Farm Machinery

Size of Tractors

Naturally the farmer, when he comes to the point where he is ready to buy a tractor, will ask two questions. What size tractor shall I buy? How many horses will it displace for me?

Neither one of these questions can be answered in a way which will apply to every case. The selection of a tractor, and its ability to displace horses after it is selected, both depend upon circumstances which are different with every individual, hence it is impossible to announce any rule which will apply. The best the farmer can do is to profit by the experience of other farmers who have used tractors and whose conditions approximate somewhere near to what his own happen to be.

Tractors now have been used so numerously and under so many kinds of conditions during the last two or three years that it is fair to draw some conclusions which may be considered average and which serve as a really safe guide to the farmer who is considering the purchase of a tractor. These conclusions refer particularly to the size of the tractor which, under normal conditions, most likely will give satisfaction upon a farm of a given size, and what its effect likely will be, again under average conditions, as regards the displacement of horses.

Very recently the writer was privileged to examine the results of a questionnaire which was sent out to tractor owners, for the most part in the corn belt, and to analyze the replies. Eliminating those farmers who replied from sections of the country where the conditions are radically different from those to be found in the corn belt, and confining the examination to those replies which presumably come from farmers who are using tractors under conditions which are approximately uniform, some valuable conclusions are possible.

In all 193 replies were examined. Sixty-one of these farmers work farms under 200 acres in size, including the popular quarter-section farm. Eighty operate farms which vary in size between 201 and 400 acres, while 52 work farms about 401 acres in size, but not exceeding a section save in a very few instances.

Tractors Fitted to Farms

The first general fact revealed by an examination of these replies is that there is in practice a progressive increase in the rating of the tractor and its plow-pulling capacity to correspond with the progressive increase in the size of the farms. A consideration of the following figures will make this clear:—

Of the 61 farmers on farms of less than 200 acres 20 per cent. use an 8-16 tractor; three per cent. a 9-18; 24 per cent. a 10-20; 19 per cent. a 12-25, while 18 per cent. use tractors of lower, or higher rating or tractor attachments. In this group it is evident that the 8-16 and the 10-20 are the most popular.

Among the 80 farmers who work from 201 to 400 acres 17½ per cent. use an 8-16; 27½ per cent. use a 12-25; 12½ per cent. use tractors of higher or lower rating than those mentioned. In this group there is a noticable diminution of the popularity of the 8-16, while the 10-20 and the 15-25 are favorites, with the 13-30 making its appearance.

In the third group, where the farms are above 401 acres, of 52 farmers 23 per cent. use the 10-20; six per cent. the 12-25; 23 per cent. the 20-40; 13½ per cent. the 20-40; six per cent. the 25-50; 13½ per cent. the 30-60, and the only 14 per cent. used tractor rated below a 10-20. The predominant choice in this groupis for the tractors which rate between the 10-20 and the 20-40, with as many 30-60's in use as there are of the 20-40's.

How the size of the tractor increases progressively with the size of the farm is evident. This is important to know, as these are actual experiences of farmers who are receiving satisfactory service from their machines.

The replies give also some indication of the effect tractors have had upon the question of the displacement of horses. Nothing but averages can be considered here. Upon some farms horses have not been displaced. Some have disappeared from others. There is no rate of displacement which can be considered to be valid, as this is a matter which depends upon the individual farmer and is determined to a large extent by the character of the crops he raises.

Starting with the government established relation of six horses as normal equipment on a farm of 160 acres in size, the farmers who reported from farms of less than 200 acres say they have retained an average of five horses to the farm, only one less than the average equipment for farms of that size. In the next group, on farms of 201 to 400 acres, an average of seven horses has been retained. Ten horses is the average number retained by the 52 farmers included in the class who farm more than 401 acres.

It is probably certain that another investigation, conducted in territory where conditions are more varied, would result in somewhat different results. But for corn belt conditions the foregoing may be considered as fairly representative. This notion is confirmed by results of other investigations which have been conducted in the past by government agents and by state agents. Their conclusions do not depart far from those announced above, hence these may be accepted as typical.—F. M. Loomis, in Farm Engineering.

Preventing Separator Fires

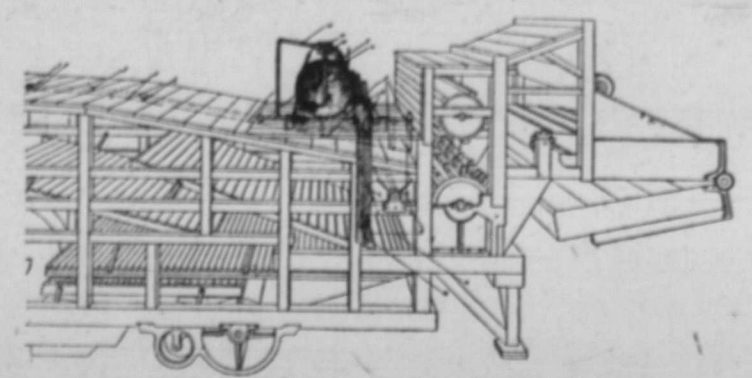
As a result of a study of explosions in threshing machines the United States department of agriculture recommends that one or more of three measures be adopted to prevent loss from this cause. These are: (1) The installation of an efficient grounding system for the removal of static electricity from the machines; (2) the installation of a suction fan to remove smut and dust and to prevent the formation of an explosive mixture of dust and air while the threshing is being carried on; and (3) the installation of a device to act as an automatic fire extinguisher which in the event of fire will not only save the machine but prevent the flames from spreading to the surrounding grain.

The first two of these devices have been tried with successful results in the field. The automatic fire extinguisher was not constructed until the threshing season had been closed, but it has been tested under severe conditions in the explosion galleries of the Bureau of Mines at Pittsburgh, and in these tests it has operated successfully. It has also been tested under practical threshing conditions at the Government farm at Arlington and proved effective in extinguishing fires which were produced in different types of grain separators there.

A total of 27 tests were made in both places. In no case was there a failure to act promptly and efficiently, nor was there a premature action.

Studies of dust explosions and fires in grain separators have been carried on both by the department in co-operation with the University of Idaho and by the Washington State College. These indicate that static electricity is the cause of the great majority of these accidents. The electricity may be produced in a number of ways by the operation of the machine during the threshing process and under certain conditions will readily ignite the dust-laden atmosphere within the thresher. It is generally agreed that before this can take place the dust must be fine and dry and in a state of suspension, but the exact conditions necessary to bring about an explosion have not been definitely determined. This uncertainty, it is said, is a strong argument for equipping all threshers with the preventive devices already named.

The best method, the investigations indicate, for carrying off any static electricity that may be produced, is to connect wires from all moving parts on the machine to one wire and to ground that wire. This is the method that has been adopted in the system recommended by the department specialists. In this system the common wire or conductor is grounded through a rod which should be driven at least three feet into the ground, which should be kept well moistened. There are connections to this conductor from the shaft of the cylinder, from the shakers, from the entire sieve, and from the metal casing of the stacker fan. These parts are the ones on which static electricity appears most likely to be generated. The common lead and its main branches are of No. 14 bare copper wire. The connections should be of flexible insulated wire coiled a sufficient number of times to permit full flexibility. The wire should be attached to the framework of wooden machines by staples, which should be of the insulated type or else there should be a cushion of rubber or other material between the staple and the wire. Otherwise the wire is likely to snap and break the circuit.



Automatic Fire Extinguisher for Use on Threshing Machines

A, galvanized tank 3-16 inch thick, 18 inches diameter, 44 inches long; B, main operating spring; C, acid bottle, 1 quart capacity; D, ratchet to hold spring back; E, dog to catch on ratchet; F, fuse locations; G, operating levers; H, outlet pipe; I, nozzles for spraying fluid; J, distribution pipe; K, wire connecting trigger; L, main tripping lever from fuse to dog; M, spring to operate trip; N, trigger to hold down trip; O, hammer for breaking bottle; P, 3-way valve; R, long pipe nipple for hose connection.

Remove Dust by Suction Fan

The installation of the suction fan is desirable because, before any explosion can occur, there must be a favorable mixture of dust and air. The purpose of the fan, therefore, is to remove the dust from the vicinity of the cylinder. The arrangement recommended by the investigators it to attach a suction fan to the top of the separator. This fan exhausts from above the cylinder and also from beneath the fan.

While it is pointed out that there is no way of absolutely demonstrating that either the grounding of the machine or the suction fan actually prevents explosions, the fact remains that no such occurrences have taken place, as far as is known, with separators that were properly equipped in this way. On the other hand, explosions are constantly occurring in other machines operated without them but otherwise under identical conditions.

Danger From Other Sources

These devices, however, do not remove all danger from fire, for in addition to electric sparks foreign materials which find entrance into the separator may start fires, and for this reason the automatic fire extinguisher is regarded as a desirable additional protection. This device, the details of which are shown in the accompanying illustration, consists of a tank mounted on top of the separator. This tank is filled with water containing soda, and in addition there is a bottle within it filled with sulphuric acid. A wire line, in which are mounted a number of fuses, connects the tank with the separator. If sufficient heat is developed within the separator, one or more of these fuses will melt. This breaks the wire line and releases a trigger, which in turn frees a tripping mechanism and causes a hammer within the tank to strike and break the bottle of sulphuric acid. The discharge of the sulphuric acid into the water containing soda forms carbon dioxide. This generates sufficient pressure to force the water through the discharge pipe and the discharge nozzles to all the crevices of the separator.

Location of Fuses

The locations of the fuses will vary with each type of machine. They must be such, however, that the fuses are sure to be reached either by the flame or the heat. On the other hand, they must be so placed that the wire connecting them will not be broken by the straw or by the moving parts of the separator. The location of the nozzles also depends upon the type of machine. Further details in regard to the construction of this device and of the two others will be furnished with blue prints upon application to the Office of Public Roads and Rural Engineering.

In recent years the number of explosions and fires in threshing machines appear to have been increasing to such an extent that the situation is now serious in many sections of the country. Definite reports of 166 such accidents were received by the field workers of the department and investigated. It is probable, however, that many more explosions occurred on which no report was made. Such accidents have been known to cause serious injuries to workmen and in addition are responsible for much destruction of property and for practically prohibitive insurance rates. For these reasons it is believed that the measures outlined for their prevention deserve the careful study of all concerned with grain threshing.

Machinery Demonstrations

From the large number of queries regarding the purchase and operation of field machinery; the interest already shown in the demonstration in the draft of plows at plowing matches; the clever advertisements announcing the introduction on new machines of all kinds; the shortage of reliable help and the fact that much new machinery has to be procured, the writer is convinced that well organized field trials of farm machines of all kinds, held during the summer months, would fill a long felt want; further, it would be in the interests of the manufacturer as well as the farmer, to have these trials put on.

There would be considerable work for those in charge. Plans would have to be well organized. There will be adverse criticism in every district. To escape criticism, do nothing, attempt nothing, say nothing and be nothing. This work can be done if the right men are put in charge. Remember after you put them in charge, support them. A few cannot do it all.

Let us suppose the town of Progress decides to have such a demonstration in connection with their annual plowing match or the summer fair. The directors of the Agricultural Society or the local Grain Growers' Association would call a meeting in co-operation with the implement men. If they seemed indifferent their respective head offices would assist. Explain the proposition and tell them, for example, that the farmers in the surrounding district would like to see the different makes of plows tried out, the draft of each tested, the important adjustments pointed out, new hitches demonstrated, to see whether they did all that was claimed. Perhaps there are some new harrow attachments, and we want to know if they are better than a section of an old drag harrow, and how much power is required for each?

This for the first year might be sufficient. But can't you see how tests of spring-tooth and duck-foot cultivators, full disc and cutaway disc harrows as well as tandem disc harrows might be instructive. A demonstration of stump