

April 5, 1949.

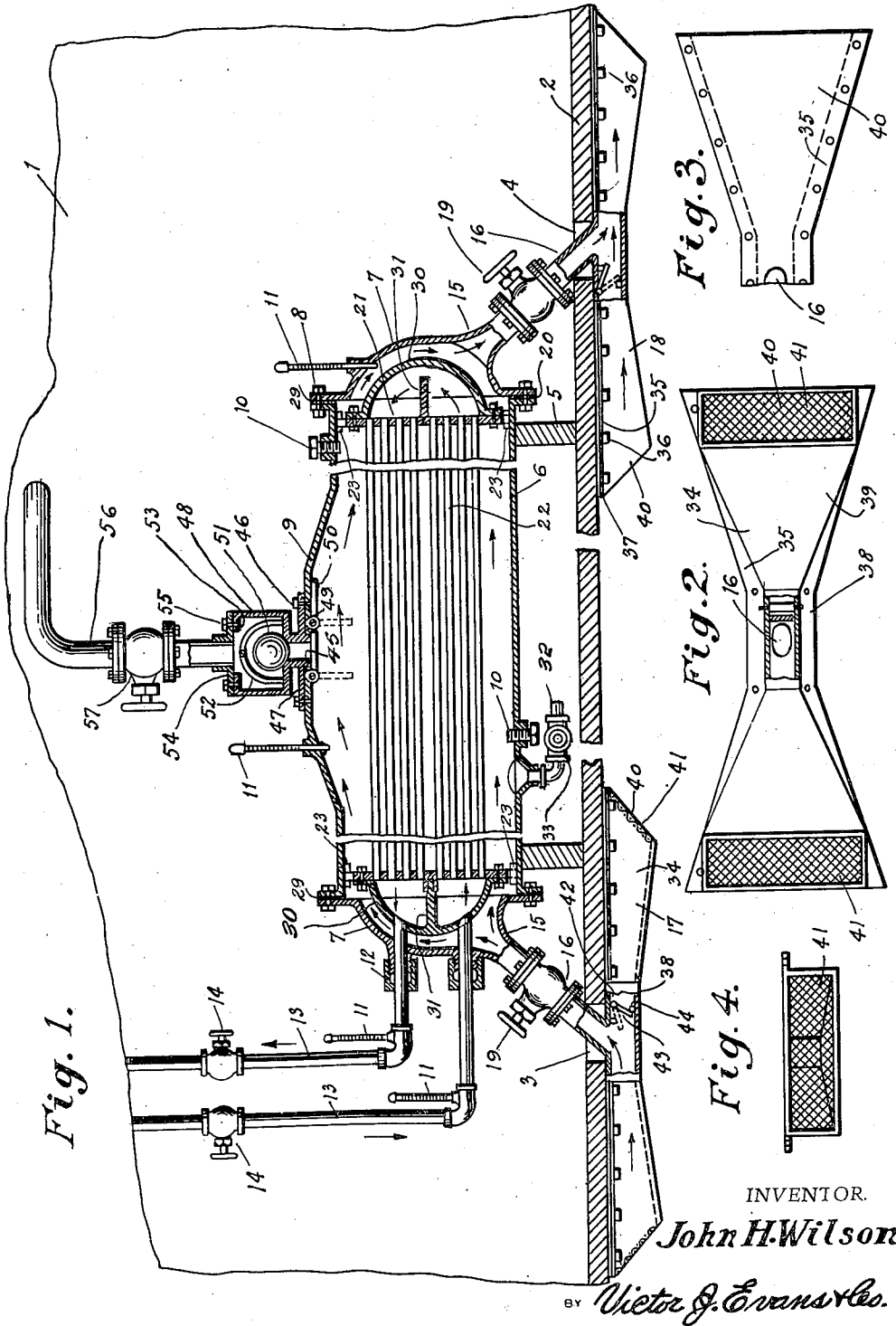
J. H. WILSON

2,466,525

COOLING DEVICE FOR POWER PLANTS OF BOATS

Filed Aug. 8, 1945

4 Sheets-Sheet 1



INVENTOR.

John H. Wilson,

BY Victor J. Evans & Co.

ATTORNEYS

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J. H. WILSON

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4 Sheets-Sheet 2

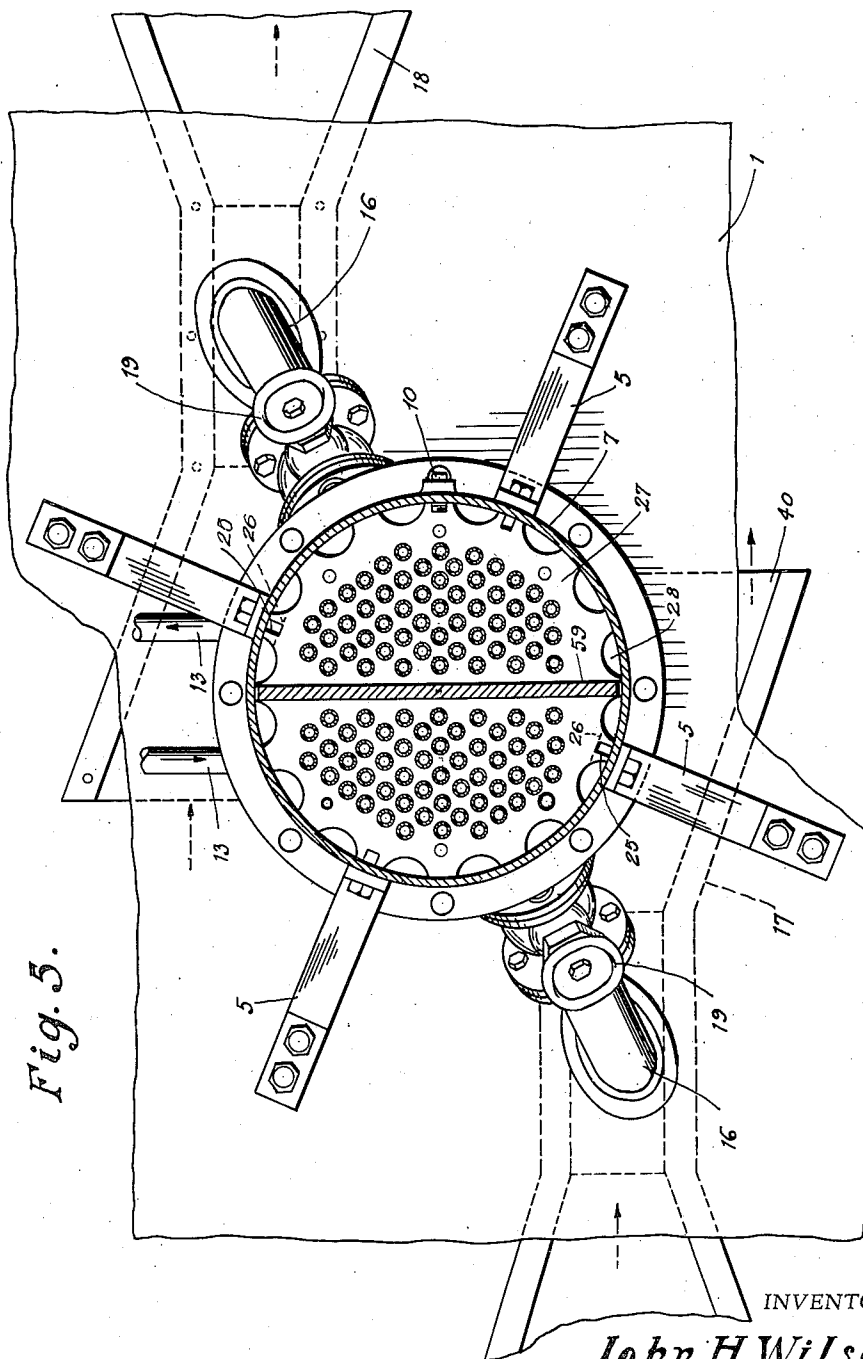


Fig. 5.

INVENTOR.

John H. Wilson,

BY Victor J. Evans & Co.

ATTORNEYS

April 5, 1949.

J. H. WILSON

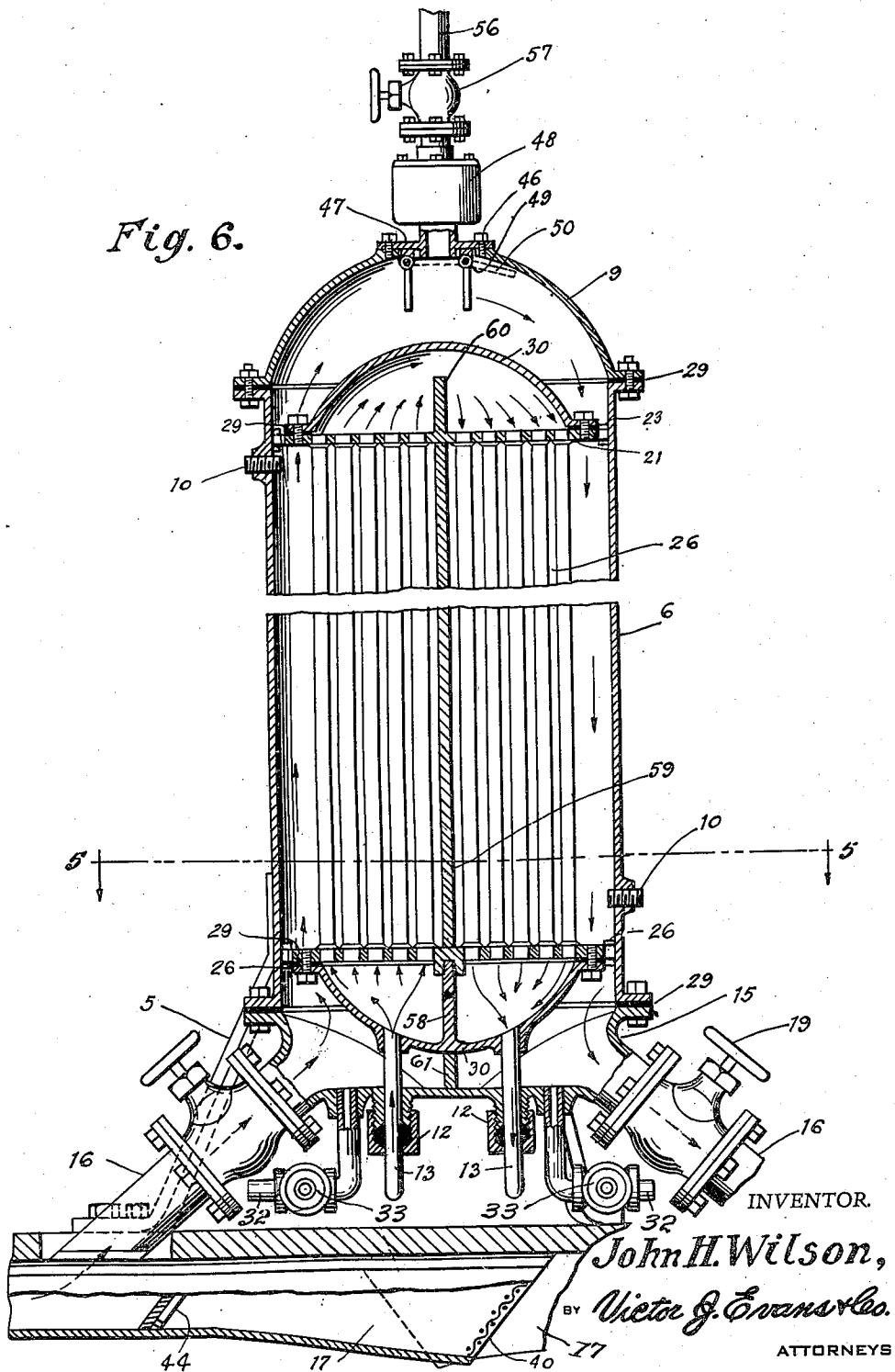
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Fig. 6.



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Fig. 7.

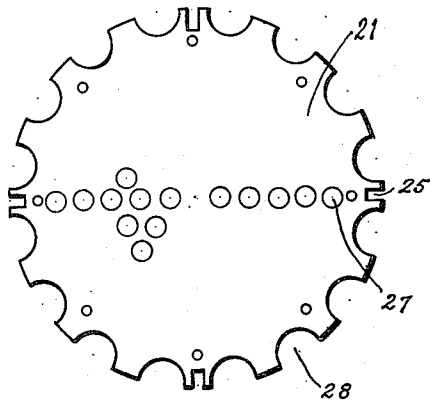


Fig. 9.

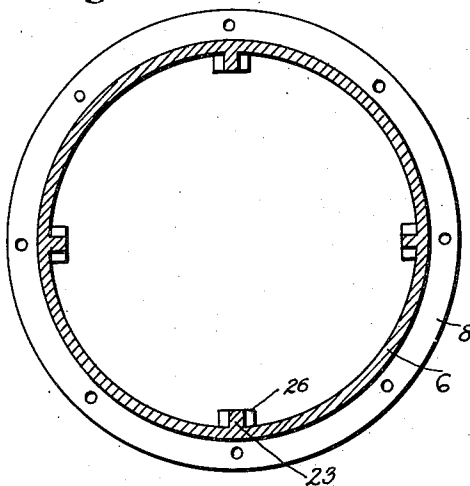


Fig. 11.

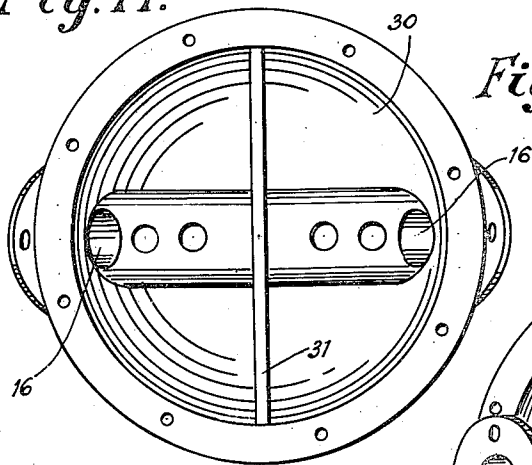


Fig. 10.

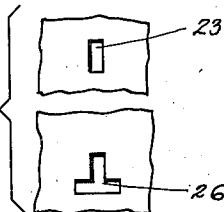


Fig. 12.

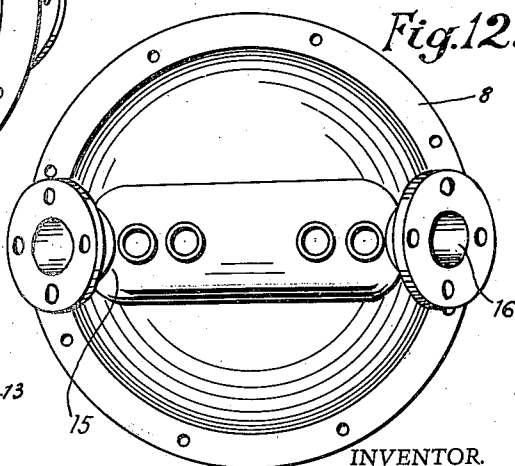
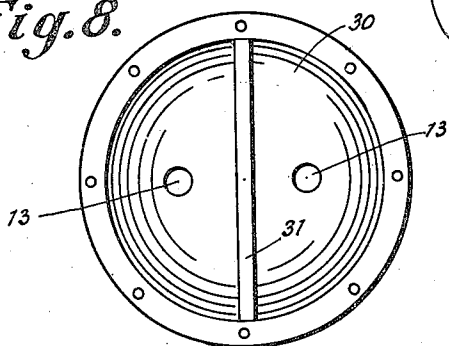


Fig. 8.



INVENTOR.
John H. Wilson,

BY *Victor J. Evans & Co.*

ATTORNEYS

UNITED STATES PATENT OFFICE

2,466,525

COOLING DEVICE FOR POWER
PLANTS OF BOATS

John Harrison Wilson, Bay Shore, N. Y.

Application August 8, 1945, Serial No. 609,579

6 Claims. (Cl. 257-239)

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My present invention, in its broad aspect, has to do with improvements in cooling devices for the power plants of boats, whereby salt water is used as the cooling medium (or the water from other bodies over which the boats may be navigated), thereby eliminating the necessity of using circulating pumps which are subject to a number of disadvantages not present with my invention. I provide in the bottom of a boat a water circulating tank through which cold salt water is passed, and also through which the cooling medium is circulated to be cooled by the salt water, there being provided improved means for introducing cold salt water and evacuating warmed or heated salt water which has contacted the cooling medium of the power plant, and this improved means is effective whether the boat be moving forward, or backward, or simply floating in one position so that there is no chance of the power plant becoming overheated. In attaining the objects and advantages of my invention, I provide water intake and outlet scoop devices operable both when the boat is going forward or backward and which have improved construction to operate with a syphoning effect, and an improved automatic valve and circulating means operating upon the principle that heated water rises for circulating the salt water when the boat is standing still so that proper circulation is maintained at all times. The power plant cooling medium is circulated through an improved closed system of fluid circulation wherein a tube arrangement has heads, domes and baffles and immersed in the cold salt water, and in addition there is provided zinc plugs for preventing electrolysis, improved strainers for the scoops, and generally an improved structure and principal of operation which is sturdy, efficient, practical, simplified in that there are relatively few parts, and those are so constructed as not to be likely to become damaged or get out of order.

Other, and equally important objects and advantages of my invention will be apparent from the following description and drawings, and it is pointed out that changes in form, size, shape, materials, and construction and arrangement of parts is permissible and within the purview of my broad inventive concept, and the scope of the appended claims.

In the drawings, wherein I have illustrated a preferred form and a slight modification of my invention—

Figure 1 is a longitudinal section showing the parts of my device;

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Figure 2 is a bottom plan view of a scoop having some parts in section;

Figure 3 is a top plan view of one of the ends of the scoop;

5 Figure 4 is an end view of a scoop;

Figure 5 is a transverse section of a modified form of my invention taken on the line 5-5 of Figure 6 in which the device occupies a vertical instead of a horizontal position;

10 Figure 6 is a vertical section through the modified form of my invention;

Figure 7 is a view of one of the heads of the cooling medium circulating system;

15 Figure 8 is a view of the dome-like end of my device;

Figure 9 is a view of the flange of a dome end having head attaching lugs;

Figure 10 are fragments showing the forms of top and bottom lugs;

20 Figure 11 is an interior view of a dome, and

Figure 12 is an exterior view of a dome showing the connection to the scoop.

25 In the drawings, wherein like characters of reference are used to designate like or smaller parts throughout the several views:

The numeral 1 designates a boat, having a bottom 2 having openings 3 and 4 for intake and exhaust connection for salt water to my invention. Suitably carried on supports 5 on the bottom 2 is a cylindrical sea water receiving and circulating tank 6 having at each end a dome-like closure 7 flanged and bolted to the tank as at 8. The tank has a domed top part 9 and zinc plugs 10 to prevent electrolysis. Suitable thermometers 11 are provided to indicate the temperature of fluid in the tank. Leading into the tank through packing glands 12 at one end are intake and outlet connections 13 for the cooling medium of the boat power plant (not shown), and these are also provided with thermometers 11 and hand operated control valves 14. At each end of the tank 6 and leading into the domed closure 7 through extensions 15 are connections 16 through the boat bottom openings 3 and 4 to scoops 17 and 18. 45 Each connection has a hand operated control valve 19, and the scoops 17 and 18 operate both to introduce cold sea water into the tank or withdraw sea water from the tank, depending on the direction of movement of the water into the scoops in the manner which will hereinafter appear. Suitable packing 20 is provided between the domed ends and the tank body.

50 Supported in the tank 5 by heads 21 are circulation tubes 22 for the cooling medium of the boat power plant. The tank wall has vertical top

lugs 23, and the heads are slotted as at 25 to receive and mount the same on the lugs. A bottom lug slot is T-shaped as at 25 to provide a key. The lugs 23 are formed adjacent the upper end of the tank wall, and the bottom lugs 26 are formed adjacent the lower end of the tank wall as shown in Figure 6. The heads are provided with plural tube openings 27, see Figure 2, through which the tubes are received and mounted, and the side edges of the heads are provided with semi-circular recesses 28 for circulation of sea water about but not through the tubes 22. Attached in sealing contact by packing 29 to the heads 21 are domed end members 30 which form with the head a closed chamber communicating only with the tubes 22 at each end, and through one domed end member the intake and outlet connections 13 for the cooling medium of the boat power plant are led, as shown in Figure 1. A transverse baffle 31 is in each domed end member so that the cooling medium of the boat power plant will enter one section of tubes from one connection 13 and return to the other connection 13 through another section, as indicated by the arrows within the domed end members 30 in Figure 1. The tank 6 has a drain 32 with a valve 33.

My scoops 17 and 18 are particularly defined in a companion patent application, No. 604,701, filed July 12, 1945, now Patent No. 2,462,450, issued February 22, 1949, and each includes an elongated hollow rectangular body 34 flanged as at 35 and attached to the boat bottom by bolts 36. A packing 37 is provided beneath each scoop. Each scoop has a restricted portion 38 midway between its ends having end portions 39 which gradually flare or angle outwardly and downwardly toward the mouths 40 which are screened as at 41. The side walls are cut at an angle toward each other in a downward direction to form the inclined mouths 40. Hinged as at 42 within the restricted portion and back of the connection 16 to the tank and toward one of the ends of the scoop is a flap valve 43 seating against a frame 44 in its closed position to partition the scoop to cause water to be forced into the connection 16 and tank 6 when the water is introduced into the scoop in one direction (as shown with the forward scoop in Figure 1), and to be projected through the scoop from end to end past the connection 16 when opened (as in the case of the after scoop in Figure 1) by pressure of water into the scoop in the opposite direction to form an unrestricted passage through the scoop and past the connection, so that the scoop functions as a syphon to withdraw water from the connection 13 to tank 6. The scoop therefore functions both to introduce and withdraw water from the tank 6, and there being a connection and scoop at each end of the tank 6, cold water is directed into the tank at one end and withdrawn from the other whether the boat be moving forward or backward to circulate cold sea water about the tubes 22 in heat transferring relation to the cooling medium of the boat power plant. It will be noted that the sea water is circulated in one direction or the other through the dome 9 of the tank.

When the boat is not in motion and the scoops are inoperative, there is no circulation of sea water in the tank, and since the power plant may be running, I provide means for causing circulation of the water. At the top of the dome 9 of the tank is an opening 45 to which is bolted as at 46 the flange 47 of a valve body 48 which has hinged at 49 at the lower end diametrically op-

posed flap valves 50 designed to hang down and uncover or open the valve body when the water is dormant (see dotted lines in Figure 1) or one or the other of which is moved by pressure of flow of water when the water in the tank is circulating through the dome in either direction, as in movement of the boat forward and backward. The valve body has an upper seat on which is seated a ball check valve 51 in a cage 52 which opens when water passes upward through the body. The body has a flange 53 and a cover 54 bolted to the flange at 55 and from which leads the conduit 56 which leads through the side of the boat below the water line as indicated in Figure 1. A manually controlled valve 57 is interpolated in the conduit 56. Pressure of heated water in the tank 6, and the inclination of heated water to rise, opens the check valve 51 when the boat is dormant and water is forced out of the tank 6 through the conduit 56 and drawn in through conduits 16 and the scoops 17 and 18 which serve as posts, thus providing circulation when the boat is not in motion, but the power plant is in operation as more particularly described in my companion application.

In the modified form of my invention shown in Figures 5 and 6, the tank 6 instead of being arranged horizontally, is arranged vertically, and the dome-like part 9 is at the top and carries the valve body 48, whereas the two connections 16 are at the bottom. Two drains 32 are located at the bottom, and the two connections 13 leading from the boat power plant (not shown) lead through the bottom to the domed-end member 30 of the cooling fluid circulating device. However, a baffle 58 is formed on the lower dome-like end 38 and extends to the head 21, and another baffle 59 is mounted on the lower head and extends upward between the sets of tubes 26 to the upper head 21, and another baffle 60 is formed on the upper head and extends part way to the top of the upper dome-like end 30, and a baffle 61 is formed on the bottom between the connections 16. Cooling fluid follows the direction of the arrows in Figure 6 upwardly through the tubes in one side, over the baffle 60 and downwardly through the tubes on the other side.

From the foregoing, it is believed that the operation and advantages of my invention will be apparent, but it is again pointed out and emphasized that interpretation of the scope of my invention should only be conclusive when made in the light of the subjoined claims.

I claim:

1. A heat transference arrangement for cooling the cooling fluid of boat power plants, comprising a water circulating tank having intake and outlet connections with the body of water upon which the boat is floating, said connections adapted to circulate and change the water in the tank during the forward and backward motion of the boat, a closed system of motor-cooling fluid circulation through the water in the tank and including tubes in heat transferring relationship with the water in the tank, a scoop-like device on the inlet and on the outlet connection to introduce water into the connection when the flow is in one direction onto the scoop, and to create a syphoning effect in the scoop to withdraw water when the flow is in another direction through the scoop, and valve means mounted on the upper part of said body, having a conduit connected thereto for dispelling water outwardly of the body to cause water to enter said intake and outlet

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connections for changing and circulating the water when the boat is not in motion.

2. A heat transference arrangement for cooling the cooling fluid of boat power plants, comprising a water circulating tank having inlet and outlet connections with the water upon which the boat is floating, said connections adapted to circulate and change the water in the tank during the forward and backward motion of the boat, scoop means on each connection for introducing and circulating the water in the tank during forward and backward motion of the boat, syphoning means on each connection for withdrawing water from the tank, valve and expansion means for changing and circulating the water in the tank when the boat is not in motion, and means including circulating tubes in the tank for circulating the motor cooling fluid through the water in the tank, and said latter means having dome-like members and tube supporting walls forming closed compartments with which the tubes communicate, and fluid circulating connections with the cooling system of the boat power plant.

3. The invention as defined in claim 2 wherein the tank has dome-like ends, and a dome-like formation at the top supporting the valve means for changing and circulating water when the boat is not in motion.

4. The invention as defined in claim 2 wherein the intake and outlet connections to the tank are

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inclining toward the front and the back of the boat, and wherein the tank is provided with drain means.

5. The invention as defined in claim 2 wherein the scoop means are elongated and provided with valve means opening to produce a syphoning effect upon the connection with the tank upon flow of water into the scoop in one direction and closing to introduce water into the connection upon flow of water into the scoop in another direction.

6. The invention as defined in claim 2 wherein the valve means for circulating water when the boat is stopped includes two opposed flap valves to close the valve means when the boat is moving forward or backward, and a check valve opening by pressure of water in the valve when the valve is open, and a tubular connection from said valve out of the boat.

JOHN HARRISON WILSON.

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