J. G. VINCENT.

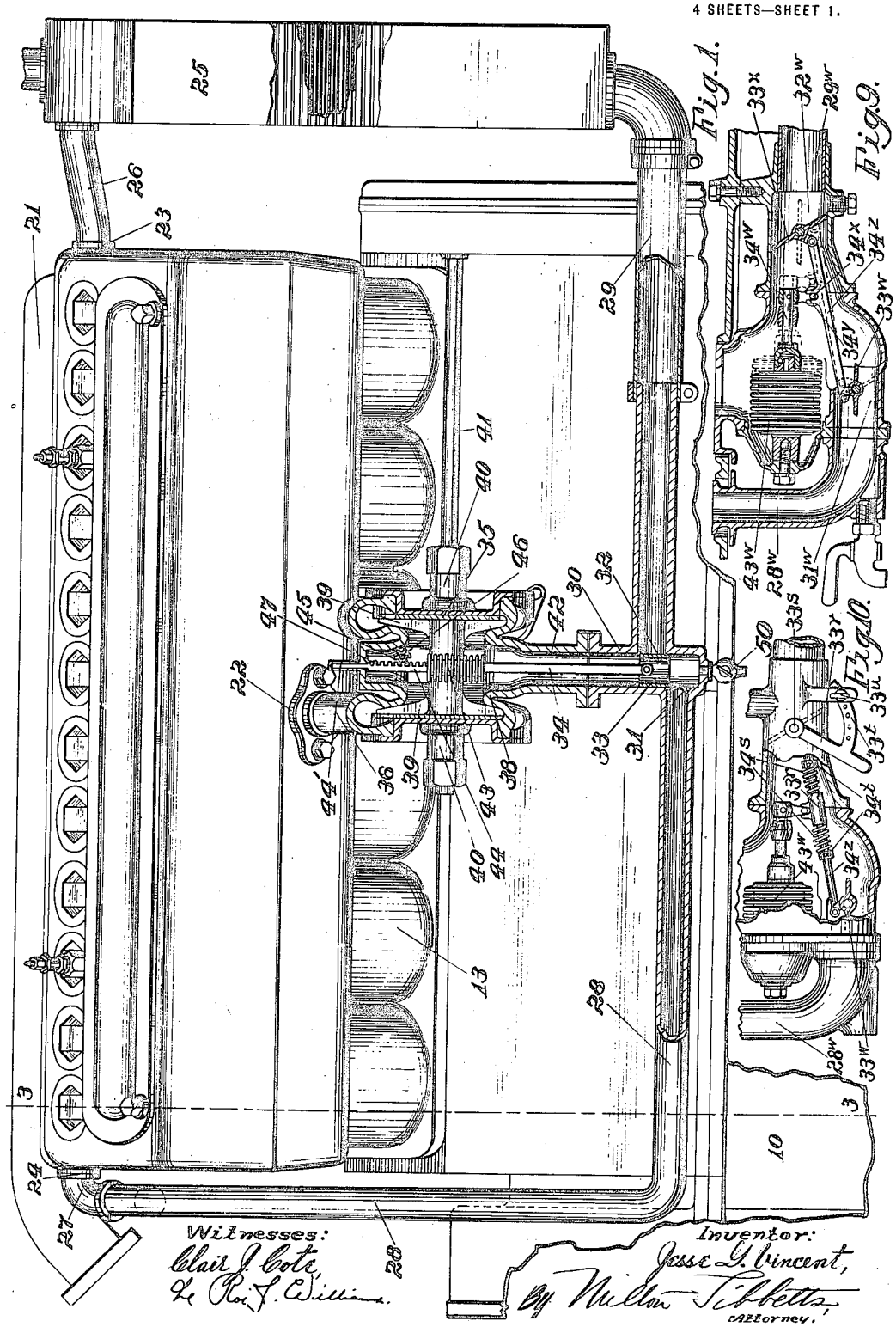
HYDROCARBON MOTOR.

APPLICATION FILED APR. 14, 1915.

1,305,035.

Patented May 27, 1919.

4 SHEETS—SHEET 1.



J. G. VINCENT.

HYDROCARBON MOTOR.

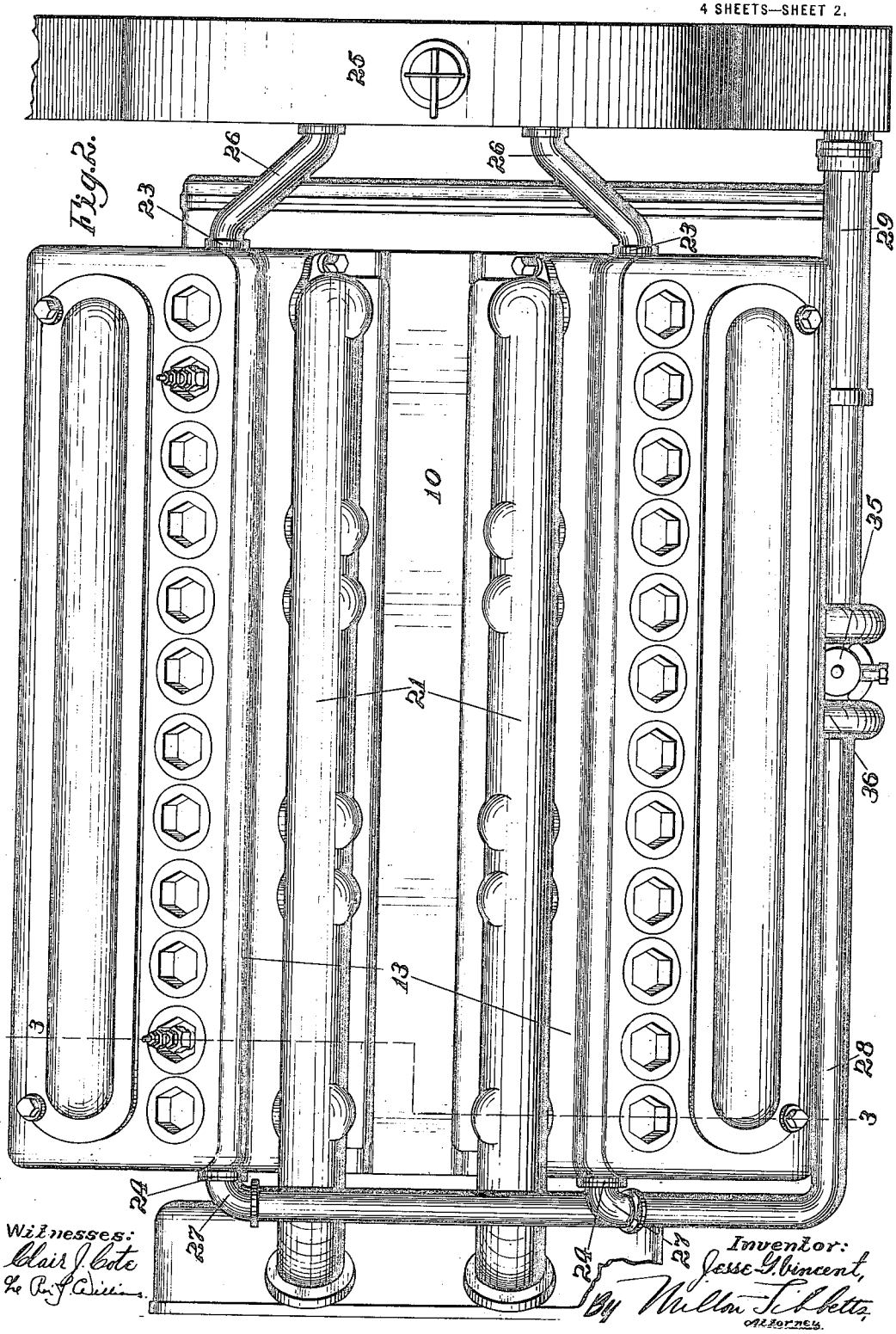
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

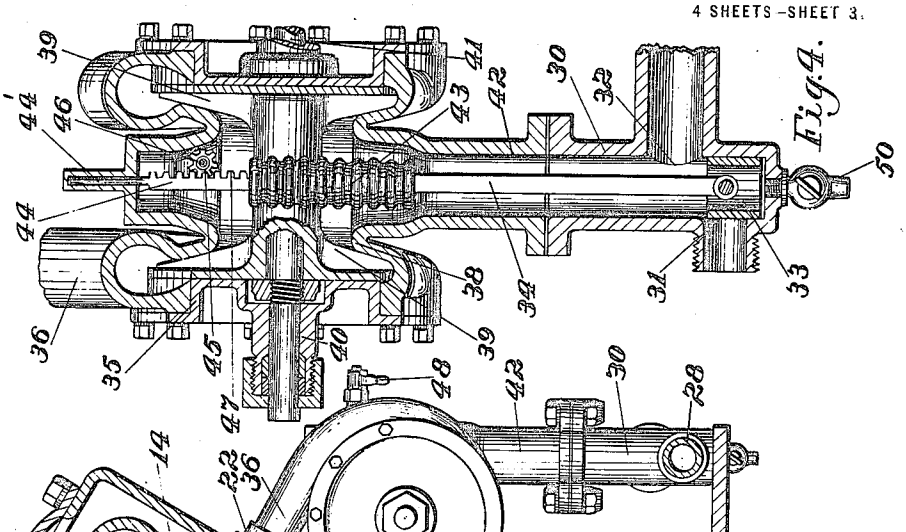


Fig. 4.

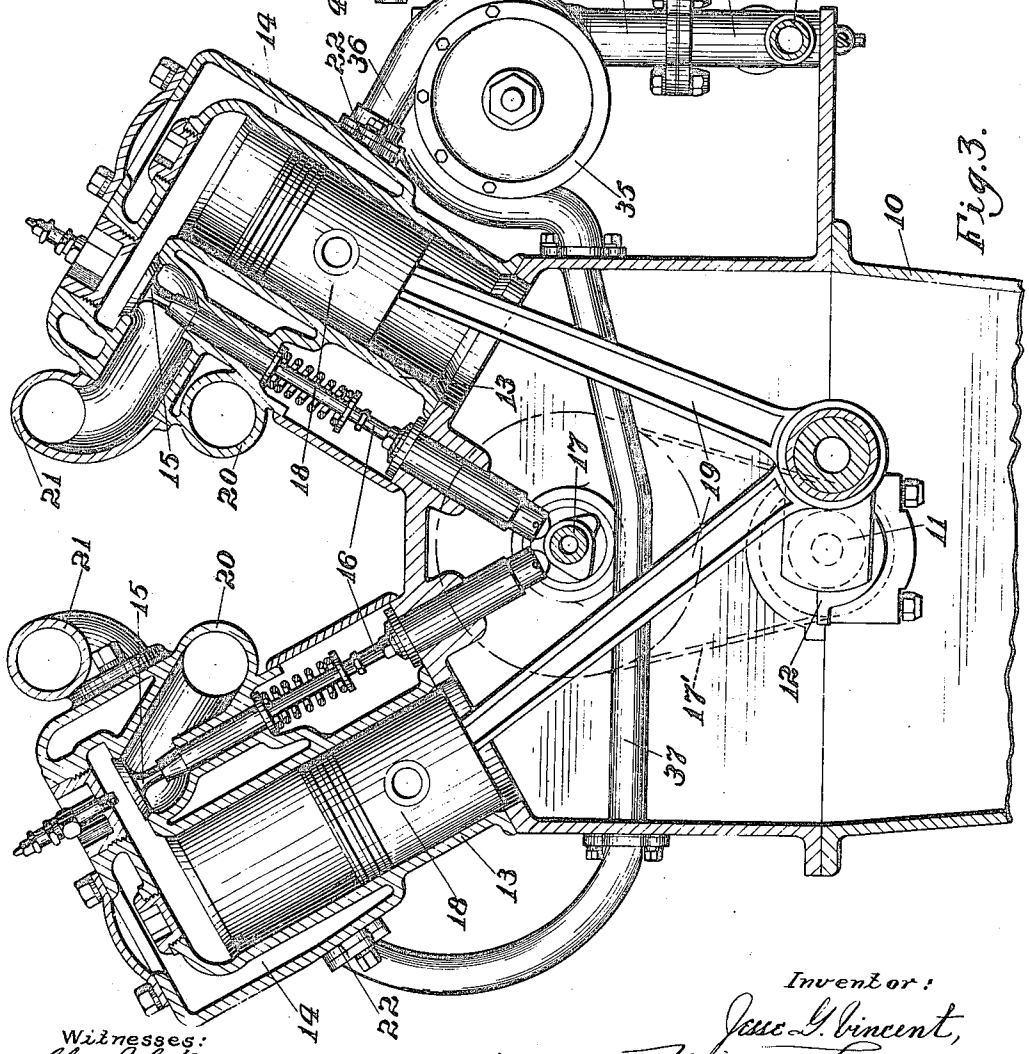


Fig. 3.

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4 SHEETS—SHEET 4.

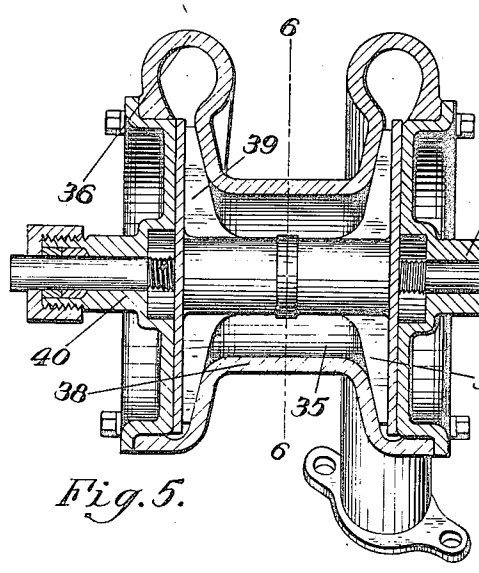


Fig. 5.

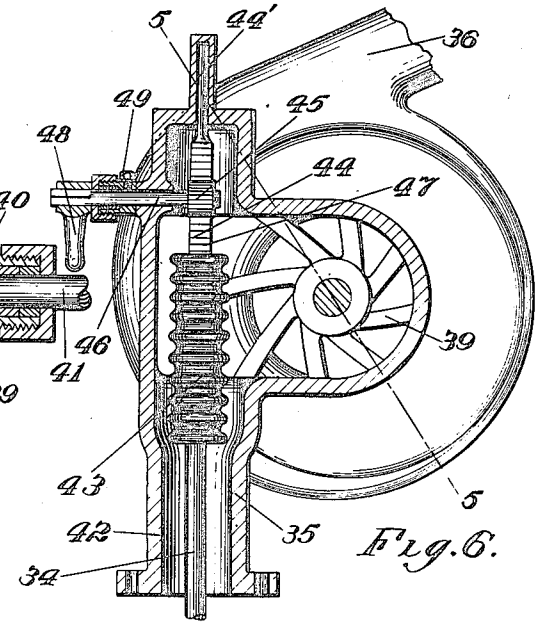


Fig. 6.

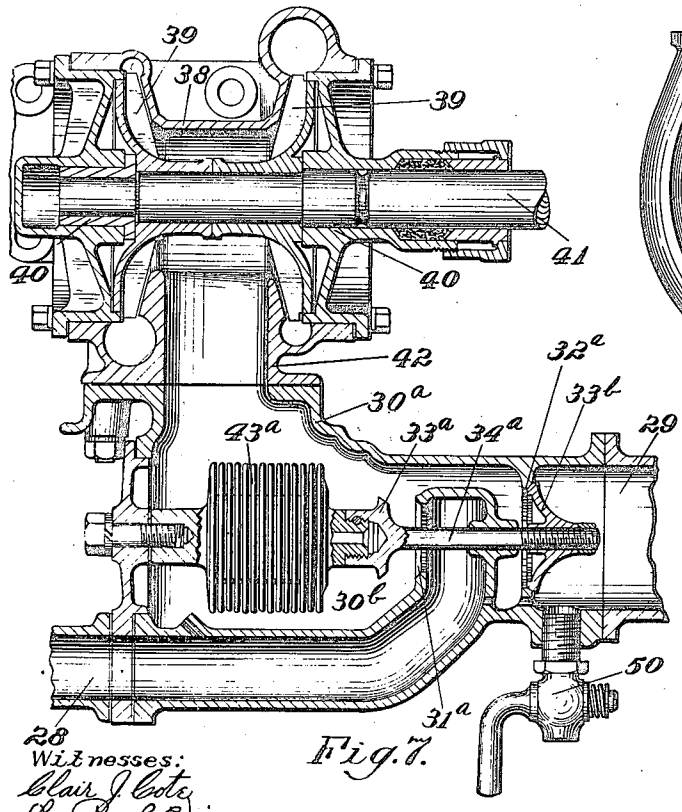


Fig. 7.

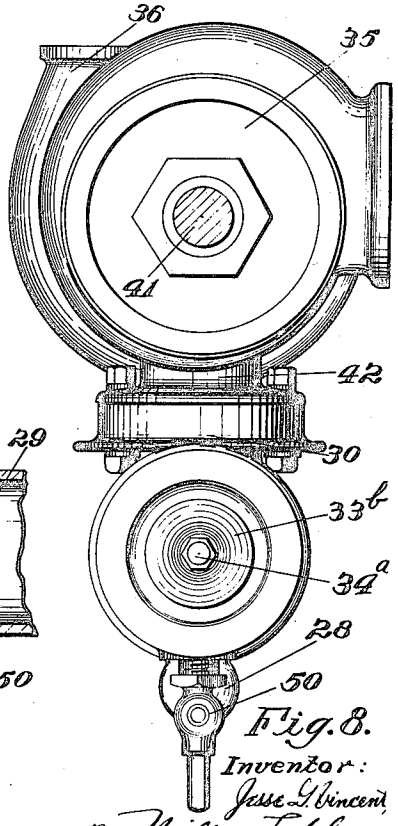


Fig. 8.

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UNITED STATES PATENT OFFICE.

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HYDROCARBON-MOTOR.

1,305,035. Specification of Letters Patent. Patented May 27, 1919.

Application filed April 14, 1915. Serial No. 21,314.

To all whom it may concern:

Be it known that I, JESSE G. VINCENT, 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 the cooling thereof. More specifically the invention relates to a water circulation system for the cylinder water jackets of a hydrocarbon motor in which the temperature of the water is automatically controlled by a thermostat or equivalent device. As an illustration of one embodiment of the invention a twelve cylinder motor having two cylinder blocks of six cylinders each arranged in V position is shown, but it will be understood that the invention is not limited to the exact form herein shown but may be modified in various ways without departing from the scope of the invention.

One of the objects of the invention is to provide a simple and practical automatic control for the temperature of the water of the cooling system of a hydrocarbon motor.

Another object of the invention is to provide a cooling system for a hydrocarbon motor having two cylinder blocks, in which the temperature of the water will be automatically controlled and will be uniform in the two cylinder blocks.

Another object of the invention is to provide a simple and novel pump mechanism and thermostat device for a hydrocarbon motor.

Another object of the invention is to provide a particularly advantageous and novel arrangement of conduits and water circulation elements of a hydrocarbon motor.

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

Figure 1 is a side elevation of a motor made in accordance with this invention, some of the parts being shown in section;

Fig. 2 is a plan view of the motor illustrated in Fig. 1;

Fig. 3 is a vertical transverse section substantially on the line 3—3 of Figs. 1 and 2;

Fig. 4 is an enlarged section through the thermostat chamber showing the parts in a different postion from that shown in Fig. 1;

Fig. 5 is a section through the pump mechanism taken longitudinally of the driving shaft, and substantially on the line 5—5 of Fig. 6;

Fig. 6 is a vertical section taken transversely of Figs. 1 and 5 substantially on the line 6—6 of Fig. 5;

Fig. 7 is a sectional view of another form of the pump and thermostat;

Fig. 8 is an end elevation of the pump and thermostat shown in Fig. 7;

Fig. 9 is a sectional view of another form of thermostat unit; and

Fig. 10 is similar to Fig. 9 but showing a modified form of valve connection.

Referring to the drawings, 10 represents the motor base or crank case, in which is mounted the crank shaft 11 in suitable bearings 12. A pair of cylinder blocks 13 are mounted upon and secured to the crank case with the cylinder axes of the respective blocks in V relation. In the form shown, the cylinders are arranged approximately 60 degrees apart, the motor shown being a 12 cylinder motor. Inlet and exhaust valves 15, of usual form, control the combustion space within the cylinders. The valves are operated by suitable push rods 16, which in turn are actuated by a cam shaft 17, common to both cylinder blocks and shown as arranged vertically above the crank shaft and driven thereby through chain mechanism 17′ or other suitable gearing. The usual piston 18 and connecting rod 19 are shown, and the intake pipes are represented at 20 and the exhaust pipes at 21.

Each of the cylinder blocks is provided with a water jacket 14 having an intake opening 22 arranged adjacent the middle of the block and preferably on the outer side thereof, as shown particularly in Fig. 3. It will be understood that the water jackets surrounding all of the cylinders of each block are inter-connected so that they form practically a single water jacket around the entire block of cylinders. Each block is provided with an outlet at either end, the front outlets indicated at 23 and the rear outlets at 24. Radiator means 25 are suitably mounted at the front end of the motor and conduits or pipes 26 connect the outlets 23 of the cylinder block water jackets with said radiator means 25. At the rear end of the motor there are branch pipes 27 which lead from the outlets 24 to a bypass pipe or

conduit 28. It will be understood that the radiator 25 may be of any suitable well-known construction adapted to cause a rapid radiation of the heat from the water passing downwardly through it. It is provided with an outlet pipe or conduit 29 which leads rearwardly to a conduit 30 with which the bypass pipe 28 also connects. Referring particularly to Figs. 1 and 4, it is seen that the port opening 31 of the pipe 28 into the conduit 30 is arranged just below the opening 32 of the pipe 29 into said conduit 30. These openings are controlled by a valve 33 which may be moved in the conduit 30 by means of its stem 34 to cover and uncover the ports 31 and 32 above referred to. In the position shown in Fig. 1, the port 32 is practically closed and the port 31 is open, it being understood that the water entering the conduit 30 through the port 31 will pass upwardly through the valve 33. In Fig. 4 the valve 33 is in its lower position closing the port 31 and leaving the port 32 wide open. In this latter position of the valve the bypass conduit 28 is thrown out of action and the radiator means is in operation.

Referring particularly to Figs. 1 and 3, it will be seen that a pump mechanism 35 is arranged between the conduit 30 and the intake openings 22 of the two cylinder blocks. A pipe 36 forms a communication between the pump mechanism 35 and the intake 22 of the right hand cylinder block in Fig. 3, and a pipe 37 leads from the pump mechanism through the crank case to the intake 22 of the left hand cylinder block of said figure.

In the form of the invention shown, the pump mechanism comprises a suitable double pump casing 38 in which a pair of spaced impellers 39 are rotatably mounted. These impellers are probably best shown in Figs. 5 and 6 as are also their bearings 40 in the casing. The impellers are suitably driven from the motor crank shaft by means of a shaft 41 extending forwardly from the pump casing to the gearing at the front end of the motor.

The pump casing 38, in addition to its connection with the cylinder blocks and crank case through the pipes 36 and 37 as above described, is also connected to the conduit 30 by the tubular part 42 which forms a continuation of said conduit 30. It will be seen, therefore, that the conduit 30 forms a common intake for both pumps. It will be seen also that one of the pumps discharges into the pipe 36 and the other into pipe 37, but as both of them take the water from the conduit 30, the water passing to the two cylinder blocks is of the same temperature.

Referring to Fig. 6, the pump casing is enlarged somewhat at one side to form a continuation of the intake conduit 30, and the valve stem 34 extends upwardly into this enlarged part and is connected to a thermostatic unit 43 of any suitable construction. It may be in the form of an expansible metal or, as shown in the form of a plaited tube containing an expansible liquid or gas whereby the valve 33 through its stem 34 is caused to change its position with relation to the openings 31 and 32 upon a change in temperature of the water passing through the conduit 30. A rack bar 44 is secured at the upper end of the unit 43, and its cylindrical upper end 44′ forms a guide for the unit 43 and valve stem 34. The thermostat unit and valve are adjusted or positioned by a small pinion 45 on a shaft 46 engaging the teeth 47 of said rack. Said shaft 46 may be moved by the handle 48 arranged on the outside of the casing and a locking screw 49 secures the shaft.

It will be understood that the thermostatic unit 43 contracts with the cold and expands with the heat. Therefore, the valve 33 being set in the position shown in Fig. 1 when the motor is cold, if the motor is started and the pump thereby operated, the cold water in the circulation system will pass through the water jackets of the cylinder blocks and out at the rear end through the pipes 27 and 28, through the port 31 and the valve 33, and flow over the thermostatic unit 43 and back to the pump. There will be practically no circulation from the front end of the cylinder blocks to the radiator because of the closure of the port 32 by the valve 33. As there is practically no radiation in the pipe 28, the water in the system will soon begin to heat up and thus expand the thermostat 43. As the thermostat expands, it moves the valve 33 downwardly and begins to cut off the port 31 and open the port 32. In the normal operation of the motor the valve will probably remain near its lowest position, but this will of course vary with the effectiveness of the radiator means 25 due to atmospheric changes. The positioning device 45, 46, is useful in varying the temperature degree at which it is desired to operate the motor. A drain cock 50 is provided adjacent the valve mechanism to assist in draining the water system.

Referring to the form of pump and thermostatic mechanism illustrated in Figs. 7 and 8, it will be seen that the pump is substantially the same as that illustrated in the other figures except that there is no enlargement for the thermostatic unit, the latter being arranged in a separate chamber below the pump. There is a similar tubular part 42 to which is attached a casing 30^a formed with a chamber 30^b in which is a horizontally arranged thermostatic unit 43^a connected to a valve stem 34^a having valve 33^a coöperating with port 31^a and valve 33^b coöperating with port 32^a. The pipes 28 and 29 communicating with ports 31^a and 32^a respectively are also shown in Fig. 7. For

the purpose of holding the valve 33^b closed as long as possible after starting the motor cold so that it will quickly heat up to normal temperature, the valves are so positioned that the water pressure against them tends to hold valve 33^a open and valve 33^b closed, thus by-passing the water until it is quite hot before the thermostat can act to expand and open the pipe leading from the radiator. Also, in the use of a thermostat which expands upon puncturing, the radiator port 32^a will be opened or left open as the case may be, automatically in case of an accident to the thermostat.

In Fig. 9 a thermostat 43^w is used similar to that of Fig. 7, but the valves are differently arranged. Where comparatively higher water pressures are used, or for other reasons, it is desirable to have the two valves balanced and interconnected. Thus the stem 34^w is operatively connected through pin 34^x and transverse slot 34^y with a link 34^z, which link forms an interconnection between a balanced butterfly valve 33^w controlling the passage 31^w in the pipe 28^w, and a similar valve 33^x controlling the passage 32^w in the pipe 29^w. This link is so connected to the valves that while one is opened the other is closed and vice versa, and the thermostat connection is such that, as shown in full lines in Fig. 9, when the system is cold or the active element contracted, the valve 33^w will be open and the valve 33^x closed, and vice versa. Since both valves are balanced the water pressure does not affect the operation of the thermostat.

In Fig. 10 the thermostat is so connected to the valves that the latter may be independently and manually operated. In case of failure of proper operation of the thermostat or for any other reason it is desirable at times to positively open the valve 33^x and hold it open to permit circulation of water through the radiator 25. Thus in Fig. 10 the connection from the element 43^w to the link 34^z is a yielding one, the slot 34^y being formed in a sleeve 34^r sliding on the link 34^z and arranged between springs 34^s and stops 34^t. It will be seen that the normal operation of the valves is the same as in Fig. 9, but they may be manually operated independently of the thermostat, one or the other of the springs 34^s yielding for the purpose. The valve is manually operated by a handle 33^r secured to its stem 33^s on the outside of the pipe 29^w and a segment 33^t permits of locking the valve in any desired position by means of the set screw 33^u.

Various other forms of the invention may be devised and will fall within the terms of the claims, and I do not intend that my invention shall be limited to the exact constructions shown, these being by way of illustration only.

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

1. In a hydrocarbon motor, in combination, a pair of water jacketed cylinder blocks arranged side by side, radiator means arranged at one end of the blocks and connected therewith, pump mechanism arranged between the ends of the blocks and supplying the jackets of both blocks, connections from the radiator means to the pump mechanism, and connections from the ends of the cylinder blocks remote from the radiator means to the pump mechanism.

2. In a hydrocarbon motor, in combination, a pair of water jacketed cylinder blocks arranged side by side, radiator means arranged at one end of the blocks and connected therewith, pump mechanism arranged between the ends of the blocks and supplying the jackets of both blocks, connections from the radiator means to the pump mechanism, connections from the ends of the cylinder blocks remote from the radiator means to the pump mechanism, and automatic means for controlling the circulation of water through the connections.

3. In a hydrocarbon motor, in combination, a water jacketed cylinder block, a pump and connections for feeding cooling water adjacent the middle of the block, and conduits leading from both ends of said block to the pump.

4. In a hydrocarbon motor, in combination, a water jacketed cylinder block, a pump and connections for feeding cooling water adjacent the middle of the block, conduits leading from both ends of said block to the pump, and a thermostat arranged to control the flow of water through said conduits.

5. In hydrocarbon motor, in combination, a water jacketed cylinder block, a pump and connections for feeding cooling water adjacent the middle of the block, a radiator, connections from one end of the cylinder block to the radiator, connections from the outlet end of the radiator to the pump, and a by-pass connection from the other end of said cylinder block to said pump.

6. In a hydrocarbon motor, in combination, a water jacketed cylinder block, a pump and connections for feeding cooling water adjacent the middle of the block, a radiator, connections from one end of the cylinder block to the radiator, connections from the outlet end of the radiator to the pump, a by-pass connection from the other end of said cylinder block to the pump, and a thermostat arranged to control the radiator outlet and by-pass connections.

7. In a liquid circulation system, in combination, a plurality of pumps, an intake conduit common to both said pumps, and a thermostat arranged in said conduit.

8. In a liquid circulation system, in combination, a plurality of pumps, an intake

conduit common to both said pumps, and having a plurality of supply ports, a valve controlling said ports, and a thermostat arranged in said conduit and connected to said valve.

9. Pumping means comprising a pump casing, a pair of spaced impellers in said casing, and a thermostat arranged between said impellers.

10. Pumping means comprising a pump casing, a pair of spaced impellers in said casing, and a thermostat arranged within the casing and between said impellers.

11. In a hydrocarbon motor, in combination, two separate water jackets, means including two separate pumps for feeding cooling water to said jackets in parallel, and a single thermostat for controlling the temperature of the water of both said jackets.

12. In a hydrocarbon motor, in combination, two separate water jackets, separate pumps for feeding cooling water to each of said jackets, a common intake for said pumps, and a thermostat arranged in said intake for controlling the temperature of the water of both said jackets.

13. In a hydrocarbon motor, including separated independently pumping elements, in combination, two separate water jackets, pump means, means for feeding cooling water separately from said pump means to each of said jackets, a common return from said jackets to the pump means, and a thermostat arranged in said return.

14. In a hydrocarbon motor, including two separated independently pumping elements, in combination, two separate water jackets, pump means, means for feeding cooling water separately from said pump means to each of said jackets, a common return from said jackets to the pump means, and a thermostat arranged in said return adjacent the pump means for regulating the temperature of the water of both said jackets.

15. In a hydrocarbon motor, in combination, two water jacketed cylinder blocks, pumps for separately feeding cooling water to the jackets of said blocks, a common inlet supplying cooling water to said pumps, a by-pass from both of said blocks to said inlet and an automatic valve controlling said by-pass.

16. In a hydrocarbon motor, in combination, two water jacketed cylinder blocks, pumps for separately feeding cooling water to the jackets of said blocks, a common inlet supplying cooling water to said pumps, a by-pass from both of said blocks to said inlet, a valve controlling said by-pass, and a thermostat in said inlet adjacent said pumps for controlling the position of said valve.

17. In a hydrocarbon motor, in combination, two water jacketed cylinder blocks, pumps for separately feeding cooling water to the jackets of said blocks, a common inlet supplying cooling water to said pumps, a by-pass from both of said blocks to said inlet, and a valve controlling said by-pass.

18. In a hydrocarbon motor, in combination, two water jacketed cylinder blocks, a plurality of pumps for separately feeding cooling water to the respective jackets of said blocks, a radiator means, conduits from the cylinder jackets to the radiator means, a conduit from the radiator means to the pumps, and a thermostat in said latter conduit controlling its delivery to the pumps.

19. In a hydrocarbon motor, in combination, two water jacketed cylinder blocks, pumps for separately feeding cooling water to the jackets of said blocks, a radiator means, conduits from the cylinder jackets to the radiator means, a conduit from the radiator means to the pumps, a by-pass from the cylinder jackets around the radiator means, and a thermostat on the receiving side of said pumps controlling the radiator outlet conduit and the by-pass.

20. In a hydrocarbon motor, in combination, a pair of water jacketed cylinder blocks arranged side by side, radiator means, water connections from the jackets to the radiator means, a plurality of pumps arranged at one side of the motor and connected to separately supply the jackets of said cylinder blocks, and a conduit connecting the radiator means with the pump mechanism.

21. In a hydrocarbon motor, in combination, a pair of water jacketed cylinder blocks arranged side by side, radiator means, water connections from the jackets to the radiator means, a plurality of pumps arranged at one side of the motor, a direct water connection from one pump to the adjacent cylinder block, a water connection from the other pump to the other cylinder block passing across the adjacent cylinder block, and a conduit connecting the radiator means with the pump mechanism.

22. In a liquid circulation system, in combination, a pump having a port and a valve for controlling said port, a thermostat for operating the valve, and means for moving the valve independently of the thermostat.

23. In a liquid circulation system, in combination, a pump having a port and a valve for controlling said port, a thermostat for operating the valve, and means on the outside of the pump casing and adapted to be manually operated for moving the valve independently of the thermostat.

24. In a liquid circulation system, in combination, a pump having a port and a valve for controlling said port, a thermostat for operating the valve, and means for moving and positively setting the valve independently of the thermostat.

25. In a liquid circulation system, in com-

bination, a pump having two passages connected therewith, a balanced valve for each of said passages, an interconnecting link between said valves, and a thermostat for operating said valves.

26. In a liquid circulation system, in combination, a pump having two passages connected therewith, a balanced valve for each of said passages, an interconnecting link between said valves, and a thermostat connected to said link to operate said valves.

27. In a liquid circulation system, in combination, a pump having two passages connected therewith, a balanced valve for each of said passages, an interconnecting link between said valves, a thermostat yieldingly connected to said link to normally operate said valves, and means for independently operating said valves.

28. In a liquid circulation system, in combination, a pump having two passages connected therewith, a balanced valve for each of said passages, an interconnecting link between said valves, a thermostat yieldingly connected to said link to normally operate said valves, and a manually operable handle arranged exteriorly of said passages for independently operating said valves.

29. In a liquid circulation system, in combination, a conduit having a port and a balanced valve irresponsive to the liquid pressure for controlling said port, and automatic means independent of the water pressure and responsive to the temperature of the liquid for operating the valve.

30. In a liquid circulation system, in combination, a pump having a port and a balanced valve irresponsive to the liquid pressure for controlling said port, a thermostat, and positive connections between said thermostat and the valve for operating the latter.

31. In a liquid circulation system, in combination, a pump having a port and a balanced butterfly valve irresponsive to liquid pressure for controlling said port, a thermostat, and positive connections between said thermostat and valve for operating the latter.

32. In a liquid circulation system, in combination, a pump having two passages connected therewith, valves for closing said passages, a valve stem on which both said valves are mounted and a thermostat for operating said valve stem and opening or closing said passages.

33. In a liquid circulation system, in combination, a pump having two passages connected therewith, a balanced butterfly valve for each of said passages, a rigid interconnecting link between said valves and a thermostat connected to said link to operate said valves.

34. In a liquid circulation system, in combination, a pump having two passages connected therewith, a balanced valve for each of said passages, a rigid interconnecting link betwen said valves and a thermostat for operating said valves.

In testimony whereof I affix my signature in the presence of two witnesses.

JESSE G. VINCENT.

Witnesses:
L. Roi J. Williams,
Clair J. Cote.