

# STUDIES IN SMALL TRACTOR DESIGNS

By  
E. R. WIGGINS

## VI.—Light Tractor Systems: Lubrication

**P**ROPER lubrication for the tractor is one of the most important things to be watched for by the operator.



Plowing

Upon this depends the life and efficiency of the machine. To lubricate a part, a thin film of oil must separate the sliding surfaces. If this film be broken, or the oil be squeezed out, the two metal surfaces will come into contact and increased friction wear, and, possibly, destruction will result.

A farmer of my acquaintance had an experience very recently with an 8-16 h.p. tractor, that taught him a lesson in lubrication. On this particular tractor is a planetary transmission which is surrounded by a very tight case. The case was filled with a heavy steam cylinder oil, ideal for the gears but very poor for oil holes and for lubricating bearings. The various bearings for gears and shafts inside this particular case, are oiled by means of oil holes into which the oil in the case is supposed to run. One day while plowing, the tractor came to a sudden stop. Examination showed that one of the web castings that turns on the crank shaft and holds two pinions inside the gear case, had seized tight to the shaft.

Here is what had happened. The oil being heavy thickened greatly because of the cold weather and did not run into the bearing which therefore became hot; the shaft expanded slightly and the wheel stuck to the shaft. Thin oil should have been used so that it would have run completely around the bearing. The point is this, the oil did not get to a certain point where oil was needed badly. Thin oil should be used in transmissions of this kind in winter.

All of the lubricating systems used on light tractors to-day are very satisfactory as far as design is concerned; but the farmer must

use some judgment in regard to good oiling. A tractor will not oil itself unless the operator has put oil in the right place so that it can be used. Common sense should guide the operator. He must not, for example, oil one part regular

rod ends, and also by pressure and splash from the same source.

In the all-loss system in small tractors, we find the full splash in which oil is fed directly into the crank case, or the force-feed system where the oil is pumped to each bearing as used or is drained into the crank case and is used up by being drained from the crank case, or burned up by splashing against the piston. The oil in most "all-loss" systems is at a certain level in the crank case. The lubrication of all the parts is kept up by splash and by feeding oil from the reservoir into the crank case, where it is used at about the same rate as it is fed in. It is claimed that the all-loss plan is less fool-proof than the circulating. The trouble with the all-loss system is that the operator may allow an excess of oil to run into the crank case which will cause carbon to deposit in the cylinders, or feed too little oil so causing the parts to wear too quickly. The line of demarcation between the two oil-

The best system and the most expensive, as far as first cost is concerned, is the force feed with oil under pump pressure to all the bearing surfaces. The pump is generally very expensive and with a cheap tractor means that a high percentage of cost is in the oil pump alone. The writer has noticed that tractors so equipped have given the best service to the farmer.

It pays to use a good grade of oil even if the cost is high because the better service the farmer will get from the tractor will pay in the end. Proper lubrication for the motor is most important, but we must not forget that the gearing, shafting, and axles of the remainder, needs attention. Where grease cups are provided, they should be filled often. When running day after day, the writer believes that they should be filled daily. Where a bearing can be lubricated by a grease cup there is no better means of lubrication available. A grease cup can be used either to great advantage, or not at all.

## Cooling

In the matter of cooling, most makes of small tractors are alike. Out of eighteen makes of two plow machines, only one is air cooled. One is hopper cooled, and another is tank cooled. These two machines are different types of tractor made by the same firm. The remainder use the circulating system with radiators and either centrifugal or geared pumps.

Of fourteen makes of three plow tractors, all have radiators with pumps except one which has a radiator and no pump, using the thermo-siphon principle for circulation.

Water is used more than any other medium for cooling. There is one make of air cooled tractor

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A Two Plow size Harvesting Corn

of two plow tractors reveals the fact that the motors are lubricated as follows: Sixteen have force feed, five use the splash system in connection with pump feed, two are splash, and one mixes the oil with the fuel.

Out of fourteen three-plow machines, six are force feed, five are splash and force feed and three splash.

Lubrication of motors can be divided into two general groups, circulating and all-loss systems. Under the circulating system, we have, in small tractors, the splash system in connection with a pump. In this case, a quantity of oil is filled to a fixed level in the crank-case pump from where it is pumped to all parts requiring oil. In some circulating systems, the oil is applied to moving parts by splash alone from the connecting-

ing systems is not very distinct and as can be seen they are closely related.



Disking with the Small Tractor pays