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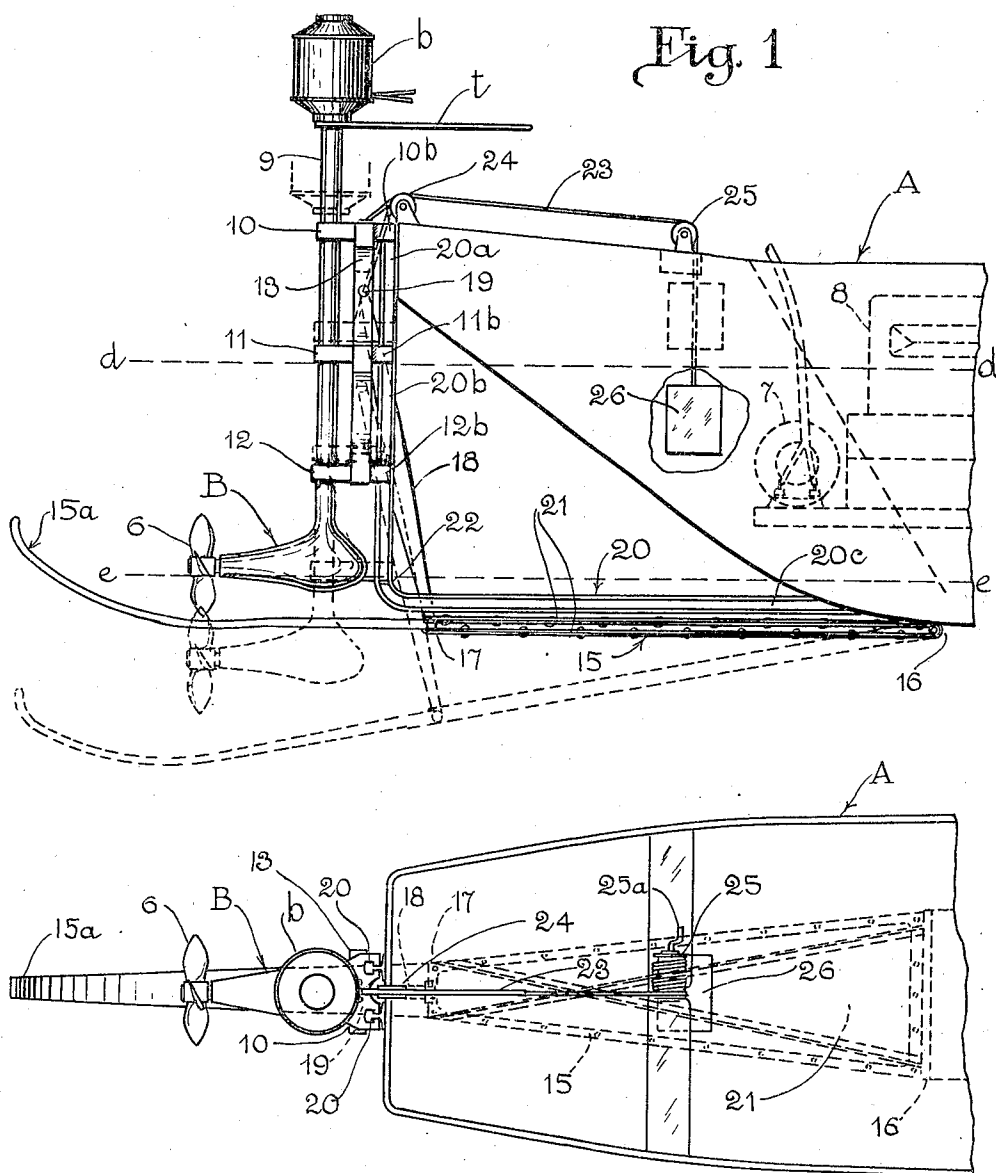
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2,135,907

MARINE PROPULSION UNIT

Filed Feb. 17, 1936

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2 Sheets-Sheet 2

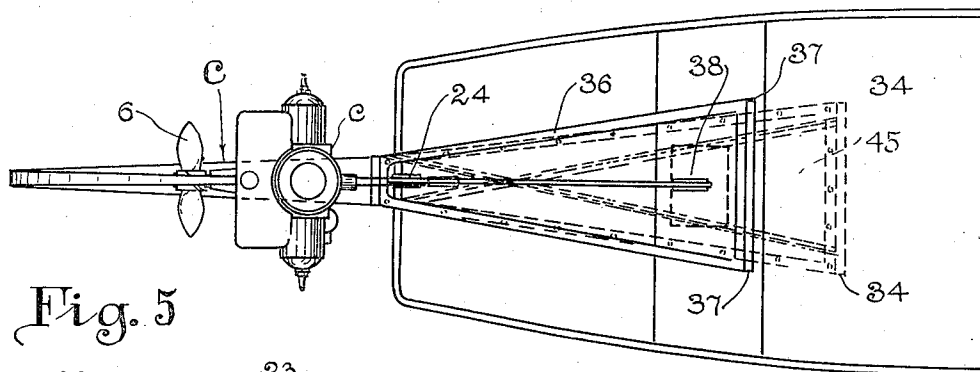
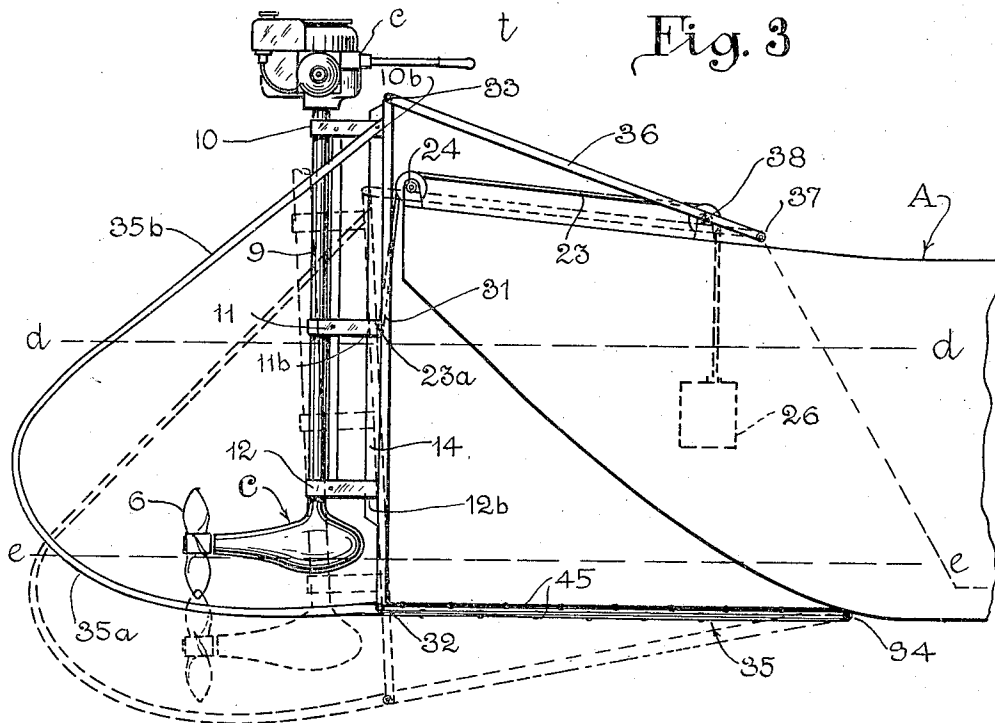


Fig. 5

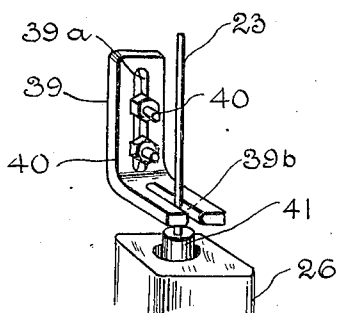


Fig. 4

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2,135,907

MARINE PROPULSION UNIT

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Application February 17, 1936, Serial No. 64,286

4 Claims. (Cl. 115—41)

This invention relates to marine propulsion and more particularly to detachable propelling units for water craft of the surface type.

One of the objects of the present invention is to provide a novel detachable propelling unit adapted to be installed in a surface water craft or vessel of any type, including those not originally designed to be self-propelled, such as an ordinary river, lake or ocean barge, or any towboat, thereby rendering such water craft or vessel a self-propelled unit.

Another object of the invention is to provide a novel propelling unit capable of being easily and cheaply installed in any water craft without making any substantial alterations in the hull of such craft, and particularly without providing special wells in the hull, adapters in the stern, grooves in the keel, and similar modifications, thereby providing a propelling unit which can be securely installed in any vessel without requiring permanent changes in the vessel structure or weakening the same, which would unfit the vessel for its original uses.

A still further object of the invention is to provide a novel propelling unit which could be easily removed from the vessel in which it has been installed, without leaving any permanent irreparable modifications in the hull of such vessel.

Still another object is to provide a propelling unit which could be adapted with the aid of simple adjusting means to exert the propelling effort at such a location and in such a direction with respect to the longitudinal axis of the hull of the vessel as to give the best efficiency of the propeller for the particular type of water craft.

Still another object of the invention is to provide a novel propelling unit which could be easily adjusted to changes occurring in the draft conditions of a vessel, effecting the best efficiency of propulsion both in full load (deep draft) and in light or no load (shallow draft) conditions of the vessel.

A still further object is to provide a propelling unit which would permit maximum safe immersion of the propeller when the craft is being operated in shallow waters, in which the immersion of the propeller would be automatically varied in such shallow waters so as to follow the configuration of the bottom of the water channel, and in which the propeller would be maintained at a safe distance from the bottom.

A still further object is to provide means for automatic raising of the propelling unit when passing over submerged obstacles such as rocks, bars, snags, and the like, thereby effecting an

automatic protection to the propeller in dangerous waters irrespective of whether the vessel is moving ahead or astern, or whether its stern is moving sidewise, as may be the case in maneuvering the vessel.

A still further object is to provide a propelling unit which could be rotated in its operative position through a large predetermined angle, thereby effecting the necessary maneuverability of the vessel.

A still further object of the invention is to provide a detachable propelling unit, the submerged parts of which can be easily raised for inspection or removed for repair irrespective of the load condition of the vessel.

Other objects and advantages of the present invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification, wherein two embodiments of the invention are illustrated. In the drawings, wherein like reference characters designate corresponding parts in the several views,

Fig. 1 is a side elevation of the stern of a vessel in which there is installed a detachable propelling unit embodying the present invention.

Fig. 2 is a top view of the construction shown in Fig. 1.

Fig. 3 is a view similar to that of Fig. 1, showing a modified structure embodying the invention.

Fig. 4 is a top view of the structure shown in Fig. 3.

Fig. 5 is a perspective view showing the adjustment mechanism of the modified structure.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation, and it is not intended to limit the invention claimed herein beyond the requirements of the prior art.

Referring to the drawings, A designates generally a water craft or vessel of any type intended to be converted into a self-propelled craft. The detachable propelling units are designated generally in the preferred and modified structures by the characters B and C, respectively. Referring now to Figs. 1 and 2, the preferred structure comprises a power unit b, which

is preferably an electric motor of a suitable type and capacity provided with a reversing mechanism, and a propeller 6 of a screw type which is suspended in said power unit and is driven thereby in a manner well known in the art. A substantially vertical transmission shaft is mounted in a housing 9 which is journaled in brackets 10, 11 and 12 in such a manner that said housing 9 and consequently the entire power unit B can turn in said brackets 10, 11 and 12 through a large predetermined angle, but is restrained from any movement in brackets along its longitudinal axis. The ends 10b, 11b, and 12b of said brackets 10, 11 and 12 are adapted to slide on the substantially vertical portions 20b, 20b of frame members 20, 20. Said frame members 20, 20 are securely fastened to the hull of the vessel as at 20a and 20c. A connecting member 13 is provided for the purpose of fastening the brackets 10, 11 and 12 together, thus making them slide on 20b, 20b as a unit. The downward movement of the connected brackets is limited by stops 22, 22 provided at the lower portions of members 20, 20. The thrust of the propeller 6 is transmitted to the lower bracket 12 and to the frame members 20, 20, which transmit it to the hull of the vessel A. If desired, brackets 10, 11 and 12 may be provided at 10b, 11b and 12b with suitable rollers in order to eliminate friction incident to sliding on the members 20, 20.

Hinged to the hull of the vessel A at 16 there is provided a skeg 15 extending rearwardly of the propeller 6. The extending portion 15a of said skeg 15 is curved upward to provide protection to the propelling unit B, and particularly to propeller 6, when the vessel is moving ahead or astern over shoal regions. Said skeg 15 is V-shaped, its narrow end being curved up, as described, and the wide part being closed and hinged to the hull as at 16. Such construction enables the skeg 15 to withstand considerable side thrust and impact loads which occur when the unit B is turned through an angle, and a submerged obstacle, such as a rock, strikes the skeg 15 at an angle. The wider portion of said skeg 15 is preferably built up from channel steel and is covered, both top and bottom, with sheets 21 to form an enclosed member which prevents an accumulation of drift wood, weeds or the like, as would occur if an open or skeleton skeg were used. An inclined link 18 is hinged to the skeg 15 at its lower end as at 17, and at its upper end is hinged to the connecting member 13, as at 19.

It will now be understood in view of the foregoing description that when the skeg 15 strikes a submerged obstacle, the same will operate to raise said skeg 15 which, in turn, will raise with the aid of the inclined link 18, connecting member 13, and the brackets 10, 11 and 12, the entire propelling unit B. When the obstacle is passed, the weight of the unit B, as well as that of the skeg 15, and of the brackets 10, 11 and 12, operates to lower the unit B and to bring it down to its original operative position. In shallow waters, the operation of the skeg 15 causes the propeller 6 to follow the configuration of the bottom at a safe distance therefrom, whereby maximum safe immersion of the propeller is effected at all times. Figs. 1 and 3 illustrate different draft conditions of the vessel, the dotted line *d-d* representing the loaded draft line, and the dotted line *e-e* the light draft line. From the examination of said figures it is clear that

when the propelling unit is in position shown by the solid lines, the immersion of the propeller 6 is insufficient for operation under the light draft line conditions. In accordance with the invention, operative position of the propelling unit B and consequently the immersion of the propeller 6 are made adjustable according to the draft conditions. The adjustments are effected in the present embodiment with the aid of a cable and counterweight mechanism which comprises a cable 23 passing over a number of suitable pulleys or drums, such as 24 and 25, having one of its ends fastened to the bracket 10, while the other end has a counterweight 26 attached to it. Cable 23 is provided with suitable means operating to restrict adjustably its upward movement beyond a certain predetermined point, but permitting its free downward movement, or in other words, restricting the downward movement of the propelling unit B beyond its predetermined operative position and permitting free upward movement of said unit. In the preferred embodiment of the invention, said means are represented by a ratchet wheel mechanism provided in the drum 25. With the aid of the handle 25a the propelling unit B may be raised or lowered and adjustments of the operative position thereof are thereby effected, since the ratchet mechanism provides a stop for the propelling unit in its downward movement. Referring to Figs. 1 and 3, by raising the counterweight 26 to the position shown in dotted lines, the propelling unit will be lowered to the position represented by similar dotted lines, thus effecting sufficient immersion of the propeller 6 for light draft line conditions. Of course, any intermediate position of the propelling unit between those shown by the solid and dotted lines in the Figs. 1 and 3 may be easily effected. The counterweight 26 is so selected that it will support part of the weight of the propelling unit and brackets, thus decreasing the force which must be applied to the skeg 15 for raising the unit B. However, the counterweight should not be so heavy as to cause rising of the propelling unit B in operation except where required to protect the propeller. In some instances I propose to form the counterweight as a water tank, which can be varied in weight by pumping the water into or from said tank and so regulate within rather narrow limits the minimum forces required to raise the skeg and attached propulsion unit.

The electric motor 5 is supplied with current by a suitable generator 7 electrically connected to said motor with the aid of suitable conductors. The generator 7 is driven by a prime mover of any suitable type, as indicated at 8. Any practical type of prime mover may be used for the above purpose, and any other source of electric current than a generating unit may be utilized, if practical. Such a generator and prime mover may be of the conventional Diesel power driven generator units now available for such uses.

In operation, the propelling unit B is first set at a predetermined proper elevation for the best operation in the given draft conditions. The drum 25 is used for this purpose, as described. The setting thus effected determines the maximum depth to which the propeller 6 will be permitted to descend, but it will not restrict or prevent the raising of the propelling unit B by the skeg 15 when the same strikes a submerged obstacle or is following the configuration of the bottom in shallow waters. The propelling unit

6 can be turned with the aid of a bar or tiller *t* either to the right or to the left, turning in supporting brackets, in order to steer and maneuver the vessel. When it is desired to raise the propelling unit for inspection or repair, hinge 19 is disengaged, and the propelling unit is simply slipped up on the frame structure. Such raising may be done either by hand or with the aid of a suitable crane. It may also be done conveniently with the aid of the drum 25, in which case a suitable support of sufficient height with a pulley provided at its top is used in place of the pulley 24.

The modified structure shown in Figs. 3, 4 and 5 is adapted for use in place of or as a substitute for the preferred structure. In said modified structure the power unit comprises a gasoline motor, such as the conventional outboard type shown at *c*, suspended in brackets 10, 11 and 12 similarly to the electric motor *b* of the preferred structure. The ends 10*b*, 11*b* and 12*b* of the brackets 10, 11 and 12 are slidable on a member 14 fastened to a substantially vertical link 31. Said link 31 is hinged as at 32 to the skeg 35, and at 33 to the upper substantially horizontal link 36. Said link 36 is hinged to the hull of the vessel, as at 37. The skeg 35 is hinged to the hull of the vessel as at 34 and is bent upward in its part 35*a* and forward toward the vessel in its part 35*b*, where it is fastened in any suitable manner to the link 31. The wider portion of said skeg 35 is preferably made similar to that of the skeg 15 of the preferred structure, that is, the same is built up from channel steel and is covered, both top and bottom, with iron sheets, such as shown at 45. Such construction, in addition to limiting the accumulation of litter on the skeg, also imparts a buoyancy to the skeg which assists materially in reducing the amount of counterweight required to minimize the forces operating to raise the skeg and propulsion unit. The cable 23 is fastened to the link 31 near the middle portion thereof, as at 23*a*.

From the above description it will be clear that in the modified structure the thrust of the propeller 6 is transmitted to the hull of the vessel through the upper link 36 and the skeg 35, and that in said modified structure the frame members such as 20, 20, are entirely eliminated. In order to strengthen the link 36 and the skeg 35, the same are made of relatively large transverse dimensions, particularly at the hinges 34 and 37 (see Fig. 4) in order to make the structure strong enough to withstand considerable side thrust when the propelling unit is turned to the right or the left to steer the vessel.

The cable 23 is passed over the pulleys 24 and 38, and the counterweight 26 is attached to its end. In this embodiment I prefer for the sake of economy to dispense with the drum such as 25 (see Fig. 2), substituting for the same the structure shown in Fig. 5. Said structure comprises an angular bracket 39 provided with longitudinal slots 39*a* and 39*b*. Bolts 40, 40, secured at a suitable place on the vessel structure engage the slot 39*a* and enable fixing the bracket 39 at a desired elevation. The cable 23 passes through the slot 39*b* and slides freely therein. A washer 41 serves as a stop and prevents upward movement of the cable beyond the desired elevation, thus preventing the downward movement of the propelling unit *C* below the point for which the bracket 39 is set. In Fig. 3 there is shown in solid lines the operative position

of the propelling unit *C* for the loaded draft line condition. To set the structure for the light draft line condition, such as shown by the line *e-e*, bolts 40, 40 are loosened, and the bracket 39 raised to a higher position, whereupon the bolts 40, 40 are tightened up. This position of the bracket 39 will permit higher upward movement of the counterweight 26 and will allow the propelling unit *C* to assume the position shown in Fig. 3 in dotted lines, insuring complete immersion of the propeller 6. Bracket 39 also operates to prevent excessive oscillation on the counterweight 26 under actual operating conditions. If desired, the counterweight 26 may be made slidable in vertical direction in side guides, thus entirely eliminating the possibility of objectionable oscillation. A certain amount of adjustment is possible, if desired, by moving the washer 41 on the cable 23. It should be noted that the axis of the propeller 6 is slightly rotated in the counter-clockwise direction as the propeller 6 moves down, which operates to set the propeller 6 in a more efficient position for operation in shallow waters. The action of the skeg 35 and its cooperation with the counterweight 26 are similar to those of the skeg 15 of the preferred structure. There is no sliding of the brackets 10, 11 and 12 on the member 14 during the operation. However, when it becomes necessary to raise or to remove the propelling unit *C* for inspection or repair, the same may be done without disassembling the entire structure by slipping the unit *C* upward relative to the member 14.

Thus, in one of its broader aspects, my invention contemplates providing a novel detachable propelling unit for surface water craft, which unit is capable of being attached to the hull of a water craft of any kind without making any irreparable modifications in the hull structure thereof, and which is further capable of being adjustably set during the operation in an operative position to suit the draft characteristics of the particular water craft as well as the load conditions thereof, and which is provided with means operating to raise said propelling unit in order to make the propeller avoid submerged obstacles or prevent it from scraping the bottom when the craft is being operated in shallow waters.

Although only two embodiments of the present invention have been illustrated and described, numerous changes and modifications in the form and arrangement of parts will appear to those skilled in the art, and the same may be made without departing from the spirit of my invention. For example, direct mechanical drives such as belts, ropes, gears, chains, and the like, transmitting mechanical power directly to the vertical transmission shaft of the propeller, may be used. For example, in the construction shown in Fig. 1, a prime mover such as a steam engine, or a stationary gasoline engine may be mounted adjacent the stern of the hull and be coupled with the vertical transmission shaft in any manner to permit relative vertical movement of the shaft to the prime mover, while being power driven by the prime mover. One such coupling device may be the use of drive pulleys on the shaft and on the flexible driving belt or belts. In certain instances, a slip joint or spline may be provided in the transmission shaft between the propeller and the prime mover and so permit the raising and lowering of the propeller by a telescoping action within the shaft. Such an arrangement would be

desirable particularly where the device of the present invention is utilized in a conversion of a vessel, as for example from a stern paddle wheel type to a propeller driven type of vessel.

5 Another type of prime mover which may be utilized is a steam or other power driven unit mounted directly above the transmission shaft and movable therewith and supplied with steam or other power from a power generating unit
10 within the hull of the vessel. In place of the drum 25 or the bracket 39, a simple loop on the cable 23 cooperating with a number of hooks suitably positioned may be used for the purpose of adjusting the operative position of the propelling
15 unit.

I claim:

1. A marine propulsion unit comprising a hinged frame vertically disposed to have its upper and lower members extending substantially horizontally and an intermediate member extending
20 substantially vertically, said frame at the front ends of its horizontally extending members being adapted to be hinged to the hull of a vessel and to be adjustably limited in its downward movement relative thereto; a power driven propeller
25 unit rotatably secured to the intermediate member of said frame and bodily movable therewith, said unit including a screw propeller, a substantially vertical power transmission shaft therefor and an internal combustion engine of the outboard type operatively connected therewith; and
30 a propeller protecting member extending beneath the propeller and secured to said intermediate frame member and adapted to move said frame in response to its movements occasioned by obstructions of the channel.

2. A marine propulsion unit comprising a hinged frame vertically disposed and having its upper and lower members extending in a substantially horizontal plane and connected with
40 an intermediate member lying in a substantially vertical plane, said frame being hinged at the forward ends of the horizontally extending members to the stern of a vessel and adjustably limited in its downward movement relative thereto; a power driven propeller unit rotatably secured
45 to the intermediate member of said frame and bodily movable therewith, said unit including a screw propeller, a substantially vertical power transmission shaft therefor and an internal combustion engine of the outboard type operatively

connected therewith; a counterbalance operatively connected to the intermediate member of said frame and adapted to facilitate the movement of said propeller unit relative to the vessel; and a propeller protecting member hinged to the hull at one of its ends and extending beneath the propeller and secured to said intermediate frame member at its other end, said protecting member being adapted to move said frame in response to movements occasioned by contact with
50 obstructions in the channel.

3. A marine propulsion unit comprising a hinged frame vertically disposed to have its upper and lower members extending substantially horizontally and an intermediate member extending substantially vertically, said frame at the front ends of its horizontally extending members being adapted to be hinged to the hull of a vessel and to be adjustably limited in its downward movement relative thereto; a power driven propeller secured to the intermediate member of said frame and bodily movable therewith; and a propeller protecting member extending beneath the propeller and secured to said intermediate frame member and adapted to move said frame in response to its movements occasioned by obstructions of the channel.

4. A marine propulsion unit comprising a hinged frame vertically disposed and having its upper and lower members extending in a substantially horizontal plane and connected with
30 an intermediate member lying in a substantially vertical plane, said frame being hinged at the forward ends of the horizontally extending members to the stern of a vessel and adjustably limited in its downward movement relative thereto; a power driven propeller secured to the intermediate member of said frame and bodily movable therewith; a counterbalance operatively connected to the intermediate member of said frame and
40 adapted to facilitate the movement of said propeller unit relative to the vessel; and a propeller protecting member hinged to the hull at one of its ends and extending beneath the propeller and secured to said intermediate frame member at
45 its other end, said protecting member being adapted to move said frame in response to movements occasioned by contact with obstructions in the channel.

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