USING THE TRACTOR FOR BELT PURPOSES

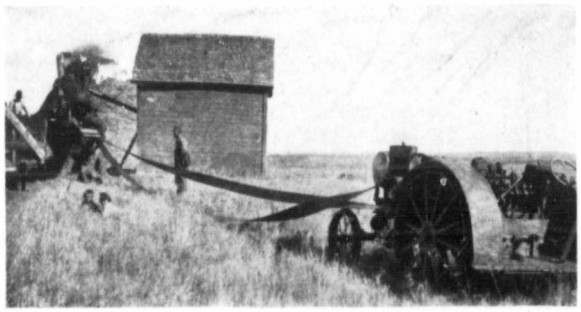
By ROBERT WHITEMAN

IN purchasing an engine, and especially one of the light tractors, we expect that it will do a great deal more than plow. Belt work always increases as time goes on and one has found that the engine can be depended upon for nearly every job around a farm. All tractor manufacturers make their engines with this general purpose standpoint in view, but not all attain the object sought. In order to get best results on the belt, it must be an easy matter to line up to the machine to be driven. Some manufacturers seem to add the belt pulley as an afterthought and make it extremely difficult to get the engine pulley in line for belt work. Not long ago a splendid article appeared in The Canadian Thresherman and Farmer, giving various devices for lining up the various types of engines which should be of great help to those who have engines of the types illustrated. But why make t necessary for the farmer to be forced to stake down the engine to prevent if turning sidewise or to carry a jack around to shove the engine over in order to line up the belt? In threshing time, especially, with only a limited number of days suitable for work, we cannot afford to lose two or more hours a day in setting the machine. Why manufacturers persist in fitting a perfectly good engine with an inconvenient belt pulley, has caused considerable warm feelings by the man out in the field. True, many light tractors are purchased for plowing only, but in order that the farmer be fully satisfied with his investment, it must also be equipped with a pulley easy of access.

Practically all small tractors are high speeded, ranging from 600 to 1,200 revolutions per minute. This means a small belt pulley ranging anywhere from 8 to 20 inches. In order that the belt stay on a pulley of this size, it must be almost perfectly in line with the driven machine. When it is the intention to do some belt work with an engine of this type: For quick setting, the pulley should be on the same side as the steering wheel in plain sight of the operator in order that he can sight over it to the pulley which he wishes to drive. This means quick lining up and will save a new engineer a good many hours of time.

Size of Pulleys

A gas engine is usually made to run at a set speed. Some few makes are so arranged that while the engine is still running at its set speed the pulley can be run at a wide range of revolutions per minute. With this type of machine you are still getting the maximum power from your engine even though the pulley is running fast or slow. This means that it can be attached to any machine without necessitating a change of pulleys. Other makes of engines, however, have very little range of speed, and when it is changed do not develop the rated horsepower. This means, then, that if one has a separator a proper size pulley must be obtained before he can expect satisfactory results. Otherwise, a uniform speed cannot be kept. The engine may be slowed down while the separator is running empty to run properly, but once the grain starts going in, there is a slacking of speed. On the other hand, one may set the speed while the separator is full, but once it is empty the speed is such that the separator almost racks itself. The writer had an experience of this kind when trying to fit a high speed engine to a separator with a belt pulley too small. The result was that even though the engine had plenty of rated horse power it was constantly laboring owing to its being run too slow and the separator speed was very uneven. A separator being run in this way cannot be expected to do first class work owing to the uneven speed it is bound to throw over. If one has a small engine belted to a cream separator, the proper size pulleys must be obtained or the separator will not skim clean. All machines are made for a rated speed, and we can obtain that speed only through proper size pulleys, if we want satisfactory results.



F. K. SCHMITT of High River, Alta., making money for himself and a neighbor with his tractor and belt

Figuring Size of Pulleys

The following rules should enable anyone to figure out just the right size pulley for his requirements. The speed of the engine is always known also the size of the pulley on it. Supposing then we have a separator and the manufacturers state its speed is 1,000 revolutions per minute, what size pulley would be necessary to run it at this speed with the engine running 500 revolutions per minute, the engine pulley being 20 inches in diameter? The speed of the engine multiplied by the diameter of the engine pulley, divided by speed which separator is to run, will give the sized pulley required for separator.

Taking the above example:—

Engine—500 rev. by 20 pul. diam.

Separator—1,000 rev. per min.
(10-inch pulley for separator)

When one has an engine with variable speeds, the present separator pulley does not need changing. We have then to find the proper speed at which to set pulley on engine. It works practically the same way as the above illustration, except we use the separator speed in pulleys instead of the engine. Supposing separator is to run at 1,200 and has a pulley 8 inches in diameter and your engine has a 15-inch pulley?

$$\text{Separator}—\frac{1{,}200 \times 8}{15} = 640$$

This formula may be used for any belting purposes, is a very simple one to remember, and every power user should memorize it.

Belting

Once we have our pulleys sized properly, the next thing is to see that our belting is of the right size and thickness. Many seem to think that a belt is suitable so long as it runs, not paying any attention to power it is supposed to transmit. If the belt is too narrow or too thin it will slip, and in order to overcome this we tighten the belt, and this throws a great strain on it and also on the bearings of the machine. It shortens the belt's life by half and very often more than that. With belts at the present price it pays to take good care of them, and when buying a new one be sure it is wide enough for the load it must carry.

There seems to be quite a diversity of opinion among power users as to which way a belt should be placed on a pulley. Experienced threshermen, however, tell us that the hair side should be next to the pulley because the other side stretches more than in keeping an equal strain on the fibres of the leather. This means lengthening the life of the belt. More uniform stretching occurs, reducing slippage, and a belt placed this way does not need re-lacing so often. A single belt one inch wide will carry approximately 33 pounds per square inch. A double belt, one inch wide, will carry 83 pounds per square inch. To find the strength of belt:—

D—Diam. of large pulley
N—No. rev. per min.
W—Width of belt

Using as divisor 2,750 for single belt, 1,925 for double belt.

Example:—An engine has 30-inch pulley, speed 250 rev. per minute, uses 6-inch belt (double).

$$\frac{30 \times 250 \times 6}{1925} = 23.5 \text{ h.p. delivered to driven machine}$$

To find width of belt—Where a man has bought machinery and wishes to find the belt suited to the power required, it works out just as simply. Supposing the engine listed above was a 20 h.p. engine. Example:—

$$\frac{20 \times 1925}{20 \times 250} = 5.13\text{-inch belt}$$

We see from the above example that a 6-inch belt furnishes nearly 3 horse-power more than is necessary, making a good safe reserve power and greatly lengthening the life of the belt. Another precaution is that of fitting the pulley properly for its load. Large pulleys have sufficient grip to insure against slippage, but a small pulley carrying much of a load must be lagged with leather because the pulley surface is so small that unless a very thin belt is used, slippage cannot be prevented.

When lacing a belt much power can be lost by not cutting both ends straight across. Leather or rubber belting is always stretching more or less particularly when exposed to weather conditions. Also those requiring frequent removal, as on separators, stretch very much, due to putting them on and off the pulleys so often. An unevenly cut belt soon