May 15, 1923. 1,455,335

W. B. INGRAM

THERMOSYSTEM FOR INTERNAL COMBUSTION ENGINES

Filed Sept. 13, 1919 2 Sheets-Sheet 1

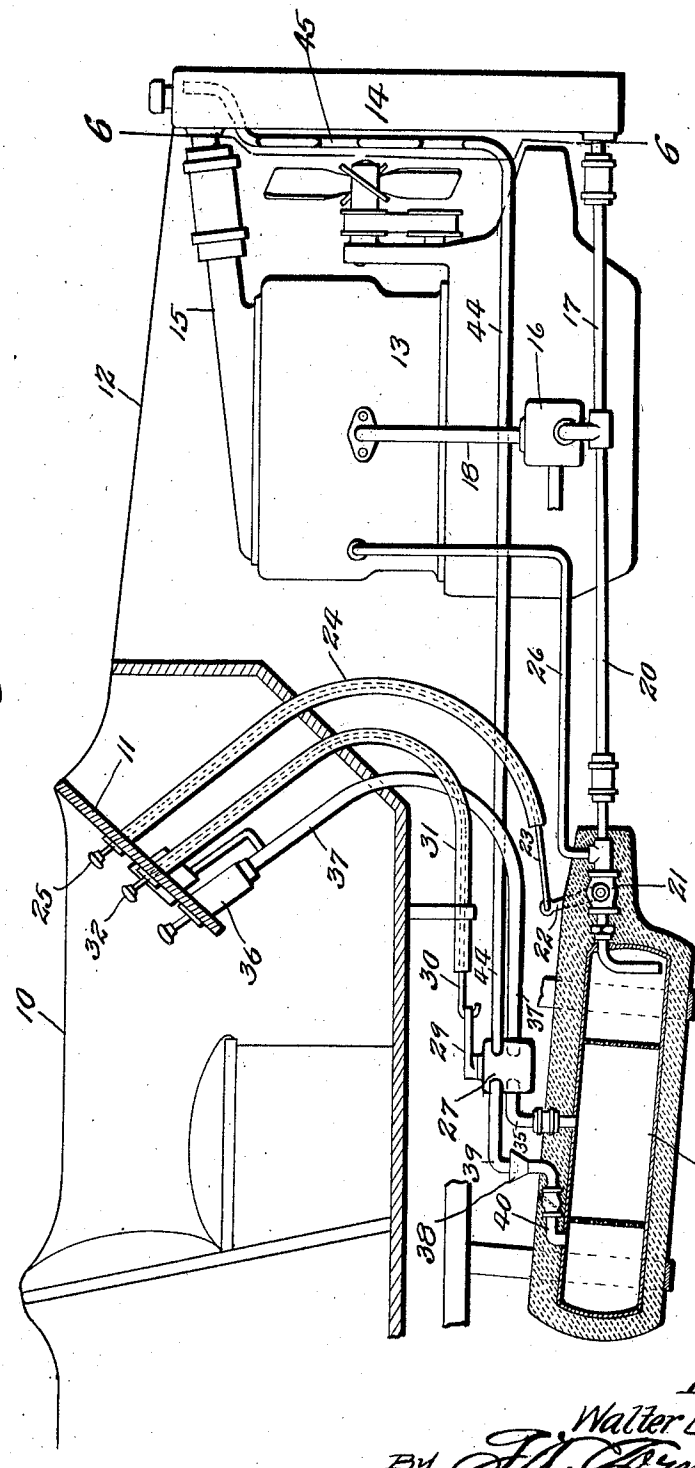


Fig. 1

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Fig. 2

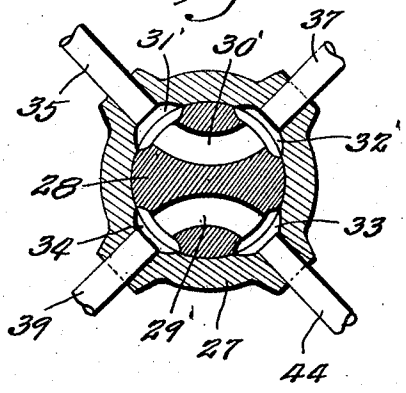


Fig. 3

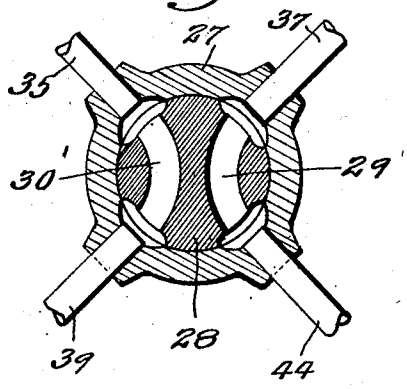


Fig. 4

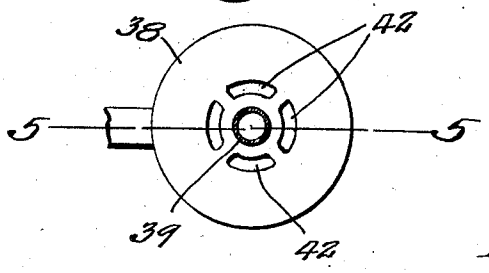


Fig. 5

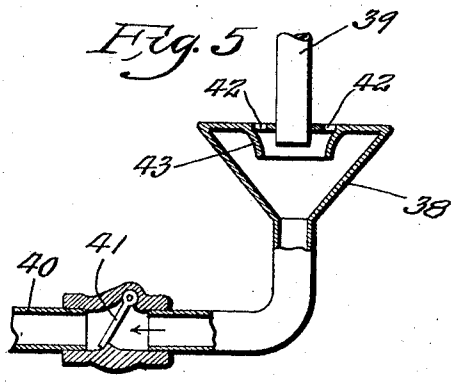
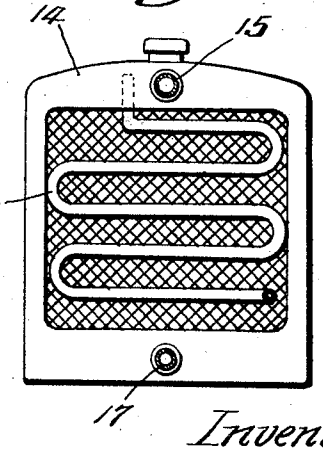


Fig. 6



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UNITED STATES PATENT OFFICE.

WALTER B. INGRAM, OF ST. LOUIS, MISSOURI.

THERMO SYSTEM FOR INTERNAL-COMBUSTION ENGINES.

Application filed September 13, 1919. Serial No. 323,514.

To all whom it may concern:

Be it known that I, WALTER B. INGRAM, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Thermo Systems for Internal-Combustion Engines, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates generally to the internal combustion engines of motor vehicles and more particularly to the cooling system associated with the engine, the principal objects of my invention being to provide a relatively simple system that will be effective in cooling the engine by means of water circulating through the radiator and through the water jacket of the engine, said system providing for the draining of the water from the radiator and water jacket, thus eliminating the possibility of the freezing of the radiator and engine during the cold periods of the year; and, further, to provide a system wherein the water from the system while warm can be temporarily transferred to a storage tank, and later delivered back to the radiator and water jacket of the engine to partially heat the engine and thereby assist in starting the same after it has been out of service for some time, for instance, while the vehicle is standing on the street for several hours or while occupying an unheated garage over night.

Further objects of my invention are to provide a relatively simple and efficient system that can be combined with practically all forms of motor vehicle engines now in general use; and, further, to provide a system which is positive in action and which is at all times under control of the driver of the vehicle.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is an elevational view of an internal combustion engine of the type generally used upon motor vehicles and showing my improved system associated therewith, parts thereof being in vertical section.

Figure 2 is a horizontal section taken through the center of the main control valve of the system.

Figure 3 is a sectional view similar to Figure 2 and showing the valve in shifted position.

Figure 4 is a plan view of a combined vent and drain connection forming a part of my improved system.

Figure 5 is a vertical section taken approximately on the line 5—5 of Figure 4.

Figure 6 is a vertical section taken approximately on the line 6—6 of Figure 1.

Referring by numerals to the accompanying drawings which illustrate a practical embodiment of my invention, 10 designates the body of a motor vehicle, 11 the dash thereof, 12 the hood, 13 the internal combustion engine, 14 the usual radiator, 15 the connection from the water jacket around the engine cylinders to the upper portion of the radiator, 16 the water circulating pump, 17 the connection from the lower portion of the radiator to the pump, and 18 the connection from the lower portion of the water jacket around the engine cylinders to said pump.

Supported in any suitable manner and at a convenient point beneath the body of the vehicle is a tank 19 that is wholly encased in asbestos or like heat insulating material, said tank declining slightly toward its forward end and leading from the lowermost point at the forward end of the chamber within this tank upwardly and thence forwardly to the pump 16 is a tubular connection 20. This tubular connection 20 is preferably in direct alignment with the tubular connection 17, and together these connections decline slightly from the lowermost point of the radiator 14 to the point where the connection 20 enters tank 19, and by virtue of such arrangement the water from the water jacket will under certain conditions automatically drain or discharge into tank 19.

Located in this tubular connection adjacent to the tank is a valve 21 provided with an operating handle 22. Connected to this operating handle is the lower end of a flexi-

ble member 23, such as a section of piano wire, the same extending upwardly through a tube 24, the upper end of the latter being seated in the dash 11. The flexible member 23 extends entirely through this tube 24 and its upper end is provided with a knob or operating handle 25.

Leading from the lowermost point in the chamber of the water jacket around the engine cylinders to the tubular connection 20 adjacent valve 21 is a drain pipe 26. Located adjacent to tank 19, and preferably above the central portion thereof is a valve housing 27 in which is arranged for operation a cylindrical valve 28, the upper end thereof carrying a laterally projecting operating arm 29. Secured in any suitable manner to this arm is the lower end of a flexible member 30, such as a section of piano wire, the same extending upwardly through a tube 31, the upper end of which is seated in the dash 11 and the upper end of this flexible member 30 is provided with a knob or operating handle 32.

Formed through the body of valve 28 are arcuate ports 29′ and 30′ which are adapted to communicate with ports 31′, 32′, 33 and 34, the latter being formed in the inner face of valve housing 27 and disposed approximately ninety degrees apart. Leading from port 31′ to the chamber within tank 19 is a pipe 35 and leading from port 32′ upwardly to a small manually operable air pump 36 that is positioned on the dash 11 is a pipe 37.

Leading from port 34 to a funnel-shaped housing 38 is a pipe 39 and leading from said funnel-shaped housing into the upper portion of tank 19 is a pipe 40 in which is located a check valve 41. The funnel-shaped housing 38 is provided in its top with outlet apertures 42 and extending downwardly into the chamber within said housing around these apertures is an annular lip or drain flange 43.

Leading from port 33 to the upper portion of radiator 14 is a pipe 44, a portion of which immediately to the rear of the body of the radiator 14 is formed into a coil 45.

While the vehicle to which my improved system is applied is being operated during the warmer months of the year, valve 21 is preferably closed and valve 28 is shifted so that it occupies the position, as illustrated in Figure 2, with port 29 in communication with the ports 33 and 34 and port 30′ in communication with the ports 31′ and 32′. Thus as the engine is operated, the pump 16 will effect a circulation of the cooling water in the system from the water jacket around the engine cylinders through connection 15 to the top of the radiator 14 and the cooling water after passing downwardly through said radiator will pass through pipe 17 to the intake or suction side of pump 16.

Any vapor which may accumulate in the upper portion of the radiator or any overflow therefrom due to boiling will find exit through pipe 44 and after passing through ports 33, 29′ and 34, will pass through pipe 39 and from thence through pipe 40 to tank 19. Inasmuch as pipe 44 is of considerable length and provided with the coil 45, vapor passing through said pipe will be condensed and in such condition delivered to the tank 19, although any vapor that passes through the valve and through pipe 39 to the conical housing 38 will find exit through the apertures 42 in the top thereof.

If desired, a sufficient amount of water may be placed in the system to fill or partially fill the tank 19 and the supply of water within the tank can be carried as a reserve supply to be used in an emergency or in the event that water in the radiator becomes low and cannot conveniently be replenished.

To utilize the reserve supply of water from tank 19, valve 21 is open by pulling knob or handle 25, thereby opening valve 21, after which pump 36 can be manually operated to pump up sufficient pressure in tank 19 above the body of water therein to force a portion of said water outwardly through pipe 21 to the radiator, and the space within the water jacket around the engine cylinders.

Or, if desired, the valve 21 can be opened for a short period while the pump 16 is in operation, and the latter will draw a sufficient amount of water from the tank through pipe 20 to replenish the supply within the radiator.

While the vehicle is being operated during the colder periods of the year, and there is danger of freezing of the water in the cooling system, or while the vehicle is parked for several hours or remains over night in an unheated garage, the valve 28 is shifted by proper manipulation of knob or handle 32 so as to bring ports 29′ and 30′ into register respectively with ports 32 and 33 and 31 and 34 as illustrated in Figure 3, and at the same time valve 21 is opened.

Assuming that these operations are performed immediately after the engine of the vehicle has stopped, the warm water from the radiator and the jacket around the engine cylinders will gradually pass through pipes 20 and 26 into tank 19 and thus the radiator and water jacket are automatically drained so as to obviate all danger of freezing. The air in tank 19 will, as the water discharges thereinto, pass upwardly through pipe 35, and from thence through the valve and pipe 39 to housing 38 and from thence said air will escape to atmosphere through the apertures 42.

Inasmuch as the tank 19 is jacketed with a relatively heavy layer of asbestos or analogous material, the water which passes thereinto in a heated condition will remain

in such condition for a considerable period of time and said water being thoroughly insulated from external temperatures will be protected against freezing, even though the vehicle remains standing for several days in temperatures below the freezing point.

When the valve is shifted into the position illustrated in Figure 3, the driver of the car can hasten the discharge of water from the cooling system into the tank 19 by manually operating pump 36, thereby pumping air through pipes 37 and 44 into the upper portion of the radiator and the pressure of this air will accelerate the flow of water from said radiator and the water jacket of the engine into tank 19. After the radiator and water jacket have been thus drained and it is desired to start the engine to drive the vehicle, valve 28 is shifted into the position illustrated in Figure 2, thereby bringing port 30′ into register with ports 31′ and 32′, and by operating air pump 36, air is forced into tank 19 through connection 35 and the pressure of such air forces the water in said tank through pipes 20 and 17 to the radiator and through pipe 26 to the water jacket of the engine.

If the vehicle has been standing only a few hours, the heat from the water thus pumped back to the radiator and engine jacket will be effective in lowering the temperatures thereof and which result will greatly facilitate the starting of the engine.

In the event that alcohol or the like is used in the cooling water of the system and there is any tendency of said alcohol to vaporize, the resulting vapor will pass through pipe 44, from thence through port 29′, and from thence through pipes 39 and 40 to the tank, and as a result, there is very little, if any, loss of alcohol or other liquid that may be mixed with the water to reduce its freezing point.

A self-draining thermo system of my improved construction is relatively simple, is applicable for use in connection with all types of motor vehicle engines utilizing a water circulating system for cooling purposes, and by providing means for draining the water from the radiator and water jacket of the engine, the time, labor and consequent expense due to repairs on the radiator and engine as a result of freezing is eliminated. Further, by providing the storage tank for receiving the water drained from the radiator and water jacket of the engine, it is possible to operate the vehicle in extremely low temperatures without danger of freezing, and after the vehicle has stood for a considerable period of time, the water which is maintained in warm condition within the storage tank can be readily returned to the radiator and water jacket of the engine to raise the temperatures thereof and facilitate the starting of the engine. Further, by providing the encased storage tank, the requirement for heat in a garage to prevent the water in the radiator and engine from freezing is eliminated.

It will be readily understood that minor changes in the size, form and construction of the various parts of my improved self-draining thermo system can be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim:

1. The combination with an internal combustion engine and the cooling system associated therewith, which cooling system includes a radiator, of a tank, connections between said tank and radiator, and means for creating air pressure within said radiator to force the cooling liquid therefrom into said tank.

2. In combination with an engine provided with a cooling system including a radiator unit, a fan behind said unit, a storage tank, an overflow pipe forming a connection between the cooling system and the storage tank and provided with a coil outside of the radiator unit and positioned between the radiator and the fan, said coil being of sufficient length to cause condensation of vapors therein when cooled by said fan, and a vent in proximity to the storage tank to permit the discharge of vapor.

3. In combination with an engine provided with a cooling system, a storage tank, a valve controlled connection between the cooling system and the storage tank to permit the passage of vapors from the cooling system to the storage tank, said connection being of sufficient length to permit said vapors to condense therein, a substantially closed funnel adjacent the tank into which said condensation is permitted to discharge, the upper surface of said funnel being provided with suitable vents.

4. In combination with an engine provided with a cooling system, a storage tank, a valve controlled connection between the cooling system and the storage tank to permit the cooling fluid to drain into said tank, a second connection between the cooling system and the tank to permit vapors to pass into said tank, means for supplying the tank with air pressure, and a single valve controlling the supply of air pressure to the tank and controlling the connection whereby the vapors pass into said tank.

5. In combination with an engine provided with a cooling system embodying a radiator, a storage tank, a connection from the bottom of the radiator to said storage tank, a controlling valve, an air pump, a connection from the controlling valve to the top of the radiator, and a connection from the controlling valve to said air pump,

and means for operating said controlling valve to place said last-mentioned connections in register.

6. In combination with a motor vehicle provided with an engine having a cooling system embodying a radiator, said motor vehicle being also provided with a dashboard, a storage tank, a pump for the cooling fluid, said pump being connected with the radiator and also connected with the storage tank, a valve for closing the connection between the pump and storage tank, a second connection between the radiator and tank to permit the discharge of vapors from said radiator, a pump operated from the dashboard and having a connection with the tank, and a controlling valve operated from said dashboard, said controlling valve operating to control the circulation of air from the pump, said controlling valve further operating to control the circulation of vapor from the radiator.

In testimony whereof I hereunto affix my signature this 10th day of September, 1919.

WALTER B. INGRAM.