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MARINE ENGINE COOLING SYSTEM

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Fig. 1.

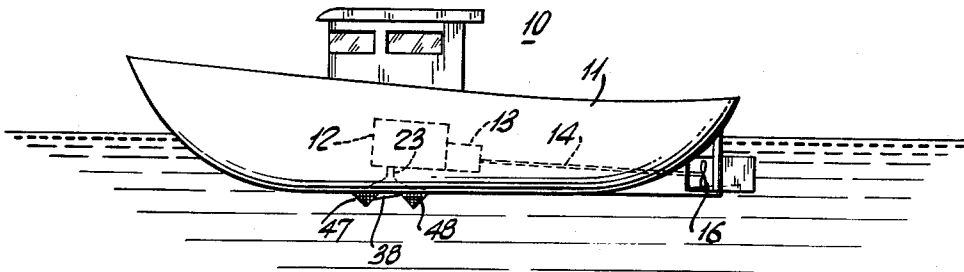


Fig. 2.

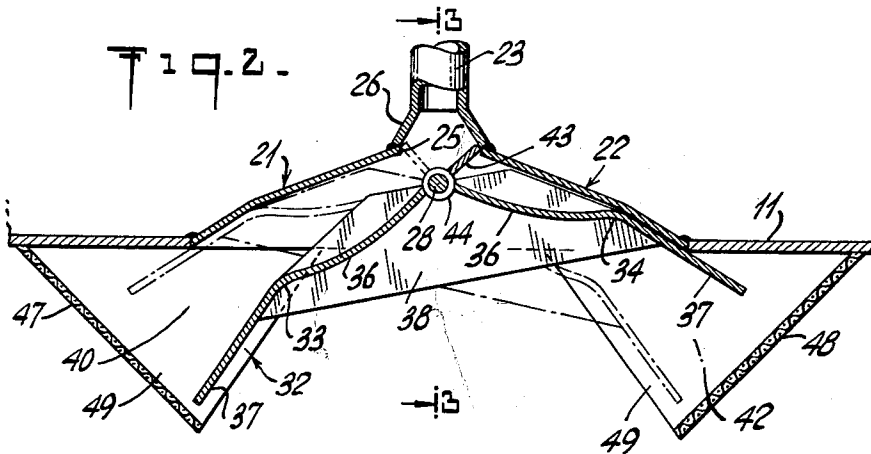
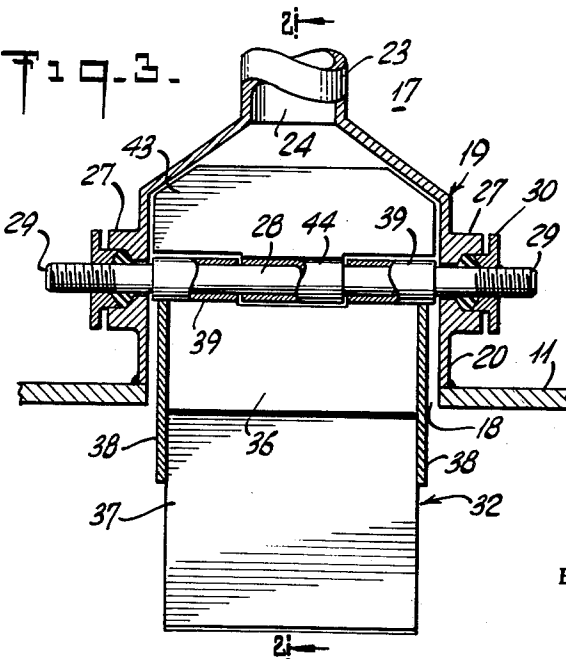


Fig. 3.



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## MARINE ENGINE COOLING SYSTEM

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3 Claims. (Cl. 115—5)

The present invention relates generally to improvements in power boats and it relates more particularly to an improved cooling system for internal combustion engines employed as the drive means for boats.

Where an internal combustion engine is employed as the primary drive for a boat, such engine is generally water cooled either directly by water circulated from the body which floats the boat or indirectly through a heat exchange unit. A heat exchange unit is employed where the body water is salty or brackish in order to minimize corrosion in the cooling system. In any event means are generally provided, conventionally a water pump driven by the internal combustion engine by means of a suitable power takeoff, to effect the circulation of the primary cooling water, that is the water taken up from the body in which the boat is afloat. It is necessary that the engine cooling system be in good operation since an increase in engine temperatures above a critical maximum not only is detrimental to the operation of the engine and may result in its rapid breakdown but such increased temperature is highly hazardous and could readily result in serious fires aboard the boat with the attendant dangers. Thus any breakdown in the engine cooling water circulating pump, for practical purposes completely disables the boat. Systems have been heretofore proposed for circulating the engine cooling water without a power driven pump but dependent on the boat's motion in the water. Such systems however possessed many drawbacks and disadvantages, being unidirectional, of inadequate capacity, unreliable, and otherwise leaving much to be desired.

It is thus a principal object of the present invention to provide an improved power boat.

Another object of the present invention is to provide an improved water cooling system for internal combustion engines in small power boats.

Still another object of the present invention is to provide an improved apparatus for circulating water through the cooling system of a boat internal combustion engine in the absence of a power driven water pump.

A further object of the present invention is to provide a water circulating system for boat internal combustion engines which is automatically motivated by the motion of the boat independently of the direction of travel thereof.

Still a further object of the present invention is to provide a water circulating system of the above nature characterized by its simplicity, ruggedness, reliability and low cost.

The above and other objects of the present invention will become apparent from a reading of the following description taken in conjunction with the accompanying drawing wherein;

FIGURE 1 is a side elevational view of a power boat embodying the present invention.

FIGURE 2 is a fragmentary enlarged longitudinal sectional view of the improved water scoop section; and

FIGURE 3 is a transverse vertical sectional view thereof.

In a sense the present invention contemplates the provision, in combination with a power boat including a hull and an internal combustion engine having a water cooling system, of the apparatus comprising a water intake member mounted on said hull and communicating with the exterior of said hull below the water line thereof and including downwardly facing front and rear sections, a conduit connecting said water intake member to said cool-

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ing system, and a flap member responsive to the direction of flow of water along said hull and alternatively movable to a first position diverging from said water intake front section to delineate therewith an open forwardly directed first scoop and engaging said water intake rear section to delineate therewith a closed rearwardly directed second scoop, and a second position diverging from said water intake rear section and engaging said water intake front section to effect the closing and opening of said first and second scoops respectively, said first and second positions being effected with the rearward and forward flow of water along said hull respectively.

According to a preferred form of the present apparatus the intake member includes a pair of panels downwardly diverging from an upper restricted outlet opening to a downwardly directed inlet opening coplanar with the hull. The scoop forming flap is in the form of a dihedral member, having downwardly diverging wings and is hinged at its elbow to a transverse shaft located intermediate the panel members. A valve flap is provided which is likewise swingably supported by the horizontal shaft and is movable into alternative closing engagement with the scoop throats. Gratings are suitably supported in registry with the inlet ends of the scoops.

Referring now to the drawings which illustrate a preferred embodiment of the present invention, the reference numeral 10 generally designates a power boat including a hull 11 which, although illustrated as formed of metal, may be formed of any suitable material. Housed in the hull 11 is any desirable internal combustion drive engine 12 provided with a suitable conventional water cooling system of the direct or indirect cooling type, in each case the primary cooling water being obtained from the body of water floating the boat 10. The engine 12 is coupled in the usual manner through a transmission unit 13 and a shaft 14 to a drive screw 16 located at the stern of the boat.

In order to effect the circulation of the primary cooling water from the body of water through the engine cooling system there is provided an improved bidirectional water scoop device 17 which is mounted in the hull 11 in registry with a horizontal rectangular opening 18 formed in the bottom of the hull 11 well below the hull water line. The device 17 comprises an intake member 19 including transversely spaced vertical side walls 20 projecting upwardly from the side borders of the opening 17 and welded to the hull 11, and inclined front and rear walls 21 and 22 respectively, converging upwardly from the front and rear edges of the opening 17 and likewise welded to the hull. The walls 21 and 22 form a predetermined dihedral angle to each other and each include upper and lower slightly angularly related sections, the upper edges 25 of the walls 21 and 22 defining stop members. The intake member 19 is connected to the engine cooling system by means of a pipe or conduit 23 communicating with the intake member 19 through a port 24 and joining the upper borders of the walls 20, 21 and 22 by way of peripheral walls 26 converging to the port 24.

A pair of transversely aligned packing blocks 27 are affixed to opposite side walls 20 and have axial bores formed therein registering with corresponding apertures formed in the walls 26. A pintle defining transverse horizontal shaft 28 extends between the walls 20, projecting through the aligned bores in the blocks 27 and terminating in threaded ends 29. A suitable packing material is nested in wells formed in the blocks 27 and packing nuts 30 engage the shaft threaded ends 29 and are tightened to compress the packing and effect a watertight joint between the walls 20 and the shaft 28.

Rockably carried by the shaft 28 is a dihedrally shaped flap member 32 including a pair of downwardly outwardly inclined front and rear wing panels 33 and 34 respectively,

each of which includes an upper upwardly concave section 36 and a lower planar section 37 forming an obtuse angle with the upper section 35. A pair of parallel trapezoidal reinforcing gusset plates 38 are secured to the opposite side edges of wing panels 33 and 34 extending from the upper joining edges thereof to the upper parts of the wing lower sections 37. Suitably affixed to the flap member knee delineated by the upper edges of the wing panels 33 and 34 are a pair of transversely spaced axially aligned tubular knuckles 39 which rotatably engage the shaft 28.

The flap member 32 is so shaped and related to the intake member walls 21 and 22, as described above, that when it is rocked to its counterclockwise position as illustrated by full line in FIGURE 2, the front wing panel 33 is lowered and delineates with the front wall 21 a forwardly directed, open, front water scoop whereas the rear wing panel 34 is in closing engagement with the rear wall 22 the lower sections thereof being in parallel abutment to delineate a rearwardly directed closed water scoop. On the other hand, when the flap member 32 is swung to its clockwise position as illustrated by broken line in FIGURE 2, the front wing panel 33 engages the front wall 21 to close the front water scoop 40 and the rear wing panel 34 swings away from the rear wall 22 to delineate therewith a rearwardly directed open water scoop 42. It should be noted that at all times the lower edges of the wing panels 33 and 34 project below the hull 11 along the borders of the opening 17.

Also rockably supported by the shaft 28 is a valve flap panel 43 which projects upwardly into the area delineated by the lower edges of the peripheral walls 26. The flap panel 43 is of substantially rectangular configuration with the upper corners cut away to match the transverse cross section of the water scoop outlets as delineated by the upper edges of the wall 21 or 22 and the knee of the flap member 32. Disposed along the lower edge of the valve flap 43 and engaging the shaft 28 between the knuckles 39 is a tubular knuckle 44. The valve flap is alternatively swingable into opposite positions in abutment with a stop 25 to close the throat outlet of a corresponding scoop 40 or 41 and open the throat outlet of the other scoop.

In order to prevent the fouling or clogging of the device 17 or the conduit 23 a pair of front and rear grates or screens 47 and 48 are disposed just forwardly and rearwardly of the swinging path of the lower edges of the wing panels 33 and 34. The grates 47 and 48 project from the hull 11 inwardly and downwardly to a point slightly below the bottom edges of the wing panels in their lowermost positions. The side edges of the grates 47 and 58 may be supported by triangular plates 49 depending from the hull 11 along opposite edges of the wing panels 33 and 34 so that water entering the scoops 41 and 42 pass through the grates 47 and 48 respectively.

Considering now the operation of the improved water circulating system described above, as the boat 10 advances forwardly, the relatively rearwardly moving water strikes the front face of the wing 33 extending below the hull 11 and the front face of the wing 34 to swing the flap member counterclockwise thereby opening the scoop front 40 and closing the rear scoop 42 as aforesaid. The water passing through the grate 47 flows into the scoop 40 and up through the throat thereof and by way of the conduit 23 through the engine cooling system. The water flowing from the throat of the scoop 40 bears on the valve flap 43 to swing and retain it in its clockwise position closing the throat of the scoop 42. It should be noted that the flow of water into the scoop 40 and through the cooling system increases with increased boat speed so that greater cooling is effected when needed, that is when the engine drive is greater. The cooling water leaves the engine cooling system through any suitable discharge means. The circulation of cooling water is effected in a similar manner when the boat 10 moves in a rearward direction except that the scoop 40 is closed and the

scoop 42 is open and receives the water, by reason of the flap member 32 swinging to its clockwise position, and the valve flap 43 swings to a position closing the throat opening of the scoop 40.

While there has been described and illustrated a preferred embodiment of the present invention it is apparent that numerous alterations, omissions and additions may be made without departing from the spirit thereof.

What is claimed is:

1. In combination with a power boat including a hull and an internal combustion engine having a water cooling system, the apparatus comprising a water intake member mounted on said hull and communicating with the exterior of said hull below the water line thereof and including downwardly facing front and rear sections, a conduit connecting said water intake member to said cooling system, and a flap member responsive to the direction of flow of water along said hull and alternatively movable to a first position diverging from said water intake front section to delineate therewith an open forwardly directed first scoop and engaging said water intake rear section to delineate therewith a closed rearwardly directed second scoop, and a second position diverging from said water intake rear section and engaging said water intake front section to effect the closing and opening of said first and second scoops respectively, said first and second positions being effected with rearward and forward flow of water along said hull respectively.

2. In combination with a power boat including a hull and an internal combustion engine having a water cooling system, the apparatus comprising a water intake member mounted on said hull and communicating with the exterior of said hull below the water line thereof and including downwardly facing front and rear sections, a conduit connecting said water intake member to said cooling system, a flap member responsive to the direction of flow of water along said hull and alternatively movable to a first position diverging from said water intake front section to delineate therewith an open forwardly directed first scoop and engaging said water intake rear section to delineate therewith a closed rearwardly directed second scoop, and a second position diverging from said water intake rear section and engaging said water intake front section to effect the closing and opening of said first and second scoops respectively, said first and second positions being effected with rearward and forward flow of water along said hull respectively, and a flap valve disposed between said scoops and said conduit and responsive to the flow of water through one of said scoops to close the throat of the other of said scoops.

3. In combination with a power boat including a hull and an internal combustion engine having a water cooling system, the apparatus comprising a water intake member mounted on said hull and communicating with the exterior of said hull below the water line thereof and including a pair of diverging front and rear panels inclined downwardly and outwardly from a restricted upper outlet opening to an enlarged downwardly directed inlet opening, a conduit connecting said outlet opening to said cooling system, and a dihedral flap member including downwardly inclined diverging wings and hinged at the knee thereof for rocking about a transverse horizontal axis disposed intermediate said panels adjacent the upper sections thereof, alternative of said panels being engageable by a corresponding wing and the opposite of said wings and panels diverging to delineate closed and open scoops respectively, said scoops having upper outlet throats.

4. The combination of claim 3 wherein said wings extend beyond the ends of said panels.

5. The combination of claim 3 wherein said panels terminate at said hull and said wings project below said hull.

6. The combination of claim 3 including an upwardly directed valve flap rockably supported about said hori-

zontal transverse axis and swingable into alternative closing engagement with said scoop throats.

7. The combination of claim 3 including filter members disposed adjacent the inlets to said scoops.

8. The combination of claim 3 including a pivot pin 5 coinciding with said axis, said dihedral flap and said valve flap being provided along their inner edges with knuckles engaging said pin.

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