INSTRUCTIONS FOR G. AND H. MODELS WHITE STEAM CARS

THE WHITE COMPANY
CLEVELAND, OHIO, U. S. A.

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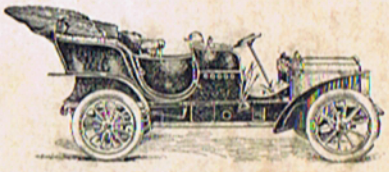
The White Steam Car



Cleveland, Ohio, U. S. A.

While the cuts herein are of the Model G Car, the instructions apply equally to the Model H, as practically the only difference between the two is in the size of the parts and the location of the water tank, condenser pump, air pump, etc.

The setting of the water regulator, however, is an exception to this rule, as it should be set to by-pass at 450 lbs. on the Model H instead of 550 lbs. as on the Model G Car.

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Index.

Lubrication.

In filling oil and grease cups, care should be exercised to prevent dust or grit mixing with either oil or grease.

The lubrication of engine is principally automatic; the oiler being driven from the crank shaft by means of a chain and sprocket. Oilers can also be worked by hand plungers and it is well before starting to give these a few strokes. A pint of oil should be placed extra in the crank case every 200 miles.

Renew oil in the axle gear case every 1,000 miles.

Oil all working joints, such as spring hangers and rod ends.

Keep front wheel bearings and steering gear case filled with grease.

All leather boots enclosing working joints must be kept full of grease.

Grease cups must be given attention and should be given a turn every day before car has been started.

Examine oil connections for clogging or leaks.

It is better to lubricate too much than not enough and it will save time and worry.

Should steam gauge needle vibrate, pump oil around pipe line. Open valves 118 and 111, plate 13, and pump with cylinder hand oiler 108, plate 13, until oil runs from valve 111. Always close valve 118 when through.

Fuel Connections.

Plate 5.

Fuel is supplied to burner from tank X, plate 14, through pipe A, plate 5, then through fuel strainer B. From the strainer, fuel passes through pipe H, valve J, pipe K, valve L; pipe M and pipe H A to vaporizer N. The gas is discharged from the vaporizer through pipe NA and nozzle O into burner induction tube R. Warming up valve G is supplied through pipe I. This valve is only used when it is necessary to get steam to start the engine running, and opens up a straight path for the fuel to the burner without the fuel passing through any of the regulators. It is operated entirely by hand and care must be taken to see that the valve is shut tight when not used for warming up, and when being used that it is not left open long enough to get a red hot generator. Ordinarily two minutes is the time.

The strainer B consists of a device for running the gasoline through a chamois skin. By removing the plug in the end the chamois can be taken out and cleaned and by removing the plug on the bottom any water that has collected in the strainer can be drawn off. This strainer should be cleaned frequently.

At 68° Baume scale, and 74 specific gravity, the shutter (S) is right. For lighter grades the shutter (S) should be closed enough to keep the fire down in the burner, etc.

To Fill Fuel Tank.

See that main valve AB, plate 14, is closed, and that no fire is in sub-burner, main burner or near the car. Loosen cap Y and allow the air pressure to escape before the cap is entirely removed. Fill through the hole Y, but do not remove strainer. Put cap back in place and screw down tight to prevent leak.

To Fill Fuel Tank—Continued.

To raise air pressure in tank, press the plunger in pump A A, plate 14, down hard, and turn to the left to open valve in the bottom of the pump. Move plunger up and down its full length of stroke until 30 pound pressure has been attained. When pumping keep the palm of hand over hole in top of plunger to prevent escape of air. The pump should be locked when not in use. To do this press plunger down and turn to the right to close the valve.

In the main fuel line (A) plate 14, where it leaves the tank there is the main shut-off valve (AB). When this is closed there is no further flow of fuel from the tank. This valve (AB) also contains a ball check, and should there come a rapid rush of fuel out of this valve it would carry the ball to its seat and automatically check the fuel flow. In order then to get any further flow of fuel it will be necessary to unseat the ball. This is done by closing the main shut-off valve (AB). This valve has a projection or pilot on the end of it which when the valve is shut will force the ball check from its seat and thus allow the free passage of fuel again when the main valve is opened.

To Light the Sub-Burner.

To light the sub-burner it is asumed that the fuel tank has been filled, the pressure pumped up to 30 pounds, and the main fuel valve AB, plate 14, has been closed.

See that sub-burner valves D E F, plate 5, are all closed, open the main fuel valve AB, plate 14, which allows the fuel to come through the pipe A, plate 5, to the sub-burner V, plate 5.

To Light the Sub-Burner—Continued.

Open valve D, plate 5. This is the main valve between the main fuel supply line and the sub-burner. Open door W, plate 5, in the side of the sub-burner and place a lighted match inside. Open valve E slightly and close it again until enough fuel has been admitted into the drip cup where the match lies to burn well. Keep this drip cup burning well for two minutes by admitting fuel through valve E whenever necessary. Then open valve F, plate 5, for by this time the sub-burner should be hot, and by opening valve F vaporized fuel will pass up through cap P and burn with a blue flame, as soon as the fuel in the drip cup burns out. This can be seen by looking through a little hole in the side of the generator casing just above where the sub-burner enters the casing.

In case the sub-burner goes out but is still hot enough to vaporize the fuel, it can be lighted by putting a match through hole in the casing without use of the drip cup.

To remove the pilot light it is only necessary to unscrew the union in pipe MA, plate 5, then give the inside of the sub-burner a turn with the hand to unfasten the bayonet lock and whole inside comes out, leaving the sub-burner casing still in position. In this way sub-burner can be changed very quickly and easily if necessary.

Valve D controls the supply of fuel to the sub-burner and valve F controls the height of the flame. The fuel is admitted through valve E only at starting to warm the sub-burner vaporizer as in the plumber's lamp, and the valve F must be opened before this raw fuel in the drip cup all burns away, so that there will be flame to light the fuel admitted through F.

To Clean Sub-Burner.

When sub-burner will not roar with valve F, plate 5, one-half turn open, it indicates the clogging in the body of sub-burner or in the jet.

Being sure that no fire is in the burner or near the car, and that valve D is closed, remove valve stem F. Now open valve D and if the fuel flows freely from stuffing box F, the sub-burner is clear and clogging is in the jet.

A cleaner is furnished with each tool kit, and by pushing this through valve F, the jet can be cleaned. Never use a larger sized wire than furnished with cleaner as the hole in jet will be made too large.

If fuel does not run freely from valve F, the sub-burner should be cleaned.

Unscrew union on pipe MA; turn sub-burner to the left and pull down. Take apart, each piece having been marked so as to be easily assembled. Use small drill that is furnished with tool kit for cleaning. When assembling, be sure the joints are made tight. Be careful not to strip small screws by too great a strain. After being assembled, blow any dust that it may contain through the stuffing box F then replace valve stem.

In replacing sub-burner cone P, be sure slotted part is underneath.

To Clean Vaporizer.

To clean the nozzle O, plate 5, unscrew and remove any foreign matter. Replace and should the fuel not feed freely, the vaporizer must be taken out.

Remove the vaporizer door. Then remove the lower part by unscrewing the nut and pull down. Unscrew upper union on pipe H A and take out vaporizer. Note the position of end support, and the pipes, so they may be replaced in their original position. Now take apart and with the large drill furnished with tool kit, clean thoroughly.

In replacing screws and support be sure copper gaskets are under each.

Be careful support enters support post U, plate 5.

Fuel strainer B should be cleaned at the same time as vaporizer.

To Fill Water Tank and Generator.

Remove the cover of tank 96, plate 14, and fill in any manner that is convenient. Be careful the water is as clean as possible.

Now pump water to generator.

Press plunger of pump 99, plate 14, down hard, and turn to the left once or twice to open valve in bottom of pump. See that throttle is closed, and valve 111, plate 13, open. Work plunger up and down its full length of stroke until water runs from valve 111, indicating sufficient water in generator. Close valve 111 and lock pump by pressing plunger down hard and turn to the right to close valve.

In case water should get between the plunger and bottom of pump when valve is closed, it will be found impossible to force plunger down far enough to unlock valve. Unscrew stuffing box to let the water out at the top, press the plunger down and open the valve, then replace the packing and screw up the stuffing box.

Water Connections.

Plate 9.

The water is discharged from feed water heater 5, through pipe 63, then through flow motor 120, plate 9, and thermostat 122, then through pipe 127 and enters generator at 128. Water enters flow motor through 123 and is discharged through 124 into pipe 127. Water to thermostat enters through pipe 100 then passes through pipe 130 entering pipe 127 with the discharge from flow motor. Generator discharges to engine through steam pipe 129, plate 5. The hand water pump 99, connects with by-pass pipe 121 having a connection at bottom of water tank 96.

To Clean Water Tank.

The water tank 96, plate 14, should be flushed every two days. Do this after a run. The water will be warm, and oil will flush out much better.

Clean tank strainer often. To do this, remove plug at bottom of tank, and draw off water. Then take out strainer by reaching down in tank, and giving a turn to the left. In replacing strainer be sure it is securely fastened.

The strainer 66, plate 3, should be cleaned as often, or more frequently, than the strainer in water tank.

To Clean Fuel Strainer.

B. Plate 5.

In the main gasoline line (A) at (B) there is a strainer put in to catch any dirt and water that may be in the fuel. It is advisable to clean out this strainer every week. This can be readily done by removing the bottom plug. This will allow any water held in the strainer to be drawn off. It is also advisable to take out the strainer itself occasionally and clean thoroughly and see that everything is in good shape. This is done by removing the large plug (C) at the end. If the chamois skin strainer seems in bad shape, replace it with another.

To Start the Car.

Fill the fuel tank X, and pump the air pressure to 30 lbs. by means of hand air pump AA (page 6).

Fill the water tank 96 and pump generator full (page 10).

Light the sub-burner V, Plate 5 (page 7).

After the sub-burner has been lighted about five minutes the vaporizer N, plate 5, will have become heated sufficiently to vaporize the fuel for the main burner. Now start the main burner by opening slightly the warming up valve G, Plate 5. This allows the fuel to flow from the main fuel line into the vaporizer N, through pipe HA without passing through any regulator. Should the vaporizer not be thoroughly heated a few drops of raw fuel may drip from the vaporizer nozzle O. If this drip is continuous close valve G, and allow the vaporizer to get hotter. It is advisable in starting, to open and close valve G intermittently four or five times, the interval of opening being about two seconds. By this means any sudden rush of fuel is avoided before the vaporizer gets thoroughly heated. With the main fire started satisfactorily leave valve G open about a quarter of a turn and watch the steam gauge closely. This is important

as the steam pressure runs up very quickly, and any inattention when the fire is first turned on may result in excessive pressure and cause the safety valve to open. As soon as the pressure reaches 300 lbs. blow off the surplus water collected in the pipe through the blow off valve 111, Plate 13. As soon as steam comes from this valve, close it and allow the steam pressure to reach 300 lbs. Now turn the warming up valve G, so that there is not over ten pounds showing on the vaporizer pressure gauge 209. **Now start the engine to running, care being taken to work the water out of the engine easily and carefully.** Should the pressure go above 300 lbs. in the generator while warming up before the engine is running, the warming up valve G should be closed. *This warming-up valve G must not be left open more than two minutes,* because it allows fuel to flow to the burner independent of regulation and after two minutes it will cause a red hot generator.

As soon as the engine begins to turn over, open valve J and close valve G. Valve J opens the fuel connections through the regulators, and from that time on the supply of fuel and water will automatically take care of itself.

Run the engine for two or three minutes, so that everything has a chance to get to working well, and the car is ready to start. Care should be taken not to run the engine too rapidly, when running idle, as such racing of the engine does no good and is injurious.

To start the engine running put the emergency gear lever in the neutral point so that the engine will run free, press the starting lever 93 (Plate 13) down as far as it will go and open the throttle 101 carefully. The first steam that goes into the engine will be condensed in the cylinders and the water must be given a chance to work out, so do not rush the starting by opening the throttle too much.

To Start the Car—Continued.

It is also necessary in starting from cold to throw your reverse lever backward and forward a few times, thus assisting the water to work out of the cylinders. The engine will run jerkily until the water is out, after which it will go smoothly. As soon as this occurs, take your foot off of the starting pedal and allow the engine to run for two or three minutes. Now to start the car, shut the throttle and throw in either gear that is desired. Press down the starting pedal, open the throttle and the car will move off. As soon as the car has moved a few feet take your foot off the starting pedal. It is advisable to run with valve J full open and to close it only when standing still and when leaving the car.

When starting the car after stopping for a time, but when the sub-burner is not put out, if there is steam pressure enough to start the engine running idle, it will not be necessary to use the warming up valve G. In that case, open valve J and start the engine running.

If the car has stood long enough so that the steam pressure has gone, it will be necessary to use the warming up valve G, and under these conditions it must be used very carefully and not left open more than two minutes. At the end of two minutes if there is not steam enough to start the engine it is a sign that there is no water in the generator, and to leave the fire on any longer would not cause any more steam pressure, but would heat the generator red hot and do harm. Shut off valve G and pump water into the generator by hand and start as previously explained. It is essential in starting up that the driver make sure that he does not use the warming up valve G so as to get a red hot generator.

Engine, Back View.

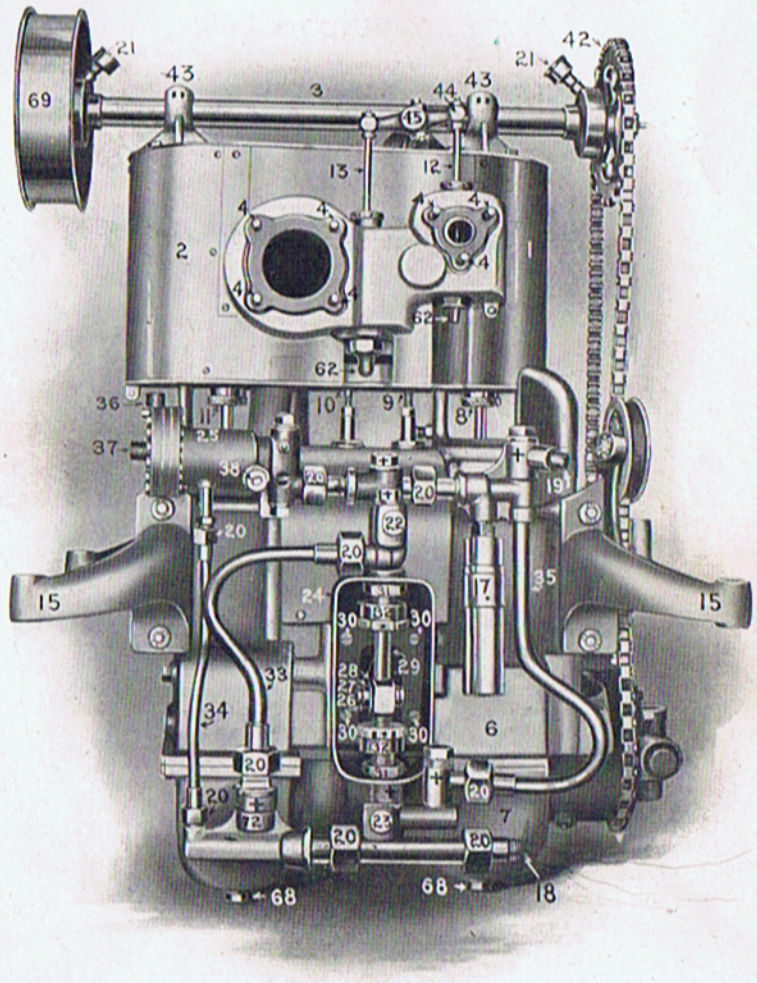

Plate 1

Engine Numbers.

X Check valves
No. 1 High pressure cylinder
No. 2 Low pressure cylinder
No. 3 Fan shaft casing
No. 4 Feed water heater stud
No. 5 Feed water heater
No. 6 Engine casing
No. 7 Crank case
No. 8 High pressure piston stuffing box
No. 9 High pressure valve stuffing box
No. 10 Low pressure valve stuffing box
No. 11 Low pressure piston stuffing box
No. 12 Valve opening exhaust from high pressure cylinder
No. 13 Valve closing high pressure exhaust from low pressure steam chest
No. 14 Valve admitting steam from high pressure to low pressure steam chest
No. 15 Engine girt
No. 16 Engine sprocket
No. 17 Compression chamber
No. 18 Suction from tank
No. 19 Discharge pipe from pumps to feed water heater
No. 20 Unions in water connections
No. 21 Grease cup
No. 22 Upper power pump
No. 23 Lower power pump
No. 24 Power pump frame
No. 25 Water regulator

Engine, Front View.

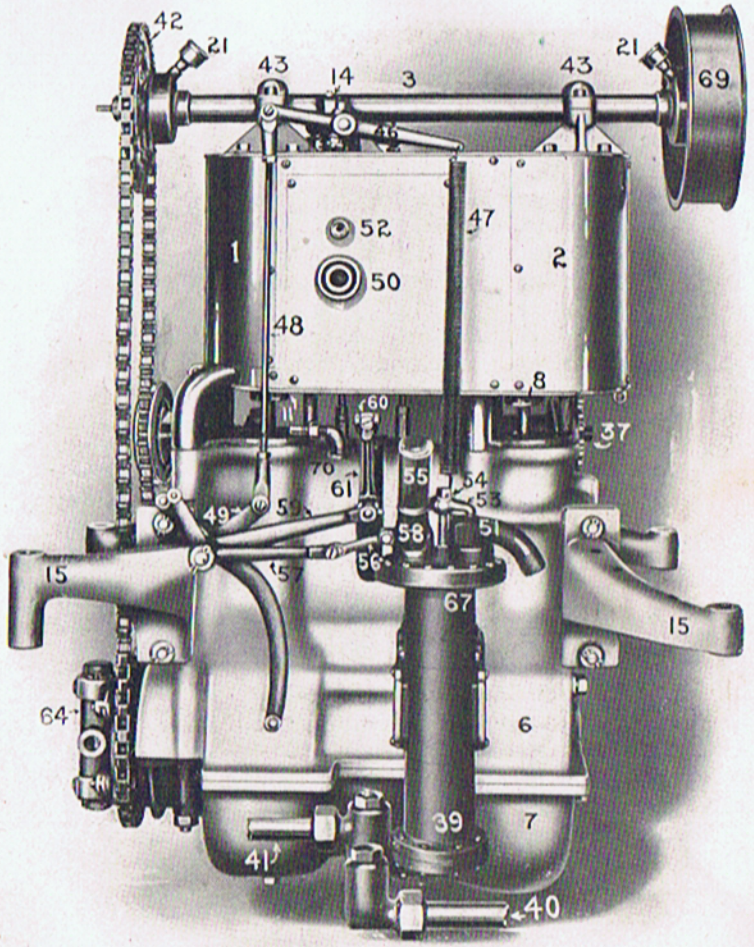

Plate 2

No. 26 Pump lever pin
No. 27 Pump lever
No. 28 Pump block
No. 29 Pump plunger
No. 30 Screws attaching pump frame to engine
No. 31 Power pump lock nuts
No. 32 Power pump stuffing boxes
No. 33 Upper power pump suction pipe
No. 34 Water regulator by-pass pipe
No. 35 Discharge pipe of lower power pump
No. 36 Steam gauge and oil connection of water regulator
No. 37 Steam connection of water regulator
No. 38 Water regulator adjusting worm
No. 39 Condenser pump
No. 40 Condenser pump suction end
No. 41 Condenser pump discharge end
No. 42 Fan shaft sprocket
No. 43 Fan shaft casing support.
No. 44 Simpling valve rocking lever
No. 45 Simpling valve rocking lever shaft
No. 46 Simpling valve rocking lever (spring side)
No. 47 Simpling valve lever spring
No. 48 Simpling valve lever connecting rod
No. 49 Simpling valve bell crank
No. 50 Main steam connection to high pressure steam chest
No. 51 Engine air pump discharge connection
No. 52 Cylinder oiler connection
No. 53 Engine air pump yoke
No. 54 Engine air pump yoke bolt

No. 55 Engine air pump strainer
No. 56 Air pump regulating lever
No. 57 Air regulating lever bell crank
No. 58 Air pump suction check chamber
No. 59 Bell crank connecting to reverse arm
No. 60 Reverse arm
No. 61 Connecting rod reverse arm to bell crank
No. 62 Simpling valve cap
No. 63 Discharge to generator
No. 64 Engine Universal joint
No. 65 Bolts holding universal joint to crank shaft
No. 66 Feed water strainer casting
No. 67 Engine air pump
No. 68 Plug for draining crank case
No. 69 Fan shaft pulley
No. 70 Crank case oiler connection
No. 71 Feed water heater drip to condenser
No. 72 Upper power pump suction check casting
No. 116 Fan shaft chain idler

Engine.

Plates 1, 2 and 3.

The engine is of compound marine type with a high and a low pressure cylinder, and with a high pressure piston valve and a low pressure slide valve, operated by the regular Stephensen link motion. Ordinarily steam from the boiler is only admitted to the high pressure cylinder in compound engine, but in order to start at any position that the engine may be in, it is necessary to admit high pressure steam into the low pressure cylinder as the high pressure piston may be on its dead center. This is accomplished by means of the simpling valves 12, 13 and 14, plates 1 and 2.

Engine—Continued.

When starting, the first steam that enters the cold cylinders is condensed and the engine must be started slowly and given a chance to warm up, and get this water out. Opening the throttle too much, so as to admit a great deal of steam when the cylinders are cold, will result in damage to the engine.

In the position shown, the valves are set compound. Valves 12 and 14 are closed, and valve 13 is open. The steam in high pressure steam chest passes into high pressure cylinder, then exhausted through passage, and through valve 13 into low pressure steam chest; then through low pressure cylinder to condenser.

To simple engine, pedal 93, plate 13, is pressed down. This movement will open valves 12 and 14 and close valve 13, plate 1. Steam passes from high pressure steam chest through valve 14 into low pressure steam chest. The opening of valve 14 allows the same amount of pressure to both cylinders. As valve 13 is closed, the exhaust from high pressure cylinder passes through valve 12 to the condenser and the engine operates as a simple engine.

Spring 47, plate 2, returns these valves to their normal position when the starting pedal 93, plate 13 is released. If the engine should thump when compound, but runs smoothly when pedal 93 is down, it generally means that these valves are not seating properly and should be inspected and ground if necessary. The engine will not run smoothly if valves 12 and 14 do not seat properly. This is especially true of valve 14.

Both high pressure piston valve and low pressure slide valve are adjusted in the same manner as any valve of this type in use in steam engines.

Engine, End View.

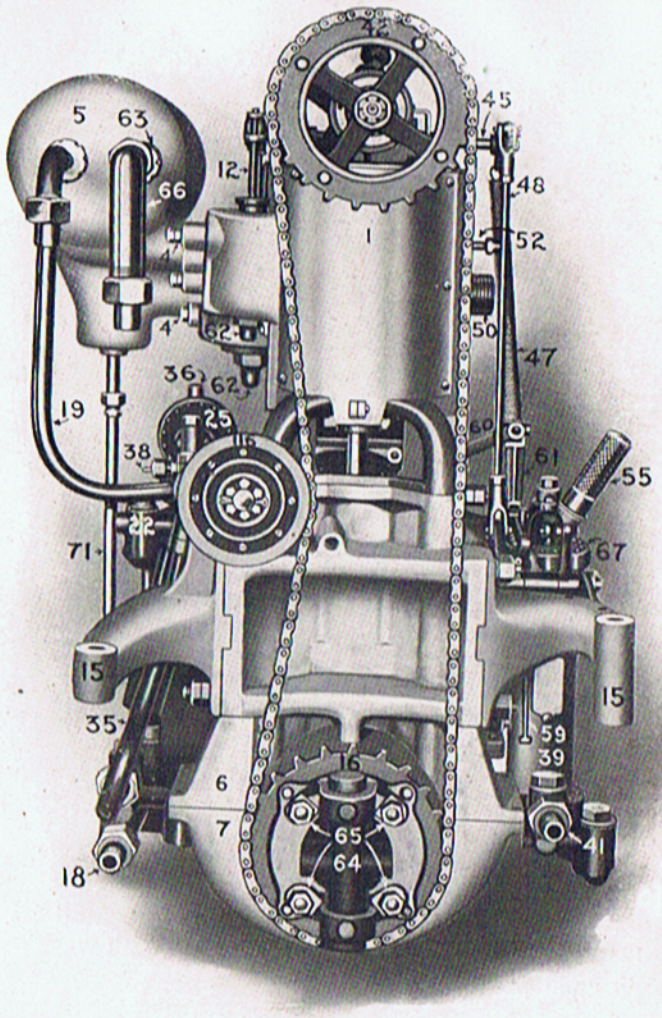

Plate 3

These valves give no trouble if properly lubricated. Care should be taken when starting to press the starting pedal No. 93 down as far as it will go so that all the simpling valves come into operation.

Crank Shaft.

Plate 4.

No. 73 Valve stem bearings
No. 74 Link-yoke
No. 75 Crosshead
No. 76 Crosshead pins
No. 77 Connecting rod
No. 78 Connecting rod cap
No. 79 Valve links
No. 80 Eccentric rods
No. 81 Eccentric rod cap
No. 82 Air and condenser pump eccentric rod
No. 83 Water pump eccentric rod
No. 84 Counter balance low pressure
No. 85 Counter balance high pressure
No. 86 Main bearing
No. 87 Main thrust bearing
No. 65 Bolts holding universal joint to crank shaft

The crank shaft is fitted with ball bearings throughout. Bearings No. 86, plate No. 4, are main journal bearings; No. 87 being a main journal thrust bearing. The bearings are unusually large for the size of the engine, and the wear is very slight if well lubricated. The connecting and eccentric rods are made with straps and fastened with bolts which are positively locked with washers at each end.

Engine Crank Shaft.

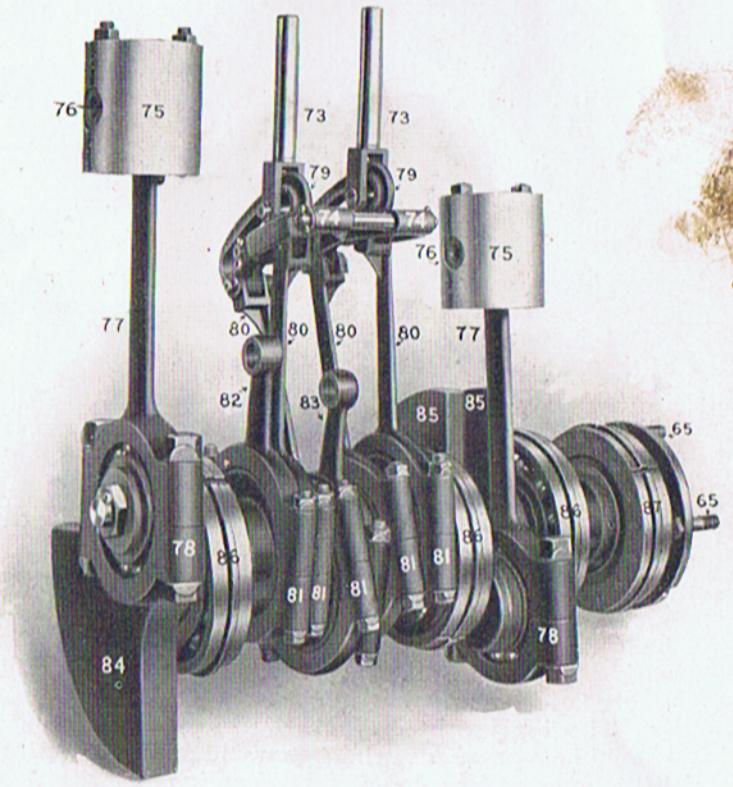

Plate 4

When crank is taken out of engine, care must be used in replacing it to see that it is not pulled out of line when screwing up the caps that hold the main bearings in place. This is important for if pulled out of line the engine will not run true and the strain of running unevenly is liable to break the shaft.

A pint of oil should be pumped into the crank case every two hundred miles by using hand oil pump 109, plate 13, or filling at plug located in front of oil connection 70, plate 2.

Generator Pumps.

There are two pumps that force water into the generator. These are arranged as in plate 1, No. 22 being called the upper pump and No. 23 the lower pump. Both of these pumps get the water from the tank through pipe No. 18; part of the water going to No. 23 and part being drawn through check casting 72 and pipe No. 33 to No. 22. Both pumps are driven from the same eccentric by the same rocker lever, and deliver water to the generator through 19, and are automatically by-passed by the water regulator 25 through pipe No. 34. The nipple connecting pump No. 22 to the water regulator contains a small strainer to prevent foreign matter getting into and clogging water regulator by-pass valve. This strainer should be cleaned occasionally. A plunger, No. 17, with a spring below it is put into the water line to cushion the strokes of the pumps.

The lift in the ball checks of these two pumps should be 1-32 of an inch. They will pump water if the lift is more or less, but at 1-32 of an inch lift the pumps are most efficient. It is desirable on the hand pump to have a little more lift than this to prevent choking in the main water supply pipe to the generator.

To reseat these check valves remove the bronze balls and insert a steel ball of the same size. Place a drift or piece of pipe on the ball and rap once or twice, and the seat will be as perfect as new.

The water from pumps passes through 19, plate 3 into pipe coil in feed water heater 5, then through 63 and then through water strainer 66. To clean strainer 66 loosen unions at both ends and remove casting by lifting upward, as strainer gauze is fastened to lower union. This strainer should be cleaned frequently.

Condenser Pump.

Condenser pump No. 39, plate 2, draws water from condenser through No. 40 and discharges to the tank through No. 41. This pump contains a good sized grooved plunger and the valves are of the mushroom type. If there are no air leaks in the condenser and connections the pump is capable of maintaining some vacuum at moderate speed.

Power Air Pump.

The power air pump 67, plate 2, and the condenser pump 39, are driven from the same eccentric and rocker lever.

The air pump inlet and outlet valves are situated at the top, and are so constructed that they can be easily removed. It is only necessary to slacken one bolt 54, which passes through a yoke 53, holding down both valve clamps. The inlet valve is protected by a fine wire screen 55, preventing dirt from being drawn into pump.

When the engine is running the pump piston is in motion, but delivers no air to tank as lever 56 keeps suction check from seat. When pressure is needed, press pedal 94, plate 13, which operates lever 56, pla'e 2, and allows suction check to seat; keep the pedal 94, plate 13, down until the required amount of air has been pumped.

To clean the valves, remove valve chambers No. 51 and No. 58, plate 2, by taking off the yoke No. 53. Lift out the valves and clean them and the seats thoroughly. Place the valves in their original position and clamp the valve chambers down tight.

Generator, Burner and Fuel Connection Numbers.

No. 128 Generator inlet
No. 129 Discharge to engine
No. 119 Thermostat cap
No. A Supply pipe from fuel tank
No. B Fuel strainer casting
No. C Fuel strainer plug
No. D Main sub burner valve
No. E Sub burner flush valve
No. F Sub burner adjusting valve
No. G Warming up valve
No. H Pipe to main burner valve
No. I Pipe to warming up valve
No. J Main burner valve
No. K Pipe to flow motor
No. L Flow motor fuel valve
No. M Pipe from flow motor fuel valve to vaporizer.

Generator, Burner and Fuel Connections.

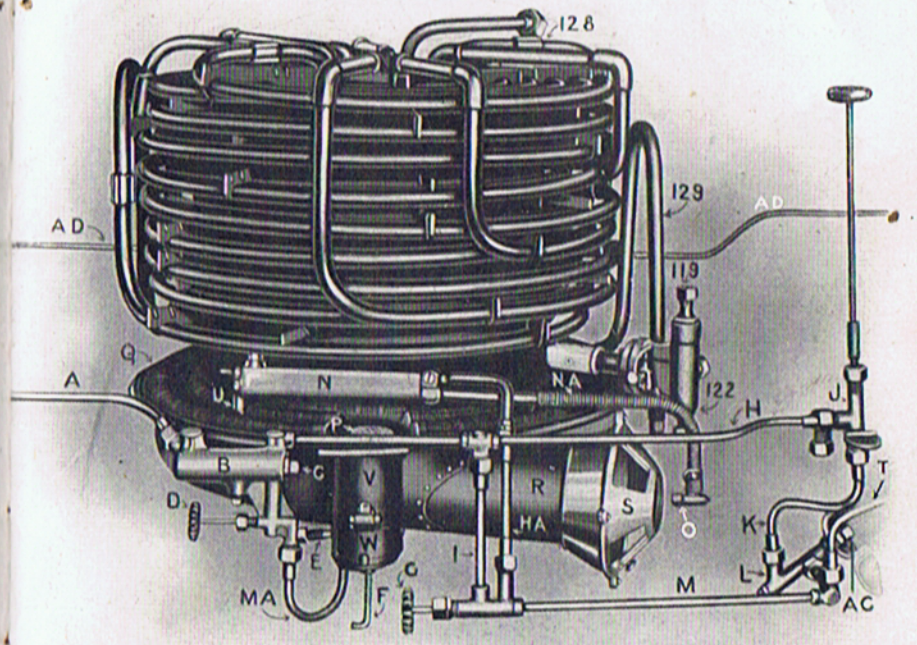

Plate 5

Generator, Burner and Fuel Connection Numbers—Cont'd.

No. N Vaporizer
No. O Vaporizer nozzle
No. P Sub burner cap
No. Q Burner
No. R Burner induction tube
No. S Induction tube shutter
No. T Pipe to vaporizer gauge
No. U Vaporizer support post
No. V Sub burner casing
No. W Sub burner casing door
No. AC Flow motor stuffing box
No. AD Pipe from power air pump
No. NA Vaporizer discharge pipe
No. MA Sub burner supply pipe

Flow Motor Numbers.

No. 123 Water inlet
No. 124 Water outlet
No. 125 Stuffing box
No. AC Stuffing box
No. L Fuel valve
No. 191 Piston
No. 192 Piston rod
No. 193 Valve stem
No. 194 Valve stem lock nut
No. K Fuel inlet
No. M Fuel outlet
No. 195 Groove
No. 196 Plug for draining
No. CA to CD Graduation in valve stem
No. CB Plug
No. 197 By-pass valve

Flow Motor.

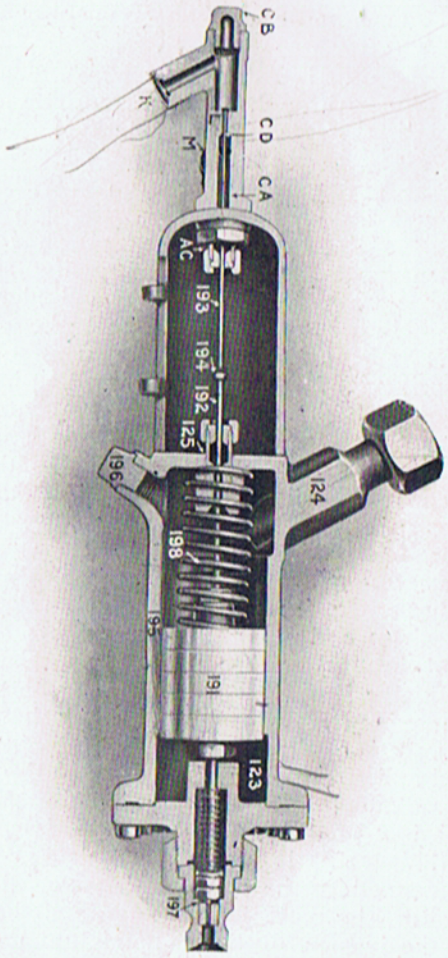

Plate 6

Flow Motor.

Plate 6.

The flow motor is a device by which, when there is any flow of water through it, the rate of flow of water is made to govern the rate of flow of the fuel.

Water enters the cylinder at 123, plate 6, through a connection at back unseen in the cut. It flows by the piston through groove 195 and out through 124 to the generator. As the flow increases piston 191 will be forced down in the cylinder compressing spring 198; and the more water that enters the cylinder the more the piston will be forced down, and the greater the amount of water passing through the motor will be, until the spring 198 has been compressed an inch; at that point valve 197 is drawn away from its seat and if the flow or amount of water coming into 123 is any further increased it passes out through valve 197, and the piston 191 has reached the limit of its action. The generator pressure or pressure under which the water enters this flow motor has nothing to do with the action of it, as it is the amount of water passing through and not the pressure that causes it to act. Attached to the piston 191 is a small piston rod passing out through a stuffing box No. 125 and through another stuffing box AC, terminating in the fuel valve L of the flow motor. In the position in the cut, there is no water flowing through the flow motor, and piston 191 is at the top of its movement. And valve L is closed and no fuel is passing from K through L and out at M. When there is water flowing through the motor, 191 is moved down and valve L is consequently opened. This valve is graded in such a way that the more it is opened, or the more 191 is moved down by the flow of water, the more L is opened and the more fuel is fed to the burner, until the maximum movement of

the piston is obtained and at that point there will be the maximum fuel flow and consequently the greatest fire under the generator.

The union at valve 197 can be readily removed giving free access to that valve for cleaning, and any deposits in the flow motor can be cleaned out through plug 196. Care should be taken not to tighten the stuffing box nuts on 125 and AC too tight or it will interfere with the free action of the motor. When well packed tightening with the fingers is all that is necessary.

Thermostat.

Plate 7.

The thermostat is a regulator acted on by the temperature of the steam as it leaves the generator. The two elements 207 and 208, plate 7, project into the steam pipe. No. 208 is a tube closed at one end. No. 207 is a rod inside of the tube but not fastened in any way. The pressure of the plunger and spring 206 acting through the bell crank lever 205 always keeps 207 in place so it does not require fastening. As these elements 207 and 208 get heated up 208 expands and gets longer but 207 does not expand appreciably so that as 208 gets longer 207 projects less from the end of 208, and 205 is consequently gradually pushed up until eventually it raises valve 202 from its seat, and allows the passage of water from 200 through valve seat 203 into water outlet 204, thence to pipe 130 to pipe 127 and into the generator in varying quantities in proportion to the distance that the rod 207 allows the bell crank 205 to raise valve stem 201. As the elements cool 208 contracts and forces 207 out

Thermostat—Continued.

against the bell crank until valve 202 will come to its seat again. Thus the thermostat accommodates itself to the needs of the generator as is shown by the temperature of the steam as it leaves the generator.

Thermostat is adjusted to maintain a temperature of 390 degrees C.

No. 119 Thermostat cap
No. 200 Water inlet
No. 201 Valve stem
No. 202 Valve stem nuts
No. 203 Valve stem seat
No. 204 Water outlet
No. 205 Bell crank
No. 206 Bell crank spring
No. 207 Glass rod
No. 208 Steel tube

Thermostat.

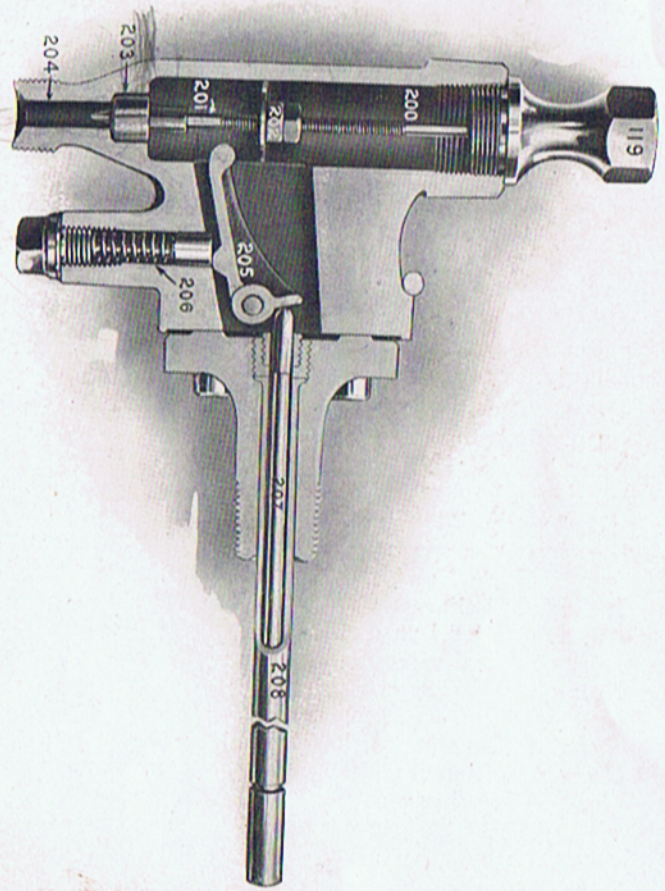

Plate 7

To Adjust Thermostat.

To adjust thermostat, place a centigrade thermometer, reading as high as 500 degrees C. on steam pipe in hole 199, plate 14. Run engine and watch temperature. Reading the highest temperature obtained and also the lowest, the difference should not be more than 30 degrees and the average reading should be about 390 degrees. Should the average go above 390 degrees close throttle, and remove cap 119 and take out valve stem 201. Screw the nuts 202 down toward the point to lower temperature.

Should temperature be found too far under 390 degrees raise by screwing nuts away from point.

One complete turn of nut 202 will make a difference of 50 degrees and in changing temperature turn nut 202 accordingly.

Never attempt to change the thermostat setting without using a thermometer.

Water Regulator.

No. 132 Main casting
No. 133 Water regulator cover
No. 97 Water regulator washer
No. 134 Diaphragm
No. 135 Plug
No. 136 Diaphragm shifting pad
No. 137 Plunger
No. 138 Spring

Water Regulator.

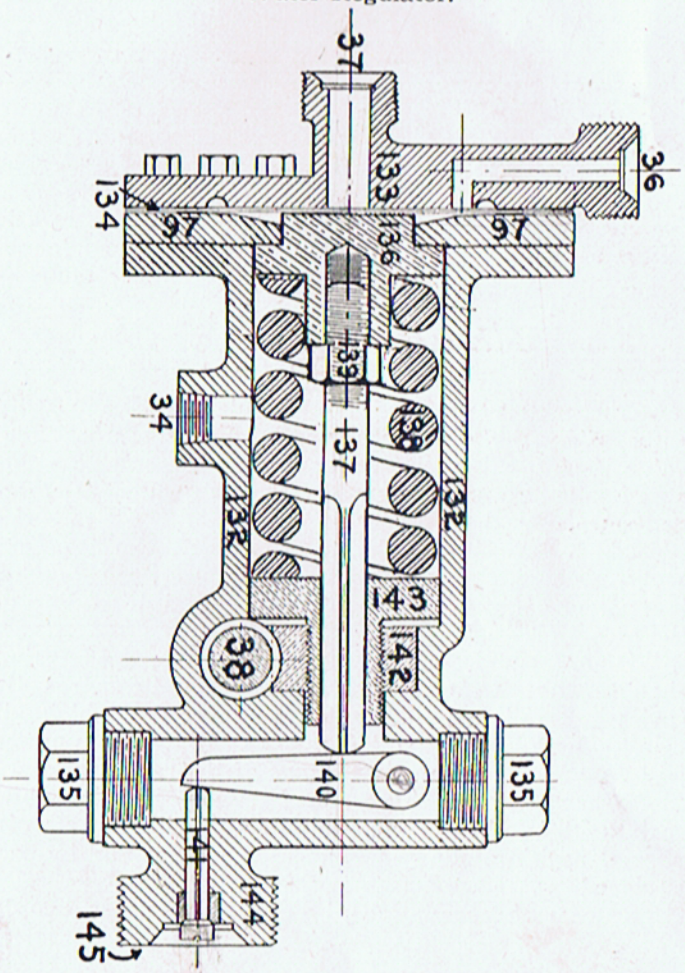

Plate 8

No. 139 Lock nut for plunger adjustment
No. 140 Lever
No. 141 Valve
No. 142 Spring adjusting nut
No. 143 Spring adjusting pad
No. 144 Valve seat
No. 145 Connection to pump discharge
No. 34 By-pass
No. 36 Connection to oiler and steam gauge
No. 37 Steam pressure connection
No. 38 Spring adjusting worm

Water Regulator.

Plate 8.

The water regulator is a simple diaphragm valve actuated by the steam pressure in the generator. This valve is situated in the water line and it acts to either permit all the water thrown by the two water pumps to be returned to the tank, or to permit none of it to be returned, thus causing all the water to flow toward the generator through the other parts of the automatic regulating system; the valve being free or closed depending on the steam pressure.

The steam pressure in 37, (plate 8) presses against the diaphragm 134, causing 136 to move and compress the spring 138. The spindle 137 moves lever 140, which will cause valve 141 to leave the seat 144. Water from pumps will flow round valve 141 and out of the regulator at 34.

When steam pressure goes below tension for which spring 138 is adjusted, the spindle 137 will return to its normal position, allowing valve 141 to seat and by-pass is closed.

In case of renewing diaphragm the regulator must be

taken out. Blow off steam pressure; disconnect at 34, 36, 37 and 145. Be careful not to lose valve 141. Turn spring adjusting worm 38 to the right until the tension on spring 138 is entirely relieved, and remove screws from cover. Cover 133 and plate 97 should be marked that they may be replaced in their right position. One side of plate 97 is concave, and this side must be next to diaphragm or the regulator will not by-pass.

When plate 97, diaphragm 134, and cover 133 are being replaced, care should be taken to tighten cover screws evenly. Turn adjusting worm 38 to the left about two-thirds the number of turns the spring was relieved. This will put tension on spring very near to the pressure required—which is 550 pounds. Now be sure valve 141 is in position and the regulator is ready to be attached.

Make all connections except 34; this is to be left open to show at what pressure regulator by-passes. It will also show any indication of a leak round 141.

Oil must now be pumped around diaphragm. Open blow-off valve 111 and oil valve 118, plate 13. Use cylinder hand oiler 108, plate 13, until oil runs from valve 111. Now be sure to close oil valve 118 as the diaphragm is surrounded by the required amount.

Run the engine free. When steam pressure reaches 550 pounds, the by-pass valve 141 should be open and water discharge at 34. If water is discharged before pressure reaches 550 pounds, turn adjusting worm 38 to the left a full turn or more. Keep doing this until the steam pressure reaches 550 pounds at which pressure the regulator should by-pass.

By adjusting regulator with 34 disconnected, the condition of valve 141 will be made known. If this valve leaks it should be reseated by grinding with fine pumice. Put plug in the pump end of 34 to get suction.

Water Connections.

No. 5 Feed water heater
No. 17 Compression chamber
No. 18 Suction from tank
No. 19 Discharge pipe from pump to feed water heater
No. 22 Upper power pump
No. 23 Lower power pump
No. 25 Water regulator
No. 33 Power pump stuffing boxes
No. 34 Water regulator by-pass pipe
No. 36 To steam guage
No. 37 Steam connection of water regulator
No. 63 Discharge from feed water heater to flow motor
No. 96 Water tank
No. 99 Hand water pump
No. 100 Pipe from 63 to thermostat
No. 120 Flow motor
No. 121 By-pass pipe to tank
No. 122 Thermostat
No. 123 Flow motor inlet
No. 124 Flow motor outlet
No. 127 Pipe to generator
No. 128 Generator inlet
No. 130 Pipe from thermostat to motor discharge
No. A Supply pipe from fuel tank
No. M Pipe from flow motor fuel valve to vaporizer

Water Connections.

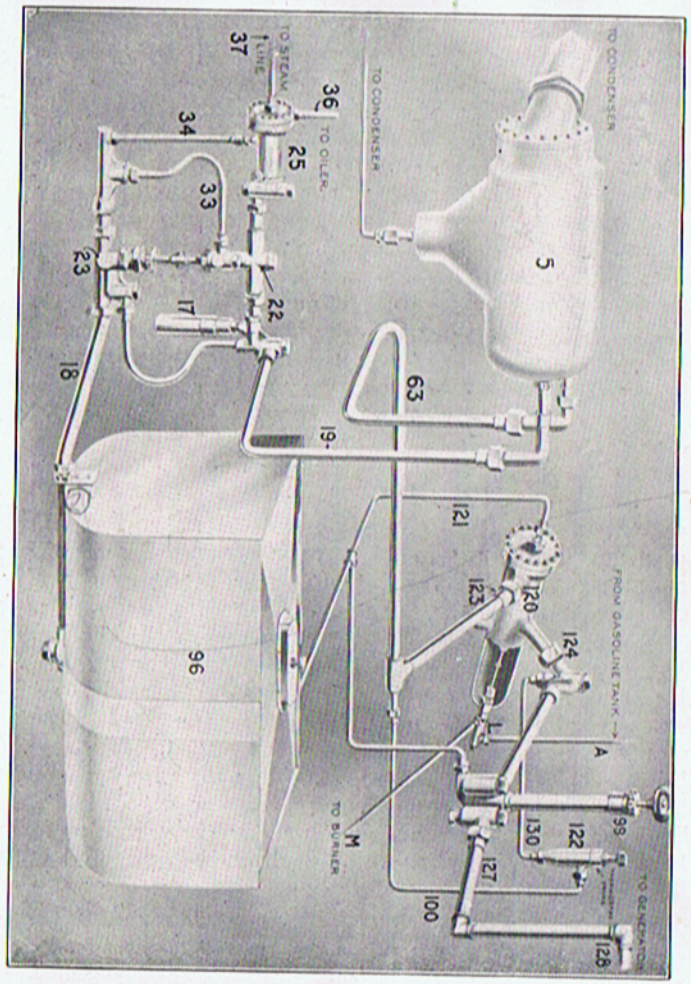

Plate 9

System of Regulation.

The feed water pumps, 22, 23, the water regulator, 25, the flow motor, 120, and its adjuncts, the thermostat, 122, and its valve (all of which have been described), together with the various pipes which we will now point out, constitute the so-called regulating system, which, in its operation, so controls the water supply to the generator and the fuel supply to the burner as to maintain substantial uniformity of steam pressure and temperature in the generator, whatever may be the conditions in use, and irrespective of any attention from the operator.

The fuel is contained in tank X, plate 14, in which pressure should be about fifty pounds. A feed pipe A, plate 9, going from this tank to the burner M, contains a valve L, by which the flow of fuel is controlled.

The feed water pumps, Nos. 22 and 23, which are connected with the engine, pump water from the tank 96, through pipe to the water regulator 25. Steam from the generator is led to this water regulator through pipe 37. When the steam pressure exceeds 550 pounds, it opens the valve of this water regulator, with the result that all of the water thrown by the pumps is by-passed through pipe 34 back to the pumps. When the steam pressure falls below 550 pounds, this valve closes, whereupon all of the water thrown by the pumps goes toward the generator through pipe 19. This pipe goes through the feed water heater 5 and after it emerges therefrom, it divides into two branches which are again united to form the main feed pipe 127, which is directly connected with the generator.

The main branch consists of the pipes 123 and 124 and in this branch the flow motor 120 is connected. The other branch, which may be termed the shunt branch, consists of the pipes 100 and 130, and in this branch the thermostatic controller valve 122 is connected. When the water regulator is closed all of the water thrown by the pump goes toward the generator through one or both of these two branches. Until the steam gets somewhere near the required temperature, the thermostat valve is closed, and therefore all of the water must go through the flow motor branch.

As the water flows through this flow motor, it moves the piston therein a distance proportionate to the rate at which the water flows past said piston.

The piston is connected by rod 192, plate 6, with the fuel valve stem 193, through which the valve L, is correspondingly opened. The construction of these parts before explained, is such that the ratio between the flow of fuel to the burner and the flow of water through the flow motor branch of the feed pipe remains constant. This ratio, however, is such that the fuel supply to the burner is in excess of that required for the water which flows at the same time through the flow motor branch. Consequently, the temperature of the steam will rise with the result of so operating the thermostat that it opens its valve 202, plate 7, so that some of the water, depending upon how wide this valve is opened, will flow to the generator through this shunt branch of the feed pipe. This does not necessarily affect the flow of water through the flow motor, and, consequently, does not change the position of the piston therein, and therefore does not change the rate at which fuel is being supplied to the burner. But this result has been brought about, viz., the ratio

between the water supply to the generator and the fuel supply to the burner, has been changed; because while the fuel supply is not changed, the water supply has been increased by the amount which flows through the shunt branch of the feed pipe. If the ratio between fuel and water is now inexact, as, for example, if the water is in excess, the steam will soon cool, and the thermostat will act to move the valve 202 in the closing direction, thereby reducing the quantity of water going through the shunt branch of the feed pipe, without effecting any change in the rate at which water is flowing through the other branch, or in the rate at which fuel is flowing to the burner. So this thermostat operates, as the temperature of the steam rises above or falls below 390 degrees centigrade, to change the ratio between fuel supply and water supply, by increasing or diminishing the water supply without effecting any change in the fuel supply.

The foregoing describes the operation of the parts when the pumps are going fast enough to throw water in excess of the capacity of the generator. When, however, the pumps are going slowly and throw water at a rate which is less than the capacity of the generator, a slightly different action takes place, because when the water regulator allows any water to flow past it, all of the water thrown by the pumps is being delivered into the generator through the two branches of the feed pipe described. When, by the action of the thermostat, the valve 202 is opened or closed, more or less of that water will go through the shunt branch, thereby making a corresponding change in the volume of water which goes through the flow motor branch. Any change in the rate of flow through the flow motor branch causes a change in the position of the piston in the flow motor, and consequently a change in the rate of fuel flow. In other words,

when the pumps are going slowly, the changes in ratio between water supply and fuel supply are brought about by changes in the rate of fuel supply without changing the rate of water supply. But when the pumps are going at a rate which exceeds the capacity of the generator, these changes in ratio come from changes in the rate of water supply without any change in the rate of fuel supply. In all cases, however, the required changes in ratio are brought about by the described action of a thermostat.

Returning now to the flow motor, attention is called to the relief valve 197, plate 6. It is clear that one may need a large volume of steam, even when going slowly, to go through heavy roads or up hill. The pumps are of such capacity that they can supply water to the full capacity of the generator, even when the engine is running slowly, as when the car is going at about fifteen miles per hour. Therefore, when going at a greater speed, the amount of water thrown by the pumps exceeds the capacity of the generator. When we remember that the action of the water regulator is to either by-pass all of the water thrown by the pumps, or to let it all go toward the generator, and when it is also remembered that if too much water goes into the generator it may become flooded and inoperative, it will be understood that some means must be provided to take care of the excess water. The relief valve 197 is provided for this purpose. The faster the rate of flow of water through the flow motor, the farther will the piston therein be moved. When it is moved beyond the position it will occupy when the water supply to the generator is equal to the capacity of the generator the piston opens this relief valve and all of the excess water is by-passed through pipe to the water tank.

Recapitulation.

When the engine is in operation, it operates the feed water pumps. The water regulator either by-passes all of the water thrown by the pumps, as when the steam pressure exceeds 550 pounds, or it allows all of the water to flow toward the generator, as when the steam pressure is less than 550 pounds. That is to say the water supply is controlled by an "all on" or "all off"—the required variations being due to changes, automatically brought about in the frequency and durations of these "all on" periods. The water flows through two branches, in one of which is a flow motor and in the other a valve controlled by a thermostat. The water going through the flow motor moves a piston therein, which, in turn, proportionately opens the fuel valve. It also opens the relief valve when the rate of water flow into the flow motor exceeds the capacity of the generator, and by-passes the excess water. The ratio betwen fuel supply to the burner and water supply to the generator is varied by the action of the thermostat on the valve, which increases or decreases the rate at which water flows past that valve through the shunt branch. The practical result of the automatic action of the described parts is to maintain the steam at practically uniform high pressure and high temperature under all working conditions without any hand manipulation of any kind, and without requiring any attention from the operator. All he has to do is to manipulate his throttle so that the engine will get the steam required for the running of the car at the desired rate. The automatic regulating system sees to it that the steam so used is immediately replenished without any substantial variations of pressure or temperature.

Emergency Gear.

Plate 10.

The power is conveyed to rear axle through a hollow steel shaft 112, plate 15, and two universal joints 114 and 117, plate 15. Except in case of emergency, the drive is direct through a bevel pinion and gear, and bevel compensating gear.

In plate 10 the emergency gear is shown in mesh.

The power is transmitted through shaft 146 to gear 148, then through double gears 152 and 153, then to 151 and 154. In this position the engine makes two and one-half revolutions to one of the bevel pinion 154.

Internal gear 150 and external gear 151 are one piece. For direct drive, 148 is moved into 150, locking shaft 146 with pinion 154. The same movement of lever that slides 148 into 150 slides 152 and 153 out of mesh, and they remain idle until the emergency gear is again used.

To run the engine free, move gear lever 103, plate 13, to center. When in this position, the gears are entirely out of mesh and allow the engine to run without transmitting power to axle.

Oil cup 158, plate 10, catches the splash in gear case, and a small pipe leads the oil to bearing of 154 and 149.

Gear case should be renewed with oil for each 1,000 miles. There are three plugs in case. Remove these and drain, then replace bottom plug and renew from top until oil runs from hole near bottom.

Emergency Gear Numbers.

No. 146 Pinion driving shaft
No. 147 Emergency gear shaft
No. 148 Driving spur gear
No. 149 Spur gear
No. 150 Internal spur gear—149
No. 151 External spur gear—149
No. 152 Large spur gear on emergency shaft
No. 153 Small spur gear on emergency shaft
No. 154 Driving pinion
No. 155 Pinion shaft rear bearing
No. 156 Rear axle bearing
No. 157 Pinion shaft front bearing
No. 158 Oil cup
No. 159 Roller bearing
No. 160 Shifting lever groove
No. 161 Shifting lever groove

Emergency Gear.

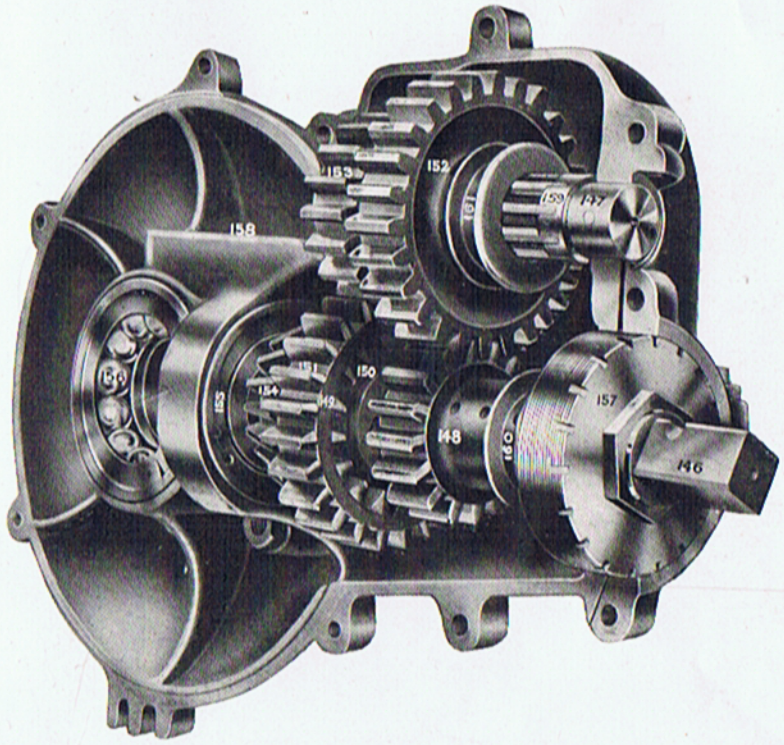

Plate 10

Condenser.

Plate 11.

No. 131 Connection to feed water heater
No. 89 Overflow pipe
No. 91 Fan bracket
No. 162 Exhaust inlet
No. 164 Fan
No. 165 Fan pulley
No. 166 Connection to condenser pump
No. 167 Drip cock
No. 168 Top of condenser
No. 169 Bottom of condenser
No. 170 Condenser side frame
No. 171 Hood support bracket

The condenser is made up of four rows of flanged tubes connecting a top and bottom chamber. The exhaust from the engine enters the top chamber 168, plate 11, and the condensed water is drawn out through the connection 166, plate 11. When there is more steam entering the condenser than it can take care of, the excess overflows through 89, plate 11. Inside the aluminum shield 89 is a check valve which prevents steam overflowing except when there is an excess.

To clean the condenser remove the exhaust chamber 168 and the bottom 169, thereby leaving the tubes exposed and free to be cleaned perfectly without removing the condenser from the car.

Condenser.

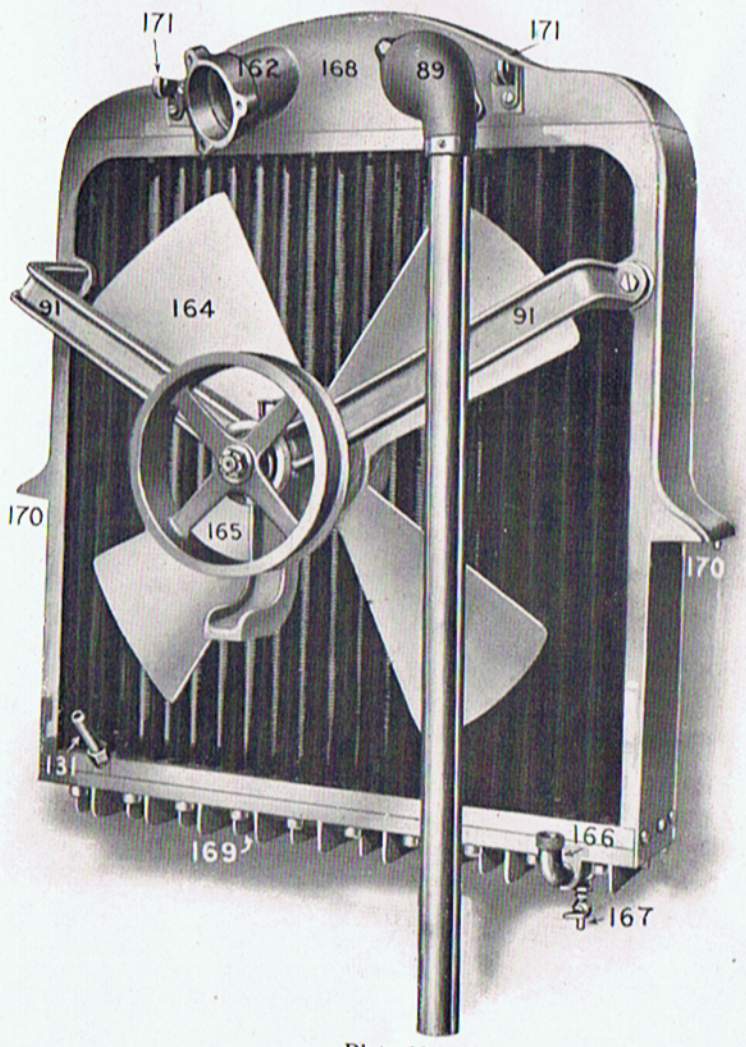

Plate 11

Brakes.

Plate 12.

No. 185 Brake drum
No. 186 Foot brake shoe
No. 187 Emergency brake band
No. 188 Foot brake spring
No. 189 Foot brake turn buckle
No. 190 Emergency brake turn buckle
No. 198 Brake yoke

Both the foot brake and the hand brake act on a drum fastened to the rear wheels. The foot brake is an internal expanding brake 186, plate 12, and the hand brake an external contracting brake 187; one acting on the inside and the other on the outside of the drum, No. 185. Both of these brakes are lined with camels hair belting and put into action by means of continuous steel cables, thus making each set compensating. Adjustments should be made at the turn buckles 189 and 190, and not with the brake cables.

All joints should be kept well lubricated so that they will work freely and it is a good thing to put oil on the hair belting occasionally.

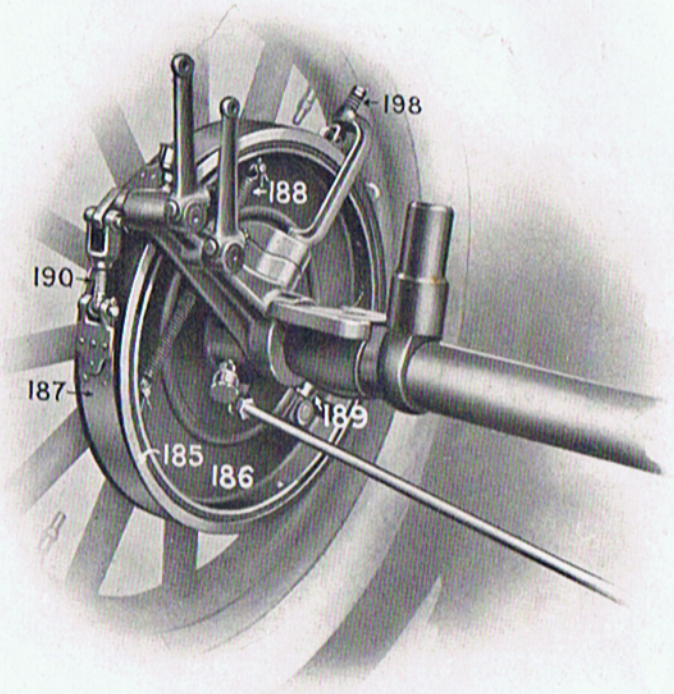

Plate 12

Rear Axle.

The rear axle is ball-bearing throughout, and the casing should contain enough oil to thoroughly lubricate it. It is advisable to look at this about once every thousand miles. To do this remove the bottom plug in the casing and see if any oil comes out, and whether it is in good condition. If everything is all right, put in the bottom plug and remove the plug on the side near the bottom and fill with oil through the top plug until it runs out of the side plug, the casing then has the proper amount of oil in it. It is a good thing to clean out all of the old oil occasionally and fill altogether with new oil.

The axles are taper so that the wheels will always fit tightly. In putting the wheels on care must be taken to see that the ball bearing cone in the end of the casing will allow the wheel to come clear up on the taper and at the same time the cone be far enough out to properly mesh with the wheel hub as it is intended to do.

There is a wheel puller originally with each car for taking the rear wheels off, and when the strain is first put on these pullers it is well to rap the end of the puller smartly with a hammer to assist in loosening the wheel on the taper.

Chassis.

No. 5 Feed water heater

No. 12 Valve opening exhaust from high pressure cylinder

No. 13 Valve closing high pressure exhaust from low pressure steam chest

No. 14 Valve admitting steam from high pressure to low pressure steam chest

Chassis, Side View.

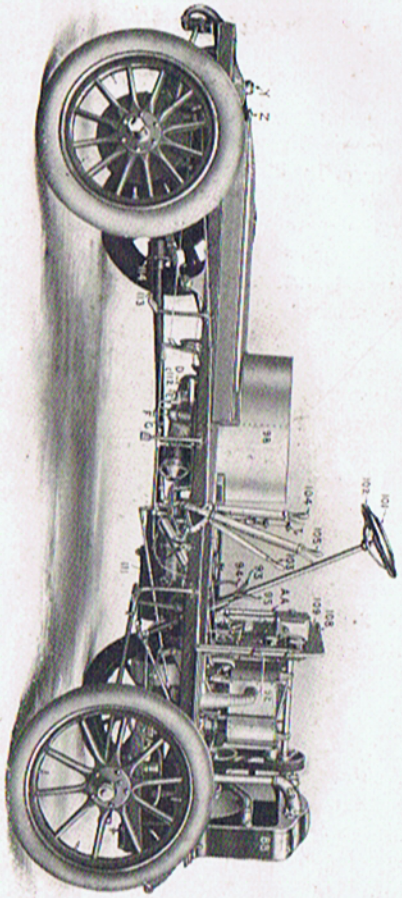

Plate 13

Chassis—Continued.

No. 19 Discharge pipe from pumps to feed water heater
No. 37 Steam pipe to water regulator
No. 67 Engine air pump
No. 68 Plugs for draining crank case
No. 88 Condenser
No. 89 Condenser overflow
No. 90 Exhaust pipe
No. 91 Fan bracket
No. 92 Engine
No. 93 Pedal operating simpling valves
No. 94 Pedal operating air pump valve
No. 95 Pedal operating foot brake
No. 96 Water tank
No. 63 Feed water heater discharge
No. 98 Generator
No. 99 Hand water pump
No. 101 Throttle wheel
No. 102 Steering wheel
No. 103 Emergency gear lever
No. 104 Reverse lever
No. 105 Brake lever
No. 106 Brake cables
No. 107 Brakes
No. 108 Cylinder oiler
No. 109 Crank case oiler
No. 110 Gear case
No. 111 Blow-off valve
No. 112 Driving shaft
No. 113 Emergency gear rod
No. 114 Universal joint (rear)
No. 115 Air line check valve
No. 117 Universal joint (front)

Chassis, Top View.

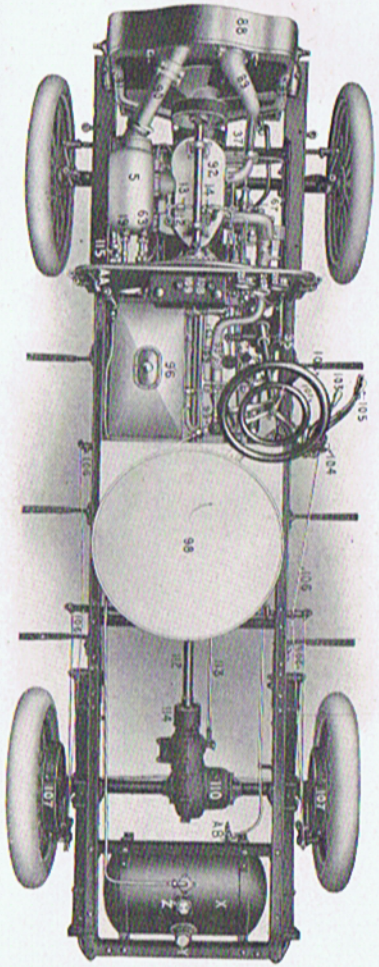

Plate 14

No. 118 Oil valve to water regulator
No. 126 Upper blow-off valve
No. 199 Thermometer casting
No. AA Hand air pump
No. AB Main fuel shut-off valve
No. X Fuel tank
No. Y Fuel tank filler cap
No. Z Fuel tank gauge
No. A Fuel supply pipe
No. AD Pipe from air pumps
No. Q Burner

Throttle.

Plate 16.

The principle on which this throttle is constructed is that the steam in its passage through the throttle should be controlled at a different point than the valve seat. By this principle the seat does not get the wear in throttling the steam and consequently will never leak when closed. It is accomplished by having an extension 180 (Plate 16) at the end of the throttle spindle 174 which projects up from the valve seat 181 into the passage 184. 180 is nearly a fit for 184 and has a beveled point. When the throttle is open, as in the Plate, 181 is drawn away from the seat by the action of the threads on the throttle stem when it is turned, but 180 is of such length that it is not drawn out of 184 and immediately the valve has left the seat the throttling is all done by the position of 180 in 184, obviating the wear on the seat itself.

Chassis, Bottom View.

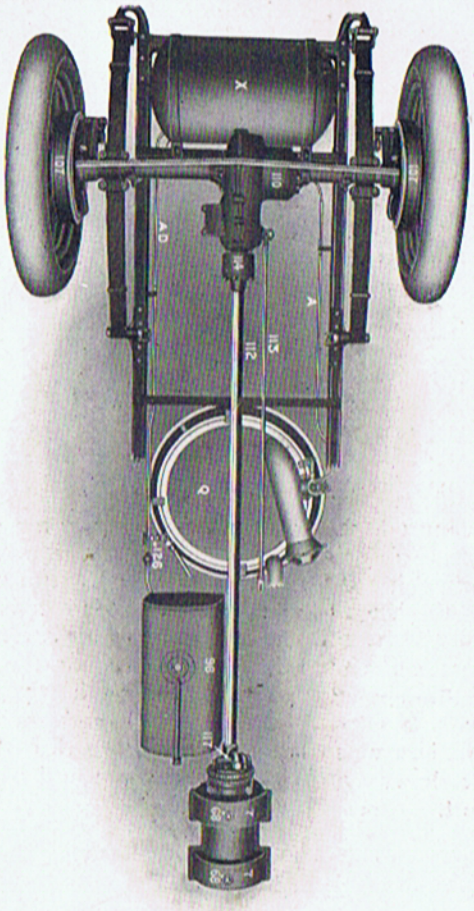

Plate 15

Throttle—Continued.

No. 172 Throttle casting
No. 173 Nickle seat
No. 174 Throttle stem
No. 175 Union nut
No. 176 Throttle sleeve
No. 177 Throttle lever
No. 178 Stuffing box nut
No. 179 Stuffing box gland
No. 180 Projection on valve stem
No. 181 Valve seat
No. 182 Connection to engine
No. 183 Connection to generator
No. 184 Passage through throttle seat
No. 163 Throttle bracket

Care must be taken in setting the throttle so that the lever 177 is in such position that when connected to the throttle wheel it can be shut. And also when shut it can be opened to the largest extent that is possible considering the length of the arc through which the lever 177 moves. There must be movement enough to draw 180 out of 184 or it will be impossible to get enough steam into the engine to run at top speed. The movement will be found to be sufficient when the position of the throttle closed is such that lever 177 is at the extreme end of its arc of movement.

Throttle.

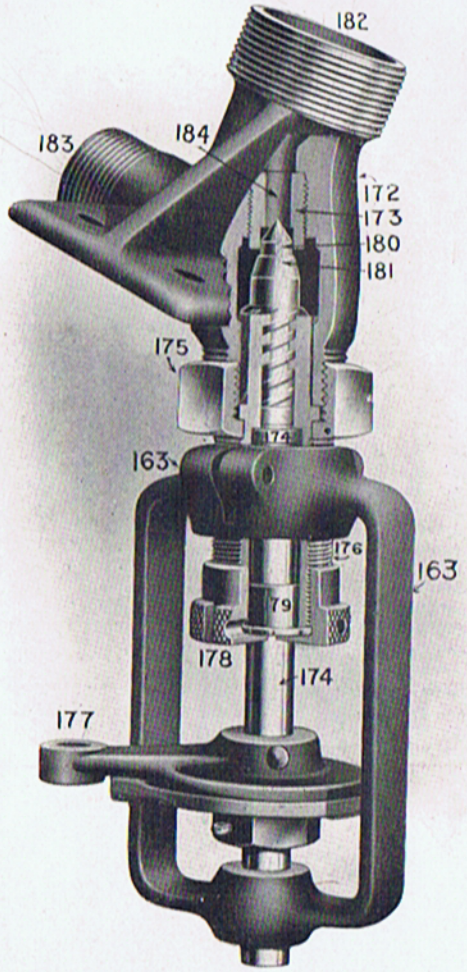

Plate 16

Throttle, To Adjust.

To set the throttle: Loosen 175 and move 163 until the desired position is reached. 163 should not be loosened on 176 for this purpose, but they should be considered as one piece. 176 carries the threads in which the spindle 174 works, and which controls the movement of the throttle valve, and by moving the position of the threads the position of 177 is changed for the corresponding same position of the throttle valve.

To grind the throttle: Loosen the screw clamp on 163 and turn it to the right on 176 about quarter of a turn. Tighten the clamp 163 and loosen 175 and move 177 to the right of 163. By this means the valve stem 174 projects farther through the sleeve 176, and the valve comes up against the seat before the sleeve 176 comes up to its seat. Turn 174 and 176 together by holding 163 and 177 together and the valve at 181 will move on its seat without being drawn away from it, and the seat can be ground without removing the entire throttle from the car. By undoing the nut 175 the stem can be taken from the car and pumice put on the seat to grind it.

To Get Good Results.

The instructions in this book should be thoroughly noted.

Care should be taken that all parts are well lubricated; the stuffing boxes packed, and all joints tight.

When the stuffing boxes begin to leak, it is advisable to take them up at once before the steam has a chance to wear a groove in the packing. When new packing is first put into the stuffing boxes, it should be watched for leaks until it gets thoroughly settled. After once getting settled without the steam wearing a passage through it, the box will not have to be repacked for a long time.

Use 600-W cylinder oil.

Keep air pressure from 50 to 60 pounds.—Always above 50 pounds.

Do not crowd the car when starting. Give the engine time to warm up.

Do not try to run 70 miles per hour.

Do not try to make fast time on bad roads.

Do not overload the car; it is designed for five or seven passengers only.

5006 Model 17.

Ordering Parts.

When ordering parts specify:

MODEL OF CAR.
NUMBER OF CAR.
NUMBER OF PART.
NAME OF PART.
COLOR (if painted).
SHIPPING DIRECTIONS.

We open book accounts only with established dealers of White cars.

Orders from individuals which are not accompanied by cash will be sent C. O. D.

When possible, parts should be ordered through White car dealers, as necessary repair parts are generally carried in stock by them.

When returning parts for any purpose, have box properly tagged with your name and address, and prepay charges; also write us, giving particulars concerning same, regardless of any previous correspondence you may have had on the subject.

All prices are net F. O. B. factory at Cleveland, Ohio.

Index to Numbers and Letters.

31 Power pump lock nuts
32 Power pump stuffing boxes
33 Upper power pump suction pipe
34 Water regulator by-pass pipe
35 Discharge pipe of lower power pump
36 Steam gauge and oil connection of water regulator
37 Steam connection of water regulator
38 Water regulator adjusting worm
39 Condenser pump
40 Condenser pump suction end
41 Condenser pump discharge end
42 Fan shaft sprocket
43 Fan shaft casing support
44 Simpling valve rocking lever
45 Simpling valve rocking lever shaft
46 Simping valve rocking lever (spring side)
47 Simpling valve lever spring
48 Simpling valve lever connecting rod
49 Simpling valve bell crank
50 Main steam connection to high pressure steam chest
51 Engine air pump discharge connections
52 Cylinder oiler connection
53 Engine air pump yoke
54 Engine air pump yoke bolt
55 Engine air pump strainer
56 Air pump regulating lever
57 Air regulating lever bell crank
58 Air pump suction check chamber
59 Bell crank connecting to reverse arm
60 Reverse arm
61 Connecting rod reverse arm to bell crank
62 Simpling valve cap
63 Discharge from feed water heater to flow motor
64 Engine universal joint

65 Bolts holding universal joint to crank shaft
66 Feed water strainer casting
67 Engine air pump
68 Plug for draining crank case
69 Fan shaft pulley
70 Crank case oiler connection
71 Feed water heater drip to condenser
72 Upper power pump suction check casting
73 Valve stem bearings
74 Link yoke
75 Crosshead
76 Crosshead pins
77 Connecting rod
78 Connecting rod cap
79 Valve links
80 Eccentric rods
81 Eccentric rod cap
82 Air and condenser pump eccentric rod
83 Water pump eccentric rod
84 Counter balance low pressure
85 Counter balance high pressure
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88 Condensor
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90 Exhaust pipe
91 Fan bracket
92 Engine
93 Pedal operating simpling valve
94 Pedal operating air pump valve
95 Pedal operating foot brake
96 Water tank
97 Water regulator washer
98 Generator

99 Hand water pump
100 Pipe from 63 to thermostat
101 Throttle wheel
102 Steering wheel
103 Emergency gear lever
104 Reverse lever
105 Brake lever
106 Brake cables
107 Brakes
108 Cylinder oiler
109 Crank case oiler
110 Gear case
111 Blow off valve
112 Driving shaft
113 Emergency gear rod
114 Universal joint (rear)
115 Air line check valve
116 Fan shaft chain idler
117 Universal joint (front)
118 Oil valve to water regulator
119 Thermostat cap
120 Flow motor
121 By-pass pipe to tank
122 Thermostat
123 Flow motor inlet
124 Flow motor outlet
125 Stuffing box
126 Upper blow-off valve
127 Pipe to generator
128 Generator inlet
129 Discharge to engine
130 Pipe from thermostat to motor discharge
131 Connection to feed water heater
132 Main casting

133 Water regulator cover
134 Diaphragm
135 Plug
136 Diaphragm shifting pad
137 Plunger
138 Spring
139 Lock nut for plunger adjustment
140 Lever
141 Valve
142 Spring adjusting nut
143 Spring adjusting pad
144 Valve seat
145 Connection to pump discharge
146 Pinion driving shaft
147 Emergency gear shaft
148 Driving spur gear
149 Spur gear
150 Internal spur gear 149
151 External spur gear 149
152 Large spur gear on emergency shaft
153 Small spur gear on emergency shaft
154 Driving pinion
155 Pinion shaft rear bearing
156 Rear axle bearing
157 Pinion shaft front bearing
158 Oil cup
159 Roller bearing
160 Shifting lever groove
161 Shifting lever groove
162 Exhaust inlet
163 Throttle bracket
164 Fan
165 Fan pulley
166 Connection to condenser pump

167 Drip cock
168 Top of condenser
169 Bottom of condenser
170 Condenser side frame
171 Hood support bracket
172 Throttle casting
173 Nickel seat
174 Throttle stem
175 Union nut
176 Throttle sleeve
177 Throttle lever
178 Stuffing box nut
179 Stuffing box gland
180 Projection on valve stem
181 Valve seat
182 Connection to engine
183 Connection to generator
184 Passage through throttle seat
185 Brake drum
186 Foot brake band
187 Emergency brake band
188 Foot brake spring
189 Foot brake turn buckle
190 Emergency brake turn buckle
191 Piston
192 Piston rod
193 Valve stem
194 Valve stem lock nut
195 Groove
196 Plug for draining
197 By-pass valve
198 Brake yoke
199 Thermostat casting
200 Water inlet

201 Valve stem
202 Valve stem nuts
203 Valve stem seat
204 Water outlet
205 Bell crank
206 Bell crank spring
207 Glass rod
208 Steel tube
209 Vaporizer pressure gauge
210 Steam pressure gauge
211 Air pressure gauge
A Supply pipe from fuel tank
AA Hand air pump
AB Main fuel shut-off valve
AC Flow motor stuffing box
AD Pipe from power air pump
B Fuel strainer casting
C Fuel strainer plug
CA to CD graduation valve stem
CB Plug
D Main sub burner valve
E Sub burner flush valve
F Sub burner adjusting valve
G Warming up valve
H Pipe to main burner valve
I Pipe to warming up valve
J Main burner valve
K Fuel pipe to flow motor
L Flow motor fuel valve
M Pipe from flow motor fuel valve to vaporizer
MA Sub burner supply pipe
N Vaporizer
NA Vaporizer discharge pipe
O Vaporizer nozzle

P Sub burner cap
Q Burner
R Burner induction tube
S Induction tube shutter
T Pipe to vaporizer gauge
U Vaporizer support post
V Sub burner casing
W Sub burner casing door
X Fuel tank
Y Fuel tank filler cap
Z Fuel tank gauge