Oct. 2, 1951 J. W. DANIELS 2,569,802

INBOARD POWER UNIT FOR SHALLOW DRAFT BOATS

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FIG. 1.

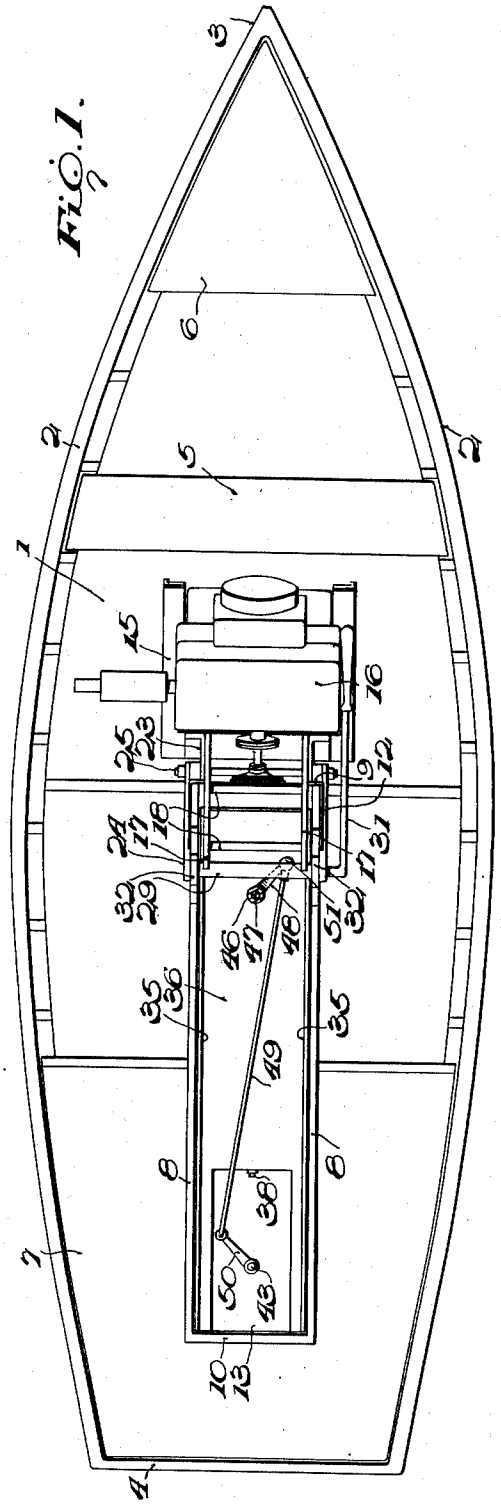
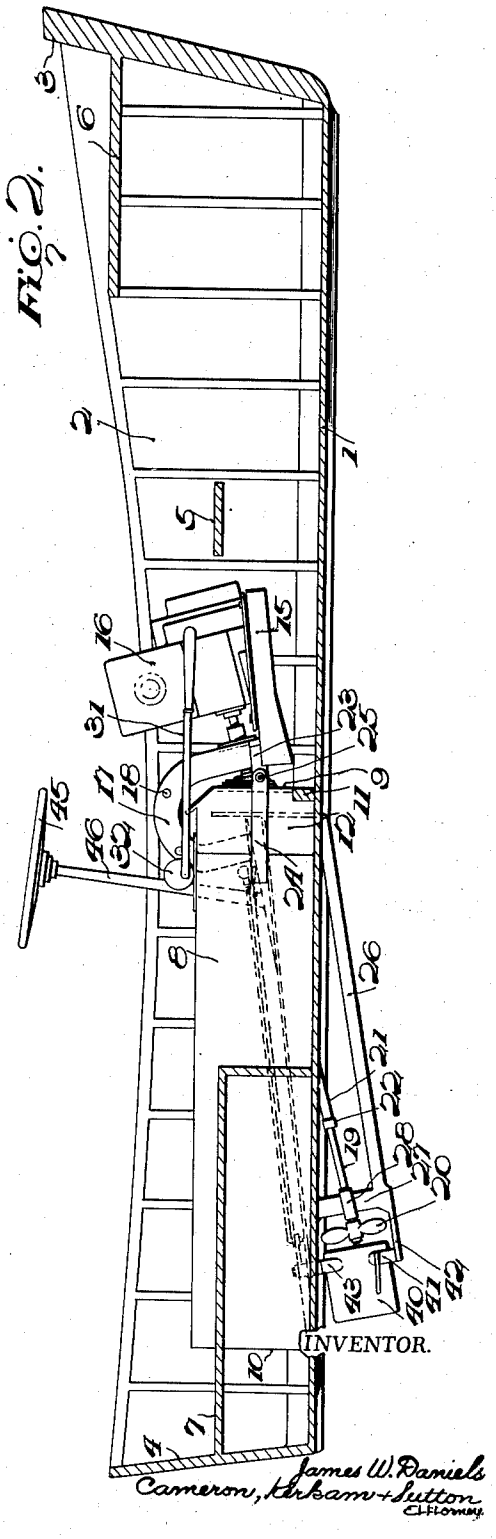


FIG. 2.



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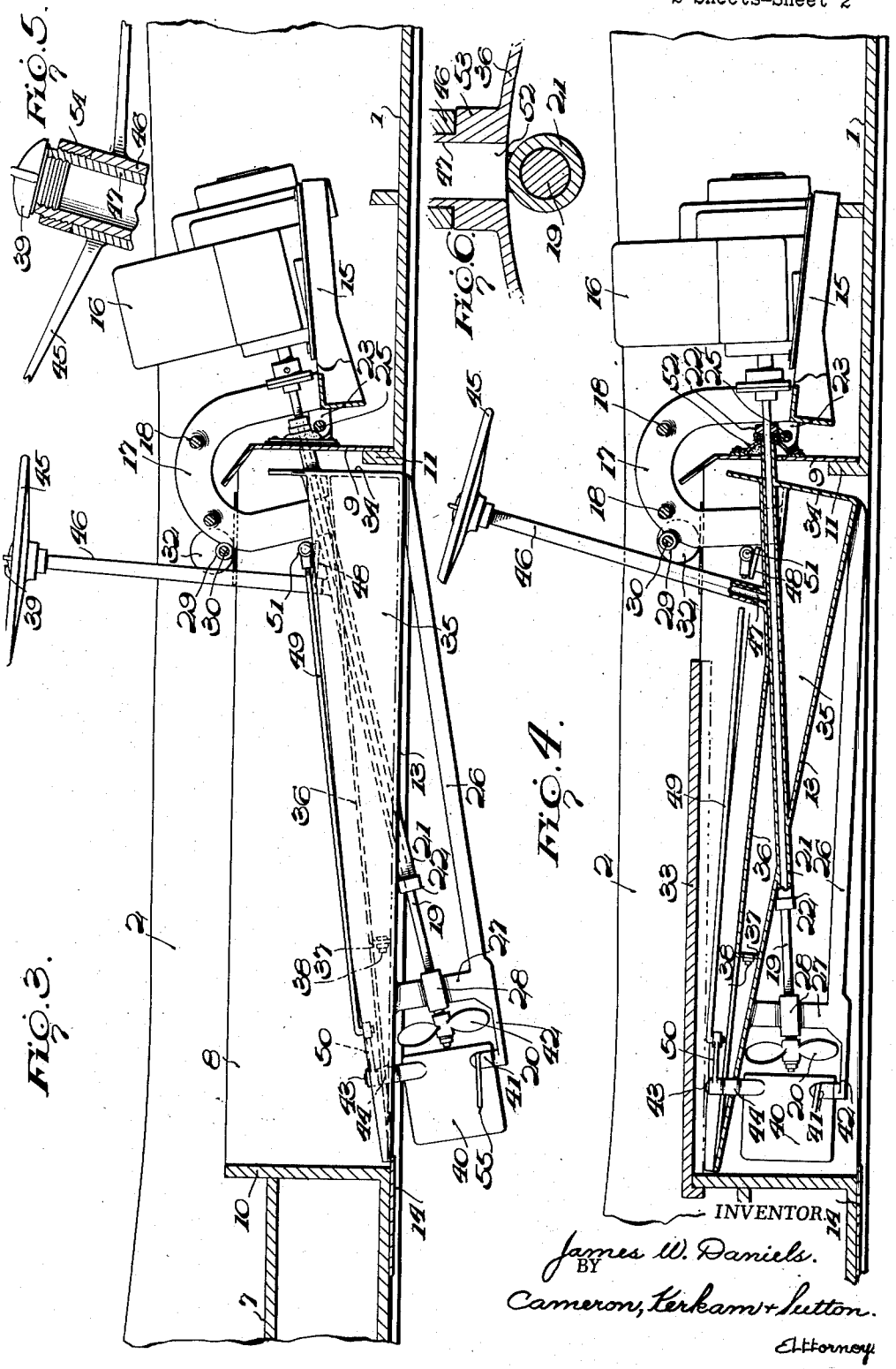


FIG. 5.

FIG. 6.

FIG. 4.

FIG. 3.

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INBOARD POWER UNIT FOR SHALLOW DRAFT BOATS

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9 Claims. (Cl. 115—41)

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This invention relates to shallow draft boats and more particularly to an inboard power unit therefor which is constructed and arranged so that parts of the unit projecting below the hull, particularly the propeller, are automatically withdrawn within the contour of the hull in case the boat runs into very shallow water or over a sand bar, rock, or other obstruction to navigation.

An object of the invention is to provide a simple and inexpensive power unit of the above type which is easy to install in the boat and automatic and reliable in its operation.

Another object is to provide for automatic withdrawal of the propeller and associated parts within a well while maintaining the desired fairing of the hull in normal running and for a power plant outside the well where it is easily accessible at all times for starting, servicing, and like purposes.

A further object is to provide a power unit of the kind characterized above wherein withdrawal of the propeller and associated parts into the well does not interfere with the normal utilization of the space within the boat.

A still further object is to provide a power unit of the type characterized in the preceding objects which comprises a unitary assemblage of power plant, drive shaft, propeller, rudder, steering mechanism and fuel tank that is installable in or removable from the boat as a unit.

One embodiment of the invention has been illustrated in the accompanying drawings, but it is to be expressly understood that said drawings are for purposes of illustration only and are not to be taken as a definition of the limits of the invention, reference being had to the appended claims for this purpose.

In the drawings,

Fig. 1 is a plan view of a shallow draft boat embodying the invention;

Fig. 2 is a side view of the boat with the near side removed to show the interior;

Fig. 3 is an enlarged detail, partly in section, showing the power unit in normal position;

Fig. 4 is a similar enlarged detail showing the propeller and associated parts withdrawn into the hull; and

Figs. 5 and 6 are detail sections of the steering shaft and the filling tube for the fuel tank.

The invention is particularly applicable to small flat-bottomed boats and hence it can be illustrated and described conveniently in connection therewith although its use is not restricted to this application. The drawings show

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a typical boat of this type, comprising a flat bottom 1 and sides 2, a pointed bow 3 and a square stern 4, and a thwart 5 and small bow and stern decks 6 and 7, respectively.

An opening of suitable size and shape, preferably rectangular and elongated in the fore and aft direction, is formed in the bottom 1 near the stern of the boat and is framed by vertical side walls 8 and forward and aft end walls 9 and 10 to form an open well, the walls being of course high enough to extend above the waterline. The well will usually be built permanently into the boat structure except that the forward wall 9 or a portion thereof is preferably removable to facilitate removal of the power unit from the boat. In the form shown, this forward wall comprises a metal plate the lower edge of which is secured to a transverse member 11 at the forward edge of the well and the sides of which are bent around the walls 8 of the well as indicated at 12 in Fig. 2 and suitably secured thereto.

The inboard power unit per se comprises a supporting frame having two sections united by an upwardly extending U-shaped frame member or members to form a rigid structure. The after support section comprises a plate-like bottom member 13 forming a bottom closure for the well in normal running position and shaped to maintain the desired fairing of the hull. In the present case, therefore, the member 13 has a flat bottom, and in its normal position in the well (Figs. 2 and 3) the end of the support rests on a stop plate 14 so that it is flush with the flat bottom 1 of the boat. The forward support section comprises a bed 15 for mounting a suitable power plant, here shown as an air-cooled internal combustion engine 16. The two support sections are rigidly united by U-shaped frame members 17 which may be connected by any suitable number of transverse brace bars 18. When the unit is installed in the boat, the frame members 17 straddle the forward end wall 9 of the well, the after or rear support section 13 being located in the well as described above, and the forward bed section 15 being outside the well and near the bottom of the boat where the engine 16 is out of the way as much as possible and the stability of the boat is increased while the engine is easily accessible at any time for starting or service.

The power plant 16 drives a shaft 19 and a propeller 20 mounted on the end of the drive shaft beneath the after support section 13. A tubular bearing 21 for the drive shaft extends downwardly at an angle through the support 13, to which it is suitably secured as by welding, and

the upper forward end of this bearing projects freely through an opening in the forward end wall 9 of the well and terminates close to the power plant. Thus a large part of the length of the drive shaft 19 is supported and enclosed in the bearing, and leakage of water between the shaft and bearing is easily prevented by suitable packing and nuts 22 at one or both ends of the bearing. A flexible seal 52 of any suitable type surrounds the shaft bearing 21 and is secured to the end wall 9 of the well to prevent leakage of water through the opening through which the bearing passes in case the water in the well should rise to this level.

The rigid supporting frame 13, 17, 15 is pivotally mounted as a unit so that the after support section 13 can swing between the positions shown in Figs. 3 and 4. By locating the pivot axis close to the forward end of the well between the two support sections, the entire unit is substantially counterbalanced, and a slight upward force on the support 13 is sufficient to swing it to the position shown in Fig. 4. Also the pivot axis is preferably located as near as possible to the shaft bearing 21 so as to minimize the movement of the bearing in the opening in the end wall 9. In the form shown, bearing brackets 23 project rearwardly from the forward vertical legs of the frame members 17 just below the shaft 19 and its tubular bearing 21, and corresponding brackets 24 extend forwardly from the sides of the well, the unit being pivotally mounted by a pin 25 extending through these brackets.

In case the boat runs into very shallow water or passes over an obstruction such as a sand bar or rock, the entire unit therefore swings easily on the axis 25 to tilt the support 13 to the position shown in Fig. 4 and withdraw the propeller 20 into the well where it will not be damaged. This tilting movement takes place automatically by virtue of a suitable keel-like guard projecting below the support 13 in advance of the propeller 20. In the form shown, a strut 26 extends from the forward end of the support 13 parallel to and beneath or in advance of the drive shaft. The end of this guard is connected to the support 13 by a vertical strut 27 which can be utilized to provide a further shaft bearing 28.

The unit may also be tilted manually and held in the position shown in Fig. 4 whenever desired, and it is advantageous to provide a simple manually operable means to tilt the unit and to hold or lock it in tilted position. In the form shown, a tube 29 is secured to the frame members 17 above the top of the well and a shaft 30 is rotatable in the tube by means of a handle 31. The shaft carries eccentrics 32 which engage the top edges of the side walls 8 of the well. When the handle is in the position shown in Figs. 1 and 2, the eccentrics permit the rear support section 13 to rest on the stop plate 14 as shown in Figs. 2 and 3, and to swing freely and automatically between the positions shown in Figs. 3 and 4. When the handle is swung counterclockwise, however, the eccentrics are rotated to the position shown in Fig. 4 with the result that the unit is tilted and locked in tilted position.

In order to provide a complete self-contained power unit, the rear support section 13 is utilized to carry suitable steering gear and a fuel supply tank. On the other hand, these parts are so arranged that even when the unit is tilted, they do not project above the top of the well except at its forward end. Thus the rear end of the well, which is set well back into the stern deck 7

to provide the proper location of the propeller, need project only slightly if at all above the level of the stern deck, and most of the length of the well can also be closed by a suitable removable cover 33 as indicated in Fig. 4 so as to preserve a maximum of utilizable boat space without interference from the tilting frame and associated parts. Fig. 4 shows the position of maximum tilt of the frame in which the extreme rear end of the support 13 is at a level just below the top of the well. The support being inclined, however, its forward end is only slightly elevated above the bottom of the well. The solid angle between the inclined support and a horizontal plane through its elevated rear end is therefore available for fuel tank, steering mechanism, and the like, with the result that the unit per se comprises a rear section which tapers in general outline from its forward to its rear end.

Thus the forward part of the rear frame section comprises a wedge-shaped fuel tank either mounted on the support 13 or built up in any suitable manner using the support itself as the bottom of the tank. For example, a vertical wall 34 extends upwardly from the forward end of the support to form the end of the tank, and its sides are formed by vertical walls 35 along the side edges of the support, the walls 35 decreasing in height toward the rear for the reason explained above. The top of the tank is formed by a plate 36 extending between and joined to the side walls 35. The shaft bearing 21 extends down through the tank, the forward part of the plate 36 preferably extending over the top of the shaft bearing as shown in Fig. 4 and its end being joined to the end wall 34. The rear end of the tank is formed by a vertical wall 37 provided with a drain plug 38, this rear end wall being located short of the rear end of the support 13. The tank is filled through a suitable filling cap 39 which for convenience can be located on the steering apparatus above the top of the well as described below.

A suitable rudder 40 is mounted below the rear end of the support 13 behind the propeller 20. The lower pintle 41 of the rudder turns in a bearing formed in the end of an extension 42 of the strut 26, which also passes under the propeller 20 and further protects it against damage. The upper rudder pintle 43 extends rotatably through a bearing 44 in the rear end of the support 13 so that the rudder can be operated from above the support. For reasons set forth above, however, the rudder actuating member projects above the top of the well near its forward end and is connected to the rudder through suitable operating mechanism. In the form shown, a steering wheel 45 and its approximately vertical shaft 46 are rotatably mounted on a spindle 47, preferably tubular, which projects upwardly from the top of the fuel tank, and an arm 48 on the lower end of the shaft is connected by a link 49 with an arm 50 connected to the upper end of the rudder pintle 43. In case the axes of the shaft 46 and rudder pintle 43 are not parallel, a ball joint 51 can be used to connect the arm 48 and link 49.

The spindle 47 is preferably tubular to provide a convenient means for filling the tank from a point above the top of the well. In the form shown, the tubular base of the spindle delivers fuel to the tank through an opening 52 in the top plate 36. The steering shaft surrounds and rotates on the spindle between a shoulder 53 and nut 54. The upper end of the tubular spindle is closed by the filling cap 39 mentioned above.

It will be understood that the unit is desir-

ably biased around its pivot axis **25** so that it tends to assume the position of Figs. 2 and 3 in normal running. This may be done by providing a slight excess of weight to the rear of the pivot axis. However, the rear well section of the unit is advantageously made of light material to decrease the total weight and cost of the unit, and in this case the desired biasing effect can be provided by inclined fins or vanes carried by the substructure beneath the support **13**. As shown, one or more such vanes **55** are carried by the rudder **40**.

It will be observed that the invention provides a unitary power drive and steering gear which can be manufactured and sold as well as installed in or removed from the boat as a complete, integral unit. When installed in the boat, however, the invention provides substantially all the advantages of a permanently built-in installation. That is, the engine or motor has approximately the usual location where it is readily accessible at any time, the propeller is properly located beneath and well to the rear of the boat, cavitation effects are eliminated and the normal hull contour is unchanged during normal running, and the drive shaft, fuel tank, and steering gear are substantially enclosed so that they are protected against damage and so that danger to the occupants of the boat is minimized at the same time. In addition, the tilting movement of the unit automatically protects the propeller and rudder against damage in case of shallow obstructions, while the engine continues to run and the normal propelling action is resumed as soon as the boat passes over the obstruction. This action takes place without interfering with or in any way altering the use of the boat space, and in fact is scarcely noticeable to occupants of the boat except for a small amount of displacement of the steering wheel.

While only one embodiment has been described and illustrated in the drawings, it will be understood that the invention is susceptible of other embodiments and that various changes may be made in the details of construction and arrangement of the parts without departing from its spirit. Moreover, any suitable type of engine can be used, including any desired type of drive as respects gearing, clutching, and like mechanical details. Hence reference should be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. A boat having a well in its bottom, a plate-like support forming a closure for the bottom of the well and maintaining the normal hull contour, said support having an extension over the forward end of the well and down outside the well toward the bottom of the boat, a power plant carried by said extension, a tubular shaft bearing extending downwardly at an angle through and secured to said plate-like support with its forward upper end projecting movably through an opening in the forward end of the well, flexible sealing means between said tubular bearing and the end of the well, a drive shaft extending from said power plant through said shaft bearing, and a propeller on the end of said drive shaft, said support and extension being pivoted outside the well on an axis between the forward end of the well and the power plant whereby said support is tiltable in the well to withdraw said propeller therein, the forward part of said support carrying a wedge-shaped fuel tank, the top of said tank being inclined rearwardly toward said support and the depth of the tank at any point being no greater than the vertical distance between the tilted support and the level of its elevated rear end, the elevation of said rear end being not greater than the top of the well.

2. The construction defined in claim 1, said tubular shaft bearing extending through said fuel tank.

3. A boat having a well in its bottom, a plate-like support forming a closure for the bottom of the well and maintaining the normal hull contour, said support having an extension over the forward end of the well and down outside the well toward the bottom of the boat, a power plant carried by said extension, a tubular shaft bearing extending downwardly at an angle through and secured to said plate-like support with its forward upper end projecting movably through an opening in the forward end of the well, flexible sealing means between said tubular bearing and the end of the well, a drive shaft extending from said power plant through said shaft bearing, a propeller on the end of said drive shaft, a rudder mounted on and beneath the rear of said support and having an operating shaft extending through said support, a rudder-actuating member extending upwardly from the forward end of said support above the top of the well, and rudder-operating means connecting the lower end of said member with the upper end of said shaft, said support and extension being pivoted outside the well on an axis between the forward end of the well and the power plant whereby said support is tiltable in the well to withdraw said propeller and rudder therein.

4. An inboard power unit for a shallow draft boat provided with a well, said unit comprising a frame having a rear well section and a forward bed section, said sections being rigidly connected by a U-shaped frame section extending upwardly therefrom, a power plant mounted on said bed section, a tubular shaft bearing extending downwardly at an angle through and secured to said rear section, the forward upper end of said tubular bearing being close to said power plant, a drive shaft extending from said power plant through said bearing, a propeller on the end of said drive shaft, a rudder mounted on and beneath the rear end of said rear section behind the propeller and having an operating shaft extending through said support, rudder-operating mechanism including an actuating member extending upwardly from the forward end of said rear section, a guard projecting downwardly from said rear section in advance of said drive shaft and propeller, and means for pivoting the unit on an axis between said rear and bed sections comprising a bearing bracket mounted on said U-shaped frame section.

5. The unit defined in claim 4, including manually rotatable eccentric means mounted on the upper part of said U-shaped frame section to the rear of said bearing lug, whereby the unit may be tilted manually around the axis of said bracket when installed in the boat.

6. The unit defined in claim 4, the forward part of said rear section carrying a wedge-shaped fuel tank having a top inclined rearwardly and downwardly toward said rear section, said tubular bearing extending through said tank and said rudder-actuating member extending upwardly above the tank.

7. The unit defined in claim 6, said rudder-actuating member being tubular, and means for feeding fuel therethrough for filling the tank.

8. A boat having a well in its bottom which is elongated in a fore and aft direction, and an inboard power unit comprising a frame having a rear well section and a forward bed section, said sections being rigidly connected by a U-shaped frame section straddling the forward end of the well, a power plant mounted on said bed section, a propeller, rudder and fuel tank carried by said rear section, propeller driving means including a shaft driven by said power plant and extending through an opening in the forward end of the well, rudder-operating mechanism carried by said rear section and including an actuating member projecting above the top of the well near its forward end, pivot means for said unit having a transverse axis located outside the well adjacent its forward end and between said rear and forward sections, whereby said unit may be tilted to withdraw said rudder and propeller into said well, the elevation of said fuel tank and rudder-operating mechanism when the unit is tilted being less than the top of the well except for said projecting actuating member.

9. The construction defined in claim 8, in-

cluding a transverse, manually rotatable shaft secured to said U-shaped frame section above the top of the well, and an eccentric member rotatable by said shaft and engaging the top of the well to tilt said unit.

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