Sept. 26, 1961 M. L. JACOBS ET AL 3,001,499

REAR MOUNTED PLANING AND STABILIZING STRUCTURE FOR POWER BOATS

Filed March 16, 1959 2 Sheets-Sheet 1

Fig. 1

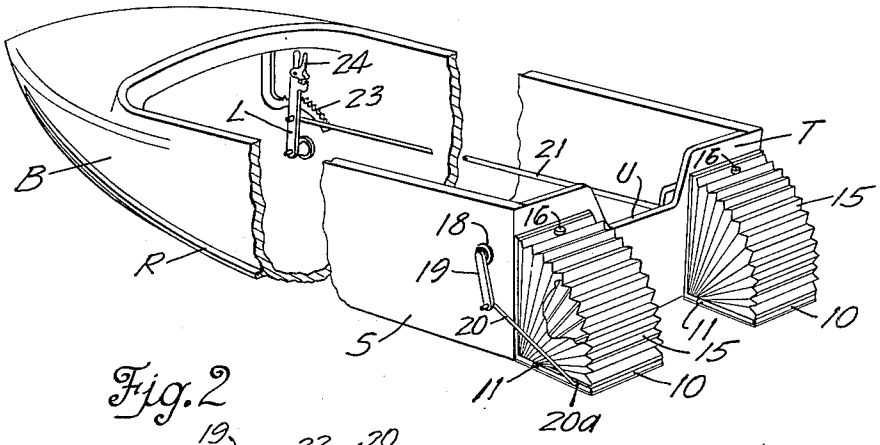


Fig. 2

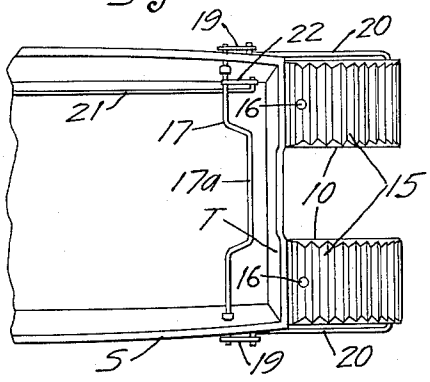


Fig. 4

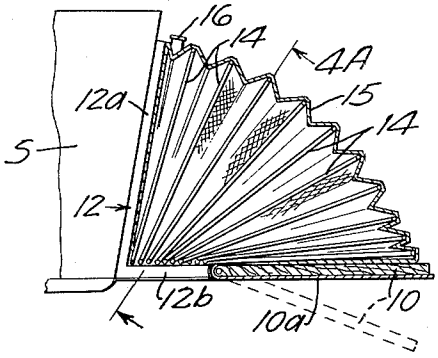


Fig. 3

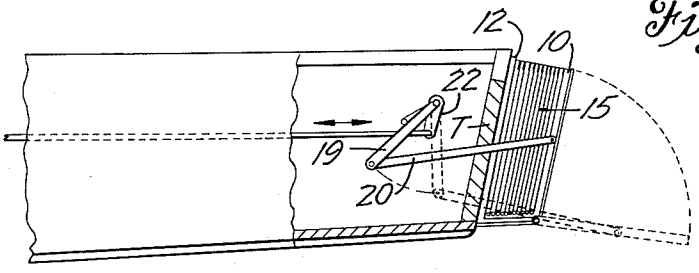
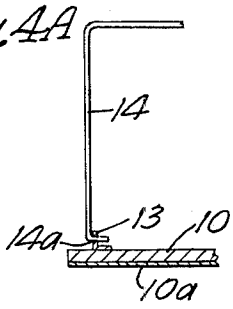


Fig. 4A



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Fig. 5

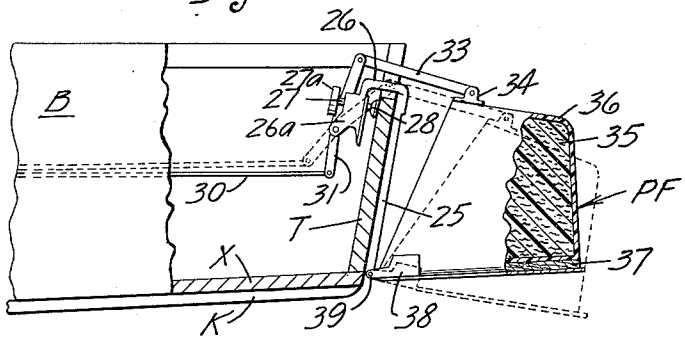


Fig 6

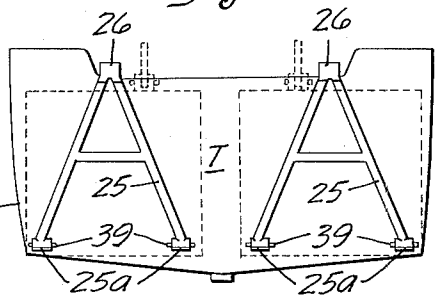
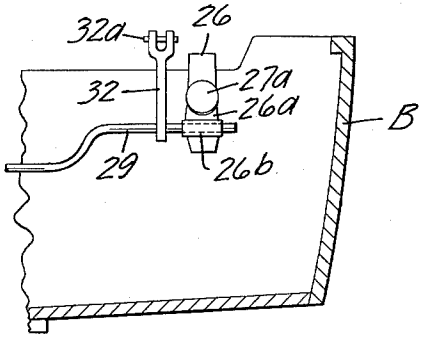


Fig. 7



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REAR MOUNTED PLANING AND STABILIZING STRUCTURE FOR POWER BOATS

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This invention relates to smaller power boats equipped with either inboard or outboard motors and has particular relation to equipment or attachments which substantially improve the riding qualities and stabilization of such boats under various conditions of wind, current and waves in travel or at rest.

In our co-pending application, S.N. 747,736 we disclosed the broad general features of adjustable planing-floats which when applied to conventional power boats of smaller size, would prevent the slapping or pounding of such boats during travel through waves as well as would adequately stabilize the stern and waist of the boat to prevent wallowing in the trough of waves and swamping through action of stern waves. The said stabilizing action was accomplished through displacement of water in two transversely spaced areas disposed rearwardly of the stern or transom of the boat and angularly adjustable planing surfaces were formed at the bottoms of said displacement means, hingedly connected with the stern plate or transom to vary the angle of displacement and provide very effective stern-elevating leverage from points or areas disposed in spaced relation to the stern plate or transom.

It is an object of our present invention to provide combined planing elements and stabilizing displacement means having a pair of elements disposed in transversely spaced relation behind the stern of the boat and having minimum weight and maximim collapsibility for substantially facilitating the unloading of a boat, stern foremost into the water and for minimizing the space requirements for housing and storage and transportation of a boat on a trailer in travel.

A further object of this invention is to provide readily attachable planing-float structure for smaller power boats which is exceedingly light and compact in structure and which will conform to standard hull shapes and provide angular and adjustable lifting functions at the stern of the boat and from behind the stern to eliminate slapping and pounding and stabilize the rear portion of the boat in numerous and substantially all conditions of wind, waves, tides and travel.

In one form of our present invention, the two transversely spaced, adjustable water displacement and stabilizer mediums constitute angularly collapsible bellows-type housings mounted in sealed relation to the stern plate or transom of the boat and to planing plates which in turn at their foremost edges are hingedly connected behind and to the stern plate or transom of the boat for immediately adjustable varying angular relation to the general contour of the bottom of the stern and waist of the boat.

Most power boats, particularly at higher speeds, ride with the bow and a substantial portion of the fore hull structure out of water and with the stern disposed close to the water level. Such riding, if waves are present, produces severe slapping and pounding, causing discomfort to the passengers as well as stresses imposed upon hull and motor. The problem of smooth riding and swamping or instability during travel or at rest, with boats has been increased in recent years by the manufacture and use of considerably heavier and more powerful engines, particularly of the outboard type.

With our improved construction the stern portion of

the boat is perfectly stabilized in travel or at rest while the rear of the boat and also the bow portion thereof may be adjustably lifted to put a minimum amount of friction on the hull during travel at high speed. With our structure, adjustment may be instantly made by a control at the wheel or convenient to the driver so that varying conditions in taking different courses through waves and tides, may be properly compensated to assure smooth riding of the boat without pounding or rolling in high speeds and in considerably heavy winds.

The foregoing and other objects of the invention will be more apparent from the following description made in connection with the accompanying drawings wherein like reference characters refer to similar parts throughout the several views and in which:

FIG. 1 is a foreshortened perspective view of a power boat adapted for attachment of an outboard motor having one form of our invention operatively applied thereto;

FIG. 2 is a top plan view of the rear portion of said boat with our attachment in operative position for travel;

FIG. 3 is a view partly in side elevation and partly in vertical section showing the rear portion of the same boat with our stabilizing float collapsed for transportation or for loading the boat into the water, rear foremost from a trailer;

FIG. 4 is a detail side elevation of the boat showing one form of the invention extended for planing and stabilizing operation, the lower portion of the planing plate and lower bellows being broken away to show parts in cross section;

FIG. 5 is a view partly in side elevation and partly in vertical section showing another form of our invention with the dotted lines indicating rear-leverage planing position of the stabilizing float;

FIG. 6 is a rear view of the last mentioned form showing the reinforcing clamping brackets with the pivoted planing floats removed;

FIG. 7 is a fragmentary cross section taken transversely through the rear portion of the boat and looking to the rear, showing one of the clamping brackets and control for one of the floats; and

FIG. 4–A is a fragmentary sectional view taken along the line 4A—4A of FIG. 4.

Referring now to the form of our invention illustrated in FIGS. 1 to 4 inclusive, a power boat of conventional hull and configuration is shown having the bow B, the stern portion S and the usual transom or stern plate T recessed downwardly along its upper edge at U to form a suitable vertical attachment plate for an outboard motor. A rearwardly and downwardly curved diagonally disposed splash rail R is provided at each side of the hull extending from the bow apex to the waist of the boat and is desirably of a width of an inch or more and extends outwardly and downwardly relative to the boat hull.

The bottom of the hull of the boat is provided with the usual longitudinal keel board K which depends a short distance below the bottom X of the hull in conventional fashion.

Our invention includes as essential elements a pair of transversely spaced stabilizing and angularly adjustable planning members which in the form of FIGS. 1 to 4 inclusive, each comprises a rectangular planing plate **10** which may be constructed from a sheet of plywood or rigid non-corrosive metal and if made of plywood, preferably is coated on the underside thereof with a slippery plastic coating **10***a*. The planing plates **10** are hingedly connected by hinge structure **11** with the forward edges of L-shaped attachment brackets **12**, as shown being of the width of the stabilizer planing structure and having forward upstanding attachment plates **12***a* which are

rigidly secured by suitable waterproof cement, screws or other means to the outward side portions of the transom or stern plate T. The narrow base portions 12*b* of the brackets 12 are rigid with the attachment plates 12*a* and in addition, to supporting the hinge construction 11 at the rearward edge thereof, serve as supports for a pair of narrow angle strips 13 (see FIG. 4–A) which extend longitudinally of the boat hull behind the stern and which are provided with a plurality of longitudinally spaced bearing apertures to accommodate and journal the lower ends of a plurality of U-shaped stay members 14 for distending a sealed expansible bellows housing 15. The side edges of the planing plates 10 and the outer sides of the bellows housing 15 preferably extend in substantial continuance or slightly inwardly from the assumed extended contour of the sides of the boat hull from the stern. The bellows housing 15 may be constructed of suitable flexible sheet material which is impervious to water such as impregnated duck or thin canvas or certain of the plastic filled textile materials or flexible plastics which are available on the market. The vertical top and side and bottom edges of the bellows housing are all efficiently sealed, the forward upstanding edges being sealed at each side of the housing with marginal portions of the upstanding attachment plate 12*a* and the lower edges of the bellows housing at both sides thereof being efficiently sealed with the shelf-like horizontal portion 12*b* of the bracket and further, with the upper surface and longitudinal marginal portions of the planing plate 10. The housing is constructed with pleats or folds as shown, which extend generally radially at the sides of each housing and each pleated portion at its center fold as shown in FIG. 4, is distended at sides and outer edge by one of the U-shaped stays 14. Pivot pins 14*a* journal the lower ends of the inverted U-shaped stays for each housing in the apertured bearings formed in the angle strips 13, the pivoted ends of the stays being closely spaced apart in succession to provide for easy extension or compaction of the respective housing in bellows manner when the associated planing plate 10 is lowered or raised respectively. A short vent tube 16 is carried in the peripheral portion of each bellows housing adjacent the forward attached end thereof communicating with the interior of the respective housing at the highest point thereon.

The hinge axes of the planing plates 10 are disposed very slightly above the level of the bottom of the hull of the boat at the stern end.

We prvide simple instantly adjustable means for varying the angulation of the rearwardly disposed planing plates 10 relatively to the stern portion of the hull bottom and in the embodiment disclosed in FIGS. 1 to 4 inclusive, we provide a transversely disposed crank shaft 17 journaled adjacent its ends in ferrule bearings 18 provided appropriately in aligned portions of the sides of the hull just forward of stern plate T. The crank shaft 17 as shown is offset downwardly and rearwardly medially thereof at 17*a* to accommodate and be free of interference of the clamping portions of an outboard motor. The outer ends of crank shaft 17 extend through the sides of the hull and have affixed thereto depending lever arms 19 which have pivoted to the outer ends thereof non-corrosive metal links 20 which in turn at their rearward ends, are pivotally connected at 20*a* with the outer side edge portions of the respective planing plates.

In FIG. 1 the planing plates 10 of the two combination stabilizer and planing sections are shown in substantially horizontal position and in FIG. 4, the dotted line position shows the plates further angled with reference to the stern of the boat and depressed at their free ends to apply lifting leverage from areas rearward of the stern of the boat, to lift the stern during travel and as will be later seen, to prevent slapping or pounding of waves on the hull during travel.

In FIG. 3 the planing plate 10 of one side of the stern is shown in fully collapsed position with the bellows housing completely collapsed in snug relation with the stern plate or transom T accomplished by turning the crank shaft 17 clockwise as viewed from the left or port side of the boat.

The crank shaft 17 may be instantly and turnably controlled by a hand lever L or the equivalent interconnected as by an elongated link 21 with a rocker arm 22 which is affixed within the boat hull to one end of the journaled crank shaft 17. A suitable gear segment 23 is provided for adjustably retaining lever L in a variety of adjusted positions receiving a conventional elevatable tooth (not shown) manipulatable by a trigger arm 24 pivoted to the upper end of the lever handle.

It will of course be understood that various instantly controllable media or mechanisms may be sbstituted for the simple lever, longitudinal linkage 21 and rocker arm 22 to instantly adjust the angular relation of the planing plates 10 with the stern plate of the boat and to of course also when desired, completely collapse the planing float structure into the position shown in FIG. 3.

Operation

When the boat with our structure attached thereto is ready for transportation or to be placed in storage, the two planing plates 10 are angled upwardly to collapse the bellows housing structure and dispose the bellows and plates in compact relation against the stern plate of the boat.

When the boat is lanuched for travel, in the water the planing floats are extended with the plates 10 disposed substantially horizontally in general conformity with the stern bottom of the hull structure. The two widely spaced housings rearwardly of the boat's stern then displace the supporting water and stabilize the stern of the boat and prevent wallowing of the boat during travel. They also constitute bouyant bodies to normally raise the stern of the boat when the boat is at rest.

In travel of the boat forwardly when waves are encountered, bouncing and pounding of the hull and jarring of the motor is quickly eliminated by pulling rearwardly on the lever L after releasing the gear segment which instantly deflects or angles the planing plates 10 downwardly from their hinged connections, the amount of adjustment being made to overcome the bouncing and pounding effect. This adjustment will vary considerably depending upon the water and weather conditions and the direction of travel relatively to the waves.

In conventional power boats which do not have our novel apparatus attached thereto when speed of the boat is increased through even small waves or ripples the bow of the boat rises out of the water correspondingly lowering the stern of the boat and pounding of the boat increases with speed through waves.

Furthermore, in diagonally crossing waves or in travel in the troughs of waves, wallowing is encountered which often is dangerous and in traveling with the waves, often swells stern-swamp the boat.

These unpleasant and sometimes dangerous effects are entirely avoided through the corner stabilizing effect of our widely spaced planing plates and displacement housings 15.

If fast travel of the boat is suddenly abated as in preparing for a landing even through waves travel towards the stern of the boat, it will not be swamped due to the corner stability and displacement bouyancy provided by the stern connected bellows housings 15.

In adjusting the planing of the hull by angular lowering of the two widely spaced planing plates 10, leverage is applied most advantageously from areas spaced a short distance behind the transom or stern plate of the boat. Such leverage is substantially great and only a slight angulation is required to maintain the stern elevated at the desired level relatively to the water surface and unexpectedly the speed of the boat is not diminished. In travel the bow portion of the boat equipped with our

apparatus does not vary its general area level from the position of other bow portions of conventional boats not equipped with our structure. At high speeds with our structure, actual frictional surface of the hull is not increased to any appreciable extent. In fact if splash rails R are employed diagonally at the bow portions of the boat there is a definite combined lifting effect of the entire hull during high speed travel since the splash rails R laterally extending downwardly tend to lift the bow of the boat at high speeds while the deflection of the planing plates **10** at a slight angle correspondingly lifts the stern thereby enabling the bottom of the hull to plane on a minimum water contact area.

In the form of our invention illustrated in FIGS. 5 to 7 inclusive, a very quickly attachable and detachable floating and planing structure is provided, comprising generally speaking a pair of widely spaced planing-float assemblies hingedly mounted in a generally similar manner outwardly of the transom or stern piece of the boat.

As shown, a sturdy clamping structure is provided for each angularly adjustable planing float assembly, each structure having a rearwardly and outwardly rigid A-frame **25** disposed in operation flush against the rear upstanding surface of the transom or stern plate T of the boat and rigidly interconnected at the upper converging end of the A-frame with an inverted U-shaped sturdy clamping structure indicated as an entirety by the numeral **26**, said clamping structure for each of said planing floats having a depending head **26***a* which is disposed inwardly of the transom T and which threadedly carries a heavy clamping screw **27** having swivelly affixed to the rear end thereof an enlarged clamping collar **28** for engagement with the upper recess edge of the stern plate or transom T. The forward end of clamping screw **27** has affixed thereto an enlarged knurled knob **27***a* to facilitate tightening of the clamping structure.

The depending head **26***a* of the clamping bracket has a horizontal transverse bearing **26***b* in the lower portion thereof which journals one end of a transverse crank shaft **29** which as shown, has its intermediate portion offset downwardly to be spaced from the clamping structure of an outboard motor (not shown).

The crank shaft **29** is journaled in its ends by the bearings **26***b* of the two widely spaced attachment brackets and is turned by linkage mechanism including the longitudinally disposed link **30** pivotally connected at its rearward end with the lower end of a fixed rocker arm **31** secured adjacent one end of the crank shaft, as shown in FIG. 5. The link **30** may be connected with instantly controlled lever adjustment means of the type illustrated and described with reference to the first form of our invention.

For adjustment of each of the planing floats an upstanding rocker arm **32** is rigidly affixed to terminal portions of the crank shaft **29**, said arms **32** of the two crank shaft ends being aligned and each of the rocker arms **32** at its upper end is bifurcated for pivotal connection by a pin **32***a* with a rearwardly extending actuating link **33** which at its outer end is pivoted to an upstanding ear **34** rigidly affixed and preferably through reinforcement structure secured to the interconnected planing float indicated as an entirety by the letters P.F.

Each of the planing floats P.F. has a body of trapezoidal cross section **35** preferably constructed of a foamy closed cellular plastic construction such as styrofoam molded or otherwise formed appropriately with the outer side walls of each body lying within the confines of imaginary extensions of the stern sidewalls of the boat. The very light bouyant body **35** is preferably encased and reinforced by a tough hide or casing **36** which may be conveniently constructed of a reinforced plastic such as the tough plastic sheeting employing with the plastic per se, reinforcing of glass fibers or the like. Each of the bouyant bodies **35** at the base thereof is firmly adhered and supported upon a planing plate **37** which may be constructed of suitable material such as

coated plywood. The forward edge of each of the planing plates **37** is provided with a sturdy hinge bracket **38** which terminates forwardly in an apertured bearing **38***a* for receiving the hinge pintle **39** which passes through and is retained against displacement in a hinge bearing **25***a* formed horizontally at the lower extremities of each of the two legs of the A-frame **25**. Thus, each planing float is hinged at two widely spaced points to the depending diverging ends of the rigid A-frame **25** disposed exteriorly and flush against the rear surface of the transom T.

It will be noted that in both forms of the invention, the planing plates and accordingly of course the displacement or bouyant bodies mounted thereon are hinged on axes spaced rearwardly from the stern plate or transom of the boat. This causes lifting power to be very effectively applied to the stern and furthermore enables the effective planing lengths of the planing plates to be diminished as contrasted with the structure of our pending application, S.N. 747,736.

From the foregoing description it will be seen that we have provided highly efficient, simple and immediately controllable planing mechanism and stabilizing displacement means for power boats varying in conventional structure and size to positively eliminate slapping and pounding of the boat with the inherent discomfort to passengers.

It will further be seen that with our improved structure the speed of a power boat is not decreased when downward deflection of the planing plates is required to eliminate slapping of the boat hull as it travels through waves or ripples, yet on the other hand by combining our structure with splash rails properly mounted at the bow portions of the boat extending from the parting line of the bow along the sides, the actual frictional surface of the boat contacting the water at high speeds will be decreased by lifting the boat stern and bow portions of the boat as contrasted with conventional hull structures now in use which do not utilize our invention.

It will of course be understood that various changes may be made in the form, details and arrangement of the parts without departing from the scope of our invention.

What is claimed is:

1. A readily attachable, rear-mounted planing and stabilizing structure for power boats of the type having a conventional one-piece hull including a bow, stern and bottom portions and an upstanding stern plate, said planing and stabilizing structure comprising a pair of transversely spaced, rigid mounting frames adapted to be securely clamped to the upstanding stern plate of a power boat and each having a substantial depending frame portion disposed in contacting relation with the rear and exterior of such a stern plate and terminating at each instance at the lower end portion thereof and hinge elements located transversely of the boat and in close relation to the bottom edge of the stern plate when said structure is so attached to a power boat, a pair of displacement bodies of box-like configuration each having a rearwardly inclined front face and each being attached at the lowermost edge of its front face to respective hinge elements of the associated mounting frames for swinging movement on substantially horizontal axes transversely of the boat, said water-displacement bodies being transversely spaced apart and extending longitudinally rearwardly from opposite sides of said stern plate when said planing and stabilizing structure is mounted on a boat, a pair of rigid substantially planar planing plates each being attached and sealed to the bottom of one of said displacement bodies for swinging movement therewith, and actuating mechanism operatively connected with said displacement bodies and being controllable from within the boat hull for simultaneously varying the angulation of said displacement bodies and its associated planing plates.

2. A structure as set forth in claim 1 wherein said

actuating mechanism includes a crank shaft adapted to be mounted interiorly and transversely of the boat hull adjacent the stern plate and being journalled in forward portions of said mounting frames.

3. A structure as defined in claim 1 wherein said displacement bodies are of buoyant construction and are formed of non-hygroscopic, like foam material.

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