



A Wide Step  
In Advance



# Gearless Steamer

WHAT IT IS  
AND  
WHY IT IS

The Latest Word in  
Automotive Develop-  
ment.

Gearless Motor Corp.  
Pittsburgh, Pa.

# HOW IT WORKS

*A Brief Non-Technical  
Description of the*

## Gearless Steamer



Manufactured by

**The Gearless Motor Corp.**

117 Flavel Street, Pittsburgh, Pa.

NOTE—Many of the details of design herein described are patented or pending by patents applied for and may not be used without danger of infringement.

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# Simplicity

IT IS generally conceded that Simplicity in the Mechanical Dictionary spells Durability and Reliability and that the man who has caused two blades of mechanical grass to grow where formerly there was but one, is not the party Swift had in mind, and yet, automobile manufacturers seem to have been straining every nerve to outdo each other year after year in the matter of complications, adding this, that, and the other to cover the inherent defects of the Internal Combustion (or explosive type) motor.

Many highly ingenious devices have been worked out at heavy expense, only to be superseded in a year or two by something more expensive and complicated, and still the end is not yet. The fuel problem is the serious one now, and chambered manifolds, "hot spots," electric heaters, etc., are adding their weight to the load, and still the man who must make a train or keep an important engagement must allow fifteen or twenty minutes on a cold morning for the uncertainty of starting his motor, and he may have to press the old teakettle into service before he gets away.

The fuel problem is not likely to improve, and so the complications are extending to it also, and it will soon be a matter of a little of this, that, or the other "Dope" to be manufactured in a string of million-dollar plants transported in fireproof tank cars to another lot of fireproof stations, finally to be mixed with your gas, so as to make it possible to start the motor and keep it running in cold weather without knocking itself to pieces.

The steam car doing away with all this complication in mechanism and using safe low grade fuels is the logical answer to the problem. Simplicity is the key-note in its

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design and operation, and with this simplicity goes performance unequalled by any gas car so far produced. Steam answers every requirement and steam must come into its own.

Among the advantages conceded to the steam car are the following:

*Perfect speed control from one lever.*

*Greater power at all speeds.*

*Much lower cost of operation.*

*Greater tire mileage.*

*Smoother and quicker acceleration.*

*Simplicity and reliability of operation.*

*Less moving parts to wear.*

*Longer life and less early depreciation.*

*Less liability to freeze.*

*Ease and economy in repair.*

*Better riding qualities due to better speed control.*

*Safety in certainty of action.*

**STORED ENERGY.**

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## Stored Energy

Stored energy—stored in such a way as to be instantly available in case of emergency is the very most desirable thing an automobile can possess. It saves many an accident, smooths the way through traffic, and levels the steepest grades. It is totally lacking in a gas car and is the most noticeable attribute of the Gearless Steamer. The stored energy is contained in the steam generator which contains ten gallons of water under pressure and at a temperature so near the steam temperature that a sudden reduction of pressure (brought about by the natural operation of the car under a heavy demand for power or speed) makes it instantly respond to the needs of the occasion with no conscious effort on the part of the operator. There is no fear of stalling nor laying down of the motor. It is always ready to speed ahead to get out of the way of trouble.

## Comparison of Steam and Gas Engines

The action of a steam engine is entirely different in principle from the action of a gas engine though both transform heat into mechanical power or motion and both use pistons and cylinders in doing it.

The gas engine is only able to give out power through a series of explosions, one occurring to every four strokes of each piston, and the cylinders and pistons must be built in a special way, called single acting. The effect of this is an uneven jerky motion transmitted to the crank shaft, which must be smoothed out by the use of a heavy balance wheel. Again, the gas engine must be started by mechanical means of some sort, such as a crank or starting motor and must attain a considerable speed before it develops much

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power. This introduces the clutch and change gears.

The steam engine uses pressure on each side of its pistons, applying the energy with an elastic push twice to every revolution of its shaft for each of its cylinders. A steam engine such as the Gearless uses, having four double acting cylinders, will equivalent the performance of a sixteen cylinder gas engine. It is easy to see where it gets its superior power and smoothness of action. It requires nothing but steam from the throttle lever to start it and gives its greatest power to the wheels at slow speed.

## Steam Power Cycle

Steam power is obtained by boiling (or evaporating) water in a closed vessel, so that it becomes steam, continuing the application of heat until pressure is built up in the vessel, (steam generator) leading it by a pipe to an engine (motor) cylinder, allowing it to expand and cause the piston in the cylinder to move and produce work (controlling its action by valves) and exhaust into a condenser where it is reconverted into water to be used over again. Of course, to get the water into the steam generator, to make the cycle continuous, we must have a pump to overcome the pressure in it.

The simple cycle of events above described is all there is to steam power. The refinements that make for economy such as the use of superheat, and liquid fuel of the heavier grades which make for safety are the commercial developments which distinguish the present day steamer from the original designs of years gone by and place it beyond comparison.

## Gearless Power

The way the Gearless Steamer takes fuel and water and transforms them into power and motion is described in detail in the following pages for the benefit of those who are curious to "see what makes it go." We have had so many requests for this information that it seemed advisable to get out a special booklet devoted to a simple description of the mechanism.

The fundamentals of the Gearless steam power plant are a Steam Generator, Fig. 1; a Firebox and Burner, Fig. 5; a Smoke Flue or Stack, Fig. 3; a Motor, Fig. 10; a Feed Pump, Fig. 7; a Condenser, Fig. 15 and Fuel and Water Supplies, Fig. 15.

Describing these briefly in detail:

### Gearless Steam Generator

The Gearless Steam Generator is of the water tube type, consisting principally of twelve sections and three headers. The sections are joined to the headers by flat seated union connections in such a manner as to permit any section to be removed from the completed generator without disturbing any other. All sections are interchangeable. Each section consists of a double row of vertical tubes (V) of small diameter welded top and bottom into four cross headers, and two larger vertical tubes (WL) into which the ends of the cross headers (C) are welded, connected at their upper ends by a bent tube or steam leader (S) from the center of which the steam manifold is taken. The tubing is of special alloy steel, developed for Gearless purposes, which will not rust nor scale at high temperatures. The total heating surface is approximately 120 square feet.

### Weight

So light and efficient is this generator that it weighs less than a Ford motor and can be steamed from cold in three to four minutes.



FIG. 1

### Quick Response To Heavy Demand

It is not a flash generator, but has many of the much sought characteristics of one, its action being nearly that of a flash generator with a gravity feed. When heavy demand for steam is made, the water recedes in the small tubes, backing up into the large tubes and leaving a small quantity of water only for the fire to act upon. The normal quantity of water in the generator is ten gallons, but not more than three gallons may be in the small tubes at times of heavy steam demand. This action combined with the separator action, which takes place in the large tubes, gives a very large quantity of steam of a very superior quality, without the slightest tendency to foam or prime.



FIG. 2

## Oil

The small quantity of oil which gets by the oil separator in the tank has no detrimental effect and generators which have been in service two years covering thousands of miles show no deposits of either scale or sediment. All such matter settles down into the two lower longitudinal headers where it is easily blown out.

## Durability

Gauge cocks and a sight glass are provided to show the water level and a dry boiler is generally the direct result of carelessness, however, Gearless boilers have been run dry repeatedly without any apparent injury. This is because they will not make steam after the water is evaporated below the lower cross headers (C), while still the joints (J) are covered.

In cases of this kind, no special precautions are necessary. The fire is shut off as soon as the difficulty is discovered and the pumping started. Since the cause of low water is almost invariably a neglected water tank, it is generally necessary to fill the tank first, but



FIG. 3

it is not necessary to wait for the generator to cool down. While the pumping is going on, the pressure may go up to eight hundred pounds per square inch, but will soon settle away to about four hundred when the automatic water feed device cuts out and the generator is ready for business again.

## Casings

The steam generator is enclosed in a substantial double casing of sheet steel well stayed and braced between the inner and outer shells of which a heat insulating material of very light weight and unusual efficiency is laid. So good is the heat insulation that only after a long hard run is there any perceptible warmth on the hood and never sufficient to do the slightest damage to the paint.

## Care

Gearless Steam Generators require the minimum of care. They should be blown down about once in two weeks, while in constant use, and if stored for any considerable

time, the water should be drained out and the cocks left open.

## Suspension

The construction of the Gearless Steam Generator is very strong and rigid, but to prevent any stress being placed on the parts, the rear end is mounted rigidly on the chassis frame in specially designed hangers, while the front swings in a cradle shown in Fig. 4, making what is known as three point suspension. In this way the tubular structure is relieved of all twisting due to unevenness of the road or uneven spring action.

## Burner

The Gearless Burner is a self contained unit, made in five principal parts and bolted to the steam generator by means of lugs welded to the lower headers. It fits up inside of the burner housing which is a part of the generator casings. It is easily removable by removing a few nuts. It is entirely enclosed (air tight) and no fire can get out of it.

The five principal parts are the pan, in which the complete burner is assembled, the two burner boxes, the pilot light, the vaporizer and the tubes.

## Pan

The pan is a welded sheet metal casing with a heavy front plate to which the vaporizer and other parts are bolted. Around the upper edge of it is a strip with holes for the reinforcing wires which hold the refractory lining in place. Two flanges on the sides near the bottom serve to hold it in place on the steam generator.



FIG. 4

## Boxes

The burner boxes, two in number, are made of pressed steel with small cast iron perforated grids fastened to the turned up portions by means of flat headed screws and anchor plates. These grids are the surfaces on which the gasified fuel is burned. The perforations are small holes arranged in rows and drilled at the proper angle to spread the flame. The spaces between the grids and the vertical sides of the burner pan are lined with special refractory material which is held in place by reinforcing wires.

## Tubes

The tubes are three in number and enter the ends of the boxes, each being fitted with a mouthpiece of peculiar shape to obtain the correct mixture of air and gas without the use of shutters or other regulating devices.

## Vaporizer

The vaporizer is a very highly developed part of the Gearless Burner. It is made of a special metal developed for the purpose and consists of a number of practically straight tubes welded into a strong compact unit so shaped as to permit the free expansion of all the parts without stress. These tubes contain wires especially treated to prevent sticking in case they are to be removed for cleaning. There are five of these wire cables, and plugs are provided in the face of the burner for their removal. The nozzles are fitted

with screens and the tips beside being slightly adjustable in the tubes, are so shaped as to eliminate any tendency toward blocking of the jets.

The ordinary cleaning of the burners is done with steam and air, but occasionally the cables must be pulled.

## Burners of Impractical Type

Numerous attempts have been made to design a practical burner for a steamer without a standby or pilot light. A careful examination of these burners shows them to be useless for the purpose. Some very ingenious arrangements with complicated electrical controls and means for igniting from the dash by means of a switch, have been devised, reflecting great credit on their inventors, in whose expert hands they seem to work very nicely, but inasmuch as engineers may be divided into two classes, the practical and the impractical, so may burners be classified, and it is our opinion that the vaporizing principle is the only sound one yet found. In the Gearless Steamer its development has been carried to such a point that it is one of the outstanding features of the car.

## Pilot

The improved Gearless Pilot Light fulfills three distinct functions. It ignites the main burner automatically, it keeps steam up ready for instant service, and it keeps the car from freezing in the cold weather or in a cold garage.

The Gearless Pilot is different from others. It consists of a long cast iron grid perforated and situated in such a way that the burner boxes are grouped around it. It has a direct draft at starting and is provided with a vaporizer of special design and material,



FIG. 5

which can be easily removed on those rare occasions when it must be cleaned. It may be readily inspected and may be left running indefinitely so that the occasional ignition of it after cleaning or a long period of idleness, which is done with a common match, is never a hardship. Once properly adjusted, it may be forgotten, save for the fuel in the supply tank which may be filled without putting out the pilot.

## Draught Flue

The passage for the exhausted gases from the firebox is at the back of the steam generator casing and is built as a part of it. The products of combustion arise through the tubes of the generator and are led forward underneath the baffle plate, which lies on top of the upper cross headers and is triangular in shape to spread and properly distribute the flame, and backward over the baffle, thence down the flue to a point below the water tank, where it is discharged into the air.

## Protective Apron

There is an apron of sheet steel which forms a continuation of the metallic dash and extends entirely across the car and back toward





FIG. 6

the rear of the car separating the products of combustion and any odors from the front compartment under the hood from the occupants of the car.

## Pumps

The pumping unit that feeds water to the generator, oil to the motor and fuel to the burner is located on the right side of the car under the floor boards. It is a self contained unit comprised of four (Monel Metal) plunger pumps of the hydraulic type, two feeding the steam generator, one pumping the fuel pressure and one taking the oil from a tank located in the cowl through the sight feed on the dash and delivering it under pressure to the engine valves by means of a pipe and oil channel in the cylinder block.

The check valves of all of these pumps are removable in one piece without disturbing any pipe joints. Generous packing boxes are provided and the necessity for repacking is infrequent. The capacity of the pumps is entirely adequate for the steepest hills and heaviest roads. The drive is from the engine by means of a rod with adjustable ends and automatic lubrication. The pumps are attached to the chassis frame by bolts and may be removed for repair or adjustment as a unit.

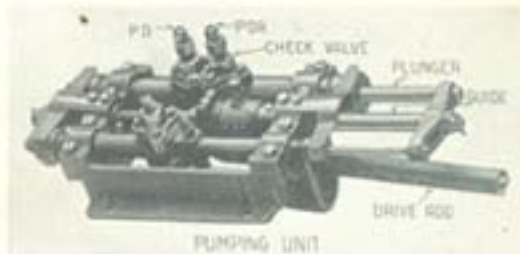


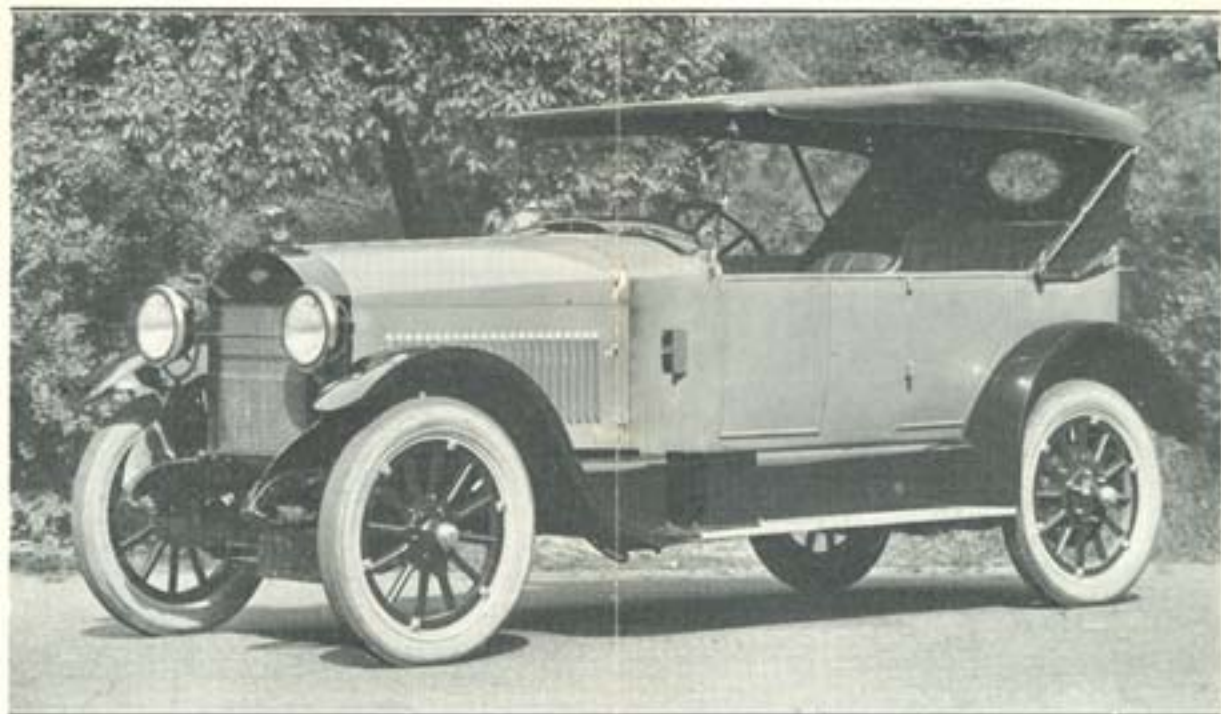
FIG. 7

## Automatic Water Feed Device

The amount of water fed to the steam generator is in proportion to its needs, the supply being regulated by a thermostatic valve similar to the valve in a steam trap. The action is as follows: The pumps work continuously when the car is in motion. The water is drawn from the feed water tank (WT) Fig. 15 and discharged under pressure into pipes (PD and PDR) Figs. 7 & 9. A branch is taken from this discharge pipe back to the feed water tank and led up to the thermostatic valve (BP) Fig. 9. This valve is open or closed according to the level of water in the steam generator. If the water is high enough to fill the brass expansion tube Fig. 9 the valve will be open and allow the feed water from the pumps to be returned to the tank, but if it is filled with steam, which is hotter than water, the brass tube will be lengthened by expansion and the valve closed, shutting off the bypass to the water tank and forcing all the feed water to go into the steam generator.

## Automatic Pressure Control

The pressure in the Gearless Steam Generator is automatically regulated by a simple diaphragm regulator Fig. 8 which has been used for many years for similar purposes. The



GEARLESS STEAMER

## Specifications

WHEEL BASE—127 inches.

FRAME—Pressed steel—53 $\frac{1}{4}$ " Deep.

FUEL—Kerosene or Distillates.

MOTOR—Four Cylinder Steam 3x6 Variable Cut-off  
Horsepower—65 (full stroke).

STEAM GENERATOR—Water Tube. Gearless  
Special Steel Safety Type—Built in sectional inter-  
changeable units.

BURNER—Vaporizing type with improved Gasifier.

CONDENSER—Tubular Radiator—Ample Capacity  
equipped with pressure relief valve.

PUMPS—Outside packed. Hydraulic Type. Mechan-  
ically driven from motor. Auxiliary Pump—  
Duplex Steam (optional). Water Pumps—  
Double Capacity.

REAR AXLE—Gearless Special Type  $\frac{3}{4}$  Floating  
eliminating Differential and all driving gears by  
direct connection to the motor.

BRAKES—Internal—expanding. External—contract-  
ing. 14" Diameter. 2 $\frac{1}{4}$ " Wide.

ROAD CLEARANCE—11 $\frac{1}{4}$  inches.

TANKS—Capacity: Fuel, 20 gal.; Water, 25 gal.;  
Oil, 2 gal.

LUBRICATION—Forced Feed and Splash Sight Feed  
on Dash.

WHEELS—Wood Artillery Type. Wire Wheels Extra.

STEERING WHEEL—16" gemmer.

LIGHTING SYSTEM—Electric 6 volt special Split-  
dorf Unit with Storage Battery.

LAMPS—10" with dimmers.

FINISH—Standard, Dark Green and Blue-Black.  
Special—in colors to order. Finish—nickel.

TIRES—33x4 Straight Side Cords.

SPRINGS—Semi-elliptic. Front 2x36. Rear 2x52.



FIG. 8

steam pressure on one side of the diaphragm is opposed by a spring. The diaphragm in its movement actuates a valve in the fuel line to open or close it and so long as the pressure on the upper side of the diaphragm is less than the spring pressure opposing it the fuel valve is wide open and fuel goes to the burner, but when the steam pressure is sufficient to move the diaphragm against the spring pressure the valve closes, the burner goes out leaving the pilot to maintain the pressure.

## Motor

The motor is a simple duplex steam engine—two engines built in one frame, each a two cylinder 3 x 6 quarter crank unit with a separate crank shaft and capable of working independently of its mate. In operation each engine drives a rear wheel, thus dispensing with differential gears and obtaining a superior differential action which is particularly noticeable in making turns on a heavy grade.

The construction of the motor is clearly shown in the accompanying cuts. The valves are simple slide valves which are the only kind which will take care of the water of condensation that sometimes collects in the cylinders. They are actuated by a Walchaert Valve Gear and the link may be hooked up in four positions, (three forward and one reverse) which makes for economy and speed. It is operated by a lever at the left of the wheel.

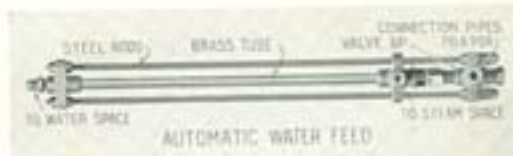


FIG. 9

## Valve Lubrication

The valves are lubricated by force feed from underneath and the oil does not come into contact with steam until after it has done its work. The valves on Gearless Cars show no appreciable wear after two years constant operation, in fact, we have never had occasion to grind a valve except for accident.

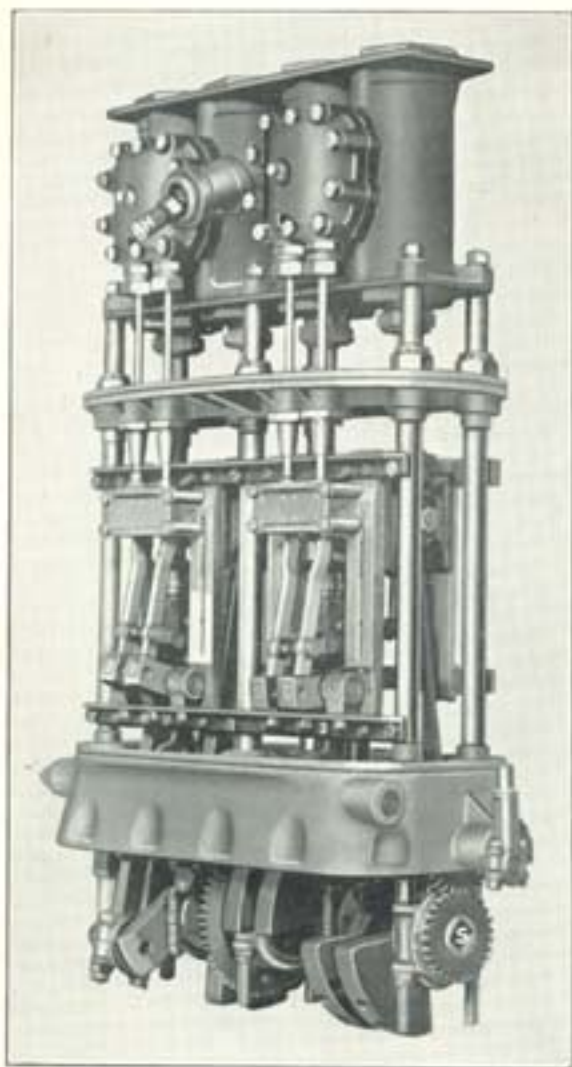
The connecting rods have plain bearings, babbitt lined, the crosshead pins being without adjustment, using hardened and ground bushings. The eccentrics and valve motion are principally of bronze with hardened bushings and fixed adjustments. The crank shafts are of high grade steel, heat treated. They are mounted on ball and roller bearings. The ends of the crank shafts have squared sockets (S) Fig. 10 to receive the axles.

The entire mechanism of the motor is encased and runs in oil.

The stuffing boxes are generous in proportions and are packed about every five thousand miles.

## Motor Hangers

The weight of the motor is taken partly on the rear axle housing and partly on the chassis frame through a flexible hanger shown at H. This carries the heavy end of the motor, the end resting on the axle housing and therefore unsprung, being hardly more than the weight of the common differential and driving gear arrangement.



THE GEARLESS MOTOR  
FIG. 19

## Speed

The Gearless Motor is the slowest speed motor we know of. At 60 miles per hour it is only running 600 R. P. M. and 20 miles per hour only 200. It is needless to say this means long life and quiet vibrationless action.

## Lights

The Gearless Electric Lighting System is a direct current generator storage battery combination driven from the engine by gears and mounted on the engine rear case. The battery is mounted on the left running board.

## Piping

The main steam pipe is of seamless steel tubing put together with our own special connections. Starting at the throttle valve, which is attached to the rear of the steam manifold on top of the steam generator, it goes first to the superheaters located in the firebox. These superheaters are a Gearless development. They are made of a special material which will stand very high temperatures and therefore do not burn out. The life of these superheaters is certainly more than 20,000 miles and may be three times that figure. The main steam pipe leaving the superheaters goes to the steam loop and from there continues to the swivel joint at the motor which is so designed as to allow the motor and chassis to swing to take care of road inequalities. The entire steam line is metallic and in fact all of the lines are metal, no rubber hose being used. A drip pipe is provided to drain the cylinders and steam chests. It is provided with a valve operated from the left side of the car.

## Condenser

The condenser is a modification of the standard automobile radiator but larger and more substantially built. It is provided with a spring relief valve which opens, if the back pressure on the engine becomes excessive, discharging to the atmosphere. There is a safety valve on the steam generator also to insure it against the possibility of overpressure. Some machines are equipped with fans driven by exhaust steam.

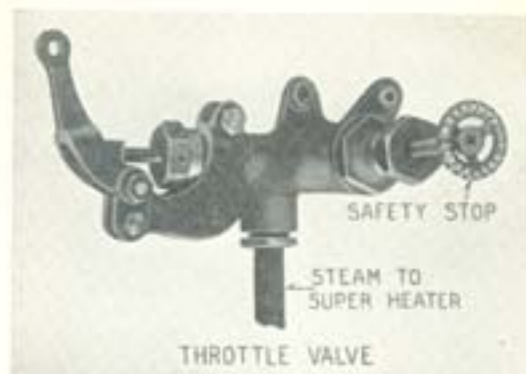


FIG. 11

## Exhaust Piping

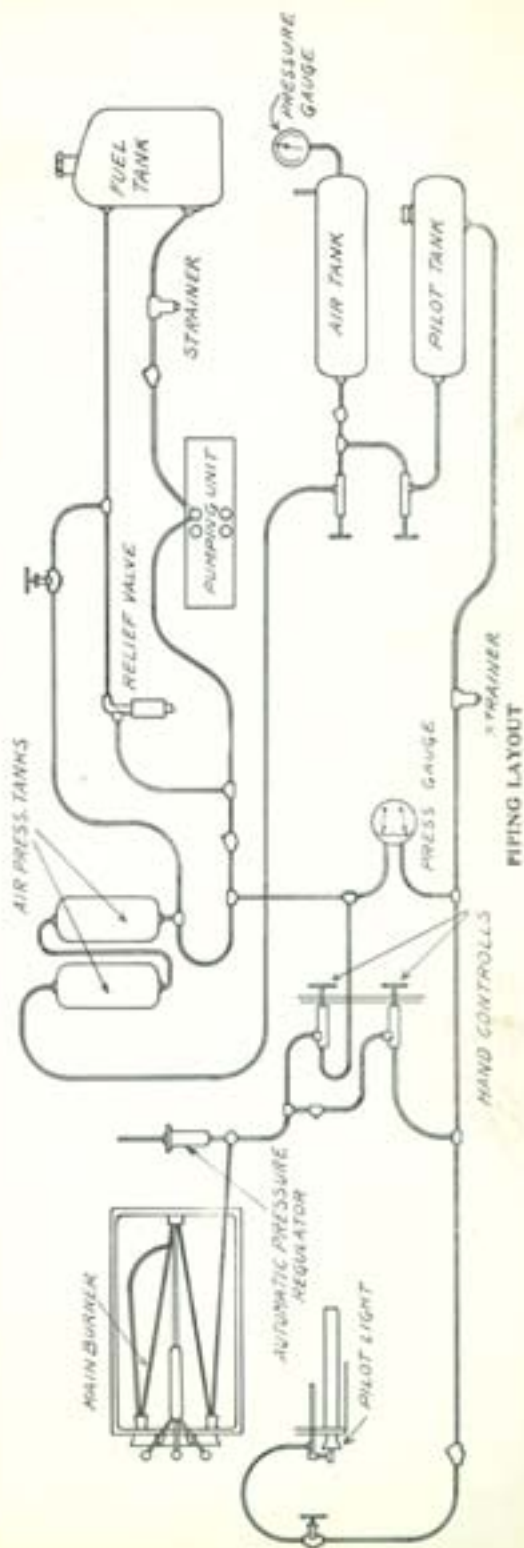
The exhaust pipe connects the motor with the condenser. It is made of flexible metallic tubing coupled with our own type of joint, using no packing whatever. The condensed steam from the condenser is led back to the water tank through a similar pipe and an oil separator where it is ready for use again in the steam generator.

## Water Tank

The water tank (WT) lies under the front compartment of the body and under the floor boards. It is thoroughly braced internally and so supported in the chassis that it may be removed without disturbing any of the other parts of the car. It may be filled through the filler horn on the side of the body near the front door or by means of a steam ejector and hose, from a brook or trough by the roadside without manual effort. The outlet to the pumps is protected by a large strainer which may be removed and cleaned without removing any piping.

## Tanks-Air, Pilot, Starting

Under the front seat is the air tank. This provides air for starting the burner and for the pilot tank which is situated beside



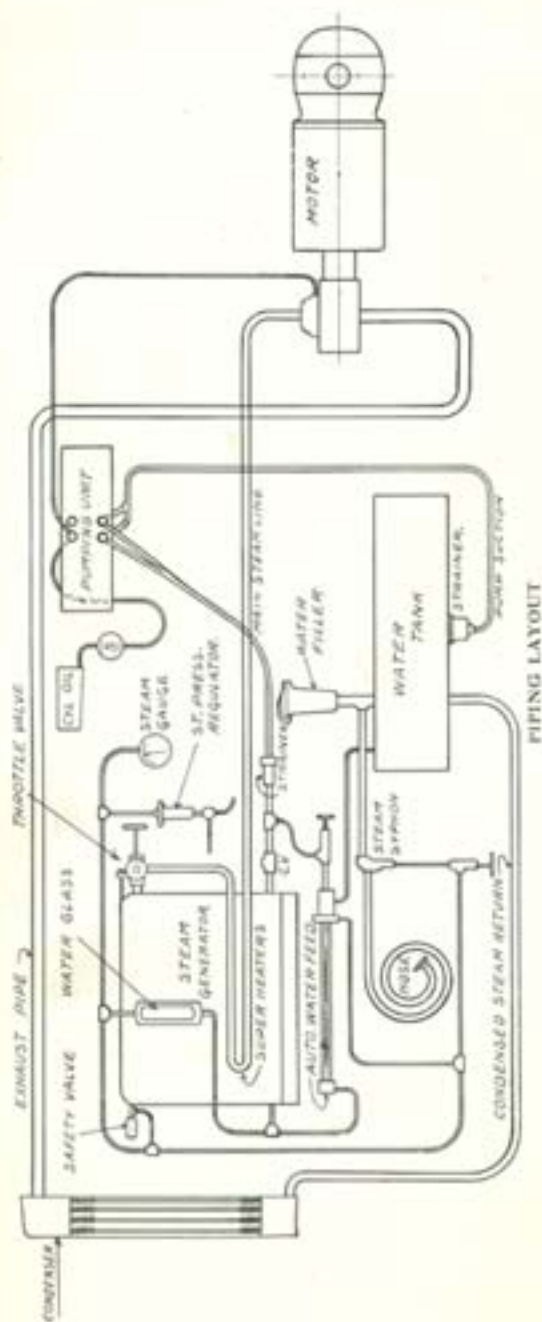


FIG. 11

it. It is conveniently fitted with a filler and gauge and may be filled at almost any gas station having an air hose. This does away with all hand pumping. There is also a tank in the kerosene line which is used as an auxiliary in starting.

## Fuel Supply

The fuel tank is placed in the rear. It holds twenty gallons of kerosene and is connected to the pumping unit by copper piping. In operation the fuel is pumped from the tank to the pressure tanks, which provide a reservoir of small capacity for fuel under pressure, the excess amount beyond the requirements of the burner being returned to the fuel tank. The operation of the fuel system is entirely automatic.

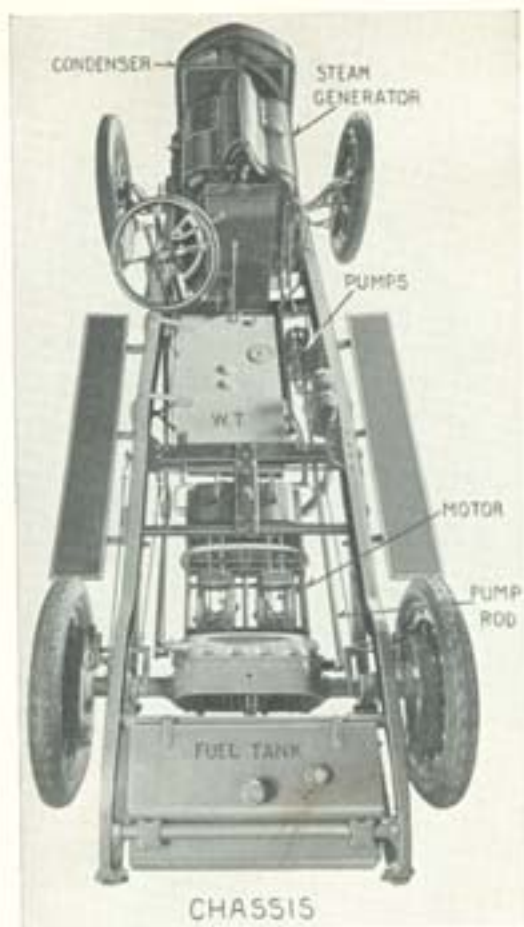


FIG. 15

## Dash Fittings

The simplicity of operation of the Gearless is shown by the fittings on the dash.

There are two gauges and three valves not found on gas cars and these take the place of more than twice their number of fittings.

The valve in the center is used in starting the car only, the one on the right in towing, heavy hauling, or some similar emergency, (it closes the feed water by-pass to the tank, making all feed water go to the boiler) and



FIG. 16

the one on the left controls the fuel to the burner, allowing it to be closed off when the car is out of use.

The gauges indicate the steam and fuel pressure but as these are controlled automatically, they are used for reference only.

The compressed air supply when required is controlled by two valves near the floor and on the vertical seat panel.

Under the cowl there is a valve which completely cuts off the steam from the engine and acts as a throttle lock.

The operation of the throttle is by the hand lever on the steering post. The usual foot and hand brakes are in their accustomed places.

The chassis frame is 5 $\frac{3}{4}$ " deep, of high grade steel. The springs are 36" and 52", semi-elliptic. The tires are 33 x 4 and other standard specifications will be found on pages 16 and 17.

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## Safety

Safety is one of the specially valuable features of the Gearless. The steam generator is built for 6,000 pounds pressure, tested at 2,000 pounds, and works at 600 pounds. A water tube steam generator cannot be exploded and for that reason is the only type allowed on naval vessels. The entire front of the body is metal and the burner is air tight. In all of our development work there has been no accident of any kind causing injury to anyone, and this includes the testing and demonstration of the first twenty-five cars in seven states, covering a period of over two years.

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## STEAM The Inevitable Motive POWER

**S**TEAM is the oldest of motive powers. Almost four thousand years ago it was employed in certain primitive capacities. Since the discovery of the principle of the Steam Engine it has completely dominated the industrial world—more particularly the transportation world. Inevitably, Steam must drive the Automobiles and Motor Trucks of the world, because it holds every advantage and not one disadvantage.

In the first place, the Steam Engine generates tremendously more power and speed than the gasoline engine. In the early Gordon Bennett races all honors were invariably swept away by steam-driven cars. So monotonous did the performance become that when finally the Vanderbilt races were instituted, Steam Cars were eliminated, many of the leading manufacturers of gasoline cars in the country immediately thereafter began the national advertising campaign of these manufacturers which ever since have held the attention of the public to the gasoline car.

In Europe, where the possibilities of the Motor Vehicle have been more fully developed than they have here, and where the development of the several types of cars has been free and untrammelled, the *Steam Car greatly predominates*. Undoubtedly the same will be true in America before many years. The Automobile is no longer a thing of sport or mere amusement. It has become an object of strict utility. The glamour of its advertising is beginning to wane. People are purchasing their cars and trucks with a view only to performance, and on this basis *Steam forever must win—as it always has won in every contest between Steam and gasoline throughout the engineering world.*



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# List Prices

January 1922



TOURING CAR

\$2600.00



ROADSTER, *Wire Wheels*

\$2650.00



SEDANS, *Built Only on Order*

\$3600.00

*and Upward*

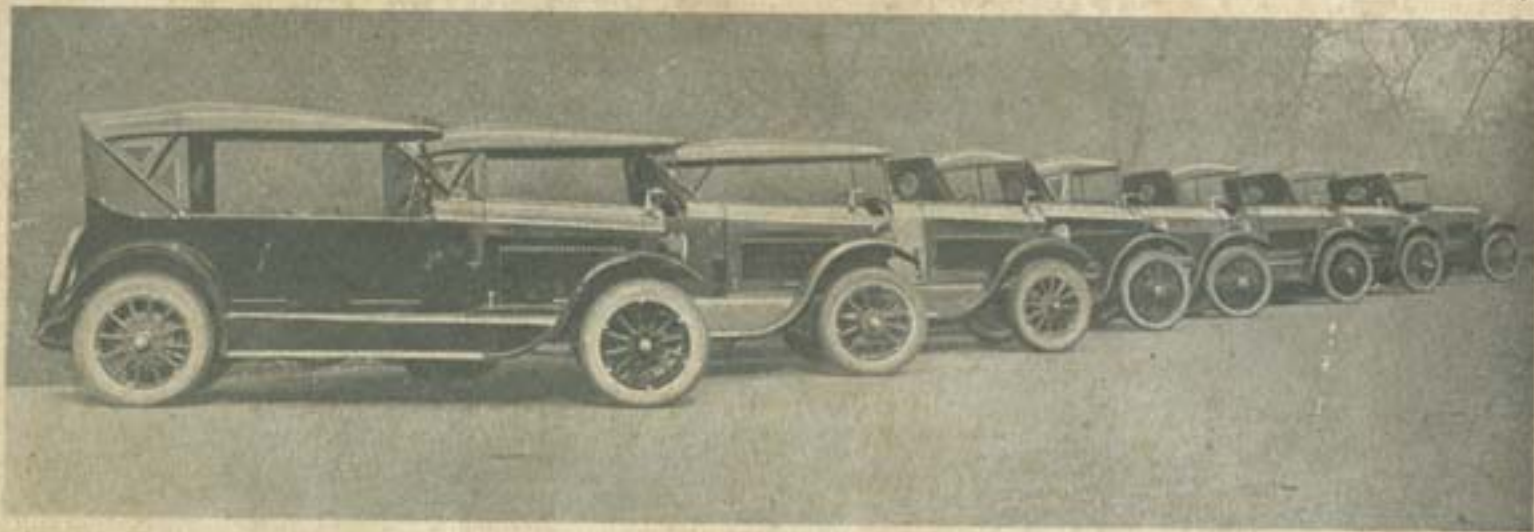


CHASSIS

\$2000.00

Bodies must be sent to our plant for mounting or our representative must supervise work. Above do not include War Tax and are f. o. b. Pittsburgh, Pa.





GROUP OF GEARLESS MOTOR CARS