The entire project is owned by one man, only 78 years old. It's never too late, boys.

★ ★ ★

The economics class was discussing factors which caused industry in general to migrate from Minnesota. "And the third factor," said Dr. Montonna, "is the lack of extensive local supplies of fuel." "And the fourth," remarked a conservative in the group, "is Governor Olson."

speakers discuss

Natural Resources for Sigma Xi

By Lloyd Bredvold, C. E. '37

"OUR Natural Heritage in Relation to Public Welfare" was selected as the topic for the eighth annual series of lectures presented by Sigma Xi, honorary scientific society. The four lectures were presented on successive Friday evenings, from January 25 to February 15, inclusive, in the Northrop Memorial Auditorium. Featured as speakers were four outstanding Minnesota faculty members, Doctors Geo. A. Thiel, Henry Schmitz, Frederick J. Alway, and Richard E. Scammon, who presented authoritative non-technical papers on scientific subjects, contributing to the general theme of the series. The lectures were illustrated by motion pictures, slides, and scientific exhibits.

The first of the series was presented by Dr. George A. Thiel, Professor of Geology and Mineralogy, on Friday evening, January 25. Dr. Thiel discussed "The Relation of Human Activity to the Depletion of Our Water Resources." Dr. Thiel analyzed the problems of water depletion and conservation, and stated that although there is no undue alarm with regard to depletion, precautionary steps must be taken to conserve present supplies and to prevent future depletion.

As a constructive program for maintaining water levels, Dr. Thiel suggested six methods approved by geologists and hydrologists: first, rehabilitation of all kinds of vegetation to retard run-off during rainfall; second, control of run-off with dams and reservoirs; third, artificially increasing the recharge due to percolation; fourth, conservation of water in underground reservoirs by artificial basins; fifth, control of flowing wells to conserve hydrostatic pressure in artesian basins; and sixth, an educational program to bring before consumers the details of occurrence and the use of water.

Dr. Thiel discussed the erosion of immense areas in the arid regions of the United States as a result of the depletion of vegetation by over-grazing and cultivation. He predicted that dust storms and erosion will continue until vegetation is again restored.

Dr. Henry Schmitz, Professor of Forestry and Chief of the Division of Forestry, presented a picture of "Forests and Human Welfare" in the second lecture of the series. He emphasized our need for forests and the methods of conserving them.

"Forests contribute to human welfare in at least five distinct ways," stated Dr. Schmitz, "namely: a source of essential raw material, conserving water and soil, creating suitable environments for recreation, providing a home for wild life, and furnishing forage for the western livestock industry." He pointed out that forests have non-commercial uses, an advantage that cannot be claimed for most natural resources.

The recent decrease in lumber consumption need arouse no fear that we are approaching a time when there will be little use for wood, Dr. Schmitz stated. During periods of depression there is always a decrease in lumber consumption. Paper, one of the most essential materials in modern civilization, will probably be manufactured from forest products for some time to come despite predictions to the contrary, he asserted.

"The Soils" was the subject of the third Sigma Xi lecture, presented by Dr. F. J. Alway, Professor of Soil Chemistry and Chief of the Division of Soils. The factors affecting soil productivity and the importance of mineral elements were stressed.

Minnesota ranks third in the United States as to the amount of land classed as "excellent," with twelve million acres in this class and an equal amount rated as "good." Dr. Alway pointed out that not only the richness of the soil, but topography, contour, climate, and other factors must also be considered in the classification of soil. The scarcity of excellent soil in the Dakotas is due to the lack of sufficient rainfall.

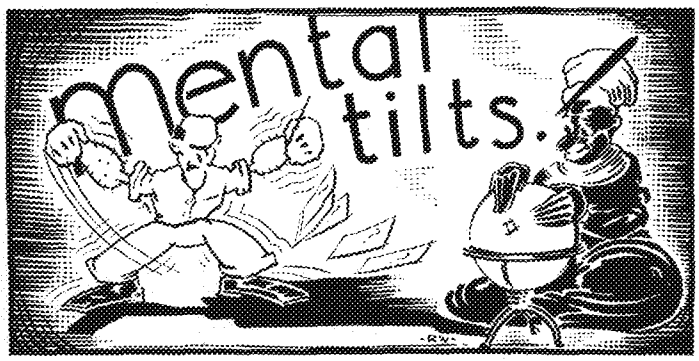
The four chief minerals required by plants for their proper development, and therefore essential in good soil, were considered at some length by Professor Alway. A number of slides were shown to illustrate the benefits resulting from the application of these minerals, phosphate, potash, mineral, and sulphur, to soils containing insufficient amounts.

The most important factor in crop production, Dr. Alway asserted, is water. A ton of alfalfa hay requires approximately a thousand tons of water during its growth. It is evident that without sufficient water good crops are impossible.

The fourth and last lecture of the 1935 series was given by Dr. Richard E. Scammon, Dean of Medical Sciences and Professor of Anatomy, on February 15. His subject was "People As a Factor in Our Natural Heritage."

Dean Scammon described the growth of the world's population and its distribution over the parts of the globe. He pointed out that there had been a great rise in population in Europe starting in the 17th century and a similar rise in American population starting in the 18th century. While many early students of population were greatly concerned with the fear that population might outstrip the food supply, modern students of population have noted that there is a decline in rate of growth, although not in the absolute numbers of people since the early years of the 20th century.

In dealing with the population of the Northwest, he showed curves and graphs indicating that, on a purely statistical basis, one might predict that the population would become stationary in this area in the course of the next two or three generations. But he pointed out that such predictions were only statistical, and that changes in the industry, agriculture, or transportation of this area might make a great alteration in population growth. He also pointed out that a stationary population from many points of view might prove an advantage rather than an injury to the community.



Last month we got a lot of answers to the camp problems. The first one was right, and James C. Lewis, Chem. '36, was the lucky winnah of the one dollah! Congratulations, James, now take a crack at these. Our Professor Quackenbush has been runnin' around in all directions looking for student-stumping puzzlers.

• • •

An employer wanted to employ a man and three applicants answered his ad. He thought up a unique test. He put the three men so that each one could see the other two. He blindfolded them and told them he was going to put a paper spot either black or white on the forehead of each. When he removed the blindfold each one that could see a black spot was to stamp his foot. The first one that could tell what color spot was on his own forehead would get the job. He then put a black spot on the forehead of each.

When the blindfolds were removed all the men stamped, of course. After about ten minutes one of the men correctly said, "I have a black spot on my forehead." How did he figure it out?

A Fur-Lined Bowl?

The prof is quite a lover of good brown ale. He has a wassail bowl in the form of a frustrum of a cone with the following dimensions: It is 10 inches high, has a top diameter of 9 inches and a bottom diameter of 4.5 inches. It was full, but the professor has lapped up three-fourths of the liquid. Now the prof wants to know what diameter ball could be placed in the bowl so that it would be just covered by the ale.

Get the Postman

There are two vertical telephone poles near the campus. The other day the telephone company put on brace wires from the top of each pole to the bottom of the other. The lengths of the wires were 30 and 40 feet, respectively. What is the distance between the poles and the heights of the two?

There is another buck waiting for anyone who can, in the space of a month, successfully wrap his mind (not his automobile) around telephone poles, wade through ale-bowls without being put under the table, and banish spots before his eyes. Take an aspirin and go to it.

Answers to January Tilts

The Musical Fruit

The grocer gypped himself by .5525% of the actual weight weighed out or .555% of the weight asked for.

A Techno-Log?

The log had to be cut at distances of 19.76 and 31.31 feet from the small end.

Like Father Like Son

The father worked 30 days at $2.40 per day and the son 25 days at $2.00 per day.

Turn the Page for the CONTEST PRIZE Announcement

PRIZE WINNERS ANNOUNCED

Douglas Kuehn, M. E. '35 - $5.00
Marvin Walseth, Aero. E. '36 $3.00
Wesley Matey, M. E. '37 - $2.00

Checks are being mailed to the above students who won in the advertising contest announced on this page last month. The first correct answer was turned in by Kuehn Saturday morning, January 19, shortly after the magazines were distributed in the post office boxes. The others followed soon after.

Contestants found that the contest was even easier than we said as several merchants had no seal while the contest was on, yet only the names of three were asked for. The correct names submitted by the prize winners included:

The Engineers' Bookstore
The Gopher Cafe
Lisk's University Foto Shop
Hasty Tasty

There is no contest for you to enjoy this month, but we know you will enjoy dealing with these dependable merchants who are always ready to serve you each and every month.

TEA ROOMS

MRS. HUSBANDS' TEA ROOM, 701 Washington Ave., S. E.
PAGODA TEA ROOM, 505 Washington Ave., S.E.
WALNUT INN, 315 Walnut St. S. E.

CAFES

BROWN JUG CAFE, 1303 Fourth St., S. E.
CAMPUS CAFE, 308 Oak St., S. E.
CARPENTER'S CAFE, 418 14th Ave., S. E.
COLLEGE INN RESTAURANT, 1320 4th St., S. E.
GOPHER CAFE, 315 14th Ave., S. E.
WALT'S HARVARD GRILL, 606 Washington Ave., S. E.
HASTY TASTY, Lake at Hennepin
VARSITY CAFE, 1509 University Ave., S. E.

PRINTERS AND STATIONERS

ACME PRINTING AND STATIONERY CO., 421 14th Ave., S. E.

DRUG STORES

CAMPUS PHARMACY, 500 Washington Ave., S.E.

JEWELERS

TORLEIF FIEVE, 319 14th Ave., S. E.

DRY CLEANERS

DAHLGREN CLEANERS, 714 Washington Ave., S. E.
VERN SCHEI, 718 Washington Ave., S. E.
VARSITY CLEANERS, 508 Washington Ave., S. E.

BOOKSTORES

ENGINEERS' BOOKSTORE, Main Engineering Bldg.

BOOKBINDERS

E. H. MILLER, 1326 Fourth St., S. E.

PRINTERS

THE COLWELL PRESS, INC., 405 South Sixth St.

PHOTOGRAPHERS

UNIVERSITY FOTO SHOP, Oak and Washington, S. E.

WHAT STUDENTS SHOULD KNOW

ABOUT WHATMAN'S PAPERS

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1. Water Color. The uniform, rough texture recommends it for use in the water color classes.

2. Cold Pressed. Excellent for water color and India ink renderings. It is also suitable for mechanical drawing because of its fine erasing quality.

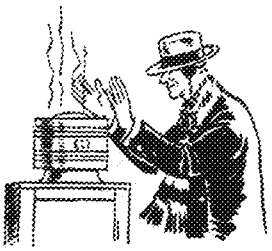
3. Hot Pressed. Smoothest and therefore best for ink drawing.

All papers can be had in the double elephant size.

The paper made in the famous Whatman mill in England is of rag content with finely ground and uniform composition. Handmade—Whatman's is superior to ordinary machine-made paper, for its fibers have equal strength in all directions.

●

G-E *Campus News*



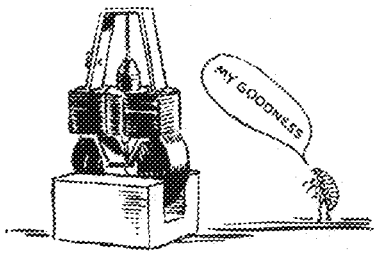
HEATING WITH COLD WATER

Reversible air-conditioning equipment, which may be adapted to either heating or cooling, depending on the season, is now in operation in a new building in Salem, N. J.

Reversing the cycle of the ordinary household refrigerator, the refrigerant absorbs heat from the water of a well which is at least 52 degrees even in coldest weather. This heat is added to that created by the work of the electrically driven compressors, and the refrigerant at 135 degrees gives up the total heat to the air of the building. Thus it is possible for an expenditure in electric energy equivalent to 100 heat units to obtain a total of 300 or 400 units for heating. Physics students will recognize this system as the heat pump.

During the summer, the process is reversed. The heat is absorbed from the air of the building. Then this heat and the heat from the compressors is dissipated in the water from the well, which then can be used for bathing, or washing dishes.

The building is completely equipped for year-round air conditioning. Besides heating and cooling, the equipment automatically controls the humidity, and cleans and circulates the air. The engineering and the planning for the installation were done by engineers of the American Gas and Electric Company and the General Electric Company, and the equipment was built and installed by General Electric.



FLEA-POWER MOTOR

New photoelectric cells, recently developed in the General Electric Research Laboratory, furnish enough energy to operate a tiny electric motor rated at four ten-millionths of a horsepower.

These "cells" differ from photoelectric "tubes" in that the cells convert light energy into electric energy, whereas phototubes do not themselves generate electricity but instead control the amount of current permitted to flow through them according to the amount of light they receive. The cells are of the selenium type, the selenium being coated with a film of platinum so thin as to be semitransparent.

Four of the cells are used to operate the motor, which in direct sunlight turns at about 400 rpm. But enough light energy is converted into electricity, when a 75-watt incandescent lamp is lighted eight inches away from the cells, to turn the motor at good speed, using three ten-thousandths of an ampere. One watt of power can be obtained from about 15 square feet of cell area in direct sunlight.

Dr. C. W. Hewlett, North Carolina State, '06, Ph. D., Johns Hopkins, '12, of the Research Laboratory was in charge of investigations that led to the development of the cells and the tiny motor.

GREEN BLUES

When the G-E "House of Magic" was exhibited at the Franklin Institute in Philadelphia not long ago, the cathode-ray oscillograph was one of the most popular features. This device, as you undoubtedly know, shows the wave shape of any sound, music, speech, or just plain noise—in the form of a moving, pale greenish-blue line on the end of the tube.

Rubinoff, the well-known radio violinist and orchestra leader, came down to see how his violin notes looked in the device. He had only a few moments in between engagements. But he became so interested after watching the gyrations of the dancing green line when he played "Humoresque" that he stayed for half an hour. He played on, and found that his violin produced green notes—even when he played the blues.

R. H. Mighell, U. of Denver, '29, of the G-E Research Laboratory, was in charge of the exhibit.

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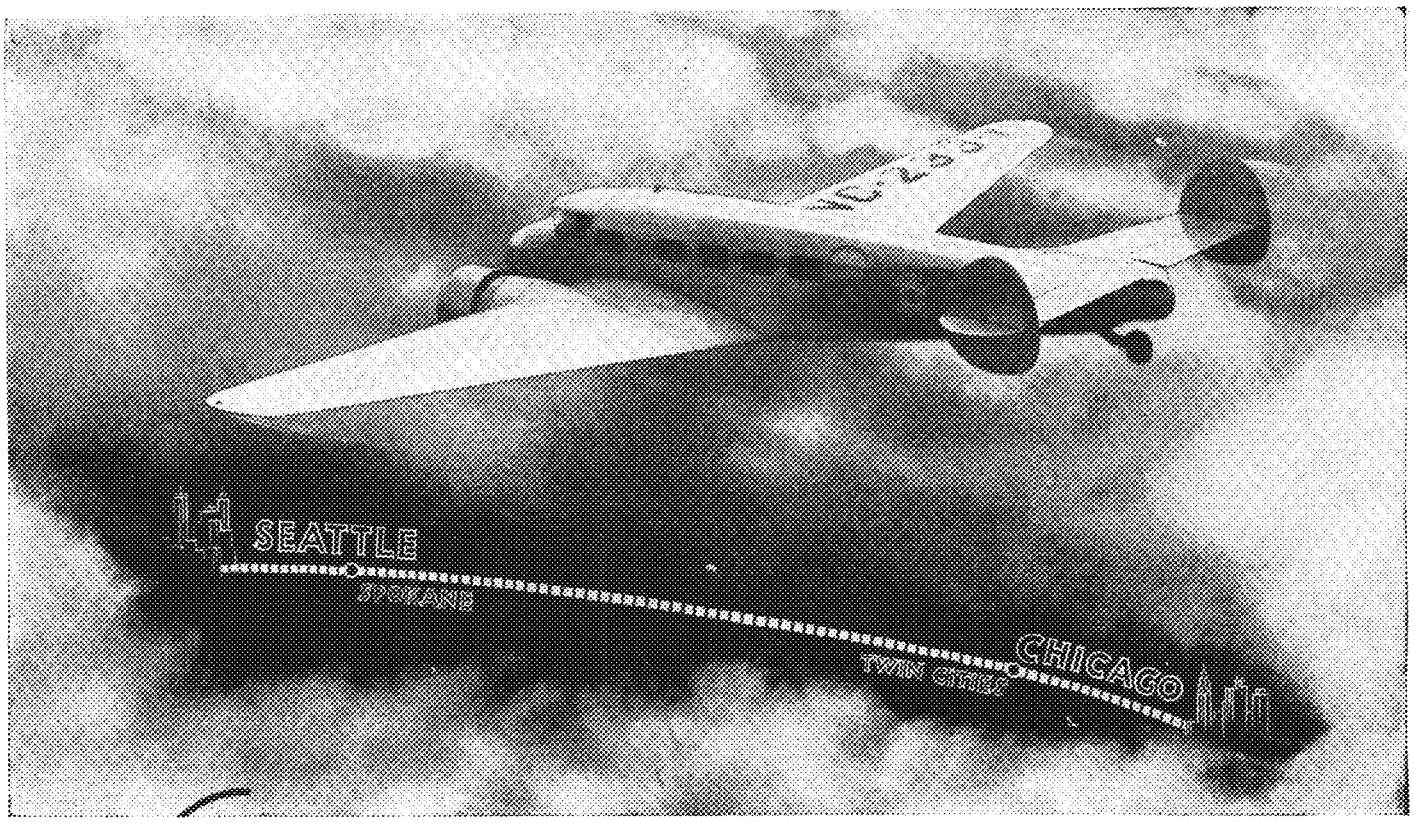
GENERAL ELECTRIC

The MINNESOTA TECHNO-LOG

MARCH 1935
Volume XV Number 6



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SETTLE COMFORTABLY in your soft cushioned chair. Burrow the back of your head into the built-in pillow headrest. Tilt the chair back to its most comfortable angle and relax.

TALK in ordinary conversational tones. The cabin is soundproofed.

READ the latest magazines, which the co-pilot will bring you, or take a book with you. There is an individual reading light in the cabin wall at the side of your chair.

WRITE letters or postcards on the stationery or cards furnished by the Co-pilot. He will also bring a writing table. Air mail stamps can be obtained at any airport.

ARRIVE refreshed and relaxed, gliding into your destined port with the luxurious feeling of being untired, unruffled, stimulated by an experience no other form of travel can give.

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NORTHWEST AIRLINES

Knives of Flame

Oxy-Acetylene Machine Cutting and Flame Machining Lower the Cost of Fabrication.

By H. ULLMER*

LIKE CUTTING CHEESE—the oxy-acetylene cutting blowpipe demolishes a 52-ton cast iron rock crusher bowl.

Machines for guiding and moving the oxy-acetylene cutting blowpipe automatically are the most important of the recent developments in man's harnessing of flame for productive purposes. Like ribbons of fire, multiple flames of oxygen mixed with acetylene surround a jet of pure oxygen to cut steel, cast iron and other ferrous metals into intricate patterns—quickly and easily—with remarkable savings in costs over old methods.

New Methods of Production

Since 1903, oxy-acetylene cutting by hand has been widely used in demolition and maintenance work. During the last several years, the effectiveness of oxy-acetylene cutting as a means of production has been proved and tremendously multiplied by the development of machines for various repetitive cutting requirements. The operating fields of these machines range from the simple beveling of steel plates to the cutting of intricate patterns. Most of the machines can cut vertically and horizontally. Some can be adjusted to cut circles without the use of patterns. Others cut bevels, gouge grooves, and shape complicated designs.

Shape Thousands of Identical Parts

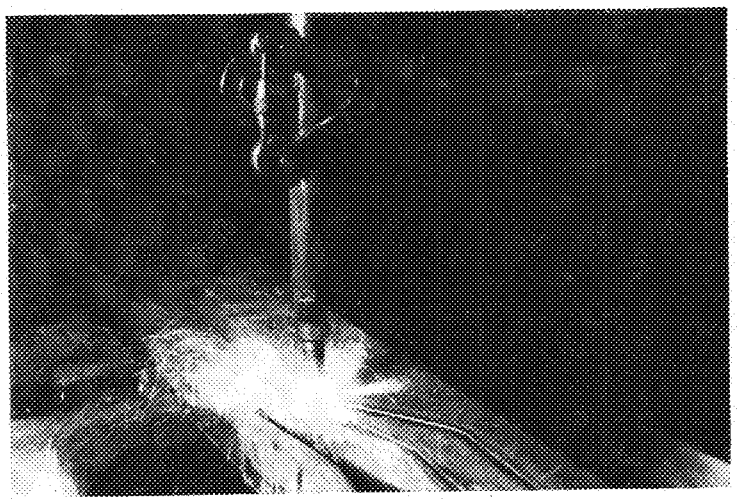
The economical continuous or intermittent production of identical regular or irregular shapes from rolled or forged steel is an outstanding accomplishment of present day oxy-acetylene cutting machines. With remarkable ease they follow templets of the desired form for the pieces to be cut. So accurate are the results that for many purposes the cut pieces can be used without machining or further finishing. Only by looking close at the smooth sides of the cut can an experienced eye tell the difference from a mechanical cut.

In a Wide Variety of Pieces

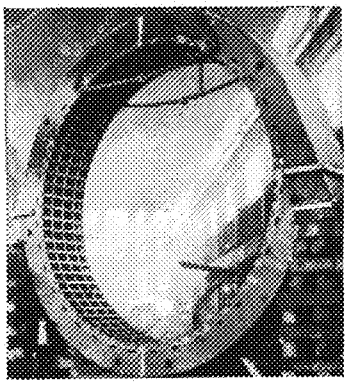
Some of the different pieces of equipment fabricated from oxy-acetylene shape-cut steel include: press frames of rolled steel requiring high strength and resistance to shock, gear blanks, cams in all types of intricate designs, forming dies which need little finishing before use, and flywheels often over a foot thick. In every case the shape-cut parts retain the great inherent strength and toughness of the rolled or forged steel from which they are made.

Costs Cut With Oxy-Acetylene Cutting

No great investment in machinery is needed for oxy-acetylene cutting.



ONE OR A MILLION—flame cut parts can be produced easily and cheaply by oxy-acetylene machine cutting. These dipper tooth blanks are alike as two peas in a pod. No expensive patterns or dies are required.



FLAME-CUT PARTS—are welded into assemblies like this yoke for a 25,000 KVA Water Wheel Generator.

Pattern cost is reduced to a minimum and the making and storage of expensive and intricate patterns is avoided. In most cases the machine cut shapes can be beveled easily by oxy-acetylene cutting and quickly made ready for assembly by welding, thus further reducing the cost of the finished equipment and making a more salable and a more serviceable product.

Machines Now Available

Machines of all sorts for various types of oxy-acetylene cutting and flame machining have been developed by The Linde Air Products Company, a Unit of Union Carbide and Carbon Corporation. Assistance and information as to how oxy-acetylene cutting can be economically fitted into your production operations can be obtained without obligation through Linde Sales Offices at Atlanta, Baltimore, Birmingham, Boston, Buffalo, Butte, Chicago, Cleveland, Dallas, Denver, Detroit, El Paso, Houston, Indianapolis, Kansas City, Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Phoenix, Pittsburgh, Portland, Ore., St. Louis, Salt Lake City, San Francisco, Seattle, Spokane, and Tulsa. Everything for oxy-acetylene welding and cutting—including Linde Oxygen, Prest-O-Lite Acetylene, Union Carbide and Oxweld Apparatus and Supplies—is available from Linde through producing plants and warehouse stocks in all industrial centers.

With Engineering Cooperation

Users of oxy-acetylene welding and cutting, and other products and processes developed by Units of Union Carbide and Carbon Corporation benefit from a most unique coordination of scientific research with manufacturing, sales and service facilities. These combined resources of a vast organization assure a full measure of satisfactory performance.

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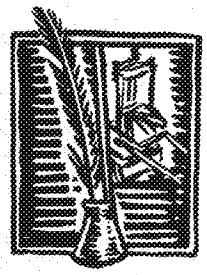
*Chief Engineer, Service Division, The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation.



At The Desk

Last month we made a serious mistake in this column. We described the cover picture as a steam turbine. It was of course, not a turbine at all, but two men welding with oxy-acetylene torches.

The electrotype from which the picture was printed was loaned to us by National Carbon Company, of Cleveland.

This issue the picture on the cover was borrowed from Standard Oil Co. of California, and we think it is pretty cute. How do you like the clouds? They would do justice to the greatest artist. They make a fine frame for the graceful man-made bird.

The frontispiece presents a view of a substation for a power distribution line. *Electric Journal*, from whom we obtained the picture, does not tell us where the picture was taken, but it was somewhere in the eastern United States.

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MINNESOTA TECHNO-LOG

37 ELECTRICAL BUILDING . . . U. *of* M.

MARCH, 1935

Eugene Price
MANAGING EDITOR

David Buck
BUSINESS MANAGER

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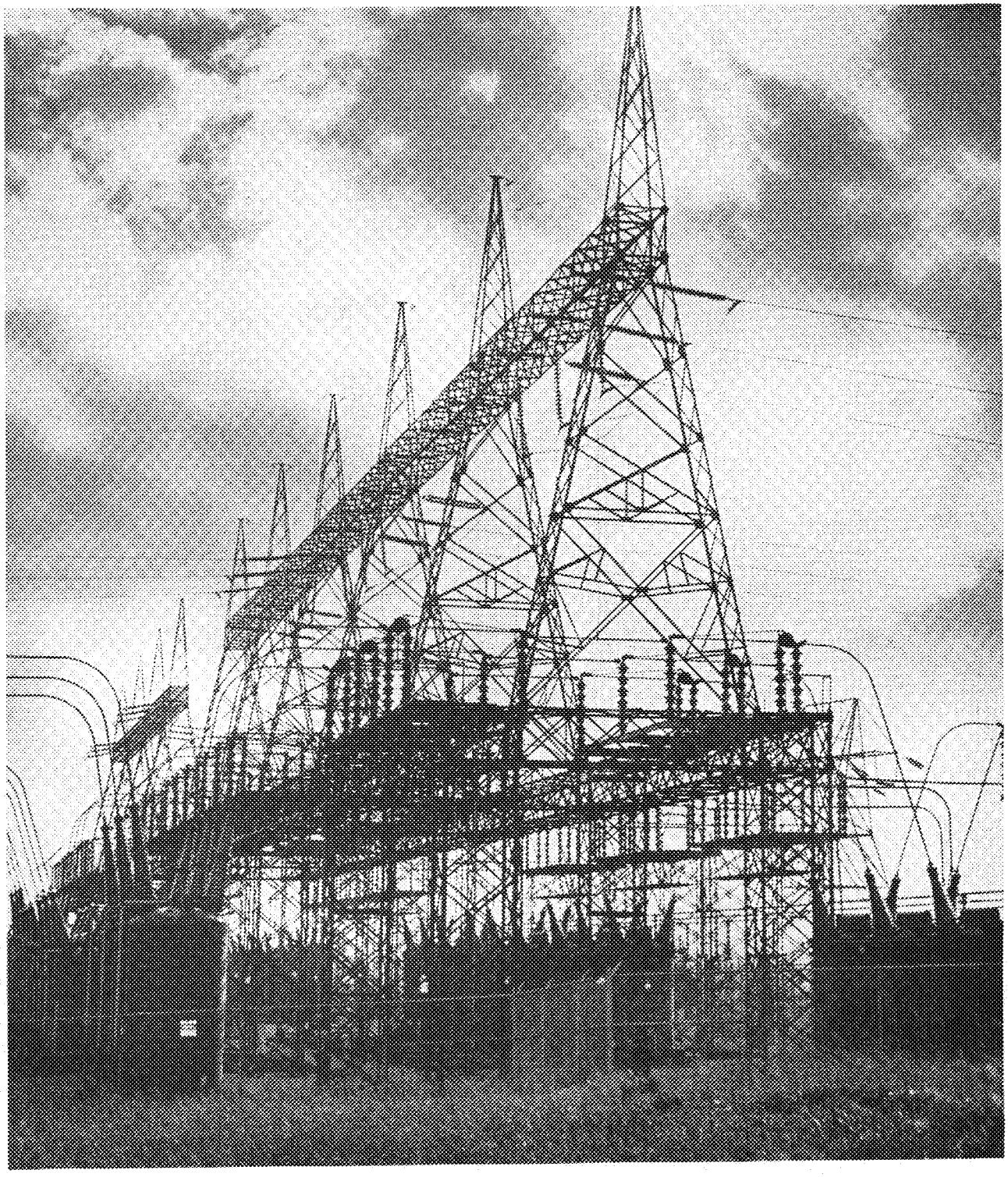
This Month



Substation

wirephoto speeds pictures at 1,700 Miles Per Hour from west coast to minneapolis

By EUGENE PRICE, E. E. '35

"NEW YORK, New York, Atlanta calling." The voice comes from a speaker built into the tall control panel. "New York," says the answering voice of the chief dispatcher, "Stand by, Atlanta, while San Francisco sends the riot picture, then we'll pick up your fire. O.K.?" "Atlanta O.K.," replies the first. "Ready, San Francisco?" says the New York operator. "San Francisco ready," comes the answer. "Let's go," the chief dispatcher orders.

The quiet of the communication channel gives way with a click to a high, penetrating note. In a moment the piercing tone breaks momentarily into a liquid crackling, and an assistant steps over to the receiving instrument, presses a button, and leisurely pulls out a long metal slide. Soon, though you cannot see it, a cylinder in the receiver begins to turn. The high note comes on again, but now it varies in volume, from a quiet whistle to a shrill shriek.

You are listening to a picture!

Actually, you are hearing volume modulations that correspond to varying values of light and shadow in a picture that is turning before a pencil of light in San Francisco. And in the receiving machine on the table another pencil of light is tracing that picture in negative on a sheet of photographic film. The loudest volume may become the flame of a torch when a print is made, while the quiet whistle may be a shadow cast by it.

In a few minutes another crackling sound tells us that the picture is done, and the towel-draped assistant slips the plate back into the long cylinder that contains the completed negative and lifts it from the machine. While the communication channel cuts in to take the place of the powerful note and your ears adjust themselves to the sudden quiet of terse conversation, he sets another cylinder, with its negative inside, in place on the receiver. Then he carries the first one into the mysterious draperies of the darkroom, where you and I may not go.

The transmission of a seven by nine inch picture has taken only seven minutes. Roughly, the distance to San Francisco is 2000 miles. It has traveled at 1700 miles per hour! Over eight times as fast as a transport plane.

There the negative is developed and a shiny print, known to the journalist as a "glossy," is made from it. Then it is sent down to the basement, five stories below, where stereotypers seize it and reproduce it on a metal plate, then in a paper mold, and finally in metal again, but now with type beside it, and clamp it onto presses that soon are pouring tons of newsprint into the street, where newsboys shout the latest development in the news of the day.

And the time that it took to give the hurrying readers on the street an actual picture of the riot has been shortened by the twelve hours it would take a plane to come from San Francisco. In twelve hours, the whole face of the news can be changed. In twelve hours that picture may be as out of date as last summer's hat.

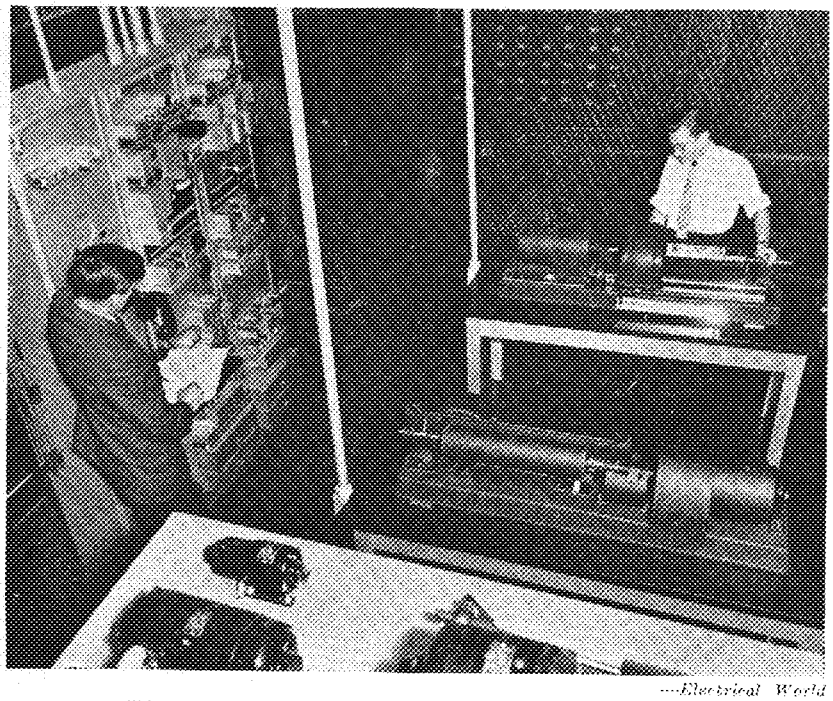
What is this Wirephoto, that puts pictures on the street while they still are news?

In the first place, wirephoto is not television. That is, the machine does not project light rays which could be seen as a picture by the human eye.

Wirephoto not television

Instead it builds the news photograph out of a mosaic of dots 1/100 of an inch square, too slowly for the eye to blend the tiny squares into a picture. The apparatus by which it accomplishes this is a most interesting one.

Each newspaper is equipped with a sending machine and a receiver. They are very similar in appearance. At one end of the table on which either appa-



—*Electrical World*

The operator is adjusting the sending machine

This print was made from the original negative as it was received

ratus rests is a fully enclosed motor. A shaft leads through a clutch to a drum on which the print or film is mounted. A gear train drives a threaded shaft parallel to the first which moves the scanning unit along the picture cylinder. In the receiver the revolving drum is enclosed in a light-tight metal cylinder along one side of which is a long aperture. A metal ribbon, wound on spring rolls at both ends, covers the slot. The ribbon moves with the scanner. Exactly in front of the scanning beam the ribbon is punctured to allow the beam to strike the negative wrapped around the drum. The ribbon protects the rest of the sensitized paper from being fogged by light in the room. In the sending machine the drum is not covered, because light cannot harm the original print.

The method of driving the motors is unique. It is necessary that they be driven at an absolutely constant speed, or the picture would be distorted. They are run at 100 revolutions per minute by current supplied through vacuum tubes. A tuning fork, carefully designed to vibrate at 300 cycles per second, and kept at uniform temperature in a heat-insulated box, generates a flicker of voltage which is impressed on the grids of a two-tube phase detector. These tubes in turn form part of a resonant circuit which is thus kept oscillating evenly at 300 cycles. The output from this circuit is used to run the separately excited synchronous motors. On the same shaft with the motor is an induction generator, also producing a 300 cycle voltage. It is this voltage which is impressed on the plates of the phase detector. This voltage and the grid voltage from the tuning fork are so balanced against each other that any momentary change in the speed of the motor will cause a change in the current supplied to the armature which will bring the machine instantly back into synchronism.

Inside the scanning unit of the sender are a light source, a vibrating light valve, mirrors to focus the broken beam of light onto the print, and a photo-electric cell. The light valve is the most interesting part of the unit. It has an aperture 1/100 inch square, partially covered by two duralumin ribbons connected together electrically at one end. A magnetic field is passed through the ribbons perpendicular to them. A 2400 cycle current is passed through the ribbons. The reaction of the current in the magnetic field causes the ribbons to draw together during half the cycle, spread apart during the next. The result is that the light beam is blinked on and off 2400 times a second. The circumference of the drum is such that the print moves 1/100 of an inch between exposures. The aperture is 1/100 inch square. As a result the picture is broken up into squares 1/100 inch on a side.

The scanner is moved along the cylinder at a rate of one inch per minute. The cylinder turns at 100 r.p.m. so the horizontal motion breaks the picture up into strips 1/100 inch wide, and the strips are broken up into 1/100 inch blocks by the action of the shutter.

A three-tube amplifier is employed to step up the power level of the pulsations to a usable point. The amplifier uses dry battery tubes and has a gain of 77 decibels. Filters and equalizers are used to eliminate unwanted vibrations and distortions. Another amplifier then furnishes the last bit of regu-

The enlargement shows the elemental segments of the picture

lation before the pulsations are transmitted.

The carrier frequency is also 2400 cycles. It is obtained by taking part of the power from the 300 cycle oscillating circuit, and feeding it to a circuit which is resonant at 2400 cycles, the eighth harmonic of 300. Part of the output is used to supply current for vibrating the light valve.

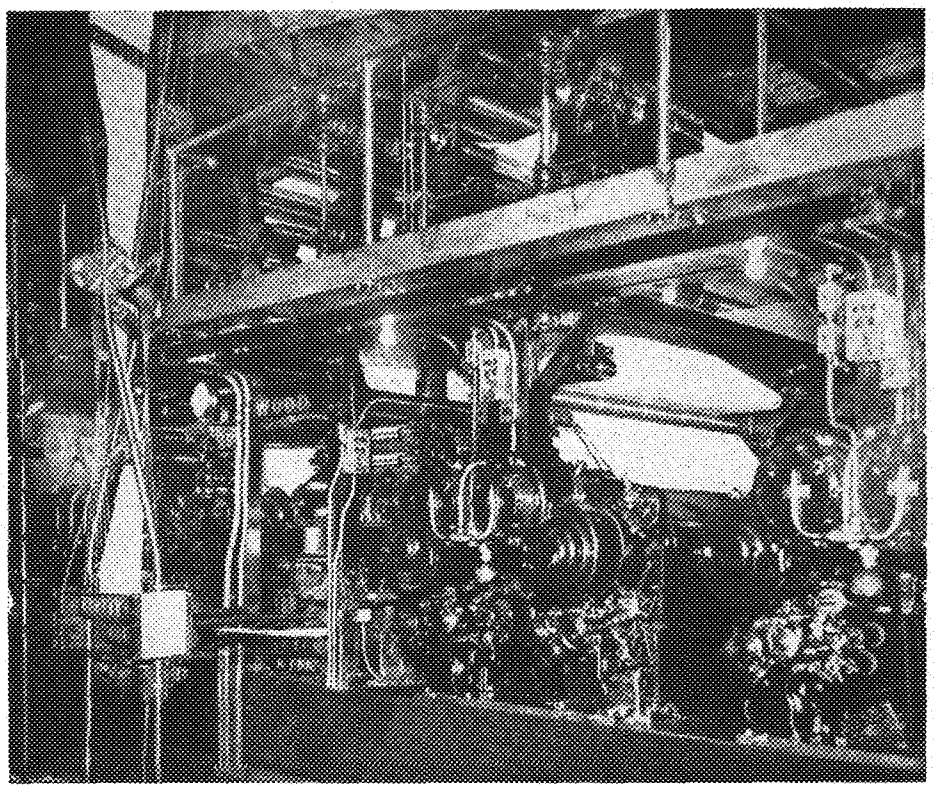
Pictures sent on 2400 cycles

Maximum line power is adjusted to 1 milliwatt, and the minimum to 14 db. below maximum. The difference represents the amount of contrast between black and white areas in the picture. In order to secure this exact difference a mirror is inserted into the light beam in the sending scanner after it has passed through the valve. The mirror is adjusted so that it allows part of the beam to pass and strike the tube direct. Just enough light passes to provide for a power of 14 db. below one milliwatt.

The length of the network which carries the picture impulses from the sending station to receiving stations makes it imperative that automatic compensators correct the current for changes in line losses. Because such corrections would cause disiortions in the picture, the regulators operate only between pictures, remaining set during transmission.

At the receiving station the line current is passed first through an amplifier, then through a detector which filters out the 2400 cycle carrier and yields a direct pulsating current. The varying current operates a shutter, a single-ribbon type, in this case, which allows more or less light to be focused on the negative, depending on whether the momentary value of the current is high or low. By means of the synchronizing apparatus described before the drum is kept turning at just the right speed to expose the negative in squares 1/100 inch on a side. The ribbon light valve is damped through a tuned circuit such that it will prevent all vibrations not impressed on it by the varying current.

All power for the apparatus is direct current, the alternating current for the synchronous motors being generated by the induction generator. The power is obtained from motor generator sets run on standard 60 cycle alternating current. Storage batteries of small capacity are floated in the line to eliminate momentary pulsations in the flow. The elimination of distortion required by the detail of news pictures is one of the most important points in the whole system. The complex control systems and the battery control show how important a point it is.



Presses soon are pouring tons of newsprint into the street

There is no synchronization apparatus connecting the sending with the receiving end. Instead, the 300 cycle current fed to the motor at either end is relied on to keep the drums turning at the same speed, and the automatic clutch throws in the receiving motor at the proper time to place the picture properly on the negative. It is interesting to note that the motors are run during the full working day, in order that changes in temperature may not cause uneven operation. Instead of starting the motor when it is desired to send a picture the clutch is thrown in by an automatic mechanism actuated by a push-button. So quiet in operation are the motors that newcomers standing beside a machine not in use are not aware that the motor is running.

The wirephoto operator begins the day by starting the power plant. After the motor-generator set has been brought into operation and the voltages adjusted, the operator tunes the light valve mechanism of the receiving machine. He adjusts it so that it will vibrate at a natural frequency of 1,200 cycles.

At 5:30 a. m. the New York office opens the talking circuit, and all points in the network report that they are ready, and give the list of pictures that they have available. The chief operator in New York determines the order in which pictures shall be sent. Then for a few minutes he transmits power levels equivalent to the highest and lowest light values in the picture. The receiving stations then adjust their machines to register the correct modulation for each power level, and the intermediate shades fall into place naturally.

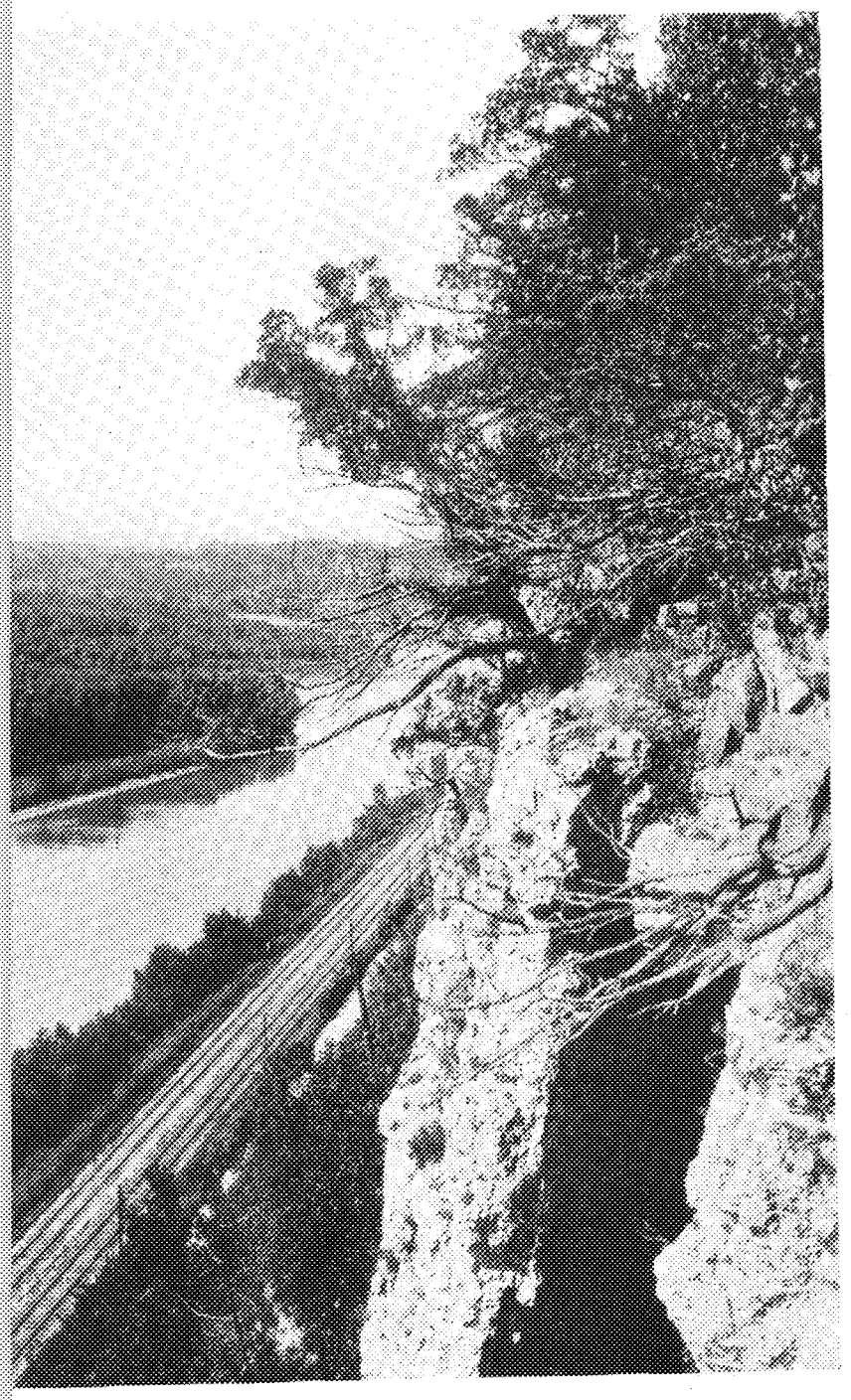
New York opens line at 5:30 a.m.

Then the actual transmission of photographs begins. In the sending station the power is interrupted three times, and the operators at the receiving stations hear the break in the note and press a button which prepares the machine for operation. Then the operator who is sending a picture starts his machine and simultaneously the clutches of all receiving machines are thrown in, and the drums begin to turn in synchronism with the sending drum. The varying power level impresses the picture variations on the negative, as we have discussed before.

Industrial Taxation In Minnesota

While industrial corporation income in Minnesota decreased from 128 million dollars in 1928 to 30 million dollars in 1931, there was no decrease in taxes.

By WILLIAM WEBER, M. E. '35



—*Railway Eng. and Maintenance*

TAXATION has always been important to every person, regardless of the amount of wealth he possesses, because whether or not he possesses taxable wealth in any amount, he must pay taxes directly or indirectly as a part of the sale price of any article that he may purchase, be that article a staple necessity of life, as bread, or a luxury, such as cigarettes. The recent depression, coming after a decade of rapidly mounting taxes, ushered in an era of decreased total income and a generally decreased outlay of individual funds. This outlay of funds was not decreased, however, so far as the individual's payment for taxes was concerned. For that reason and also because the stringencies and emergencies of relief for some 12 per cent of the population of the country by direct or indirect government aid have led to an increase in tax outlay, the average person is more active in his interest concerning the amount of his income that he must pay to the government.

Only a small portion of the huge sum paid by taxpayers every year goes for the actual administration of government, although in some cases the administration may be badly managed and often ambiguous in character. If the individual, who, it must be admitted, pays heavy taxes, were to be denied the use of the splendid network of public highways which now cover the nation, the public schools and universities for the education of his and others' children, or to actually share his bread with some unfortunate fellow citizen, it is most likely that he would consider himself confronted with a much more serious and imperative problem than the present one of high taxes.

The administration of our government is divided into three primary divisions, namely: local, which includes city and county; state; and national. Therefore, the money paid

in taxes may be classified as local, state, and national. In Minnesota, the taxes paid on real estate and property are paid as one tax, from which the city and county governments deduct their legal levy and from which the state government also secures its portion for state expenses. Therefore, the local and state tax may be considered as a state tax. The federal tax is composed of income taxes, capital stock taxes, and various excise and sales taxes.

Taxes divided in three parts.

The taxes paid the local and state governments by industries in Minnesota are varied and of several forms. Industries which are interstate in character, as telephone corporations, railroads, and express companies, are assessed on their gross earnings. Other industries carried on within the state pay various special taxes. These taxes may be real estate and property or general taxes, money and credit taxes, corporation income taxes, gross earnings taxes, or state property taxes. Franchised industries, such as power and light companies, pay, in addition, a franchise tax. The elevator and milling companies also pay a tax on grain in elevators in addition to the taxes mentioned above. Minnesota mining companies pay in addition to the general tax a 6 per cent tax based on a valuation somewhat less than net value of ore mined and a 6 per cent royalty for permission to mine and explore ore bodies.

The general tax paid by manufacturers in the state is levied on a one-third valuation of "manufacturer's materials and manufactured articles, all tools, implements and machinery, whether fixtures or otherwise."

The income tax levied by the 1933 legislature on individuals and corporations is 1 per cent on the first $1,000 of income above specified exemptions and increases to 5 per cent on individual and corporation income in excess of $10,000 above exemptions. This income tax is expected to increase the state's revenue three to five million dollars a year.

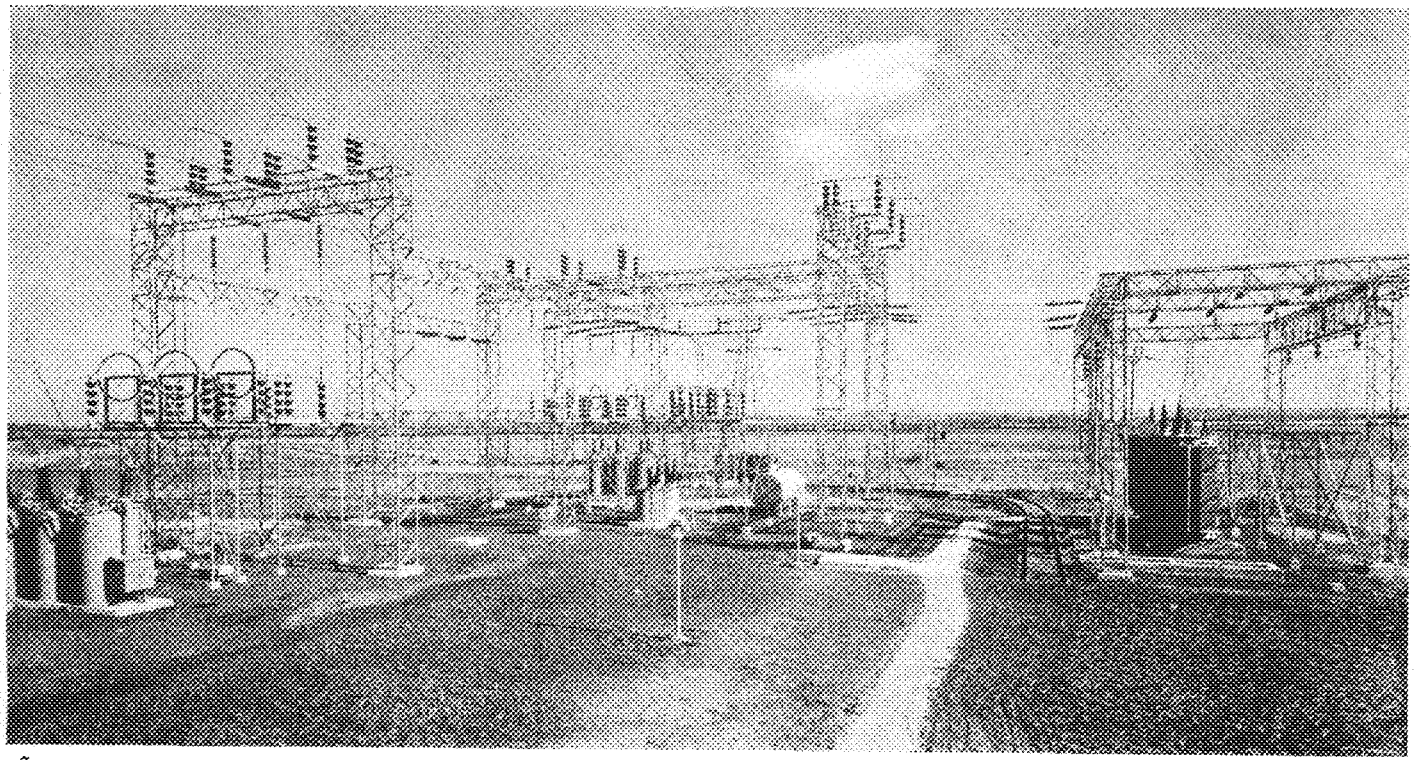
The general property tax is the largest source of industrial revenue in Minnesota. The Minnesota Yearbook for 1934 states that the general property tax rate levied in 1933 and payable in 1934 is 12.91 mills, or 1.29 cents for each dollar of assessed valuation. The assessed valuation is based on various percentages of actual value of different properties and materials. This valuation is 50 per cent for iron ore, 33.33 per cent for merchandise, machinery, and manufactured articles, and 40 per cent on platted real estate and personal property not in the other classes.

Before proceeding with the analysis of the taxes paid by a specific industry in Minnesota, it is interesting to note from a chart in "Taxation in Minnesota" by Roy G. Blakey and associates, that while industrial corporation income in Minnesota decreased from 128 million dollars in 1928 to 30 million dollars in 1931, there was no decrease in taxes paid by these industries. There was a slight increase in 1929 and 1930, but it leveled off to the 1928 value in 1931. This gives evidence that the portion of the selling price of a manufactured article produced in 1931 as a result of taxes paid by the manufacturer was several times greater than that of 1928. With the advent of the recent corporation income tax and no marked decrease in other taxes, it is entirely logical to assume that such portion is and will be higher in this and succeeding years.

The Northern States Power Company is a representative industry in Minnesota whose extensive taxations may be compared with its revenues. The company will pay the largest single amount received by the state during the current year in the form of a personal property tax amounting to $1,230,261. The remaining amounts estimated to be paid to the state for 1934 are given in order of their amounts: Real estate tax, $577,686; gross earnings tax, $376,261; state property tax, $297,181; state corporation income tax, $159,135; moneys and credits tax, $37,973; and a franchise tax of $33,719.

Revenue compared with taxation.

From the above amounts, it is seen that the estimated



total tax for 1934 to be paid by the company to the state of Minnesota is $2,712,216.

The total gross income of the company for the year 1934 is $24,358,153. Therefore, the taxes to be paid by the power company to the state comprise 11.1 per cent of the gross revenue for the year. This percentage represents the amount to be paid for city, county, and state taxes.

The federal taxes to be paid in 1934 consist of a federal income tax, a federal capital stock tax, and a federal excise tax on electric power. The federal corporation income tax amounts to $432,000. The capital stock tax to be paid is $42,277, and the excise tax is $174,932.

The federal tax which the company is to pay in 1934 is therefore $649,209, which is 2.7 per cent of the estimated gross revenue for the year.

It is noted, then, that the company expects to pay out 13.8 per cent of its gross revenue for the year 1934 in the form of local, state, and national taxes.

The preceding figures, then, lead one to conclude that the service supplied by the company could be reduced to one-seventh less than the present sale price if the company had no taxes to pay. In other words, the company could produce electric energy and gas one-seventh cheaper than it does, other costs remaining the same. Under the present rate scale the consumer could expect to get electric power for six cents per kilowatt-hour instead of seven cents if the public utilities paid no taxes.

Rates would be one-seventh less.

It is evident that a corporation doing business in Minnesota is forced to make provision of a substantial amount in the sale price of its product for the payment of taxes. Since the tax levy for 1933, payable in 1934, in Minnesota is 12.91 mills, it is interesting to consider the amount that would be paid by a concern which does business in the state but is not subject to the taxation that applies to the public utilities companies.

Let us assume a hypothetical case in which the manufacturer pays no capital stock or gross earnings tax, but whose tax is paid in accordance with the general property provision of the tax statutes. This provision states that the taxable value of the manufacturer's equipment, material, and manufactured articles shall be one-third the actual value. The manufacturer must therefore make provision for getting about 4.3 cents for every dollar actual value for his product for the payment of taxes from the sale price of the article, exclusive of the amount that he must charge in the sale price for taxes on his real estate, equipment, and other taxable items necessary in his business. The manufacturer must furthermore make provision in his sale price for such federal taxes as he may be subject to, as the income tax and capital stock tax, if a corporation, and for any excise tax that may be assessed against his product.

The ore mining companies in Minnesota pay large amounts in taxes other than the usual taxes assessed against other concerns. They pay a 6 per cent tax on an assessed value of their product, less than the net actual value, as well as a 6 per cent royalty. The price of ore produced in the state would be materially less if there were no taxes to be paid by the industry or even if the industry did not pay the special taxes assessed against it. It is important to note here that the ore taxes not only apply to the price paid by a resident of the state for iron and steel products, but also apply to the price paid throughout the nation, since the largest part of the iron ore used in the country is mined in this state.

One might be led to conclude that if the manufacturer did not pay taxes the cost of everything would be materially reduced. However, it is evident that since taxes must be paid, the individual's taxes would be substantially increased. It is difficult to imagine any industry operating without paying taxes to the government under which it operates.

It is significant that the manufacturer, though he may pay heavy taxes, and is therefore required to increase the selling price of his product, makes for a smaller net outlay for taxes by the consumer than would otherwise result if the consumer paid all taxes. This is substantiated by the fact that during the past five years, while taxes have not decreased, but have rather increased in varying amounts in most cases, the prices of manufactured products have decreased, resulting in a smaller outlay by the consumer.

From Bologna to Ramesis

By RODERICK WILLIAM SILER

Assistant Professor of Mathematics

THE city of Bologna, Italy, should have a significance to college men the world over. This is not entirely because a certain type of sausage originated there, nor even because the word "bologne" seems to have come from that direction. Bologna was the seat of the University of Bologna, generally credited with being the oldest university, founded in 1158.

In medieval days, when Bologna was in its glory, times were very different from what they are now, and the schools reflected the environment. Believe it or not, those ancient institutions managed to exist without engineers. In those universities there were colleges of Theology, Law, Medicine, and Arts, and this undoubtedly accounts for a certain loftiness in the attitude of young theologians, lawyers, and medics towards young engineers today. Engineers, who are gluttons for facts, would have found themselves gasping for what would have seemed to them pretty thin air in such famous ancient schools as Bologna, Salamanca, Paris, or Oxford. Judging from such information as has come down to us, the standing of professors and students in medieval schools was based, not on the accumulation of facts and data they had dug up, but on their ability to prove a great deal without any facts. In other words, the schools of that time seem to have resounded with argument, with debates

of a purely theoretical sort. To an engineer this is not so remarkable when occurring in Arts, Law, or Theology, for there they are still arguing, but that the Medics should also have been guilty of sailing along without much factual knowledge is surprising. It seems that in those days people experienced a not entirely unnatural disinclination to permitting their dead relatives serving in the capacity of what are technically known as "stiffs," for young doctors to cut up. With the result that medical students rarely witnessed a dissection, and therefore knew none too much of the mysteries of the human interior. To a patient suffering from stomach or liver complaint it must have been very interesting to hear a couple of young medieval doctors arguing as to the exact functions of those organs. However, if it is admitted that ability in debate is the true test of a man, I want to say that that ability is not to be sneezed at. I have had arguments of the medieval sort myself, where the other man had no more physical proof of what he was talking about than I, and you cannot beat this situation for heavy wrangling. The test of a great debater is to win without knowing anything about his subject. Anyone can win an argument with facts. It is rather surprising that in such centers of discussion as the old schools no women were admitted. Various reasons are given for this exclusion, but I suspect that the real reason was that the boys wanted to win an argument occasionally.

After all, the pursuit of knowledge in that age had to be adapted to the conditions of the time, and it must not be forgotten that then the common run of men, compared with the present, were desperately poor. This accounts for many of the peculiarities in their teaching. For instance, books were rare and expensive. A professor might have a few, but the average student wouldn't have any. Therefore the professor read his book in class, and the students either took notes or memorized. If students were poor in those days it wasn't because they had to buy new textbooks every year. But the books they had—or the professor had—they appreciated, straining every bit of meaning out of them, discussing them, and of course arguing about them. I have read somewhere of the furnishings of a medieval classroom, and it was remarkable chiefly for the lack of furniture. Rushes were spread on the floor and the students spread themselves on the rushes. The professor had at one end of the room a raised platform and, I hope, a chair. A rather dreadful thing about the medieval schools was that they began classes very early in the morning, soon after daylight, and this before the invention of alarm clocks, which are such a helpful curse today. They appreciated daylight in those days, for the nights were dark. At sundown a city grew very black. Streets were unlighted, lights in houses were few and far between.

But care must be taken in passing judgment on those ancient schools not to be too abrupt in doing so. There is, in the first place, some reason to suspect that the universities then held a more unique and significant place in the society of their day than ours do now. They were actually centers of democracy in a world where autocratic government was the rule, much inclined to take the view that in a school men should be judged chiefly by their mental ability, and enforcing this opinion by a jealous insistence upon certain rights and privileges which members of the university, faculty, and students were entitled to and which set them apart from the rest of the world. They were, for instance, exempted from paying taxes and from military service, both of which privileges would be appreciated today. If a member got into trouble with the civil authorities he was tried by the university, not the civil, authorities. At some schools, notably at Bologna, the rector must be a student and, though the tenure of position was limited, while it lasted the rector lived in a blaze of glory. He convoked meetings of the university, took precedence in university functions over the most prominent outsiders, acted as judge over students charged with crime, and had a certain authority over the professors. That, I would say, was a student job worth working for. It all seems to indicate that the ancient schools, lacking our facilities for education, realized very clearly that education is less a piling up of facts than a satisfactory interpretation of the facts one has. They did not mistake the means for the end, a great peril of the present, when men have on hand such a glut of physical facts that many of them can neither see nor think beyond it.

Mr. Siler takes us back to college in Medieval days when the textbook racket did not flame so brightly, seats us on the rush covered floor, and discusses with us the fine art of debating. He also offers a cash reward. Read it and collect.

Coming down to the present, I wish to state that I am offering a reward for certain information. I don't know whether or not you noticed it, but just at the close of the last football season the papers published reports to the effect that the boys at Fordham University had had their mascot, a fine upstanding he-sheep, sometimes known as a ram, stolen. This happened just before their Purdue game which, as you may remember, Fordham lost. As far as I could discover, no suspicion attached to the Purdue boys; and I am inclined to believe that no Western Conference team would steal the opponents' ram. Much as I regret to say it, the Easterners are inclined to do such things, which we of the West would never consider, to win a football game; and it is undoubtedly this knowledge that caused the Fordham boys to suspect the boys from New York University, their hated rivals. To take another team's mascot, especially if he is a ram, is taking unfair advantage, it seems to me. From all accounts this mascot, named Ramesis, was much beloved and admired at Fordham, and his disappearance simply demoralized them. They had a pretty fair team, from all accounts, and if they had played here I am inclined to think that Fordham, plus the ram, could possibly have held Minnesota to, say, six touchdowns. Minus the ram the score would have been much larger, of course. The lesson for us out here, it seems to me, is never to have a mascot. The team, the student body, the faculty, become too much attached to it, and when it is lost no one cares whether a game is won or not. What has worried me for three months is whether or not Fordham has recovered Ramesis, and if not, what effect it has had upon the morale of the student body? Also, if the ram is gone, where is he? I shall be very glad, indeed, to pay the reward to any professor, student, or other *Techno-Log* reader who presents information or clues. The reward will be a 1935 dime.

The Minnesota

TECHNO-LOG

EUGENE PRICE
Managing Editor

DAVID BUCK
Business Manager

Behold — The Engineer

Since the Lord made the Earth in six days, engineers, although paid on the six-day basis, have continued to work seven days and nearly as many nights a week. An engineer can be recognized by his trusting appearance and the resigned look on his face, and a table of sines and cosines next to his heart.

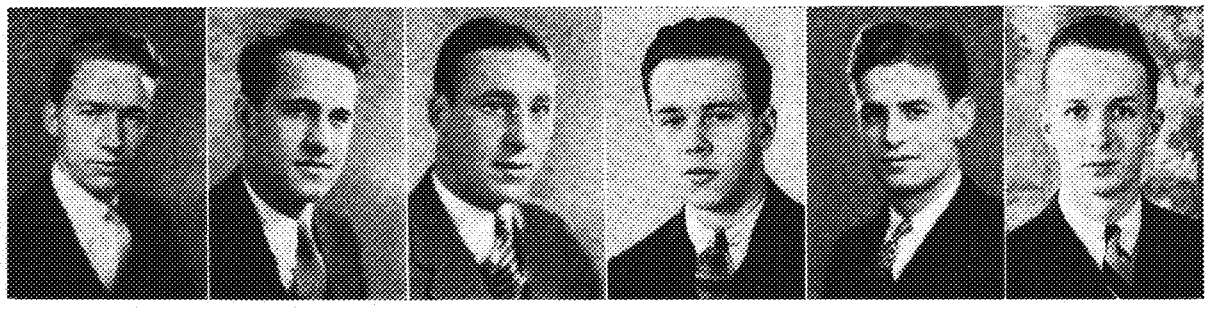
Throughout the ages the engineer has continued to function, until now, our technical schools yearly turn out about 10,000 young hopefuls on the American public, each armed with a slide-rule and a bad case of brain fatigue due to four years of unremitting toil. Some of these souls are immediately saved by becoming bond salesmen and insurance agents. Some of the remaining, after working incessantly as engineers, gain success by becoming advertising managers, accountants, salesmen, and managing executives. But, alas, some fail and become Assistant Chief Engineers, Chief Engineers, and, if complete failures, become Consulting Engineers.

An engineer with the temperament of a grand opera sta is an inventor and can be recognized by long hair and flowing bow-tie. There is only one engineer on record wh has become rich. He recently died in Colorado and left fortune of $50,000 which he amassed through unceasing toi superhuman perseverance, remarkable ingenuity, and th death of an uncle who left him $49,995.

An engineer is said to be a man who knows a great dea about little and who goes along knowing more and mor about less and less until finally he knows practically every thing about nothing—whereas: A salesman on the othe hand, is a man who knows a very little about a great de and keeps on knowing less and less about more and mor until finally he knows practically nothing about everythin

—Michigan Techn

Here's the Board



—*Gopher Photos*

From left to right the men are:
Herbert Jensen, chemistry, chairman
George Lemke, aeronautical engineering
Leon Hamlet, civil engineering
Rex Galles, architecture
Frank Pellegrino, electrical engineering
Gordon Maas, mechanical engineering

The introduction of this section is made for the purpose of acquainting the student body with the men to whom they have delegated the responsibility of the publication of this magazine.

Last month we ran an editorial suggesting that you bring your comments and criticisms to the board. Because some of you may not know the representative from your particular school, we are printing the pictures of the men.

We hope that you will remember these men when you have something on your mind about the *Techno-Log*.

Now Here's A Book

By Clifford I. Haga
Instructor in English

THIS month the column should be headed "Now Here Are Books" for I am going to say a little about three books, two recent and one of twenty years ago. When I read two of them, Dorfman's "Thorstein Veblen and His America" and Wells' "Experiment in Autobiography," a few months ago, my mind went back frequently to Henry Adams' "The Education of Henry Adams"; and now I think of the three as forming a sort of triptych with Adams in the central panel and Veblen and Wells in the side panels. Adams, Yankee-bred son of U. S. presidents, was a scholar and historian who wrote chiefly for historians. Veblen, Minnesota-reared son of Norwegian immigrants, was a scholar, economist, sociologist—even prophet—who wrote for scholars but came to be read by all manner of men. Wells, product of that mid-Victorian chaos in which all boundaries were wiped out under the impact of popular education and popular science, is a novelist, historian, scientist, economist, sociologist, philosopher, preacher, prophet, and heaven knows what, and wrote for—for whom did he not write? The reason why I balance these three men as I do is that, in spite of their apparent diversity, they were all vitally concerned with the same thing: man's place in the world. Adams describes his search for knowledge in the most personal terms, Veblen in the least personal, and Wells in the most intimate, yet each sheds his light upon that central problem in a uniquely profitable way.

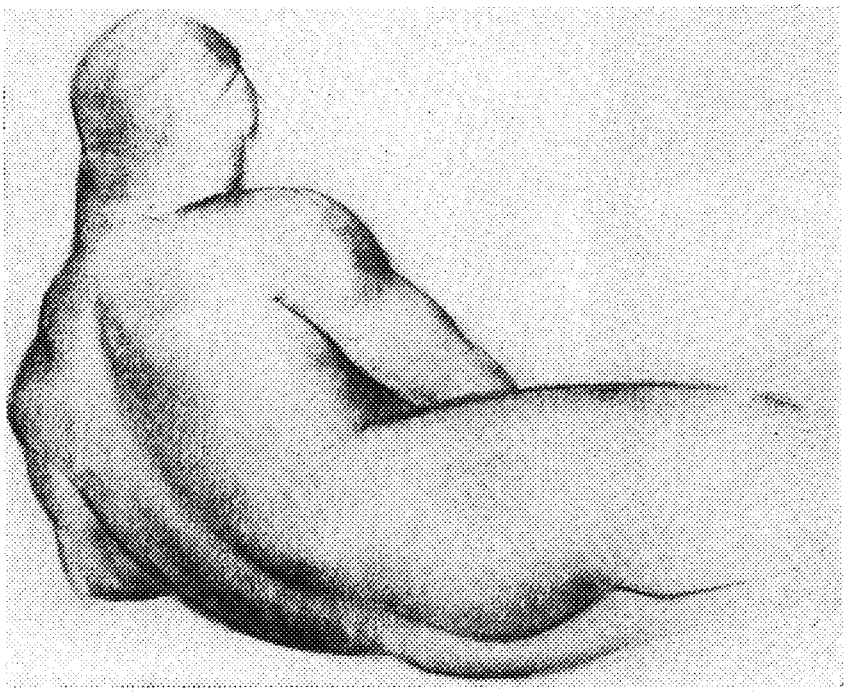
Another reason why I bracket together these three books is that in all we have running concurrently with the ordinary materials of biography—ancestry, birth, growth, work, play—the broad panorama of social and political change that unfolded as these men lived, acting upon them to make them what they became and acted upon by what they did. Adams presents that panorama as a historian and a philosopher would show it, giving us the immense perspective that is history in the compact generalizations that are philosophy. In Dorfman's "Veblen" that panorama is more the textbook view, detailed, detached, documented, without Adams' literary quality or Wells' colorful intimacy, yet because of its completeness as continuously interesting as the other two. Wells draws that background picture in a third way, building up its outlines in the flashing light of a thousand and one anecdotes. Adams had the historian's trick of describing a period of time—as much for aesthetic reasons as for philosophical reasons—in terms of some symbol, and he found the symbol for modern life in the Dynamo—Science—as he found medieval life symbolized by the Gothic cathedral. Veblen knew science, used it, wrote it—and criticized it, neither wooing it with symbols nor surrendering to it with that yearning which drives less well-balanced minds to seek some neat, vest-pocket panacea. Wells threw himself upon science with all the passionate ardor of the enthusiast who has at last found the key to all things, and in his multitude of books there echoes that "Eureka! Eureka!" he first shouted when as a youth he entered the laboratory and the lecture room.

I used the analogy of the triptych to show how these men arrange themselves, and I placed Adams in the center because he has greater depth and a broader sweep than the other two. Veblen considered fewer aspects of man's life, but penetrated more deeply those problems over which his mind lingered. Wells has too great a sweep, too much enthusiasm, ever to penetrate or really to include all there is—but he has the brilliance of lightning and bursts upon the average reader (that is to say, the duller mind) with more of a shock. Read all three—as read them you must—in the order I have listed them. Then when you have read them you can say: "Many things may be unknown to me, but these things I know—and *understand*."

Architectural Notes

New State Offices

Among the recent building news is the proposal for a new state office building which would take its place near the Capitol group. The building as recommended by the committees of the State Legislature would be thirteen stories in height and constructed at a cost of $750,000. If the building is approved, there will surely be much controversy in regard to the site which has been proposed for the state owned land northeast of the Capitol bounded by University Avenue, Cedar and Robert Streets, and Capitol Curve. The selection is certain to be fought by St. Paul which will ask for conformance to the Cass Gilbert plan for development of the Capitol approach. This scheme would probably place the new building next to the present office building and facing the Capitol approaches.



A charcoal drawing from life by Robert Auvinen.

A. I. D.

The American Institute of Decorators has in preparation a course of instruction which it hopes may become typical for the schools and colleges preparing students for this field. The course has not yet been worked out in detail, but the Institute has in mind a four year professional course equivalent in scope to the course which has been offered at Minnesota for years. It is interesting to note the minimum percentages of time for the subjects in the approved A.I.D. course. The schedule follows:

Design	34.00%
Materials of Decoration	15.00%
Form and Color (drawing and other practical work)	10.00%
Construction (including practical work)	8.75%
Professional Practice (business methods, ethics, law, etc.)	5.00%
History of Architecture and Decorative Arts	8.75%
Economics, Languages, etc.	10.00%
Total	100.00%

The ideal maximum course which the Institute has in preparation provides two years of academic college work before the four year professional course.

The Little Gallery

Mrs. Ruth Lawrence, curator of the Little Gallery, has announced the program for the rest of the school year. Since the thirteenth of this month there has been a showing of Mestrovic's drawings and photographs of his sculpture. There will be much interest in the display of faculty work scheduled for the first two weeks in April. From the fifteenth to the last of April there will be an exhibit of textiles to show the modern trend in textile design. Beginning May 1, the work of students in all art departments will be exhibited. Mickey Mouse will enter the Little Gallery on May 13, when a selection of original Walt Disney cartoons arrive there. The season will be closed in the last two weeks of the school year with an exhibit of amateur photography.

Along with modern thought and expression the student could well consider these quotations of Laotze, Chinese philosopher of 500 B. C. Frank Lloyd Wright believes that in them is the "only valid introduction" to the writings of Louis H. Sullivan.

Pots were made from clay.
But within lies the essence of the pot.

Roof and Walls make the House.
But the essence of the House is enclosed space.

Fundamentally:
In Matter is found utility.
In essence is found significance,
But in the oneness of the two lies the life of anything.

The whole can always dominate the part.

Design

Grade Three design is just completing the design for a concert hall for which the Scarab medal will be awarded.

Nomograms — What Are They?

By A. S. LEVENS

Assistant Professor of Drawing and Descriptive Geometry

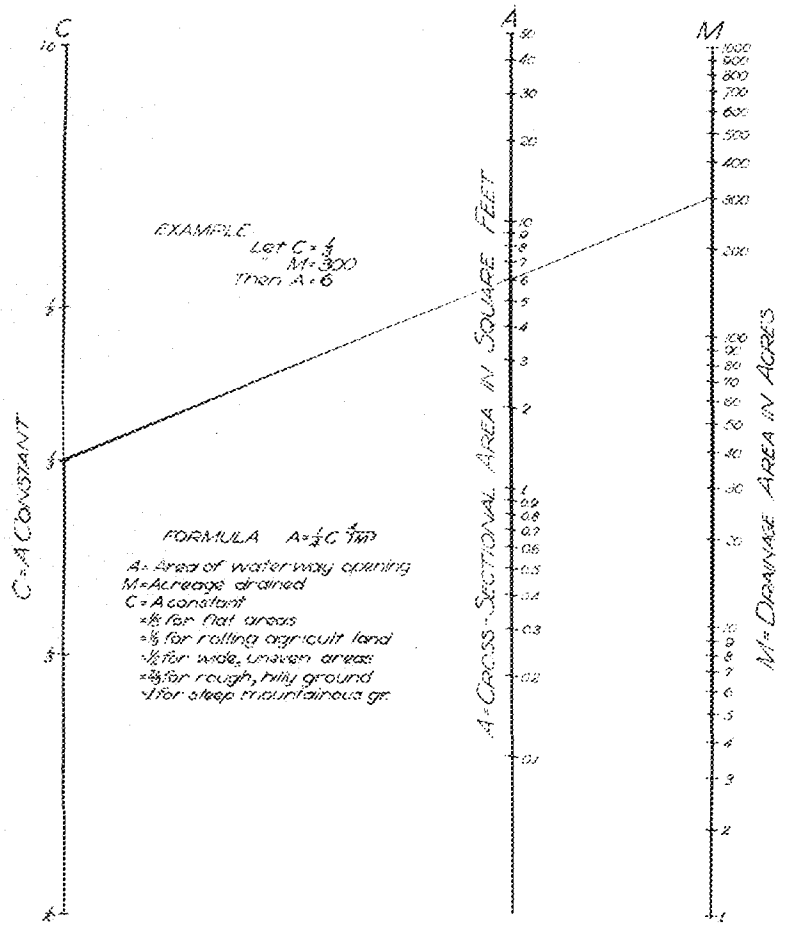
YES, the word is spelled correctly. Undoubtedly, you know of monograms, but what of nomograms?

Within recent years the use of nonography — that branch of mathematics which deals with the graphical representation and solution of mathematical expressions — has become more and more evident. In the industries and in the professional practice of engineering, the nomogram — especially the alignment chart, is recognized for its convenience in making calculations graphically. Nomograms can be used to advantage in those lines of work in which repeated computations of a given formula are necessary.

Recently, a former student, Mr. Guy Arthur who was enrolled in the Alignment Chart course, developed a chart for the Munsingwear Corporation where he is employed as industrial engineer. This chart (see Fig. 3) is used to calculate the percentage of irregulars in a "lot" of processed hosiery. These calculations are made by "Overinspectors" who, previous to the introduction of the chart, worked the calculations out in longhand. The average time necessary to make one calculation is four times that required to calculate the percentages by using the chart. The estimated saving in time is ten minutes per operator per day or a total of about one hour per day. The accuracy of calculations has been increased about ten per cent. The inspectors prefer the chart, and the management is pleased with the greater accuracy, the saving in time, and the ease of teaching the operator.

Fig. 2 shows a chart for solving the Talbot formula for determining culvert sizes. This chart is of the usual type — rectangular cartesian co-ordinate system. Fig. 1 is an alignment chart for the same equation. The simplicity and ease

(Please turn to page 132)



Runoff chart based on one-fourth the results given by the Talbot formula (or approximately 1 inch rainfall per hour). Multiply values by average maximum local rainfall intensity.

Designed by: A.S. Levens C.E.

Fig. 1

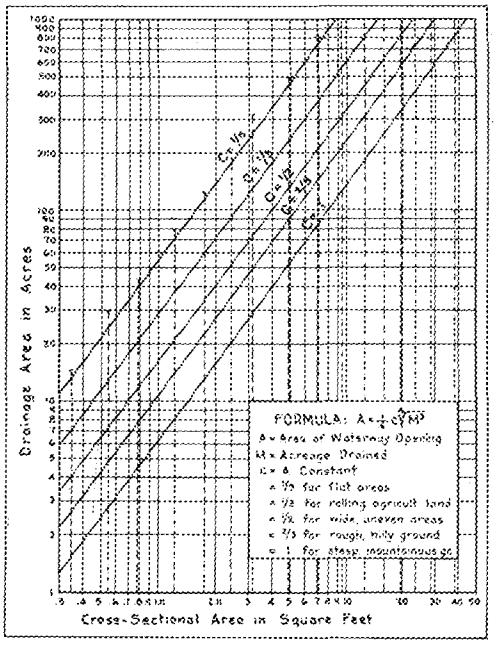


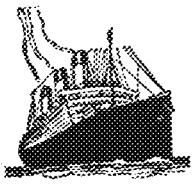
Fig. 2

The picture above shows the complicated diagram originally used in determining culvert sizes. At the left is shown the alignment chart for the same equation. You can compare them for ease of manipulation.

minnesota engineer

Sails the Seven Seas on Liner

All the way from Kobe, Japan, came a letter to Professor John Du Priest from **Bob Yobe**, M.E., '34 on board the S. S. President Harrison. Bob's



is a story of ambition and hard work finally successful. Brief sketches from his long and interesting letter give us the gist of his experiences: Rode the rods to New York . . . . pounded pavements from pier to pier for three weeks in a bitter attempt to get any kind of a job on a steamship . . . . thousands of experienced seamen out of work . . . . no experience myself . . . . biggest obstacle of all . . . . perseverance won out . . . . job on S. S. President Harrison as wiper . . . . lowest class job on ship in engine room . . . . surprised when found out going around world . . . . $37.50 a month clear . . . . had wonderful time . . . . kept eyes and ears open . . . . promoted to fireman at $50 a month . . . . promoted to watertender at $60 a month . . . . promoted to boss of fire room . . . . qualified for 3rd engineers license . . . . qualifying for 2nd engineers . . . . still ambitions . . . . picking up valuable experience . . . . seeing the world . . . . saving money.

For you M.E.'s, the President Harrison is 502 feet long, net tonnage of 6,600 tons, powered by 2 reciprocating, triple-expansion steam engines, speed about 15 knots, steam pressure to the H.P. cylinder is 220 lbs. per sq. in., I.P. is 65 lbs. per sq. in., L.P. is 15 lbs. per sq. in. Steam is furnished by 6 Scotch boilers rated at around 1500 h.p. a piece. Originally a coal burner, it now burns 1,000 gal. of oil an hour at maximum speed, 97-100 r.p.m. Bob says he is looking for a real job with a future, and from his former work, we're sure he'll be successful.

\+ + +

It is the ambition of all journalists to scoop the press. It was our good fortune to make a very minor scoop, and although it will not go down into the history of reporting, it gives a faint insight as to how one would feel should he get one that would rock the world. The following news comes from our reporter, **Steve Gadler,** E.E. '32, stranded up at a CCC camp in the wilds of northern Minnesota.

He tells us that **Udert Hella,** C.E. '32, about whose pet deer we ran a short note two months ago, was promoted to a first lieutenant and is now the youngest commanding officer at an outfit.

Steve also sent us the following items of interest:

At the ECW camp, S-53, **Glenn Youatt,** C.E. '29 will be found doing all the forestry engineering work. His mailing address is Side Lake, Minn.

E. J. Hammer, Chem. '32 has strayed far from the engineering field and now is the educational adviser at the above camp. The story is told that every man in his camp carries a slip-stick. Education has called another engineer in the person of **Carl G. Widseth,** Ag.E. '33, who is the educational adviser at CCC camp 704, near Ely.

The class of C.E. '30 is represented at ECW camp S-52 near Orr by **I. W. McPherson** in the capacity of camp engineer. **Charles Ten Brook,** M.E. '29 may be reached at CCC camp 715. He spends his evenings in Virginia, admiring the beautiful.

At ECW camp S-83 near Big Falls, we find **Paul J. Perrault,** C.E. '23, as superintendent; he remembers his profs at school by maintaining perfect control over the decimals in his engineering calculations.

With that broad grin of his, **George A. Schraeder,** C.E. '31, states that he is ready to patent a snowshoe device for transits. Letters reach him at Effie, Minn.

Since last month's issue, **Scott Linsley,** E.E. '32, has resigned his position with the ECW to accept a similar position with the Twin City Sewage Commission. (His old position is already filled.)

Lloyd Knutsen, Arch. '32, is a "First Loole" in the Army, attached to the Sub-District headquarters at Hibbing. His big interest is his dog, "Blanka."

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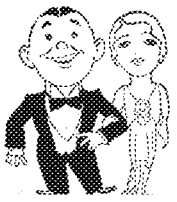
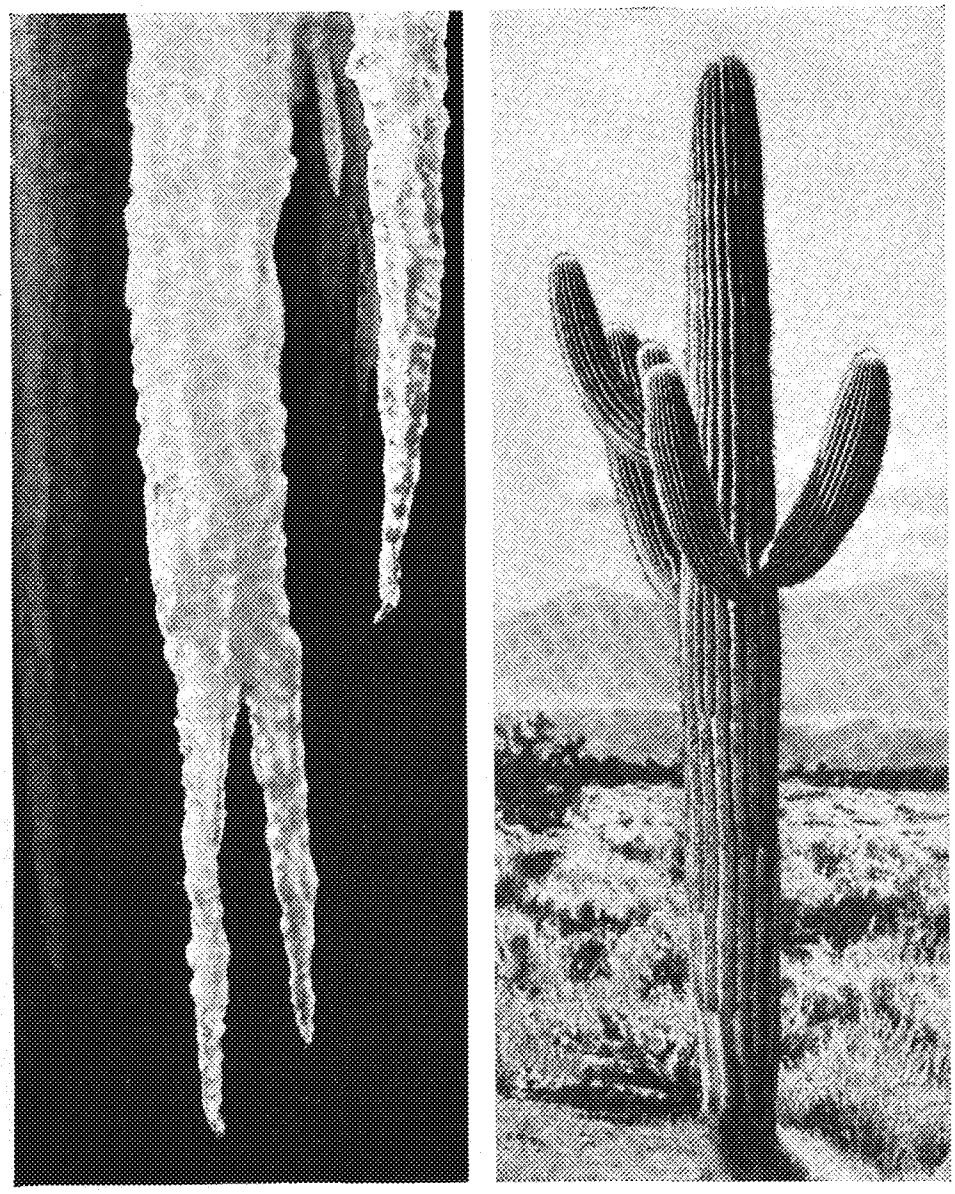
Gayle Priester, M.E. '32, is now working for the Carrier Engineering Corporation. Gayle's address is the main office of that company in Newark, N. J. His work consists of engineering and design of heating and ventilating equipment for railroad coaches, office buildings, and stores.

Another one profiting from CCC work is **Homer D. Thomas,** M.E. '33, who went to work two days after graduation for the Dept. of Drainage and Waters, State of Minnesota, as a Junior Engineer on the soil erosion work in the southeastern part of the state; from there to construction work at Ely. Homer built seven camps involving not only the design and construction of buildings



but also of roads, the development of water and sewerage systems and the installation of lighting facilities. From Ely to Rochester, building there nine summer camps and one winter camp. Garnering all kinds of experience, he was next appointed quartermaster over ten camps, involving all construction work and purchasing of materials and supplies. It is Homer's opinion that the CCC is permanent for the next several years at least, and he is working hard for promotions, involving, we suppose, more "jack." First Lieutenant Thomas recently acquired another boss, Mrs. Thomas by name. They were married last June. Present address is Park Rapids.

Up on the iron range we have an M.E., **Paul La Liberte,** '33, working for the Cutler-Magner Company, with headquarters in Duluth. This company manufactures line, refines salt, and is the Northwestern Distributor for Huron Portland Cement. Paul's duties include office work and general engineering duties.



The Telephone "can take it"!

Your telephone must work 24 hours a day. It must be immune to icy blasts of the frozen north—dry burning heat of the desert—heavy, humid atmosphere of swamp lands.

And it is. For Western Electric—manufacturing unit of the Bell System—sees to it that telephones, switchboards and cable are prepared for life anywhere. Through long experience and rigorous testing, telephone engineers have learned how to make apparatus which is not adversely affected by the whims of climate.

In pioneering and producing improved apparatus, Western Electric contributes to the year 'round reliability of your Bell Telephone service.

Why not telephone home one night each week? Bargain rates after 8.30 P. M.—reverse the charges if your folks agree!

BELL TELEPHONE SYSTEM

"Pedal-Harmonica" Aids Success of *Techno-Log* Round Table

The *Techno-Log* Round Table meeting, held in the main lounge of the Minnesota Union, Feb. 14, went over with a bang. Over fifty interested engineers were royally entertained by a program starting off with songs and ending with a "get acquainted" meeting and refreshments.

Toastmaster Connie Bevier started the program by presenting the Technical Glee Club, which sang a number of popular songs.

After the music, a very interesting movie on Goodyear blimps and dirigibles and a "Stan Laurel" comedy were presented. Sound effects for the movies were furnished by Lindquist and Simmons of the *Techno-Log* staff.

Gordon Rosholt, business manager of the 1933-34 *Techno-Log*, gave a talk in which he pointed out that employers are often interested in the outside activities in which a student participates as much, if not more, than his scholastic standing. Herb Jensen, chairman of the Minnesota *Techno-Log* board, spoke of the duties and policies of the board. Dave Buck and Bob Dixon, business and advertising managers, respectively, both spoke on the duties of the business department and told the fellows about the jobs which could be found in that department. The work of the editorial department was explained by Eugene Price, managing editor.

The *Techno-Log* quartet, consisting of Arnold Cohen, Bertil Lindquist, Eugene Price, and Charles Sweatt and accompanied by Wayne Stone on the "Concert Grand Pipeless Organ," rendered the popular airs, "No, No, A 1000 × No," and "The Man on the Flying Trapeze."

The meeting then adjourned to the lunch room where the fellows were served refreshments. Needless to say, "where there is food there is fun"; all enjoyed themselves.

The round table meeting was held for the purpose of giving the engineers a good time and getting them interested in the *Techno-Log*. Both of these objectives were accomplished and as a result there are already eight new members on the *Techno-Log* staff. The new members include: Paul Campbell, Don Erickson, Sid Schulz, and Willis Swanson on the editorial staff; and Milo Bolstad, Erling Hellaud, and Charles Strom on the business staff.

Intlekofer Chosen Engineer Day Head

Jack Intlekofer, Aero. E. '36, was chosen as chairman of Engineers' Day, which will be on May 17 this year. Candidates for the position were proposed by petitions from the junior class of the College of Engineering and Architecture or the School of Chemistry. Each candidate submitted a proposed Engineers' Day program to the Technical Commission on the basis of which the chairman was chosen.

E. E. Fraternity Holds Initiation

The Beta Chapter of the Kappa Eta Kappa, electrical engineering fraternity, held their annual founders day and winter initiation banquet Feb. 16 at Miller's Cafeteria.

William R. Carter, president of the chapter, acted as toastmaster. L. C. Caverley, professor of electrical engineering, and Mr. C. L. Johnson entertained the group with some very interesting stories.

The new members were welcomed into the fraternity by Charles Steinmetz, and Carl Henrici accepted the welcome in behalf of the new members.

The new members of the chapter are: Cyril Baranoosky, Carl Henrici, James F. Jordan, Alfred R. Kephart, Harlow G. Moore, and H. Carlton Stenderson.

Senior Bridge-Builders Claim Reform Not Due to Lockout

In that it is common for scholars of great mental acumen to grow neglectful of personal surroundings, it is not odd that a kind of bohemianism developed recently among the Senior Civils. These ardent scholars, unmindful of their environments, evoked considerable displeasure on the part of Fred, the equally ardent janitor. Despite his warnings, wastepaper, cigarette butts, textbooks, and other rubbish accumulated everywhere but in the proper receptacles.

The increasing volume of Fred's deprecations were climaxed in a very positive gesture which left the Civils victims of a lockout. They protested their innocence to most of the charges against them and proceeded to circulate a petition to regain their lost status. In a rather *ex officio* statement they confessed an occasional eraser fight but claimed that card games in any form had been taboo because of the wishes of the faculty. "We did not wish to displease them in this regard," they said, "so we shot craps instead."

The petition was successful and the room was returned the following day, only, however, on the promise of the offenders to keep everything in an exemplary state. In order to expedite adherence to the principles of the new era, the following sign was displayed on the door:

SENIOR CIVIL ROOM
The Senior Civils Are Responsible for This Room
ALL OTHERS KEEP OUT

This bold announcement offended the sensibilities of certain juniors who were wont to frequent the above haunts. It was then not long before the junior room bore a warning of the following nature:

THIS IS THE JUNIOR CIVIL ROOM
ALL OTHERS PLEASE KEEP OUT

Undaunted by the upperclassmen the sophomores raised a battle flag which read:

This Is the
SOPHOMORE CIVIL ROOM
KEEP OUT
The Dean

Some doubt has been expressed as to the validity of the last line. This spirit of play which has now entered the arena irks the dignity of the seniors, who claim that the underclassmen are misconstruing the spirit of the movement. In fact, the seniors sadly miss the solid comfort of the fall quarter and seriously consider scrapping the waste cans and pacifying the janitry with tobacco and liquid assets.

E. E.'s Brain-Children to Perform Before Electrical Show Visitors

Visitors to the Electrical building during the Eleventh Biennial Electrical Party, Friday evening and Saturday, April 26 and 27, will behold a veritable Little World's Fair, according to Carlyle Barton, manager of the event; Frank Pellegrino, chairman of student exhibits, and Jack Reusch, chairman of manufacturers' exhibits. With students busily engaged at building their favorite brain-children, plans for the show are already beginning to materialize. Negotiations have been completed for a number of interesting commercial displays. A huge electric sign now being constructed by members of the illumination committee under the direction of Charles Shortley, will decorate the facade of the building.

Admission to the opening session of the show, from 7 until 10 o'clock Friday evening, will be by invitation only, while all day Saturday the doors will be thrown open to the general public.

The gay spot of the party will be the ball to be held in the Minnesota Union ballroom immediately after the close of the Friday night showing. Purchasers of ball tickets will be issued invitations to the premiere of the Electrical Show, according to Sylvester Laskin, dance chairman.

Some of the exhibit features now being worked out are: Speech scrambling, delaying, and unscrambling devices, writing at a distance, radio and light controlled mechanisms, and all sorts of freak and bewildering phenomena, the exact nature of which are being kept secret for the present.

A. S. A. E. Studies Application Letters

Better job application letters is the aim of a special class that meets each Thursday for the Senior Agricultural Engineers. Mr. R. C. Lausing, Chief of the rhetoric section, and Mr. A. J. Schwantes, the A.S.A.E. faculty advisor, combine their efforts to smooth out the important step from school to industry.

The first sessions were concerned with a brief review of the mechanics of letters. The discussion in the next meetings centered around what should properly be included in a letter of application. Then each senior submitted a letter to be criticized before the class; after the weak spots in the letters had been corrected the letters were mailed. The importance of treating the application to each company as a separate problem was stressed in order that the letter would have individuality as well as correct details.

These informal classes are a project of the Minnesota Student Branch of the A.S.A.E., and also serve as an aid to the instructors by minimizing the numerous requests for individual help in checking letters of application.

Mountings Simplify E. E. Lab Operations

Five motor and generator units and two dynamometers in the electrical engineering laboratory have been equipped with new standardized bases in order that any two pieces might be coupled together with a minimum of labor. The work is under the direction of L. C. Caverley, assistant professor of electrical engineering. The stands for the dynamometers were designed by Professor Kuhlman.

The trucks on which the units are mounted are all of uniform height. The units are mounted on these stands with plates of rolled steel under their mountings so that the centers of the shafts of the machines are all the same height above the floor. On each shaft there is a round disk eight inches in diameter with either four pins or holes in it, which will fit into a similar coupling on another machine. The trucks have a coupling device consisting of one pin and hole and may be locked together by fitting the pins and holes together and locking with set screws.

A. I. E. E. Makes Inspection Tours

Encouraged by the interest the student body has shown, the American Institute of Electrical Engineers continues its policy of sponsoring biweekly inspection trips to various plants of interest in and about the Twin Cities. On Thursday, February 14, the group made a tour of the Minneapolis-Honeywell Regulator Company, and on Friday, March 1, saw how coke, gas, and their by-products are manufactured at the Koppers Gas & Coke Company in St. Paul.

In order to encourage the writing of student papers, the state section of the A.I.E.E. has increased the prize awards in the paper contest to $25 and $15. Students still have ample time in which to prepare their entries, as the contest will be held some time in April. Leonard Ostergren, A.I.E.E. president, urges those interested to begin work on their papers now.

Nomograms—What Are They?

(Continued from page 127)

of using the latter chart is obvious.

The writer believes that it is unwise at this time to go into the theory which is used in the construction of alignment charts. If you are interested in this work, it is

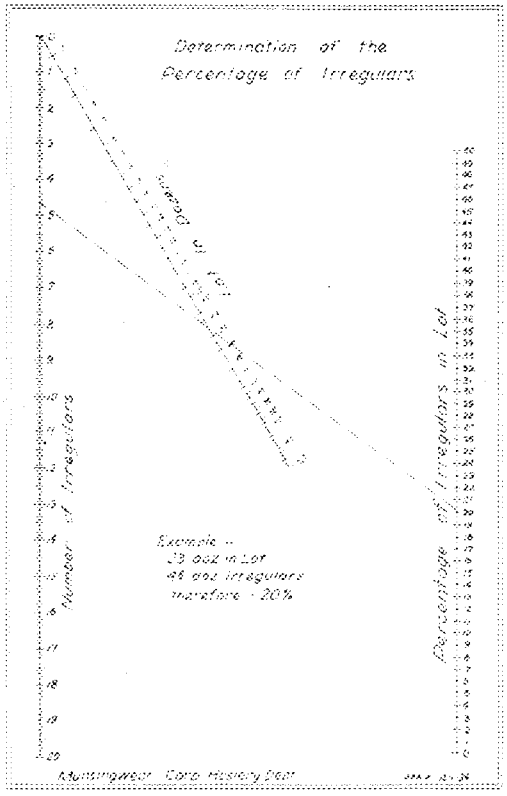


Fig. 3

suggested that you avail yourselves of the opportunity to pursue studies in this important field. The College of Engineering is one of the few schools which offer a course in "Alignments Charts." Draw. 52S.

KAHN-NOTATIONS

By Howard Kahn, Ch. E. '35

No stranger to most of us is John S. Young, the announcer for the KSTP radio program sponsored by the publications on the campus, and whose picture adorns in half the covers of *Ski-U-Mah*. John's fame is spreading rapidly, it seems, for he received a letter recently with an autographed picture of Tony Wons, the letter saying in effect:

Dear Sir: We have heard your programs over KSTP and have enjoyed them very much. You *too* should have pictures taken to distribute among your admirers.

..... Studio.

Just John and Tony, a couple of boys who made good.

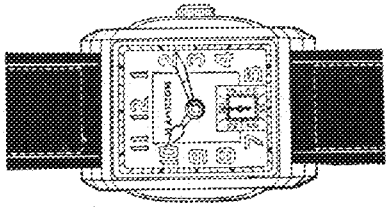
\+ + +

According to their poster, the A.I.E.E. held a meeting on February 29 . . . the advantages of a college education . . . "friable" means easily pulverized, and "cooney" is a new word of meaning as yet unknown . . . A doctor, asked in a practice-trial at the law school to define in more simple terms "auro-sclerosis," replied "fixation of stapes" . . . As one student put it, the doctor is addicted to circumlocution . . . H. Cottingham is busy on the chem show for this year . . . and a sensation it will be . . . "Hygroscopicity" is an earful.

\+ + +

The U.P. reports the following, too good to keep:

An application test for a government job contained the following questions, to which there were supposed to be no answers. "How long is a piece of string?" and "How far can a dog run into the woods?" A.S.U.I. student, undoubtedly an engineer, answered, "A piece of string is twice as long as the distance from the center to either end."



and "A dog can run only half way into the woods; after that he's running out of the woods."

He got the job.

\+ + +

(Editor's Note: The dog wouldn't *run* through the woods, he would stop occasionally.)

\+ + +

We see by the alumni files that Allan Crawford '12, is circulation manager for the *Farmer's Wife*, and that Henry Daum '12, is ditto for the *Farmer* . . . but who takes care of the farmer's daughter ? ? ? Why does water run down a bath-tub drain in a counter-clockwise direction ? ? ? and if due to the rotation of the earth, then does it rotate clockwise in South America ? ? ? D. A. W. reported that "he is the fellow who always wears a broad happy smile and sits bear-headed, occasionally shaking his bushy mop of hair" . . . Just the animal in him coming out . . . Most pleasing to the eye it was to watch a fair young co-ed, Marion Johnson, daughter of the illustrious Dr. Nimrod J., her car caught in a slippery spot, get out of the car and delicately sprinkle sand under the front wheels.

\+ + +

Here's one for accountants:

Write the number 12345679, and select the integer which was written most poorly. Multiply the entire number by 9 times the faultiest digit, . . . and see how much practice you get. Bertil H. T. Lindquist once lost 50c in a beer dive . . . a drunk bet that he could tear a hole in a newspaper through which could be moved a full size horse . . . and did it . . . Bertil has found a real use for the *Daily* . . . he makes beautiful fans, with the aid of only a pocket knife, three mirrors, and his own native intelligence.

\+ + +

The Goodyear company is sending out traveling representatives to interview seniors in engineering, chemistry, and business. They are visiting 52 colleges and universities and will select a total of 75 men. It is our humble opinion that such effort, time and money are being spent not in an effort to get the best 75 men, but in a hope that when the rest of the men are executives (this means you), they will remember Goodyear when they are buying belting and such. And not a bad idea.

\+ + +

Dave Buck gives us this one:

A certain light about this school phoned the g-friend one evening inviting her over to play bridge. She refused for no apparent reason, but, after a bit of persuasion, admitted that she had just eaten a garlic sandwich and would prefer to stay home that evening. Upon his insisting she finally agreed that if he would eat a garlic sandwich when he came to get her, she would go. When she was dressing the doorbell rang, her father answered it, ushered a boy in, shuffled him into the kitchen, and handed him a garlic sandwich. The father being a dominating sort of person, the young fellow pitched into the sandwich without a question. A few minutes later the young lady came down to see the guy choking down the last bits of the s-wich, and discovered to her embarrassment that he was not the b-friend who had phoned.

\+ + +

Major Potts, invited to give a humorous after-dinner talk at the A.I.Ch.E. banquet, told two jokes, orated twenty minutes on the advantage of gas warfare and the new proposed chemical R.O.T.C. unit . . . some strategy . . . Plenty internal dissension at the *Daily* . . . Tau Bete bids are out . . . K. Ray, *Gopher* editor, was voted into membership into Phi Lambda Upsilon, honorary chemical fraternity, but being a busy man forgot to appear for the fall initiation ceremony . . . and so will not be a member until Spring . . . if he forgets that time, his golden opportunity will be gone forever . . . Ray, by the way, is one boy who made good . . . editor of *Gopher*, debate squad, and high scholarship . . . but somehow fails to get the esteem of his fellows . . . Watch closely the Progressive campus political party in the Spring elections . . . Dean Leland, asked to give a three-minute talk, no more, no less, rambled at length for fifteen . . . and had some difficulty in coming to the point . . . we, entrusted with the job of cutting off the long-winded, lacked the guts to call the halt, being as how he is who he is . . . The *Techno-Log* Round Table was moderately successful . . . new plans of procedure have speeded up production, increased efficieney on the mag.

\+ + +

Frank Leistiko made many an enemy by denouncing certain members of Pnyx political party because of their race. . . . Pnyx issued a statement that his views do not represent the views of the group.

\+ + +

As Doc Montonna puts it, in general that might be true in specific cases.

We Only Heard--

By Lee Whitson, M. E. '35

A departure from the conventional type of radio broadcasting antenna was made at station KOA, Denver, when a new vertical type of aerial was installed recently. Engineers expect to achieve a greater signal strength than was possible with the older type of horizontal aerial because a smaller amount of the electrical energy will be lost by radiating out into space.

The supporting tower is 470 feet high and tapers from 35 feet square at the base to two feet square at the top. It weighs fifty tons and is capable of withstanding the pressure of a 125 mile-an-hour wind.

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An unusual steel pier recently constructed on the Southern California coast facilitates the loading of bulk cement into ships at a point where there is no harbor. The pier, fabricated entirely by arc welding, extends one-half mile from the shore and supports two 12-inch pipe lines for cement, one 6-inch oil line, and one 3-inch water line. The structure contains over five miles of welding for which 22,000 pounds of electrodes were used.

\+ + +

Norbide, a recently developed material produced by combining boron and a high grade petroleum coke, is exceeded in hardness only by the diamond. It is replacing gems in many industrial applications such as wire-drawing dies and abrasives for shaping and forming other cutting tool materials. The high resistance of this new material to abrasion makes it particularly useful for sand-blasting nozzles. Norbide is resistant to acids and alkalies, and is capable of withstanding temperatures up to 1,832 degrees Fahrenheit and compressive pressures of 260,000 pounds per square inch.

\+ + +

A new 110,000-kilowatt turbo-generator soon to be installed in the River Rouge plant of the Ford Motor Company will be the largest in the world. It will operate at 1,200 pounds pressure and 900 degrees Fahrenheit.

The high pressure stage of the compound turbine will be located directly above the low pressure stage, and because of the high initial temperature, no reheating between stages will be required. The machine will operate at 1,800 r.p.m. and will exhaust under an absolute back pressure of one inch of mercury. Air coolers will recover the generator heat losses and return them to the feedwater.

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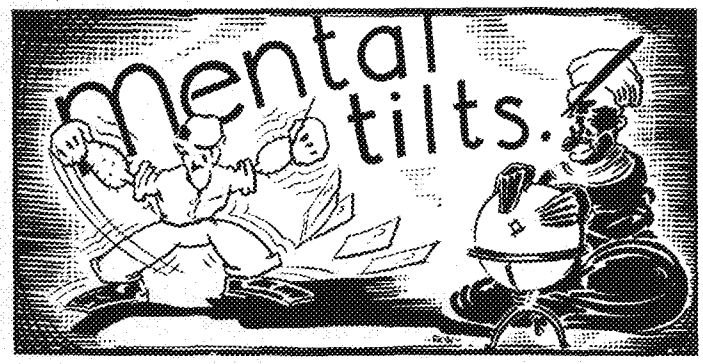
Solid carbon dioxide, commonly known as dry-ice and used to pack ice cream and other edibles, is being put to novel uses. A 6,500-pound rectangular steel tank was recently set on a flat foundation by lowering it onto blocks of dry-ice, sliding it into position, and allowing the ice to melt from under it.

Pulverized dry-ice, scattered from an airplane above the clouds, is alleged to have precipitated a copious rainfall in Germany. Farther experiments under the auspices of the Society for Dry-Ice Research are to be conducted in this method of rain making.



Last month's Tilts had the engineers stumped. Whatsamatta you guys? None of you turned in correct solutions. We only got two solutions anyway, and one of those was from a University College student, Charles Sage. Here's hoping you can do more with these.

Too Many Birthdays

The old professor is in a quandary. He remembered the other day that two of his illustrious relatives have birthdays coming in the near future but cannot recall which is what. He knows, however, that when he was born, his sister was ¼ as old as his mother. She is now ⅓ as old as his father. In 4 years he will be ¼ as old as his male elder. At present he is ¼ as old as the mater. Now, his trouble is that he can't recall which two have the same birthdays.

Money, Money, Money

After spending three sleepless nights tossing over monetary tempests resulting from befuddlement by Mr. Kent, who lectured on money in the Auditorium the other evening, one of the "Get Rich Quicks" in the office suddenly tore out like greased lightning on wheels. He ran all the way down to the Northwest Banco, and breathlessly informed the banker that if he could take out a $2,000 loan he would gladly pay him $50 per month for 60 months. What was the rate of interest, compounded monthly, seeing as how the banker accepted so readily?

How Big Is a G-Fruit?

We have an old fishbowl at home, parabolic in shape in order to fool the fish. Its shape conforms to the equation $x^2 = 4y$. One night some time ago, the folks being away, we decided to pull a fast one on one of the fish who has been noted for his Wimpyish appetite. We filled the bowl with water until the depth, including the fish was 5 inches. We tried to feed him a grapefruit but the ones we had were too big and the fish couldn't swallow them if they weren't all wet, so we sent one of the fellows over for one which, when dropped in, would be just covered with liquid. What size was the G-fruit?

Answers to February Tilts

A Fur-Lined Bowl?

The diameter of the ball was 6.20 inches.

Get the Postman

Only limits can be given because not enough conditions were furnished. The heights of the poles vary from 0 to 30 ft. for one, and 26 4 to 40 ft. for the other. The distance between has limits of 0 to 30 ft.

● ● ●

Here is the way the successful job-seeker figured. He knew that both the other men could see black spots on the others' forehead. Then he thought, "Suppose the spot on my head were white. The man on my left could then see one white and one black spot. *But*, he would know that the man *on my right* with a black spot, had tapped his foot. That would indicate that the man on the right could see a black spot, but since mine would be white he must see it on the man to the left. The man on the left would soon be able to reason that his own was black. Either of the men could reason in this way, but since neither did in ten minutes it is obvious that my spot is *not white*." He was right.

SOMETHING DIFFERENT IN CLASSES

The following concerns which have advertised regularly in the *Minnesota Techno-Log* are listed under eleven classes. If you take one letter from the name of each class in turn you can spell a word of eleven letters which is the name of a class that includes all the concerns listed on this page.

Here's how! Think of an eleven letter word which might apply to all of these concerns. Check and see if the first letter is in "TEA ROOMS," the second letter in "DRUG STORES," the third letter in "ENGRAVERS," and so forth.

If you can't find the solution ask a member of the *Techno-Log* staff. Show your friends and you'll be in a class all by yourself.

TEA ROOMS

MRS. HUSBANDS' TEA ROOM, 701 Washington Ave., S. E.
PAGODA TEA ROOM, 505 Washington Ave., S.E.
WALNUT INN, 315 Walnut St. S. E.

DRUG STORES

CAMPUS PHARMACY, 500 Washington Ave., S.E.

ENGRAVERS

THE WESTON CORPORATION, Lake and Dupont.

CAFES

BROWN JUG CAFE, 1303 Fourth St., S. E.
CAMPUS CAFE, 308 Oak St., S. E.
CARPENTER'S CAFE, 418 14th Ave., S. E.
COLLEGE CLUB, Oak and Washington, S. E.
COLLEGE INN RESTAURANT, 1320 4th St., S. E.
GOPHER CAFE, 315 14th Ave., S. E.
HASTY TASTY, Lake at Hennepin

PHOTOGRAPHERS

UNIVERSITY FOTO SHOP, Oak and Washington, S. E.

BOOKSTORES

ENGINEERS' BOOKSTORE, Main Engineering Bldg.

CLOTHING

STANDARD CLOTHING, 1407 University Ave., S. E.

PRINTERS AND STATIONERS

ACME PRINTING AND STATIONERY CO., 421 14th Ave., S. E.
THE COLWELL PRESS, INC., 405 South Sixth St.

JEWELERS

TORLEIF FIEVE, 319 14th Ave., S. E.
E. W. RUDD, 720 Washington Ave., S. E.

DRY CLEANERS

DAHLGREN CLEANERS, 714 Washington Ave., S. E.
DON'S KAMPUS KLEANERS, 1302½ 4th St., S. E.
VARSITY CLEANERS, 508 Washington Ave., S. E.
VERN SCHEI, 718 Washington Ave., S. E.

BOOKBINDERS

E. H. MILLER, 1326 Fourth St., S. E.

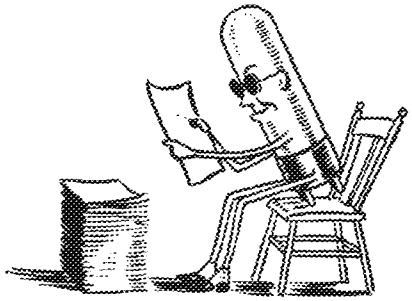
TRACE IT!

Tracing paper is a boon to the student draftsman. It saves time, for he can draw over a sketch already done. It is comparatively inexpensive, and he may use it freely.

What are the most desirable qualities in a tracing paper? First it must have transparency, for its principal use depends on that quality. Secondly, tracing paper should be strong enough to resist splitting, tearing, and folding. Even if a paper is very transparent, it is no good if it cannot withstand stretching, rendering, etc. Don't buy a cheaper paper even if it has good transparency, for it probably has poor wearing qualities.

●

G-E *Campus News*



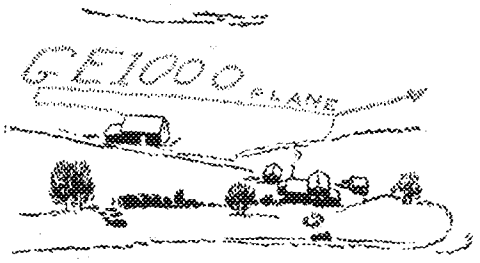
GLASSES FOR ELECTRIC EYES

Electric eyes are wearing colored glasses and doing a new job. As a result of strict NRA code requirements, the paper industry had to find a rigid means of classifying different qualities of paper. The Institute of Paper Chemistry found that as far as white book papers were concerned, the percentage of light they reflected was an indication of their quality.

The General Electric general engineering laboratory built the necessary device—an instrument which relies on the scrutiny of two phototubes in series to measure the coefficient of reflection. This is an exceedingly delicate task, as the matter of a small percentage of reflectivity determines the price and quality of a paper.

Here's where the glasses come in. To do certain jobs right, the electric eyes had to don different colored glass screens in the form of a filter and lens arrangement. It wasn't that they were getting old; they just needed a little assistance.

J. L. Michaelson, Northwest Missouri State Teachers College, '28, is G-E engineer in charge of building these instruments.



"GE-1000"

When, after a two-day search, a rescue plane finally located the lost transport plane which "mushed down" on a lonely Adirondack peak a couple of months ago, General Electric radio engineers rushed an emergency portable short-wave radio station into the mountain country to help in co-ordinating land and air rescue operations. The disabled ship was in the center of a wilderness, miles from the nearest means of communication. The radio expedition, however, managed to set up its equipment in a cabin at the end of a one-track automobile trail, only four miles from the scene of the mishap. There, designated as station "GE-1000" at the request of the airline operators, the equipment was used as an emergency unit in the airline's radio system. The General Electric engineers co-operated in communicating with the planes that guided the rescue parties toward the stranded fliers. They also helped send back news of the rescue, directly to owners of short-wave receiving sets, and through a rebroadcast by WGY, the General Electric station at Schenectady, to other listeners.

W. J. Purcell, chief engineer of WGY; W. R. David, U. of Kentucky, '19; E. H. Fritschel, Iowa State, '26; G. W. Fyler, Yale, '29; R. H. Williamson, Iowa State, '28; R. W. Orth, Minnesota, '30; G. M. Brown, Washington State, '29; and R. A. Lash, Ohio Northern, '29, comprised the General Electric radio expedition.

TURBINE BIOGRAPHY

A turbine can now write its own biography, with the aid of recording instruments recently developed in the General Electric general engineering laboratory.

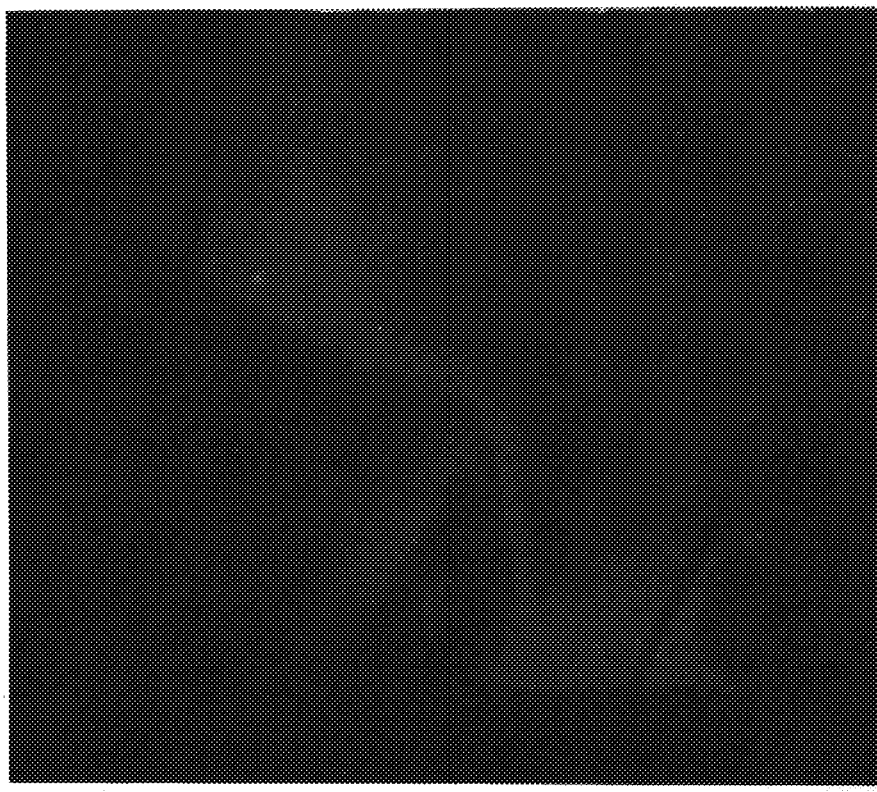
These sensitive devices were developed for the supervision of large turbines from a point remote from the scene of operation. The instruments measure and record shaft eccentricity, bearing vibration, shell expansion, and interference of rubbing or rotating parts. They provide the operator with an indication and a permanent record, on paper, of mechanical performance throughout the starting period and subsequent running time.

C. D. Greentree, Alabama Poly, '28; A. V. Mershon, Pratt Institute, '13; and M. S. Mead, Case School of Applied Science, '23, of the General Electric general engineering laboratory, worked on the instruments.

96-130DH

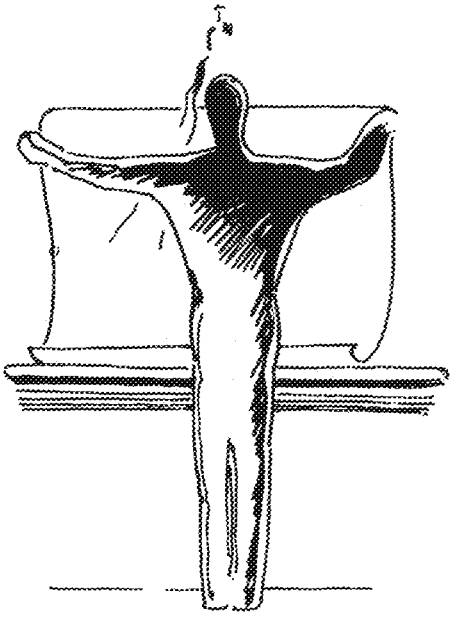
GENERAL ELECTRIC

The MINNESOTA TECHNO-LOG



APRIL 1935
Volume XV Number 7

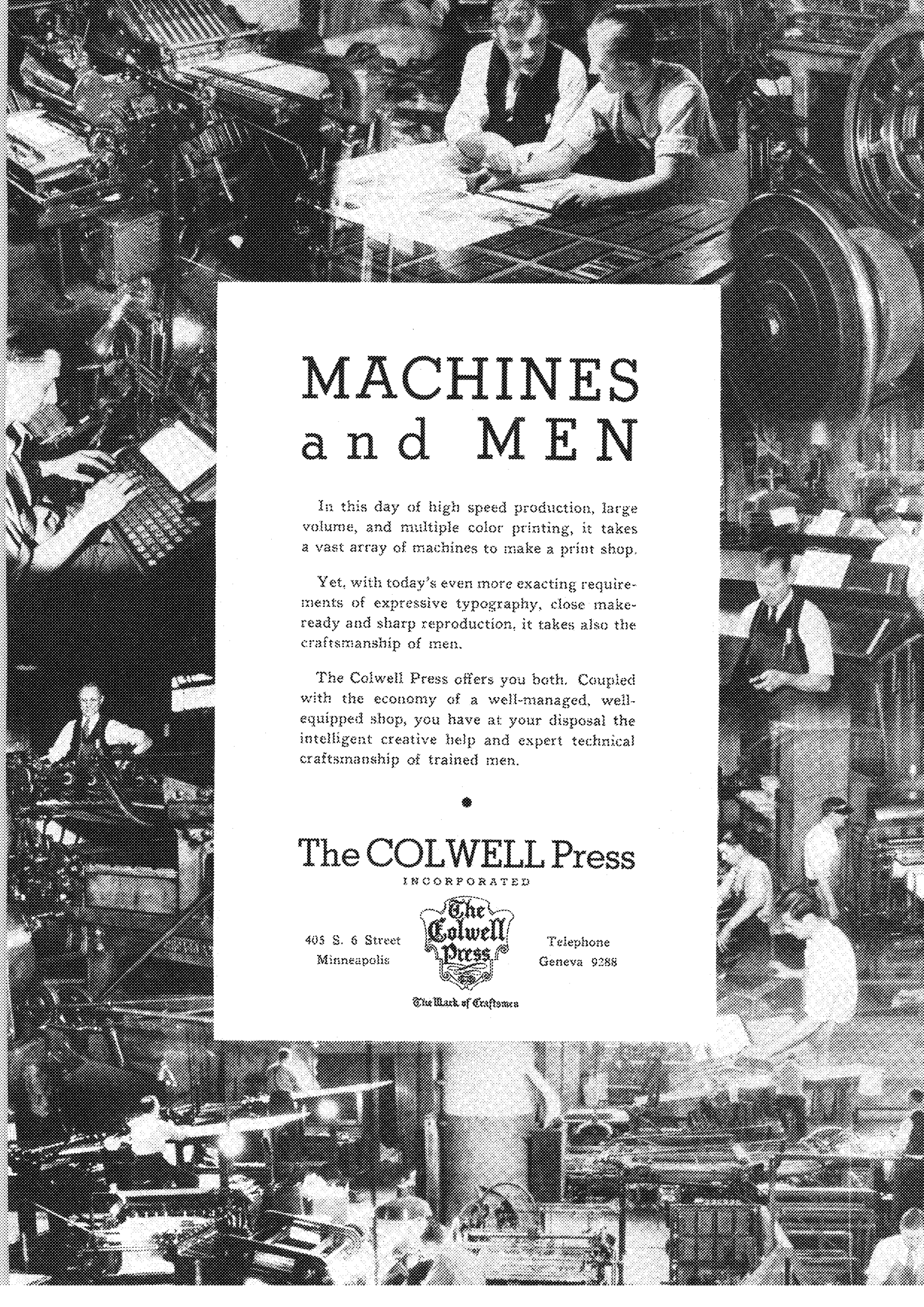
SINK SCENE



The young architect is wetting his paper. Next, he will paste it to his drawing board. Presently, it will dry stretched tight as a drum. The young man has no qualms about this treatment to the paper. Stretching is a common-place procedure, and the paper must withstand it and all the drawing, erasing, and rendering to come.

Good paper is tested for tensile strength, tearing strength, and folding. The erasing qualities are determined from the type of surface desired. It is a "clean" paper if the raw materials used in its manufacture are of the highest quality.

●



MACHINES and MEN

In this day of high speed production, large volume, and multiple color printing, it takes a vast array of machines to make a print shop.

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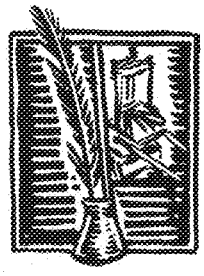

At The Desk

Probably many of you will recognize the cover picture. It was photographed by Harry Poague at the Minneapolis-Moline Power Implement Co. You can see that it is a scene from a steel mill. The molten metal is being poured from the large ladle which receives it from the furnace into smaller ladles, which will carry it to the molds. Those of you who have seen the operation know how the metal gleams and spits sparks. It is a spectacular sight, as you can see.

The frontispiece we borrowed from General Electric Review. It shows an installation of large d.c. motors driving a mine hoist. There are two 1500 hp. motors in the unit, and the hoist is of the double drum type. It is rather hard to get an idea of the size of the machines from the picture, but the steps on the base to the right may give you a clue.

Entered as second-class matter April 9, 1925, at the post office at Minneapolis, Minnesota, under the Act of March 3, 1879. Office, 37 Electrical Building, University of Minnesota. Telephone, Main 8377, Extension 514. Subscription rate, $1.50 a year. Single copies, 25 cents. Advertising rates upon application.

MINNESOTA TECHNO-LOG

37 ELECTRICAL BUILDING . . . U. of M.

APRIL, 1935

Eugene Price
MANAGING EDITOR

David Buck
BUSINESS MANAGER

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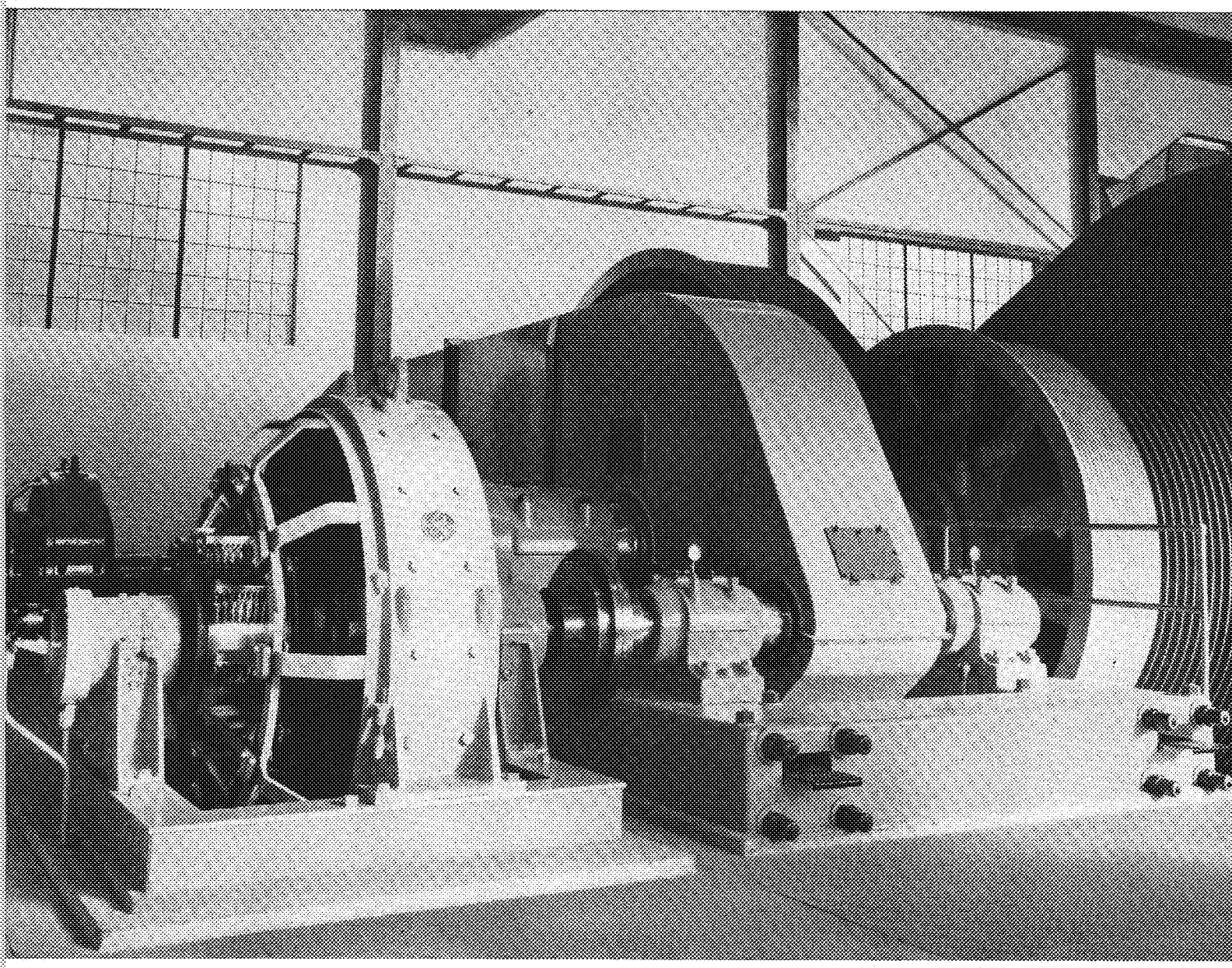
Volume XV **Number 7**

This Month



3000 Horses

air pilots conquer Winter Flying Dangers in far north

By WILLIAM BIRD, AERO E, '35

IN discussing the problem of winter flying, the average person might wonder why one flies in the winter when the temperatures and deep snow are seemingly so forbidding to the use of the airplane. But when we look into the question a little more thoroughly, we find that there is something to this winter flying business.

Perhaps the most logical place to turn in order to glean a little insight into winter operations is Canada. Tremendous mining developments are taking place from the Canadian National Railway up to the Arctic Ocean, from Quebec to British Columbia, and other than the dog team in winter and the canoe in summer, virtually the only means of transportation is the airplane. Although it might seem that the Canadian airline distances are comparatively short as compared to the network of airlines all over the United States, it might be of interest to compare the actual pounds of express carried in the two countries. In the U. S., there was carried a total of 1,884,540 pounds during the year of 1933. In Canada, for the year 1934, the total carried was 5,766,690 pounds. These figures give an indication of the tremendous activity of aviation in Canada. In addition, most of the Canadian flying is done in colder weather than the United States lines encounter.

Contrary to what one might think, winter flying is eagerly looked forward to by the operator as a means of increasing speeds and pay loads due to the discarding of the floats. In the summer months, most of the flying is done with floats owing to the absence of landing fields and the tremendous numbers of lakes, but after the freeze-up these cumbersome and unwieldy "seven league boots" are removed in favor of the smaller and lighter skis. In the winter, every open field and lake is a potential landing place for these airplanes and it is possible to slip in and out of lakes that would be almost suicidal for a landing and take-off with floats.

During the war, experiments were carried out in Canada and the Northern States, utilizing skis in place of wheels for landing on snow covered fields. From the long narrow ski the present day type of ski has evolved—a comparatively short but wide runner turned up slightly at the heel and quite considerably at the toe.

Metal skis have been tried and for the average sized airplane have been found to be rather unsatisfactory. The main reason is that after the airplane has been left standing in the snow in very cold weather for even a very few minutes, the snow sticks to the metal sole, making it so rough that take-offs are difficult and often impossible. Some similar trouble has been encountered with wood skis in slushy weather. Again, the metal ski has not the same flexibility that the wood ski has and in case of minor repairs, the wood ski is more easily serviced with the more or less makeshift methods that are available in case of a forced landing miles from the home base. The U. S. Army is experimenting with combination wheels and metal skis which seem to be giving good results although the combination would be of little use in conditions such as are found in Canada. Experiments are also being carried out with merely a slightly curved steel tube for a runner but this would appear to be unsatisfactory in deep snow. The type of ski used by most operators is of laminated wood, usually ash. Sometimes, two or three narrow brass strips are riveted to the sole, according to the operator's preference.

Built onto the ski is a pedestal into which fits the regular axle stub of the wheel undercarriage. There are several types of pedestals in use but the commonest is that built up of welded steel tubing. Another common type is built up of layers of wood bolted through the ski. Al Cheeseman, of South Polar fame, is the designer of a patented shock absorbing ski pedestal that is meeting with much favor among the operators of the heavier airplanes. The pedestal is mounted on the ski somewhat behind the center of pressure so that the ski will have a tendency to ride up onto the surface of the snow. The tail skid is usually fitted with a small ski, although for the lighter airplanes a common round nosed shovel is quite popular and inexpensive. So much for the construction of the skis.

OBVIOUSLY, the ski cannot be mounted on the axle stub and left to its own devices. Consequently, they must be suitably rigged to keep them in the proper position at all times. After much experimentation an approved rigging has been adopted as the most satisfactory for general use. It consists of a check cable on the toe and heel. The rear check is of such a length that the ski is held at a slight angle of attack when the airplane is in a normal flight position, the tension of the shock cord holding it in this position. A harness snap should be fastened at one end of the cord so that the tension can be taken off while not flying. The front check cable is quite slack so as to allow the ski to rotate vertically a short distance as when landing on rough surfaces, but not enough to let

the toe droop so low as to make the landing dangerous. If a rear ski is used it should be rigged at a considerable angle of attack, so that it will quickly come up to the surface of the snow or ride over any obstacle it may encounter.

IN preparing the airplane for winter flying, one must be prepared for temperatures as low as 70° below zero F which is by no means uncommon along the Mackenzie River Basin. Needless to say, a water cooled engine would be worse than useless under these conditions, although Prestone cooled engines have been used quite satisfactorily. The more common engines operating in the northern part of Canada are Hornets, Wasps, Whirlwinds, Gypsys, and Cirrus', all of which are air-cooled, and can be prepared to work properly even at these extreme temperatures. Any exposed oil lines should be well lagged with asbestos insulation as should the oil tank, and, with a wet sump motor, the crankcase. In any case, the motor should be more completely cowled, especially the crankcase. Carburetion is hard enough at these temperatures without handicapping it still more by using cold air from the slipstream. Hence it is advisable to change the intake so that the air is taken from inside the cowling rather than from the slipstream. Instruments such as venturis, etc., should be placed on or near the exhaust pipe so that they will not freeze or get plugged with flying snow. If the aircraft is a cabin type of airplane, it is advisable that the cabin be lined with some insulating material, and, always, the pilot's window should be equipped with some anti-frost device.

So much for the preparations. It might be well to turn our attention now to operation problems both from the standpoint of maintenance and of flying. If the aircraft is operating from a well-established base with permanent hangars, so much the better. However, in most cases, the operator has no fixed base and assuming that he has picked a base from which there will be a reasonable amount of flying done, it might be well to construct a "nose hangar" which is merely a small wood or metal shack, three sided, and with a heavy curtain across the front. The nose of the machine can be thrust into this hangar and the curtain draped closely around the cowling, forming a small workshop in which the mechanic may work on the engine without interference from the cold. In most nose hangars it is advisable to have the floor raised in order to provide accessibility to the engine, and, of course, a small heater is always in order, provided that there is no danger of a gasoline fire.

There is always the possibility that the airplane will be forced to spend the night away from its base and for this reason it is well to carry a tarpaulin of such a size that it can be draped over the engine and still be long enough to form a hood reaching to the ground. About the most popular type of heater is the ordinary plumber's fire pot, although it must be guarded because of its open flame.

As is the case with all airplanes left in the open, it must be tied down at night. Usually in the North, winter flying is done off the surface of a lake, and hence the easiest way to fasten the machine is to have poles frozen into the ice to which the airplane is tied. Another common method is to freeze sections of chain or rope into the ice and tie the airplane to these. When very high winds are expected, the machine should be turned down wind or else have the tail raised up in flying position, and securely tied. In some cases where the airplane is being left in the open for a considerable length of time, a snow wall is built around the machine high enough to spoil the lift of the wings. For an example of what can happen to an insecurely tied airplane, a well known incident happened on the First Byrd Antarctic Expedition in which a Fokker Super-Universal was wrecked beyond repair in a few seconds. If such an accident should befall the flier miles from his base or human habitation, his is a difficult position.

As for emergency equipment, it should be kept in mind that the pilot will often be away from his base for days at a time, and that the cabin of his machine will probably be the best living quarters he will have. Emergency rations, axe, snowshoes, plenty of matches, etc., should never be left behind. Besides these, every flier carries with him a good sleeping bag, which is merely a large eiderdown blanket so arranged that it can be buttoned along the side and bottom and which combines light weight with adequate protection from the coldest weather. An exhaust type of heater is excellent for heating the cabin of the airplane when in flight. Anyone who has done any flying in sub-zero weather fully realizes the necessity of good clothing and dresses accordingly with a heavy suit, warm gloves or mitts, mukluks—sort of glorified furlined moccasins which fit over the aviator's footwear and well up the leg—and, if the airplane is of the open cockpit type, a good face mask is indispensable. In selecting a mask, care should be taken to avoid too large a nose opening, and the bottom of the mask should have some means of fastening down so that it will not flap around in the draughts in the cockpit.

And now let us turn our attention to the actual flying. If at all possible the oil should be heated before putting it in the engine; in fact this is almost essential with a dry sump engine. In any case, the engine must be thoroughly warmed before any attempt is made to start it. This is most easily done by using the plumber's fire pot in conjunction with a chimney, for which a length of ordinary stovepipe is as good as anything. During this period, the motor and heater should be kept closely shrouded or cowled with the tarpaulin—due respect being paid to the fact that the tarpaulin is inflammable if it is too close to the heater. A fire-extinguisher of the Pyrene type should be kept handy in case there is a fire.

DURING this period, which usually takes well over an hour, the operator can be warming the engine oil. Since there is a tendency for the oil to decompose with the heat, it should not be warmed over an open flame, but, if at all possible, by setting the oil container in boiling water until ready for use. When the engine has been sufficiently warmed and the oil is ready, the oil should be poured into the tank or crankcase as quickly as possible and the engine started without delay. In sub-zero weather, if the engine does not start within ten minutes, it will in all probability be found necessary to go through the whole procedure again. It is hard to realize the speed with which an engine cools off in such low temperatures, but cases are on record where an interval of only a few minutes occurred between the time the oil was poured into the engine and when the drain plug was opened. The oil

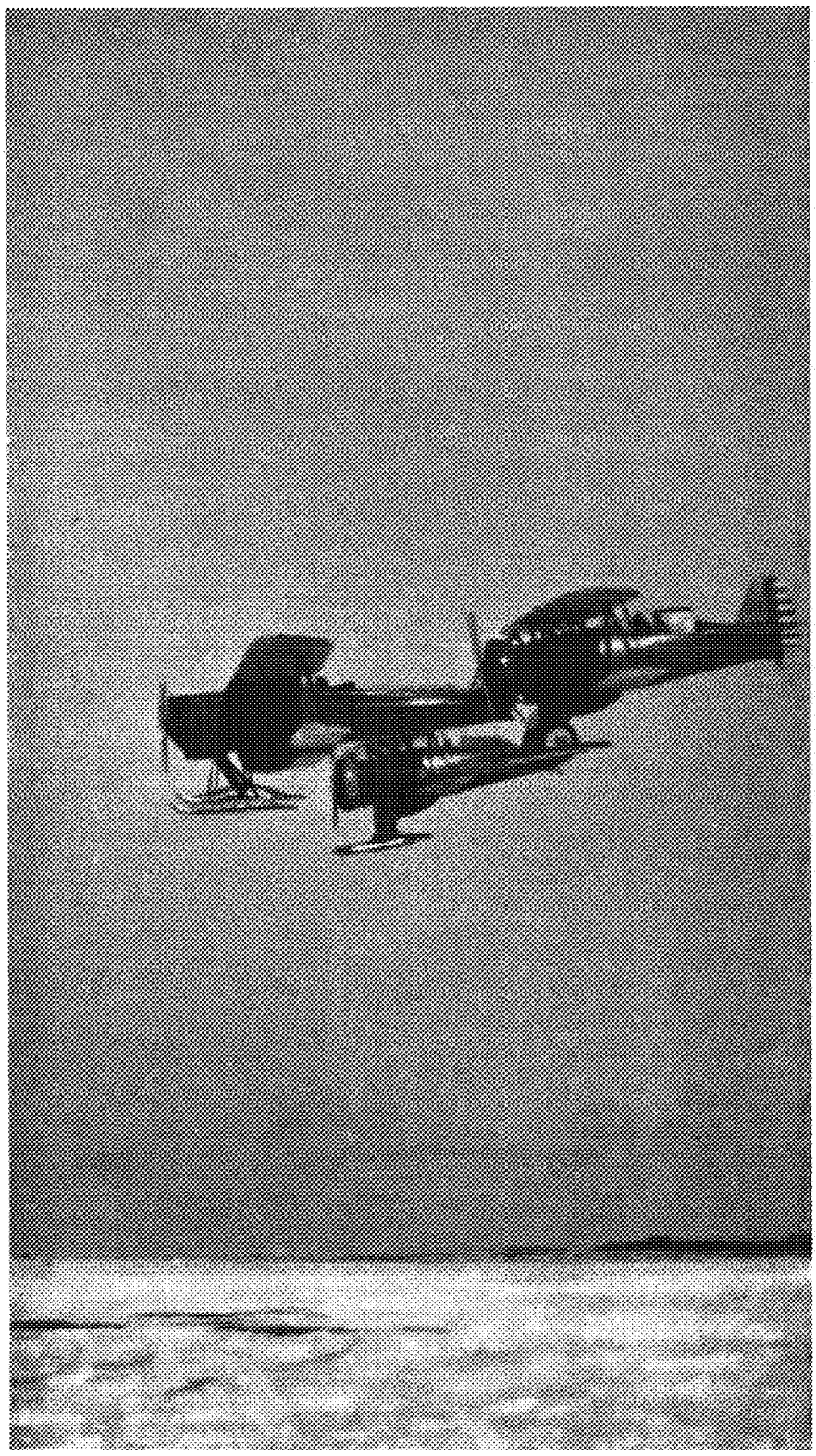
was so stiff by this time that it would not pour out of the crankcase. If this should happen, the plug must be closed and the heater applied for a somewhat longer time.

Assuming that the engine has been started, no time should be lost in taking off so that the engine will not cool off while idling. In taxying, short turns should be avoided in order that the axle stub will not be twisted off owing to the length of the ski. During the take-off the tail should be kept well down to avoid any possibility of a nose-over in the event that a soft or sticky patch of snow is encountered. Occasionally the pilot will have to take off in weather close to the freezing point or above it and in such cases, the snow will often be so sticky and soft that sufficient speed for the take-off cannot be obtained. A common method of overcoming this is to oil the sole of the ski with kerosene, and the operator usually has a board on which a piece of carpet or bundle of sacks are tacked, soaked with kerosene, and frozen into the ground. By merely taxying the airplane over this the ski is quickly and effectively oiled. Owing to the fact that the tail is well up, the airplane usually stalls off the ground, and it is advisable to level off just above the ground, if space permits until the airplane has gained sufficient speed to climb.

If one has had the experience of trying to land a seaplane on smooth glassy water, he will readily appreciate the difficulty of judging the height of the airplane over the water. The same problem is often present with ski planes over large expanses of snow under certain light conditions.

After the flight has been completed the pilot's first thought should be for his engine. The oil should be drained immediately while it is still warm, and if the weather is quite cold, it is often advisable to allow the engine to run for a short time so that it will not cool too quickly. When the oil has been drained the engine should be closely shrouded or otherwise protected from the cold and snow. If the airplane is going to be down for some time, fastening down must not be neglected and when the wind is likely to be particularly high it is advisable that the control surfaces be fastened so that they do not swing in the wind and suffer damage.

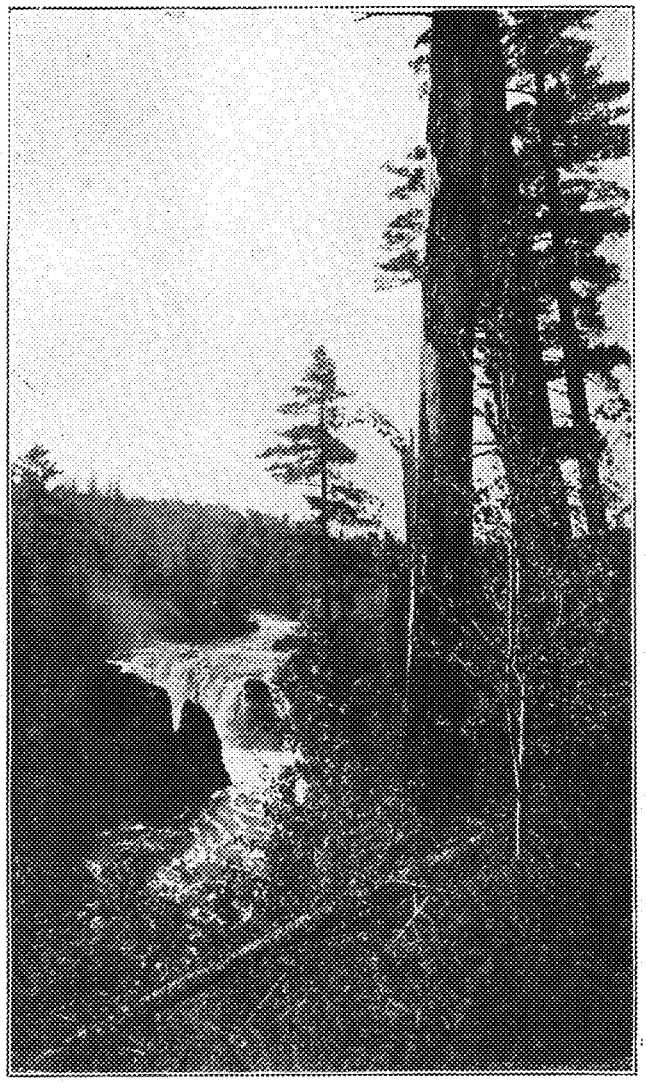
During the breakup period flying necessarily is at a standstill since the snow is too soft and sticky for take-offs and landings and there is still too much ice on the lakes for pontoons. Needless to say, wheels are almost worse than useless when the snow is over a few inches in thickness and the danger of a nose-over is great. In certain cases where flying is an absolute necessity, such as a mercy flight, a stunt that has proved successful more than once is to lay down a runway of planks which have been well greased. The airplane can generally gain sufficient speed to make the takeoff. A ski landing can be made on bare ground without too great danger of a nose-over, provided the pilot is skillful enough, but needless to say, this is not recommended as everyday practice.



—*Sportsman Pilot*

C. C. C. Rebuilds Shattered Forests

By STEVE GADLER, E. E. '32



NAPOLEON once said, "Give me men that are 18 years of age and I will storm the gates of Hell." President Roosevelt, no doubt, had this quotation in mind when he created the Civilian Conservation Corps, an army of young men whose ages range from 18 to 25, to tackle a job almost as hard as that stated by the famous warrior.

Before we go into details about this difficult job let us turn the pages of time back to our grade school days. Recall from among faint memories your geography lessons. "Elmer," the teacher would say, "name the most important industries in the United States." Of course, Elmer had not studied his lesson but Alice Jane would wave her hand and, when called upon to recite would name three or four industries with lumbering among the first mentioned.

Yes, we do recall and remember from our geography that lumbering was the chief industry of the country and of Minnesota. But today, due to the fact that our forests were depleted and never replaced, lumbering as an industry has almost disappeared.

We will confine ourselves in this article to the forestry engineering phase of the work which is being done by the C.C.C. The making of truck trails, fire towers, bridges, land surveys, dams, and communications are projects which cannot be dispensed with as aids in the management of our forests.

The truck trails in our forests are usually laid out and located by engineers with one eye on the serviceability of the trail for forest management and the other to cost and esthetic value. One can readily understand that truck trail construction is a problem that must be worked out in the field and not at a desk with a slip stick. The greatest amount of skill is needed in truck trail locating work. A swamp must be dodged here, a steep climb missed there, a fill and cut to be avoided, and, in addition, the shortest possible route must be found. In other words, a truck trail locator in forestry work is an expert in that work and comes by his art only from a great amount of experience in the field.

Bridges that are necessary for truck trails are made from the timber cut on the trail right-of-way. These bridges are made in rustic forest design so that they enhance the beauty of the natural surroundings. Here, too, the builder and designer must watch cost and at the same time make his bridges serviceable.

Telephonic communication is a very important part of forestry work which cannot be dispensed with in the well managed forest. The forests in Minnesota cover thousands of acres of land which must be patrolled at all seasons of the year and especially during the fire seasons. Telephones located at strategic points facilitate a smooth functioning organization to combat fires. Modern communications engineers would be baffled with the problem of phone installation for forest patrol purposes, not because the problem is complex or intricate, but due to the fact that, although it is relatively simple, it varies greatly from the problems that are encountered in all other communications fields. The grounded and the two-wire metallic systems are used almost entirely in the forests. This vital asset cannot be done justice in a short article but we must tell of an experience encountered by one of the knights of St. Pat.

A new telephone line had been completed and when the line was put in operation it was found to be "dead." An inspection was made of the new line and it was discovered that a ten foot section of the line had been cut out and a balsam pole inserted in place of the wire. The guilty party was found and when questioned about the destruction of

government property stated, "I needed the wire to repair my Ford and besides it's a helluva poor forester that can't make his voice carry through ten feet of balsam."

Fire tower construction and location is a very important part of the work that is being carried on in the forest regions. With towers properly located, fires are detected almost immediately by the tower guard. The locations of tower sites are very important and in this work the site chosen for the tower must give the best possible view of the given area to be serviced by that tower.

Cuts on these pages courtesy Minnesota State Forestry Div.

All towers which are being installed in our forests are of steel construction with cement foundations and are equipped with telephones and in some instances with short wave radios.

A forest tower of early days appears in one of the illustrations and by comparing it with one of the modern towers one can readily understand the progress that has been made possible by men who have devoted their lives to forestry work.

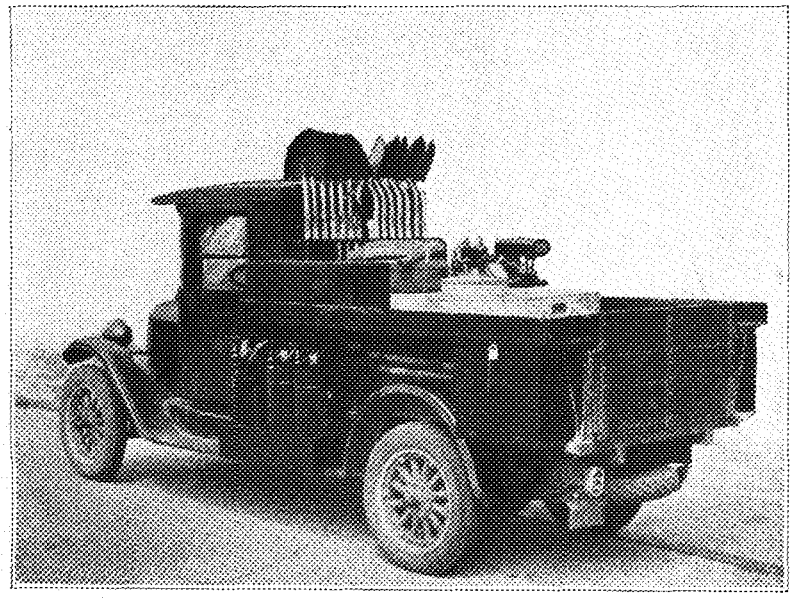
If by any chance you are interested in honor societies you also can be initiated into the "Loyal, Royal, and Ancient Order of Squirrels." The only requirements are that you be careful with fire in the woods and climb one of many towers maintained by the state of Minnesota.

About the time that the Civil War was over, a land survey of this state and other states in this region was proposed and after some delays the survey was finally organized in 1870.

A great mistake was made by those in charge of these government surveys when they let the contracts for the land survey. The system of land survey used brought out many evils such as faulty measurements, misplaced corner monuments, and in many cases monuments not placed. Field work was not done and field notes were made up in the office. All corner monuments placed were made of wood and four trees were marked and so noted in the field notes. Because of logging operations, fires, and decay most of these corner monuments of the original survey have been destroyed or lost. Today one of the great field projects in our forests is to set up a good system of permanent legal corners or monuments.

An engineering graduate (class of '31 C.E.) who has recently been promoted to the position of camp superintendent was conducting a group of visitors over the work completed in his work area. It so happened that one of the visitors noticed a peculiarly shaped curve that had been put in a recently completed truck trail. "What," he inquired, "is the reason for this curve?" The disciple of St. Pat, and we may add now also of Paul Bunyan (foresters' patron saint), pointed to a nearby hill which had been fluted by erosion and said, "Years ago, before the forests were logged off, the erosion which you see could not have happened, but when the forests were logged off, denuding the land of its soil-retaining trees, heavy rains washed the soil from that hill into what was once a beautiful lake. The result is a treacherous mud hole."

(Please turn to page 146)



Steve Cadler, the author, during the school years 1930-31 and 1931-32 was Business Manager of the Techno-Log. He is now engineer at a CCC camp located at Brimson, so he knows whereof he speaks. Steve seems to intend to get into both sides of the publication game: first business manager, then an author.

The modern forest fire-truck pictured at the left could not be used, were it not for the roads laid out and constructed by engineers for the Forestry Division.

This discussion logically takes us to soil erosion and water conservation, two very important forestry projects which cannot be dealt with at this time but suffice to say that at the present great strides are being taken to prevent the waste of land by proper erosion control.

Engineers are needed today in forestry work who can and will develop a broad understanding of conservation in all of its phases, men who are not afraid to tackle either the slide rule or the shovel.

Probably some of our foremost educators realize that a new field is opening for engineers in our forests and it seems very probable that in the near future some of our institutions of higher learning will feature a new course in forestry engineering.

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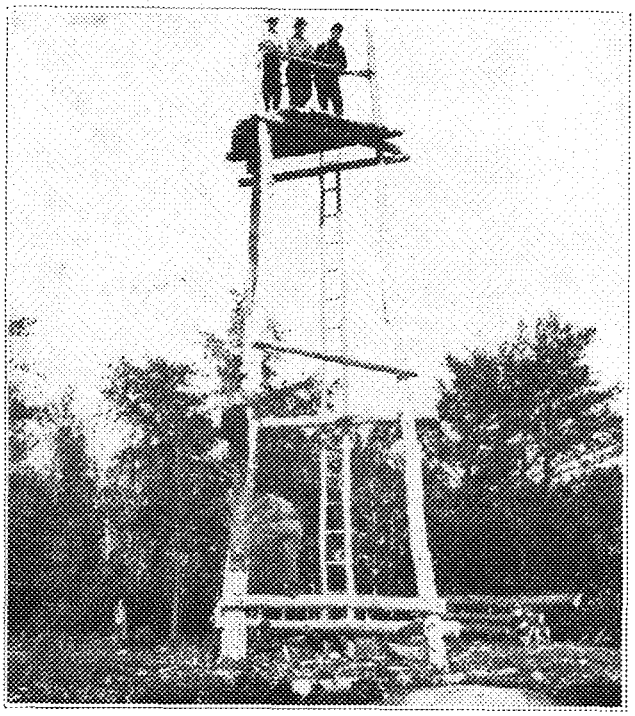

Steel forest towers have replaced old wooden structures like the one at the right.

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About Noises and Engineering

By Roderick William Siler

Assistant Professor of Mathematics

PROFESSORS are popularly regarded, the world over, as men burdened with remarkable theories. That seems one trouble with the New Deal. Now one of my pet theories is that there is too much noise in the world, and that the engineers ought to get busy and do something about it.

It is a rather startling fact, when one stops to consider, that until the coming of what we may call modern engineering the world was comparatively quiet. For Heaven only knows how long, the earth whirled through space and about its axis like a well oiled machine, making hardly a sound. A century ago it began to tune up, with the puffing of steam engines and the tooting of steam whistles. Since then there has been a steadily increasing volume of noise, up to the present, which I think is undoubtedly the climax in world uproar.

I don't want to seem too critical here. Progress must continue. But I would like to know just how much noise men can stand, and just how much they are going to get. This question ought to be of interest to philosophers and psychologists as well as engineers. Of course, someone might suggest that if we have lost the quietness of the world of a century ago we have also lost the smells that accompanied it, and that too much sound is better than too much smell. I am not so sure about that. What makes me doubtful is thought of the stockyards in Chicago when I was a boy. I lived several miles from the district where hogs were changed to pork, but when the wind came from the northwest the stockyards came to us with it. But this I also remember: that if the northwest wind lasted a few hours we gradually became indifferent to the stockyards in the air. The first hour we suffered greatly. The second hour the suffering diminished, and many people quit holding their noses. In the third hour the pain ceased entirely. Had the *odeur de stockyards* lasted forever afterwards we would have been unconscious of it. And really I doubt if the odor, rich as it was, would have done anyone the least harm.

But continuous assault upon the hearing is another matter. Men, like animals, are the progeny of numberless generations of ancestors who existed in a world where the only sounds were produced by the trees, the wind, the surge and fall of water, the occasional voices of other creatures. This to a modern man would sound like the Garden of Eden, but it was commonplace once upon a time. What our ancestors saw, felt, smelled and tasted was enough to make one of us faint, but what they escaped was a surplus of sound. In other words, from the time of Adam to the year 1800 a man could retire to his cave, his hut, his shanty, his cottage, shut the front door and commune with himself in peace and quiet. Always was there a place in which he could think and he could sleep, both of which were necessary if he expected to remain fairly sane. Even war, previous to the use of gunpowder, was carried on in comparative quiet. Crecy, Poitiers, Agincourt, that Tours where Charles Martel upset the Saracens, all great battles of modern Europe, were fought to the subdued sound accompaniment of the thud of hoofs, shouts of the combatants, and thump

of arms on armor; and any one of these battles, carried on half a mile from one of our modern city streets, would be unheard on that street. We kick up more noise in times of what we call peace than the ancients did in war.

Now because its background of silence has been too long for the human race ever to escape it, and because men are emotionally stirred more by hearing than by any other sense, and because during Easter vacation week I heard a certain popular song come via radio one hundred and twenty-three (123) times by actual count—because of all this I do firmly believe, hold, and herewith solemnly declare, that too much banging on the eardrums upsets the human stomach, hardens the arteries, shatters the nerves, scrambles the brain. In other words, unless the engineers do something to diminish our noises I believe we will all eventually become crazy. There are indications of such a trend today. The problem, as I present it, may appear too much of a philosophical-psychological-pedagogical one for some persons. Profs always were more or less crazy, they may say, and it wasn't noise that made them so. Well, perhaps. But I do hope some engineer will find out before long how to produce radios which cannot carry beyond the walls of the apartments, houses, restaurants, ten-cent stores, etc., etc., in which they are installed.

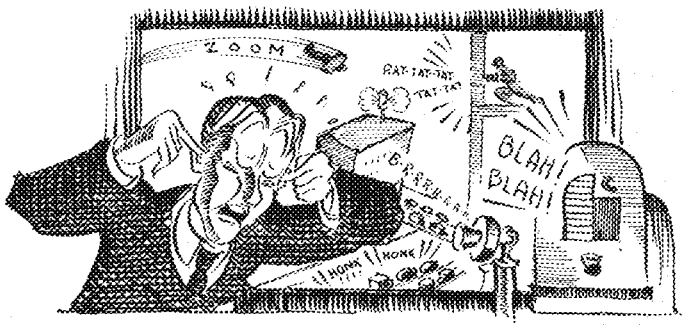
I WAS interested in reading, not long ago, the statement of a prominent Frenchman listing the necessary qualifications of a successful engineer in this order: character, intellect, scientific foundation, knowledge of men, knowledge of engineering. This statement as it stands is all I know of the gentleman's remarks, and whether or how he explained his list I have never heard. But as it appears the list is interesting, and may be surprising to some.

Notice the knowledge of engineering put fifth. And this, not for the student, but for a practicing engineer. The entire sense of this order of engineering qualities is to indicate that before a man can be an engineer he must be an individual with certain characteristics which make him a distinct asset in human society. I think it must be generally admitted that the engineering profession is of all callings the one in which a man who is entirely self centered and indifferent to human welfare is out of place. The character of engineering work, itself, almost forces this to be the case. Beyond any other profession is it true of engineering that defects in the practice of it are evident. Dealing ultimately with material, with inanimate things quite insensible to soft words or clever excuses, the results of engineering are there for everyone to see. Thus the engineer must constantly give tangible, physical, recognizable proofs of what he can do. In no other calling is there so general an agreement on what constitutes good practice as regards any definite problem as in engineering. In medicine, in law, in teaching, even in theology, there seems never a professional problem to arise which does not offer at least two solutions, and both of them ably supported. And if in this respect the engineer's problems are simpler, in that there is usually one best way, it is because the results of his solutions are so completely evident. Appallingly so if he happens to produce the wrong answer.

It might then be asked, if this is all true, why should knowledge of engineering not be placed first on the list of qualifications. I imagine that the man giving this list, when speaking of a "successful engineer," meant an engineer who had reached some degree of preeminence in the profession. However, letting this pass for a moment, is it not true that for lesser engineers, for younger engineers hoping some day to be preeminent—is it not true, even here, that professional knowledge should remain fifth in the list? It seems to me so, because completeness and thoroughness of knowledge of any profession cannot come without effort, determination, stamina. That, I take it, is what is meant by the item "character." And following that there should be a certain degree of natural mental ability, intellect. Certainly in as highly competitive a world as the present there is no reason or profit in bringing into the professions men who are devoid of intellect. Yet even here, compared with intellect, character holds first place. A mind which is never exerted will never gain much professional knowledge. If one thing is clear in this world it is that men with the greatest native ability are by no means always the most successful in later life. Character is the deciding factor. This may be one of the tragedies of human existence or one of the blessings. It's all in the way you look at it.

For the man defined as the "successful engineer," the pre-eminent engineer, the list, as it stands, is even more nearly correct. The *degree* of thoroughness of professional knowledge now becomes important. And a pre-eminent degree means more of character, more of intellect. But there are items 3 and 4: scientific foundation and knowledge of men. Here is included the background necessary to a leader in any profession. The scientific foundation is requisite in the first class engineer because engineering is nothing more nor less than applied science, and to apply a thing one must know something about it. The knowledge of men is necessary because engineering is primarily human and social. The practice of it calls for a knowledge of what men can do, will do, and want to do.

It seems to me that this list as given should be of immense interest to an engineering student as guiding his



Gordon Schlichting

efforts in college. I am inclined to think that if he have in fair degree the first four items by the time he graduates, he can let the fifth, professional knowledge, take care of itself. He will get that in practice. Certainly he cannot get it in college. No school ever turned a student out an engineer. At the most it simply prepares him to become one. And it is worth noting that a satisfactory rating in the first four items does more than provide the greatest assurance of success in engineering. There is hardly a calling that can be named where such a rating is not effective and vital. Thus a man's opportunities for later success are tremendously increased, because of the broadening of the field of work he can enter.

The Minnesota
TECHNO-LOG

EUGENE PRICE
Managing Editor

DAVID BUCK
Business Manager

St. Pat's Day

St. Pat, that venerable old patron saint of all good engineers, will emerge from his mysterious hiding place on May 17 to tread this engineering campus on his annual tour to reward with success the deserving engineers and dispatch his monkey to sit on the bedposts of those who win his ill wishes.

Engineers' Day is the day on which we give the outside world a glimpse of the work we do in Engineering College. It is our chance to show the world that we really learn something here. We can show them the latest engineering achievements and our own originality. It is a chance for all departments to cooperate with each other in friendly competition. It is an opportunity for freshmen and sophomores to outdo the "big shot" seniors. Let's forget our studies for a few days and put Minnesota's engineering college on the map.

The program for the day begins at nine o'clock in the morning with the open house which lasts until five in the afternoon. For the open house each department presents a display or exhibition typical of its own field. All the laboratories will be open and experiments run for the visitors to see. The parade is scheduled for eleven a.m. The departments, math classes, various clubs and societies will compete for the prizes offered for the winning float. One prize will be offered for the best float showing engineering accomplishments and another for the funniest float. The knighting ceremony on the knoll will begin immediately after the parade. All graduating seniors will kiss the blarney stone and be knighted by St. Pat. After the knighting ceremony the visiting alumni will be luncheon guests at their fraternities. At three in the afternoon, everyone will hurry to the Dansant and Green Tea to be held on the third floor of the Main Engineering building. There they will dance to the same orchestra whose perfect rhythm will be heard at the Brawl in the Union Ballroom in the evening. The ball will begin at nine and continue until one a.m.

Get ready, loyal engineers, and prepare for a big holiday one that you can brag about to your grandchildren.

—Jack Intlekofer

Paragraphs

It is now pretty well established that the "Peace Strike" was called, not in the interests of world peace, but to further the cause of communist activities. It is too bad that so large a number of honest peace-seekers were drawn into the demonstration.

— — —

Why doesn't the publicist think of some other way to advertise the University Theater besides near-futile efforts to locate some elusive prop? We are becoming tired of the never-ending search for hand-organs, and other necessities.

— — —

The public utility holding company bill, known as the Rayburn holding company bill, will bear close investigation. Public utility regulation is a subject which vitally affects all engineers. Both sides in the discussion are turning out propaganda by the ream. Opinions of the press range all the way from wild approval to contemptuous condemnation. Gleaning the truth behind the fireworks will be difficult but profitable.

Rules for Failure

1. Never do anything you are not paid to do.

2. Don't be thorough in your work. "Good enough" is a fine slogan to hang up and remember.

3. Pity yourself. Believe in luck alone. Remember that when you were born you did not have the chances that John D. Rockefeller, Jr., fell heir to.

4. Don't stick to anything too long. Something else may be easier.

5. Remember nothing matters except what you do during working hours. How you spend your leisure is nobody's business but your own.

6. Wait until you are making big money before you begin to save regularly. Then you will be pretty sure to die poor.

7. Either have no sense of humor at all, or inversely, try never to be serious at any time.

—*Dr. Frank Crane*

Reprinted from the *Nebraska Blue Print.*

Now Here's A Book

By Clifford I. Haga

INSTRUCTOR IN ENGLISH

IN selecting "Of Time and the River," by Thomas Wolfe, for review this month, I am keeping my fingers crossed.

One reason for my caution is the infectious hyperbole and superabundance of the book, both in style and in matter, and another is the sheer magnitude of the whole work of which this volume is only one part, the second installment of a novel which will run—when Wolfe's plan is completed—to six mighty books. Its excesses overwhelm the reader and he finishes stunned, gasping, his head awhirl and his hands atremble, wondering "Is this the novel its author will have me believe it? Is this huge book the triumph of observation and analysis which sympathy for the author's furious ambition tempts me to call it?" It is hard to say; but for my part the answer is more "Yes" than "No."

Let us first get rid of possible (and, on the whole, reasonable) objections. They can be disposed of with the frank and bold admission that by the conventional standards of novel writing there is much reason for just complaint—and then one can as boldly shrug off the damage this admission causes by saying, "What of it? 'Of Time and the River' is still a great book." The average "gentle reader" will find three things to object to: the style, the structure, the point of view. The style is a tornado, a tumult, a creation all nerves, the structure is riddled and racked by the strain of housing that tumult, and the point of view is such as to bring forth with a bitter, dainty fondness, many observations which in literature are rarely expressed with the short and simple, coarse precision of our everyday speech. Not every reader likes to hurdle, on an average, five adjectives before sinking his teeth in the noun; and when these rampant adjectives rage with superlative force, he is likely to be somewhat battered and worn before he is through. Not every reader cares to plunge into an uncharted land—no matter how promising—with no other hope than dead reckoning to see him through. And even fewer are the readers whose relish for the vigor of Anglo-Saxon is robust enough for them to enjoy its more lurid precisions when they explode at him from the printed page.

But there remain a few readers who willingly take all that in their stride and finish even such an orgy as "Of Time and the River" with minds stimulated and spirits quickened by the tussle with the richness, the uneven richness, of it all. Briefly, the story is that of a certain Eugene Gant, small town youth just out of the state university, in the years 1920 to 1925 as he plows and thunders his berserk path through Harvard, home, New York, England, and France—all the while piteously torn by a raging desire for integration, for an understanding of himself, his people, his homeland. As the book closes, we are returning with him from France where his homesick heart, out of its yearnings and its despairs, has created a symbol and a hope which is America—his land, his people, his future. The test of the novel is the degree to which the reader co-operates with Gant in his quest, in his consequent despair, and in his final hope. I find all these credibly represented as of that order of magnitude Wolfe assigns them. Much can be forgiven such creatures as Eugene Gant, much that would otherwise be fatuous exaggeration, when they claim as a necessary human right and obligation that life should refuse them no opportunity to test their strength and their weakness. Because of that sympathy which I feel for the author working through the fiction of his chief character, I find "Of Time and the River" a book well worth recommending—though with my fingers crossed.

Alumni Notes

ONE of the thousand Minnesota men, now in Chicago, is Sheridan E. Farin, C.E., '31, working in the District 10 office for the Division of Management, B. P. R. He reviews plans, — contracts — estimates — special provisions, etc., and gets into the field in construction occasionally. Married, and has a baby daughter, one year old.

From Roy F. Warner, C. E. '32, comes news of a number of other graduates. They are on the Engineers' Corps for the Iowa Institute of Hydraulics Research, in Iowa City. Among them are Martin Nelson, director, C. E., '24; Donald Anderson, C.E., '31; Marvin Webster, AeroE, '31; Fred Brockman, C.E., '32. Their work is hydraulic research on rivers, locks, and dams.

More work on dams is being done by Kenneth W. Pederson, C.E., '32, in the Water Conservation division of the SERA in St. Paul. He is making topographic surveys of proposed dam sites and water diversion projects thruout the state; at Worthington, Luverne, Morris, Hancock, Wananingo, Lake Chisago, and Lac Qui Parle Lake.

A past president of the ASME, Norbert Sternal, M.E., '34, has a job in St. Paul with the Minnesota Mining and Mfg. Co., testing sandpaper.

Herman M. Frenzel, '26 Arch., 450 Fuller Avenue, St. Paul, is listed among forty honorable mention winners in the Home Electrical Architectural competition conducted by the General Electric company in co-operation with the Federal Housing Administration. Mr. Frenzel received a cash award of $100. Several students and alumni were among the two thousand who submitted plans in the contest which opened January 1 and continued for ten weeks.

Also in Chicago is John E. Hoving, C. E., '27, service engineer for the Standard Equipment Co. He has charge of the railway supplies and equipment.

Some '34 news. Bert Getsug, M. E. works at Brown Sheet Iron and Steel Co. designing heating and ventilating equipment. We find Thor Anderson, M.E., with the C.C.C. at Marais, Minn.; and from the state of the sun kissed maideus we receive word from Ed. Kells, Aero.E., who is doing graduate work at California Tech. Perhaps Ed can give the boys a bit of advice on how to study during the warm romantic spring nights that are creeping upon us. Remember how Arthur Hanson, M.E., just couldn't satisfy his craving for ice cream? We're not one bit surprised when we discover that he's working for the Ower-Super Mix Ice Cream Company.

Speaking of romantic spring, we recently received word of these marriages during spring. Fred Teske, Jr., C.E., '27, married Minnette Crouch, Home Ec. '26. Others hitched were Homer D. Thomas, M.E., '33, 865 5th Ave., S.E., Rochester, Minn. Oswald J. Wiggins, M.E., '31, 1629 6th St. S. E., Mpls., married April, 1934; Gordon Small, '31, E.E., 2162A, North 63 Street, Wauwatosa, Wis., was married to Miss Dolores Joyce in June last year; W. F. Soules, '31, E.E., 3549 36th Avenue So., Minneapolis, was also married in June; Roland W. Stocke, '31 Civil, married Helen Morton, '31.

For 37 years, Truman Hibbard, '97, E.E., 4816 Penn Avenue S., Mpls., has been employed by Elec. Mach. Mfg. Co. A fine record, and we hope many future graduates will be able to emulate it. From a still older Grad, J. O. Morris, M.E., '88, comes information on his retirement: also the fact that he is still consulting engineer with Robertson Centripetal Wheel Co.

From the channel project now under way at Winona, Minn., comes news from Clarence E. Johnson, C., '32, Surveyman U. S. Engrs. Lock 5A. Mr. Johnson says that "practically the whole '32 class of Civils are working on the 9 foot channel."

On the Minnesota Highway Department is E. A. Hanerski, C.E., '33, 1135 6th Street N. E., Minneapolis. Albin F. Larson, '14, Ch., 40 W. Mason Ave., Chicago, has returned to work for the Board of Education, City of Chicago.

A Minnesotan, Walter Clarence Beckjord, '09, E.E., has been listed by the financial editor of the New York Evening Journal as one of the two top-ranking operating men in the gas industry. This fall, Mr. Beckjord was appointed vice-president and general manager of the Columbia Gas and Electric Corporation, New York. Mr. Beckjord has had a varied and interesting career. He was the first to finish the course offered in the cadet engineering corps of the St. Paul Gas Light Co.; left there in 1916 to go with the Madison, Wisconsin, Gas & Electric Co. as general superintendent. He stayed there a very short time, becoming an assistant engineer with the larger American Light & Traction Co. He operated a coal mine in Kentucky in 1917 and 1918, and in 1922, was promoted to chief engineer of the American Light & Traction. Four years later, he became a vice president and director. In 1930 Mr. Beckjord went to the Boston Consolidated Gas Co., where he was vice-president, a position he left to join Columbia.

WE were much surprised, and greatly pleased the other day to receive a communication from Tom Rogers, M.E. '34, and former business manager of the *Techno-Log*. Tom was manager two years ago, and went from there to business manager of the *Ski-U-Mah*. His capabilities must have been bruited about, because he was here only a few months when he received, and accepted, a fine offer from G. E. Tom wrote copy for them till the recent February 15, and then came down to New York to work for McGraw-Hill Publishing Co., on the business staff of *Product Engineering*. Tom is acting in the capacity of advertising manager, and, since they're running about 50 pages of ads a month, is kept more than slightly busy. He can be reached at 144 Columbia Heights, Brooklyn, and as he says the big city is rather "lonely", we imagine he would appreciate a line or two.

Art And Architecture

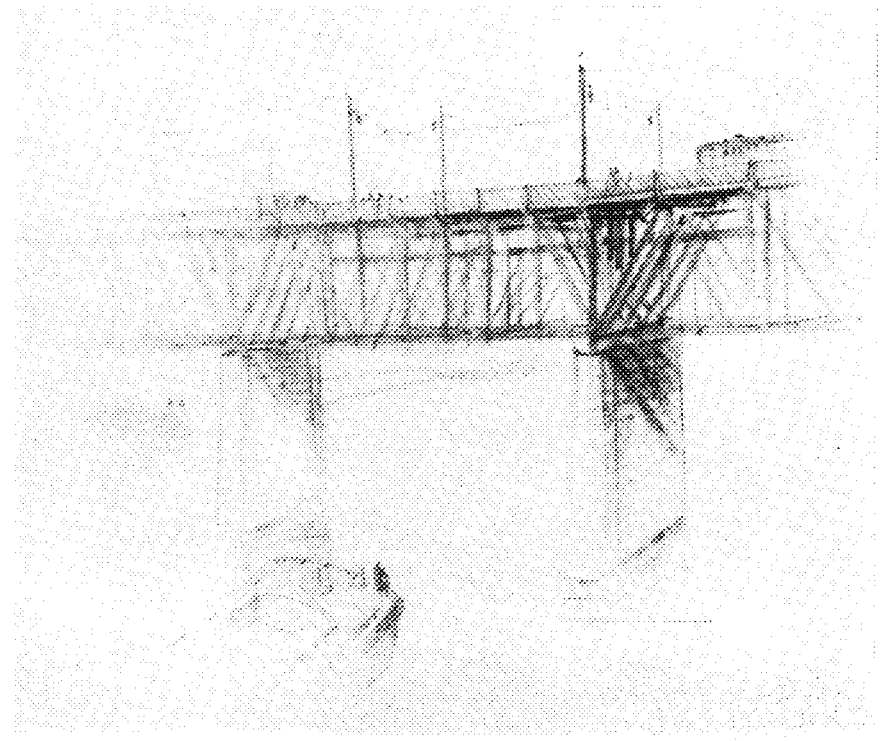
Irvine Park

In the old buildings of St. Paul there is much of architectural as well as historical interest for those who will seek them out. Some of the oldest residences are standing in sections of town which most people have forgotten about and which few people believe hold any interest. Such a place is Irvine Park. Surrounded by the mansions of the "best families" of half a century ago it is a forgotten site only a few steps below Kellogg Boulevard and Seven Corners. Several of the houses are of the Greek Revival influence, impressive and distinguished in appearance. They remind one of the handsome old houses in southeast Minneapolis. Two of the stone buildings, perhaps forty years old and in a nameless style, are credited to Cass Gilbert.

Facing the park on South Exchange Street is the house built by Alexander Ramsey in 1872 while he was governor of Minnesota. It is one of the first stone houses built in St. Paul. Governor Ramsey's daughter, Mrs. C. E. Furness, recalls that it was her mother who decided on the scheme of the house, and it was constructed by local workers and artisans under her direction. Mrs. Furness and her daughters live there now, and they are the last of the old families in that part of town; the others moved up on the hill years ago. It is in beautiful condition. The high spacious rooms are furnished with their original Victorian elegance, and the dignified facade is as impressive now as it must have been sixty years ago.

Except for the Ramsey house, Irvine Park is the proverbial run-down neighborhood with all the mansions turned into boarding houses now. Though scarcely two blocks from the city proper, it is completely removed from any traffic. It slumbers there, a curiosity for those who happen upon it. Recently, it has been proposed to run a viaduct from Kellogg Boulevard down through this section toward the southern end of the city. Then surely will an end come for this place of vanished splendor.

Washington Avenue Bridge



A lithograph drawing by Robert Auvinen

Negro Art

There is much interest these days in the New York Museum of Modern Art's exhibition of African art. From more than 600 exhibits there emerges a fascinating story of a Negro kingdom of high artistic culture, Great-Benin, which flourished in the seventeenth century. The bronzes of Benin which the natives are believed to have derived from the method of bronze casting of ancient Egypt are claimed by some to be equal to the work of Cellini himself. In the exhibition are both bronze heads and reliefs. The "woman's head" and several men's heads have boldness, a strange dignity, and fine workmanship. There are two striking figures of leopards, one of carved ivory, and several splendid reliefs with figures, animals, and trees, whose intricate patterns are highly decorative.

Some arresting bronze pipe bowls from Cameroon are skillfully and amusingly decorated with beads. Perhaps the most exquisite piece in the collection is a small carved ivory head from the Belgian Congo, with the grain of the ivory brought out to the full. But all this is a dead art, the catalogue says, because of "the decadence of the natives following their exploitation by the whites."

To Read

House of the month in architectural periodicals of March was Square Shadows, the estate of Mr. and Mrs. William Stix Wasserman at Whitemarsh, Pennsylvania. George Howe was the architect. Those interested in modern decoration can see practically every room illustrated in *Country Life*. The *Forum* also presented Square Shadows in its March issue.

A neat, up-to-date little magazine is *The Decorators Digest* published monthly under the auspices of the American Institute of Decorators. Well edited and professional in spirit, its articles are of timely importance to those following the trends in the field of interior architecture and decoration.

Invisible Joints—Strong, Trim, Simple

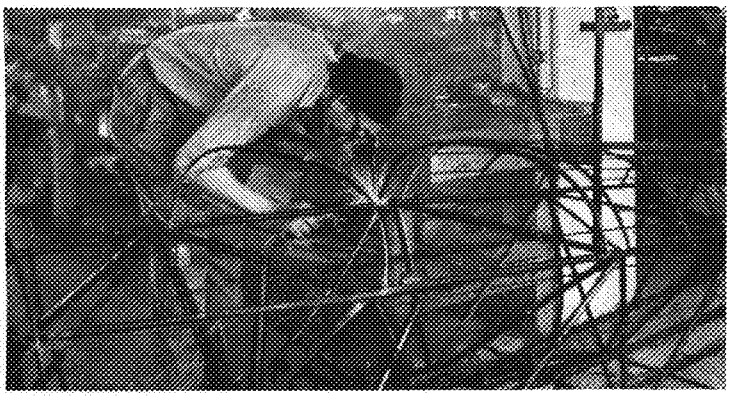
Oxy-acetylene Welding contributes these important advantages to the design and manufacture of metal products.

By W. B. MILLER*

IN THE fabrication of metals it is not necessary to sacrifice appearance and simplicity for strength. Modern methods have changed that. Through the use of welding, it is now possible, with a minimum investment in equipment, to fabricate products with strength where it is wanted. Extra bulk throughout for reinforcing the weakest spot is not necessary.

Welded for Strength

The welded joint is as strong as or even stronger than the metal it joins. It is leak-proof and thus admirably suited for piping or containers of any sort, to resist pressure, temperature, or shock. Another way of making the product stronger is to weld it from one of the new alloy steels or strong non-ferrous alloys. In this way another desirable property is usually obtained — lighter weight. Welding can be used to make joints in any of the commercial metals.



STRONG JOINTS—95 per cent of all aircraft have oxy-acetylene welded fuselages, wings and other members.

In Aircraft Construction

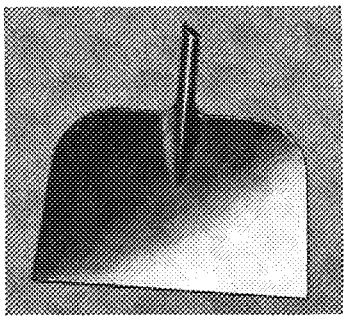
Outstanding as an example of the use of welded joints for their strength is in aircraft manufacture. In an airplane fuselage, every joint must be strong enough to withstand heavy stresses from all sides in flying. The joints must be tough also, for the shocks they undergo are sudden as well as powerful. They are made in a strong alloy—chrome-molybdenum steel. Welded joints are the standard of the aircraft industry because they fulfill faithfully these essential requirements on which so many human lives depend.

For Rigorous Use

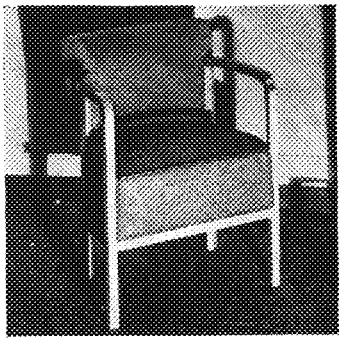
For years, field hoes were manufactured by a forging and rolling process involving a considerable investment in machinery. An enterprising hoe manufacturer found that he could eliminate inherent weaknesses by welding. He designed a bimetal job: the hoe blade of a steel made to hold its cutting edge longer, the sturdy shank of a steel selected for its ability to withstand shock and fatigue. These are then joined by welding with a bronze welding rod. In this way there is no compromise—materials are chosen for the job they are to do—and the manufacturer makes a better hoe at lower cost.

In Modern Furniture

In making metal chairs it is necessary to get a strong ductile joint and one smooth in contour to take the various special finishes which are applied to simulate wood. The strength of joints made with special high strength welding rod can support the weight of several stout men without any sign of giving way. The welded joints are rounded and curved so that but little grinding is necessary for a smooth surface.



SIMPLE—by adopting welding for these field hoes, the manufacturer produces a product with none of the disadvantages of older designs.



TRIM JOINTS—for metal furniture are made by welding. Chairs of welded metal easily support as many heavyweights as can hang on.

Welding Is Sound Design

To take advantage of all the features of oxy-acetylene welding, products should be designed or redesigned with the aid and advice of competent welding specialists. Engineers of The Linde Air Products Company are constantly perfecting details of ox-welded design which are of interest and assistance to manufacturers. Consultation on welded design can be had without charge from any Linde Sales Office. They are located in leading cities of the country: Atlanta, Baltimore, Birmingham, Boston, Buffalo, Butte, Chicago, Cleveland, Dallas, Denver, Detroit, El Paso, Houston, Indianapolis, Kansas City, Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Phoenix, Pittsburgh, Portland, Ore., St. Louis, Salt Lake City, San Francisco, Seattle, Spokane and Tulsa. Everything for oxy-acetylene welding and cutting — including Linde Oxygen, Prest-O-Lite Acetylene, Union Carbide and Oxweld Apparatus and Supplies—is available from Linde through producing plants and warehouse stocks in all industrial centers.

With Engineering Cooperation

Users of oxy-acetylene welding and cutting, and other products and processes developed by Units of Union Carbide and Carbon Corporation benefit from a most unique coordination of scientific research with manufacturing, sales and service facilities. These combined resources of a vast organization assure a full measure of satisfactory performance.

*Engineer, Union Carbide and Carbon Research Laboratories, Inc., Unit of Union Carbide and Carbon Corporation.

oscar invites sadie to

1935 Electrical Party "Sparker"

Dear Sadie:

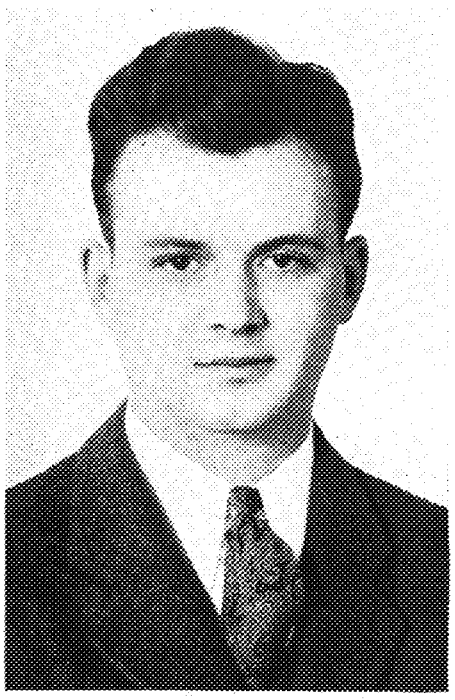
I got your letter and i was saddened and surprised to learn that aunt Mamie was so low and wish you was here. I wish you could be present on account of we are going to have an Electrical Party here the 26 & 27 of Apr. and all the fellows are taking their girls to the show and i havent any girl to take since you aint here like i wish you was and how is your aunt Sophie.

They thats the fellows who are managering the party are calling the big dance they are having on the night of the 26 the Electrical Party Sparker and it is going to be in the Minnesota Union Ballroom here and a guy by the name of Ken DeVilliers who has a band on the campus here is going to play and will you be down. Also that day only those who have purchased tickets to the dance will be invited to attend the show which will be held in the E. E. Bldg here and is it going to be good. All the guys that the committees have on them are working hard-like to get a bunch of exhibits together that the publicity chairman says is Stupendous and Breathtaking. Gee you never saw anything like it sadie they will have a big High Tension Machine which makes artificial lightening and they roast weiners and make sparks jump with it and a Robot named Cyril Cesspickle which adds multiplies divides subtracts smokes cigarettes and like to neck so he would make a good soldier if he wasnt too intelligent.

And you and me can see all this sadie even if we dont go to the dance because the second day thats saturday the 27 you can look at the exhibits and stuff even if as i said before you didnt go to the dance but we want to go to the dance dont we because we can go for 75 cents that is we can if pa answers my last letter.

Of course sadie they are having lots of other things besides the robot and the artificial lightening. They are going to show how the sounds are made in the talkies i guess they are going to have a Sound Track Projector or something to do it and i will explain it all to you on account of we electricals understand all about that stuff you see. If you have ever put in a call to Europe to talk to your aunt Gunhild in Sweden you didnt know it but you were talking all jumbled up when your voice got to the ocean and anyway we are going to have a Speech Scrambler that does that here and you can see and hear it operate and by the way what do you hear from your aunt Gunhild anyway in the last letter that she wrote to you.

Well then they have got an apparatus that they call a Stroboscope and when you shine a light from it onto a wheel which is turning very rapidly it looks like the wheel is standing still or maybe just turning slowlike and another machine which makes things disappear when you have just seen them standing there and is very mysterious. There is a room too which is very spooky and if it scares you too much i will hold your hand and not let you get any more frightened so you wont scream like that time you did when we went on a picnic and a snake got into the lunchbox. Well there are dozens of other things like if you see a fountain with the water running dont take a drink because you cant anyway because they have a photo-electric cell arranged so that you cant and there is another which is opposite because the water isnt running but if you bend over it it will and you can get a drink. but anyway i will go around with you and explain it all to you.



CARLYLE BURTON

Well there isnt much more to say except i do wish you would come down and go to the show with me because it is going to be very good as i have before indicated and we would have a very good time. Write soon and let me know if your coming so i can buy the tickets that is if pa writes a letter which i am expecting him to write. if he sells some eggs so he can send me the 75 cents in the letter that he may write. All the EE. students are selling the tickets so i am sure i will be able to get one.

love and kisses
OSCAR

P.S. I am enclosing also a picture of a guy by the name he has of Carlyle Burton who is manager of the Electrical Party so that you can see by his honest face that the show will be a good one

KAHN-NOTATIONS

By Howard Kahn, Ch. E. '35

It has often been claimed that engineering students are so engrossed in their petty calculations that they are unaware of the world about them. Therefore it was a fascinating experience to witness the quizzing of a group of Minnesota engineers, all having averages above 2.5. The following information forthcame:

That Toar is a mythological Norse god. (The fellow had claimed that he read only the comic sections of the newspaper.)

That Millikan is famous for his work on cosmetic rays.

That Joseph Byrnes is a detective. (He's speaker of the house, you dummy.)

That David Copperfield is an author, and wrote a book called Dickens.

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Here's one too good not to steal:

They're a queer crowd, the family Stein—
There's Gert, and there's Ep, and there's Ein;
Gert's stories are bunk,
Ep's sculptures are junk,
And nobody understands Ein.

\+ + +

The U. S. Naval Corps will consider no one for its aviation flight training who weighs less than 132 lbs., or more than 200. . . . The budget for the 1935 Gopher is $11,000 . . . The World's Largest states: "A 12 hour tour of the eastern United States covering a distance of 4,000 miles will be made by 11 aeronautical engineering students during the spring vacation. The party will leave by automobile." . . . At a mere average speed of 333.3 miles per hour. . . .

\+ + +

According to the office-boy, ants in the pants are being displaced by varmints in the garments.

\+ + +

Columnist Plymat mentions an episode which took place in Joliet during the recent inspection tour; but he told only half the tale, for not only was ginger ale $1 per bot. but ice was $.50 per bowl; and not one but eight lads were present at the robbery, and also four Joliet girls, who, having absorbed the better part of a qt. of Seagram's Five Crown, went home at 11:00 p.m. Come! Ye Suckers! Gather round.

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St. Paul Press:

"Women Writers Saved Novel for World, Says Sheila Kaye-Smith."

". . . Her husband, Dr. Penrose Fry, dressed the student body Saturday morning."

Men are so practical.

Professor Kuhlmann Journeys Through Southland on Vacation

Leaving his students to struggle through examinations alone, Dr. J. H. Kuhlmann of the Electrical Engineering department departed March 12 for a motoring trip through the southeastern part of the United States. Stories filtering through of real fishing, perfect beaches, and beautiful country seem to indicate that the trip was a success.

The traveling was started at noon, Tuesday, March 12, and the end of the first day found Dr. Kuhlmann in northeastern Iowa. From there he went to Evansville, Indiana, and then on through Kentucky and Tennessee via Nashville to that much discussed Muscle Shoals project. The power plant at the Wilson dam was inspected and a visit was held with the superintendent of power at the dam, Mr. B. B. Bessesseu. The next day he drove through Alabama, going through the industrial center, Birmingham, and down into Florida to Tallahassee. A very enjoyable drive followed down the west coast of Florida to Placida where a boat was taken to the Island of Gasparilla, an old pirate hang-out.

After the visit at the island, Dr. Kuhlmann drove down through the Everglades across to Miami, and from there up the east coast of Florida through Daytona to the Florida-Georgia border where he camped near the St. Mary's river, supposedly the deepest river in the United States. From the camp on the St. Mary's river, the trip was rather hastily concluded by driving up through Georgia, via Atlanta, to Chattanooga, Tennessee, and then back home through Indiana, Illinois, and Iowa. The University of Illinois at Urbana and the University of Iowa at Iowa City were visited on the way.

Whitson Wins First in Paper Contest

Lee S. Whitson, senior mechanical engineer, won first place in the competition for the paper to be presented at the convention of student chapters of the American Society of Mechanical Engineers in Chicago, April 29 and 30, with his paper on "The Decentralization of Industry." "The Die-Casting Product" was second choice and Harold W. Shaw, the writer, will serve as alternate at the convention. The papers were chosen at a meeting of the student society held Tuesday evening, April 9, in the Minnesota Union.

Jacobs, Senior Aero, Wins Boeing Award

Richard Jacobs, senior Aero, has been awarded a $1,000 scholarship at the Boeing School of Aeronautics in Oakland, Calif., for winning second prize in a national prize paper contest. His paper was entitled "Organization of United Airlines Transport Corporation with Notes on Maintenance Procedure."

A. I. E. E. Plans Inspection Trips

A.I.E.E. inspection trips, which were postponed because of the Electrical Show, will continue with trips to the WCCO transmitting station at Anoka, the Minnesota Mining and Manufacturing Company, and the Electric Machinery Manufacturing Company.

Papers which were handed in for the prize paper contest will be read by a committee consisting of members of the Minnesota Section of A.I.E.E. and members of the faculty. The four best papers will be selected and will be presented orally at a joint meeting of the Minnesota Section and Branch of the A.I.E.E. on April 29. The first prize will be a cash prize of twenty-five dollars and the second, a cash prize of fifteen dollars.

The meeting scheduled for April 8, at which Professor Emerson P. Schmidt of the School of Business had planned to speak was postponed because of the speaker's illness.

Ch. E's. Inspect Chemical Plants

Forty-six seniors in chemical engineering hustled through their winter quarter finals last month to be in readiness for their annual spring inspection trip, which began on March 20. The eleven day itinerary included over 1,200 miles of traveling in two chartered Northland Greyhound buses, and a thorough inspection of twenty-four typical chemical engineering industries in four states, plus an inquisitive glance at the variety of night life which abounds in some of our Middle-Western cities.

The men were accompanied by Dr. Charles A. Mann, chief of the division of chemical engineering, and Dr. Ralph F. Montonna, associate professor of chemical engineering.

Campus Radio Club, W9YC Reorganized

After a long period of inaction radio amateurs on the campus are once more becoming active. The Campus Radio Club has been reorganized and many of the "hams" have become interested in the University amateur radio station, W9YC.

The club held a reorganization meeting in the Electrical building February 28. Carl Henrici was elected president and Gene Happle, secretary. Vir Janes, chief engineer for station WLB, spoke at the second meeting, held March 14. He discussed a new system of modulation known as voice controlled carrier modulation.

The club began plans for a display to be exhibited at the Mid-American and Dakota Division American Radio Relay League convention May 3, 4, and 5 at the West hotel.

During the fall quarter W9YC was silenced by power supply difficulties. This quarter Bob Angster, station manager, has the transmitter working and eighteen operators are now working. Regular communication is carried on between W9YC and the Panama Canal zone, Equador, and many amateurs in the United States and other countries.

Tau Beta Pi Will Initiate New Men

Tau Beta Pi, all-engineering honorary fraternity, held its semi-annual informal initiation of new members March 13, in the Mechanical Engineers building. The formal initiation of this group will take place at the fifty-second semi-annual banquet, which will be held at the Curtis Hotel on the evening of April 17.

As customary, the alumni members present will hold a short business session to elect officers for the coming year. Cyrus P. Barnum will be the speaker for the occasion. Announcement will be made of the freshman prize winner. This prize consists of twenty-five dollars worth of school materials from the Engineers' Bookstore.

The following students are the new members to be formally initiated at the banquet:

Juniors: Harrison L. Anthes, Clyde H. Berg, Milo Bolstad, William Brastad, Russell M. Carlson, Richard Krmoun, Edward F. Marshall, William L. Nelson, Russell L. Nielson, Albert G. Oswald, Homer J. Stewart, Gordon H. Strom, Michael Tenenbaum, Frank B. West.

Seniors: Edward F. Graves, Clyde F. Norton.

Committees Complete Plans For Engineers' Day, May 17

Engineers' Day, the traditional celebration in honor of the patron saint of the engineers, Patrick, falls this year on May 17. Committees, under the leadership of Jack Intlekofer, General Arrangements chairman, are busy with plans for the occasion and have announced a general program for the day.

The day will begin officially at 9 a. m. with the Open House, which lasts until 5 p. m. It will feature continuous exhibits by the various engineering departments. Demonstrations and exhibitions typical of the work done in each department will be shown for parents, students, and the general public.

Some of the high spots in the exhibits will be:

The making of souvenirs by the mechanical engineers. The souvenirs will be made and their making explained while their recipients are watching. Civil engineers will explain and demonstrate the use of their instruments. In addition to presenting a number of plays, the chemical engineers will sponsor a special chemical show illustrating mystifying and apparently complicated chemical phenomena. Typical of the work in aeronautical engineering will be the demonstrations conducted by the aero engineers. Because so little is known about aircraft by the average person, this exhibit should be very instructive as well as interesting.

In addition to new exhibits the electrical engineers will present outstanding ones held over from the Electrical Show.

The parade, headed by St. Pat on a white horse and his Queen on a black horse, will assemble by the Electrical engineering building and start at 11 a. m. Floats built by the different technical societies and mathematics classes will be units in the parade. Contrary to custom, prizes will be given for the float best portraying some type of engineering advancement, and for the funniest float.

The Dansant and Green Tea will be the social attractions from 3 to 5 o'clock in the afternoon. The Dansant will be held in the Main Engineering Auditorium and the orchestra, a well known campus band, will be the same one which will play for the Brawl in the evening. During the Dansant the Green Tea will be served in the Architects' Reading Room.

The Brawl will be the climaxing event of the day. Dancing, to which everyone is invited, will continue from 9 until 1 a. m. in the Minnesota Union Ballroom. In addition to the music and dancing, there will be games, including a ping-pong tournament with prizes. During the intermission unique entertainment features will be presented.

Jack Intlekofer, General Arrangements chairman, has appointed the following committee men:

General Arrangements Committee

Jack Intlekofer.
Eugene Cutts.
Charles Steinmetz.
Milo Bolstad.
Ted Swenson.

Committees and Chairmen

Parade—Bertil Lindquist.
Open House—Gerry Mitchell.
Chemical Show—Harry Cottingham.
Brawl—Cruse Honey.
Dansant—James Moore.
Tickets—Earl Bennetsen.
Buttons—John Wolfe,
Mary Le Bloud.
Campus Publicity—Howard Clark.
Downtown Publicity—Lloyd Breidvold.
Knighting—John Hanson.
Poster—Collis Hardenbergh
Green Tea—Marian Bend.
Broadcasting—Tom Bragdon.
Printing—Tom West.
Office—William Brastad.

National Secretary Addresses A. S. M. E.

The Minnesota section of the American Society of Mechanical Engineers played hosts to the student branch at a supper meeting in the Minnesota Union on Friday, March 22. In the absence of G. F. Endicott, Northern Pacific official and Chairman of the Minnesota Section, Mr. M. Overstrud, Minnesota graduate, vice-chairman of the local chapter, served as toastmaster.

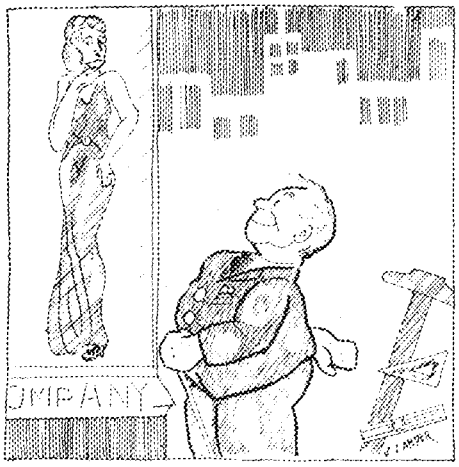
The society was fortunate in having the national secretary, Mr. Clarence Davies, present a discussion on "The Engineers' Council for Professional Development." After being introduced by Colonel Paul Doty, former president of the National Society, Mr. Davies pointed out that the E. C. P. D. resulted from the united attempts of the various engineering societies to give the engineer more social prestige.

The meeting was attended by ten or twelve professional engineers, almost as large a group of faculty men, and about fifteen members of the student branch.

Engineering Campus Visited by Stork

Miss Jean Helen Smith, prospective University student, arrived in the Twin Cities on April 8. She is a near relative of Mr. Harold D. Smith, manager of the Engineers Bookstore, and in fact, the only daughter of Mr. Smith. It is estimated that she will matriculate at Minnesota in about seventeen years. She weighs seven pounds, likes her new environment, and promises to stay as long as she can. Although she is not a "spittin' image" of her father, he showed his appreciation of her arrival by furnishing free cigarettes to all those in and around the bookstore. He intends to encourage her to take interior architecture in order to patronize home industry.

An Engineer Looks - -



- - at Life

By **B. H. T. L.**

Who is the comely lass—from ye olde arkit-crackedture who, on being informed by Miss Veblen that it is slightly immodest to sit in the Engineering Library balcony with her feet tucked up under the railing, replied, "I can't help it if those darned engineers look up. After all, I've got work to do and if they can't concentrate on their own business that's their own hard luck." But the guiding hand of the Engineering Students' Study Hour finally convinced the beautiful attention diverter that it would be more conducive to good engineering to do her work on the main floor—which, if this scrivener might be permitted a word, is exactly what all the unfair sex do anyway—get in on the ground floor.

* * *

Prof. J. D. Akerman, at an Aero. Eng. smoker asked as one of a series of questions, "Give a good name for the tail-less." One of the names submitted was "Mae West," but to this naive scribbler we believe that the name could hardly be regarded as appropriate due to very outstanding difference between the aforementioned pterodactyl and Mlle. West. But there is still a very striking similarity between the two, at that; you see, they are both streamlined; and Herr Boehnlien says a streamlined body is one which offers little resistance.

* * *

When anyone mentions the word "gentleman" we always think of Doc. H. Erikson the genial and well-poised guiding genius of the Physics Bldg. Did you ever see anybody who could whirl around on a miniature merry-go-round with a dumb-bell in each hand and still look dignified? Or swing a beaker full of aqua pura tied to a string and still maintain his mental equilibrium? Well, Prof. Erikson does these tricks and many others with unbelievable equanimity and never even ruffles his necktie.

* * *

An engineering stude is a queer duck—he pays his bucks to come here to school and, incidentally get an education, and the instructor whom he maligns the most is the man who tries to give him the most for his centavos . . . but—says our news editor—I object! You are not considering all the ramifications of the subject!—but then our N. E. is always objecting anyway, and again, if your old chronicler considered all the aforementioned ramifications there would be no colyum.

* * *

Famous last words: Ta 'ell with it.

TO THOSE WHO CARE

If you are the type of person that eats at the nearest place that calls itself a restaurant—if you trust your clothes to any dry cleaner regardless of his reputation—read no further. But if you are interested in values—if you seek something a little better than average, notice the list of concerns below. They are the ones who believe they have something worth advertising and are interested enough in *you* and your magazine to use this medium of expressing their desire to serve you.

FLORISTS

UNIVERSITY FLORISTS, 403 14th Ave., S. E.

TEA ROOMS

MRS. HUSBANDS' TEA ROOM, 701 Washington Ave., S. E.
PAGODA TEA ROOM, 505 Washington Ave., S.E.
WALNUT INN, 315 Walnut St. S. E.

DRUG STORES

CAMPUS PHARMACY, 500 Washington Ave., S.E.

CAFES

BROWN JUG CAFE, 1303 Fourth St., S. E.
CAMPUS CAFE, 308 Oak St., S. E.
CARPENTER'S CAFE, 418 14th Ave., S. E.
COLLEGE CLUB, Oak and Washington, S. E.
COLLEGE INN RESTAURANT, 1320 4th St., S. E.
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UNIVERSITY FOTO SHOP, Oak and Washington, S. E.

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ENGINEERS' BOOKSTORE, Main Engineering Bldg.

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THE COLWELL PRESS, INC., 405 South Sixth St.
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E. W. RUDD, 720 Washington Ave., S. E.

DRY CLEANERS

DAHLGREN CLEANERS, 714 Washington Ave., S. E.
DON'S KAMPUS KLEANERS, 1302½ 4th St., S. E.
VARSITY CLEANERS, 508 Washington Ave., S. E.
VERN SCHEI, 718 Washington Ave., S. E.

BOOKBINDERS

E. H. MILLER, 1326 Fourth St., S. E.

Get into the Picture

with a

Charter House

Four-piece

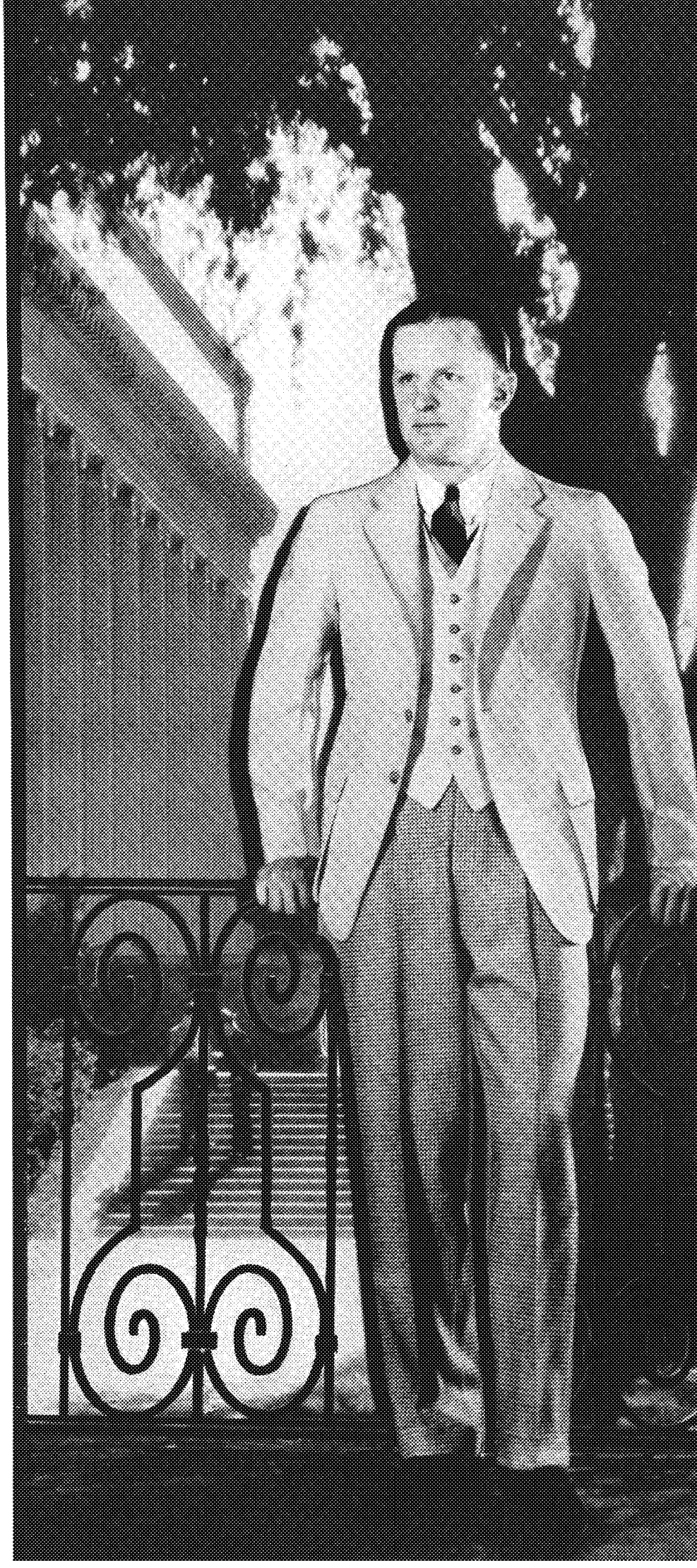
Sport Suit . . .

University apparel makes a colorful picture this spring . . . one you should know well and make the most of . . . Ensemble Sport Suits are THE thing to wear . . . almost anywhere . . . A fashion that is not only smart but really practical . . . really being three outfits in one . . . And judging by their reception a five★★★★★ star scoop. Priced at thirty-five.

Clothiers — Tailors — Furnishers

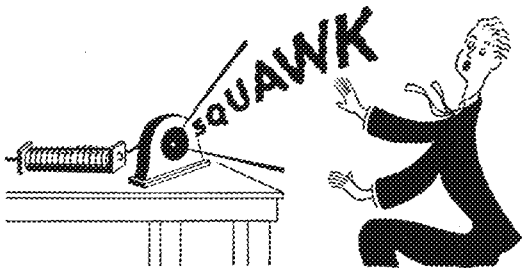
JUSTER BROS

On Sixth Street . . . . Just Off Nicollet



The newest in sports apparel is the "Light-tops" as worn by Maurice Johnson. This modish belted (with shirred back) suit doubles its usefulness when worn with darker slaks.

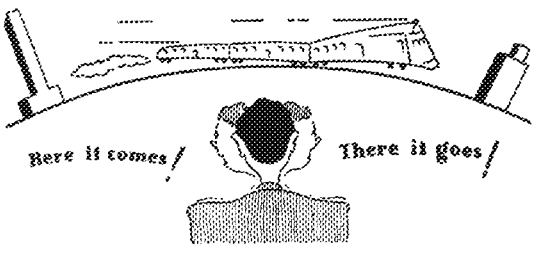
G-E *Campus News*



MAKING FLAWS SQUAWK

A VALVE used in a General Electric refrigerator unit requires a small steel spring, which, during the time that a refrigerator is in operation, is used several hundred times per minute. A small defect, even a microscopic scratch, would be sufficient to cause the spring to fail after a relatively small number of operations. Consequently a fast, certain means of inspection for the steel ribbon of which the springs are made was necessary.

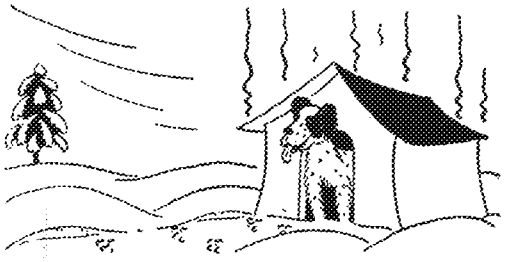
It is generally known that, if a secondary coil is placed around a core of iron and the iron is placed in a magnetic field, there is a definite relation between the chemical and physical properties of the iron and the resultant electrical wave induced in the secondary coil. Using this knowledge as a base, a General Electric laboratory built an inspection device. The spring material is run through a magnetic field, and the induced current is fed through an amplifier to a loudspeaker. A hum peculiar to the magnetic properties of the material sounds in the loudspeaker as long as the quality of the material is uniform. Any flaw, however, changes the magnetic properties, the magnetic field then becomes unbalanced, and the loudspeaker emits a shrill squawk.



STREAMLINE COMMUTING

PORTLAND-BOSTON commuters will shortly receive a taste of real speed. Fairly before they have a chance to swallow their breakfasts, they will be whisked into North Station by the "Flying Yankee." In the morning, the train will streak the 115 miles from Portland, Maine, to Boston in 110 minutes. Then during the day, it will make a round trip to Bangor, Maine, making the 250-mile trip each way in 265 minutes. When the business day closes, it will streak back up Portland way with the commuters it brought down in the morning.

The "Flying Yankee" is a 200-foot articulated train, of lightweight, stainless-steel construction. Its three sections are carried on four trucks. Power originates in a 600-horsepower Diesel engine, directly connected with a General Electric generator. Two General Electric traction motors are mounted in the first truck. An auxiliary generator and the control equipment are also built by General Electric.



HOT DOG

PEG is an elderly English setter, who can trace her family back to some of the very best nobility in her breed. When she was younger, she enjoyed nothing more than romping about in the snow. But in the last few years, American winters, with all their sub-zero weather, have not agreed with her too well.

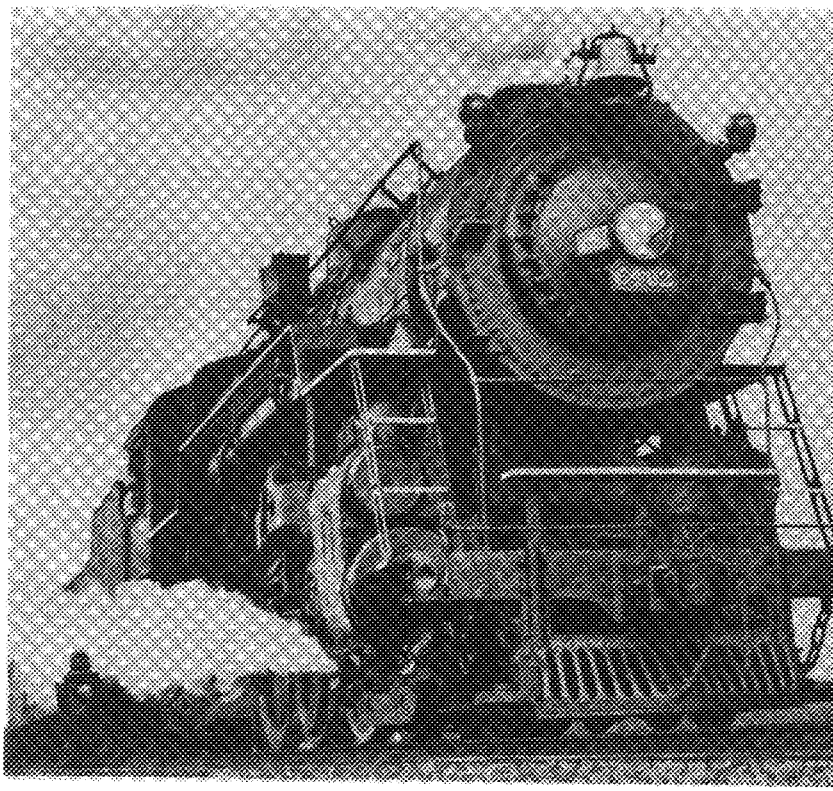
So last year, her owner, H. C. Ward, U. of Wisconsin, '05, of the General Electric office in Rochester, N. Y., decided to heat her kennel. Quite appropriately, he decided to do the job electrically. He installed a length of G-E soil-heating cable, plugged it into an outlet, and turned on the juice.

He did not stop there, however. Such a fine old dog deserved a polished job. He also installed a G-E thermostat in Peg's quarters to keep the temperature constant through all kinds of weather. Now while other dogs cower in frosty kennels, she disposes herself in luxury. She wags her thanks to General Electric.

96-138DH

GENERAL ELECTRIC

The MINNESOTA TECHNO-LOG



ENGINEERS' DAY NUMBER
MAY 1935
Volume XV Number 8

22nd Annual

May 17th

ENGINEERS DAY

• • ST. PATRICK'S • •

BRAWL

MINNESOTA UNION BALLROOM • 9:30-1

ONE DOLLAR PER COUPLE

• • • GREEN TEA DANSANT

AND THE JUDGING OF THE BEARDS

ENGINEERING AUDITORIUM

3:30 - 5:00

HAL McINTYRE'S ORCHESTRA

MACHINES and MEN

In this day of high speed production, large volume, and multiple color printing, it takes a vast array of machines to make a print shop.

Yet, with today's even more exacting requirements of expressive typography, close make-ready and sharp reproduction, it takes also the craftsmanship of men.

The Colwell Press offers you both. Coupled with the economy of a well-managed, well-equipped shop, you have at your disposal the intelligent creative help and expert technical craftsmanship of trained men.

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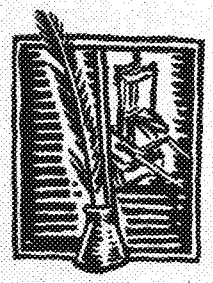

At The Desk

In contrast to all the pictures we have been seeing of Zephyrs and streamlined high-speed diesel trains, this month we present on the cover an imposing view of the old "romance of the rails," the steam locomotive. This picture was loaned us by the Baldwin Locomotive Co.

The frontispiece is a stroboscopic picture of smoke curling through the blades of a fan. This picture was taken by the light of a mercury-arc stroboscope with an *f* 3.5 lens for .00001 second exposure. For an enlightening article and other interesting pictures on stroboscopic photography of air-flow see the *Mechanical Engineer* for April, 1935, page 228. Our frontispiece was loaned to us by the *Mechanical Engineering Magazine*.

We feature this month an article on "Photography as a Hobby" written by Charles Sweatt. This article was written as a seminar paper and was so interesting that it was recommended to us for publication. We take pleasure in doing so.

How many of you have been reading Mr. Haga's column, "Now Here's a Book"? Of course it's only a book review and it's written by a prof, but try three minutes reading it. If you do you'll be sure to look up your back copies to read what you've missed.

—*W. A. S.*

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MINNESOTA TECHNO-LOG

37 ELECTRICAL BUILDING . . . U. of M.

MAY, 1935

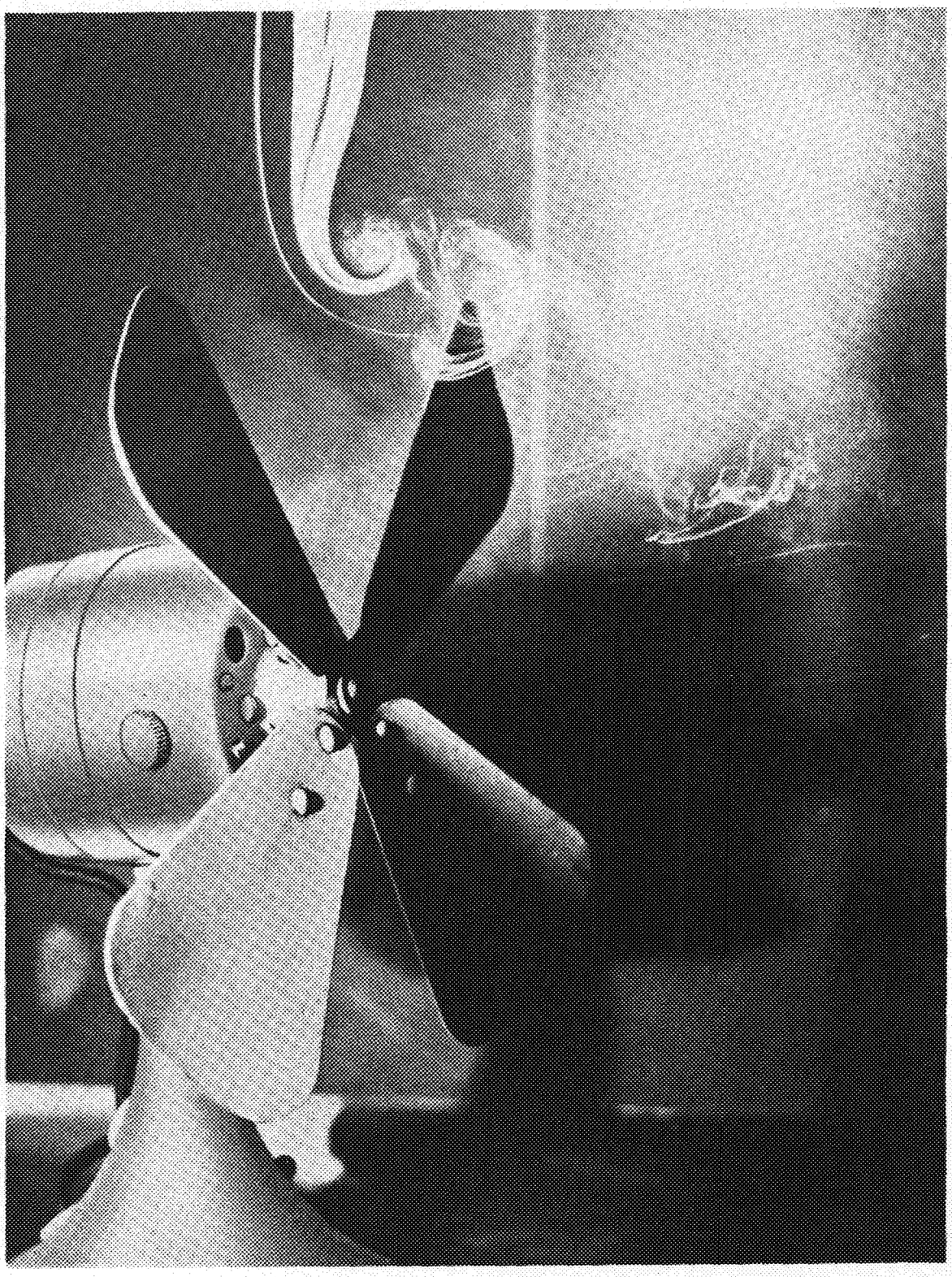
Eugene Price
MANAGING EDITOR

David Buck
BUSINESS MANAGER

Published monthly from October to June inclusive by the students of the College of Engineering and Architecture and the School of Chemistry of the University of Minnesota

Volume XV **Number 8**

This Month

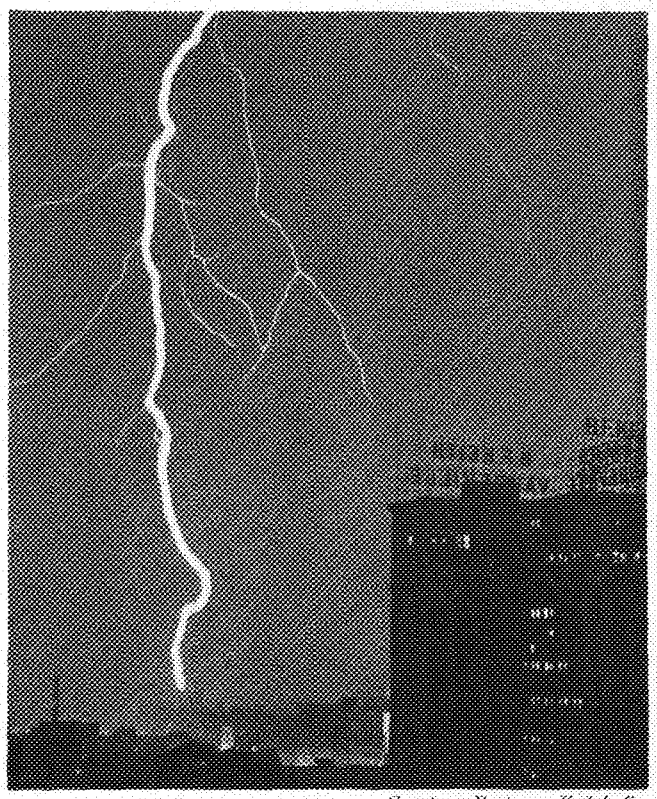


.0001 Second

CHARLES SWEATT, M. E. '35

discusses

Photography as a Hobby



—Courtesy Eastman Kodak Co.

To make a lightning picture like this set up the camera with lens wide open. Leave the camera open until a strong stroke of lightning comes within the camera range. Then close the shutter.

TWENTY years ago photography was considered an interesting novelty. The simple box camera made it possible for the amateur to take snapshots, while before, only a professional could pay the prohibitive prices of camera and equipment.

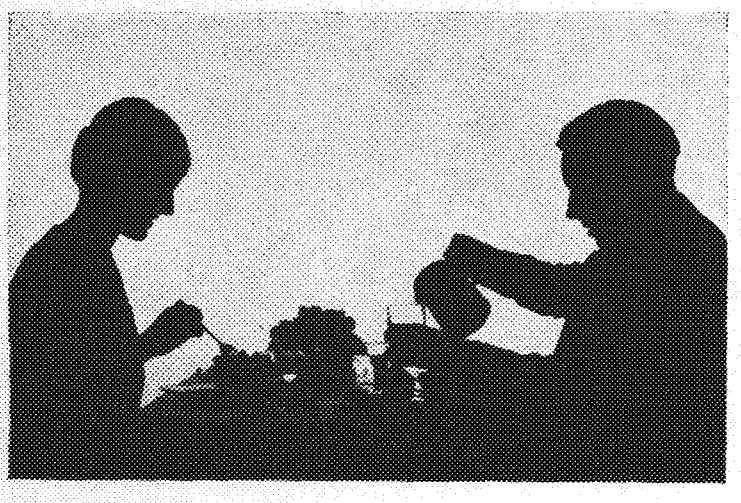
It was not long, however, before the art of picture taking became something more than a fad. Better cameras were developed and made available to the layman. Films were improved, processes simplified, and the home darkroom was supplanted by large companies who develop and print our pictures at a very moderate cost. Today then, some of us develop our own films and make our own prints, not because it is cheaper, nor because it saves time, but because modern developments in cameras, films, and other equipment have made photography a fascinating hobby.

There are several reasons that immediately suggest themselves as answers to the query, "Why does a person need a hobby?" The first and perhaps the most outstanding is the necessity for relaxation. By laying aside the hurried schedule by which we live and pursuing some line of endeavor quietly and deliberately with a relaxed mind and body, we can gain a less distorted perspective of the lives which we are living. Another reason for having a hobby is to help make life more interesting.

Some of us need a hobby to occupy our leisure time. There are often evenings and Sunday afternoons when the question comes up, "What shall I do?" Commercialized amusements are expensive and the benefit to be derived is questionable. An empty purse and a next-morning hangover are never the results of pursuing one's favorite hobby instead of "going out again tonight."

Silhouette pictures are made by exposing for a long time with strong lighting behind.

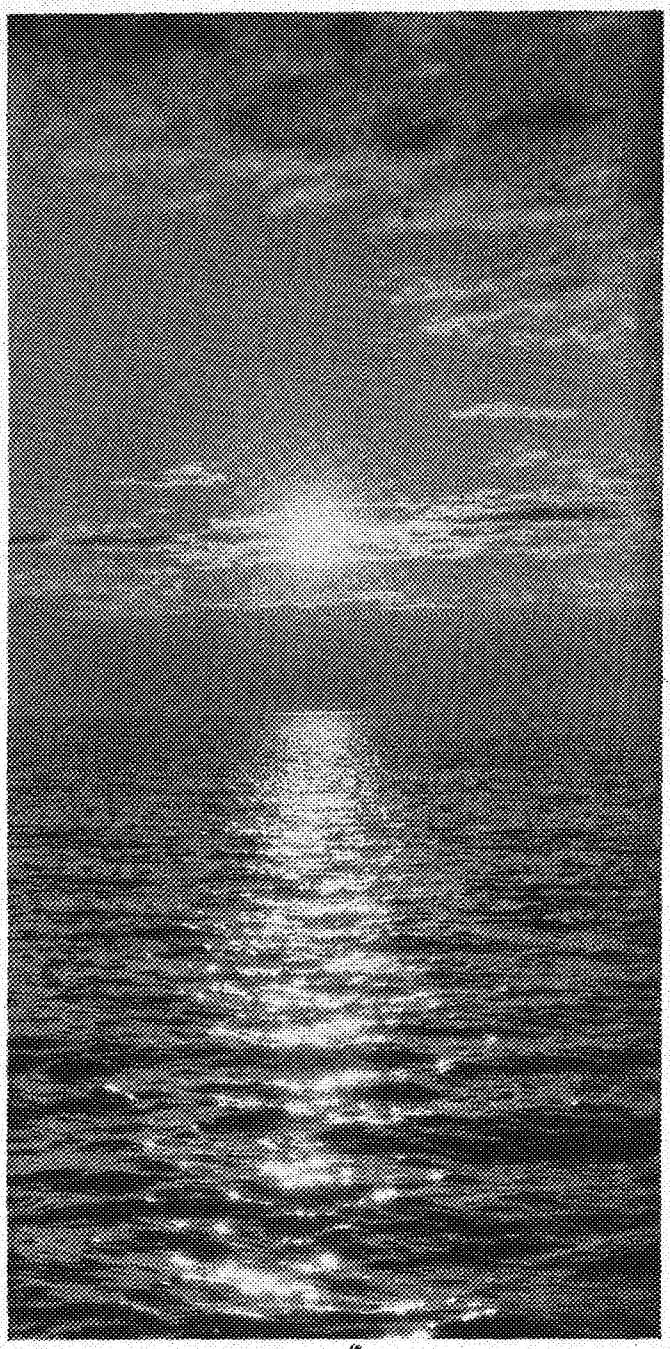
—Courtesy Eastman Kodak Co.



There are probably some people who can see no place for a hobby in their lives. But it is another class of people at which the theme of this discussion is really pointed. Those who like to take pictures and would like to go a little deeper into the subject will find photography an ideal hobby.

To student engineers, photography will be especially interesting. Technical photography has a very important place in industry. Hundreds of uses for photography in our large industrial plants could be cited. The amateur photographer is constantly running across processes, machines, or theories which are more understandable and more interesting because of the knowledge gained from his hobby.

For the natural "experimenter," photography is a field of abundant opportunity. The ordinary camera that the amateur uses for snapshots seldom has a faster lens than *f* 6.3. The advanced amateur, however, soon grows out of his ordinary camera and trades in the old *f* 6.3



for a camera with a faster lens. As the lens speed is increased to *f* 3.5 or faster the experimental possibilities are increased greatly.

One of the newest phases of the hobby is the taking of pictures by infra-red light. A film sensitive to the infra-red rays has been developed. These rays are given off in large quantities by hot objects, and a clear picture can be taken in total darkness with the only "illumination" supplied by two hot flatirons. The visible rays from an incandescent lamp can be filtered out, allowing the infra-red rays to be used as a source of illumination for picture taking in the dark. In this way, a perfectly clear picture could be taken of a burglar or safe-cracker working in total darkness.

Color photography is another subject that will challenge the experimenter. Since picture taking was invented, research men have been trying to produce photographs in natural color. The problem is a highly technical one, but not too much so for the advanced amateur. Several methods have been developed that reproduce colors with quite some success, but a great deal of improvement could be made. The Eastman Company's "Kodacolor" is one of the most successful solutions to the problem.

High speed photography has always been the subject of much experimenting, both by amateurs and by professional photographers. The amateur wants to take pictures of a horse topping a hurdle, a race car skidding around the dirt track, or a diver in the midst of a "perfect swan." The scientist wants to catch machinery in motion, test specimens in the process of being manufactured, or the action of air currents made visible by a spray of flour on aerodynamic models. In either case, the fast films and lenses of today make photographic speeds common that were unheard of only a few years ago. A stroboscope is often used to facilitate the taking of pictures at high speeds. The frontispiece of this issue was made with stroboscopic illumination.

Perhaps one of the best known commercial uses for photography is in the X-ray field. Not only have X-rays added immeasurably to the science of medicine, but they have become important in the metal working industries for inspection purposes. Steel castings and forgings which must stand high stresses may be inspected for flaws by X-ray. The modern oil refining processes are subjected to minute X-ray inspections to reveal imperfections that might cause great damage.

The huge tubes that are to conduct water around the new Boulder dam are made of riveted steel plates. Since they will work under a head of nearly 500 feet of water, the pressure will be enormous. Every bit of this plate will be examined for flaws by X-ray photography. Thousands of square feet of photographic film will be used in this project.

Every drawing, diagram, or picture printed in our magazines and newspapers depends on photography for the reproduction process. The part that science plays in making the beautiful color printing in a modern magazine is truly remarkable.

In many of the scientific and industrial applications of photography, artistic or esthetic elements are entirely lacking. In most amateur and creative photography, however, the picture is taken with a view toward "effect." Sometimes the desired effect is beauty, other times a striking effect is sought after. Realism or even ugliness may be the theme of a photograph just as they may be the motive behind the painter when he makes an oil or water color.

There are two methods of obtaining effect in a picture. The first is by composition, that is, the arrangement and artistic quality of the objects that are in the picture when it is taken. The second is by manipulation of the film and print during the processes of developing and printing. The expert can take a poor shot of the most humble subject and, by cleverly exposing and developing the negative and the print, he can create a picture pleasing to the eye.

As the amateur photographer who has his pictures developed and printed through the local drug store has nothing to do with the manipulation of his shot, he must rely on correct composition to create the desired effect. The person who carefully composes the picture he is about to take will be rewarded with much more satisfactory results.

Filters and diffusion disks can often be used to good advantage. Since the photographic negative does not definitely distinguish between white and blue light, clouds seldom show up without a filter. A yellow filter will stop out much of the blue light and give more contrast between the blue sky and the white clouds. Diffusion disks attached to the camera lens give a softened or diffused effect, and in many cases the less sharp lined print is the more pleasing one.

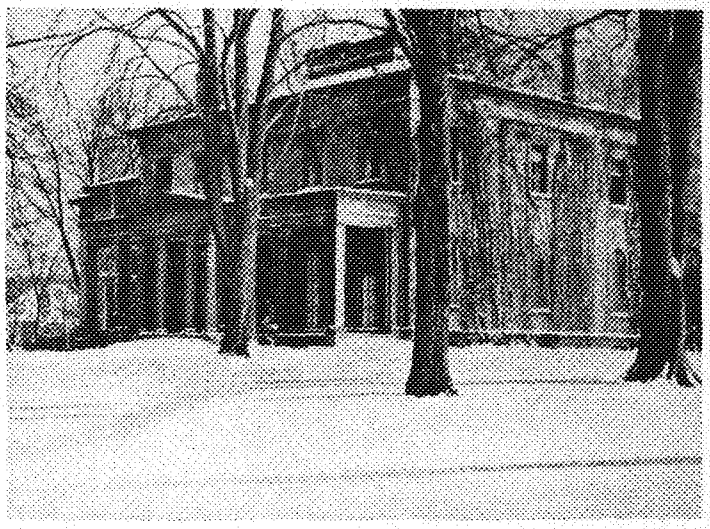
For portraits and indoor pictures, the same general rules apply, except that filters are seldom necessary, and much more control over the lighting can be had. The success or failure of a portrait often depends upon the quality of the lighting.

There is a large group of amateurs who use photography as a means of esthetic expression. The picture in its original form may not be out of the ordinary, but by the hundreds of processes of printing, enlarging, and developing, a very beautiful picture may result. These prints are almost always enlargements, and this step in the process makes possible a great deal of "dark room composing." Also, the light used to expose the enlargement can be so controlled as to make part of the picture darker or lighter than its surroundings. Screens are often used to diffuse the lines and produce softness, especially in making portraits.

One of the most interesting features of amateur picture taking is photography at night, both indoors and outdoors. New lamps to supply adequate illumination and new films that are much faster have made it possible to take a picture almost anywhere under the most adverse conditions.

The "photoflood" lamp gives a light equivalent to about 750 watts by use of a special filament with an average life of about 2 hours. The "photoflash" lamp contains a quantity of crumpled aluminum foil in an oxygen filled bulb. The foil is ignited by electricity, and creates the same effect as the old flash powder, but without the fire and smoke.

The photoflood and photoflash lights are used indoors mostly, but in some cases very interesting outdoor pictures



—*Courtesy Eastman Kodak Co.*

This picture was taken at night, with no illumination other than the light of the moon. It was exposed for 15 minutes.

have been made with them, especially the photoflash. With these lamps and the new super-sensitive films, portraits or group pictures may be made with the ordinary camera as easily at night as in bright daylight.

Night views of city streets, lighted buildings, or other scenes which are impressive because of the lighting effects can easily be recorded with the camera. A time exposure is usually necessary, but a little experience makes the problem a simple one.

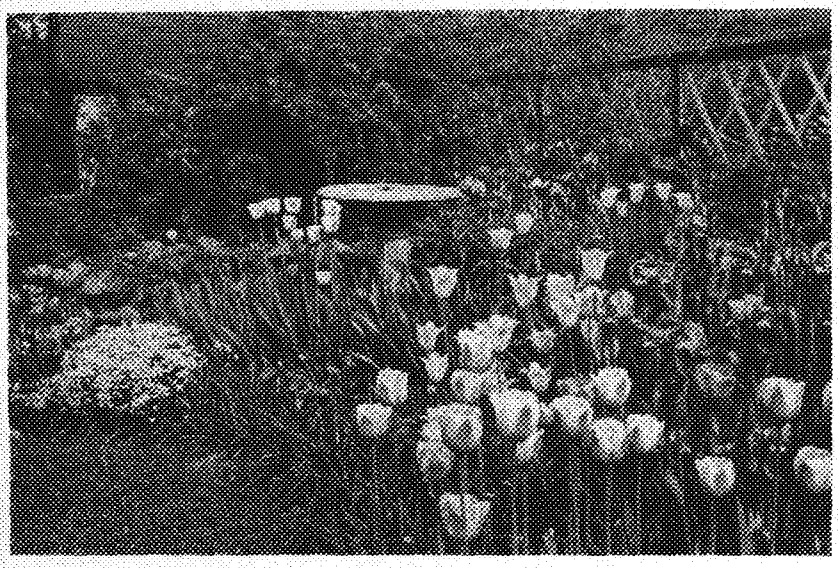
Lightning and fireworks are also interesting subjects. All that one does is point the camera in the direction in which the phenomena are likely to occur and open the shutter. After the flash, the shutter is closed and the picture is taken. Care to supply a steady resting place for the camera is necessary since any movement while the shutter is open might blur the picture.

Taking pictures in which the subject is unaware that he is being photographed is a real sport. It has long been known that the best pictures were made without "posing" and candid methods yield interesting results for that reason. The new miniature cameras make this problem simpler, with their fast lenses and compact arrangement. An angle view finder has also been developed which enables the cameraman to "look around a corner" at the subject so that his operations are even less obvious.

There are many other things that can easily be done with a little practice, but the space cannot be taken to describe all of them. Color sensitive films and filters have made possible beautiful results in photographing flowers. Cameras can be attached to microscopes and telescopes when new subjects are desired. Very interesting silhouettes can often be made without special equipment. A big fire, especially of it happens at night, will make a spectacular shot, and the owner of a miniature soon learns to carry his camera with him all the time, realizing that the best pictures happen most unexpectedly.

Panchromatic films, sensitive to a wide range of colors, make possible the fine reproduction of flowers.

—*Courtesy Eastman Kodak Co.*



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ORRISON FLATBERG.....Circulation Manager
BERTIL LINDQUIST.....Office Manager
ARMOND OLSON.....Office Staff
WILLARD OLSON.....Office Staff
RAY HOPPER.....Office Staff
CHARLES STROM.....Office Staff
FRANK BREY.....Office Staff

THE MINNESOTA TECHNO-LOG BOARD

DEAN O. M. LELAND, *Chemistry;* PROFESSOR A. S. CUTLER, *Engineering;* CHAIRMAN, HERBERT JENSEN, *Chemistry;* GEORGE LEMKE, *Aeronautical;* REX GALLES, *Architecture;* LEON HAMLET, *Civil;* FRANK PELLEGRINO, *Electrical;* GORDON MAAS, *Mechanical*

The Editor Looks Back

With the last issue of the year it becomes appropriate for the incumbent editor to put some sort of farewell into words. So, at the risk of seeming sentimental, he will cast a look back over the year and perhaps try to peer into the future.

For the editor the past year has been pleasant for the most part. There have been some disappointments, but in the publications game one soon becomes accustomed to a certain amount of grief. Of course, no editor is ever able to try out all the schemes he would like to, but there are many things not in the records that make up for the reverses.

For one thing, he came to know a group of fellows who have diverging views, but a common interest in solving the engineer's problems, whether in the field or in society. He learned that some of the fellows always had good stories on tap. Parenthetically, there is nothing more piquant than the stolen joy of sitting heels-on-desk and shooting the bull as the printer's deadline inexorably closes in. He learned, in short, a lot of things that weren't in the textbooks about college, life, and publications.

As for the future, the editor has no fears. There are capable men on the *Techno-Log* staff to carry on next year. To them must go a large measure of the credit for the *Techno-Log* this year. In their hands next year's *Techno-Log* will prosper. The editor hopes that you will give them your cooperation.

One thing you might be thinking of as the school year comes to an end. During the summer you may have some interesting experiences. If you will check over copies of the early months of this year you will find several articles on vacation subjects. Or, possibly you may run across material on some engineering project. Remember that the *Techno-Log* is always glad to get student-written articles. Bring them around next October; 2,000 words is about right. We will not be here, but the new editor will welcome you.

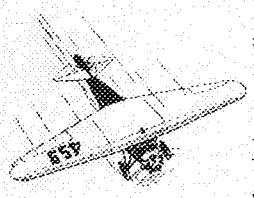
—*E. P.*

Alumni Notes

WE were sorry to hear of the passing away, a short while ago, of **James Childs,** chief of the Twin City Sanitary District. Mr. Childs was a University of Minnesota man, and extremely active in Civil Engineering. He graduated in 1909, and was on the State Board of Health till he resigned to become chief engineer for the Metropolitan Drainage Commission. When this commission was dissolved, the present Sanitary District Commission was set up and started work on the new $16,000,000 Twin Cities sewage project. More than any other person, Mr. Childs shaped plans for the project, and except for ill-health would have been chief engineer. He refused the office, and asked to be named sanitary engineer. Surviving are his wife and two children.

Horace Nutting, C. E. '25, also passed away recently. Mr. Nutting was working on the Hidalgo Co. Water Control and Imp. Dist. 1, Irrigation Dist. at Edinburg, Texas. While in school, he was active on the varsity swimming team, and active in Civil Engineering.

Encouraging news from the Aero offices. **Ray Killeen,** '34, is doing air traffic work in the United Airlines in New Jersey. Training as an assistant is **Thurman Erickson,** '34, working in airline inspection division for Pan-American Airways, at Brownsville, Texas. **Richard Nelson** is at the Seattle division of Boeing Air Corporation. His line is equipment installation on the new, confidential army bomber, being built by Boeing. At Baltimore is **Robert Jewett,** '31, in the Engineering division of the Glenn Martin Aircraft Company.



An electrical, **Harold Sanderson,** '32, recently moved to Beloit, Wisconsin, to take a position with Fairbanks Morse Company.

'Way out in the middle of the Pacific ocean, on a deserted island, **George Brimhall,** Aero E., '33 is chasing rats with a bat! No, he's not "batty," but working hard at his latest job, that of clearing Wake Island of rats in order to make it habitable and a safe place for storing of supplies for the latest great air venture of the Trans-Pacific division of the Pan-American airways: that of their new United States to China airline. George has charge of establishing air bases at five points along the route: Honolulu, Midway, Wake, Guam, Manila, and the western base, Hong Kong. It is reliably reported that Wake Island is populated by nothing but rats; and so, if his batting average isn't of the best, he may have to combine science and myth, by flying over with an airplane, and "Pied Piping" the rats into the ocean. Or have we any better solutions? Seriously though, we hope George will write and tell us more about the project, which no doubt soon will be frequently in the headlines.

From Estevan, Saskatchewan, Canada, we hear of **N. W. DuBois,** '26 M. E., who is superintendent of power distribution in the Dominion Electric Power Co., Ltd.

What the 1934 M. E. Class Is Doing

This list as compiled by Professor DuPriest, Head of the Mechanical Engineering Department, gives the names, company, and addresses of the complete 1934 M.E. class as of May 1, 1935.

Thor. W. Andersen	C.C.C. Camp	Grand Marais, Minn.
Frederick C. Brandt	St. Paul Structural Steel Co.	St. Paul, Minn.
Allen S. Burnett	General Electric Co.	Schenectady, N. Y.
W. G. Campbell, Jr.	Minnesota Power and Light Co.	Duluth, Minn.
D. D. Diamond	ERA Project, University of Minnesota	Minneapolis, Minn.
Douglas Erskine	Ford Motor Co.	St. Paul, Minn.
Leander Fischer	Graduate Student, Univ. of Minnesota	Minneapolis, Minn.
Bertram Getsug	Brown Sheet Metal Co.	St. Paul, Minn.
Herschell Gimple	Thomas Store	Minneapolis, Minn.
Arthur Hanson	Super-Mix Ice Cream Co., (owner)	St. Paul, Minn.
Helmer Hanson	Fairbanks-Morse Co.	St. Paul, Minn.
Charles Healy	Minneapolis-Honeywell Co.	Minneapolis, Minn.
Russell Johnson	Hardware and auto business with father	Hector, Minn.
Kay Jue	Marvel Seeder Co.	Minneapolis, Minn.
Sidney Karon	Laundry business	Duluth, Minn.
Ed. Kells	Graduate Student, Calif. Inst. of Tech.	Pasadena, Calif.
Everett Laitala	Graduate Student, Univ. of Minnesota	Minneapolis, Minn.
Theodore Lindstedt	Minneapolis Gas Light Co.	Minneapolis, Minn.
E. M. Maddock	Commonwealth Electric Co.	Minneapolis, Minn.
H. O. Mikkelson	Ford Motor Co.	St. Paul, Minn.
F. A. Olson	Arrow Head Steel Products Co.	Minneapolis, Minn.
Merwin S. Parks	International Harvester Co.	Berwyn, Ill.
Edward C. Petry	Armour Packing Company	St. Paul, Minn.
Ottakar P. Prachar	Graduate Student, Univ. of Minnesota	Minneapolis, Minn.
Robert L. Renz	Minneapolis-Moline Power Implt. Co.	Minneapolis, Minn.
Peter Riede	Marquette Manufacturing Co.	Minneapolis, Minn.
Frederic Smith	Minneapolis Gas Light Co.	Minneapolis, Minn.
Merton F. Snyder	U. S. Forest Service	Langdon, N. D.
Clifford Somesyn	Federal Cartridge Co.	Minneapolis, Minn.
Philip Sperry	International Harvester Co.	Chicago, Ill.
Norbert Sternal	Minnesota Mining & Mfg. Co.	St. Paul, Minn.
George Taylor	Woodward Governor Co.	Rockford, Ill.
L. F. Vobeydia	Arrow Head Steel Products Co.	Minneapolis, Minn.
Alonzo Vrooman	Air Reduction Sales Co.	Chicago, Ill.
Gladys Wallene	Secretary in law office	Cleveland, Ohio
James A. Wood	Ray Bell Films, Inc.	St. Paul, Minn.
Robert Yohe	Engineering Dept., S. S. Harrison, Dollar Lines, N. Y. C.	
George Lavacot	Waldorf Paper Co.	St. Paul
Andrew B. Carlson	Unknown	
Ed. Libby	Unknown	
Werner A. Paterson	Unknown	
Gordon Sturim	Unknown	

A. S. C. E.

PICTURED

1st row: Lindquist, Korstad, Larson, Turner, Springer, O'Brien, Enns, Lundheim, Nichols, Hanson; 2nd row: Johnson, Hamlet, Toy, Phelps, Kempe, Geottle, Arksey, Anderson, Giebenhain; 3rd row: Skrivseth, Perham, Schleiter, Harring, Carlson, Cutts, Englund, Wolfe, Sievertsen, Wahlroos, Schoell; 4th row: Peterson, Redman, Wallace, Healey, Wright, Graves, Bartel, Hedding, O'Laughlin, Dahl, Prendergast, Kolstad.

OFFICERS

The officers of the American Society of Civil Engineers are Everett Enos, president; Chester Hanson, vice president; Thomas O'Brien, treasurer; Richard Springer, secretary.

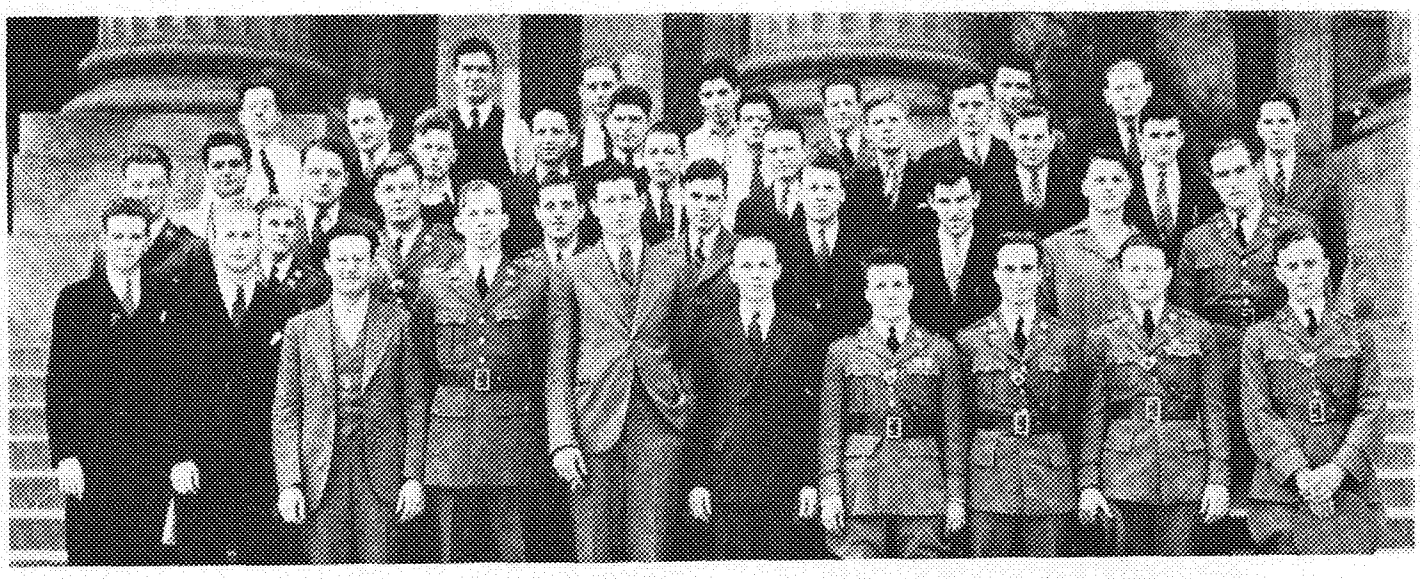
PICTURED

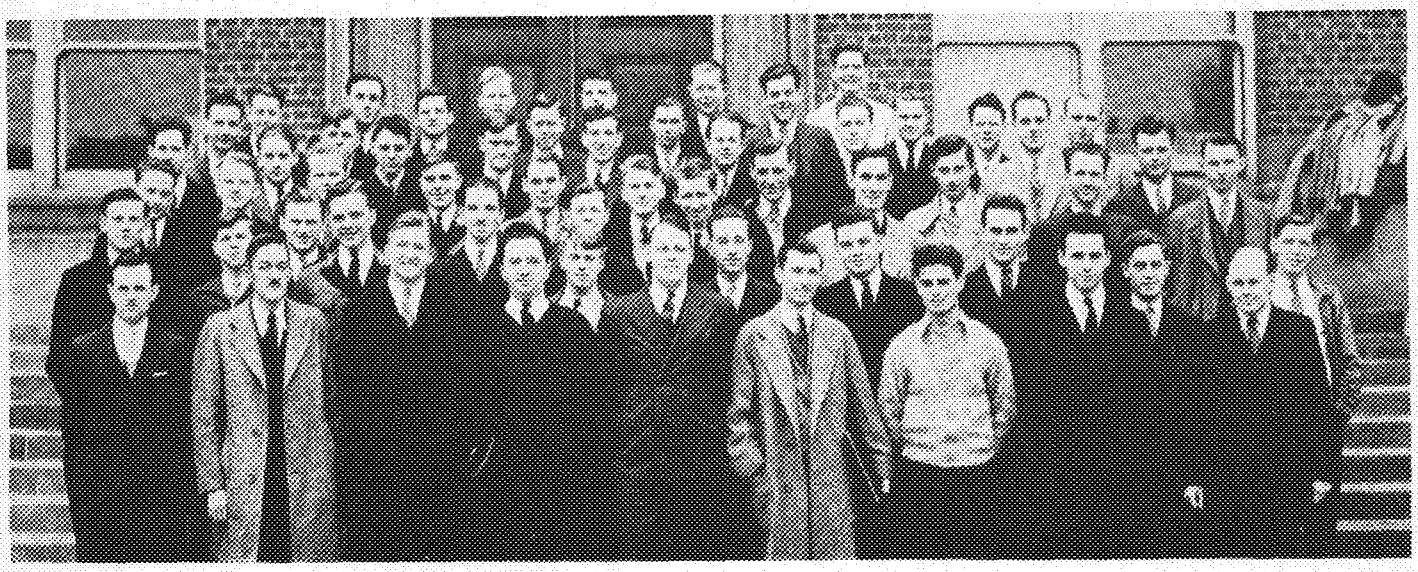
1st row: Cutler, Crockett, Lewis, Harrison, Kahn, Frederickson, Cottingham, Stinger, Schibe, Ender; 2nd row: Fadden, Haggenmiller, Mumm, Drummond, Graham, Pederson, Diercks, Kleinman, Ellis; 3rd row: Rosenbloom, Govze, Brown, Zaler, Eyster, Sward, Meyers, Smith, Raussel, Lones; 4th row: Guthrie, Grodin, Marsh, Kempf, Clayton, Yaffe, Oace, Kuphal, Krohn, Richardson, Novak.

OFFICERS

The officers of the American Institute of Chemical Engineers are Harry Cottingham, president; Ralph Frederickson, vice president; Howard Kahn, recording secretary; Stuart Harrison, corresponding secretary; Harold Lewis, treasurer.

A. I. Ch. E.





A. I. E. E.

PICTURED

1st row: Hermanson, Prof. Kuhlmann, Stone, Krauch, Ostergren, Reusch, Pellegrino, Bugni, Tangen; 2nd row: Kohlmoser, English, Smith, Becklund, Hallaway, Laing, Bleuer, Cohen, Sather, Goldfus, Price; 3rd row: Kojola, Passi, Diekhoff, Williams, C. Norton, Clifford, Nelson, Brastad, Larson, Steinmetz, Baranofsky, Kerns, D. Erickson; 4th row: Shortley, Kephart, Nielson, V. Norton, Noggle, Newell, J. Erickson, Haygarth, Carter, May, Iverson, Bernard, Burton; 5th row: Naeseth, Boese, Robinson, Russ, McGlone, Olsen, Westlund, Boyce.

OFFICERS

The officers of the American Institute of Electrical Engineers are Leonard Ostergren, president; Edward Tangen, vice president; Carl Penning, secretary-treasurer, Professor J. H. Kuhlmann, honorary president.

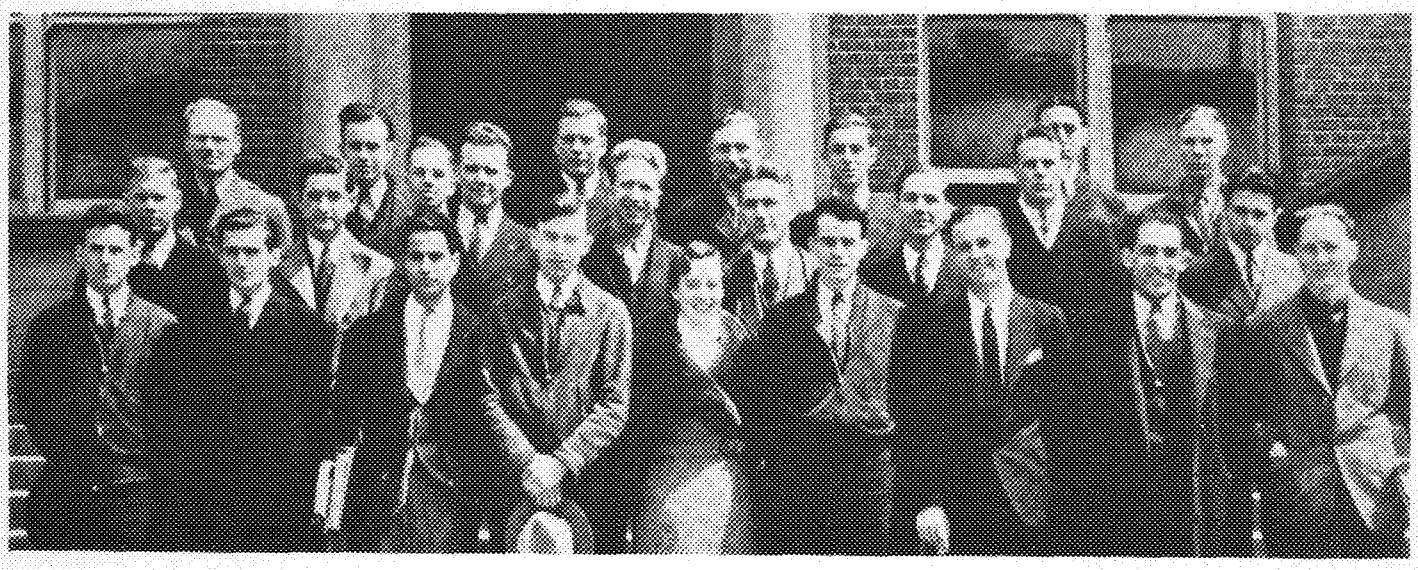
PICTURED

1st row: Zinn, Aiken, Hagger, Feeney, Earnhill, Pribyl, Berline, Falbaum, Davidson; 2nd row: Jacobs, Proebstle, Lindquist, Welles, Lau, Harmon, Smith, Kerker; 3rd row: Kromer, Stephens, Halston, Nygren, Wehmanen, Pusin, Beaupre, Adams.

OFFICERS

The officers of the Minnesota Society of Aeronautical Engineers are Roland Zinn, president; Jack Intlekofer, secretary; George Lemke, treasurer.

M. S. A. E.



ST. PAT
Frederick Bartel

THE QUEEN
Edith Reed

FRIDAY, May 17 brings to the campus the twenty-second annual Engineers' Day, complete with Parade, Open House, Dansant, and Brawl. Since 1914 loyal engineers at Minnesota have been hauling the Blarney Stone out of its mysterious hiding place and with appropriate ceremonies and gaiety dedicating the graduating seniors to the service of the patron saint of the engineers. In the 22 years of its life the "brick" has seen many adventures.

Engineers' Day itself has had a colorful history of 30 years. The first record of any celebration by engineers is at Missouri, where in 1905 one, Hain, conceived the idea of marshalling the engineers on St. Patrick's day and celebrating. Why St. Pat was chosen as the patron of the engineers is a mystery. Tall stories by the hundreds have emerged from the "bull sessions" of Pat's sworn followers. That he drove worms, then snakes, from Erin and thereby made the first worm drive; that he invented "the calculus, and handed it down for us to cuss," that he discovered the principle of the slide-rule while tending the sliding gates of Blarney Castle; that he began the study of lubrication with his invention of "good ould Irish poteen"; all are recounted by the knights.

Professor George Priester brought

ENG

ARRANGEMENT

Jack Intiekofer, chm.
Eugene Catts
Charles Steinmetz
Milo Bolstad
Ted Swenson
William Schoell
Lloyd Giebenhain
Jack Blomstrand

PARADE

Bertil H. T. Lindquist, c
John Stuck
Russell Carlson
Richard Black
Homer Stewart
Arnold Lundberg
Dario Anslemo
Lester Miller
George Hagger

OPEN HOUSE

Gerry Mitchell, chm.
Lester Solstad
Dale Stevenson
Alden Carpenter
Wallace Petri
Lee Paul
Myron Sandberg
Malcolm Lein
Clinton Hegg

CHEMICAL SHO

Harry Cottingham, chm.
Howard S. Kalm
William Prouty
Ralph Fredrickson

BRAWL

C. Cruse Honey, chm.
Jim Acker
Marvin Lee
Henry Lykken
Earl Olson
Don Swanson
Karl Haugen

TICKETS

Earl Bennetsen, chm.
Bernhardt Petry
Victor Gilbertson
Lee Funke
Ralph Lindholm
Roy Dynesius
John Wentz
Thomas Ruth
Bob Hose

CAMPUS PUB.

Howard Clark, chm.
Wayne Stone
Robert Dixon
Condit Revier
Marvin Walseth

DOWNTOWN P

Lloyd Bredveld, chm.
Melvin Lohmann, chm.

ERS'

lace Ardeen
Springer
rge Reynolds
ak Sandgren
s. W. Guptil

KNIGHTING

Hanson, chm.
ert Ronquist
Peterson
old Sjostrum

DANSANT

es Moore, chm.
Goettl
ncis Duschik
ge Vicnorsen

GREEN TEA

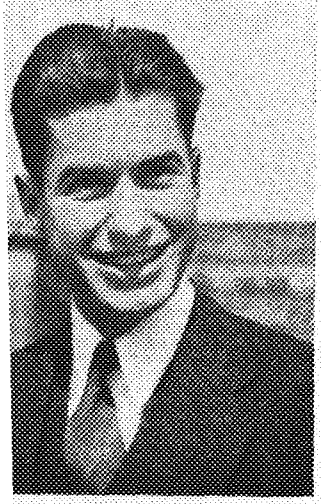
iam Bend, chm.
is Anderson
othy Towne
en Rischoff

POSTERS

lis Hardenbergh, chm
hard Brandhorst
rles Frost
ot Anderson
ard Baldwin
don Schlichting
ert W. Hose

BROADCASTING

Bragdon, chm.
ur Broms
am McVicker
ard Seeger
Polin
in Von Eschen



JACK INTLEKOFER

the tradition to Minnesota in 1910. He was an instructor, fresh from the senior class at Iowa, where the engineers had a week of celebration. Not until 1914 did Minnesota engineers adopt the idea. St. Patrick's day was chosen for the festivities.

After the celebration the Blarney Stone, of history unknown and with weird Punic inscriptions on its sides (for the Phoenicians first brought the stone to the groves of Blarney) was hidden in the stone quarry south of the present site of the Medical group. In 1915 the stone was dug up and carried to a shed belonging to Professor Frank Rowley. The shed was on the ground where the Library now stands. The day before the celebration the Miners rushed the guards placed over the stone and tried to drag it away. The guards resisted valiantly and one escaped and aroused the Engineering building. History records that the engineers "made their exit from the building by every available door and window." Rushing pellmell across the campus they fell on the shovel-swingers and scattered them.

The knights carried the stone up the steps of the engineering building but there the Miners attacked again, now reinforced. Up and down the steps the stone was dragged, first by one group, then by the other. At last however, virtue triumphed and the Blarney Stone was installed safely in the engineering building. The celebration next day went off without hitch.

But the miners, smarting under their defeat, vowed vengeance. The next year their attack was successful. They overpowered the guards, seized the sacred monolith, and rolled it down the steep bank back of the Mines building into the Mississippi river. The engineers searched for a long time and at last the mystic powers of the stone came to the rescue. The tale is told that during the night the searchers saw reflected on the placid surface of the river a glowing green shamrock.

A loyal engineer, Oscar Larson by name (one of the Minnesota Larsons, perhaps) dove into the stream, and sure enough, there below was the sacred stone. Brawny engineers fixed cables to it and lifted it out. The "muckers" were defeated again.

This year the program will be little changed from the customary calendar handed down for so many years. The day begins officially at 9:30 a.m., with the opening of the Open House doors. The Mechanical, Electrical, Main, and Experimental engineering buildings and the Chemistry building will be thrown open to the public. Committee chairmen guarantee to leave the crowd gasping with astonishment at their exhibits. Souvenirs will be given to visitors according to the usual custom. The buildings will be open until 5 p.m.

Floats in gaudy and serious design will feature the Parade, led by the University Marching band. St. Pat and his queen will ride in state in the procession with their honor guard of seniors. The procession will march from the E. E. building to University Ave.; on University Ave. to 10th Ave.; on 10th Ave. to 5th St.; on 5th St. to 14th Ave., arriving finally at the Knoll, where the graduating seniors will kneel before the thrones of Pat and the Queen, kiss the Blarney Stone and receive the accolade at the hand of Minnesota's reincarnation of the Saint.

The Green Tea and Dansant will be the affair of the afternoon. Interior Architects will serve the tea in the architecture library, and Hal McIntyre's orchestra will play for dancers in the auditorium. The Dansant will begin at 3:30 and continue until 5:00.

The crowning event of the day, the Engineers' Brawl, will be held at the Union. Beginning at 9:30 in the evening it will continue until 1:00, to the music of Hal McIntyre's orchestra.

BUTTONS

John Wolfe, chm.
Mary Lou LeBlond, chm.
Ione Kuechle
Phyllis Borgat
Dorothy Towne
Irene Gorman
Betty Vincent
Orville K. Wright
Raymond Hopper
Richard Appert
Josephine Woodward

PRINTING

Tom West, chm.
Laidman Robinson
Albert Jacobs
Charles Rubley
Harold Hammerschmidt
Clarence Reave

OFFICE

William Brastad, chm.
Hugh Kent Laing
Albert G. Oswald
William P. Smith

Flying Club

PICTURED

Kragness, Bennetsen, Driscoll, Proebstle, (Pres.), Zinn, Salisbury, Smith, Barlow, Barnhill, Carhart, Prof. Ackerman, Jacobs, Church, Siegel, Morse, Bush, Ray Proebstle, Onsgard, Williams, Heinke.

OFFICERS

Flying Club officers for the second year of 1934-35 are: Leonard Proebstle, president; Al Driscoll, vice-president; Earl Bennetsen, secretary; Alden Smith, treasurer; Richard Jacobs, assistant treasurer.

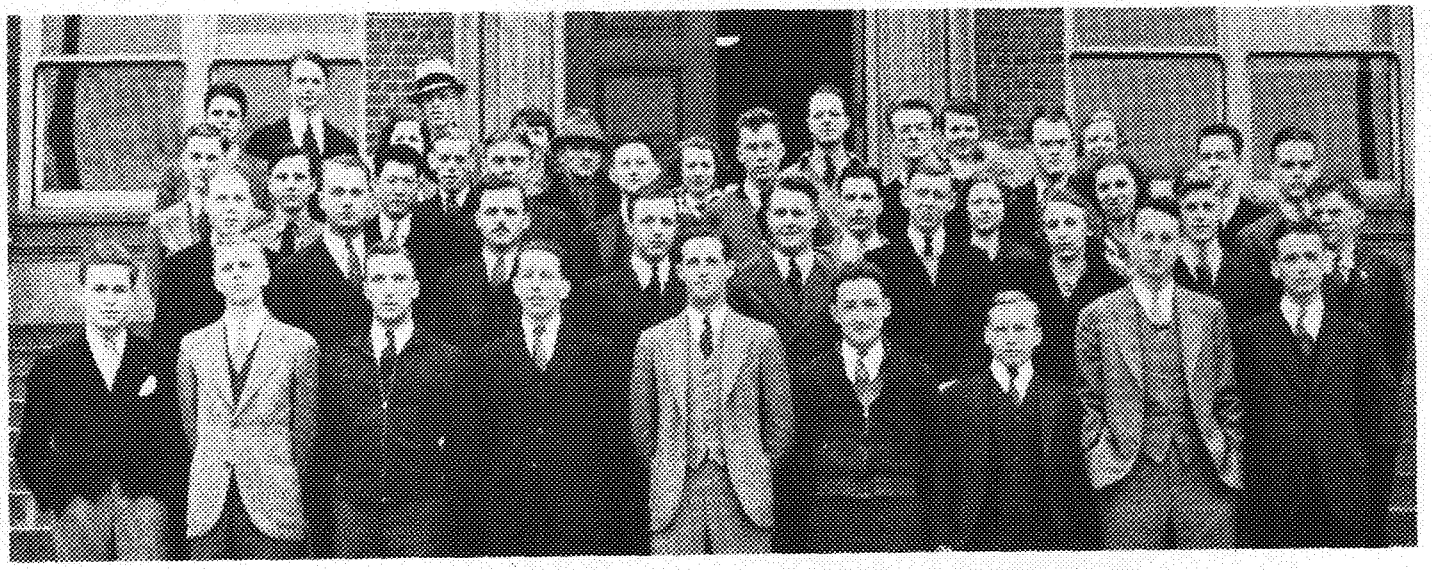
PICTURED

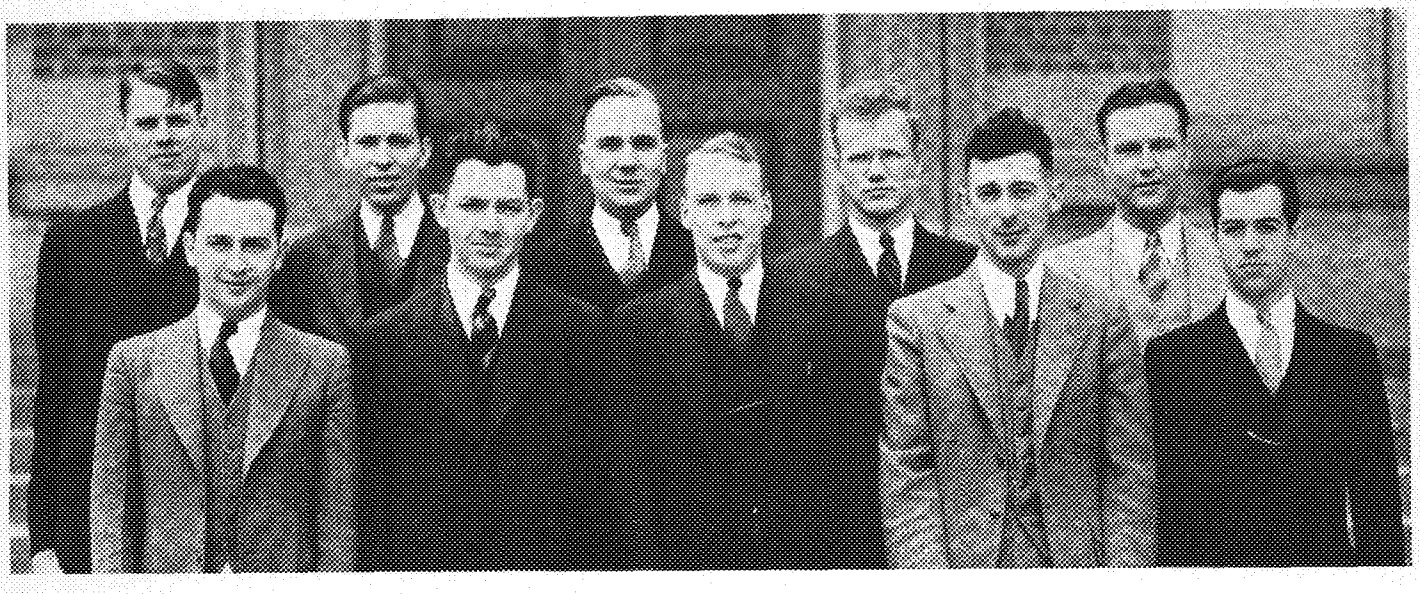
1st row: Brandhorst, Brazer, Walters, Tuscany, Gilbertson, Lehman, C. Johnson, J. Frost, Lofstrom; 2nd row: Diehl, Rohde, Sperry, Swan, Carlberg, Walley, Morienson, Herz, Rice, Klogel, Erickson, Pronnett; 3rd row: Hose, Reigert, Nitta, Wolfgang, R. Johnson, Lein, Tudor, Kuechle, W. Frost, Schlichting, Towne, Broms, Vincent, Folsom, Frahm; 4th row: Smith, Hardenbergh, Bend, Fugelso, Hanley, Cook.

OFFICERS

The officers of the Architectural Society are Victor Gilbertson, president; Robert Auvinen, vice president; Mable Johnson, secretary; Collis Hardenbergh, treasurer.

Architectural Society





A. S. M. E.

PICTURED

1st row: Kolinsky, Howard, Prof. Ryan, Edeskuty, Cooper; 2nd row: Nelson, Olson, Sweatt, Stone, Knus.

OFFICERS

The officers of the American Society of Mechanical Engineers are Edgar Howard, president; Joe Edeskuty, vice-president; Malven Olson, secretary; Wayne Stone, treasurer.

Now Here's A Book

By Clifford I. Haga

INSTRUCTOR IN ENGLISH

LEWIS MUMFORD'S "Technics and Civilization" is as exciting a book as one can get hold of—especially if he is an engineer who wants to learn his place in the scheme of things. It ought to be Required Reading for everyone else, as well, for it is the first attempt to deal completely with that modern phenomenon, the Machine Age, without scaring the wits out of the reader with spooky robots and other swivel-jointed devils. Mumford trails the machine back to its origin, and then follows it on up through the centuries—it's really astonishing what a venerable thing the Machine Age is—to the present time where we stand on the threshold of a new era in which (if everything goes well and this really is Utopia) we can all heave a sigh of relief, uncross our fingers, and proceed to live the good life on the basis of a ten-hour week with neither death, taxes, nor leaks in the roof to trouble our chromium-plated souls. Mumford is not sure that it will be Utopia, but in an ardent last chapter he urges us to grow up and make the possible the probable.

As I said, he makes out that the Machine Age is not a thing of yesterday. Instead of starting his story, as most people do, with Watt's steam engine and the Industrial Revolution of the Eighteenth Century, he goes far back to the Eleventh Century and sets up a monument in a monastery. Before we could have machines, he says, we had to *want* machines. In his early chapters he shows us what were the intellectual, political, and social influences which made machinery possible by making it necessary. Then, using Geddes' classification, he names the periods of development: the Eotechnic Phase from about 1000 to 1750; the Paleotechnic, 1750-1850; the Neotechnic, 1850-1930; and, last, the Technic, since 1930. That is to say, in the beginning we had energy-conversion systems of a low efficiency using wind, water, and animal power; next, the more efficient heat energy systems of steam power; third, the incredibly flexible and efficient electrical system; and, fourth, the electro-chemical system, whose possibilities are known only to God, Charles Kettering, and two or three men locked up in a DuPont laboratory.

It is a rich story and an exciting one that Mumford tells; not a machine or process of any importance is overlooked, and few of its repercussions on our life as a whole are ignored. As a result of reading "Technics and Civilization" one will be able to see that the Machine Age has some good points and that engineers and technologists who nursed it along have by their efforts remade even such remote things as art, literature, music, and religion—to say nothing of more spirited pastimes like love, sport, and politics. (Perhaps, the cynic might say, that's the trouble with each of those today.) And finally, the book has—oh most noble virtue!—an excellent bibliography.

1935 Chemistry Show

A PAGEANT of ancient and modern chemistry will be the School of Chemistry's part of Engineers' Day. Sponsored by the Minnesota Chapter of the American Institute of Chemical Engineers, it will be held Friday, May 17, and Saturday, May 18.

The Exalted Grand Master Alchemist, Harry H. Cottingham, commonly known as egma, is in charge of general arrangements. Grand Master Alchemists, his assistants, are William Prouty, Ralph Frederickson, and Howard Kahn. The Master Alchemists are in charge of committees. The doors of the building will be guarded by a huge reptile, the pet of egma. Staring, and with green fire flowing from his open jaws, he will welcome the visitors. This snake is the only survivor of St. Pat's great worm drive of Ireland.

The public will be taken through the initiatory rites of the Ancient and Royal Order of Alchemists. They will see the dark, dusty, and dismal laboratories of the alchemists and later pass into the laboratories of the modern scientists. Calman Kish is head initiator.

The laboratory of stunts and freaks, under the supervision of Leonard Waldoch, will feature the personality register. All engineers and their girls are invited to try out this apparatus. It knows all, sees nothing, but tells plenty.

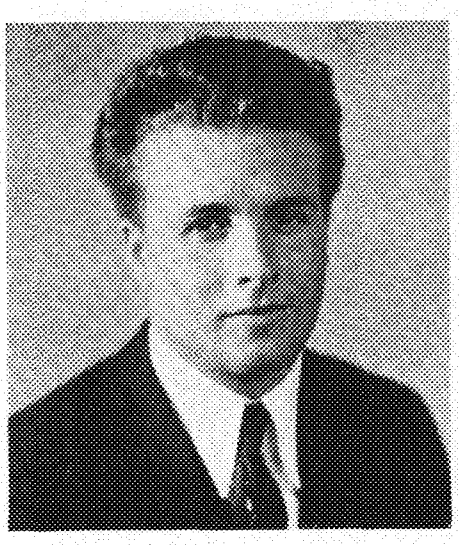
The Sisters of Alchemy will demonstrate their skill under the direction of Faith Anderson. A cosmetic exhibit, showing the compounds which produce the healthy complexion of the fair sex, will be arranged.

"Allah's Garden," an array of chemical flowers will be prepared and allowed to grow during the show. A fortune-telling apparatus which operates on the principle of colors of liquids will be operated to divulge the future of the spectators. Photographs will be printed on the faces of leaves. All of these experiments will be arranged and managed by the coeds of our college. The secretarial work connected with the arrangements and production of the Pageant was done by Betty Blomberg.

The glow-worm will have to do some tall flitting to outshine the members of the chemi-luminescence department, headed by William Pritchard as chief glow-worm. Certain organic compounds will be mixed together and will produce enough light to enable one to read a newspaper. The light production will take place in a cake of ice to show that it is really cold light. This department will include a display of Crookes and Cathode tubes and a demonstration of fog track apparatus showing the trail of a radio-active emanation.

The inorganic and organic laboratory will be in charge of Robert Richardson and Edward Marshall, respectively. These laboratories will show the operations of simple chemical processes by which common products are derived.

The bio-chemical exhibit is in charge of Eric Kneen and W. W. Benton. These exhibits will show the use and value of chemistry to plant and animal life. Many microscopes under which slides of plants are placed will be shown.



Harry Cottingham

During the past two weeks, under the supervision of Everett Drummond and under the direction of Willard Stinger, the road show has traveled to the high schools of the Twin Cities. There they have produced two melier-dramers, "Explosive" and "A Janitor's Life." These plays are of chemical nonsensical nature. They were produced to arouse the interest of the students in the Chemistry Show. These plays have met with much success, and will be reproduced during the course of the show. All of the players and stage hands are students of the Chemistry College.

To the visitors of the show, a free bulletin will be given. This bulletin, edited by Fred Meyers, will contain, in addition to the program for the auditorium performances, the list of exhibits and the students responsible. Among its pages will be found humor, cartoons, and news of a more serious nature pertaining to the School of Chemistry.

Of great benefit to high school students will be the Vocational Guidance Bureau, the purpose of which will be to assist doubtful persons in the selection of their profession.

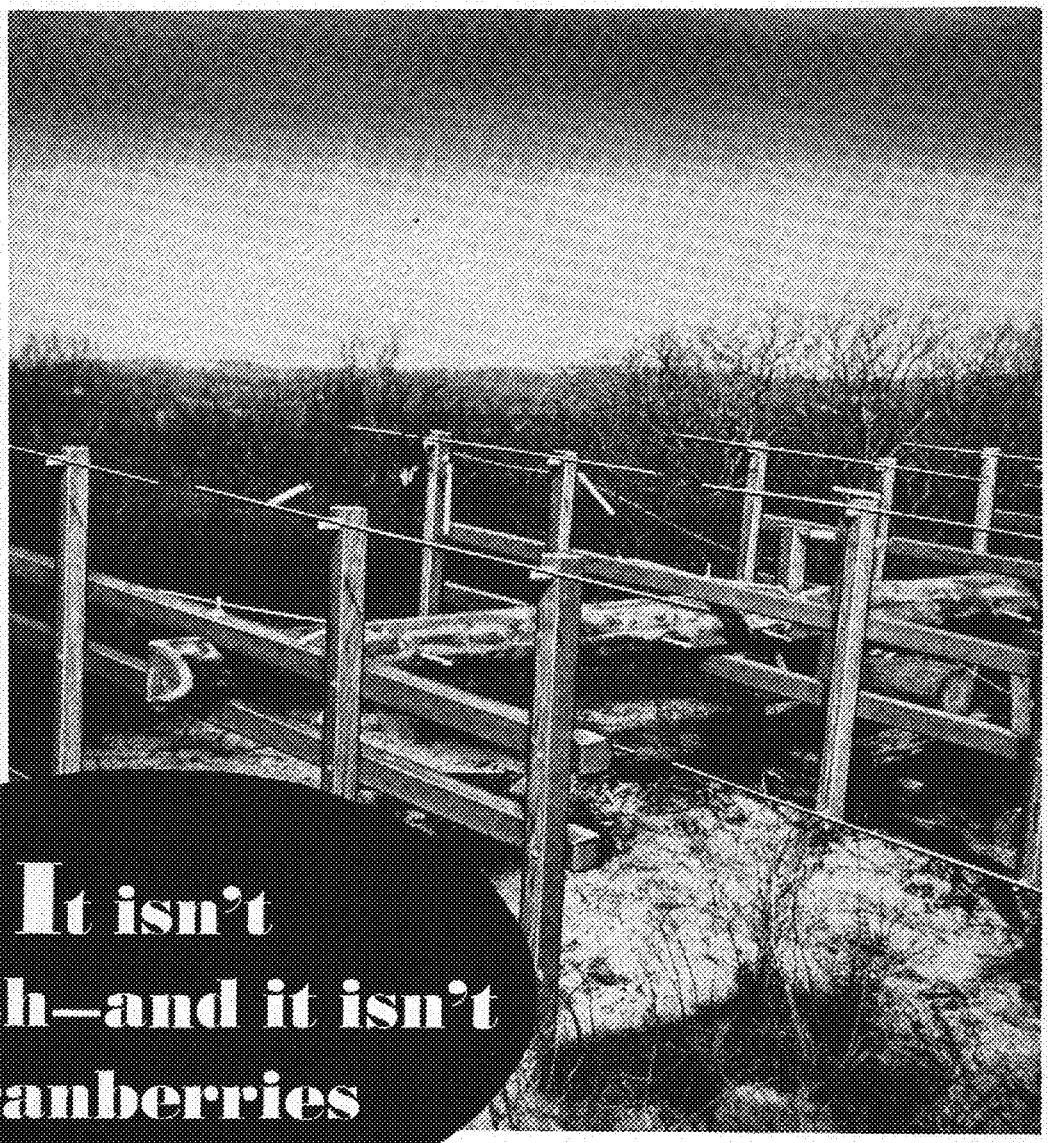
Master Alchemists of Chemistry Show Committees

Name	*Committee*
Arthur Danielson	Photography
Harold Lewis	Finance
Fredrick Meyers	Publications
Leonard Waldoch	Stunts
David Grahame	Phys. Chem.
Edw. Marshall	Org. Chem.
Willard Stinger	Dramatics
Clarence Euler	Alumni Notif'tion
Walter Cutler	Public Welcome
Jerome Haggenmiller	Publicity
Leslie Bernick	Display
Robert Ellis	Ind. Exhibits
Everett Drummond	H. School Coord.
Robert Munum	Mimeography
Elsworth Crockett	Signs
Robert Richardson	Inorg. Chem.
Faith Anderson	Women's Ex.
William Pritchard	Chemi-lum.
Calman Kish	Initiatory Rites
Marian Sedin	Bacteriology
Ed Schiebe	Snake Care
Albert Savage	Anal. Chem.
Eric Kneen	Bio-Chem.
W. W. Benton	Bio-Chem.
Gerald Raymond	Visual Edu.
Ralph Oace	Chem. Eng.
George Mitchell	Crime Detection Lab.
Martin Jaffee	Crime Detection Lab.

It will be worth your while to attend the show because the biggest part is educational as well as interesting and brought down to a level so that everyone can understand.

St. Pat, the faculty, and committees in charge welcome you to our show.

(For Pat's Sake, Don't Miss It.)



It isn't codfish—and it isn't cranberries

It's an ultra-short wave radio telephone antenna—before being raised above the dunes of Cape Cod. ℂ. For some years, Bell System engineers have been studying ultra-short waves. They have developed automatic transmitters and receivers which may be connected with regular telephone lines at points far from central offices. They hope such radio links will be useful in giving telephone service to points difficult to reach by usual methods. ℂ. The installation on Cape Cod—which is now undergoing service tests—is just one more example of Bell System pioneering in the public interest.

Why not telephone home one night each week? Bargain rates after 8:30 P. M.—reverse the charges if your folks agree!

BELL TELEPHONE SYSTEM

April's Architectural Designs

Art Exhibit

THE exhibit of the Association of Collegiate Schools, shown at Minnesota for several weeks in April, is, this year, devoted to showing work in construction done in the various schools. Several schools seem to integrate design and construction in what must be a most constructive manner. The star of the exhibition showed just such coordination. Winner by popular acclaim was Wolf Jessen of Texas, represented by an outstanding example of the "slap-dash" school of water-color rendering. This *esquisse-esquisse*, a doorway, was accompanied by a very finished and professional appearing working drawing, easily the best in the exhibit. The question most often asked by student lookers-on was, "When do they find time for all this?" Another exhibit that elicited much wonderment was a full-size chair detail done as part of the work in interior design at U.S.C. There was some doubt displayed as to the results if such full-sizing practice were of universal application.

Design

The first four weeks of the spring quarter were both busy and important ones in the drafting rooms. Contrary to the usual practice of staggering the problems, all grades had problems due simultaneously, leaving almost everyone high and dry without "niggers." To add to the interest, the only prizes of any economic value, those given by the Gargoyle Club and the Alpha Alpha Gamma sorority, were in this set of problems.

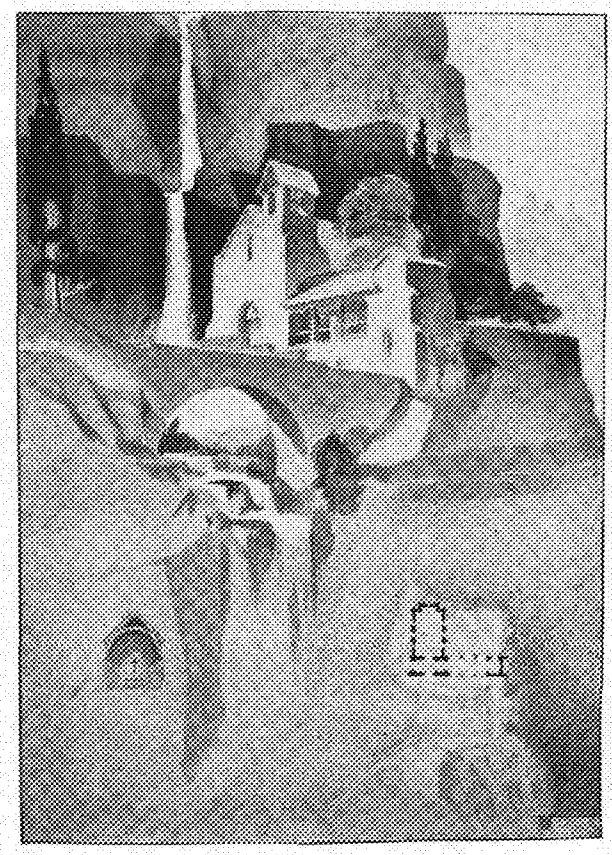
The Gargoyle prizes, now the ranking monetary awards in school, were won by Fred Mann and Robert Hose. The problem was the design of a small chapel in the entourage of a mountain monastery, of the Roman Church, used by laymen seeking spiritual redress from the buffets of an indifferent materialistic world. This chapel, supplementing a larger one, was to be used chiefly for individual prayer and only the most minor of services. Mann's *projet*, characterized by a realistically beautiful rendering, reflected the calm yet rugged simplicity demanded by the function and the site. Hose's *projet*, while somewhat more elaborate and formal, had the same feeling.

The Alpha Alpha Gamma prize, in Grade II, was awarded to John Perkins for his solution of "A Lobby in a Steamship Office." He employed a symmetrical design done in wood panelling. Second place, taken by Doris Anderson, employed a sweeping curved ceiling, giving the feeling of the open sea. Mary Lou LeBlond was also awarded a mention on a more or less standard variation.

The freshman class took two problems: "A Park Commission Headquarters" for the architects and a "Patio" for the interior architects. Richard Frahm took First Mention on a low-slung brick job, admirably suited to the function and the site. Talbot Jones, William Millbraith, and Lester Morley were awarded mentions on problems somewhat more formal. In the Patio problem two First Mentions were awarded to Minnie Marie Hanson and Elizabeth Vincent for beautifully rendered problems. Dorothy Ebel and Marguerite Osborne were given Mentions.

The seniors were, this time, dealing with reality. The class was divided into two sections, one finding some use for Nicollet Island, the other designing a Christian Science Church for a sloping site at the intersection of Calhoun and Excelsior Boulevards. In the Nicollet Island problem, Norman Fugelso and R. Isaacs won Mentions for their adaptions of Labor Center to the Island. Also in the running, although farther along, were airports, a zoo and a transient camp. In the church division Thomas Tudor and Armin Rohde were awarded Mentions for their solutions of the sloping site.

A Mountain Monastery



It is trite but true that a photograph hardly does justice to this brilliant watercolor of Fred Mann's.

Arch. Society

The Architectural Society, meeting in solemn conclave on Thursday, May 2, 1935, elected officers for the 1935-36 school year. Those elected were: Collis Hardenbergh, president; Gordon Erickson, vice-president; Fred Mann, treasurer; and Miriam Bend, secretary.

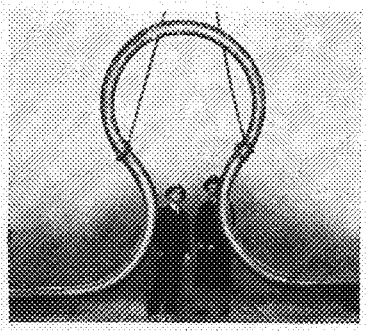
—*Gerhard Brandhorst*

Streamlined Piping

Oxy-acetylene welding and cutting add a new note of grace and efficieney in modern piping systems.

By **G. O. Carter***

Nowadays everything is being "streamlined" — airplanes, automobiles, trains, ships, approach their greatest degree of grace and efficiency through this design principle. Usually their streamlining is all on the outside. Piping joined by welding is streamlined both inside and outside.



WELDED ASSEMBLIES such as this loop in a steam line are easily made.

100,000 Miles Installed

Welded joints were first used for river crossings in oil pipe lines. They proved strong and sturdy enough to withstand the shocks of this difficult service. Soon welding came into general use for every joint in the line. Today over 100,000 miles of welded pipe carry oil, gas and gasoline over the country.

The economies which welding brought to the construction and maintenance of pipe lines led to its adoption for power plant and industrial piping. Now it is the first choice of many engineers for all kinds of piping.

Prevents Leakage Loss

Streamlined welded piping has many attractive features besides its smooth lines. Welding is sound, safe, and in the final analysis, the most economical way of putting pipe together.

Welding makes a "jointless" job—insures the owner from future maintenance. Permanence is so positive that in the Cathedral of St. John the Divine in New York, welded piping has been installed in masonry walls fourteen feet thick. In other instances coils of welded piping have been set directly in plaster in the ceilings and walls of beautiful residences. Modern skyscrapers enclose mile upon mile of welded piping. In one building group in the East there are over 85 miles of welded steam piping alone.

Avoids Friction

Pipe joined by welding is smooth inside and outside—truly streamlined. The smooth outside makes insulation less costly and easier to apply. The smooth inside makes friction negligible and reduces power losses. Welded piping is now used for gases and liquids of all sorts and for many solids—requiring pipe of every size and of almost every metal.

Permanent but Flexible

To be a sound investment today, buildings must remain relatively free from maintenance. Piping must be permanent, strong, leakproof and reasonable in cost.

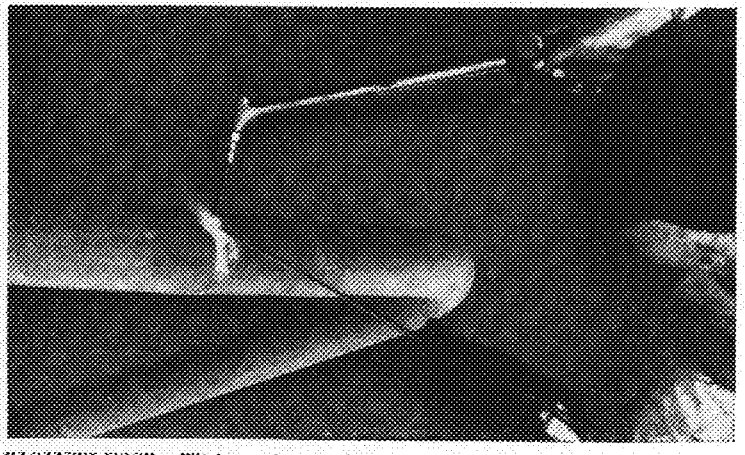
SINUOUS CURVES of welded pipe sweep from floor to floor carrying steam, water, gases and liquids.

Welded piping is permanent. But alterations can be made easily when desired. The oxy-acetylene cutting blowpipe gives the ready means of making an opening. The addition is then tied-in simply by means of welding. This is especially important in the modernization of old buildings.

Installation Facilities Everywhere

The Linde Air Products Company, a Unit of Union Carbide and Carbon Corporation, has pioneered many applications of the oxy-acetylene process in pipe welding. Without cost or obligation to you, it will gladly furnish complete data on welded piping methods. It will make available also such further technical assistance your engineers or construction men may require. Linde Sales Offices are located at Atlanta, Baltimore, Birmingham, Boston, Buffalo, Butte, Chicago, Cleveland, Dallas, Denver, Detroit, El Paso, Houston, Indianapolis, Kansas City, Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Phoenix, Pittsburgh, Portland, Ore., St. Louis, Salt Lake City, San Francisco, Seattle, Spokane, and Tulsa.

Everything for oxy-acetylene welding and cutting — including Linde Oxygen, Prest-O-Lite Acetylene, Union Carbide and Oxweld Apparatus and Supplies—is available from Linde through producing plants and warehouse stocks, everywhere.



"JOINTLESS"—With a safe, simple and portable oxy-acetylene welding and cutting outfit and suitable welding rods, pipe of any size, any commercial metal, is assembled rapidly into sound jointless piping systems.

*Consulting Engineer, The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation.

KAHN-NOTATIONS

By Howard Kahn, Ch. E. '35

One of the local athletes evidently doesn't confine his activity to sport alone. He has been rushing a girl for about three months, and, according to her confession, he kissed her the other evening for the first time. "And," said the gal, "has he got technique!" After all that time, he should have something.

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Alpha Tau Sigma, honorary journalism fraternity, is showing signs of life . . . and about time. . . . You can give your wife real property, but you can't sell it to her. . . . The DANGER signs at the American Steel and Wire Co. are printed in six languages. . . . The by-products of the U. S. S. Lead Refining Co. are more valuable than the main product . . . the former being gold and silver. . . . All males under 21 years of age are infants in the eyes of the law. . . . Try the mock-trials at the law school for a full afternoon's entertainment . . . a gigantic battle of liars. . . . Prof. Martenis, by actual count, "ah-ed" 600 times and "eh-ed" 150 times per hour during one lecture.

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The Daily states:

"Little Ruth Slenczynski, 10-year-old prodigy who recently played her way into affectations of Twin City Music lovers . . ."

—The reporter who couldn't take it. After spelling her name, he was through for the day.

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It was in the Grasselli Chemical plant and the inspecting chemical engineers paused before entering the insecticide department. The guide was hesitant about entering because of the dangerous breathing conditions prevalent, at which the class insisted that Kenny Ray should be taken through. Whereupon the pilot naively asked, "Why? Is Kenny an insect?" But no one knew whether he was or not, and so the trip was resumed.

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And then there are the untouchable Chinese girls, Too Yong Too, and No Yen Too.

U. Aeros Active in National Fly Club

The National Intercollegiate Flying Club, which has been in the process of formation for the past two years, was completely organized at a recent convention in Washington, D. C. It has been formed as a special chapter of the National Aeronautic Association.

Richard Jacobs, winner of the second prize in the Boeing Scholarship competition, was the chairman of organization.

On April 1 and 2, delegates from 20 different colleges in the United States met in Washington to form the organization. There were 75 representatives in all, Minnesota having 17 delegates.

Earl M. Bennetsen and Donald A. Martin, both of Minnesota, were elected secretary-treasurer and delegate-at-large on the executive council, respectively.

Plans are now being formed for a national college flying club meet to be held at Purdue.

A. S. A. E. Plans Trip to Georgia

Tentative plans for a pilgrimage to Athens, Georgia, are being made by the Minnesota Student Branch of the A.S.A.E. This city will be a Mecca for the Agricultural Engineers during the latter part of June. Several graduating agricultural engineers are planning to attend this joint meeting of the Senior and Student Branch of the A.S.A.E.

Although Lester Malkerson, president of the national as well as the local organization, firmly denies that Plato's "Beauties of Ancient Athens" has reference to Athens, Georgia, the rumor persists that Lester has already acquired a wardrobe as befits a Southern gentleman.

On the evening of April 18, Mr. F. E. Carroll of the Deere and Webber Company addressed the society on "Modern Credit Practices" at a meeting held in the Minnesota Union.

E. E. Shop Notes

Bob Auten, Freshman Electrical, deserves the title "Biggest Liar on the Engineering Campus." Bob was given the job of explaining to the gullible public, including some engineers, the manner in which the tin-can motor at the electrical show operated. Not satisfied with a straightforward and true explanation of the motor, Mr. Auten decided to add a few fine points to the theory and informed those visiting the exhibition that the tin-can motor received its motive power via radio waves. He even went into a complex explanation of the method by which the polarity of the transmitted radio wave was changed to change the direction of rotation of the motor. Bob even claims to have pulled in certain professors with his explanation and judging from the crowd continuously around his exhibit we can believe it.

The staff of the amateur station W9YC has grown some gray hair since the Electrical Show. Being of a generous nature, the station manager, R. C. Angster, offered to send messages free of charge to all points of the globe for those who visited the exhibit. The result of this generous offer was amazing if not a bit tragic. During the two days the show was held, over 400 wires were filed at the station. There were messages for Norway, Italy, Hawaii, Philippine Islands, China, New Zealand, South Africa, and Australia, to say nothing of the fairly local ones for South America and Cuba. As result of this pile-up of traffic the station has been operated almost continually since the closing of the show.

A. S. M. E. Delegates in Chicago for Annual Midwest Convention

The program of the local branch of the A. S. M. E. for this month was highlighted by the Third Midwest Student Conference in Chicago. Eight members made the trip along with Prof. Jimmy Ryan whose job as chaperon became a figurehead soon after they passed the city limits.

Besides two days of good clean fun touring the town, the boys derived a great deal of knowledge and inspiration from the technical sessions and the inspection tours sponsored by the society. The mornings of the two conference days were spent in presentations of papers by representatives of fifteen midwest engineering colleges. Minnesota's representative, Lee S. Whitson, spoke on the subject "Decentralization of Industry" and prompted a discussion which had to be curtailed by the chairman in order that the program might go on. The social feature was a banquet and "stunt night" at which the local men presented the "anti-harmony" quartet accompanied by the now famous "Concert Grand Pipeless Organ." It was only after a terrific battle that the hula-hula act of Joe "Stuff" Edeskuty, more usually known as "Grass Skirt Joe" was intercepted in time to protect the innocence of several lovely maidens present at the meeting.

Probably the most interesting trip was a tour of the Illinois Steel Company. Bessemer refining, rolling mill and blast furnace operations were in full swing. Some of the fellows also took in the Allis-Chalmers plant and the A. O. Smith automatic frame plant in Milwaukee on the return trip.

Ostergren First in Paper Contest

Leonard Ostergren, senior electrical engineer and president of the society, won first place in the A. I. E. E. prize paper contest with a discussion of the Electrical Stroboscope. He was given a $25 prize by the Minnesota section of the national organization, who also presented a second prize of $15 to Edward Tangen, junior electrical engineer, for his paper entitled "Industry and Government Control."

The papers were judged at a joint meeting of the student branch and the Minnesota section Monday, April 29. Two other papers were presented at the meeting which was held in the E. E. auditorium at 8 o'clock in the evening. They were "The Electrolytic Condenser," by William Brastad, and "Modulated Telephony" by Cyril Baranofsky. The section members judged the four papers, which were the best presented in the contest.

Ostergren demonstrated the use of a stroboscope and showed slides illustrating its uses in the course of his talk.

New Director for Tech. Glee Club

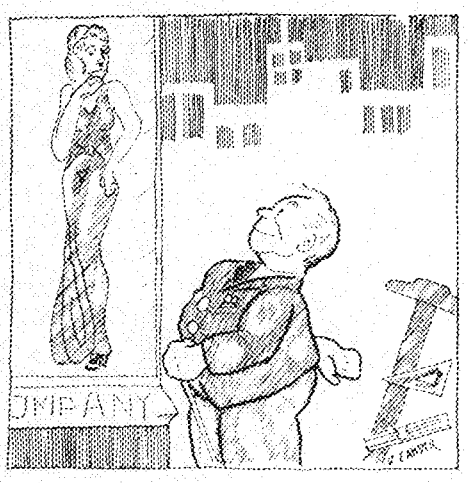
Under their new director, John Solie, the Technical Glee Club has begun reorganization for spring activities. Plans have been made to sing with the University Band at twilight concerts in front of the Northrop Auditorium. In addition they have made arrangements to sing in the coming student production "The Prince of Pilsen," and are planning to sing with the Engineers Club later in the season.

Thursday, May 2, Professor Harlowe C. Richardson of the Department of English spoke to the Glee Club on "The Benefits of Music for College Students."

The Technical Glee Club will sing over Radio Station KSTP, Thursday, May 16 in conjunction with Engineers' Day.

The Club is still looking for new members and would appreciate it if students who can, or think they can, sing would come to their meetings held every Thursday evening in the Main Engineering Auditorium. Any fellows who are interested, or know of anyone who might be interested, in singing, are urged to get in touch with either Paul Rossiter, Carl Pennig, or Tom O'Brian at once or watch for the next meeting of the Glee Club.

An Engineer Looks - -



- - at Life

By **B. H. T. L.**

In the spring a young man's fancy . . . you know . . . Charles Q. Gottfried, the illustrious rifleer and man-about-town, with your old chronicler once fell to such depths as to enroll in a Geology course. Also enrolled in said Geology course were numerous and sundry members of the fairer sex. One of these women in particular deserved the title of "fair"—in fact, it might be said with some semblance of honesty, that the femme had first rights to the title. Her face was not exceptionally pretty, but it certainly was striking. The unusual characteristic about this girl was her figure, if I may use such a prosaic word as that—nay, she had more than a mere "figger"—her body was a symphony of form with curves curiously reminiscent of those of the old depot stove or the proverbial "busted sofa." One balmy spring afternoon, the warm yellow rays of Old Sol were streaming through the windows and the whole world was feeling mellow with a good share of the mellowness concentrated in our Geology classroom. The class was over and this modern Venus came back where Chuck and I were sitting seriously considering getting out of our chairs and going home. She picked up her light spring coat and, as she had both arms through the sleeves she paused, presumably to stretch that beautiful lithe body. The aforementioned body was outlined against the smiling face of old Man Sun and let me say, gentlemen, there was a **body.** Mr. Gottfried was out of his chair in a flash, all indications of his spring lethargy gone. I rose also, almost as much interested in Charles' enraptured countenance as I was in the girl. "Look! Lindquist, look!" breathed Gottfried—and my hopes for a perfect, peaceful and beautiful afternoon faded. "Now," I told myself, "he'll ruin it all by making the usual unprintable remark typical of the hard-boiled Engineering student." But still I answered him, "Yes, Chuck," as soothingly as possible—it was apparent that he was under the stress of some great emotion. "Look!" gasped Mr. Gottfried. "Her eyes! like watch-crystals; aren't they?"

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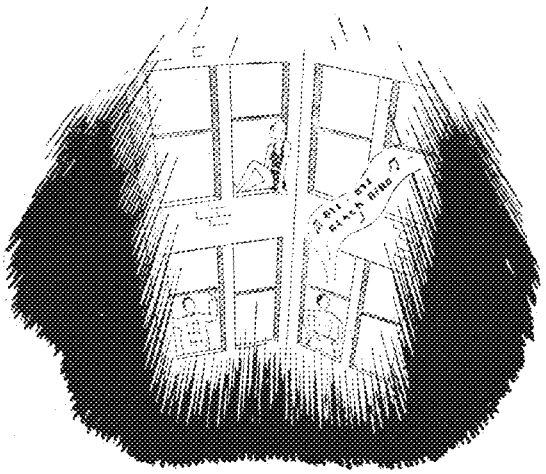
Famous last words: Brakes?—What for?

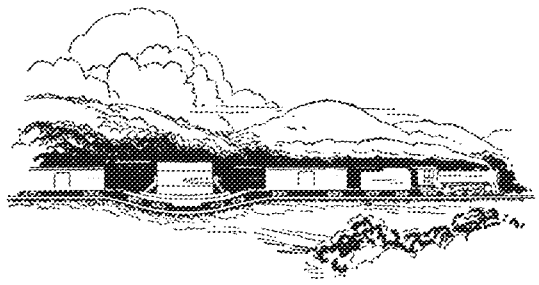
G-E *Campus News*



SYNTHETIC SUNLIGHT

THE people whose apartments faced the lower levels of the ventilating shafts in a 14-story New York apartment house had long ago given up the hope that direct sunlight would enter their windows. Imagine their astonishment one morning not long ago to find light—lots of it—streaming in. When they looked, they found not the sun, but 18 of the sun's able little imitators—General Electric floodlights. They had been mounted on the ninth-floor level.

The engineers were thoughtful of the tenants' feelings. For when the switch is thrown no sudden glare of light paralyzes unaccustomed householders in the act of brushing their teeth or doing setting up exercises, pastimes which were formerly cloaked in intimate gloom. A fully automatic synchronous-motor time switch actuates a dimmer, and the floodlights do not attain full brilliancy for 15 minutes.

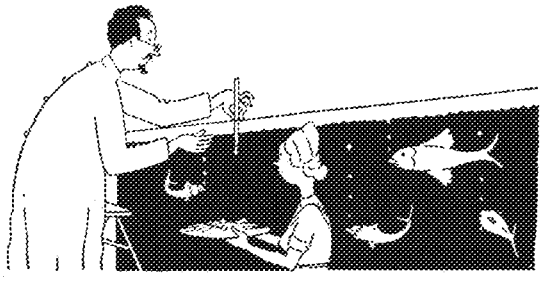


GROANING RAILS

A FEW weeks ago, the rails between Schenectady and Benning, D. C., groaned under what is believed to be the heaviest load ever transported on a single car. The load consisted of the generator shaft, rotor, and poles for a General Electric frequency-converter set being installed at the plant of the Potomac Electric Light and Power Company to deliver 25-cycle, single-phase power to the Pennsylvania Railroad.

Because of weight and clearance requirements, however, the route of the shipment was round about. A check of practically every foot of the way was made to determine if temporary obstructions could be removed to allow the load to pass. From Schenectady to Wilkes-Barre, Pa., the car traveled on the Delaware & Hudson. From Wilkes-Barre, the car was sent to Hagerstown, Md., on the Pennsylvania Railroad, where it was turned over to the Western Maryland Railroad. After an extensive detour, it was delivered back to the Pennsylvania on its main line just south of the Baltimore tunnels, which were the principal reasons for the complicated routing. From there it was carried directly to the power company's siding in the District of Columbia.

The equipment weighed 367,000 pounds. The special car added another 104,300 pounds, making the total weight on the rails 471,300 pounds.



FISH LIFE SAVER

THE people in the New York Aquarium were very unhappy. Many of their rare fish were dying of a mysterious malady. An investigation showed that the water pumped into the tanks contained contaminating metal salts, and that these salts came from the metal pumps in the system.

They appealed to the H. A. Smith Pump & Motor Company for help. Mr. Smith began testing all the nonmetallic substances available for making pumps. He tried 14 materials and found that General Electric Textolite was the only one that would prevent this pollution of the water and at the same time make a satisfactory pump.

Engineers of the General Electric Plastics Department were called in, and a new pump was designed, using five different grades of Textolite. The pump was so constructed that no water can come into contact with metal.

98-149DH