June 1, 1965 G. A. MOORE 3,186,371

SPEEDBOAT STABILIZER

Filed April 1, 1964 3 Sheets-Sheet 1

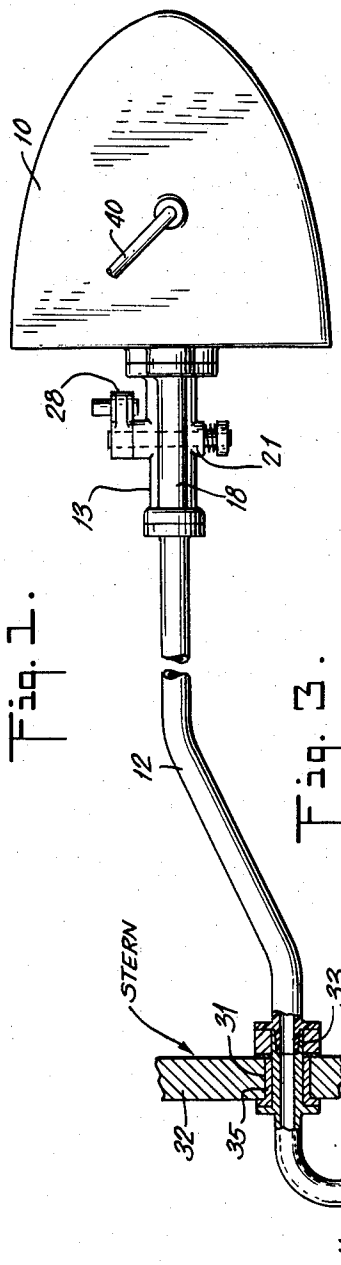


Fig. 1.

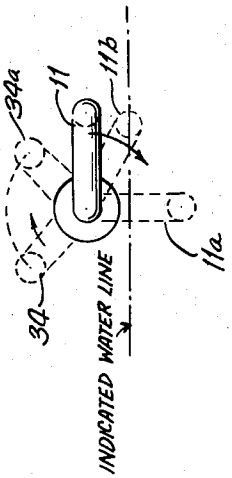


Fig. 3.

Fig. 2.

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Filed April 1, 1964 3 Sheets-Sheet 2

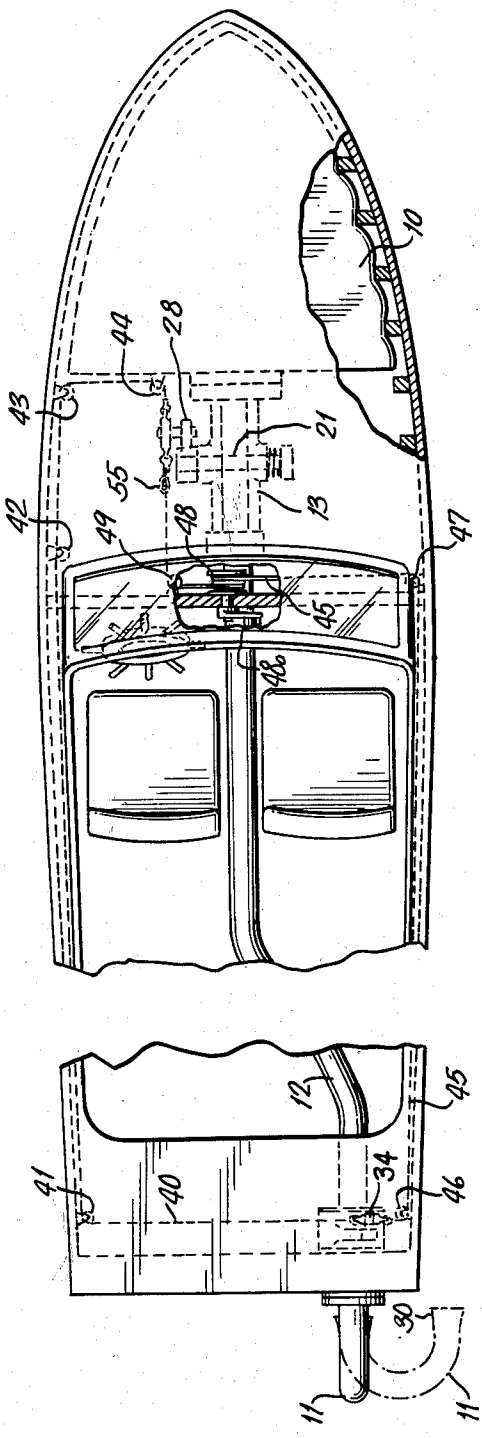


Fig. 4.

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SPEEDBOAT STABILIZER

Filed April 1, 1964 3 Sheets-Sheet 3

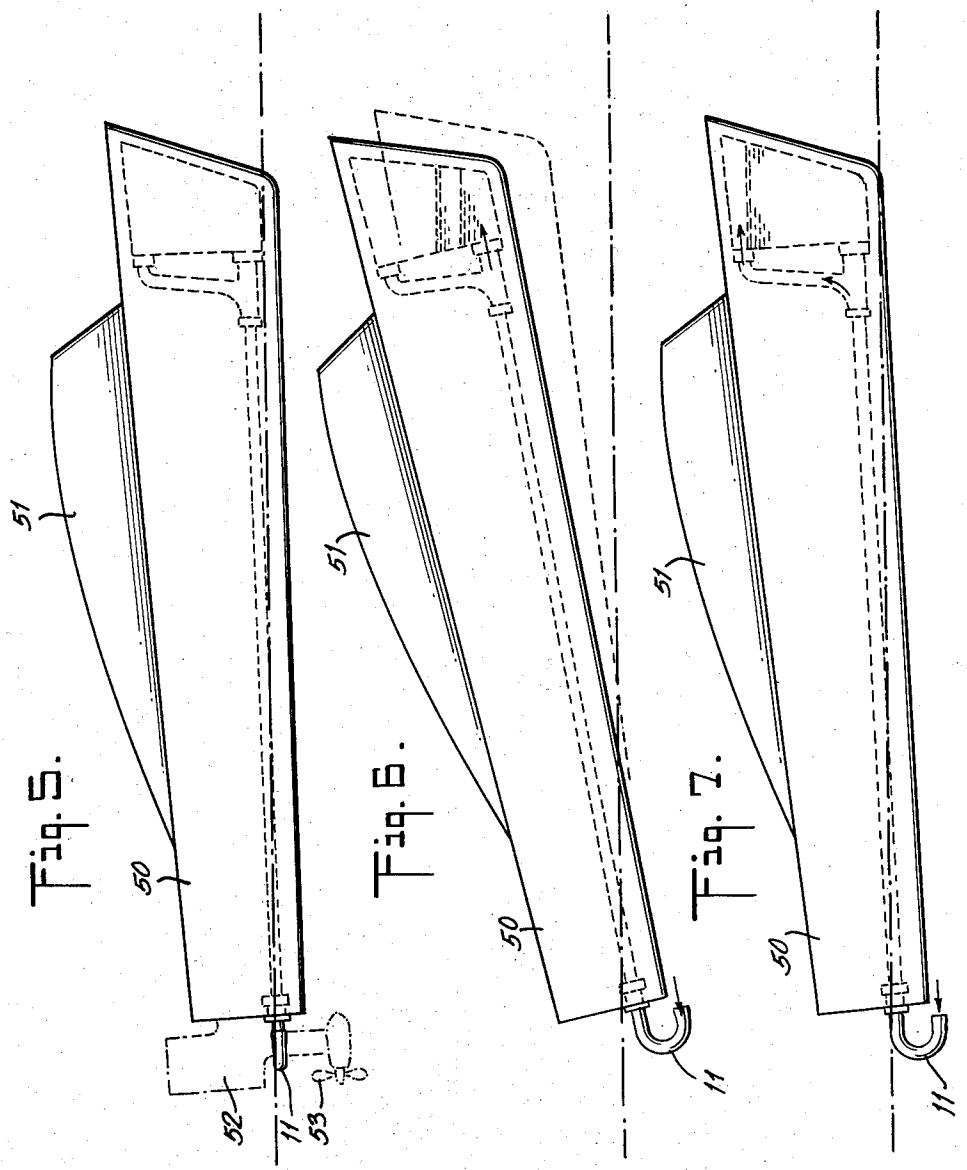


Fig. 5.

Fig. 6.

Fig. 7.

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United States Patent Office 3,186,371
Patented June 1, 1965

3,186,371

SPEEDBOAT STABILIZER

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Filed Apr. 1, 1964, Ser. No. 356,373
12 Claims. (Cl. 114—125)

This invention pertains primarily to speedboats which are driven by powerful inboard or outboard motors, which are capable of accelerating rapidly and which when operating in rough water have a strong tendency to pound, to the great discomfiture of the passengers or crew.

The bottoms of modern speedboats are normally weighted at the stern by reason of high powered engines usually employed, and when the boat is propelled through the water at high speed, the bow tends to lift out of the water and the stern to pull down somewhat, so that when the boat goes through waves in rough seas, the bow rises and falls, creating a severe pounding action on the water. This action is particularly marked in light speedboats of from 20 to 30 feet in length, when provided with a heavy, powerful engine near the stern.

High speed not only is desired to move quickly from one landing to another, but is necessary for towing water skiers and the like.

One object of my invention is to greatly reduce the pounding shock and heavy vibration of a speedboat of the character above referred to, when it is operating at high speeds in rough water.

Another object is to provide a novel and simple apparatus which may be applied readily, and with small expense, to a boat which has been in use for several years, as well as to a new boat during the building process, to minimize the stress and strain to which boat hulls are normally subjected.

A further object is to provide for easy control of the weight at the bow of the boat by filling to a greater or lesser extent a water tank, preferably formed of plastic material, which is adapted to be flexibly expanded, anchoring it into the spaces between the ribs of the boat hull at the bow where the tank is located. An inlet scoop is adjustably mounted at the stern near one side of the boat where it will not interfere with the engine or propeller and is connected, preferably by plastic pipe, to the water tank in the bow. The arrangement is such that when the boat is speeding in rough water, the scoop may be set to inject water through the pipe into the tank, in any weight producing volume as may be desired.

Other objects and advantages of the invention will be readily understood by those skilled in this art by reference to the accompanying drawings and the appended specification.

Referring to the drawings:

FIG. 1 is a plan view of apparatus incorporating the stabilizing device of this invention, a small portion of the stern of the boat being shown in section to illustrate an adequate method of attachment and the functional operation of the injector scoop.

FIG. 2 is a side elevation of the apparatus of FIG. 1 in which the scoop is shown in broken lines in the position which it will normally occupy when it is projecting into the water and injecting water into the tank. A control check valve and its attachments are shown in cross section.

FIG. 3 is a rear view of the scoop with its control lever shown in several alternative positions.

FIG. 4 is a plan view, shown partially in section, of a speedboat equipped with the apparatus of my invention, particularly illustrating the control mechanism.

FIG. 5 is a side elevation of a speedboat hull provided with the apparatus of FIGS. 1 to 3 and showing the scoop adjusted to its water level position, where it will produce substantially no water injection but will act as a drain and permit water to exhaust.

FIG. 6 corresponds to FIG. 5 except that the boat is illustrated with its bow out of water and the stern drawn down into the water as is normal when such boats are operated at high speed. In FIG. 6 the scoop is shown as adjusted to inject water into the tank at the bow.

FIG. 7 shows the boat with the bow tank filled with water and well illustrates the stabilizing effect of the weight balancing facility which is produced by the apparatus of this invention. The bow is practically on the mean water level, and the stern is below this water level with the scoop injector adjusted to project below the bottom of the boat in position to receive water rapidly in volume as the boat moves forward.

The embodiment of my invention illustrated in the drawings comprises a tank 10, preferably formed of plastic material such as a polyethylene fabric or other suitable plastic material and shaped substantially as shown in FIGS. 1 and 2, to fit generally into the bow limits of an ordinary speedboat, which may for example have a length of from 15 to 40 feet, an injector nozzle or scoop 11, preferably made of bronze or some other suitable substance which will not be subject to corrosion in salt water, a pipe 12, preferably of plastic material, and a control element 13, which is preferably formed of bronze and has two outlet paths, one through passage 15 into the tank 10 near the bottom and the other through by-pass 16 which leads upwardly through pipe 18 and is connected to discharge into the tank 10 near the top.

The control element 13, as clearly shown in FIG. 2, has check valve 20 attached to a shaft 21 and adapted to swing downwardly to close on a seat 22, as shown in dotted lines in the figure, or to swing upwardly to an open position, shown in full lines in the figure, so that water injected through the scoop 11 and pipe 12 enters the tank 10 near the bottom through passage 15. When the check valve 20 is closed, as by water head pressure in the tank, back flow of water from the tank 10 through passage 15 is prevented, and if water is still being injected through pipe 12, it will flow through the by-pass passage 16, pipe 18 and into the tank 10 near the top through connection 25.

A lever arm 28 is attached to the shaft 21 within the cockpit of the boat outside the control element 13. The lever arm, when in the position shown in full lines in FIG. 2, locks the valve 20 in its fully open position. When the lever arm is moved to the dotted position in the figure, however, the valve 20 is free to pivot between its open and closed positions. In this latter position of the lever arm, the valve 20 is normally closed, the weight of the valve retaining it against its seat 22. However, when the scoop 11 injects water into the pipe 12, the pressure of the injection opens the valve and permits the water to flow into the tank 10 until the water volume increases to a point where its head pressure equals the pressure of injection. At this point, the check valve 20 will automatically close, and the water, if continued to be injected, will flow through the by-pass passage 16 and pipe 18 into the tank 10 until the tank is fully charged. Therefore, to drain the tank, the check valve is opened by movement of the lever 28 to the position shown in full lines in FIG. 2.

The scoop 11 is preferably somewhat bell-shaped at its outer end, as shown at 30, and its inner end extends through a hole 31 in stern 32 of the boat and is mounted to swivel in response to a control lever 34. A bushing 35 is fitted into hole 31 and constitutes a bearing in which the scoop 11 is mounted. The scoop has an inner exten-

sion 33 which is connected to the end of the pipe 12 by a watertight slip joint, and said extension 33 has a control lever 34 attached. The scoop with its inner extension is so mounted in the bushing 35 as to swing readily in response to control lever 34 while constituting a watertight joint adequate to prevent any leakage into the boat.

The control of the scoop and its actuating lever will be clearly understood by reference to FIG. 3, which shows in full lines the scoop 11 in substantially horizontal position above the water line. The lever arm 34 is in a corresponding position at the left in FIG. 3, but may be swung to position 34*a* corresponding to position 11*a* of the scoop, both of these parts being shown in broken lines and clearly indicating that the intake end of the scoop 30 is below the water line in the latter position and above the water line in the first position. If desired, the lever arm 34 may be actuated to move the scoop 11 to a position 11*b* halfway below the water line. In this position of the scoop, the rate at which water enters into the tank 10 is relatively slow, which permits close control of the water admitted to the tank.

A cable 40 is attached at one end to lever 34 and is guided over sheaves 41, 42, 43 and 44 and is attached to lever 28 of the control valve at its opposite end as illustrated in FIG. 4. A second cable 45 is attached to lever 34 and is guided over sheaves 46 and 47, is wound around control drum 48 with its opposite end extending over sheave 49 and attached to control lever 28 of the check valve which forms a part of the control element 13. The control drum is conveniently located near the steering wheel of the boat and the engine throttle so that the operator may, without changing position in the boat, control the engine and also control the position of the scoop by a suitable lost motion connection to the lever 28. There is thus an interlocking association between the position of the scoop and the manual opening and closing of the check valve 20.

The drum 48 has a hand crank 48*a* subject to the control of the operator. By turning the drum in a clockwise direction, the check valve 20 when closed is opened and the scoop 11 moved to its substantially horizontal, out-of-water position. Under these conditions the tank 10 is quickly drained by outflow of water exhausting through scoop 11.

Assuming that the boat is started and accelerating forward in the water and the water becomes rough, the operator may then manipulate the hand crank 48*a* to turn the drum 48 in a counterclockwise direction, thereby releasing the check valve 20 to function automatically and swing the scoop injector down into the submerged position 11*a* of FIG. 3.

Tank 10 is provided with a vent and overflow drain pipe 40 at the top, and this is preferably a rubber or plastic tubing which by its extended length may discharge any excess of water charge over the side of the boat.

Referring to FIG. 5, the boat here shown for the purpose of illustration comprises a hull 50, a spray wind shield 51, and a motor 52 with its propeller 53. When the boat is at rest, it has a shallow draft and throughout the entire length of the hull extends below the water level to an almost uniform depth. Usually, however, on account of the weight of the motor, the stern of the boat will lie somewhat deeper.

If the boat is driven at reduced speed in calm water, the stabilizing apparatus of my invention may remain neutral, the scoop injector being positioned substantially horizontally above the water line.

If, however, the boat is operated at high speed by gunning the engine, the power thrust of the engine propeller of the boat will cause the bow to lift and ride substantially as shown in full lines in FIG. 6, with a major portion of the boat hull out of water and the stern dipping to a lower level below the water line. During such maneuver, however, the bow may be lowered as desired, for example, to the position shown dotted in FIG. 6, for better balance and smoother riding by lowering the scoop into the water to charge the tank with a limited volume weight of water. Then, when the scoop is raised out of water, the check valve 20 will close and retain this particular charge in the tank. In this regard, a loop link 55, as shown in FIG. 4, permits sufficient lost motion in the movement of the valve 20 (FIG. 2) to enable the scoop 11 to be positioned above the water while permitting the valve 20 to continue to pivot and not locking the valve in its open position. Hence the pressure head weight of the water in the tank 10 is sufficient to retain the valve 20 shut unless and until the operator moves he hand crank 48*a* to its fully clockwise position, thus opening the valve 20 and thereby draining the tank.

If the boat as shown in FIG. 6 is driven at high speed through rough water and due head on into water waves, the bow will swing up and down and produce a very severe pounding shock action, which is most uncomfortable for any passenger or crew in the boat, and in most instances necessitates curtailing the speed in order to lessen the shock. This is corrected by the further use of the stabilizer of my invention by swinging the scoop into its lower submerged position 11*a*, as shown in FIGS. 3 and 6, whereby water will forcibly enter into the mouth of the scoop, flow through the pipe 12 and quickly fill the tank 10 with water until the weight near the bow is sufficient to substantially stabilize the boat and bring it substantially into the posiion shown in FIG. 7.

By reason of the fact that the tank 10 is formed of plastic material, the weight of the water when the tank is filled will press the side walls of the tank into the spaces between the ribs of the boat in a manner as shown in FIG. 4 and thus insure that it is held firmly in position when the boat is in operation. Also because of the flexibility of the plastic walls of the tank, a tank of a given size is adapted for boats which differ considerably in shape and size, and hence the number of different sizes of stabilizers necessarily carried in stock by the boat yards or manufacturers may be substantially reduced.

When the boat is stabilized, as shown in FIG. 7, it may be driven at high speed in rough water with the usual bounding effect largely eliminated, to the comfort of the passengers and crew.

On many occasions, the operator may wish to drive the boat at moderate speed with the scoop in a substantially horizontal or drain position, and yet it may be desirable to keep the tank 10 filled. This is accomplished through the use of the loop link 55, described above, which permits enough lost motion in the movement of valve 20 to enable the pressure head weight of the water in the tank 10 to keep the valve 20 shut until the operator moves the hand crank 48*a* to its full clockwise position, opening the valve and draining the tank.

Although the tank 10 is primarily employed for stabilization by taking on water as needed, it has the additional advantage of providing an air displacement, when empty, to provide buoyancy which is sufficient in many cases to prevent the boat from sinking should its hull be punctured, as by accident.

While I have shown and described an embodiment of this invention best known to me at this time, it will be obvious to those skilled in this art that variations and modifications may be made without departing from the spirit of the invention, and only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. A stabilizer for boats comprising a tank adapted to be located in the bow, a pipe connection thereto and extended to a gooseneck-shaped scoop mounted in the stern and adapted to swivel into position below the water line to take in water as the boat moves forward and inject it into the bow tank, and to swivel out of the water to a position to drain water from the bow tank.

2. The structure of claim 1 in which a two-way con-

nection is provided from the pipe, one to the tank near the bottom and the other to the tank near the top.

3. A stabilizer for boats comprising a tank adapted to be located in the bow, a gooseneck-shaped scoop mounted in the stern and adapted to swivel into position below the water line to take in water as the boat moves forward and inject it into the bow tank, a two-way connection from the pipe, one to the tank near the bottom and the other to the tank near the top, a check valve biased to automatically occupy a closed position after the water has been injected into the tank through the bottom conduit, and a top vent with a flexible hose outlet leading over the side to take off overflow from the tank when the scoop is acting to force water into the tank when full.

4. The structure of claim 3 having a hand operating means for opening the check valve to drain the tank as desired.

5. The structure of claim 3 in which means for opening the check valve is coupled with the scoop injector whereby the check valve may be opened when the scoop injector is adjusted out of operation.

6. In a speedboat having a heavy engine at the rear, a rudder and throttle control near the bow, a stabilizer comprising a water tank shaped to fit the bow of the boat, an injector swivel mounted at the stern of the boat and connected to said tank, means for adjusting the position of the injector to take in water when the boat moves forward or to adjust it above the water level, whereby the tank in the bow may be filled to the desired extent with water to stabilize the boat or to drain the tank when the stabilization is unnecessary.

7. In a motorboat adapted to operate at relatively high speeds, a tank mounted forward in the bow, a check-valve having a two-way connection including an upwardly directed by-pass pipe connection to the tank at its bottom and top, the two-way connection being joined with a main pipe extending to and through the stern of the boat and terminated in connection with an actuatable water intake injector and exhaust, means for actuating said injector to charge water into the bow tank during boat operation in rough water, whereby the weight producing effects of the water charge substantially counter-balances the otherwise up and down pounding action of the boat bow when riding over rough and choppy water waves.

8. The structure of claim 7 wherein the check-valve is biased to automatically close when the water-head pressure in the tank is balanced by the pressure of the water injection, said check-valve by-pass affording means to further charge the tank with water for increase of weight producing effects and up to full tank capacity as may be desired.

9. The structure of claim 7 in which means for opening the closed check-valve for tank drainage of its water charge is coupled for control with the injector, whereby its adjusted water exhaust position is coordinated with the opening position of the check-valve.

10. The structure of claim 7 in which the tank is molded of flexible plastic material shaped in contour for snug fitting into the bow spaced shape of the boat, whereby upon being charged with water its contoured side walls are flexibly expanded against the inner ribs or walls of the boat bow for stability.

11. Apparatus means for stabilizing motorboats when propelled over rough water, which comprises a water receiving tank formed of plastic material and mounted forward in the bow of the boat, said tank having a water intake and outlet defining tubular connections, one directed into the bottom thereof having an interposed actuatable check-valve adapted for opening and closing, and a second one directed into the top of the tank thereby by-passing the bottom connection, said connections being joined with a water conveying conduit extended therefrom to and through the stern end of the boat and terminated by connection with actuatable valvular means adapted for charging said tank with water for weight producing effects when desired and thereby stabilizing the boat when propelled over and through rough water waves, whereby bow lift and dropping shock pounding on the hull of the boat is substantially counter-balanced by the water weight effects of the charged tank.

12. In a motorboat powered for high speeds, an accessory device adapted for installation in said boat for purposed of stabilizing its operation over rough water waves, said device comprising a flexible plastic tank adapted in contour to fit snugly forward into the bow of the boat and having pipe connections wtih an actuatable water intake injector and exhaust adjacent the stern, means for actuating said injector to charge water into the bow tank during boat operation in rough water, whereby the weight producing effects of said charge substantially counterbalance the otherwise uncontrolled up and down pounding action of the boat hull when riding over the rough water waves, and further means for emptying said tank of its water content by gravity when the propelled boat approaches calm water.

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