Aug. 9, 1949. M. J. KELSON, SR 2,478,489

COOLING SYSTEM FOR ENGINES

Filed Aug. 11, 1948

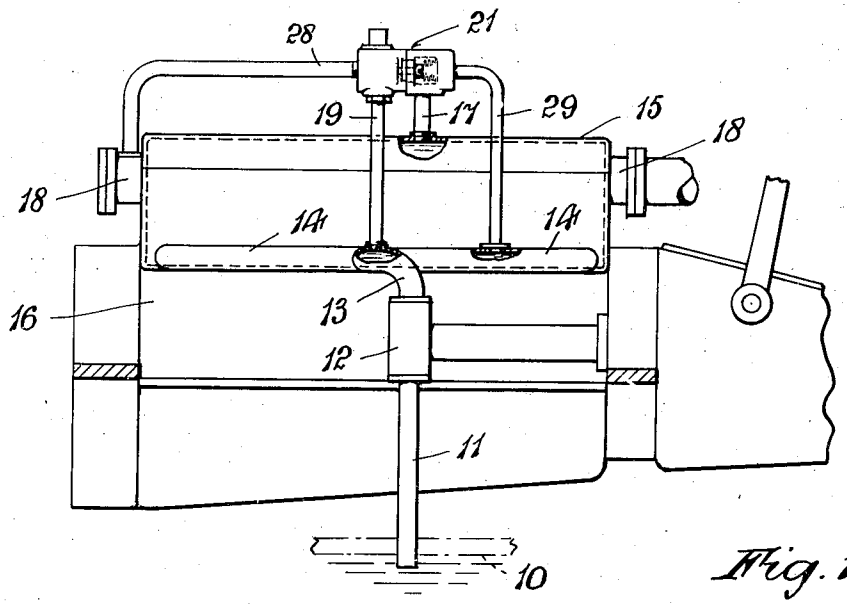


Fig. 1.

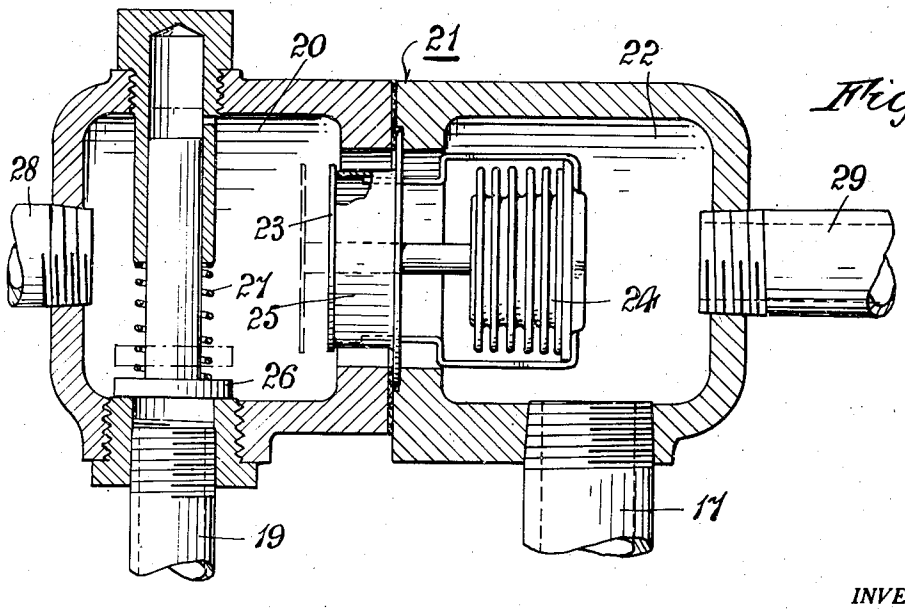


Fig. 2.

INVENTOR.
Malcolm J. Kelson, Sr.
BY
Stanley Lightfoot.

Patented Aug. 9, 1949 2,478,489

UNITED STATES PATENT OFFICE

2,478,489

COOLING SYSTEM FOR ENGINES

Malcolm J. Kelson, Sr., Detroit, Mich.

Application August 11, 1948, Serial No. 43,669

2 Claims. (Cl. 123—178)

1

This invention relates to means for improving the efficiency of the cooling system of a fluid-cooled internal combustion engine, and more particularly to the cooling system of a boat engine; having for its object to provide an arrangement of conduits and valves in association with the water pump and water jacket of an engine, the said valves being equipped to open and close under varying conditions of pressure and of water temperature in the jacket of the engine in a very desirable manner.

A further object is to provide in such a cooling system for automatic control of flow of water through the engine water jacket either by convection or by forced flow, determined by conditions of temperature in the jacketed water about the engine cylinders.

A still further object is to provide in such a system, in combination with a pump, means for selectively diverting water from the pump either through the water jacket of the engine or bypassing said water through a pre-loaded valve; with provision for establishing a convection cooling system through the water jacket of the engine when water from the pump is bypassed through said pre-loaded valve.

Still further objects or advantages additional or subsidiary to the aforesaid objects, or resulting from the construction or operation of the invention as it may be carried into effect, will become apparent as the said invention is hereinafter further disclosed.

In carrying the said invention into effect, I may adopt the novel construction and arrangement of parts hereinafter described, by way of example, having reference to the accompanying drawing, wherein:

Figure 1 is an elevation of a boat engine to which a cooling system embodying the said invention is applied; and

Figure 2 is a sectional enlarged detail view of the valved casing forming the heart of the improved system.

Similar characters of reference indicate similar parts in both figures of the drawing.

10 indicates the hull of a boat provided with a water intake pipe 11 leading to a pump 12 from which in turn a delivery pipe 13 leads through branches 14 to the lower part of the water jacket 15 of the boat engine 16. 17 indicates the outlet pipe from the upper end of the said water jacket and 18 is the exhaust pipe or manifold of the engine.

Extending upwardly as a branch from the pipe 13 is a pipe 19 which communicates with one

2

chamber 20 of a dual chambered casing, generally numbered 21, the second chamber 22 of which is separated from the first-mentioned chamber by a valve 23. This valve 23 is influenced by a thermostatic bellows device 24 to open and close relative to one end of a tubular valve casing 25 which, with the said valve 23, serves to partition the chambers 20 and 22 from one another when the valve is closed. The nature of such thermostatic valves and their usual equivalents is well known and will not be described in detail herein.

26 is a valve biased by the spring 27 to normally close off communication between the pipe 19 and the chamber 20; and 28 and 29 are outlet pipes leading from the chambers 20 and 22, respectively, the pipe 28 opening into the exhaust manifold 18 of the engine and the pipe 29 opening into the lower part of the water jacket of the engine by way of the branch 14 of the pump delivery pipe 13.

The valve 26 may be loaded to require a pressure of, say, ten pounds to open it and the thermostatic element 24 may be designed to open the partition valve 23 when subjected to a water temperature of, say 160° F.

It will now be seen that under conditions of a relatively cold engine where the temperature of water in the jacket is below 160° F., the pump 12 builds up a pressure in the pipe 19 above ten pounds and discharges its entire flow, by way of the chamber 20 and pipe 28, back into the exhaust manifold 18 of the engine from which the water will be discharged with the exhaust gases in the usual manner, the water serving to cool these gases in the exhaust pipe as is well known. At the same time a purely convection flow of water through the water jacket of the engine will take place by way of the pipe 17, the chamber 22, and pipe 29 leading back to the lower part of the water jacket.

However, when the temperature of the water in the water jacket reaches 160° F., the valve 23 will be opened by the action of the thermostatic means 24 permitting a free flow of water from the water jacket through pipe 17, the chambers 22 and 20 and the pipe 28 into the exhaust pipe 18 so that cool water from the pump is then passed directly through the water jacket by way of the branch 14 and pipe 17 through the then open valve casing 25 to meet undue tendencies of the jacket water to rise in temperature above that determined by the thermostatic means. This may or may not be accompanied by the complete closing of the valve 26 although it is desirable that this valve be so loaded that it will close under

such conditions when the partition valve **23** is open. It will be apparent that, when this valve **23** opens, pressure in the pipe **19** will fall due to the flow from the pump being free to pass through the water jacket of the engine, and it is proposed that the valve **23** be of such area of opening as to provide for free passage of the water thereby to the pipe **28**.

It will also be seen that the pipe **17** is at one time part of a convection flow system involving the pipe **29**, and at another time part of a forced flow system involving the pipe **28**, according to the temperature of the water in the water jacket of the engine. This should not be confused with the mere opening and closing or restricting of the flow system through the water jacket, as is commonly the case where thermostatic control systems are utilized in connection with the engine cooling systems.

The foregoing arrangement of valved passages and connections provides for a by-passing of the water from the pump through the valve **26** when conditions are such that a convection cooling system, involving the passage and repassage of a relatively small amount of water through the water jacket of the engine, is desired, the forced-flow cooling system coming into effect only when water temperature in the jacket reaches or approaches a point where such convection system would be no longer adequate for the proper cooling of the engine. This is all accomplished in a very simple but effective manner calling for an apparatus which may be cheaply and easily applied as an attachment to an existing engine with its resultant advantages.

This invention may be developed within the scope of the following claims without departing from the essential features of the said invention, and it is desired that the specification and drawing be read as being merely illustrative of a practical embodiment of the same and not in a strictly limiting sense.

What I claim is:

1. In an engine cooling system, in combination with a cylinder jacket and a pump, a circulatory pipe system connected to the top and bottom of said jacket to provide a convection fluid flow through said jacket, a discharge conduit from said pump, a check valve opening from said discharge conduit, a thermostatically valved conduit from the upper part of said first-mentioned circulating pipe system, said thermostatically valved conduit providing, when open, a flow outlet, and means for closing said check valve upon the opening of the thermostatic valve.

2. In an engine cooling system, in combination with a cylinder jacket and a pump, a circulatory pipe system connected to the top and bottom of said jacket to provide a convection fluid flow through said jacket, a discharge conduit from said pump, a check valve opening from said discharge conduit, a thermostatically valved conduit from the upper part of said first-mentioned circulating pipe system, said thermostatically valved conduit providing, when open, a flow outlet from said jacket to the discharge conduit beyond said check valve whereby to reduce the pressure differential on opposite sides of the check valve, and means sensitive to such pressure differential closing said check valve when reduced to a pre-determined extent.

MALCOLM J. KELSON, SR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,676,961	Muir	July 10, 1928
2,327,342	Drapeau	Aug. 24, 1943
2,401,646	Johnson	June 4, 1946