Nov. 5, 1963 R. W. DORST 3,109,407

JET DRIVE MOUNTING MECHANISM FOR POWER BOAT

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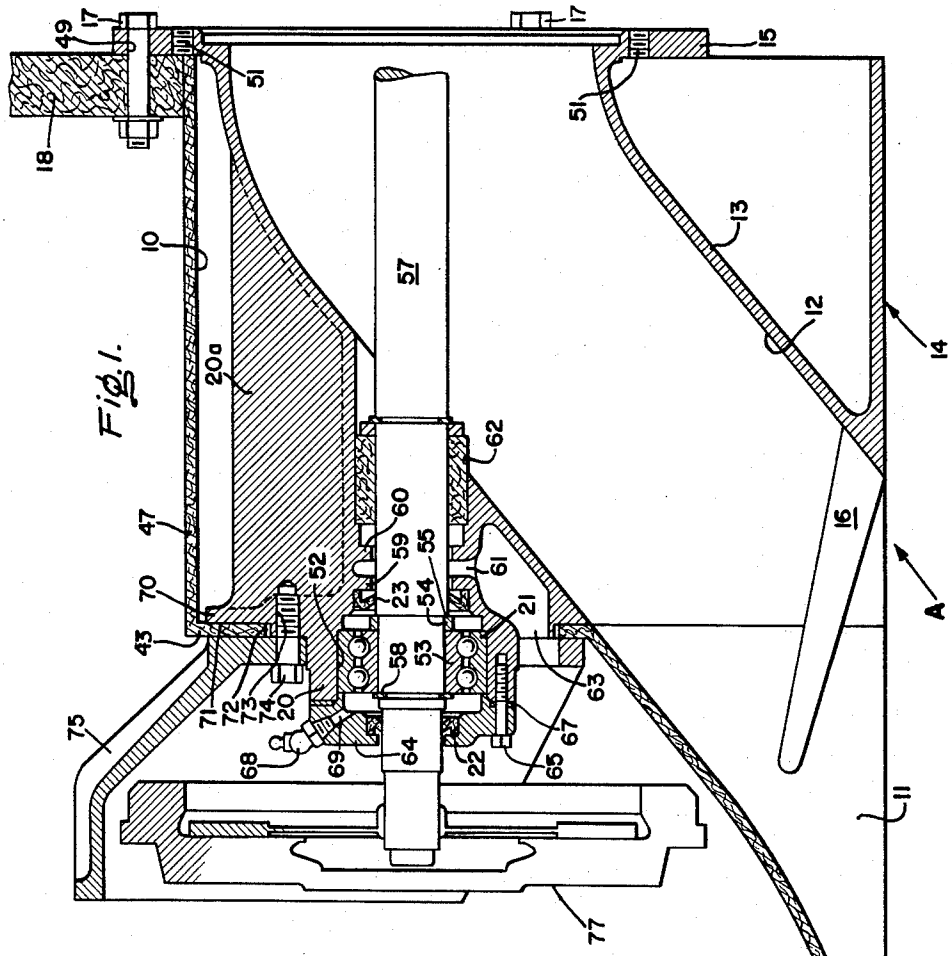


Fig. 1.

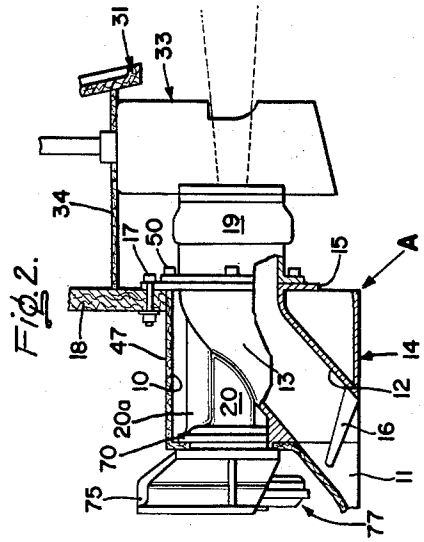


Fig. 2.

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Fig. 3.

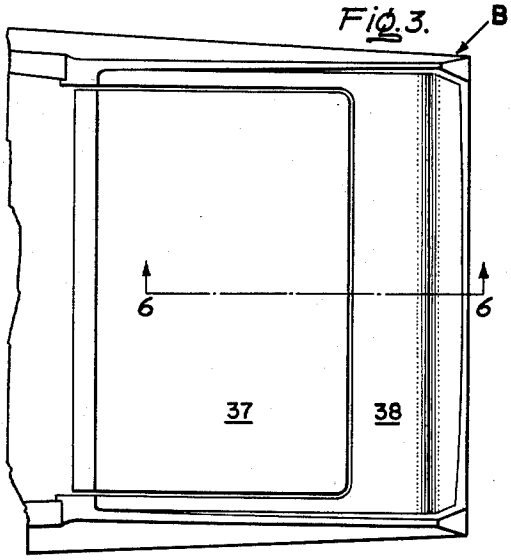



Fig. 5.

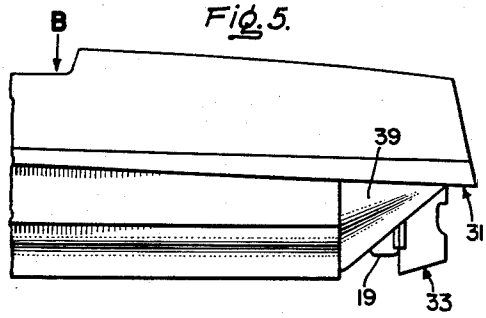



Fig. 6.

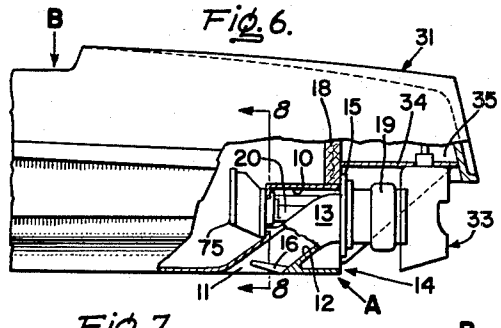



Fig. 4.

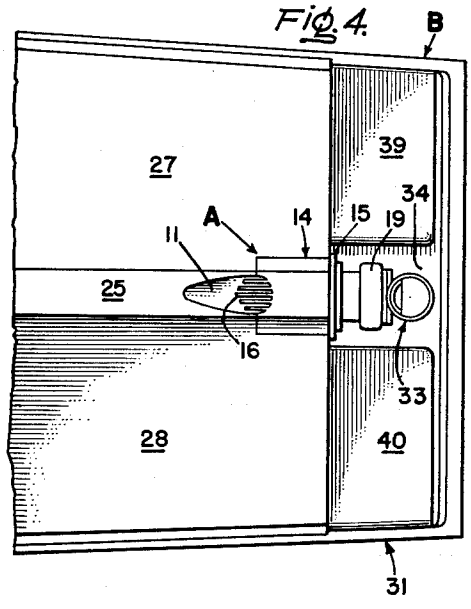



Fig. 7.

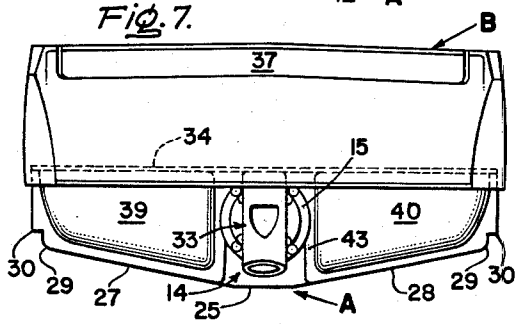



Fig. 8.

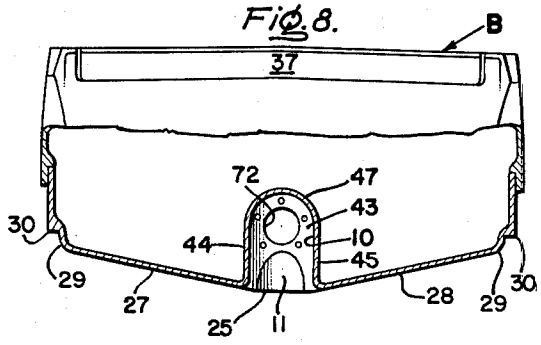
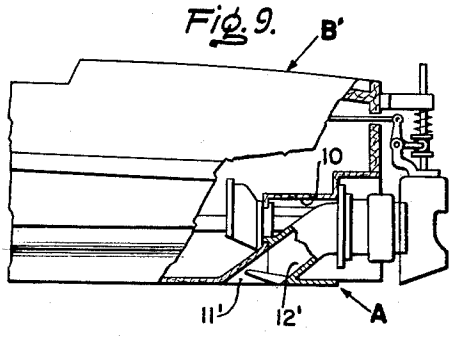



Fig. 9.




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# JET DRIVE MOUNTING MECHANISM FOR POWER BOAT

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9 Claims. (Cl. 115—14)

The present invention relates to boats, and pertains more particularly to an improved, jet drive mounting mechanism for the stern of a motor boat.

Although the principle of driving a boat by discharging a jet of water at high velocity rearwardly therefrom is old, it is only within the last few years that this form of boat propulsion has been used to any extent on small, pleasure type boats. Recently, however, this type of boat drive mechanism has received a considerable amount of attention, and several designs for using this principle have been developed. In most of these recent developments, the intake water is usually drawn from beneath the hull forwardly of the transom, is carried angularly upwardly and rearwardly through a duct into a pump, which is driven by an engine mounted inside the hull, and the pump discharges the water in the form of a high velocity jet stream rearwardly above the water level.

In this type of drive mechanism, the problem of mounting the pump on the boat hull, and of providing the intake duct from the under side of the hull into the pump, have presented serious problems.

The present invention provides jet drive mounting mechanism for a boat hull wherein a portion of an intake duct is incorporated in the hull, a recess is formed in the stern to receive an impeller mounting therein, and an impeller mounting unit is provided for interfitting into such recess and includes a complementary, continuing portion of the intake duct, together with mounting means for the impeller mechanism and discharge nozzle.

A further object of the invention is to provide an improved stern structure for a transom stern type boat hull wherein a recess is provided in the bottom of the hull at the stern, and a jet drive unit is provided of a size to fit snugly into the recess and flush with the bottom of the hull, an intake duct being in the jet drive unit and leading into a pump mounted therein.

A still further object of the invention is to provide an improved jet drive mounting mechanism for the stern of a boat hull.

These, and other objects and advantages of the invention, will be apparent from the following description and accompanying drawings, wherein:

FIG. 1 is a fragmentary, longitudinal, medial, sectional view through a stern portion of a boat hull embodying the present invention.

FIG. 2 is a similar view in reduced scale and showing the pump housing and other portions of the mechanism mounted thereon.

FIG. 3 is a fragmentary top plan view in further reduced scale of the stern portion of a boat hull embodying the invention.

FIG. 4 is a fragmentary bottom view of the hull portion shown in FIG. 3.

FIG. 5 is a fragmentary side elevational view of the hull portion shown in FIGS. 3 and 4.

FIG. 6 is a side elevational view similar to FIG. 5, but with the lower rear portion thereof shown sectionally along line 6—6 of FIG. 3.

FIG. 7 is a stern view of the hull portion shown in FIGS. 3–7.

FIG. 8 is a transverse, sectional view taken along line 8—8 of FIG. 6, the upper portion of the hull being shown in rear elevation.

FIG. 9 is a longitudinal, medial, fragmentary, sectional

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view of the stern portion of a boat having a flat, transom type stern, and with the invention embodied therein.

Briefly, in the illustrated form A of the invention, a recess 10 is formed centrally in the underside of the stern portion of a boat hull B, with a forward portion 11 of a water inlet passage 12 preferably formed in the bottom of the hull just forwardly of the recess 10. The remainder of the intake passage 12 comprises a duct 13 formed integrally in an insert 14, which preferably is of molded or cast metal, and which fits into the recess 10 and flush with the bottom of the hull B. An impeller mounting flange 15 is formed integrally on the insert 14 around the rear end of the duct 13, and this flange is secured by bolts 17 to the boat transom 18.

A high speed, axial discharge pump 19 is mounted on the flange 15, and a drive shaft duct 20 is formed integrally with the insert 14. The shaft duct 20 extends forwardly from the inlet duct 13, with which it communicates, and is secured in sealing relation to the forward end of the recess 10 (see FIG. 1).

A shaft ball bearing 21 (FIG. 1) is mounted in a seat provided therefor in the forward end of the shaft duct 20, and a pair of grease seals 22 and 23 are provided to retain grease in the bearing 21.

Referring to the drawings in greater detail, the hull B illustrated in FIGS. 1–8 is of a well known V bottom type, with a flat central or keel portion 25, and slight deadrise on the sides 27 and 28. The chines 29 are rounded, and the hull is provided with conventional "spray knockers" 30.

The illustrated jet drive mounting mechanism A of the invention can, however, be embodied in almost any form of hull, and in FIG. 9 is shown mounted in a conventional, transom, stern type of hull B'. The novel structure of the hull B of FIGS. 1–8 has many advantages over a conventional hull, such as the hull B' of FIG. 9, and is particularly adapted for use with the jet drive mounting mechanism A. In the hull B (FIGS. 1–8) an overhanging stern portion 31 extends rearwardly beyond the transom 18, and above the water line of the boat while not under way, for a distance sufficient to overlie and enclose the pump 19 and a steering mechanism 33 mounted beneath said overhanging stern portion 31.

A horizontal bulkhead 34 is sealed in place across the under side of this overhanging stern portion, and the space enclosed within the stern portion 31 and above the bulkhead 34 may be used as a part of the trunk or lazarette 35, access to which is gained through a hinged hatch cover 37, mounted in the usual after deck 38.

A pair of rearwardly tapered flotation chambers 39 and 40 are provided, one on each side of the hull. Each flotation chamber tapers upwardly and rearwardly from just above the lower edge of the transom 18 to the rear edge of the horizontal bulkhead 34. These flotation chambers provide additional buoyancy for the stern when the boat is at rest, but, as will be obvious from FIGS. 5 and 7, they are completely above the water when the boat is on a plane.

The illustrated hulls B and B' may be molded in a well known manner of glass cloth or mat and a suitable plastic, such as polyester or epoxy resin, to produce what is generally referred to as a "fiberglass" hull. The recess 10 for the jet drive insert 14 is preferably molded integrally into the hull B, and has a vertical, transverse forward wall 43, upright side walls 44 and 45 (FIG. 8) and an arched top wall 47 contiguous with the side walls 44 and 45.

The jet drive insert 14 preferably is of cast or die-cast metal, and the inlet duct 13 is preferably formed therein as an integral part thereof. The inlet duct 13 is preferably of circular cross-sectional shape, and is curved lengthwise in a smooth, gradual, reverse curve so

that its upper end is directed substantially co-axially into the forward or inlet end of the axially horizontal pump 19.

The inlet duct 13 preferably is of the same internal diameter as the inlet end of the pump 19, and when the insert 14 is flush-mounted in the recess 10, as best shown in FIG. 2, the inlet duct 13 and inlet opening into the pump provide a smooth, continuous passage for water flowing therethrough as best shown in FIG. 2. The small indented portion 11 of the inlet duct formed in the hull B is also of the same radius as the duct portion 13 formed in the insert 14, and is contiguous therewith when said insert is mounted in the recess 10 as shown in FIGS. 1, 3 and 5–7. Debris guards 16 are provided at the inlet end of the duct 13 to prevent the entrance of foreign matter therein.

Surrounding the rear end of the inlet duct 13, and extending radially therefrom, the annular, pump mounting flange 15 is formed integrally with the insert 14, and a plurality of holes 49 are provided in the flange 15 for receiving the bolts 17 by means of which the insert 14 is attached to the transom 18. A plurality of threaded holes 51 are also provided in the mounting flange 15 radially inwardly of the bolts 17 to receive a plurality of cap screws 50 (FIG. 2) for attaching the pump 19 to the insert 14.

The pump drive shaft duct 20 preferably is molded integrally with the insert 14, and a reinforcing rib 20*a* is provided lengthwise of its upper side. A bearing seat 52 is provided, as by counterboring, in the forward end of the shaft duct 20. The two-row, radial ball bearing 21 is mounted in the bearing seat 52 with the rear end of its inner race 53 retained against rearward axial displacement by a collar 54, seated against a shoulder 55 on the pump shaft 57, and against forward displacement by a usual snap ring 58 seated in a groove provided therefor in the pump shaft 57.

A pair of partitions 59 and 60 are provided transversely of the shaft duct 20, and a drain opening 61 is provided in the under side of this duct between these partitions to permit any water which might pass a conventional shaft packing 62 to drain out through this opening thence into the hull B through an opening 63 in the forward end of the insert 14 to keep such water from reaching the shaft bearing 21.

The rear shaft grease seal 23 is fitted into a seat provided therefor, as by counterboring, in the shaft duct 20, and the forward shaft seal 22 is similar fitted into a recess provided therefor in an annular bearing cap 64, which is secured to the forward end of the shaft duct 20 by cap screws 65, and is sealed thereto by a usual gasket 67. A conventional, pressure type grease fitting 68 is provided in the cap 64, and communicates with a grease passage 69 in the cap for packing the ball bearing 21 with grease.

An annular mounting flange 70 extends radially outwardly from the forward end of the shaft duct 20, and is relieved at 71 to provide a seat therein for the fiberglass forward wall 43 of the recess 10 surrounding the shaft opening 72 therein. A plurality of threaded holes 73 are provided in this annular flange 70 just inwardly of the relieved hull seat 71, and a plurality of cap screws 74 are inserted through a plurality of registering holes provided therefor in a conventional clutch housing 75. When these cap screws 74 are drawn down tight, the forward recess wall 43 is gripped tightly between the radial flange 70 of the insert 14 and the clutch housing 75. The latter is conventional, and is open on its underside to insure free drainage of any water or other liquid which might find its way therein. A conventional dry plate clutch mechanism 77 provides usual releasable, clutch connection to a usual engine driven, transmission drive shaft, not shown.

The invention provides an effective and ingenious jet drive mechanism for a boat, and one wherein the boat hull is provided with only a single, small, shaft aperture 72 therein, which aperture is not only fully sealed when the insert is secured in the recess 10, but also is located above the water line. The invention greatly facilitates the mounting and servicing of a jet drive mechanism on a boat hull, and also provides a solid metal interconnection of great strength and rigidity between the engine and the pump, which facilities the maintaining of proper pump shaft alignment.

The shape and smoothness of the interior of the water inlet duct to a jet drive pump for a boat is an important factor in the drive efficiency of a jet drive mechanism for boats. The present invention greatly simplifies the provision of high quality and uniformity in these factors, since the relatively small metal insert 14 can be readily handled for machining by conventional metal working machinery to provide a smooth uniform interior of the inlet duct 13. Such operations have not been easy or always accurate in the past, where inlet ducts were either molded as part of a hull, or were installed in the hull as a separate tube.

While I have illustrated and described a preferred embodiment of the present invention, it will be understood, however, that various changes and modifications may be made in the details thereof without departing from the scope of the invention as set forth in the appended claims.

Having thus described the invention, what I claim as new and desire to protect by Letters Patent is defined in the following claims.

I claim:

1. In a jet drive boat, a hull having an indented recess in the stern thereof and opening onto the bottom and after end of the hull, the sides and top of the recess being sealed to each other and to the hull, the only opening from the interior of the hull into the recess being a shaft hole in the forward end of the recess, an insert for insertion into such recess flush with the bottom of the hull, means for removably securing the insert in such recess, a water passage through said insert openly communicating from the bottom through the after end of the insert, means for mounting a power driven pump on the insert over the after end of the passage for drawing water in which the hull is floating from beneath the insert and discharging it in a high velocity jet rearwardly from the hull, and sealing means for sealing to the hull a drive shaft extending from the interior of the hull through such shaft hole to the pump.

2. An arrangement according to claim 1 wherein a portion of the passage is formed by a downwardly opening recess in the bottom of the hull forwardly of the insert.

3. An arrangement according to claim 1 wherein a forward continuation of the hull recess conforms to and comprises an extension of the passage through the insert.

4. A boat jet drive mechanism of the type wherein a water pump is mounted on the stern of the hull of a boat; said mechanism comprising, in combination with an upwardly indented recess formed in the bottom of a boat hull at the stern and opening onto the bottom and after end of the hull, the only opening from the interior of the hull into the recess being a shaft hole in the forward end of the recess, an insert of a size and shape to fit closely into such recess, and flush with the bottom of the hull means for removably securing the insert in such recess, a duct extending through the insert from its under side to and through the after end thereof, pump mounting means on the rear of said insert and surrounding the after end of the duct for mounting an impeller type pump thereon, and a power driven means shaft for driving such pump, said shaft extending through the hole in the forward end of the recess and sealed thereto, whereby, upon a power driven operation of such pump, water is drawn through such duct from the underside of said insert and

is discharged in a high velocity stream rearwardly from the hull.

5. An arrangement according to claim 4 wherein the power driven shaft is co-axial with the after end of such duct.

6. A boat jet drive mechanism comprising a boat hull, a water tight recess formed in the lower portion of the stern thereof, and opening onto the bottom and after end of the hull, a pump mounting insert formed for insertion into such recess with the bottom of the insert flush with the bottom of the hull, means for removably securing said insert in flush interfitted relation in such recess, an intake duct extending through said recess and communicating from the underside of the insert below the water line of such hull to the after side of the insert above the hull water line, means for mounting a jet discharge pump on said insert with the inlet side of such pump in sealed relation around the after end of the duct, and means for connecting such pump to a power driven shaft extending from the interior of the hull, through a sealed opening in the forward end of the recess above the water line for drawing water in which the hull is floating from beneath the hull, upwardly through said duct and discharging such water rearwardly in the form of a high velocity stream above the water level.

7. An arrangement according to claim 6 wherein the duct is not completed in the recess and an arched, forward extension of the hull recess is formed in the hull for contiguous, complementary relation with the forward end of the duct through the insert.



8. In combination with a boat hull having a transom at the stern thereof, a water tight recess in the bottom of the hull and opening downwardly and also rearwardly through the transom thereof, a jet drive insert fitted into such recess with the bottom of the insert flush with the bottom of the hull, means removably securing the insert in the recess, a jet discharge pump mounted on the rear of said insert, a discharge nozzle on said pump directed rearwardly above the water level of said hull, means forming a curved duct extending lengthwise through said insert with the after end of such duct in open communication with the intake side of said pump, and its forward end opening through the bottom of said insert, thereby to provide a supply of water from beneath the boat, through such duct to the pump, and a power driven shaft extending from the interior of the hull through a sealed opening above the water line of the hull in the forward end of the recess to the pump, and means operatively connecting the rear end of the shaft to the pump.

9. An arrangement according to claim 8 wherein a portion of the means forming the duct are in the insert and the remainder thereof are in the hull.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 114,637 | Beidler | May 9, 1871 |
| 633,171 | Weisz | Sept. 19, 1899 |
| 1,498,919 | Jensen | June 24, 1924 |
| 1,848,718 | Hoffman | Mar. 8, 1932 |
| 3,007,305 | Hamilton | Nov. 7, 1961 |