THE KEROSENE FUEL PROBLEM

By GEO. P. PEARCE

LOOKING ahead it seems very probable that as soon as the Liberty Air Planes begin to go on duty to defeat Kaiserism, there will be a request from the government to "Save the Gasoline," for these wonderful high speed machines must have the very best fuel, suitable for high speeds, low temperatures, sudden spurts and power variations of the most extreme kinds and the best fuel known for this is gasoline.

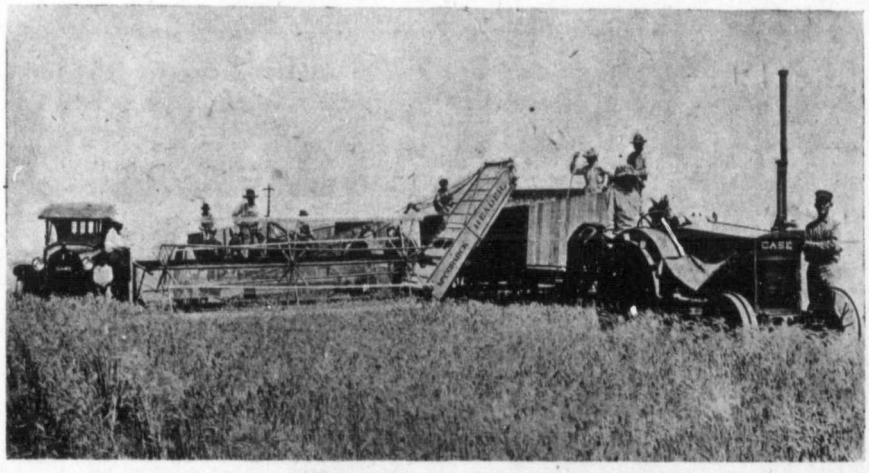
Besides the demand for air planes, there are the ambulances, motor trucks, tanks, military autos and other means of transportation and power that the armies need and must have. It will be the duty of everyone to get along with the least amount of gasoline possible.

Tractors consume enormous quantities of gasoline every year and for the steady heavy pull of plowing, kerosene is just as suitable, and, in fact, contains more power per gallon. The only reason it is not used more is because we are only just beginning to learn how to burn it, and like other things during the development stage there have been many failures which have led to the general impression that kerosene is very unsatisfactory as a fuel. Kerosene, properly burnt, is just as satisfactory as gasoline, thoroughly reliable, safer and much cheaper.

There are at present two entirely different methods of burning kerosene, each claiming to be the best and each capable of actually running satisfactorily. The first method is based upon the idea of gasifying the kerosene by the application of heat to the carburetor and then mixing this kerosene vapor with heated air and the gaseous combustible mixture is then fed into the engine for combustion. This system has met with much favor in the past because it seemed that the nearer the mixture was to an actual gas, the better and more complete combustion must be. From the combustion point of view, this is true, but from the power point of view, a heated charge is a positive disadvantage because the fuel in a gaseous state takes a great deal more space and the heated air is also expanded with the result that the total charge received in the engine cylinder is less by weight, and as power is proportional to weight of charge, and not volume, the result is that the horse-power of the engine falls as the temperature of the charge is increased.

To overcome this power difficulty the second method of burning kerosene is being developed, and that is to feed it cold with cold air and thus get the greatest weight of combustible possible in the cylinder. This, of course, is not so simple as it sounds; to put in the cylinder a slug of fuel and some air would accomplish nothing, in fact, it probably would not even ignite. This slug of fuel must be finely divided, atomized, as it is called, and then thoroughly mixed with the air until it looks like a very fine mist or fog. In this condition it is possible to get the charge in the cylinder and the heat of compression warms up the charge, so that ignition is easy and the explosion stroke very powerful and steady.

The way this fog is produced is to spray the kerosene charge into the air as it rushes through the carburetor with a velocity much greater than the worst cyclones or tornadoes and it smashes and dashes the fuel up into the exceedingly fine particles and if this atomized mixture is delivered into the cylinder in this state, then the problem is solved. On a single cylinder engine, this can fairly well be accomplished because the carburetor can be placed close to the intake valve and thus elbows and bends are reduced to a minimum. Every elbow or bend that the mixture has to pass, greatly decreases the efficiency of the mixture because while the air will make the quick turn easily, the kerosene particles will not, and they tend to keep flying straight ahead like a rifle bullet and thus many of them actually hit the wall at the bend where they form a wet film which flows towards the cylinder, but no longer in the "fog" form and in poor condition for rapid combustion. On a two-cylinder engine this trouble begins to show up still more, because the intake manifold is longer and has more bends and different ways for the fuel to go and thus the separation becomes more objectionable and the burning of kerosene is more of a problem. When an effort is made to burn kerosene by this atomizing system in a four-cylinder engine, then the difficulties begin to be very serious because on account of the fuel tending to go in a straight line, it will not feed properly into No. 2 and No. 3 cylinders. For instance, during the suction stroke of, say, No. 3 cylinder, a large percentage of the fuel will fail to make the quick turn into the cylinder and will be carried, by its momentum, along the manifold towards No. 4 cylinder, and as soon as this opens to suction, there will be an excess fuel delivered; this will cause a smoky exhaust and the operator will cut down the fuel supply. The leaner fuel supply will cause No. 2 and No. 3 cylinders to get a very weak mixture, and still No. 1 and No. 4 will receive rich mixtures, possibly some smoke will still show in the exhaust and at the same time the familiar "pop" and "splut" of the weak mixture in No. 2 and No. 3 cylinders will be heard, and so the operator will not know what to do for he makes the fuel richer to cure the "pop," he will get still more smoke in the exhaust and if he tries to cure the smoke he makes the weak cylinders worse; thus his engine will run erratic, and the conclusion is reached that kerosene is a complete failure.



A Fine Combination of Power Efficiency and Speed

Some engines will burn kerosene satisfactorily because their manifold design happens to meet the kerosene burning conditions and no tractor owner should refuse to consider kerosene as a fuel until he has thoroughly and carefully tried it out on his tractor. It should be remembered that a tractor engine runs under conditions that are most favorable to burning kerosene; that is, heavy steady loads.

To rig up your tractor for a kerosene test, is very simple and need not cost more than a few dollars. Get an old half gallon can, a large tomato can will do, and about six feet of copper tubing, the same size as is connected to the carburetor from the fuel tank, a small tee fitting for soldered joints and a couple of pet cocks for soldered joints will be all that is necessary. These can be second-hand and are obtainable at most any garage. The first thing to do before making this change is to drain all the gasoline out of the tank, pipes and carburetor. Then find a suitable place to put the half gallon can which should be about 6 in. higher than

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