F. J. DRUAR.

HYDROCARBON MOTOR.

APPLICATION FILED APR. 29, 1918.

1,327,148. Patented Jan. 6, 1920.

Fig. 1.

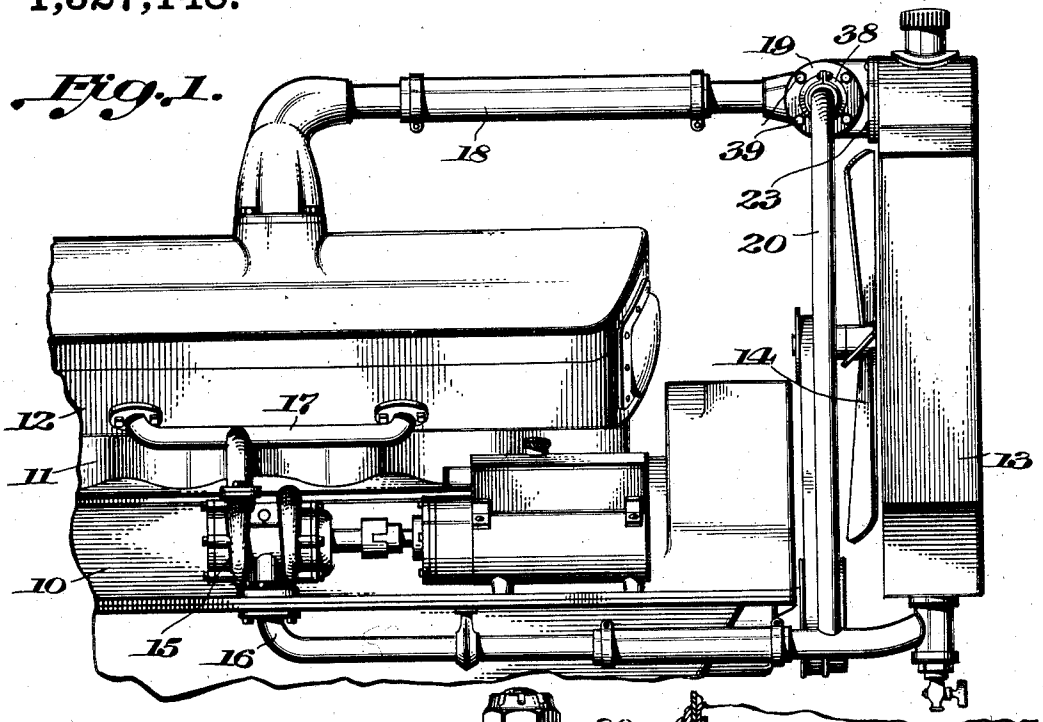
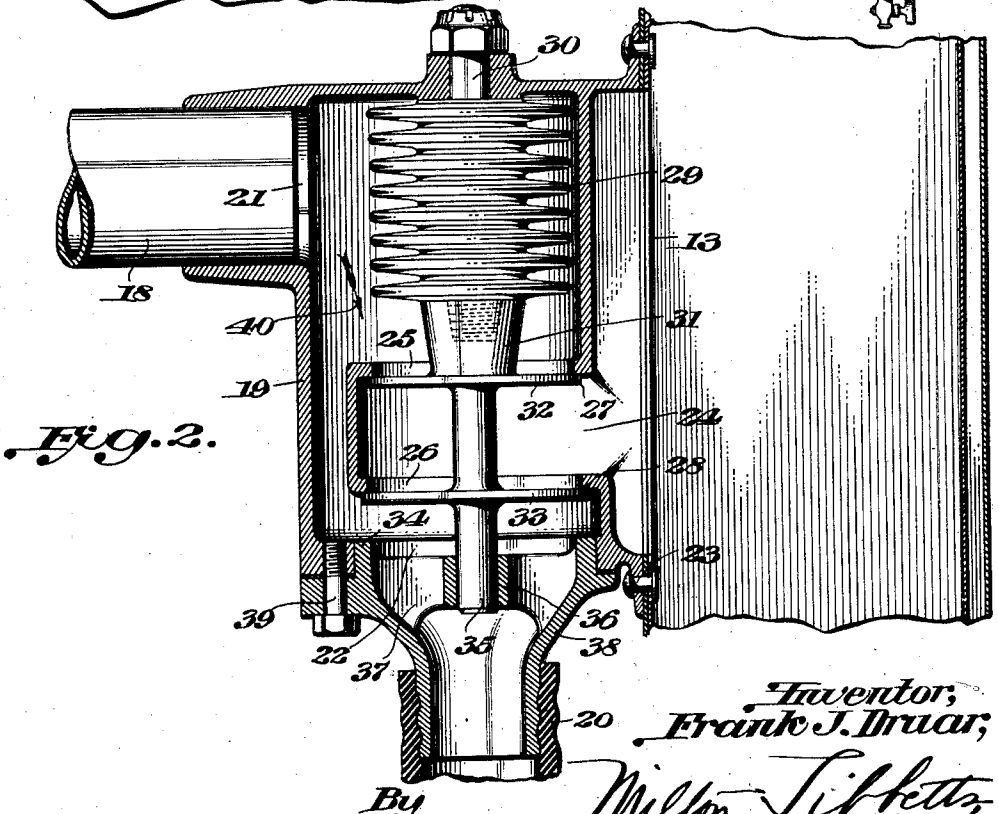


Fig. 2.



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UNITED STATES PATENT OFFICE.

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HYDROCARBON-MOTOR.

1,327,148. Specification of Letters Patent. Patented Jan. 6, 1920.

Application filed April 29, 1918. Serial No. 231,502.

To all whom it may concern:

Be it known that I, FRANK J. DRUAR, a citizen of the United States, and resident of Detroit, Wayne county, State of Michigan, have invented certain new and useful Improvements in Hydrocarbon-Motors, of which the following is a specification.

This invention relates to hydrocarbon motors and particularly to control of the water circulation thereof.

One of the objects of the invention is to provide a thermostat unit in which the valve mechanism is substantially balanced relative to the water pressure.

Another object of the invention is to provide a thermostat valve unit of simple construction for manufacturing purposes.

Another object of the invention is to provide a thermostat valve unit with two ports to one of the main openings so that the pressure of the water against the valves may be substantially balanced.

Other objects of the invention will appear from the following description taken in connection with the drawings which form a part of this specification, and in which:

Figure 1 is a side elevation of a hydrocarbon motor embodying this invention; and

Fig. 2 is a horizontal sectional view through the thermostat valve unit shown in Fig. 1.

Referring to the drawings, 10 represents a hydrocarbon motor having cylinders 11 which are water jacketed as at 12. A radiator 13 is mounted at the front of the motor and a fan 14 increases the circulation of air through the radiator. A pump 15, driven by any suitable moving shaft of the motor, draws the water from the lower part of the radiator 13 through a pipe 16 and delivers it by a branched pipe 17 to the motor jacket 12. An outlet pipe 18 from the top of the jacket carries the water to the upper part of the radiator 13.

A thermostat valve unit or casing 19 is shown as arranged between the pipe 18 and the radiator 13, and a bypass pipe 20 leads from the unit 19 to the pipe 16.

The construction of the unit 19 is shown in detail in Fig. 2. The pipe 18 above referred to connects to one end of the main body or casing of the thermostat unit through a port 21 and the bypass pipe 20 is connected to the other end of the unit and receives the water flowing therefrom through a port 22. The unit 19 is connected to the radiator 13 as by bolts or rivets 23 and the outlet 24 from the body of the unit 19 to the radiator has two ports 25 and 26 which are spaced from each other as shown in the drawings and which are also spaced from the port 22 but are arranged parallel thereto. The port 25 has its valve seat 27 on the side toward the outlet 24 whereas the port 26 has its valve seat 28 on the side toward the interior of the body of the thermostat unit.

A thermostat 29 of conventional construction and shown as a sheet metal bellows adapted to contain an expansible fluid such as alcohol, has one end secured to the body of the unit as at 30, and at its other end it is connected to a valve mechanism 31 comprising a valve 32 and a double valve 33, the former adapted to coöperate with the seat 27 and the latter with the seat 28. The port 26 is slightly larger than the port 25 so that the valve 32 may pass through it in assembling the parts, and for the further purpose of more nearly balancing the pressure or flow of water on the valves.

The valve 33 is also adapted to coöperate with a seat 34 surrounding the port 22 and the stem 35 of the valve mechanism is adapted to slide in an opening 36 formed in a spider 37 in a piece 38 which is secured to the end of the unit body as by bolts 39. The port 22 and seat 34 are formed in this piece 38 and the latter forms the end of the body of the thermostat unit.

From the above it will be seen that in the position shown the valves 32 and 33 are closed against their respective seats 27 and 28 so that the ports 25 and 26 are closed. The valve mechanism is in this position when the water flowing through the unit is relatively cold and all of the water therefore passes through the port 22 and bypass pipe 20 and none of it goes into the radiator. Under these conditions the pressure of water against the valves 32 and 33 is substantially balanced, due to the fact that it is on opposite sides of said valves, and the slightly smaller surface of the valve 32 relative to the valve 33 substantially compensates for the slight increase of pressure against said valve 32 due to the direction of flow of water through the unit body. Thus the water entering the body at the port 21 flows in the direction of the arrow 40 and therefore

causes slightly more pressure against the valve 32 tending to open the valve than it does against the back of the valve 33 tending to close the latter. Said valve 33, however, being slightly larger than the valve 32 substantially balances the pressure. By this arrangement the thermostat 29 is very sensitive in its action and as soon as the temperature of the water is raised slightly the thermostat expands and opens the ports 25 and 26. The opening of these ports causes some of the water to pass into the radiator 13 and in case the motor continues to raise the temperature of the water all of it that flows through the thermostat unit will pass into the radiator through the outlet 24 due to the fact that the valve mechanism 31 will be moved sufficiently to open wide both of the ports 25 and 26, and entirely close the port 22.

Other forms and modifications of the mechanism shown and described herein may be made without departing from the spirit or scope of the invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. The combination with a hydrocarbon motor, and a radiator, of a thermostat unit comprising a body having connections with the motor and the radiator and with a by-pass, said unit having an inlet and a plurality of outlets, balanced valve mechanism controlling said outlets, and a thermostat connected to said mechanism.

2. A thermostat unit comprising a casing having an inlet opening and three outlet ports, and a thermostat valve mechanism controlling the outlet ports.

3. A thermostat unit comprising a casing having an inlet opening and three outlet ports, valves controlling said outlet ports, and a thermostat connected to said valves.

4. A thermostat unit comprising a casing having an inlet opening at one end, an outlet port at the other end, and two intermediate ports, of a thermostat valve mechanism controlling the outlet and intermediate ports.

5. A thermostat unit comprising a casing having an inlet opening at one end, an outlet port at the other end, and two intermediate ports forming together a second outlet, valves for the outlet ports, and a thermostat connected to said valves.

6. A thermostat valve unit comprising a casing having an inlet opening, an outlet opening, and a second outlet opening in its side, said side outlet opening having two ports communicating with the interior of the casing, valves for said outlet openings, and a thermostat connected to said valves.

7. A thermostat valve unit comprising a casing having an outlet opening with two ports therefor, valves for said ports, one opening against the flow of water and one opening with it, and a thermostat connected to said valves.

8. A thermostat valve unit comprising a casing having several spaced parallel ports, an expansible thermostat having one end secured to the body of the unit, a valve mechanism having valves for said ports, said mechanism being secured to the free end of said thermostat, and a guide for said valve mechanism.

9. A thermostat valve unit comprising a casing having several spaced parallel ports, an expansible thermostat having one end secured to the body of the unit, a valve mechanism having valves for said ports, said mechanism being secured to the free end of said thermostat, and having a guiding stem beyond the valves, and a guide in said unit coöperating with said guiding stem.

In testimony whereof I affix my signature.

FRANK J. DRUAR.