INSTRUCTIONS
for Firing Up and Running the
Stanley Steam Car

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1906

Stanley Motor Carriage Company
NEWTON .· .· MASSACHUSETTS

In ordering parts for STANLEY CARS, be sure to give the number and name of the part wanted, as these numbers and names are listed in our *Price-List of Parts;* a copy of which may be had on application.

Also, give the name of the model; the year of manufacture; and the number of the car, as on the name plate at the rear of the car.

General Remarks

TO operate a Stanley steamer with success and pleasure, one must know the car, and know it thoroughly. It is a question of knowledge, not of skill. The skill necessary to perform the various operations is quickly acquired, but to know what to do, and how to do it under all circumstances, to know how every part is constructed, how it is supposed to operate, and what to do in case any part fails to perform its function, implies a knowledge of the machine that can come only from careful study.

If your car is kept at a public station, do not say to the attendant when you come in at night, "Look this car over carefully, and be sure that everything is all right in the morning." But, instead, tell him exactly what to do, and, if necessary, just how to do it, and before starting out in the morning see that it has been done.

Of course, in a pamphlet like this, only general directions can be given. A knowledge, such as is mentioned above, can be acquired only by a study of the machine itself. The old adage, "Experience is the best schoolmaster," holds true here as elsewhere.

Filling the Boiler

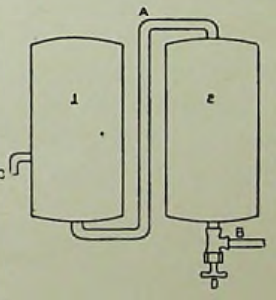
Before lighting the fire be sure there is water in the boiler. If the boiler is empty, it can be filled by using the hand water pump, provided, of course, the water tank has been first filled. Or it can be filled from the town supply through a hose. A coupling is furnished with each car for this purpose which connects with the blow-off valve. When the boiler is properly filled, the index on the water indicator should point upward at an angle of about 45 degrees.

If at any time there is doubt whether or not there is water in the boiler, give the doubt full benefit, and pump some in before lighting the fire. Be sure when pumping water by hand that the by-pass is closed; otherwise the water will go back into the tank.

After the boiler is blown off at night, close the by-pass, fill the water tank, and, when the steam in the boiler condenses, a vacuum is formed, and the water will flow from the tank into the boiler till it becomes full. Then, before lighting the fire, draw off, through the blow-off valve, about one-half pail of water; otherwise, the expansion of water in the boiler will create a pressure sufficient to cause the automatic to shut off the main fire. When drawing off water, as mentioned above, always open the throttle, to let air into the boiler to take the place of the water; otherwise, the water would run from the tank instead of the boiler.

Gasolene Pressure

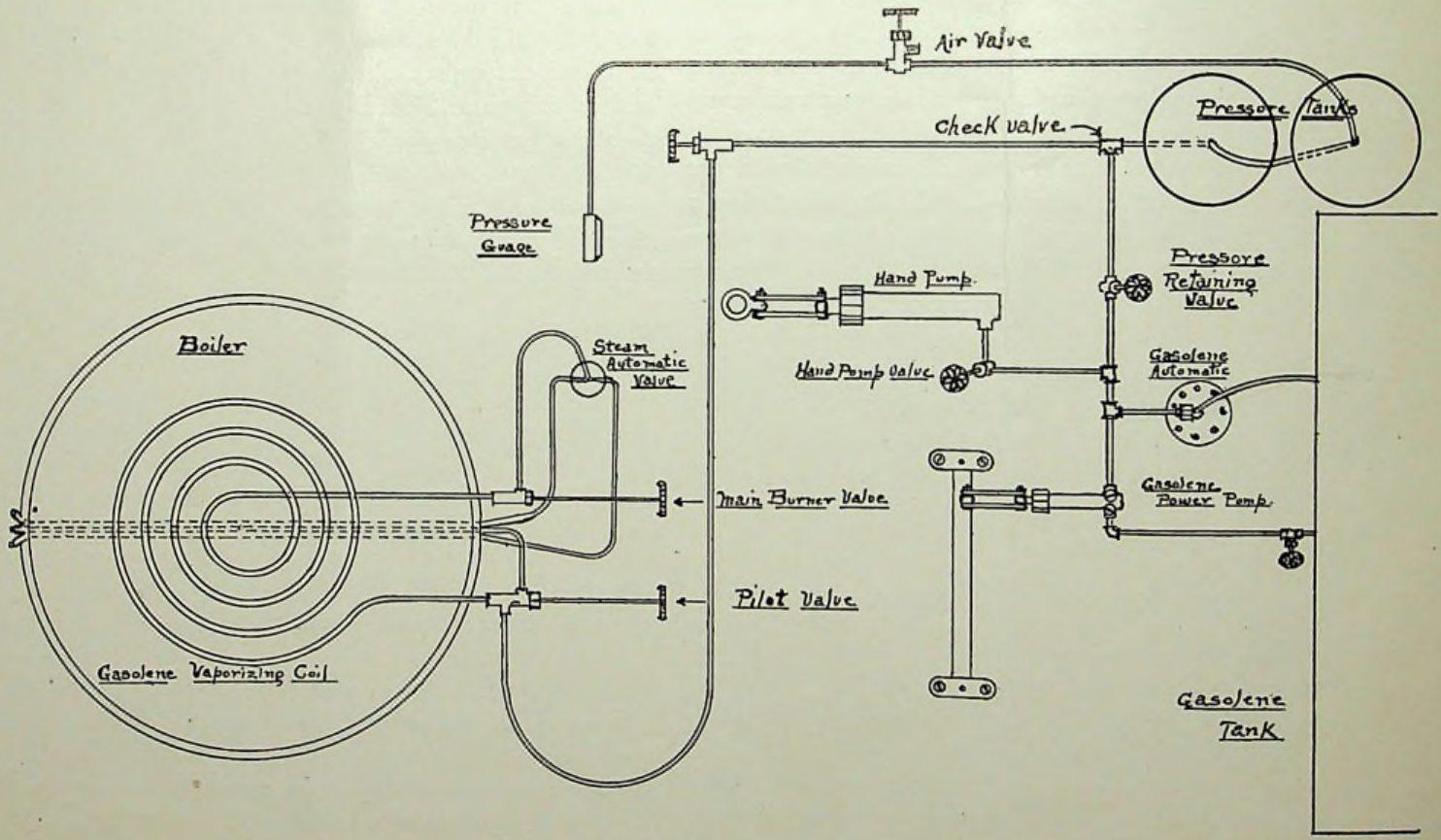
The gasolene is carried in a tank under no pressure. From this tank, it is pumped into the pressure tank. The pressure tank is a double tank, or, rather, two tanks situated side by side, so piped that the bottom of one is connected with the top of the other, as shown in the illustration.



A is the pipe connecting the two tanks.
B is the pipe through which the gasolene is pumped.
C is the air valve through which air is pumped with an ordinary hand air pump.
D is a valve for drawing the gasolene out of the tank when desired.

We will now suppose the tanks to be empty, in which case, the gauge would stand at zero, and we are to get up gasolene

Piping of Gasolene System



pressure in order to start the fire. Proceed as follows: With the hand gasolene pump, pump gasolene till the gauge registers between ten and fifteen pounds. If we could now look into the tanks, we would find tank No. 2 nearly full of gasolene. The air in this tank has been driven by the gasolene into tank No. 1, and, being compressed, is under a pressure, as indicated by the gauge. Now, attach the hand air pump to valve *C* and pump air into tank No. 1 till the gauge indicates some eighty or ninety pounds. The pressure tanks are now in good working order.

If the fire were now lighted, and allowed to burn for some time, the gasolene pressure would gradually drop. But it would only be necessary to use the hand gasolene pump to raise it again.

When running on the road, the power gasolene pump supplies the gasolene and keeps up the pressure. As this pump delivers an excess, an automatic relief valve is provided, adjustable as to pressure, through which the excess passes back into the supply tank.

The air in the pressure tank will be gradually absorbed, and more will occasionally have to be pumped in. The need of this will be indicated in two ways. First, when running, the hand on the pressure gauge will be seen to vibrate. Also, when standing with the pilot burning, the pressure will drop rapidly, owing to too little air for expansion.

In the latter case, to be certain the rapid drop in pressure is due to want of sufficient air, and not to a leaky automatic or pump valves, close the valve designed for cutting these out. This is designated, "Pressure retaining valve," in cut on page 4. Then, if the pressure continues to rapidly fall, the cause is surely insufficient air in the pressure tank.

Occasionally, it is well, in order to know definitely the relative amount of air and gasolene in the pressure tanks, to draw all the gasolene out through valve *D* and start anew, as described above. In doing this, it is sometimes necessary to pump in air to drive out all the gasolene. If the car is to stand for some time with pilot burning, close the pressure retaining valve. This prevents the gasolene from going back through the valves and automatic. Be sure to open again on starting.

Firing Up

A small gasolene torch, with directions for lighting, is furnished with each machine to be used in heating the burner nozzles, preparatory to lighting the burner.

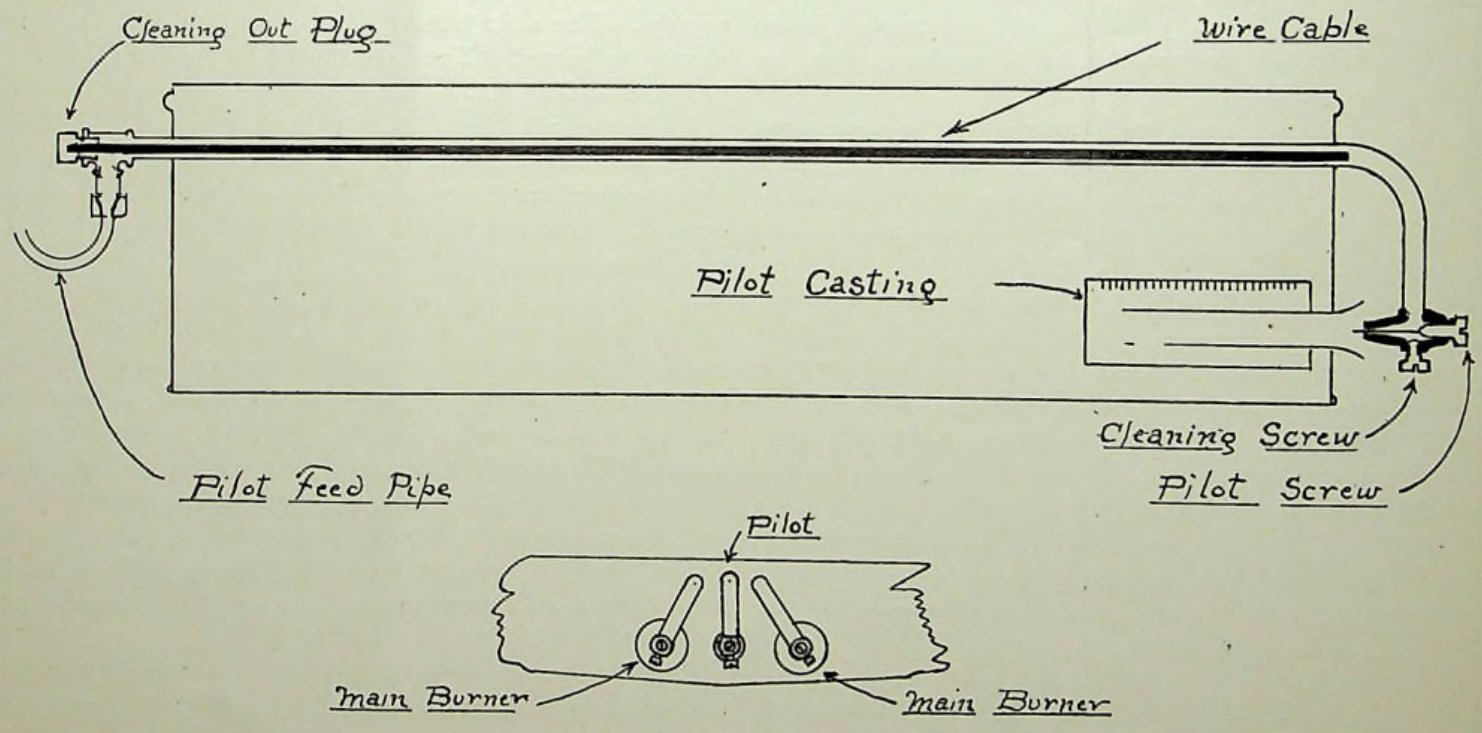
To start the fire successfully, heat the burner nozzles thoroughly. The main burner nozzles, as well as the pilot nozzle, should be heated. The heat should be applied sometime after they are sizzling hot.

Light the pilot first. To do this, open the valve one complete turn, then immediately point the torch flame into the peek hole designed for this purpose, its slide having been previously opened. After the pilot is lighted, close this slide before turning on the main fire. Open the main burner valve very slowly and bring up the fire gradually.

Open the throttle valve, and the drip valve to the steam chest to allow the first steam formed to pass through, and protect the superheaters, which are empty, and exposed to the fire. On account of injury to the superheaters, it is always best to fire up slowly. This is not necessarily time wasted, as one can spend the time making adjustments, oiling up, or inspecting the parts of the car, things which always should be done before starting on a journey. When the steam pressure rises to twenty or thirty pounds, it is best to close the throttle, otherwise, the car might run away.

Unless there is a steep hill to climb, immediately on starting out, better start when the pressure reaches about two hundred pounds. By so doing, there is less liability of injuring the engine, should there happen to be water in the cylinders, and it is less severe on the superheaters.

Section of Burner
showing
Plan of Pilot Light



Always start the car with the steam chest valve open. By so doing, the steam pipe and steam chest are freed from water. By running the car back and forth a few times very slowly, the cylinders will be freed from water, and then the drip to the steam chest can be closed. Immediately before starting on your journey, turn the main burner valve wide open, that is, give it one or two complete turns.

On all cars with hood in front, better raise the hood when firing up.

Oiling

All the bearings on the engine, on the pumps, and on the rear axle should be oiled at least once a day; oftener would do no harm. For the rear axle, ordinary machine oil is probably best, as it flows through the cups better than a thick oil. But for the engine bearings, and the pump bearings, use the same oil as is used in oiling the cylinders. The most convenient way to apply this oil is by use of an oil syringe or force pump. The oil can be taken from the cylinder oil tank under the foot board.

Be sure all the bearings get a liberal supply. The eccentrics are more apt to be neglected, as they are less accessible. In oiling these, if the oil is put in the top, between the two, it will flow down, and find its way into both ball races.

If the bearings on the steering gear are oiled once in two or three days, it is sufficient. Of course, if at any time it works stiff, find where it sticks, and oil thoroughly.

Cylinder Oiling

Owing to the great importance of proper and ample cylinder lubrication, we treat this subject separately.

Cylinders and pistons of a Stanley Engine, if oiled continuously, with a suitable quantity of good cylinder oil, would probably show no injurious wear after running many thousand miles. Yet, a run of one hundred miles, or even less, with the cylinders dry, might result in serious injury.

In order to insure perfect cylinder lubrication, an automatic power feed oiler is employed, which, if kept in good working order, is sure to accomplish the desired result.

To keep this in working trim, the first essential is to keep the tank well supplied with oil. Should the tank run dry, the pump would become air bound, and when the tank was refilled, it might fail to work. It would then be necessary to prime the pump. To do this, uncouple the pipe leading to the steam pipe at the point nearest the pump, and work the pump by hand till the air is all out. When each thrust of the plunger throws a good supply of oil, the pipe may be connected up again.

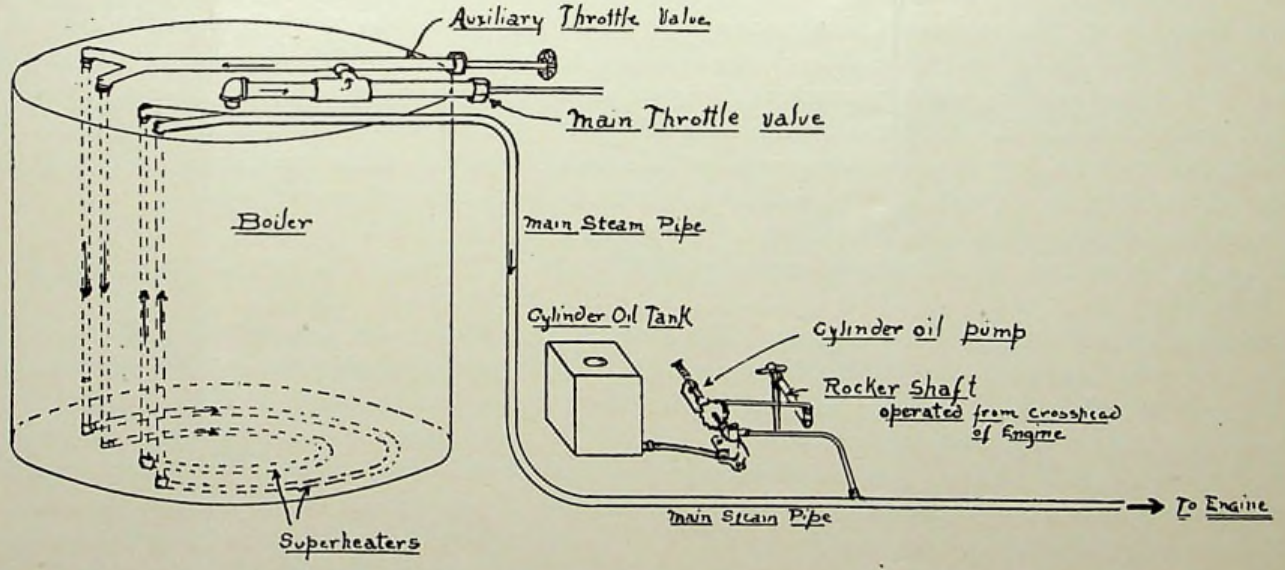
Keep the packing nut properly adjusted, and the mechanical parts of the pump working well, and use nothing but the best superheat steam cylinder oil, and you may be assured that the cylinders will be well oiled.

The Fusible Plug

If the water in a fire tube boiler were all evaporated, and the fire kept burning, the boiler would become so heated as to cause it to leak so badly as to require recaulking before it could be used again. To avoid this, all our boilers are equipped with a fusible plug. When the water in the boiler gets within 3 inches of the bottom of the boiler, the plug melts, and the noisy escape of steam notifies the operator, who immediately shuts off the fire, both pilot and main burner, thus protecting the boiler from injury.

When the plug blows, and the fire is shut off, it is a good plan to keep on running till the steam pressure is so reduced as to compel a halt. Then close the by-pass, and with the hand pump, pump water into the boiler, till it is cool enough to allow the plug to be removed, and a new lead inserted, and the plug

Steam and Oiling Systems



put back in place again. The pumping can then be continued, and, when the indicator stands about horizontal, the fire can be lighted. Usually, this can be done without reheating with the torch, provided renewing the plug has been quickly done.

It is well to keep on hand one or more tubes with lead all fitted to facilitate matters.

The material used in the fusible plug is common lead, which melts at a temperature of about 618° Fahr.

The Water Indicator

Owing to the high pressure carried in the Stanley boilers, a glass for showing the height of water in the boiler cannot be used. This fact led to the invention of the water indicator. This indicator consists of a cylinder containing a float. The cylinder is so piped that it fills with water to the level of that in the boiler. At the top of the cylinder is a chamber which contains a pulley mounted on a shaft, one end of which passes out through the side of the chamber. To prevent the steam from escaping through the hole, on the shaft, is a conical bearing, fitting a conical seat. This acts like a clapper valve in preventing the steam from escaping, at the same time allowing the shaft to turn. The float, mentioned above, is attached by means of a chain to the pulley, causing it to turn as the float rises or falls by the changing water level. As the float is heavier than water, being a metal bucket, open at the top, and full of water, it has to be counterbalanced by a weight and pulley on the outer end of the shaft.

An examination of the indicator, with the above description, will enable one to understand its construction and mode of operation. But since there are some things which may happen to the indicator to cause it to register falsely, it is well to mention them here.

First, when running over bad bumps, the cord attached to the weight may get off the pulley. In this case, the index would point down with a full boiler. All that is necessary to right it, is to put the cord back in place again. Should the cord break, the same thing would happen, as described above.

When the boiler is blown off, and the steam pressure reduced to zero, it is possible for the water to evaporate out of the bucket. The weight being heavier than the empty bucket, would cause the index to stand up vertical with no water in the boiler. This condition can readily be determined by turning the index down, and releasing it. The speed with which it flies back and the sound will indicate the absence of water in the indicator. In such a case after pumping water into the boiler, the index should again be turned down, which will allow the float bucket to sink and fill with water. It is then in good working order.

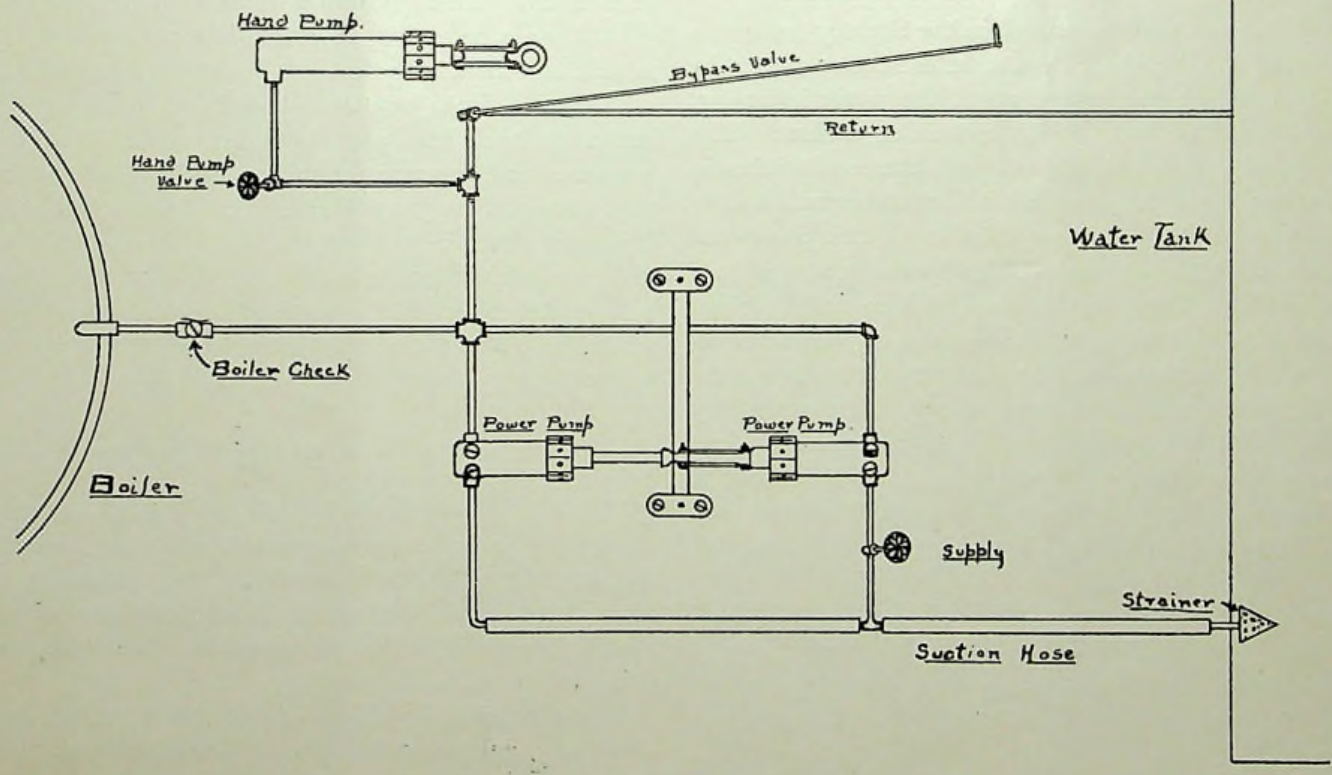
It is sometimes true that the index when turned down will not come back into place again, provided there is full steam pressure, and the car is standing still. When the car is in motion, however, the jar will cause the float to find the proper level. It is good practice to move the index up and down, every now and then, while running, to test it. Also, if the indicator spindle is kept well oiled with cylinder oil, it will cause it to be more sensitive. The oiling must be done when there is no pressure in the boiler; otherwise, the oil would not run in.

Care of the Boiler

There is no way the boiler can be injured so easily as to fire up with no water in the boiler, or to allow the boiler to run dry, and not shut off the fire. In either case, the boiler would be so heated as to cause it to leak. This would not cause a permanent injury to the boiler, but it means a repair job, and possibly being towed home.

When running on the road, the fusible plug, as mentioned elsewhere, will warn the operator when the water gets too low. But it would, of course, give no warning when firing up without water in the boiler.

Piping of Water System



Since the water used in the boiler is apt to contain more or less sediment, and always soluble organic impurities, the most common of which is carbonate of lime, these solid impurities must of necessity accumulate in the boiler, unless the boiler is frequently blown off. If the water used is quite clear and soft, blowing the boiler off twice or three times a week will do very well. If, however, the water is quite hard, it is desirable to blow off every day, if the car is being constantly used. If this matter of blowing off is properly attended to, the boiler can be run continuously on very hard water with no injurious scaling or deposit.

When blowing off, do not continue until the pressure is reduced to zero, but close the valve as soon as the water is all out, and the pressure has dropped about one hundred pounds. This is desirable in two ways: First, it leaves sufficient steam for running the car a short distance, if desired; and, secondly, when this steam condenses, it forms a small quantity of chemically pure water that falls to the bottom of the boiler and tends to redissolve any scale that has formed.

After shutting the burner valves previous to blowing off, see that the fire is all out before opening the blow-off valve. Sometimes the flame in the pilot will burn some minutes after the valve is closed. It can be extinguished by blowing into the pilot mixing tube.

The superheating tubes and the fusible fitting are driven into place, and held by friction. When prying them out, hammer them sideways to start them.

The Water Pump

As will be seen by inspection, the power-water pump works continuously when the car is running. Having a capacity sufficient to supply the boiler when running up hill and over bad roads, it must, of necessity, pump too much water when on good roads. Hence, the use of a by-pass, operated by hand, to allow the water, when the boiler is sufficiently full, to be pumped back into the tank again, instead of into the boiler.

Remember that when the by-pass valve is closed, the water is being pumped into the boiler. When open, it is pumped back into the tank. By this means, the amount of water in the boiler is under control.

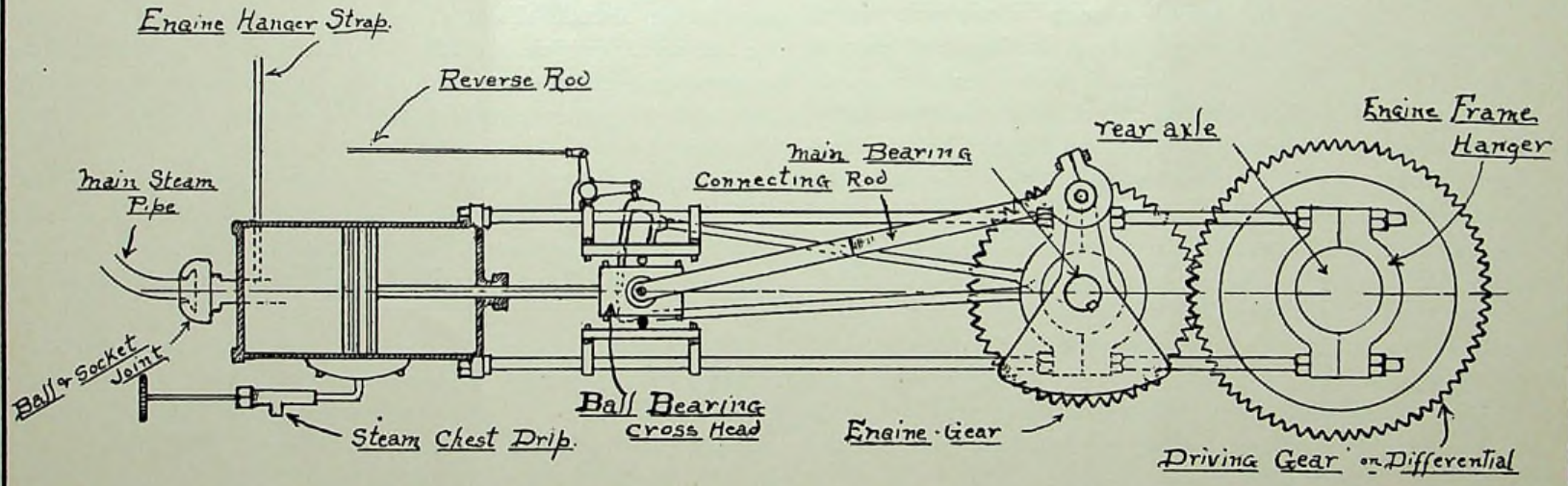
If at any time the pump fails to work, first examine the water tank to see that it is not empty. If the tank is well supplied with water, the cause of failure must be found elsewhere.

There are three principal causes, any of which may make the pump fail to work. They are as follows: First, the pump may be air bound. That is, the pump cylinder and valves may be full of air, which, with the by-pass closed, would be simply compressed and re-expanded as the pump plunger goes in and out, and its presence would prevent the water from entering the pump.

To remedy this, open the by-pass valve, and run a few rods. The pump being relieved of boiler pressure, the air will be pumped out through the by-pass, and the pump will then be primed. If the by-pass is now closed, the pump will work all right.

In the second place, difficulty with the valves may cause the pump to fail to work. Connected with the water system are three check valves. Two are on the pump, one the intake valve, the other the outlet valve. Beyond the outlet valve towards the boiler is the third valve, called the boiler check valve. The by-pass pipe is taken off between the two last mentioned. The intake valve is generally the one to cause trouble. Something may get into the valve causing it to fail to seat. To remedy this, remove the valve cap, take out the ball, and clean the seat. Be careful not to scratch the ball or seat, as this would cause the valve to leak. The other two valves very rarely have trouble. Should the one next the boiler go wrong, it would not prevent the water from being pumped into the boiler with the by-pass

Side View
of
Ball Bearing Engine.



closed, but would cause trouble when the by-pass was open, as the steam would flow back into the water tank. This valve can only be examined when there is no pressure in the boiler.

In the third place, the packing to the pump may be in such a condition that much of the water leaks by, instead of going into the boiler. This is generally remedied by simply tightening the packing nut, otherwise, repacking is necessary.

Do not screw the packing nut up too hard, as it causes unnecessary friction. A little leakage can be tolerated to save friction.

Water pump troubles are of rare occurrence, and generally easily remedied. Should, however, something happen to cause complete failure of the power pump, the hand water pump can be used to enable one to get home, when faulty parts can be put right again.

Before pumping by hand, reduce the pressure by running with the main fire off, as it is easier to pump against one hundred pounds than four hundred pounds.

The Gasolene Pump

Much that is said about the water pump will apply equally well to the gasolene pump. In some respects, however, it is different.

The by-pass connected with this pump, as mentioned elsewhere, is automatic, and opens when the pressure gets to a certain fixed point, and lets the excess flow back into the supply tank.

Should this pump become air bound, it can be primed by using the hand gasolene pump. This pump, being many times larger and drawing its supply through the power pump, will draw out all the air and fill it with gasolene. It will then work all right.

No leakage of gasolene through the packing gland can be tolerated, as it is both wasteful and dangerous. Owing to the small size of the pump plunger, and the liberal amount of packing in the gland, it will run a very long time, fully six months, and only need adjusting occasionally, without repacking.

Sometimes the hand gasolene pump will become air bound, and fail to work. To remedy this, unscrew the valve stem, which is opened when the hand pump is used, till it comes out. Now, if there is a good supply of gasolene in the tank, by placing the thumb on the valve stem hole, when the plunger of the hand pump is pulled out, and taking it off when the plunger is forced in, the air will be forced out, and the pump primed. The valve stem can now be screwed in, and the pump will work all right.

Keep all the bearings on both gasolene and water pumps well adjusted, and well oiled. This prevents wear and noise.

Care of the Engine

The first and most important thing in caring for the engine is to see that it is properly oiled. The kind of oil, and method of oiling has been spoken of under the heads "Oiling" and "Cylinder Lubrication," but we wish to emphasize its great importance here. Should, at any time, any of the bearings show the slightest discoloration from rust, you may rest assured they have been insufficiently oiled.

Graphite may be added to the cylinder oil used on the bearings with good results. It prevents rust, and lessens friction.

Successful cylinder lubrication depends upon keeping the mechanical parts of the oiling device in perfect order, and the tank well supplied with first-class cylinder oil.

Adjustment of bearings comes next in importance. As a rule, adjustments of any description rarely have to be made. The packing glands of the piston rods and valve stems require most attention. New packing is rarely needed, but merely tightening the packing nuts.

The bearings, namely, the crossheads, the wristpins, the

crankpins, the main journals, and the eccentrics, seldom need adjustment, but, when necessary, can be adjusted as follows: —

The slides to the crossheads, when it is found that the balls are loose, can be brought nearer together by screwing down the nut on the bolt that holds the frame rods together. There should always be sufficient pressure on the balls to keep them from rolling back and forth, except when the crosshead moves.

The wristpin bearings are conical bearings, and are adjusted with a screw, which is held from turning by a checknut. In adjusting these, loosen the checknut, turn up the screw till it stops, then back it out one-eighth of a turn, and then set up the checknut again.

The crankpin bearings can be adjusted by removing the bolt, taking out the plug, and reducing it in thickness by filing. When the plug is put back, and the bolt screwed in, the bearing should have no perceptible play.

The main journals and eccentrics can be adjusted only when the engine is out of the car. With the engine out, one-half of the cup on the bearing to be adjusted can be removed, and carefully ground at the ends so that when put back in place, there will no longer be any lost motion.

Care of the Burner

The source of all power in a steam car is the heat produced in the burner. A good burner kept in perfect condition is the first essential in a steam-propelled machine. If your car " does not steam well " look at once for the trouble in your fire.

The thing most likely to cause trouble with your fire is low gasolene pressure. The burner is made to run on about one hundred pounds pressure. If the pressure is only fifty pounds good results cannot be expected.

With the gasolene pressure all right, the next thing to cause trouble is a clog somewhere in the gasolene flow. This may occur in the automatic valve, in the vaporizing tube, in the burner nozzle, or in the main burner valve. Wherever it occurs, it must be found and removed.

If the burner is double, having two mixing tubes, see if both sides are equally affected. If one side burns well and the other poorly, then the trouble is not in the automatic; otherwise both sides would be affected alike. It must be either in the vaporizing tube or nozzle. Most likely in the nozzle. The nozzles can be cleaned by running a small wire through them with the screw out, or by using a bent wire with the screw in. In the latter case the fire does not have to be turned off.

If there is a clog in the vaporizing tubes, it will be necessary to uncouple, at the back of the burner, and take out the bundle of wires in the tubes, and clean both tubes and wires thoroughly. The bundle of wires can be used as a swab to knock off particles that may cling to the tubes. The screw on the burner nozzle can be removed, and the air pump used to blow all dirt out of the tube. Should the clog prove to be in the automatic, this valve must be cleaned, and the same is true of the main burner valve.

Thus far mention is made only of main burner troubles. The pilot light may go wrong. Owing to the small amount of gasolene consumed by the pilot, there is rarely ever trouble, except with the nozzle.

The screw in the pilot nozzle has attached to it a wire which passes through the hole in the nozzle to restrict the flow of gasolene. If the pilot is weak, with a screw-driver turn the screw back and forth. This revolves the wire in the hole and cleans it. This is done with the pilot alone burning.

If the pilot light burns with a yellow, smoky flame, it indicates that it does not get air enough. If it burns with a very blue flame and " lifts " from the burner, it indicates that it gets too much air. The amount of air is regulated by the position

of the nozzle in relation to the mixing tube. To give it more air, pull the nozzle further out from the mixing tube. To give it less air, push it in. The pilot light should burn with a blue flame, slightly tinged with yellow, and should lay down close to the burner casting.

Never use a reamer or broach for cleaning either pilot or main burner nozzle, as it would be likely to enlarge the hole, allowing too much gas to go in for complete combustion, which would be wasteful.

Remarks on Operating

If asked to name the most common mistake made by those who run the Stanley steamer, we should say unhesitatingly, it is in opening the throttle too wide when starting. It is altogether too common to see the operator, in starting, shove the throttle forward and start the car on the jump, with a crack to the exhaust as loud as in going up a 25 per cent. grade. This is entirely wrong. It brings a tremendous and unnecessary strain on the working parts of the engine, and is still more injurious should there happen to be water in the cylinders.

Hence, start slowly, bringing the car up to the desired speed gradually. In time this will become a habit, and a good one.

On a good level road, at any legal speed, a Stanley car, with all bearings properly adjusted and lubricated, is practically noiseless in its operation. If a thump or knock is heard, however slight, find its cause, and do not be satisfied till it is stopped. The difference between success and failure is embodied in the old saying, "A stitch in time saves nine."

As much as possible make adjustments in the garage, and not on the road. It is much more convenient, and decidedly more agreeable.

Keep the boiler well filled with water, particularly on a strange road; otherwise, an unexpected hard hill may compel the use of the hand pump, or the risk of blowing a plug.

Keep the tires well inflated. This makes the tires last longer, increases the speed of the car, and adds to the mileage on gasolene and water.

Never open any of the valves more than two or three full revolutions, as, if they are turned twelve or fifteen revolutions, they will come clear out. If the valve on the gasolene pressure system were screwed out while the fire was burning, it might cause serious fire.

Much more skill is required to run a car backward than forward. With the head turned so as to look backward, to operate the reverse, to open the throttle, and to steer, all at the same time, involves a combination of movements quite difficult for the beginner. Hence, the frequency of accidents in backing.

Make it a rule, especially at first, to back slowly, with ample sea room, and do not attempt to make an exhibition of skill till absolutely sure you possess it. After reversing, be sure that the pedal has come back so that the engine is in forward gear, before giving steam.

Remember that to back down a steep hill is much more difficult and dangerous than to back on level. Never reverse the engine when you are headed up a hill, even if you wish to back. Do not try it till certain you possess the skill to do it without an accident.

Should the fire go out on the road, shut both burner valves, run a short distance in order that the exhaust may draw the unburnt gas out of the burner, then stop and light the pilot with a match. Then turn on the main fire slightly, and after starting again, it may be turned on full.

Laying Up for the Winter

If the road conditions do not permit the car to be used in winter, to protect from injury by frost, fire up the car and run it either on the road or with the rear wheels jacked up so that everything will be hot. Turn out the fire and blow off the boiler. Before the steam is all blown off, open the safety valve and the syphon valve, and take out the fusible plug, so as to clear the water out of these. Drain the water out of the tank. Take off the caps of the check valves, and blow into the suction hose to clear the water from the checks in front. Take off the indicator by disconnecting the union on the top and bottom, and turn it upside down to drain the float.

The gasolene system will require no extra attention for winter.