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COOLING SYSTEM FOR MARINE MOTORS

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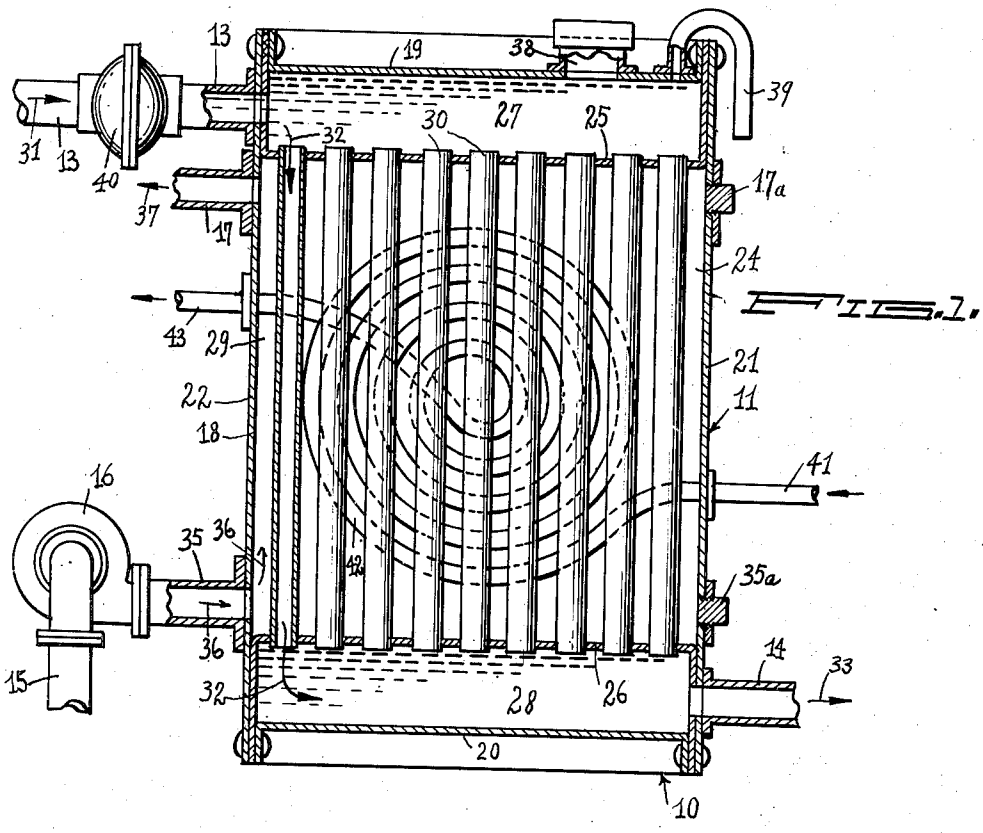


FIG. 1.

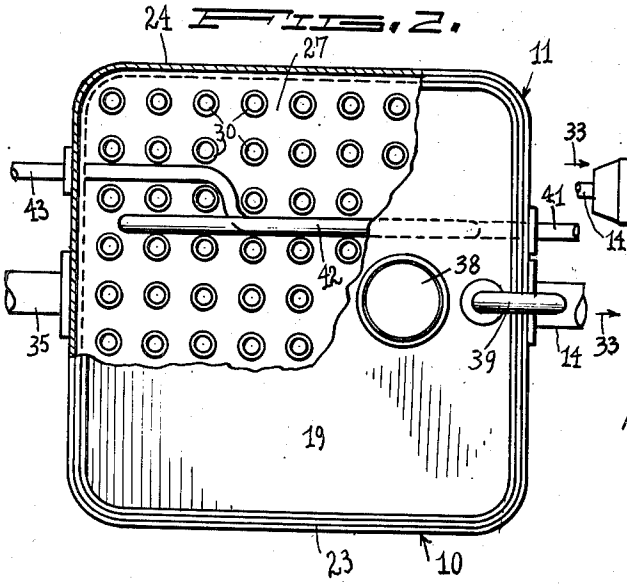


FIG. 2.

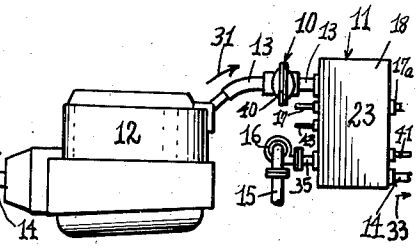


FIG. 3.

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COOLING SYSTEM FOR MARINE MOTORS

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2 Claims. (Cl. 257—224)

1

Our invention relates to marine motors, and has for its main object to provide a cooling system for such motors which will be more efficient than the cooling systems now in use.

Another object of our invention is to avoid cooling the marine motor directly by sea water, but still make use of the ready sea water for cooling purposes, indirectly. In our novel system, the motor cooling will be done by fresh water, without the need of replacing the same, by circulating it through our cooling device, and the fresh cooling water of the engine will be cooled by sea water, which will be continuously replaced. At present such marine motors are cooled by sea water pumped through cooling jackets of the motor, with numerous drawbacks, and causing injury to the motor and its operation.

Other objects of our invention will be apparent as the specification of the same proceeds, and, among others, we may mention: to provide a cooling device and system, as indicated hereinbefore, which will be simple in construction, inexpensive to manufacture, easily installed in a boat, and adapted to be used in combination with existing motors, making use of the pump of the motor, or the pump usually provided in such boats.

In the drawings forming a part of this specification and accompanying the same:

Fig. 1 is a vertical, sectional view of our cooling device for marine motors;

Fig. 2 is a plan view thereof, partly in section, and

Fig. 3 is a diagrammatical view of the connection of our device with the motor.

Referring now to the drawings more in detail, by characters of reference, the numeral 10 indicates our cooling system and arrangement for marine motors, in general, incorporating our cooling device proper 11 connected to the motor, generally indicated by the numeral 12, by an intake pipe line 13 for the cooling water of the motor to our device, and a return pipe line 14 indicated in a broken, fragmentary manner, for the water cooled in our device 11, as will be more fully explained presently.

A second pipe line 15 is also indicated with a pump 16 provided for drawing cool salt water through our device, the same leaving the device as at 17, to be returned to the sea after having cooled the fresh cooling water of the motor.

The cooler proper 11 of our system consists of a casing, or container 18 of any appropriate construction and shape, the one shown in the device being rectangular and having a top 19, bottom 20, right hand side wall 21 and left hand side

2

wall 22, as well as front and rear walls 23 and 24, respectively. An upper partition wall 25 is secured across the casing or container 18 at a comparatively short distance from the top 19, and a similarly placed transverse partition wall 26 is arranged near the bottom wall 20, whereby comparatively small upper and lower compartments 27 and 28 are formed, and a much larger main or central compartment 29, defined by said transverse partition walls 25 and 26. A plurality of pipes 30 are arranged between the two partition walls, communicating at the top with the upper compartment 27 and at the bottom with the lower compartment 28.

The hot cooling water of the motor will be conducted into our cooling device proper through the pipe line 13, as mentioned hereinbefore, and as indicated by the arrow 31, and will enter into the upper compartment 27, its movement being caused by the usual cooling water pump provided with all internal combustion marine engines. The fresh water, heated by the operation of the motor, will descend, from the upper compartment 27 into the lower one 28 through the tubes 30, as indicated by the arrows 32. It will be cooled in said tubes, as will be described presently, and will leave the cooler proper 11 by the pipe line 14 in a cooled condition to be returned to the engine, as indicated by the arrows 33.

To cool the engine cooling water in the tubes 30, cold sea water will be pumped and circulated around said tubes in the large central compartment 29. For this purpose a pipe 15 is provided going down into the water adjacent to the boat, as will be understood. A pump 16 causes cold sea water to be drawn by the pipe 15, and to be pressed into the central compartment 29, through the pipe 35, and as indicated by the arrow 36, the cold sea water will fill the compartment 29, will pass around the tubes 30, and will leave through the pipe line 17, as indicated by the arrow 37, to be returned to the sea.

The use and operation of our device will be understood from the earlier remarks and from the herein description of the drawings. The engine will be cooled by fresh water, being circulated through the cooling jackets of the cylinders through a pump provided with such engines. (Not shown.) The heated water from the motor will enter the casing, as described hereinbefore, pass through the same from the upper compartment to the lower one, by the plurality of tubes 30. The cold sea water will be drawn by the pump 16, provided with our device. In many cases, a pump is already provided with the boat and can be used instead of our pump 16, as will

be understood by those versed in this art. The cold sea water will pass through the central compartment 29 between the tubes 30 whereby the fresh engine water will be cooled. The salt water will return to the sea through the pipe 17, and the cold fresh water will return to the engine through the pipe 14.

A normally closed filler opening 38 is also provided to make up for the possible loss in the fresh water for the motor.

We also provide an expansion or overflow pipe 39, secured into the top of the device, as indicated in Figs. 1 and 2, and the purpose of which is to permit an overflow or escape of some of the water in the compartment 27, in case the device is entirely filled with water and the water is raised to a comparatively high temperature, whereby its expansive force might endanger the cooler proper 11, unless relieved.

We also employ a thermostatic device 40, of any appropriate construction, understood by experts in this art, in the intake pipe line 13. The purpose of this thermostat is, as follows: the engine water should not be cooled and should not even circulate through our device when the motor is just being started and is cold yet. The thermostat 40 normally will keep the pipe line 13 entirely closed, and, or to a great extent, permitting only a small amount of water to circulate therethrough. When the temperature of the water rises, the thermostat will open the intake pipe line 13 and, at a predetermined temperature, which we prefer to establish at about 160 degrees F., the thermostat will fully open the intake pipe line 13 and our cooling device will become fully operating to cool the engine water.

We also may use our device to simultaneously cool the lubricating oil in the motor. For this purpose, a small pipe line 41 will take the oil into our cooler proper, 11. The oil passes through a pipe spiral 42 of great many turns of small diameter and great length, and the oil will leave the cooler at 43 to be returned to the engine. The pipe spiral 42 may be set centrally between two rows of fresh water cooler tubes 30.

A second pair of intake and exit openings 35*a* and 17*a*, respectively, may be provided for the sea water in the respective wall of the cooling device 11, placed oppositely to the pair 35 and 17 described hereinbefore and shown in the drawings. Normally, the second pair 35*a* and 17*a* will be plugged and closed, and the purpose of the additional pair is that in some boats the motor and the existing pump is arranged in such a manner that it cannot be connected with the side of our device indicated hereinbefore, in which case the intake 35 and exit 17 will be plugged, and the auxiliary intake and exit, 35*a* and 17*a*, will be connected in the manner described.

While we have shown and described a preferred embodiment of our invention, it is obvious that changes and variations may be resorted to in the details of its elements and combinations, and I want it to be understood that we reserve our rights to all such changes and variations which are within the spirit of this specification and the scope of the claims hereunto appended.

What we claim is new, and want to protect by Letters Patent of the United States, is:

1. In a cooling device for a marine motor, said motor having a usual cooling jacket, and fresh cooling water circulating through said jacket, the combination of a casing, an upper and a lower transverse partition wall in the casing dividing the same into upper and lower end compartments and a middle compartment, respectively, said middle compartment generally being substantially deeper than the two other compartments, a plurality of tubes between the two partition walls, open at both ends, so as to connect the upper and lower compartments with one another, an intake for one end compartment, and an exit for the other end compartment, means to connect said intake and exit to the respective exit and intake of the motor cooling water circulating system, whereby the heated motor cooling water will pass to one end compartment, then will pass through said tubes to the other end compartment, and will return to the motor cooling jacket, by the exit in said second end compartment, and means to cause sea water to pass through said middle compartment and thereby cool the tubes therein, a spirally wound, substantially long, narrow tube in said middle compartment, edgewise set between said tubes, said spiral having intake and exit connections through the walls of the casing, and being connected into the circulating system for the lubricating oil of the motor, to provide for the cooling of said oil.

2. In a cooling device for a marine motor, said motor having a usual cooling jacket, and fresh cooling water circulating through said jacket, the combination of, a casing, an upper and a lower transverse partition wall in the casing dividing the same into upper and lower end compartments and a middle compartment, respectively, said middle compartment generally being substantially deeper than the two other compartments, a plurality of tubes between the two partition walls, open at both ends, so as to connect the upper and lower compartments with one another, an intake for one end compartment, and an exit for the other end compartment, means to connect said intake and exit to the respective exit and intake of the motor cooling water circulating system, whereby the heated motor cooling water will pass to one end compartment, then will pass through said tubes to the other end compartment, and will return to the motor cooling jacket, by the exit in said second end compartment, and means to cause sea water to pass through said middle compartment and thereby cool the tubes therein, said casing with its partition walls and compartments being formed by a shell having two U-shaped deeper intermediate covers at the two ends thereof secured on its wall, and two outer U-shaped covers of less depth also secured on said wall, over said first intermediate cover, the transverse base plates of said intermediate covers being perforated to receive said tubes passing through the middle compartment, and the upper and lower compartments being formed by the spaces between the respective U-shaped covers.

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