D'ORSAY McC. WHITE.

HYDROCARBON MOTOR.

APPLICATION FILED NOV. 24, 1916.

1,324,865.

Patented Dec. 16, 1919.

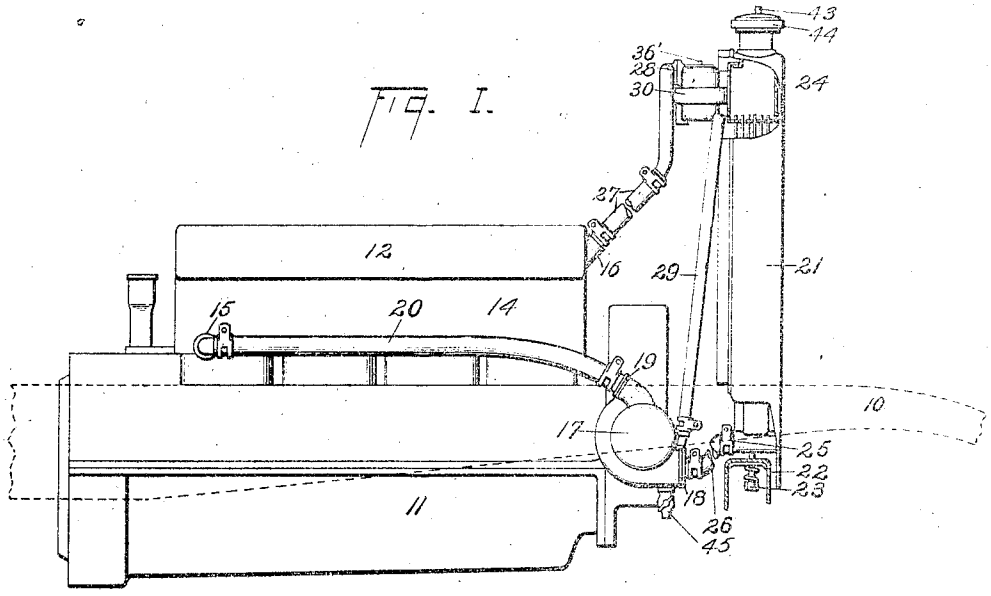


FIG. I.

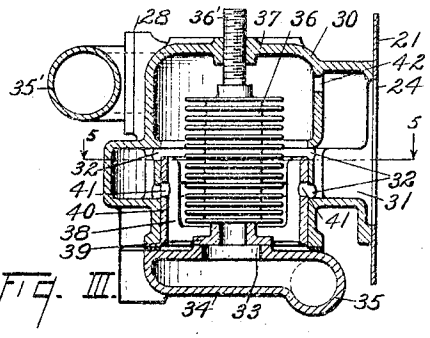


FIG. III.

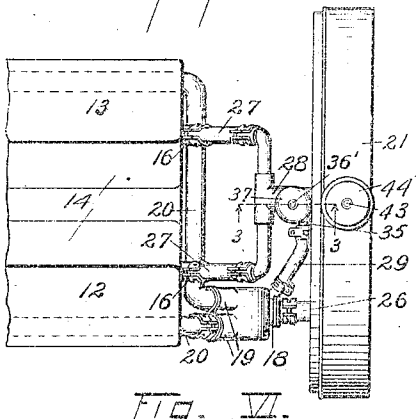


FIG. VI.

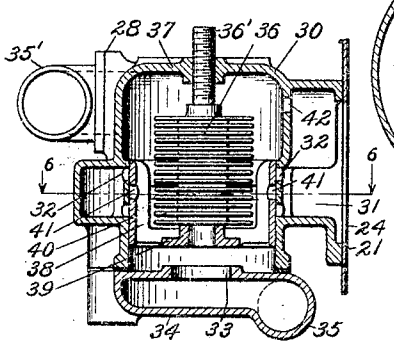


FIG. IV.

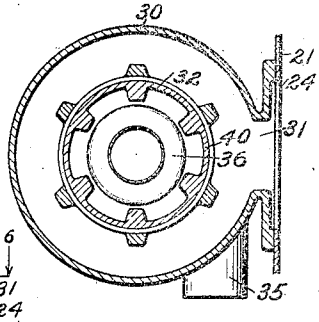
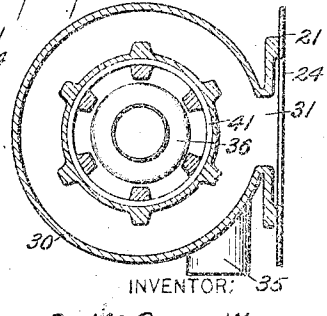


FIG. V.



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UNITED STATES PATENT OFFICE.

D'ORSAY McCALL WHITE, OF DETROIT, MICHIGAN, ASSIGNOR TO CADILLAC MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

HYDROCARBON-MOTOR.

1,324,865. Specification of Letters Patent. Patented Dec. 16, 1919.

Application filed November 24, 1916. Serial No. 133,185.

To all whom it may concern:

Be it known that I, D'ORSAY McCALL WHITE, a loyal subject of the King of England, 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 cooling systems especially adapted for use therewith.

One of the objects of this invention is to provide a cooling system, with improved means for controlling the temperature of the cooling medium, and for regulating its circulation.

Another object of this invention is to provide a hydrocarbon motor, having improved means for circulating the cooling medium through various jackets in independent parallel paths, with a common radiator and regulator for controlling the circulation through said paths.

Another object of my invention is to provide an improved regulator for circulating systems, and also an improved mounting and arrangement of such a regulator adapted to the cooling system of a hydrocarbon motor.

The system illustrated embodies a motor having its cylinders arranged in V relation, each jacket having independent circulating paths to and through it; a common regulator, radiator bypass, and connections complete the various circuits.

The various objects and novel features of this invention will clearly appear from the following description taken in connection with the accompanying drawings, which form a part of this specification, and in which:—

Figure 1 is a more or less diagrammatic side elevation, with portions broken away, of a motor vehicle power plant embodying this invention;

Fig. 2 is a fragmentary plan view of the construction shown in Fig. 1;

Fig. 3 is a vertical sectional view substantially on the line 3—3 of Fig. 2, showing the valve mechanism in one position;

Fig. 4 is a view similar to Fig. 3, with the valve in another position;

Fig. 5 is a transverse sectional view substantially on line 5—5 of Fig. 3; and

Fig. 6 is a transverse sectional view substantially on line 6—6 of Fig. 4.

Referring to the drawings, 10 illustrates one of a pair of frame side members on which may be suitably mounted a crank case 11 of a hydrocarbon power plant.

A pair of cylinder blocks 12 and 13 may be suitably arranged in V relation on the crank case 11. Each block is provided with a cooling jacket 14, having an inlet port 15 and an outlet port 16. A tandem pump mechanism 17, of any well known construction, may be mounted adjacent the front end of the motor and driven therefrom, as desired. The pump mechanism is provided with an inlet port 18, and a plurality of outlet ports 19. Each of these outlet ports is independently connected to a jacket inlet port 15, by a conduit 20.

A common radiator 21 for the jackets may be suitably mounted on a frame front cross member 22, as by bolts 23, the radiator being provided adjacent its upper end with an inlet port 24, and adjacent its lower end with an outlet port 25.

A flexible conduit 26 connects the radiator outlet port 25 with the pump inlet port 18. A pair of flexible conduits 27 connect the jacket outlet ports 16, with a common return 28, which is mounted on the radiator 21. A bypass 29, around the radiator, is arranged between the common return 28, and the pump mechanism 17, adjacent its inlet port 18.

A valve chamber 30, is suitably arranged or formed in the return 28. This valve chamber is provided with a lateral port 31 in register with the radiator inlet port 24. The chamber is also provided with valve ports 32, and with a port 33 in its lower detachable end wall 34. The upper end of the bypass 29, may be secured to the nipple 35, the interior of which is in constant communication with the chamber end port 33. The upper portion of the chamber is provided with a pair of inlet ports 35′, which are in constant communication with the jacket outlet conduits 27.

A thermostat 36 comprising a corrugated collapsible resilient tube, which may be

charged with any suitable thermo-sensitive liquid or vapor, may be secured to the upper end wall 37 of the chamber as by a threaded stem 36'.

A valve member 38 is suitably secured to the lower free end of the thermostat 36. This valve member is provided with an end portion 39, and a tubular upwardly extending or inturned tubular portion 40. The portion 40 has a plurality of ports 41 formed therein, adapted to coöperate with the ports 32 in the chamber. The tubular portion 40 of the valve member 38, is adapted to control the flow of the cooling medium through the chamber lateral port 31 by opening and closing the regulating ports 32, and the end portion 39 of the valve member is adapted to control the circulation of cooling medium through the chamber end port 33.

The operation of the preferred embodiment of this system will be understood from the foregoing description, to be as follows:

Assuming the motor and pump mechanism 17 to be started when the temperature of the cooling medium within the jackets 14 is below the desired limit, the thermostat 36 will contract, thereby raising the valve member 38 to the position illustrated in Fig. 4. It will be noted that the ports 41 are out of register with the ports 32, and the port 33 in the bottom of the chamber is unrestricted. With the valve mechanism in this position, the cooling medium will circulate from the pump mechanism 17 through the independent conduits 20, jackets 14, connecting conduits 27, common return 28 entering the valve chamber through ports 35', being discharged from the chamber through the lower end port 33, and returning to the pump mechanism through the bypass 29 around the radiator. Thus it will be seen that with the valve mechanism in this position, there will be no circulation through the radiator.

When the temperature of the cooling medium is raised by the heat generated within the cylinders to the desired upper limit, the thermostat 36 will be caused to expand, finally seating the end portion 39 of the valve member 38 over the port 33, and at the same time bringing the ports 41 into register with the chamber ports 32. With the valve mechanism in this position, the circulation between the pump mechanism and the inlet port 35' of the chamber, will remain the same as described in connection with the other position of the valve mechanism. However, on account of the fact that the port 33 is closed, and ports 32 are open, the cooling medium will be discharged from the chamber through these ports, the lateral port 31, the radiator inlet port 24, through the radiator to its outlet port 25, connection 26, and inlet port 18, to the pump mechanism 17.

It will be noted that a port 42 is formed in the upper part of the chamber 30 in constant communication with the interior thereof, and the radiator inlet port 24. This port, which is also in communication with the atmosphere, through the vent 43 in the radiator cap 44, prevents the formation of air or steam pockets within the system. It also permits the cooling medium to be drawn from the cooling system upon the opening of the drain cock 45, which is arranged at the lowermost portion of the pump mechanism 17, which is also the lowermost portion of the entire system.

While I have described and will specifically claim, what I deem to be a preferred embodiment of my invention, it will be, of course, obvious to those skilled in the art, that various modifications, changes and adaptations may be made without departing from the spirit and scope hereof.

I claim:

1. In an internal combustion engine, two cylinder blocks arranged radially relative to a common crank shaft, and having each a jacket through which a cooling liquid may be caused to flow; a radiator; two conduits of substantially equal liquid conveying capacity leading one from the upper portion of each of said jackets, and which conduits discharge into said radiator adjacent the upper end thereof; and two conduits of substantially equal liquid carrying capacity leading from adjacent the lower end of said radiator and discharging one into the lower portion of each of said jackets.

2. In a device of the class described, a chamber having an end and a lateral port; a thermostat located within said chamber and one end of which is secured to the wall thereof; and a tubular valve member secured to the opposite end of said thermostat and operated thereby, and having a port opening coöperating with said lateral port, and an end portion coöperating with said end port.

3. In an internal combustion engine, two cylinder blocks arranged radially relative to a common crank shaft, and having each a jacket through which a cooling liquid may be caused to flow; a radiator; two conduits of substantially equal liquid conveying capacity leading one from the upper portion of each of said jackets, and which conduits discharge into said radiator through a single radiator inlet port adjacent the upper end of said radiator; an outlet passage leading from a single radiator outlet port adjacent the lower end of said radiator, and which passage communicates with two conduits of substantially equal liquid carrying capacity and extending one to each of said jackets, and discharging thereinto adjacent their lower ends, and at points remote from the points at which said first men-

tioned conduits lead from said jackets; and a pump associated with said last mentioned conduits and adapted to cause a flow of liquid to occur therethrough and into said jackets.

4. In a device of the class described, a chamber having an inlet port, a laterally arranged outlet port, and an end outlet port; a thermostat located within said chamber and one end of which is anchored to an end wall thereof; a tubular valve member surrounding the free end of said thermostat and to which said free end is secured, said valve member having a side port opening coöperating with said lateral port, and an end portion coöperating with said end outlet port.

5. In a device of the class described, a chamber having an end outlet port, and a plurality of lateral outlet ports; a thermostat located within said chamber and one end of which is secured to an end wall thereof; and a tubular valve member secured to the free end of said thermostat and operated thereby and adapted to coöperate with said lateral ports to control the flow therethrough, said valve member having an end portion coöperating with the end outlet port aforesaid to control the flow therethrough.

6. In an internal combustion engine, the combination with a pair of cylinder jackets, means for independently circulating cooling medium to said jackets, a radiator, connections between each of said jackets and said radiator, and another connection between said radiator and said means, and a single bypass between said connections independently of the radiator, of thermo-sensitive means arranged in said first connection for controlling the relative circulation through said bypass and radiator, respectively.

7. In an internal combustion engine, the combination with a pair of cylinders, jackets therefor, means for independently circulating a cooling medium to and through said jackets, and a common radiator for said jackets having an inlet port and an outlet port, of means connecting the jackets with said radiator inlet port comprising a thermo controlled valve mechanism, a connection between said radiator outlet port and said circulating means, and a bypass connecting said valve mechanism with said outlet port independently of said radiator.

8. In an internal combustion engine, the combination with a pair of cylinder jackets, each having an inlet port and an outlet port, pump mechanisms, independent connections between each of said mechanisms and one of said inlet ports, a radiator having an inlet port and an outlet port, a common return for connecting said jacket outlet ports with said radiator inlet port, a connection between said radiator outlet port and said pump mechanisms, and a bypass connecting said return with said latter connection independently of said radiator, of a thermo controlled valve mechanism in said return adapted to control the circulation through said radiator.

9. In an internal combustion engine, the combination with a pair of cylinder jackets, each having an inlet port and an outlet port, pump mechanisms, independent connections between each of said mechanisms and one of said inlet ports, a radiator having an inlet port and an outlet port, a common return connecting said jacket outlet ports with said radiator inlet port, a connection between said radiator outlet port and said pump mechanisms, and a bypass connecting said return with said latter connection independently of said radiator, of a thermo controlled valve mechanism in said return adapted to control the relative circulation through said radiator and bypass respectively.

10. In an internal combustion engine, the combination with a pair of cylinder jackets, means for independently circulating cooling medium to and through said jackets, and a common radiator therefor having an inlet port and an outlet port, of a valve mechanism in said inlet port, a connection between said jackets and said mechanism, another connection between said outlet port and said means, a bypass around said radiator, and thermo-actuated means for controlling said valve mechanism.

11. In an internal combustion engine, the combination with a pair of cylinder jackets, means for providing independent parallel circulating paths to and through said jackets, a common radiator for said jackets having an inlet port and an outlet port, and a conduit for connecting said outlet port with said circulating means, of a connection between said jackets and said radiator inlet port comprising a valve chamber, and a bypass connecting said chamber with said circulating means, of a thermo controlled valve mechanism in said chamber for regulating the relative circulation through said radiator and bypass respectively.

12. In an internal combustion engine, the combination with a pair of cylinders arranged in V relation, each of said cylinders having a jacket provided with inlet port and an outlet port, a pump mechanism having an inlet port and a plurality of outlet ports, independent connections between each of said pump outlet ports and said jacket inlet ports, a common radiator for said jackets having an inlet port and an outlet port, and a common return between said jacket outlet ports and said radiator inlet port, said return comprising a chamber having inlet and outlet ports, a thermo controlled valve mechanism therein, a connec-

tion between said radiator inlet port and said chamber outlet port, and a bypass around said radiator connecting said return and said pump mechanism, said valve mechanism being adapted to control a relative circulation through said radiator and bypass respectively.

13. In an internal combustion engine, the combination of a pair of cylinders arranged in V relation, each cylinder having a jacket provided with an inlet port and an outlet port, a pump mechanism having an inlet port and a plurality of outlet ports, independent connections between each of said pump outlet ports and said jacket inlet ports, and a common radiator having an inlet port and an outlet port, of a common return between said jacket outlet ports and said radiator inlet port, means connecting said radiator outlet port with said pump inlet port, a bypass between said common return and said radiator outlet port independently of said radiator, said common return having a valve chamber therein, provided with an end port and a lateral port, a thermostat secured at one end to said chamber, and a valve member secured to the opposite end of said thermostat, said member having an end portion and a tubular portion, said portions being adapted to control said end and lateral ports respectively.

14. In an internal combustion engine, the combination of a pair of cylinders arranged in V relation, each cylinder having a jacket provided with an inlet port and an outlet port, a pump mechanism having an inlet port and a plurality of outlet ports, independent connections between each of said pump outlet ports and said jacket inlet ports, and a common radiator having an inlet port and an outlet port, a common return between said jacket outlet ports and said radiator inlet port, means connecting said radiator outlet port with said pump inlet port, a bypass between said common return and said radiator outlet port independently of said radiator, said common return having a valve chamber therein, provided with an end port and a lateral port, a thermostat secured at one end to said chamber, and a valve member secured to the opposite end of said thermostat, said member having an end portion and a tubular portion, said portions being adapted to control said end and lateral ports respectively, said chamber also having a port in constant communication with the interior thereof and the inlet port of said radiator respectively.

15. In an internal combustion engine, the combination with a pair of cylinders arranged in V relation, each cylinder having a jacket provided with an inlet port and an outlet port, pump mechanism and connections for independently circulating cooling medium to said inlet ports, a radiator having an inlet port and an outlet port, and means connecting said radiator outlet port with said pump mechanism, of a common return between said jacket outlet ports and said radiator inlet port, a bypass around said radiator, said common return having a lateral port connecting with said radiator inlet port, and having an end port connected with said bypass, a thermostat arranged within said chamber and having one end secured thereto, and a valve member secured to the opposite end of said thermostat, said valve member having a tubular portion and an end portion, said tubular portion being provided with means for controlling the flow of cooling medium through said lateral port, said end portion being adapted to control the flow of cooling medium through said bypass.

16. In an internal combustion engine, the combination with a pair of cylinders arranged in V relation, each cylinder having a jacket provided with an inlet port and an outlet port, pump mechanism and connections for independently circulating cooling medium to said inlet ports, a radiator having an inlet port and an outlet port, and means connecting said radiator outlet port with said pump mechanism, of a common return between said jacket outlet ports and said radiator inlet port, a bypass around said radiator, said common return having a lateral port connected with said radiator inlet port, and having a port arranged in its lower end wall, in communication with said bypass, a thermostat within said chamber and connected to the upper end of said chamber, a valve member secured to the lower end of said thermostat, said valve member having a tubular portion adapted to control said lateral port, and an end portion adapted to control said end port.

In testimony whereof I affix my signature.

D. McCALL WHITE.