

Sept. 30, 1969

D. L. WOLLARD

3,469,557

CHANNEL STERN POWER BOAT

Filed May 1, 1967

6 Sheets-Sheet 1

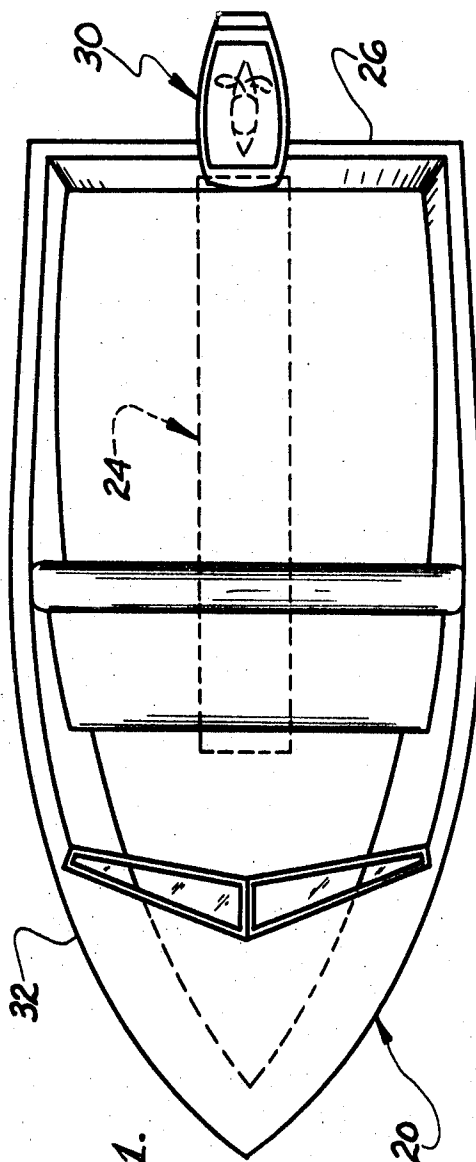


FIG. 1.

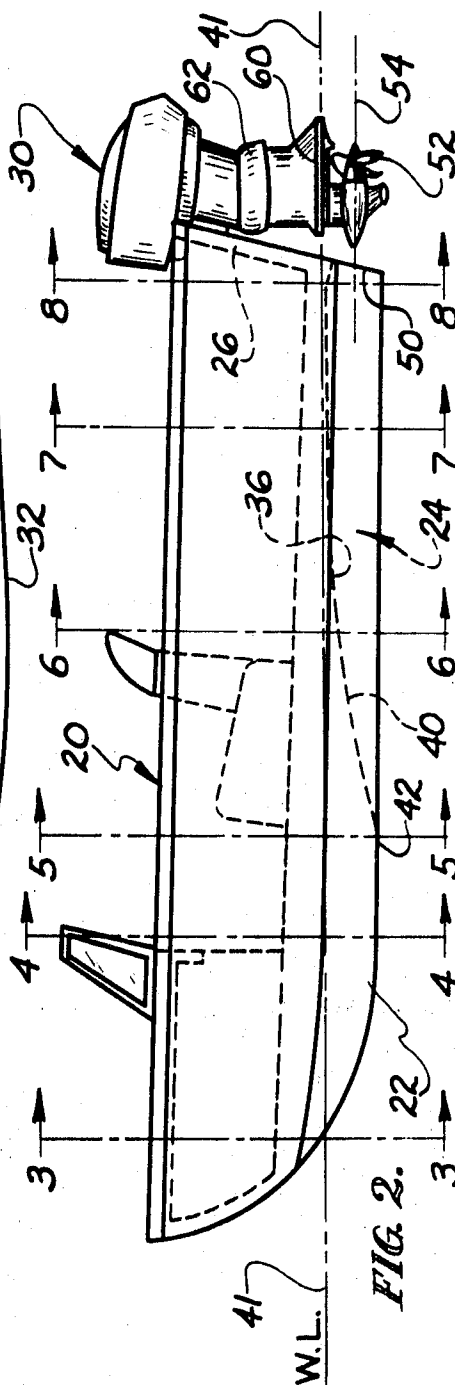


FIG. 2.

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FIG. 3.

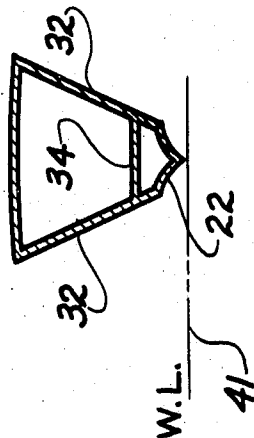


FIG. 4.

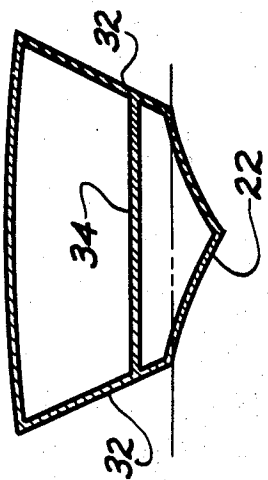


FIG. 5.

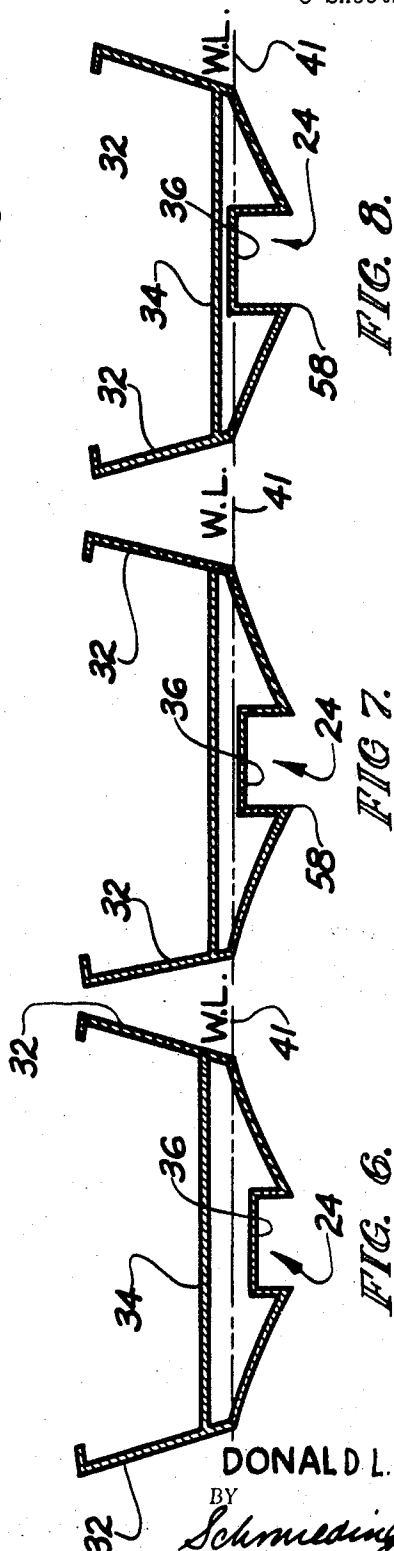
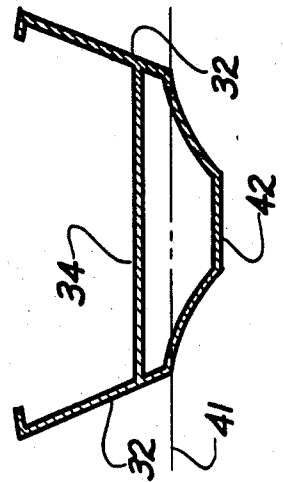


FIG. 7.

FIG. 8.

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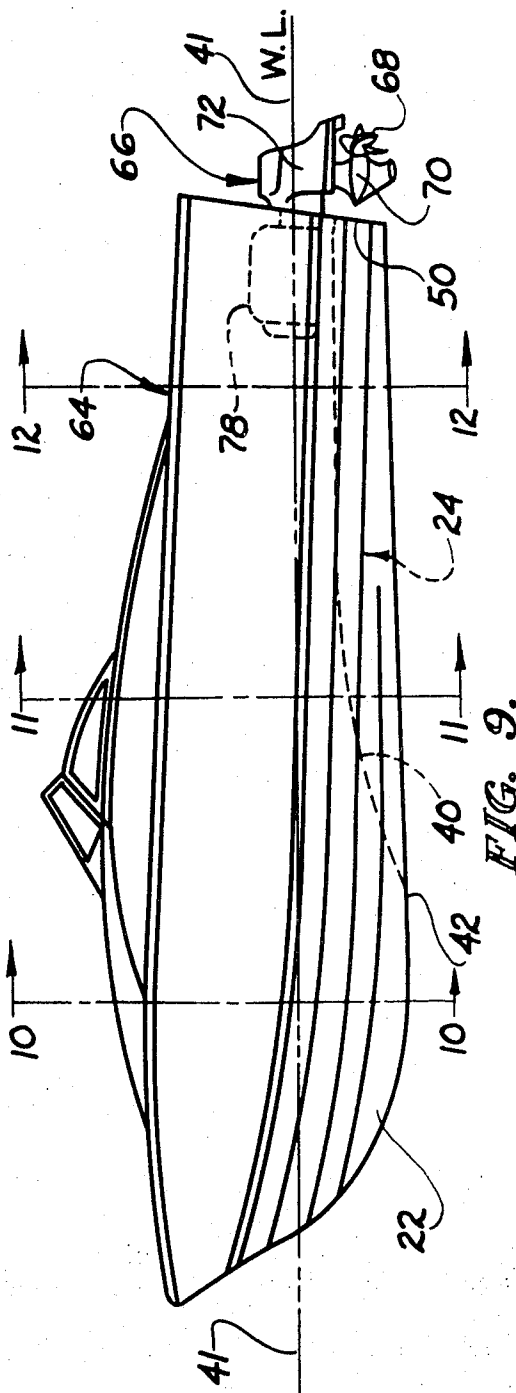
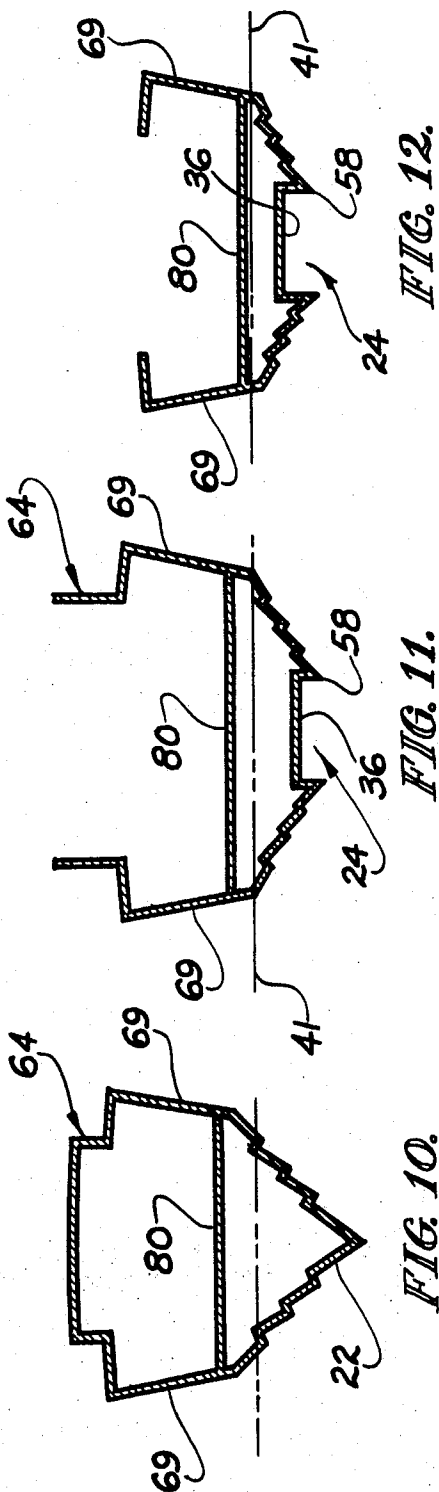
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CHANNEL STERN POWER BOAT

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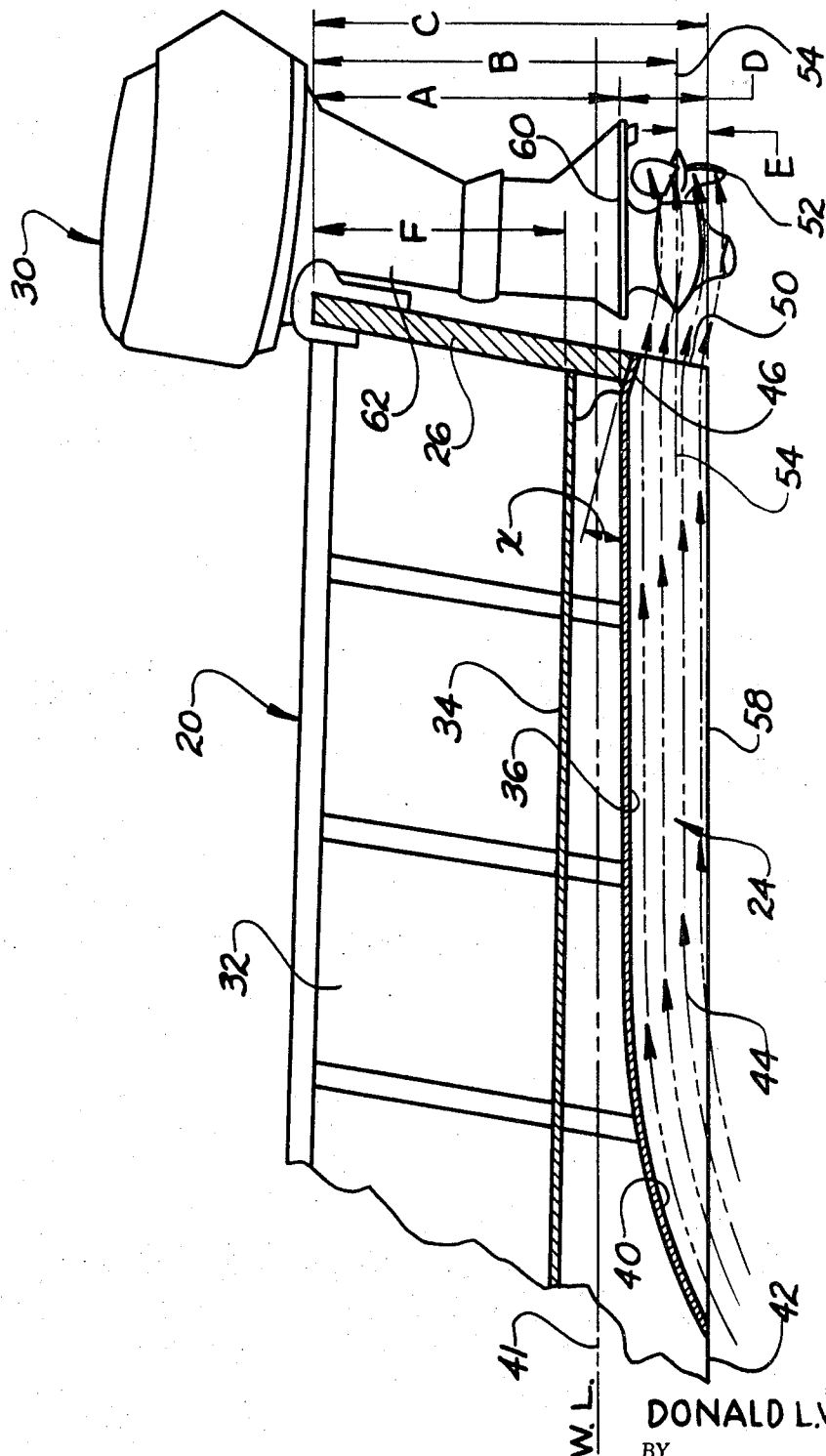


FIG. 13.

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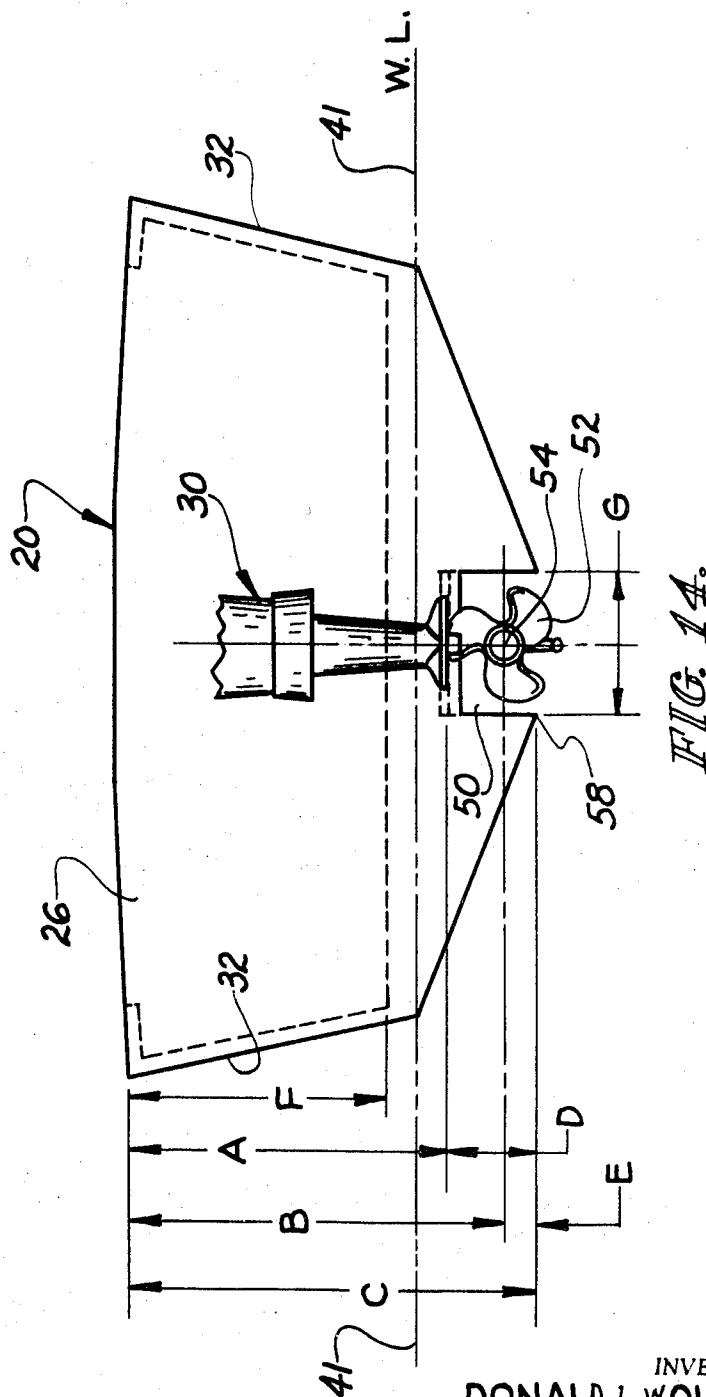


FIG. 14.

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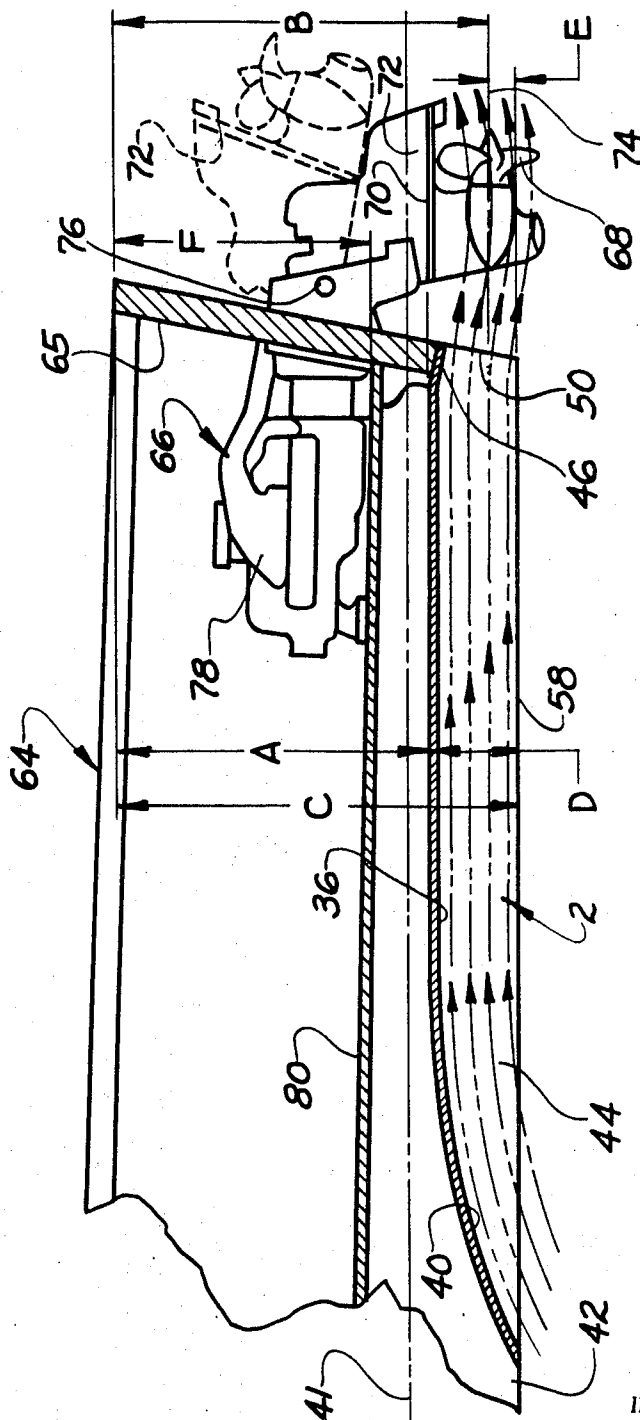
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CHANNEL STERN POWER BOAT

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CHANNEL STERN POWER BOAT

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20 Claims

ABSTRACT OF THE DISCLOSURE

A power boat for high speed shallow draft operation that is characterized by a hull provided with a fore foot portion and a longitudinally extending channel in the bottom that extends from said fore foot portion to a rear channel opening in the transom. The boat is further characterized by a power means including a propeller shaft and propeller disposed in the path of flow established by said channel.

This invention relates to power boats and particularly to a novel hull and power drive combination uniquely adapted for efficient high speed shallow water operation.

In general, the power boat of the present invention comprises a hull means provided with a longitudinally extending channel in the bottom that extends from a fore foot portion to a rear channel opening located in the transom. The longitudinal channel is so arranged to deliver, when the boat is in motion, a controlled flow of water through and outwardly from said rear channel opening.

The boat further includes a power means which may be in the form of an outboard motor or stern drive power unit of the conventional type that includes a vertical extending drive strut on the lower end of which is located a propeller and steering vane. In addition, the arrangement includes an anti-cavitation, or anti-spray plate disposed in a generally horizontal plane so as to form a guide for controlling the flow through said channel and both the axis of the propeller shaft and the anti-cavitation plate are uniquely located with respect to the channel and above the bottom such that the propeller and steering vane are effectively positioned in the flow of water established by the channel.

It should be pointed out that in some areas it is an important advantage to operate small fishing craft with a portion of the propeller actually moving through mud or sand. This is particularly true in certain important fishing areas such as the Florida Bay Country or the Tidal Flats behind the Virginia Sea Islands since in these areas it is often necessary to cross shallow mud flats and sand bars. In the past, in these fishing areas it has been common practice to operate relatively flat bottomed fishing craft across such flats and bars with their propellers actually running through previously made propeller paths or "wheel tracks" in the mud or sand flats. Such craft have been used primarily for sport fishing and have been known generally as "bonefish skiffs" or "tarpon boats" and are characterized by an inherent disadvantage in that due to their relatively flat bottoms their usefulness has been limited to shallow water or "back country" fishing operations. Moreover, since such prior craft are, when following "wheel tracks," operated with the entire propeller and lower gear unit of the drive strut passing through the sand and mud, the efficiency has been low, the speed limited and the operational life of said lower gear units has been short.

It has been determined, in accordance with the present invention, that under the above mentioned "wheel track" operating conditions, the channel hull and power drive combination of the present invention operates with high

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efficiency and without damage with the tips of the propeller actually passing through mud or sand so long as the lower gear unit of the drive strut is positioned at an elevation above the plane of the hull bottom.

As another aspect of the present invention, the hull means of the power boat may be provided with a fore foot of sharp V-shaped cross section, which is combined with the above mentioned longitudinal channel located in a rearward bottom portion of shallow V-shaped cross section. It has been determined that this combination provides a uniquely versatile hull since the sharp V-shaped fore foot provides many advantages in rough deep water operations. For example, the craft can be run into a rough head sea at high speed. At the same time the channeled, relatively flat rear hull portion also permits the craft to operate very effectively during high speed shallow water operations, in fact in extremely shallow water where a lower segment of the propeller arc is actually passing through mud or sand.

As another aspect of the present invention, the novel hull and power drive combination of the present invention, wherein the propeller is positioned above the bottom and aligned with a controlled flow of water established by the channel, greatly increases propulsion efficiency and speed during the above mentioned "wheel track" operations.

As another aspect of the present invention, the novel hull and power drive combination, wherein the lower gear unit is actually located above the bottom of the hull, protects such unit from impact and abrasion with a resulting increase in operational life.

As another aspect of the present invention, the novel hull means and power drive combination includes a unique channel configuration that includes a curved channel entrance that contributes to establishing a controlled and preferably substantially laminar intake flow of fluid with an extremely low air/water ratio. Such curved channel entrance is provided by a forward top channel wall portion that is inclined upwardly and rearwardly from the bottom, and that gradually levels out to a central top channel wall portion which extends to a rear channel opening in the transom.

As still another aspect of the present invention, the channel configuration may in some installations be provided with a slightly downturned top wall portion at the rear channel opening that has a compressing and densifying effect on the air/water mixture of the flow with a resulting increase in propulsion efficiency. It has been determined that in some installations such downturned top wall portion should be angled at from two to five degrees with respect to the horizontal with a resulting increase in propulsion efficiency as compared to channel shapes that do not include such downturned top wall portions at the channel exit.

It is another aspect of the present invention to provide a novel hull and power means combination wherein the hull bottom includes a sharp V-shaped fore foot leading into a channel that provides a substantially laminar compressed flow which in turn creates a high lift effect on the hull resulting in high load carrying capacities. Hence, for any given amount of power, larger and heavier craft can be operated across mud or sand flats as well as in other shallow water situations.

It is another aspect of the present invention to provide a novel hull means and power drive combination wherein the hull means includes a bottom provided with a channel and the power drive includes a propeller disposed in the path of flow through said channel thereby permitting higher mounting of the power drive; for example, ten inches in the case of conventional outboards and outdrives. This results in high transom safety which is par-

ticularly important during rough water operation in a following sea.

It is another aspect of the present invention to provide a novel hull means and power drive combination that permits the mounting of a conventional outboard engine on a high transom whereby the motor is away from the water and thereby not subjected to "drowning out."

As another aspect of the present invention, the above described channel hull can be uniquely combined with, for example, stern drive or outdrive type power units with the engine being mounted considerably higher, for example up to twelve inches for conventional 100 to 200 horsepower stern drive units. With the stern drive unit mounted higher in this manner it becomes possible to raise the drive strut and propeller clear of the water when not in use. This prevents accumulation of marine growth on the propeller and outdrive strut and also prevents the damaging effect of electrolysis on the outdrive mechanism.

As another aspect of the present invention, the above mentioned channel hull and power means provides the shallow water operating capabilities of a jet drive without the jet drive's inherent disadvantage of being susceptible to clogging by foreign objects such as weeds and the like. Moreover, jet drives have the further disadvantage of being inaccessible for cleaning. In the case of the present invention the channel is inherently self-cleaning and when an outboard type power means is used the strut can be raised for removing any accumulations of weeds and other foreign objects which may accumulate on the propeller.

As another aspect of the present invention, the above described longitudinally extending channel, being extended through the rear portion of the hull bottom, results in a hydraulically cushioned ride since the rearward relatively flat portion of the hull bottom has considerably less wetted surface to pound against the water surface during rough water operations.

As another aspect of the present invention the channel type hull bottom provides increased directional stability due to the rudder or keel effect of the inner sides of the channel.

As still another aspect of the present invention the longitudinally extending channel in the hull bottom provides increased beam stability; i.e., the boat is not as easy to roll about its longitudinal axis, since the center of gravity of the hull is lowered as a result of decreased hull displacement due to the presence of the channel.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred forms of embodiments of the invention are clearly shown.

In the drawings:

FIG. 1 is a top elevational view of a power boat constructed in accordance with the present invention and provided with an outboard type power unit;

FIG. 2 is a side elevational view of the power boat of FIG. 1;

FIGS. 3 through 8 are cross sectional views of the hull means of the power boat of FIGS. 1 and 2 with the sections being taken along the lines 3—3 through 8—8 of FIG. 2;

FIG. 9 is a side elevational view of a power boat constructed in accordance with the present invention, said power boat being equipped with a stern drive type power unit;

FIGS. 10 through 12 are cross sectional views of the power boat of FIG. 9, the sections being taken along the lines 10—10 through 12—12 of FIG. 9;

FIG. 13 is a partial side sectional view of a channel and outboard engine comprising a portion of the power boat of FIGS. 1 and 2, the section being taken along a vertical plane through the centerline of the boat;

FIG. 14 is a partial rear elevational view of the hull

channel and outboard drive power unit comprising a portion of the power boat of FIGS. 1, 2, and 13; and

FIG. 15 is a side sectional view showing the hull channel and outdrive power plant comprising a portion of the power boat of FIG. 9.

Referring in detail to the drawings, FIGS. 1 and 2 illustrate a typical power boat constructed in accordance with the present invention which comprises a hull means indicated generally at 20 that includes a hull bottom provided with a V-shaped fore foot portion 22, a rear longitudinally extending channel indicated generally at 24 and a transom 26.

As one embodiment of the present invention, the power boat of FIGS. 1 and 2 further includes an outboard engine mounted on transom 26 and indicated generally at 30. It will be understood that other types and configurations of engines and drives can be used without departing from the spirit of the present invention.

The structure of hull means 20, FIGS. 1 and 2, further includes side walls 32, a floor 34, and a top channel wall 36.

As is best seen in FIGS. 3 through 8, the sharp V-shaped fore foot 22 illustrated preferably becomes less sharp progressing rearwardly as is illustrated in the cross sectional views of FIGS. 3 and 4 and makes a smooth transition with the front entrance of channel 24 at a short flat bottom wall portion 42, FIG. 5.

Reference is next made to FIGS. 13 and 14 for description of longitudinal channel 24 which includes a forward top channel wall portion 40 that is inclined upwardly and rearwardly from a forward bottom wall portion 42 so as to provide a smooth, continuous channel inlet that contributes to the establishment of a controlled and preferably laminar flow characteristics for the flow delivered to the propeller.

It should be pointed out that since the channel inlet at curved wall 40 is smooth and continuous, and since it is located amidship and below the water line, the admission of atmospheric air from between the hull and water surface is maintained at a minimum during high speed operation of the craft. This provides a very low air/water ratio for the fluid flow 44 through the channel which means that high density fluid is always delivered to the propeller 52 in a controlled manner with a resulting increase in propulsion efficiency.

With continued reference to FIG. 13, channel 24 may be provided with a rear top channel wall portion 46 that is sloped slightly downwardly and rearwardly just inside a rear channel opening 50. This downturned top channel wall portion 36 serves to deflect the flow 44 slightly downwardly at the tunnel exit with a resulting increase in propulsion efficiency.

With reference to FIGS. 13 and 14, propeller 52 includes a horizontal propeller shaft the axis of rotation of which is indicated at 54 and such axis is disposed substantially centrally of the flow 44 delivered from channel outlet 50. This relationship is established by locating propeller axis 54 substantially centrally of the channel width G, FIG. 14, and by locating the propeller axis 54 a vertical dimension E above the rear hull bottom which dimension E is established to be slightly less than one-half the channel height dimension D so that the propeller 52 is substantially centered vertically with respect to the flow 44.

It should further be pointed out that for maximum efficiency the diameter G, FIG. 14, of rear tunnel opening 52 should be slightly greater than the diameter of propeller 52. For example, using a standard twelve inch propeller for outboard motors in the 80-100 horsepower class, the diameter G of rear tunnel opening 52 should be approximately fourteen inches wide so that there will be approximately one inch of water flow clearance between the tip of the propeller and the sides of the rear channel opening. It has further been determined that

with such conventional outboard motors in the 80 to 100 horsepower class the height D, FIG. 14, of channel 44 should be about ten inches in order to achieve the most efficient characteristics for flow 44 through the channel.

With continued reference to FIG. 13 it has been further determined that the most efficient operation is obtained when the anticavitation plate 60 is located a dimension A below the top of transom 26 which dimension positions said plate in substantially the same horizontal plane as the top wall 32 of longitudinally extending channel 34. This configuration provides a rearwardly extending continuation of the top of channel 24 that functions to substantially maintain, rearwardly of the channel exit 50, the controlled flow 44 of water established by the channel as described previously herein. Such maintenance of flow 44 rearwardly of the channel exit 50 functions to provide propulsion efficiency and also serves to maintain the effectiveness of the steering vane 53 of the mechanisms.

With continued reference to FIG. 13 it should be pointed out that in outboard motor applications the dimension B, which is the distance from top of the hull transom to the axis of rotation 54 of propeller 52, can be decreased by approximately ten inches for large conventional outboard motors in the 80 to 100 horsepower range. Hence the propeller can be actually raised so that its axis of rotation is above the lowermost bottom portion 58 of the hull.

Reference is next made to FIG. 15 which illustrates in enlarged detail the channel and stern drive installation of the power boats of FIGS. 9 through 12. Here the same relationships for the longitudinal channel 24 and the power drive apply as has just been described with respect to the outboard driven version of FIGS. 1, 2, and 15. For example, the axis of rotation 74 of propeller 68 is positioned a dimension E above the rear bottom portion of the hull which dimension E is slightly less than one-half of the channel height dimension D so as to position the axis of rotation 74 of the propeller 68 substantially centrally of the flow 44 delivered from the channel exit 50.

Also the axis 74 of the propeller is located substantially centrally of the channel width dimension G so that the rear view of the stern drive hull 64, FIG. 15, will appear substantially the same as the rear view, FIG. 14, of the outboard driven hull 20.

With continued reference to FIG. 15, the anticavitation or antispray plate 70 of the power means is located adjacent the top of the channel so as to form a rearward continuation of the top wall 36 of the channel. This functions to substantially maintain the densification and path of flow 44, thereby providing propulsion efficiency and maintaining effectiveness of the steering vane 73 of the mechanism.

It should be further pointed out that the stern drive version of FIG. 15, has the engine 66 mounted a dimension F below the top of transom 65 which raises the engine 78 and stern drive strut 72 approximately twelve inches for stern drives in the 100-200 horsepower range, as compared to conventional stern drive installations where the propeller and propeller housing must be located below the hull bottom 58 in order to effect propulsion. With this arrangement the entire stern drive strut 72 and propeller 68 can be raised above the water line W.L., FIG. 15, by pivoting said stern drive strut upwardly about the pivot 76. Hence, the lower unit of the stern drive 66 can be entirely removed from the water when not in use thereby protecting it from electrolysis and corrosive damage. This is not possible with conventional installations of most stern drive power units where the propeller and housing are located below the hull bottom.

While the forms of embodiments of the present invention as herein disclosed constitute preferred forms, it is to be understood that other forms might be adopted.

I claim:

1. A power boat for high speed shallow draft operation comprising, in combination, hull means including a bottom provided with a fore foot portion and a transom; a channel in said bottom and extending from a tunnel entrance rearwardly of and aligned with said fore foot portion to a rear channel opening in said transom; an outboard motor mounted on said transom and including a drive shaft extending downwardly rearwardly of said transom, a propeller shaft driven by said drive shaft and including an axis of rotation above said bottom and substantially aligned with the longitudinal axis of said channel, and a propeller on said propeller shaft; and plate means positioned to form a guide for the top of the flow from said channel said channel being relatively narrow with respect to the bottom whereby substantially all of the flow therethrough is delivered to the propeller.

2. The power boat defined in claim 1 wherein said channel includes a forward top channel wall portion that is inclined upwardly and rearwardly from said bottom.

3. The power boat defined in claim 1 wherein said propeller includes an axis of rotation positioned substantially in alignment with the center of said rear channel opening.

4. The power boat defined in claim 1 wherein the diameter of said rear channel opening is slightly greater than the diameter of said propeller.

5. A power boat for high speed shallow draft operation comprising, in combination, hull means including a bottom provided with a fore foot portion and a transom; a channel in said bottom and extending from a channel entrance rearwardly of and aligned with said fore foot portion to a rear channel opening in said transom; and a stern drive power means including an outdrive shaft extending downwardly rearwardly of said transom, a propeller shaft driven by said outdrive shaft and including an axis of rotation above said bottom and substantially aligned with the longitudinal axis of said channel, a propeller on said propeller shaft and disposed rearwardly adjacent to said rear channel opening and in the path of flow through said channel, and plate means positioned to form a guide for the top of the flow from said channel said channel being relatively narrow with respect to the bottom whereby substantially all of the flow therethrough is delivered to the propeller.

6. The power boat defined in claim 5 wherein said channel includes a forward top channel wall portion that is inclined upwardly and rearwardly from said bottom.

7. The power boat defined in claim 5 wherein said propeller includes an axis of rotation positioned substantially in alignment with the center of said rear channel opening.

8. The power boat defined in claim 5 wherein the diameter of said rear channel opening is slightly greater than the diameter of said propeller.

9. A power boat for high speed shallow draft operation comprising, in combination, hull means comprising a transom and a bottom provided with a V-shaped fore foot leading into a channel having a rear channel opening in said transom, said fore foot and channel cooperating to deliver a substantially laminar flow from said channel opening; and an outboard motor mounted on said transom and including a drive shaft extending downwardly rearwardly of said transom, a propeller shaft driven by said drive shaft and including an axis of rotation substantially aligned with the longitudinal axis of said flow, a propeller on said propeller shaft adjacent said rear channel opening and disposed in the path of flow therethrough, and plate means positioned to form a guide for the top of the flow from said channel, said channel being relatively narrow with respect to the bottom whereby substantially all of the flow therethrough is delivered to the propeller.

10. The power boat defined in claim 9 wherein said channel includes a forward top channel wall portion that

is inclined upwardly and rearwardly from said bottom.

11. The power boat defined in claim 9 wherein said propeller includes an axis of rotation positioned substantially in alignment with the center of said rear channel opening.

12. The power boat defined in claim 9 wherein the diameter of said rear channel opening is slightly greater than the diameter of said propeller.

13. A power boat for high speed shallow draft operation comprising, in combination, hull means comprising a transom and a bottom provided with a V-shaped fore foot leading into a channel having a rear channel opening in said transom, said fore foot and channel cooperating to deliver a substantially laminar flow from said channel opening; and a stern drive power means including an outdrive shaft extending downwardly rearwardly of said transom, a propeller shaft driven by said outdrive shaft and including an axis of rotation substantially aligned with the longitudinal axis of said flow, a propeller on said propeller shaft disposed rearwardly adjacent to said rear channel opening, and a plate means positioned to form a guide for the top of the flow from said channel said channel being relatively narrow with respect to the bottom whereby substantially all of the flow therethrough is delivered to the propeller.

14. The power boat defined in claim 13 wherein said channel includes a forward top channel wall portion that is inclined upwardly and rearwardly from said bottom.

15. The power boat defined in claim 13 wherein said channel includes a rearward top channel wall portion that declines slightly downwardly and rearwardly.

16. The power boat defined in claim 13 wherein said propeller includes an axis of rotation positioned substantially in alignment with the center of said rear channel opening.

17. The power boat defined in claim 13 wherein the diameter of said rear channel opening is slightly greater than the diameter of said propeller.

18. A power boat for high speed shallow draft operation comprising, in combination, hull means including a bottom provided with a fore foot portion and a transom; a channel in said bottom and extending from a tunnel entrance rearwardly of said fore foot portion to a rear channel opening in said transom; power means on said hull means and comprising a propeller shaft above said bottom and including an axis of rotation substantially aligned with the longitudinal axis of said channel; a pro-

pellor on said shaft; and means forming a rearward continuation of the top of said channel, said channel being relatively narrow with respect to the bottom whereby substantially all of the flow therethrough is delivered to the propeller.

19. A power boat for high speed shallow draft operation comprising, in combination, hull means comprising a transom and a bottom provided with a V-shaped fore foot leading into a channel having a rear channel opening in said transom, said fore foot and channel cooperating to deliver a flow through said channel and opening; and power means on said hull means and including a propeller shaft positioned above said bottom and substantially aligned with the longitudinal axis of said flow; a propeller on said shaft and disposed in said flow; and means positioned to form a guide for the top of the flow from said channel said channel being relatively narrow with respect to the bottom whereby substantially all of the flow therethrough is delivered to the propeller.

20. A power boat for high speed shallow draft operation comprising, in combination, hull means comprising a transom and a bottom provided with a V-shaped fore foot leading into a channel having a rear channel opening in said transom, said fore foot and channel cooperating to deliver a controlled flow through said channel and opening; power means including a propeller having an axis of rotation above said bottom and substantially aligned with the longitudinal axis of said flow; and means forming a rearward continuation of the top of said channel, said channel being relatively narrow with respect to the bottom whereby substantially all of the flow therethrough is delivered to the propeller.

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