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C. R. SHORT

COOLING WATER DISTRIBUTION

Filed March 1, 1926

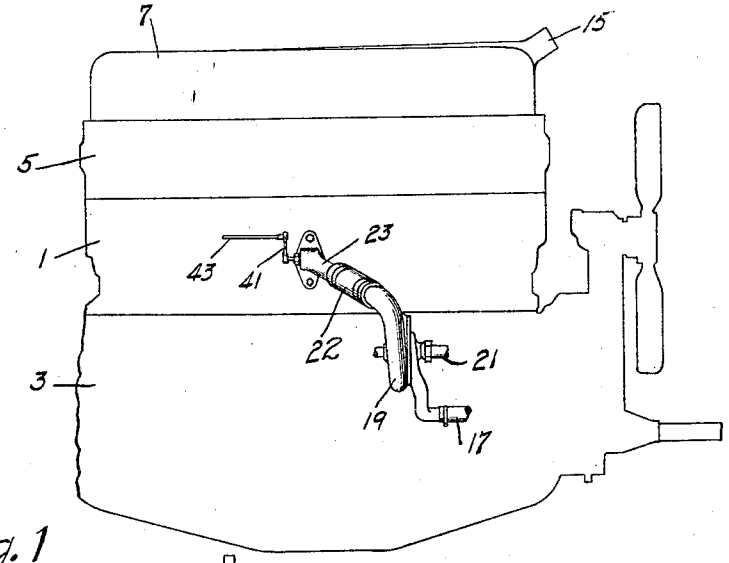


Fig. 1

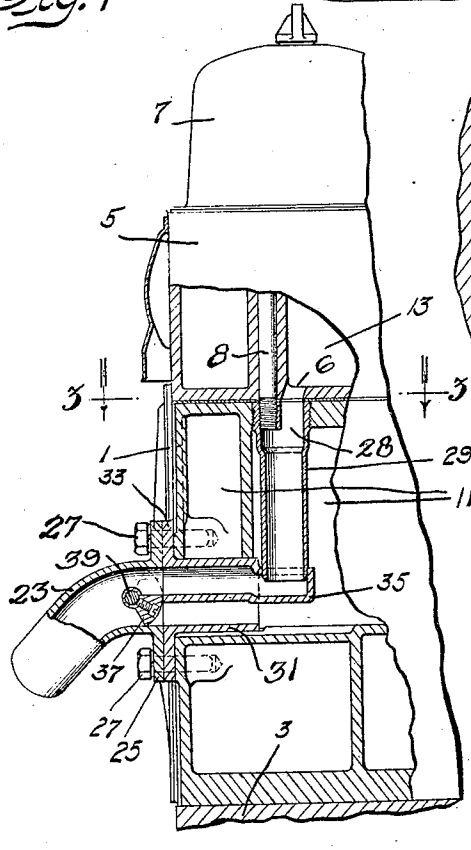


Fig. 2

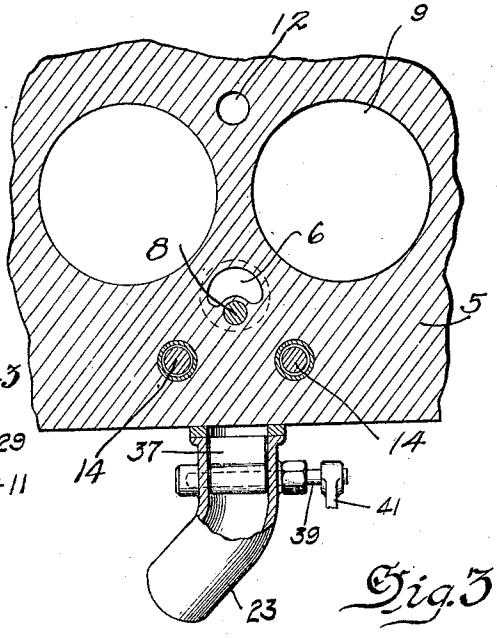


Fig. 3

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COOLING-WATER DISTRIBUTION.

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This invention relates to a cooling system intended primarily for internal combustion engines, although its usefulness is not limited thereto, other applications being obvious to those skilled in the art.

It is a fact generally known that a cooling system for explosive motors which is efficient when the motor is hot operates disadvantageously when the motor is cold by preventing it from attaining the temperature necessary for its most efficient operation.

It is an object of this invention to modify the conventional cooling system in such a way as to overcome this difficulty and to permit the motor to attain the aforesaid working temperature as quickly as possible. The modification of the conventional system aims also to accomplish this object by providing an efficient cooling agency when the motor is warm.

A further object attained is a reduction in the formation of water by condensation on the cold cylinder walls.

The above and other objects are accomplished by an arrangement whereby the cooling fluid impelled by a pump is either forced through the water jacket space around the cylinders and then to the cylinder head or impelled directly to the head. This is accomplished by a valve which directs the current in the channel desired. This valve may be manually operated or controlled by a thermostat or by other means.

For a full understanding of the invention, reference is made to the following description and drawing.

In the drawing:

Figure 1 is a side elevation of a motor.

Figure 2 is a vertical cross section through the motor.

Figure 3 is a horizontal section on line 3—3 of Figure 2.

Referring by reference characters to the drawing, numeral 1 represents a cylinder block mounted above a crank case 3. Above the cylinder block is shown a head 5. The particular motor used for illustration is one with over-head valves, therefore there is shown a rocker arm cover 7.

Within the cylinder block 1 there may be a plurality of cylinders, as shown at 9 in Figure 3. Within the block and in the space around cylinders, there is provided a water jacket 11. Within the head there is a water chamber 13 which communicates with the water jacket 11 by means of openings, such as 12, shown in Figure 3. From the chamber 13 extends a pipe 15. This pipe 15 is connected by means of a hose coupling with the usual radiator. These parts are not shown as they form no part of the invention. Numeral 14 designates push rods for valve operation.

As usual, from the lower portion of the radiator a hose coupling connects with a pipe 17 which is coupled to a water pump 19. This pump may be of any type and is operated in any convenient way, a shaft 21 being shown in the illustrated example in Figure 1. From the pump 19 a connection is made to the motor block by means of a hose coupling 22 and a fitting 23. This fitting 23 is secured to the cylinder block by means of flanges 25 held by bolts 27.

Communicating with the water jacket space of the cylinder block is a downwardly directed conduit 29. This conduit is shown as inserted into an opening in the top of the cylinder block. The conduit is threaded into the top of the block, its upper end having a threaded portion engaged by securing means 8, and an opening 28 communicating with space 13 in the head by means of a passage 6 in said head. Adjacent the connection of the fitting 23 with the cylinder block a second conduit 31 is provided. This conduit 31 has flanges 33 which engage the cylinder block beneath the flanges 25 and are secured by means of the same bolts 27. This conduit 31 extends into the cylinder block and is provided with a horizontal partition 35. The passage beneath this partition communicates with the water jacket space 11 as shown in Figure 2. The conduit space above the partition 35 is connected with the vertical conduit 29. By the arrangement as described, it will be seen that water flowing from the pump may flow beneath the partition through the cylinder water jacket 11 into the head chamber 13 by way of openings 12 and out through the pipe 15 to the radiator; or it may flow through the upper portion of the conduit through the vertical conduit 29, openings 28 and 6 and through the head chamber 13 without passing through the cylinder water jacket.

In order to control the course which the cooling fluid takes as it enters the conduit 31, there is provided in the fitting 23 a valve 37.

This valve is carried on a shaft 39 and controlled by an arm 41. It will be seen that by properly operating the arm 41 by link 43 or in any convenient way, the valve may open one passage and close the other or it may partly open each passage.

By means of the structure described above, it will be seen that the pump is in constant operation to impel a flow of cooling fluid through the cooling system; that the valve may be turned to the full line position of Figure 2 when the motor is cold; that when in this position the cooling fluid passes from the pump through the conduit 29 directly to the cylinder head, leaving undisturbed that portion of the fluid in the cylinder jacket. The motor under these circumstances heats up quickly and the fluid is being circulated only by the thermo-syphon system. After the motor is well warmed up the valve is turned to introduce the fluid into the cylinder jacket. It will be obvious that under such circumstances the current flows in the usual way from the pump around cylinder walls and out through the pipe 15. Furthermore, it will be readily seen that the valve may be positioned at any position between the full line and the dotted line positions of Figure 2 so that the distribution of the fluid may be determined as desired.

I claim:

1. In a motor comprising one or more cylinders and a head, a cooling system therefor including a pump, a water jacket about the cylinders, means within the cylinder block whereby the flow of fluid may be directed through the water jacket to the head or may be impelled directly to the head, by-passing the water jacket.

2. A motor cylinder, a water jacket thereabout, a head thereabove, means to circulate cooling fluid to the water jacket, a by-pass within the water jacket whereby the fluid may continue to circulate to the head without passing through the water jacket.

3. A motor having one or more cylinders surrounded by a water jacket, and a head over the cylinders, containing a chamber for cooling fluid, means to produce a current of cooling fluid around the cylinder walls, and means including a conduit within the water jacket to by-pass said fluid directly to said head.

4. A motor having a cylinder block containing one or more cylinders and spaces for cooling fluid, a head also provided with a space for cooling fluid, conduits secured within the block and arranged to afford communication for the cooling fluid either directly to the spaces in the cylinder head or to said spaces by way of the cooling fluid spaces in the cylinder block, and a valve for controlling the direction of the current.

5. A cooling system for motors having a water jacketed cylinder, and a water chambered head having communication therewith, means to force cooling fluid through the system, means within the water jacket space of the motor affording communication between said fluid forcing means and the chambered head directly, and also affording communication between said fluid forcing means and the head chamber by way of the cylinder water jacket, means to control the direction of the fluid current.

6. In a motor having a cylinder with a water jacket and a head from which cooling fluid is to flow to a radiator, a pump for circulating the cooling fluid, a conduit from said pump to said water jacket, a branch conduit from said pump to said head, and means to direct the flow of fluid through one or the other of said passages.

In testimony whereof I affix my signature.

CHARLES R. SHORT.