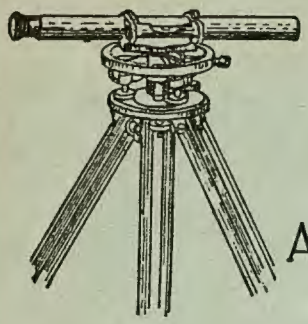

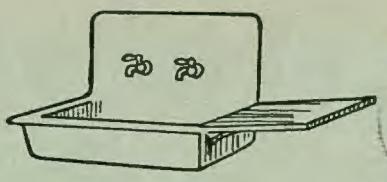
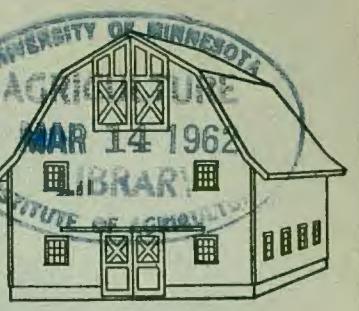

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The Selection and Care of Electric Motors for Farm Use

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As a source of farm power the electric motor offers many advantages. It is reliable, easy to start and stop, has a large overload capacity for a short time, is free from noise and poisonous fumes, and the direction of rotation can easily be reversed. It is economical because of its low first cost, low operating cost, and low depreciation. It requires very little attention and upkeep, and if properly cared for will last almost indefinitely. Motors are available in all sizes from 1/60 to 10 horsepower and in speeds of approximately 3600, 1800, 1200 and 900 revolutions per minute. Practically constant speed regardless of load is an inherent characteristic of most types. For a given horsepower, motors are comparatively small and thus may be made readily portable. They can easily be made to work automatically. For these reasons electric power is convenient and economical for operating stationary farm machinery.

Sizes and Types

Many farm and home devices such as washing machines, cream separators, and water systems, which are purchased after electricity has been installed, come equipped with the proper motor. However, if one is to install a motor to drive a machine already on the farm and operated either by hand or with some other form of power, a problem which is new to most farmers presents itself, that is, the selection of a suitable motor. First of all one must decide upon the size, and the next step is a choice of the type of motor. In the table are listed some of the common uses with the size of motor generally used. Usually a ¼ horsepower motor will be chosen for any machine which was originally designed by the manufacturer for hand operation.

To most people a motor is just a motor, but there are various types and the use of the wrong type will give unsatisfactory operation and may cause injury to the motor. The service available on most farms is single-phase A.C. (alternating current). For this service there are three types of motors in common use.

1. The **split-phase** motor is suitable only for appliances and other machines that are easily started. The main advantage is its low cost, being the cheapest of the various types. It is used for such machines as washing machines, ventilating fans, fanning mills, and grain graders. A split-phase motor should never be used on machines that are hard to start such as a cream separator. They have high starting current and when turned on may cause a momentary blinking of lights. They are available in sizes from 1/60 to 1/3 horsepower and may be used on only one voltage, either 110 or 220 volts.

2. The **capacitor** motor has a high starting power and a low starting current. It has no commutator and is, therefore, quiet running and gives no radio interference. The use of this motor is increasing very rapidly. It is available in sizes from ⅛ to ¾ horsepower and may be used on only one voltage, either 110 or 220 volts.

Machine to be driven	Size most used, horsepower	Recommended motor type: Repulsion-induction	Split phase	Capacitor
Churn	¼		x	
Concrete mixer (small)	¼	x		x
Corn sheller (single hole)	¼	x		x
Cream separator	¼	x		x
Emery wheel or grindstone	¼		x	
Ensilage cutter	5	x		
Feed grinder (large)	5	x		
Feed grinder (small, burr)	½&1	x		x
Fanning mill	¼		x	
Grain elevator (portable)	3&5	x		
Pump jack	½	x		x
Shallow well (less than 22 ft.)	¼			x
Sausage grinder	¼	x		x
Milking machine (pipe line)	1	x		
Ice cream freezer	¼	x		x
Washing machine	¼		x	

3. The **repulsion-induction** motor is generally considered the most desirable type of single-phase motor for ordinary loads, having the highest starting power and the lowest starting current. It is available in sizes from 1/6 to 10 horsepower and the same motor may be used on either 110 or 220 volts in the smaller sizes and on either 220 or 440 volts in the 7½ and 10 horsepower sizes.

Protection

Farm loads on many of the machines fluctuate widely, and the operator should be permitted to overload the motor for short periods without danger of overheating the motor. However, if the motor is continually overloaded, the temperature of the windings will pass a safe value and the motor will eventually "burn out." The inability of an operator to determine when a motor is overheated requires the use of some protective device. All motors, by the use of protective devices, should be insured against continual overloading.

Suitable protection is available in a number of different devices. The best control for protecting motors is the thermal relay. Motors of ½ horsepower or larger should also have a no-voltage release.

People have the erroneous idea that fuses protect the motor whereas they virtually give no protection. However, a fuse should always be included to protect the wiring against short circuits.

Installation

Whenever possible the motor should be installed in a dry place free from dropping water or damp air, such as may be present in pump pits or wet basements. Dusty conditions, such as those present in feed grinding rooms, should be avoided if possible. Whenever a motor is installed out-of-doors some suitable covering should be provided. It is best to install electrical equipment in a place which is dry, clean, and well ventilated, as well as accessible for inspection and care. Special motors suitable for wet or dusty conditions are available and should be selected if favorable operating conditions are not obtainable.

One of the problems associated with the use of electric power is the adaptation of the standard high speed electric motor to drive slow speed farm equipment. This is solved by using suitable pulley sizes or by the use of other speed reducers. The kind and condition of the belt are important. Because electric motors operate at comparatively high speeds they usually have pulleys that are smaller than those on other forms of farm power. Therefore, more pliable belts are required. For fractional horsepower motors the V-belt drives are the most satisfactory. V-belts may be used with either flat or grooved pulleys on the driven machine.

Care and Maintenance

The electric motor is a thoroughly dependable power unit. It will operate with very little attention for long periods of time in widely varying temperature and moisture conditions. The main point to be considered is the proper lubrication of the bearings. One of the main reasons for motor retirement is faulty lubrication and the consequent wearing out of bearings. In addition to lubrication the life of the bearings depends upon belt tension and the alignment of the driving and driven shafts. In lubricating a motor, use a light petroleum oil specified by the manufacturer. Ball and roller bearings require a light, soft grease.

The interior and exterior of the motor should be kept free from moisture, oil, dirt and grease as these have a deteriorating effect on the insulation. Remove oil or grease with a soft rag or anything which will not damage the insulation. An air line may be used to blow out the dirt and dust.

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