Avery

Service Manual

1916

Light Weight

Gas and Oil Tractors

Service Manual

AV-S-1916 ALL

call for help and must be heeded. Study carefully the principles of operation of the motor. Familiarize yourself thoroughly with all of the working parts. This will help you not only to get out of trouble but will avoid getting into trouble, which is much better. The old adages "A stitch in time saves nine," and "an ounce of prevention is worth a pound of cure," are doubly true in the care of a tractor.

In studying the instructions in this book, do not only try to remember them but try to *understand why* it is necessary to take care of a certain part in a certain way and you will be surprised how fast and easily you will get acquainted with your machine.

A FEW SUGGESTIONS WORTH REMEMBERING.

Do not adjust your push rods so as to take out all the slack when motor is hot, for the cylinders being hot and the push rods cold, the cylinders will shrink the most, leaving the rods too long when the motor cools down, and you will find it impossible to start, as the valves will not seat properly.

Don't adjust clutch when it is out. Always adjust clutch while in, so you can adjust each shoe or block alike—if blocks are not alike it will cause clutch to wear much faster.

Don't race the motor—it is hard on all wearing parts in crank case and cylinders.

Don't advance the spark or throw open the carburetor lever too quickly, this is also hard on a motor.

Don't forget to close off valve of fuel tank when leaving tractor. The float in carburetor might fail to hold and leak and you would lose all your fuel in tank.

Don't forget to close off gravity oiler to gears, its not automatic.

Don't forget grease cups—fill each one twice a day. Grease is cheaper than repairs and the time required to replace.

Don't run tractor over ditches and rough places full speed, a little slowing down may save a break.

Don't think because motor is running nicely that it doesn't need watching, life wears out of all things, quicker in some than in others because the watchman is not on guard.

Don't allow any of the bearings to pound. If connecting rod shaft bearings are loose, remove crank case cover and take up the lost motion. Dangerous to run motor with any pound in these bearings.

Don't pour gasoline in a supply tank with fire burning anywhere near the machine.

Don't try to solder a leaky gasoline tank until first filling it full of water, and allowing to stand for some time before attempting to repair.

Don't light a fire near wagon tank, or try to thaw out a faucet with a flame, as several have been killed in this way.

Remember that it is the empty tank like the unloaded gun that is most dangerous. It is impossible to explode gasoline liquid, but a tank which is empty will be full of air mixed with a certain amount of gasoline vapor which is very explosive, and will blow the tank into fragments if ignited.

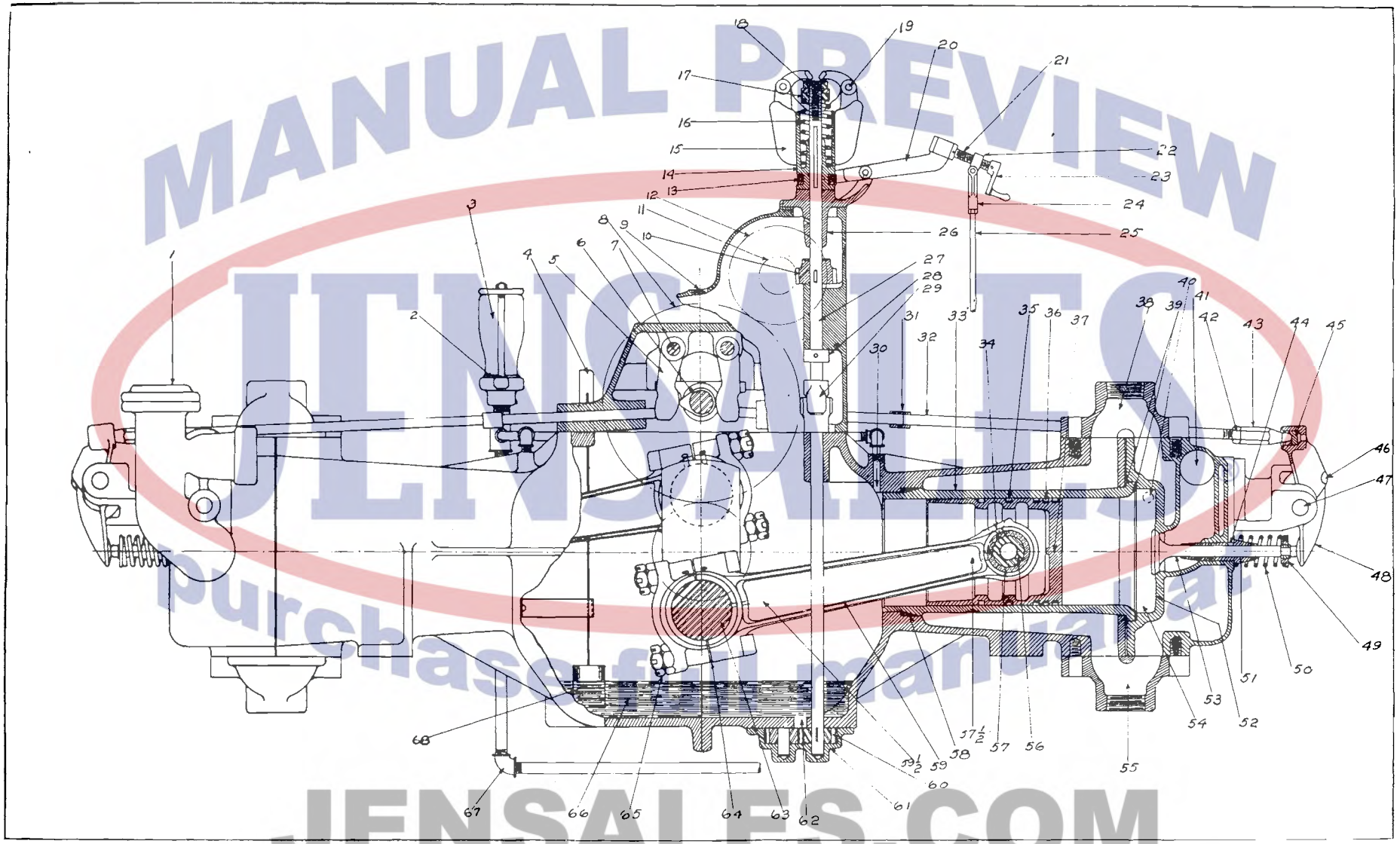
Don't take needless chances in any way with the machine as it often results in disaster, remember "Safety First" is a mighty good motto.

Don't forget to drain the water out of the radiator as soon as cold weather begins, for you will be surprised at how little cold it takes to freeze and burst the radiator tubes and water jackets.

GENERAL DESCRIPTION OF THE INTERNAL COMBUSTION MOTOR OR GAS ENGINE.

The internal combustion motor, or, a motor driven by burning the fuel inside of the cylinder instead of under the boiler, as in the case of a steam engine, is one of the simplest machines known for the purpose of transforming chemical energy into mechanical energy for the purpose of doing work. It is also a first cousin to the steam engine, as it derives its energy from the same source, namely, heat, and is truly a heat motor.

As nearly everyone at this time is more or less familiar with the construction and principle of the steam engine, we will make a few



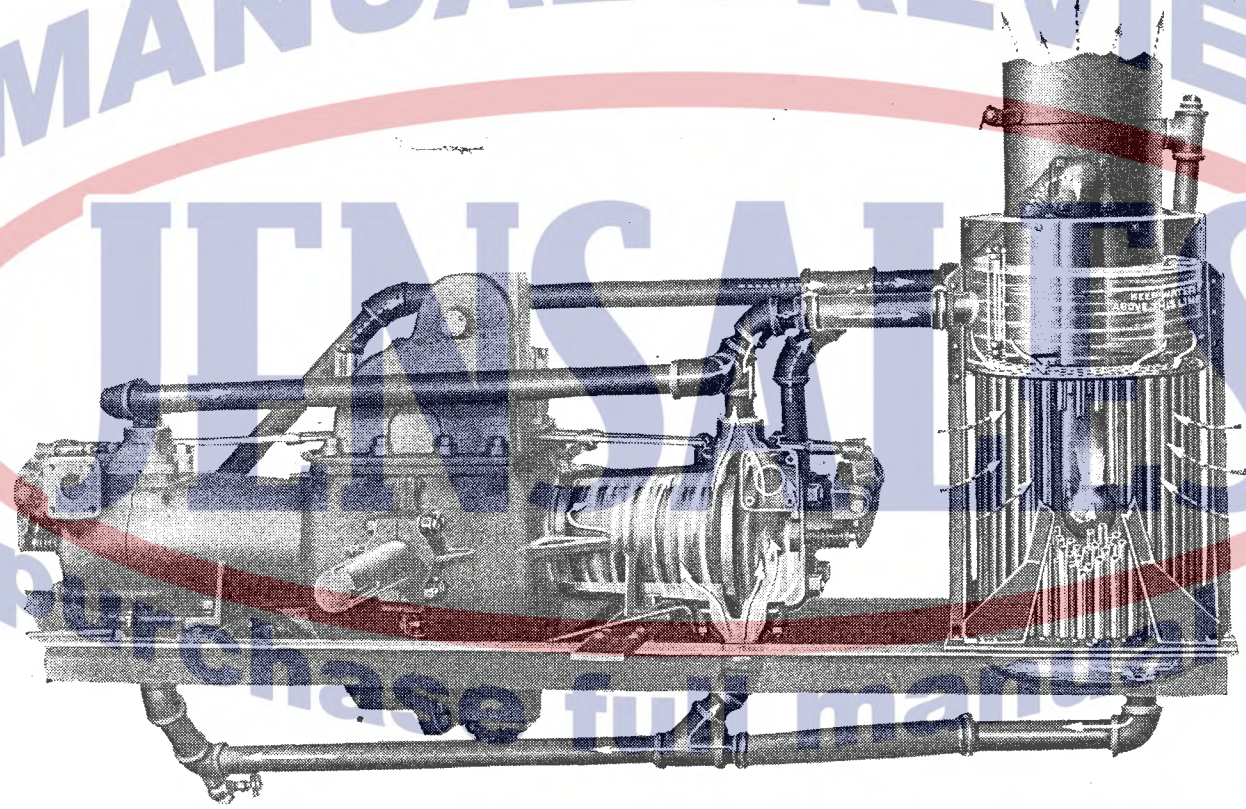
Cut No. 1

Cross Section of Avery Motor.

that the oil pump takes care of all the internal oiling of the motor, the only parts which have to be oiled by hand being the rocker arm (No. 46) and (No. 45), the valve stems (No. 44) and governors (No. 18).

Cooling System

As before referred to, at the time at which the fuel is burning in the cylinder, during the working stroke, there is a great deal of heat generated and if not carried away would in a very few moments ruin the cylinder walls and piston. Provisions have been made, however, to take care of this with what is termed the cooling system.



Cut No. 3

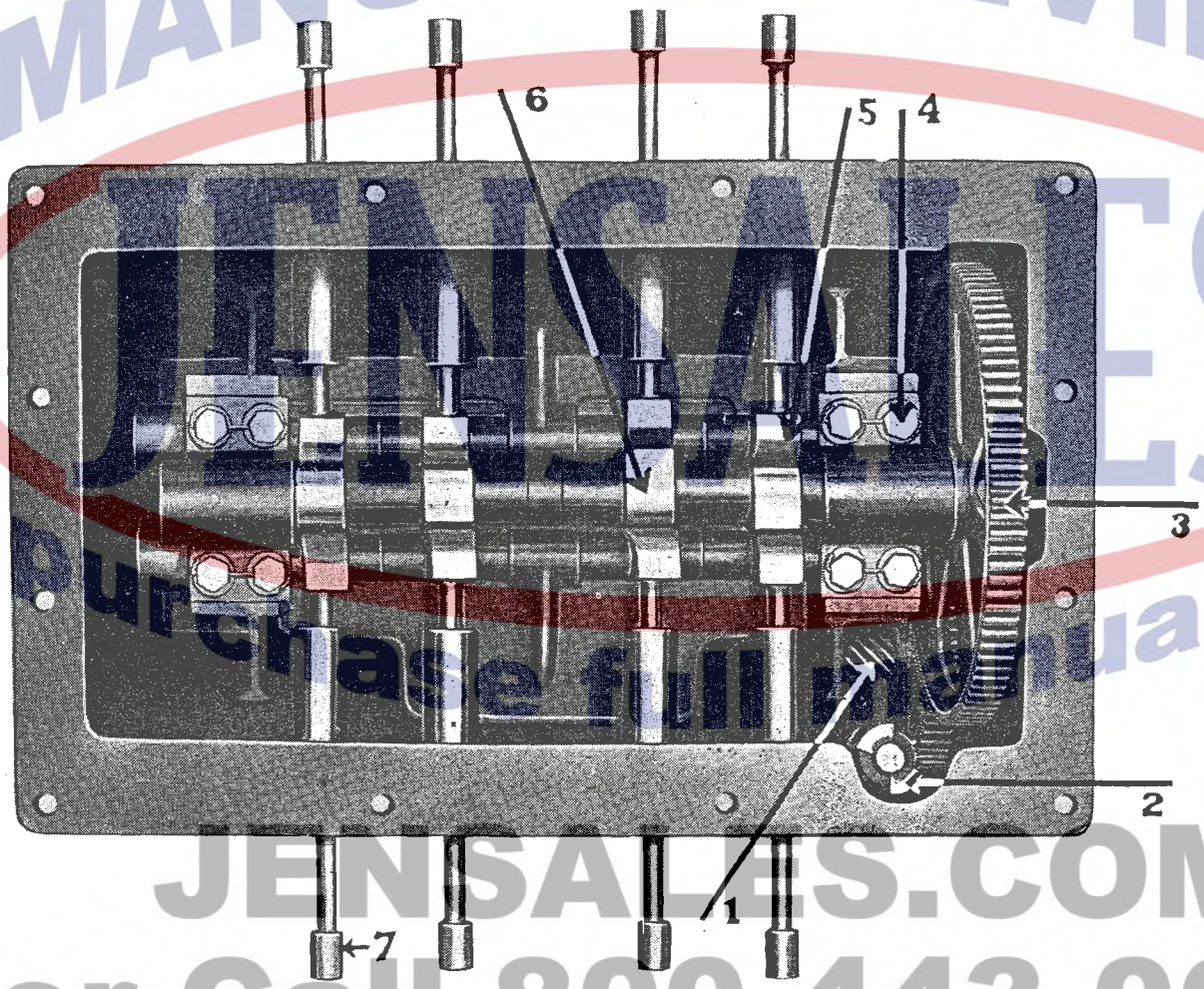
Showing Cooling System.

Referring to sectional cut of motor, cut No. 3, you will note the pipes leading to the bottom of cylinder and water space around cylinder and cylinder head. As the heat is generated in the cylinder it passes through the walls and head, heating the water surrounding the cylinder and cylinder head. This water becoming lighter than the water in the radiator, the cold or heavier water forces it up through the pipe to the radiator, at which point it flows through a great number of copper tubes and as there is air being drawn through around these tubes, due to the action of the exhaust, the heat is taken away from the water and it flows down through the radiator and back to the cylinder again to carry away more heat. In other words, motors are all air-cooled directly or indirectly. The water radiator and circulating system simply being a means by which we can present a great amount of surface for the air to act upon, thus getting rid of a greater amount of heat.

Valve gears, cams and push rods, etc.

The cut on previous page shows the Avery Light Weight Tractor Motor of a 4 cylinder type, with crank case cover removed, showing the crank shaft, connecting rods and cam shaft gear, also the oiling system, rocker arms and water, exhaust, and intake manifold flanges.

No. 1 shows the cam shaft gear; No. 2 the pump shaft connection; No. 3 a point on the oiling system where the oil enters one of the cylinders or crank cases. No. 4 shows the water manifold connection. No. 5 shows a plug in the oiling system which may be removed for the purpose of cleaning out the pipes. No. 6 shows flange on crank shaft. Upon this flange will be found the marks for valve timing and also the dead center mark, which is marked "C," which is used for setting the crank shaft



The above cut illustrates the crank case cover, inverted to show the gearing, the cams and cam shafts, cam shaft gears and bearings, together with the valve tapit hangers and push rods.

No. 1 shows a spiral gear which drives the Governor and pump shaft. No. 2 shows the pump shaft connection; No. 3, the cam shaft gear; No. 4 the bearing, No. 5, the hanger, and No. 6, the cams.

on center when replacing the crank case cover. By placing this mark to correspond with the split in the crank case, the crank shaft will be on dead center. In this position, if the cam shaft gear is turned so that the tooth marked XXXX can be seen through the one inch hole in top of crank case cover in this position the cams, valve and magneto will be perfectly timed.

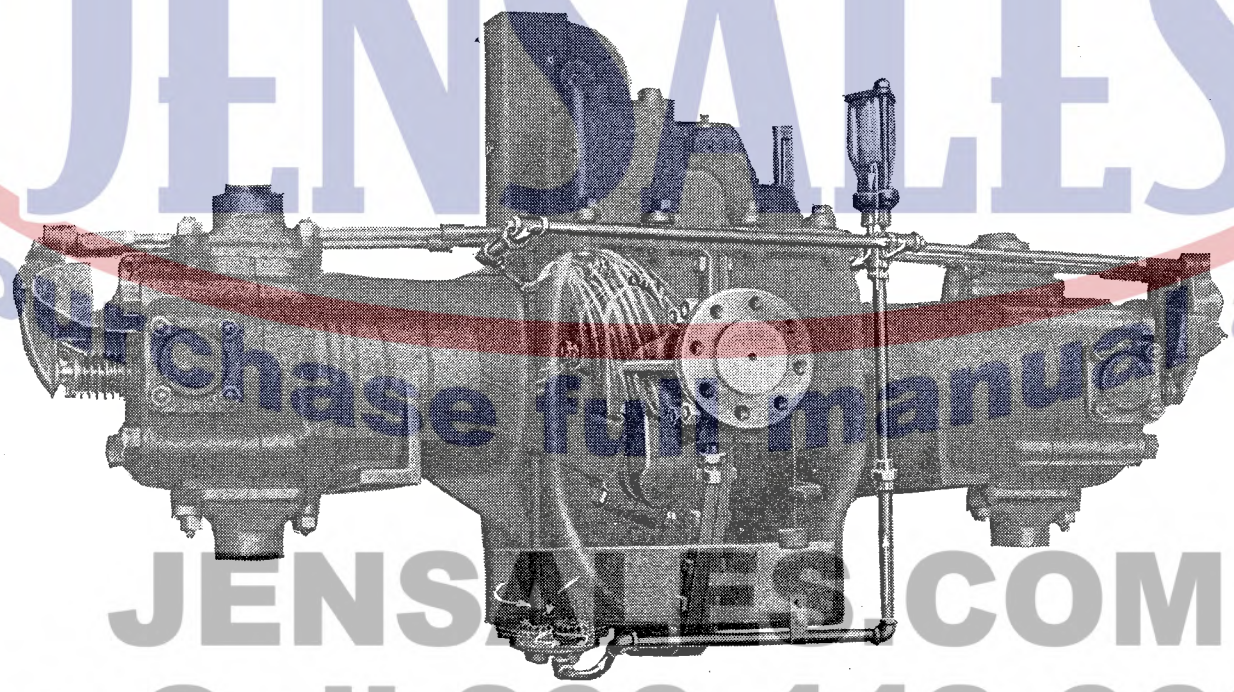
CARE OF THE GAS TRACTOR.

A Collection of Units The Tractor is commonly spoken of as consisting of nine units, namely: Motor, Oiling System, Cooling System, Ignition System, Fuel Supply, Clutch, Transmission, Frame and Wheels.

We will take up the different units in the order named, as this is also the order of their importance.

Operating Motor In operating the Motor you must always bear in mind that it is a machine and nothing else. It must be treated as a machine and handled as a machine. There is nothing human or intelligent about it, nothing superhuman, and consequently, it will simply work itself to death or tear itself to pieces when anything goes wrong, if not properly cared for.

OILING SYSTEM.



Cut No. 4

The above cut shows the oiling system of the Avery "Light-Weight" Tractor Motor. Our artist has very clearly shown the oil pump in bottom of crank case and the arrows indicating the route the oil takes, flowing up the ½" pipe to the bottle. At this point the operator can see the oil plainly flowing through the bottle, after which it flows down through the flanges to each of the cylinders and is sprayed on to the crank shaft and connecting rods, as indicated in the left hand cylinder of this cut. The depth of oil is also shown in the crank case as well as the cork float and indicator at top of crank case.