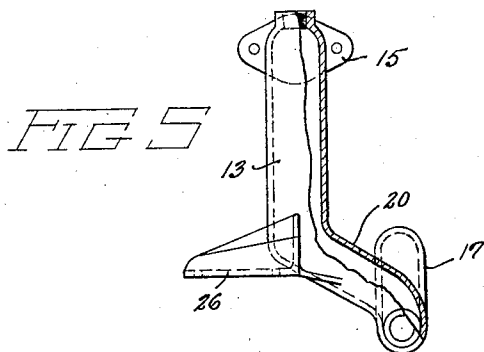
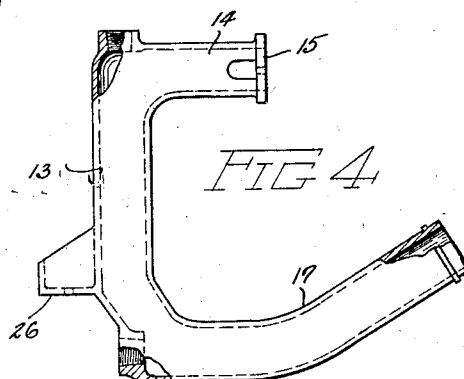
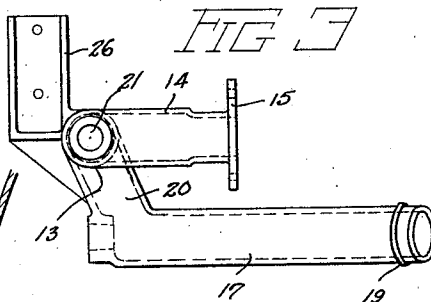
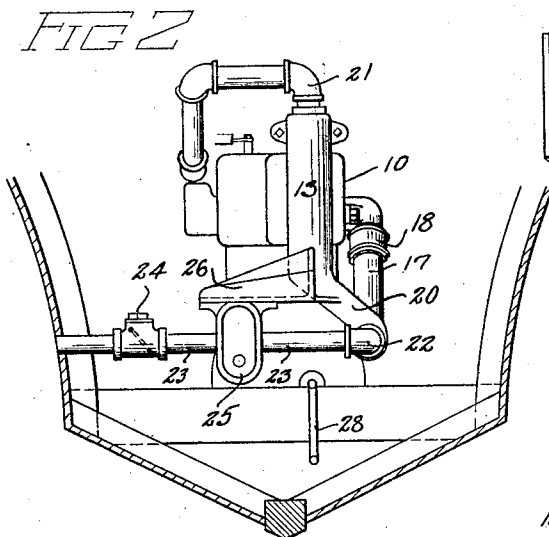
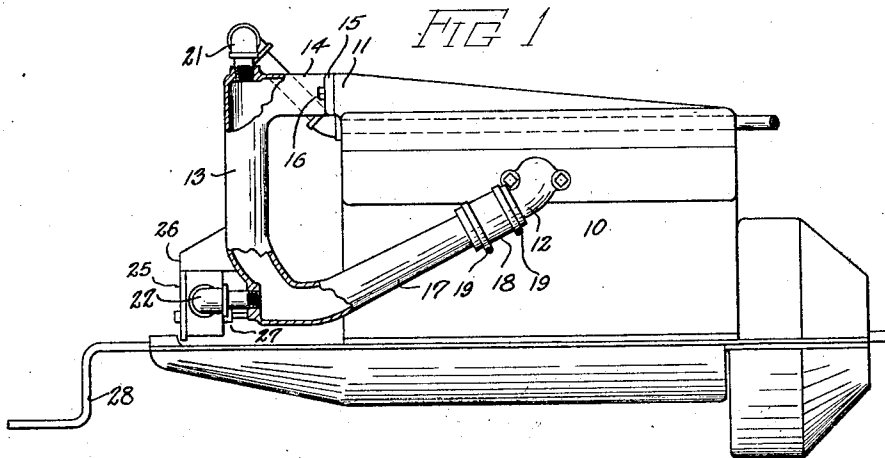


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C. C. HUBBELL
MARINE COOLING SYSTEM
Filed Feb. 26, 1923



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UNITED STATES PATENT OFFICE.

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MARINE COOLING SYSTEM.

Application filed February 26, 1923. Serial No. 621,332.

To all whom it may concern:

Be it known that I, CLINTON C. HUBBELL, a citizen of the United States, residing at Norwalk, county of Fairfield, State of Connecticut, have invented a new and useful Marine Cooling System, of which the following is a specification.

This invention relates to a cooling system for internal combustion engines and especially to an attachment which may be applied to an automobile engine to adapt the same for use in driving a boat.

It is also an object of the invention to provide a device of this character which will be very simple in construction and thus may be manufactured at low cost, one which may be quickly and easily applied to the engine by means of connections already provided thereon, and which will be efficient and reliable in operation.

With the foregoing and other objects in view I have devised the construction illustrated in the accompanying drawing in which:

Fig. 1 is a side elevation of an engine showing my cooling device applied thereto.

Fig. 2 is a transverse section through a portion of a hull of a boat, the engine and cooling attachment being shown in elevation and as they would appear looking from the left Fig. 1.

Fig. 3 is a top plan view of the cooling attachment removed from the engine.

Fig. 4 is a side elevation thereof, and

Fig. 5 is a front view thereof, a portion of the wall being broken away.

This device is especially designed for adapting an automobile engine for use as a marine engine, although, of course, it is not limited to use for this purpose, but the principle thereof may be applied to the regular types of marine engines. In the drawing the engine is indicated in outline at 10, and I have shown a common and well known form of four cylinder automobile engine. Of course when used in an automobile the engine is cooled by a flow of water thereto from an air-cooled radiator, the connection from the engine to the upper part of the radiator being attached to the outlet 11 on the cylinder head whereby the hot water flows from the engine to the radiator, and the bottom of the radiator being connected to the engine at the inlet 12 to the cylinder block. In applying this engine for marine use the radiator is omitted and

I have devised an attachment, for causing circulation of cooling water to the engine jackets, which may be attached to the engine at the outlet and inlet connections 11 and 12 so that no machining operations of any kind are required on the engine.

The attachment comprises an upright manifold 13 which has a laterally extending arm 14 at its upper end provided with a flange 15 through which screws or bolts 16 may be passed whereby this arm may be secured to the outlet 11. Leading from the lower portion of the manifold to another arm 17, preferably upwardly inclined as shown, and adapted to be connected at its free end to the inlet 12. It is adapted to be connected to this inlet by the same connecting means which was employed to connect the outlet from the radiator when the engine was used as an automobile engine, that is by means of a piece of hose 18, clamped about the arms 17 and inlet 12 by suitable clamping means 19. As the inlet 12 is on one side of the engine the lower portion of the manifold is offset somewhat as shown at 20 to allow placing of the manifold in alignment with the outlet 11, and to allow the arm 17 to extend substantially parallel with the engine.

Leading from the upper portion of the manifold preferably from the top thereof, and in alignment with the upright portion of the manifold, is an overflow pipe 21 for leading the hot cooling water to a place of discharge, as through the side or stern of the boat. Connected to the lower portion of the manifold and directed toward the entrance of the lower arm 17, and preferably in substantial alignment therewith, is an inlet 22 for the cold water supply, and connected with this inlet is a supply pipe 23 leading through a wall of the boat. A non-return or check valve 24 is preferably provided in this pipe between its inlet end and a pump 25. This pump may be of various types but is preferably a positively acting pump, and forces water from the outside of the boat through the pipe 23 to the manifold. The pump may be mounted in various ways, but I preferably provide a supporting bracket 26 therefor, cast in one piece with the manifold, the base of the pump being bolted to this bracket. It may be driven by any suitable means but it is preferably directly connected to the cam shaft of the engine by a flexible coupling

27. As the cam shaft rotates at exactly one-half the speed of the crank shaft of the engine, this speed is more efficient for pump operation than would be the speed of the crank shaft. I have indicated at 28 merely diagrammatically a starting crank for the motor.

The operation is as follows:

When the engine is running the cam shaft operates the pump which forces water through the pipe 23 and inlet at 22 into the lower portion of the manifold. Here the stream divides with part of it passing along the inclined arm 17 through the inlet to the cylinder jacket the rest passing up through the upright portion 13 of the manifold where it meets the hot water from the cylinder head and overflows with the same through pipe 21. The proportion of this water which enters the cylinder block depends on the temperature of the cylinders. The hotter the cylinders the greater will be the flow of water thereto due to the tendency of the heated water to rise. When the engine is first started the cylinders are cold and the pump is operated slowly and therefore the greater portion of the water passes directly through the upright portion 13 to the overflow as the resistance of this upright to flow of water therethrough is much less than it is through the cylinder jackets. As the engine warms up more water flows through the jackets due to the increased heating effect which flow will be assisted by the inflow of cold water through the inlet 22 as it is directed toward the inlet to arm 17. As the engine speeds up and the heating increases the speed of the pump is proportionately increased and the combined action of this inflow and the thermosyphonic action of the heated cylinders will cause more and more water to flow through the cylinder jackets. Thus the cylinders are never chilled due to a deluge of cold water nor can they become overheated due to a lack of water. Thus with my device the inflow of cold water to the manifold and the flow of water from this manifold to the engine jackets depends upon the speed of the engine and the temperature of the engine cylinders, more cold water flowing through them when speed and temperature are high and a greater cooling effect is needed, and very little when the engine is barely turning over, and thus a small cooling effect is required. The regulation of this cooling device is therefore practically automatic.

As the manifold is very simple in construction it may be made in a one piece casting. It may also be attached to the engine by the means which was formerly employed to connect the engine to a cooling radiator, and thus no machining operations are required on the engine, and it quickly and easily converts an automobile engine

into a marine motor. As the bracket for supporting the pump is in one piece with the manifold the pump is very rigidly supported and may be directly connected to the cam shaft by a flexible coupling, thus no gears, sprockets, belt, and so forth, are required.

Having thus set forth the nature of my invention what I claim is:

1. In a cooling system for an internal combustion engine having a water outlet from the cylinder head and a water inlet to the cylinder block, the combination therewith of an upright manifold of sufficient capacity to form a water storage space and connected at its upper part to said outlet and at its lower part to said inlet, a water inlet connection to said manifold adjacent the lower end thereof and directed toward the entrance to the connection to the inlet to the cylinder block, a pipe leading from a source of supply to the water inlet to the manifold, a pump in said pipe, and an overflow pipe leading from the upper part of the manifold.

2. In a cooling means for an internal combustion engine having a water inlet to and a water outlet from the cylinder jacket, an upright manifold of sufficient capacity to form a water storage space and connected at its upper and lower ends to said outlet and inlet respectively, a connection from a source of water supply to the lower portion of said manifold and directed toward the entrance to the connection to the water inlet to the cylinder jacket, an overflow leading from the upper part of the manifold, a pump in the said supply connection, and a driving connection from the engine to the pump.

3. In a cooling means for an internal combustion engine having a water inlet to and a water outlet from the cylinder jacket, an upright manifold of sufficient capacity to form a water storage space, a connection from the upper portion of the manifold to the outlet from the cylinder jacket, an upwardly inclined connection from the lower portion of the manifold to the inlet to the cylinder jacket, a connection from a source of water supply to the lower part of said manifold and in substantial alignment with the entrance to said inclined connection, a pump in said supply connection for forcing water therethrough to the manifold, a driving connection from the engine to the pump, and an overflow pipe leading from the upper portion of the manifold.

4. In a device of the character described the combination of an internal combustion engine having an inlet to and an outlet from the water chamber of the cylinder block, of an upright manifold of sufficient capacity to form a water storage space and comprising a single casting having an inlet at its upper

end connected to said outlet, an outlet at the lower end of the manifold connected to the inlet to the cylinder block, and a bracket for supporting a pump, a pump mounted on said bracket, driving connection from the engine to the pump, a pipe leading from a source of supply to said pump, a connection from the pump to the lower portion of the manifold, and an overflow connection from the upper part of the manifold.

5. In a cooling means for an internal combustion engine having a water inlet to and a water outlet from the cylinder jacket, an upright manifold of sufficient capacity to form a water storage space and having a substantially horizontal extension at its upper end connected to said outlet and a connection leading substantially horizontally from its lower end connected to said inlet, an overflow connection leading substantially vertically from the upper end of said manifold, an inlet connection for cold water at the lower end of said manifold and directed substantially horizontally toward the inlet to the connection leading to the cylinder jacket, and a pump connected to said cold water inlet.

6. An article of manufacture comprising a single casting including an upright mani-

fold of sufficient capacity to form a water storage space and having lateral extensions at the upper and lower ends thereof adapted for connection with the outlet leading from an engine cylinder jacket and an inlet to said jacket respectively, an overflow connection leading from the upper part of said manifold, and an inlet connection to the lower part of said manifold and directed toward the inlet to the extension at the lower part of said manifold.

7. An article of manufacture comprising a single casting including an upright manifold having lateral extensions at the upper and lower ends thereof adapted for connection with the outlet leading from an engine cylinder jacket and an inlet to said jacket respectively, the lower portion of said manifold being offset to place the lower extension in a plane positioned laterally of the plane of the upper extension, an integral bracket extending laterally from said manifold in the opposite direction from said offset and adapted to support a pump, an overflow leading from the upper portion of the manifold, and an inlet at the lower portion of said manifold.

In testimony whereof I affix my signature.
CLINTON C. HUBBELL.