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BELTS AND BELT FASTENERS

KINDS OF BELTS

Belts are grouped in four common types: leather, rubber, stitched canvas, and solid woven cotton. Leather belts are generally the most satisfactory for indoor use. They are the most expensive in first cost but are long lived if used and cared for properly. In a flour mill in Minneapolis there is a main drive leather belt, 3 ply, 4 feet wide, and 150 feet long which has been in constant service since 1884 (54 years) and is still in good condition. Neatsfoot has been used exclusively on this belt as a dressing. A leather belt will pull at least 20 per cent more if run with the hair side against the pulleys.

Rubber belts are suitable for damp or wet places, for outdoor use on farm machines, and sometimes for indoor use. The cost is much less than leather. Belt makers and users generally agree that most belt dressings are injurious to a rubber belt and recommend that none be used unless the belt is too small to carry its load without excessive slipping.

J. G. DENT

Solid woven cotton belting is known and used less than the others but has the advantage of a smoother surface than the sewed belting and no stitching to wear off. It is sometimes treated with a waterproof gumlike material for outdoor use or wet conditions.

V-belts are used singly or in multiple on many machines that require short drives. They are generally considered the most satisfactory for this type of drive. They are of either leather or rubber with cotton fabric or cord insertion, are made endless, provide a positive drive without slippage, and are silent.

Endless belts of all kinds are the most quiet and satisfactory where they can be used. However, new belts stretch somewhat and some means of taking up the slack must be provided either by a belt tightener or idler or by having one or both machines movable.

To get the best service from a belt, it should be wide enough and thick enough

on the lower pulley. When possible a belt should be run with the power side at the bottom of the pulleys so that the sag of the slack side will result in a greater arc or contact on the pulleys. If tighteners are used they should be applied to the slack side of the belt near the smaller pulley. This increases the arc of contact where slipping is most liable to occur.

BELT FASTENERS

Belt fasteners are grouped in four general types: the leather lacing, wire lacing, the hinge type metallic, and the metallic plate. The first two are made by hand and require considerable knowledge and skill while the metallic types may be easily put in without much previous knowledge or practice.

Lacing leather may be either rawhide or Indian tanned. At this institution both have been used in classwork for many years. The Indian tanned lace has far outlasted the rawhide and is now used exclusively. In order to get good results from leather lacing, the holes must be properly placed and of the correct size, lacing leather must be of good quality, and the lacing must be properly made.

When selecting metallic fasteners one should consider three kinds: (1) the hinge type requiring a machine for insertion into the belt, (2) the hinge type requiring only a hammer for insertion, and (3) the plate type also requiring only a hammer for insertion. The plate type is not suitable if an idler pulley is used against the outside of the belt. The hinge type has the advantage of permitting the pin to be withdrawn (before it becomes worn too badly) so that the belt may be taken apart.

LIFE OF BELT FASTENERS

The life of the hinge type belt fasteners depends quite largely on the type of pulley used. They will usually last longer on either a wood, paper, or lagged pulley than on metal. The plate type fasteners have no contact with the pulley.

Tests on the life of belt fasteners have been conducted by the Agricultural Engineering Division at University Farm for the past ten years. The apparatus used consists of a two-horsepower motor with an 8½-inch paper pulley belted to a 12-inch paper pulley on a jack shaft with shaft centers about 26 inches apart. The belt speed is 2600 feet per minute. The belt is of 3-inch single ply leather. Belt tension is controlled by sliding bearings and weights. A counting machine records the contacts that the fasteners make with the two pulleys. The accompanying chart gives the results of the tests to date.

| KIND OF FASTENER | NO. OF TESTS | KIND OF PIN | MILLIONS OF CONTACTS | | | | |
|---------------------------|--------------|--------------|----------------------|-----|-----|-----|-----|
| | | | 50 | 100 | 150 | 200 | 250 |
| Metal hinge (flat) | 2 | Bamboo | 250 | 250 | 250 | 250 | 250 |
| Bronze wire | 5 | — | 250 | 250 | 250 | 250 | 250 |
| Metal hinge (wire) | 3 | Bamboo | 250 | 250 | 250 | 250 | 250 |
| Riveted plate | 10 | — | 150 | 150 | 150 | 150 | 150 |
| Leather (double hinge) | 7 | — | 100 | 100 | 100 | 100 | 100 |
| Metal hinge (flat) | 7 | Metal Rocker | 100 | 100 | 100 | 100 | 100 |
| Hammered plate | 2 | — | 100 | 100 | 100 | 100 | 100 |
| Leather (for heavy belt) | 10 | — | 100 | 100 | 100 | 100 | 100 |
| Metal hinge (flat) | 10 | Rawhide | 100 | 100 | 100 | 100 | 100 |
| Leather (single hinge) | 10 | — | 100 | 100 | 100 | 100 | 100 |
| Metal hinge (wire) | 10 | Rawhide | 100 | 100 | 100 | 100 | 100 |
| Leather (for light belt) | 10 | — | 100 | 100 | 100 | 100 | 100 |
| Leather (for medium belt) | 10 | — | 100 | 100 | 100 | 100 | 100 |

Life of Various Kinds of Belt Fasteners

Stitched canvas belting is the least expensive and will stand more weathering and abuse than other kinds of belts. A heavy coating of paint is used for protection. There is less danger of harm to the belt when sticky belt dressings are used than with the other kinds of belting, but a dressing that clots on the belt or pulleys should be avoided.

to transmit the required load without slippage or strain on the bearings arising from the necessity of running it too tight. When possible the angle that the belt makes with the horizontal should not exceed 45 degrees. The objection to a vertical belt is that instead of its weight assisting in the transmission of power, it has a tendency to run slack and slip