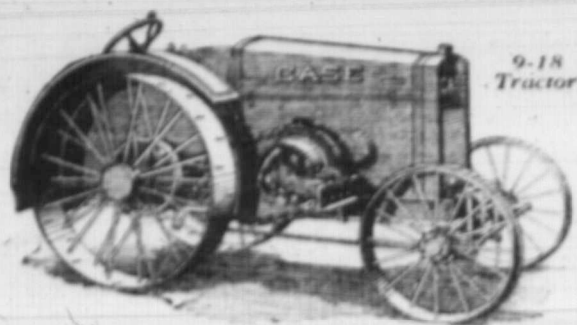




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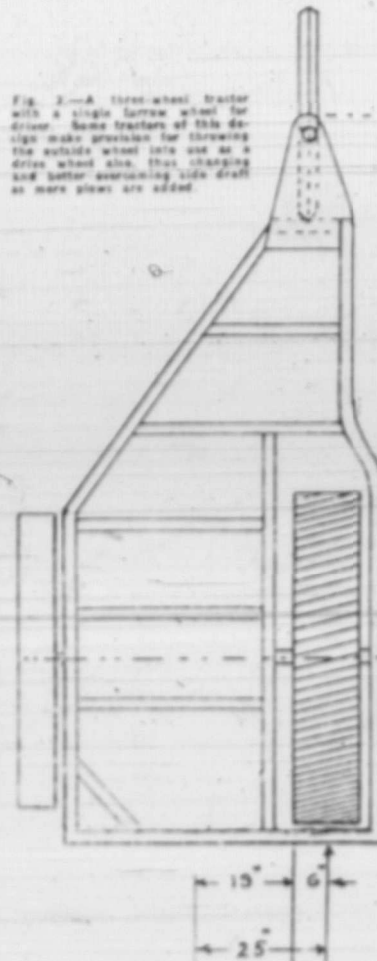
WINNIPEG, MAN.

Fundamentals of Tractor Design

Continued from Page 5

requirements are for belt work. This, it will be remembered, was second on the list and considering all the belt work a farmer has to do it is almost as essential as plowing. The heaviest belt work in agriculture is threshing, which requires anywhere from fifteen

Fig. 2.—A three-wheel tractor with a single furrow wheel for driver. Some tractors of this design make provision for throwing the outside wheel into use as a drive wheel also, thus changing and better governing side draft as more plows are added.



to seventy horsepower, depending upon the size of the thresher, the condition of the grain and how heavily the straw is fed into the machine. Only the eighteen and twenty-inch machines can be operated by the small tractors and these are the sizes that naturally would be purchased for individual use. The larger machines require either steam threshing engines or the larger sized tractors. The greater part of the threshing still is done by men who make a specialty of that kind of work. But every farmer has corn to cut, feed to chop or other work to do, and any man who purchases a tractor wants to use it for one or more of those purposes.

The larger ensilage cutters require from thirty to thirty-five horsepower especially those with blowers to elevate the ensilage. The catalogs rarely ever place the power requirements so high, but careful tests show that they are as a rule underestimated by the manufacturers. The smaller eleven and twelve inch machines can be handled by the small tractors if they are not crowded. Here is where the small two-plow machine fails to come up to its expectations.

The various operations of feed grinding, wood sawing, etc., can be carried on very successfully with machines of from eighteen to thirty horsepower. Hauling grain harvesters merely demands a tractor able to travel about three miles an hour that is easy to handle. Usually three horses are hitched to a six or eight foot binder and consequently a small tractor that can pull two plows will not have any trouble pulling two binders.

The position of the belt pulley is important since the tractor must be run into exact alignment with the ma-

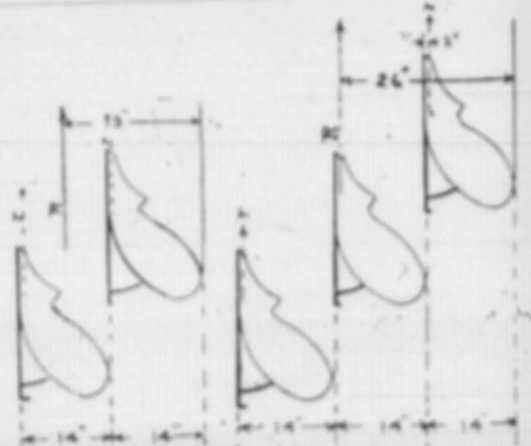
chine it is to run and then backed up until the belt is given the proper tension. This makes it advisable to place the belt pulley on the right side of the machine where the operator can sight over it while maneuvering his machine into position. Not only must the belt pulley be placed correctly, but it must be accessible, it ought to be of fair diameter to provide a generous arc of contact for the belt and it must have the correct speed. An investigation of the various farm machines operated by belt power shows that a belt speed of about two thousand feet per minute meets practically all requirements. Some machines require a belt speed somewhat higher and some considerably lower, but if the tractor has a belt speed of two thousand feet, few pulley changes need be made. These remarks with regard to the position of the belt pulley and the belt speeds I feel are very essential features, and features, moreover, that do not seem to be generally very well understood if one may judge by machines on the market.

Limitations of Mechanical Power

The size of machine to build depends largely upon market conditions and upon the cost of manufacturing. During the last two years the popular sizes have been equipped with motors of 16, 20, 25 and 30 horsepower. These have been the sizes made for general farming. The 40, 60 and 80 horsepower tractors are not made in as large numbers as formerly and what are made are sold primarily for the use of threshermen and contractors. Two plow machines are apparently the most popular at present, but when farmers get more accustomed to the use of tractors they will probably choose a three or a four plow machine. This seems to be a more economical unit and makes a better belt machine for heavy work.

However, there are a very large number of small farms in the United States of less than one hundred acres and these will probably always be better served by small tractors because the small farm cannot bear the heavy initial outlay for the larger machines and, besides, the larger machines would have to be idle too much. This matter of price is one for serious consideration. There is undoubtedly a limit to the acreage charge for power. Just what it amounts to no one knows, but it probably cannot exceed five dollars an acre and six at the utmost. The acre charge for horses in the United States is six dollars an acre and the annual maintenance charge about three dollars. If it were possible to supplant animal power completely farmers could well afford a considerably higher investment in mechanical power, but that does not seem possible.

This then brings us to a consideration of the limitations of mechanical power or of tractors in the discussion of which I realize that I am liable to errors of judgment. Also I realize there



Left hand section (Fig. 1) shows resultant line of draft for two plows. Right hand section (Fig. 2) resultant line of draft for three plows. Dotted lines show the line of draft for each plow.

are a number of people who have studied the subject for a long time that disagree with what I shall say. Many attempts are being made to develop what is known as a universal tractor, that is, one that can do anything and everything a horse can do and yet accomplish as much as any other tractor.

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