This invention relates to boat propelling apparatus and more particularly to a removable steerable propelling apparatus which may be remotely mounted on a boat to move and steer the boat sideways.

In the operation of certain boats, particularly fishing boats wherein the boat must be moved against a net, it is very often necessary to move the boat sideways. In fishing boats, it is now common to employ a powered skiff which is attached by lines to the side of a fishing boat to apply the necessary force to move the boat and at the same time move it in the desired direction. It is apparent, therefore, that each boat must carry such a skiff and while the necessary manoeuvring is being carried on, one of the personnel must leave the fishing boat to operate the skiff. When manoeuvring of this nature is being carried on, all hands are usually fully engaged in handling nets and the like and it is therefore costly to have to carry an extra hand to work the skiff alone.

It is appreciated that certain types of propeller mechanisms have been devised by which larger crafts may be manoeuvred sideways. However, such mechanisms are usually costly and bulky and therefore not suited to the average small fishing boat. Other mechanisms have been devised which may be extended from the side of a boat to drag the boat sideways. However, here again their bulkiness and weight tend to tip the boat sideways and are therefore not suited to smaller boats not having sufficient beam to adequately withstand the turning moment of the longitudinal axis of the boat. These mechanisms also have the disadvantage that, due to the constant motion of the boat about its longitudinal axis, they are alternately lifted from and submerged in the water.

The present invention overcomes the disadvantages of other mechanisms thus far designed for the purpose outlined above by providing a propulsion unit which may be extended from the side of a boat to pivot freely thereon and which automatically maintains a constant desired depth submersion. The present invention is also provided with means whereby the direction of movement of the boat sideways may be controlled from the boat in such a simple manner that the operator in attendance may also take part in other activities necessary, such as the handling of winches and the like.

The present invention comprises an elongated flexible drive shaft connected at one end to the source of power and adapted to be placed in a position in which it extends outwardly from the side of a boat, a propeller mounted at the other end of the drive shaft for rotation therewith and being normally submerged in the water when the drive shaft is placed in its outwardly extended position, an elongated boom unit pivotally connected at one end to the side of the boat and rotatably connected to the drive shaft at the latter's said other end, and floatation means connected to the boom unit to buoyantly support the latter and the drive shaft when the latter is placed in its outwardly extended position to maintain the propeller at a constant depth of submersion in the water.

In the drawings which illustrate the invention,
FIGURE 1 is a side view of the apparatus showing its attachment of the boat,
FIGURE 2 is a plan view of the apparatus taken along line 2-2 of FIGURE 1,
FIGURE 3 is an isometric view of a portion of the apparatus showing in detail means of steering thereof,
FIGURE 4 is a view of the apparatus, partially in section, taken along line 4-4 of FIGURE 3,
FIGURE 5 is an enlarged isometric view of a fragmentary portion of the apparatus related to the steering means thereof,
FIGURE 6 is an enlarged fragmentary view of the apparatus taken alone line 6-6 of FIGURE 2,
FIGURE 7 is an enlarged fragmentary view, partially in section, taken along line 7-7 of FIGURE 2, and
FIGURE 8 is an enlarged view of a portion of the apparatus in the direction 8-8 of FIGURE 1.

Referring to the drawings, a boat 10, the side 11 of which is shown, is provided with a power take-off unit 12 which comprises a shaft 13 connected at one end to an engine with which the boat is powered and extending at its other end 14 through the side of the boat, said end 14 is formed as a square boss 15, the boss having a transverse socket 16 opening outwardly at one side 17 thereof to receive a spring-urged ball 18 which is arranged to extend a short distance outwardly beyond the plane of said side.

To the boss 15 is connected a propeller drive shaft 19, the latter being sectionalized for flexibility by the use of universal joints as at 20 and 21, said universal joints being of known construction. The drive shaft which is sectionalized so as to have an outer section 22 with a central section 23 and an inner section 24 is provided with longitudinally extending spines 26 at the free end 27 of the inner section 24 which slidably mesh with the spines 28 of an internally splined sleeve 29, one end of the latter having a squared socket 30 to slidably accept the boss 15 and having a hemispherical depression 31 for receiving the wall of the socket 30 adapted to provide a seat for the ball 18 to thereby hold the sleeve firmly but releasably in place in the boss.

A cylindrical collar 33 having a bore 35 adapted to rotateally receive the outer section 22 of the drive shaft is arranged on said shaft and being constrained from sliding therealong by the hub 36 of a propeller 37 at one end 38, and by a washer 39 arranged over the shaft at the other end 40 of the collar. The propeller is secured for rotation with the shaft by means of a pin 41 passing through the hub and the drive shaft, and the washer 39 is secured against slidable movement inwardly along the outer section 22 of the drive shaft by a cotter pin 42 passed through the shaft. This arrangement is clearly shown in FIGURE 7 of the drawings.

Secured rigidly to the collar by welding or the like are a pair of arm members 43 and 44 extending outwardly and in opposite radial directions, and each being provided with a sleeve-like aperture 46 and 47 respectively near their outer extremities, the longitudinal axes of which are parallel to each other and perpendicular to the longitudinal axis of the outer sections 22 of the drive shaft. The collar 33 is held in an extended position outwardly from the side of the boat by a pair of elongated booms 50 and 51, the outer ends 53 and 54 and the inner ends 55 and 56 thereof, respectively, each being bent downwardly to form pintles 57, an example of which is shown in FIGURE 4 of the drawings. The pintles at the outer ends 53 and 54 are rotatably received in the apertures 46 and 47 of the arm members and are each provided, as shown in FIGURE 4, with a spring-urged latch 58 which is pivotally mounted on a pin 59 to said outer ends arranged so that when the latter mentioned pintles are inserted into the apertures, the latches thereof will extend outwardly beneath the arm members to prevent the booms from being inadvertently disengaged from the arm members 43 and 44.

The booms divergently extend towards the side of the boat 11 and are connected thereto equidistantly on either
side of the power take-off unit 12 by means of I-bolts 60 fastened to the side of the boat which are arranged to pivotally receive the pintles 57 formed on the ends 55 and 56 and to permit both vertical and horizontal pivotal movement of the booms. Said fast-mentioned pintles are also provided with latches 58 as hereinbefore described to prevent inadvertent disengagement of the booms from said I-bolts.

Rigidly secured at one end 62 to the collar 33 is a shaft 63, said shaft extending upwardly and perpendicularly to both the longitudinal axis of the collar and to the longitudinal axis of the arm members 43 and 44, and has secured thereto near its middle length a floatation member 65. The floatation member may be made of a foam-type thermoplastic or may be a sealed chamber formed of thin copper or brass plates, and is of sufficient size so that it will buoyantly support the entire assembly when the latter is extended from the side of the ship in the position as shown in FIGURES 1 and 2 of the drawings, and in which position the propeller is submerged in the water. The floatation member is secured against movement longitudinally of the shaft by means of spaced flanges 67 welded to the shaft above and below said floatation member.

The shaft 63 extends upwardly through and beyond the floatation member and has a gear box 70 secured for rotation at its upper end 71. Fixedly mounted near said end 71 and within the gear box 70, is a toothed gear 73 which meshes with a worm 74 formed near the outer end 75 of an elongated steering column 76, the latter being of such length that it extends inwardly at its inner end 77 over the side of the boat. Referring to FIGURES 1, 3 and 5 of the drawings, it may be seen that the steering column is of two part construction having an outer section 79 which is rotatably secured to the extend through the gear box 70 adjacent the gear 73 and an inner section 80 which extends inwardly and over the side of the boat, both sections being joined by an universal joint 82 which provides unlimited flexibility of the steering column.

It is intended that the steering column shall flex only in a vertical plane. In order to avoid flexure of the column in a horizontal plane, the outer section of the column near the universal joint 82 is encircled by an elongated sleeve 83, the latter permitting rotation of the column therein. Rigidly connected at one end 84 to the gear box 70 and extending alongside and parallel to the steering column, is an elongated brace 85, the other end 86 of which is rigidly connected to the sleeve 83 by means of a short thick web 87 welded therewith. The brace 85 as shown in FIGURES 3 and 5, comprises two short rods 88 and 89, rod 88 having a bifurcated end 90 which receives a tongue 91 formed at an adjoining end 92 of rod 89, the two being pivotally joined by means of a pin 93 passed transversely therethrough. The length of the rods 88 and 89 are such that the pivotal point of the hinged joint thus provided, is aligned transversely with the hinged centre of the universal joint 82. It will be appreciated that this construction will permit independent rotation in the vertical plane of the steering column relative the gear box, but will restrain horizontal movement of the steering column relative to said box.

The steering column 76 is slidably confined within a U-shaped bracket 95 which is pivotally secured at its base to the said side of the boat, said U-shaped bracket having upstanding legs 96 which serve as stops to limit side to side motion of the column therein.

The inner end of the steering column is provided with a steering wheel 98 which is rigidly secured thereto to provide means to rotate the column. The assembly as hereinbefore described will usually be carried in a non-operative position on a boat with the booms 50 and 51 extending vertically upwardly from their pivotal connection with the 1-bolts 60 being retained in this position by means of a line 100 which may be passed over a sheave, not shown, the latter being secured to a mast or the like, one end of the line being connected to a powered winch on the boat and the other end being connected as at 101 to the gear box 70. When it is desired to place the assembly in operation, the rope is slackened off to permit the assembly to rotatably move to its extended position as hereinbefore described, and the drive shaft 13 connected to the power take-off unit 12. In this extended position, the weight of the assembly is supported by the floatation member 65 and a predetermined length of rope payed out for two or three feet, then snubbed. The power take-off unit 12 is then engaged with the boat engine to rotate the propeller in a direction so that it will tend to rotate the column downwardly from its extended position.

It will be seen that as the axis of the outer section 22 of the propeller shaft lies in the same plane as the axes of the booms 50 and 51, the propeller will tend to move downwardly. However, the tendency for the assembly to move downwardly into the water will be overcome by the buoyant action of the floatation member holding the propeller at its desired depth of submergence. It will also be seen that the pull generated by the propeller on the propeller shaft will be transferred to the collar 33 through the washer 39, and thence through the arm members 43 and 44 to the booms 50 and 51. The angular relationship of the latter relative to the direction of thrust of the propeller will result in their pivotally finding a position in which all lateral forces are in balance, i.e. a position of lateral stability, the parts of the assembly being so arranged as to size and length that in this position of lateral stability, the longitudinal axis of the boat may be disposed to the longitudinal axis of the boat so that without the addition of extraneous forces to unbalance said lateral forces, the propeller will normally tend to exert a pulling force on the boat in a direction parallel to the transverse axis of the latter. In order to alter the lateral direction of the pull of the propeller, said propeller may be rotated against the gear 73 by means of a steering wheel thereby rotate gear 73, thereby rotating the collar to one side or the other out of its laterally stabilized position to a position in which its longitudinal axis extends at an angle to the transverse axis of the boat. It will be seen, therefore, that the direction of sideways movement of the boat may be altered at will.

During the operation of the assembly, heavy seas may sway the boat from one side to the other. However, by reason of the pivotal connection of the assembly to the side of the boat, it will be apparent that the floatation chamber will permit the propeller to remain at a constant depth submergence in the water. It is appreciated that in very heavy seas, the assembly may be inadvertently disconnected from the boat, however, the provision of the line 100 will prevent it from becoming lost.

What I claim is:

1. Boat manoeuvring apparatus for a boat having a power take-off unit at a side thereof comprising an elongated drive shaft formed of a plurality of universally jointed sections connected at an inner end to the power take-off unit and normally extending outwardly from the side of the boat perpendicularly to the longitudinal axis of the latter, a propeller mounted at the outer end of the drive shaft for rotation therewith and being normally submerged in the water, an elongated boom unit pivotally connected at an inner end to said side of the boat, a collar pivotally connected to the outer end of the boom unit for side to side pivotal movement relative thereto and rotatably supporting the drive shaft at the outer end of the latter, floatation means at said outer end of the boom unit for buoyantly supporting the latter with the drive shaft so as to maintain the propeller at a constant depth of submergence in water, an elongated rotatable steering column extending between the side of the boat and the collar, and gear means operatively connecting the steering column and collar whereby the latter, upon rotation of the column, may be rotatably po-
sitioned at varied angular positions relative to the longitudinal axis of the boat.

2. Boat manoeuvring apparatus for a boat having a power take-off unit at a side thereof comprising an elongated drive shaft formed of a plurality of universally jointed sections connected at an inner end to the power take-off unit and normally extending outwardly from the side of the boat perpendicularly to the longitudinal axis of the latter, a propeller mounted at the outer end of the drive shaft for rotation therewith and being normally submerged in the water, a collar for rotatably supporting the drive shaft at the outer end of the latter, a pair of elongated boom members pivotally connected at inner ends in spaced side by side relationship to the boat and being pivotally connected at outer ends to the collar, said boom members being arranged so as to converge towards said outer ends, flotation means at the collar for buoyantly maintaining the propeller at a constant depth of submersion in the water, an elongated rotatable steering column extending between the side of the boat and the collar, and gear means operatively connecting the steering column and collar whereby the latter, upon rotation of the column, may be rotatably positioned at varied angular positions relative to the longitudinal axis of the boat.

3. Boat manoeuvring apparatus for a boat having a power take-off unit at a side thereof comprising an elongated drive shaft formed of a plurality of universally jointed sections connected at an inner end to the power take-off unit and normally extending outwardly from the side of the boat perpendicularly to the longitudinal axis of the latter, a propeller mounted at the outer end of the drive shaft for rotation therewith and being normally submerged in the water, a collar for rotatably supporting the drive shaft at the outer end of the latter, a pair of elongated boom members pivotally connected at inner ends in spaced side by side relationship to the boat and being pivotally connected at outer ends to the collar, said boom members being arranged so as to converge towards said outer ends, flotation means at the collar for buoyantly maintaining the propeller at a constant depth of submersion in the water, an elongated flexible steering column extending between the side of the boat and the collar, and gear means operatively connecting the steering column and collar whereby the latter, upon rotation of the column, may be rotatably positioned at varied angular positions relative to the longitudinal axis of the boat.

4. Boat manoeuvring apparatus for a boat having a power take-off unit at a side thereof comprising an elongated drive shaft formed of a plurality of universally jointed sections connected at an inner end to the power take-off unit and normally extending outwardly from the side of the boat perpendicularly to the longitudinal axis of the latter, a propeller mounted at the outer end of the drive shaft for rotation therewith and being normally submerged in the water, a pair of elongated boom members extending in spaced side by side outwardly converging relationship and being pivotally connected at inner ends to the side of the boat, supporting means pivotally connected for side to side movement to the outer ends of the boom members for rotatably supporting the outer end of the drive shaft, flotation means at said outer end of the boom unit for buoyantly supporting the latter with the drive shaft so as to maintain the propeller at a constant depth of submersion in water, and manually operable steering means connected to the supporting means for positioning the latter and with it the drive shaft at varied angular positions relative to the longitudinal axis of the boat.

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MILTON BUCHLER, Primary Examiner.
FERGUS S. MIDDLETON, Examiner.
R. G. BESHA, A. E. CORRIGAN, Assistant Examiners.