

[54] **PROPULSION DEVICE FOR WATER CRAFT**

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[51] Int. Cl. **B63h 16/12**

[58] Field of Search 115/21, 22, 28 R, 29, 25,
115/26, 29

[56] **References Cited**

UNITED STATES PATENTS

2,668,513	2/1954	Reynolds	115/29 X
3,038,435	6/1962	Fairfax	115/21

3,139,061 6/1964 Johnston 115/25

FOREIGN PATENTS OR APPLICATIONS

656,524 10/1963 Italy 115/26

Primary Examiner—Trygve M. Blix

Assistant Examiner—Gregory W. O'Connor

[57] ABSTRACT

The device employs a blade moved back and forth through the water in a sculling action. Actuation is accomplished by mechanism driven by the feet of an operator. The direction of thrust of the blade can be selectively varied to provide steering control at the discretion of the operator.

11 Claims, 7 Drawing Figures

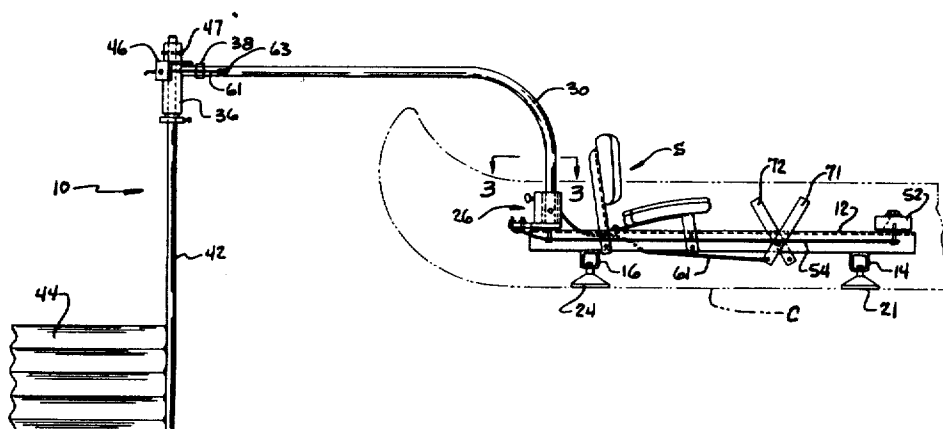


Fig. 1.

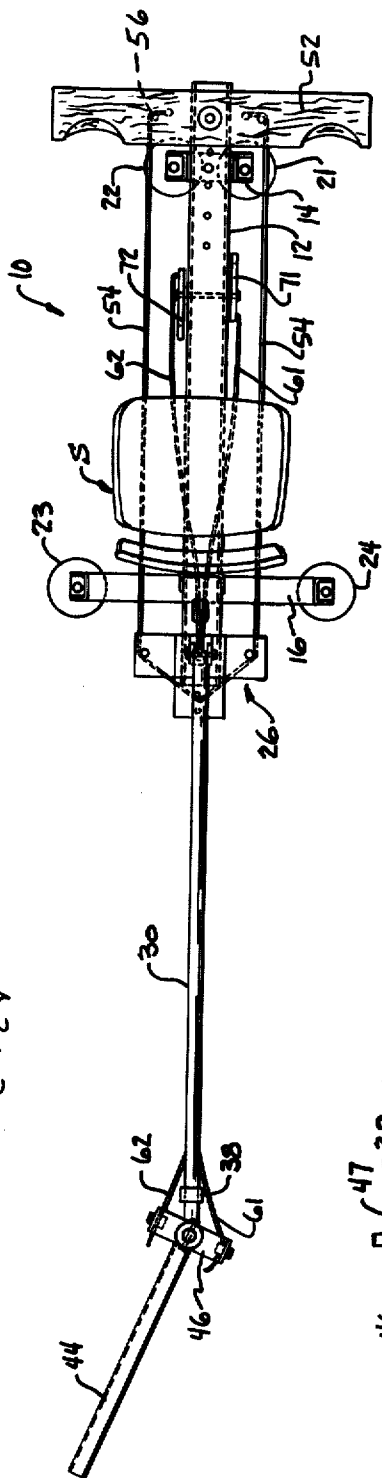


Fig. 2.

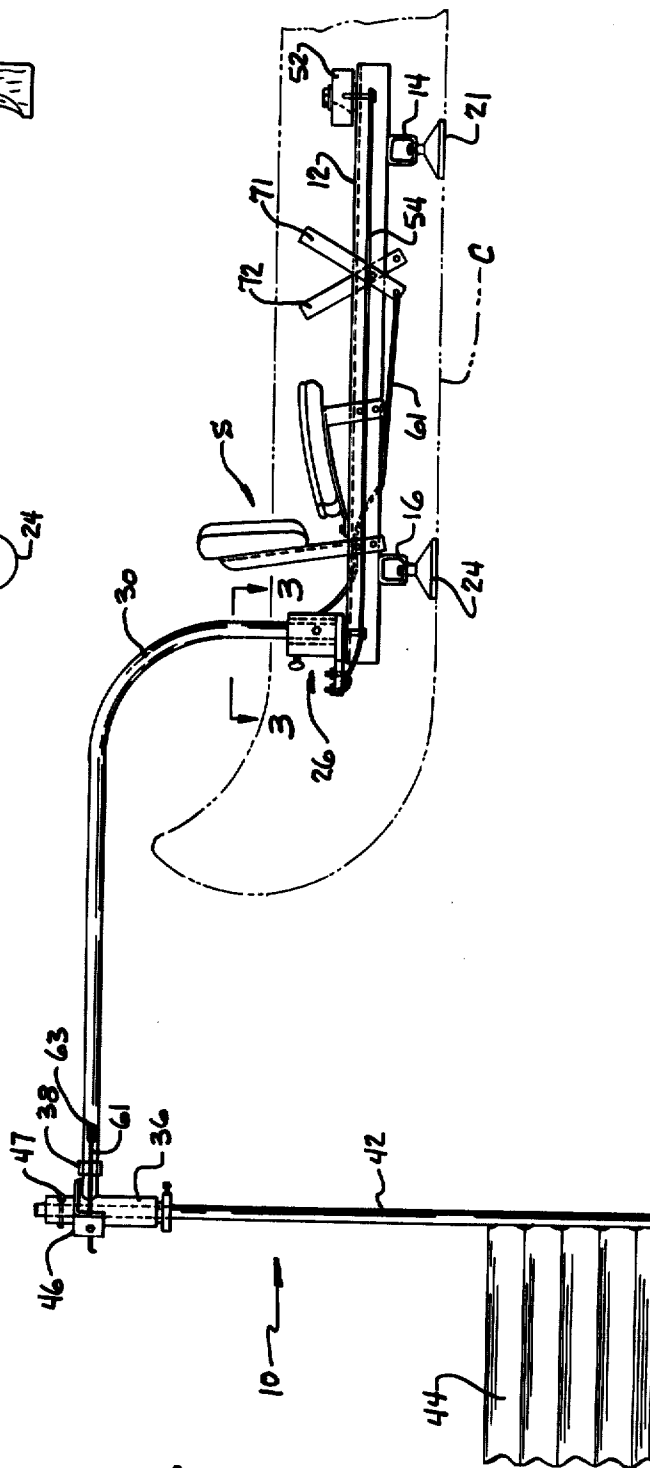


Fig. 3.

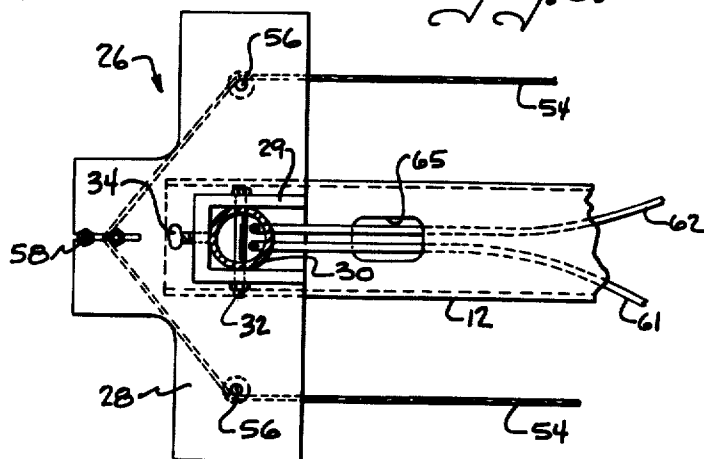


Fig. 4.

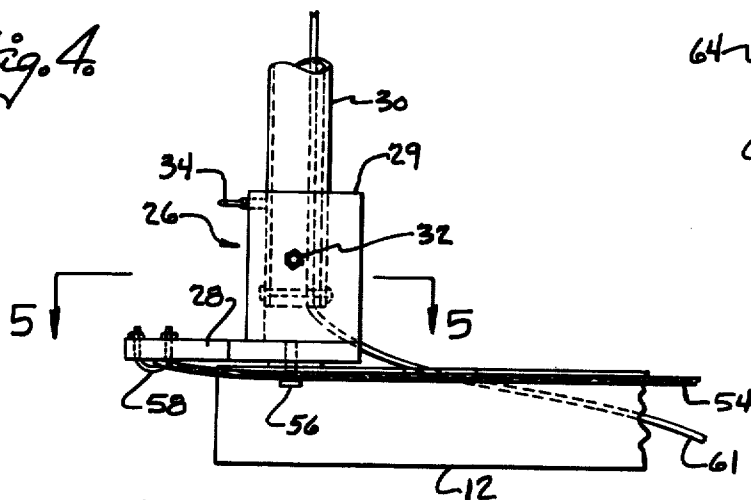
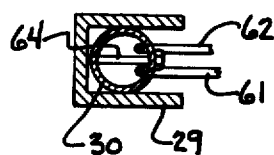


Fig. 5.



DIRECTION
OF TRAVEL

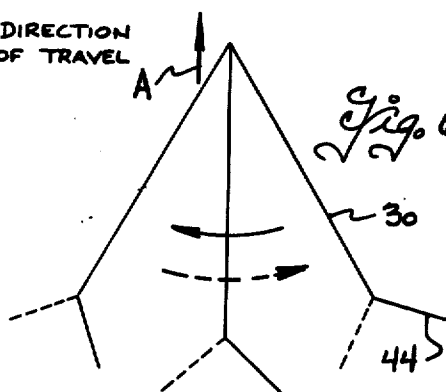


Fig. 6.

APPROXIMATE
RESULTING
DIRECTION
OF TRAVEL

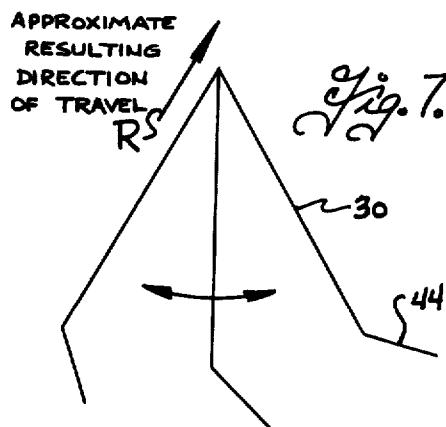


Fig. 7.

PROPULSION DEVICE FOR WATER CRAFT

BACKGROUND

The invention pertains generally to marine propulsion, and more particularly to manually-powered marine propulsion.

The broad concept of propelling small water-craft by operating an oar over the stern of such water-craft dates back several hundred years and is still in vogue in many locales. Various mechanisms have been devised for attachment to the stern of boats to assist an operator or sculler in the manipulation of the propelling oar. Some prior art devices are shown, for example, in U.S. Pats. No. 2,668,513 issued Feb. 9, 1954 to W. Reynolds; No. 3,038,435 issued June 12, 1962 to B. L. Fairfax; and No. 3,139,061 issued June 30, 1964 to W. F. Johnston. However, none of these prior devices could be easily steered. An easily steerable, manually-powered propulsion device for water craft is desirable. In many localities laws and ordinances prohibit the use of motor driven water-craft on lakes and ponds, thereby reviving interest in sculling mechanisms by fishermen and small water-craft enthusiasts. Ever increasing crowding of our water ways requires that the water craft be readily maneuverable. Steering is also desirable to compensate for wind or current.

SUMMARY

The present invention relates to a propulsion device for water craft.

It is a primary object of the present invention to provide a manually operable propelling mechanism for water-craft which mechanism is simple in construction, operation and efficient in use.

A further object of the invention is to provide a propelling mechanism of the type set forth which is portable, of light weight, and particularly suitable for use on small boats.

A still further object of the invention is to provide a mechanism of the character specified, so constructed as to facilitate using the blade as a rudder.

Another object of the present invention is to provide a propulsion device for water craft having a selectable steering feature.

Yet another object is to provide a device in accordance with the foregoing object and including mechanism which permits orientation of the blade to be controlled for steering while the blade is yet moved in a sculling action for propulsion.

These, and other objects and advantages of the present invention, will become apparent as the same becomes better understood from the following detailed description when taken in conjunction with the accompanying drawings.

DRAWING

FIG. 1 is a top plan view of a propulsion device for water craft constructed in accordance with the present invention;

FIG. 2 is a side elevation of the device shown in FIG. 1 mounted on a water craft which is indicated in phantom lines;

FIG. 3 is a fragmentary sectional view taken along line 3—3 of FIG. 2 and on an enlarged scale;

FIG. 4 is a side elevation of the fragment shown in FIG. 3;

FIG. 5 is a cross-sectional view taken along line 5—5 of FIG. 4;

FIG. 6 is a diagrammatic view of the boom and blade action for straight ahead operation, with the blade free to pivot within $\pm 45^\circ$ limits; and

FIG. 7 is a diagrammatic view of the boom and blade action for right turn operation in which the blade is held at 45° orientation to the boom.

DESCRIPTION

Reference is now made more particularly to the drawings which illustrate the best presently known mode of carrying out the invention and wherein similar reference characters indicate the same parts throughout the several views.

A propulsion device 10 is adapted for use on a water craft such as a canoe C shown in phantom lines in FIG. 2. The device has a frame composed of a longitudinal channel 12 and transverse tubes 14 and 16. A plurality of suction cups 21—24 are carried on the extremities of the tubes to serve as means for mounting the device on the water craft.

A drive yoke, designated generally by the numeral 26, is pivotally mounted at the aft end of the channel 12. As best shown in FIGS. 3 and 4, the drive yoke includes a T-shaped bottom plate 28 and an upstanding channel-shaped stub 29. An upwardly and rearwardly-extending boom 30 is mounted on the stub 29 by a pin 32. This mounting allows limited adjustment of the height of the outboard end of the boom under control of an adjustment screw 34. The boom 30 may be made in two pieces but, in the embodiment shown, it extends upwardly to clear the stern of the craft C and then rearwardly so that its cantilevered end is outboard of the craft. At the outboard end is a sleeve-type bearing 36 which is best shown in FIG. 2 a rubber bumper 38 is arranged circumjacent the boom 30 at a point closely adjacent the bearing 36 for a purpose hereafter explained.

A blade spindle 42 extends through the bearing 36 and carries a drive blade 44 at its lower extremity. The blade 44 is advantageously corrugated to provide structural rigidity. At the other end of the spindle is a blade yoke 46 secured to the spindle by a bolt 47. The spindle is rotatable about its own axis, and the blade 44 and the blade yoke 46 move with it. The bumper 38 engages the laterally-extending area of the blade yoke 46 to limit the movement of the blade 44 with respect to the boom 30.

The device thus far described is adaptable for propelling the water craft in a straight ahead direction, with the blade 44 free to swing within limits of about $\pm 45^\circ$ with respect to the axis of the boom 30, as the boom is moved back and forth in a sculling action. This operation is diagrammatically illustrated in FIG. 6 with the direction of travel shown by arrow A. The sculling action is well known and is technically explained by Newton's Third Law of Motion, "To every force there always exists a corresponding force which is equal and oppositely directed." The present application of this law may be stated by the formula, $F = Wa \div 32.2$; where F = force in pounds, W = weight of water moved axially in pounds, and a = acceleration of water in feet per second squared. This simply says that the axial force generated against the water is delivered to the water craft and is used to overcome the frictional drag of the craft. The force obtained depends on how fast the blade is moved, the blade area, and the blade angle.

Apparatus is provided for imparting the sculling action to the boom 30. In the embodiment illustrated, a laterally-extending drive bar 52 is pivotally mounted on the channel 12 at a location so that an operator seated on a seat S can reciprocate the drive bar with his feet. A single drive cable 54 is fixed at its terminal ends to the drive bar 52, and extends therefrom around posts 56 in the drive bar and like posts 56 in the T-plate 26, thus forming a kind of pantograph. The cable 54 is anchored to the leg of the T-plate 26, by a U-bolt 58. As best shown in FIG. 3, the leg of the T-plate is bifurcated to allow adjustment of the U-bolt and thus the cable tension. No relative motion occurs between the flexible cable 54 and any point of contact with the various posts 56, in either the drive bar or the T-plate, thus avoiding problems of lubrication and bearing wear. In this manner, when the drive bar 52 is reciprocated, the drive yoke 26 is also reciprocated and imparts a back-and-forth motion to the boom 30.

In accordance with the present invention, apparatus is provided to steer the craft while the sculling action goes on. This is accomplished by changing the direction of effective thrust of the blade 44. More particularly, the rotation of the spindle 42 is limited or restricted to effect steering. In the embodiment illustrated, separate cables 61, 62 are attached to opposite ends of the blade yoke 46. The cables are preferably disposed inside the boom 30 and, for this purpose, the boom 30 is provided with ingress openings, such as shown at 63. The cables exit at the inboard end of the boom which is provided with a bolt 64 (see FIG. 5) to keep the cables separated. The cables 61, 62 then extend through an opening 65 (see FIG. 3) in channel 12, and extend to control levers 71, 72 respectively. The control levers 71, 72 are pivotally mounted on the channel 12 at a position to be easily manipulated by an operator. By moving a control lever to the position occupied by lever 72 in FIG. 2, the corresponding cable 62 is tightened to limit the distance through which the blade yoke 46 can move away from the bumper or stop 38. Moving control lever 71 rearwardly, for example, would tighten cable 61 and move the blade 44 with respect to the boom 30 to the orientation diagrammatically illustrated in FIG. 7. The approximate resulting direction of travel is shown by arrow R.

In the manner just described, the water craft can be steered while the boom is swung back and forth. Of course slight steering adjustments may also be desirable to offset outside forces such as wind or current.

In the preferred embodiment of the invention, the frame, drive yoke 26, and boom 30 are made of extruded magnesium. The blade 44 and spindle 42, to which it is welded, are made of marine aluminum. The drive bar 52 is of oak impregnated with hot oil as a preservative and lubricant. The cables 54, 55, 61 and 62 are galvanized steel; while the bolts and fittings are cadmium plated.

While a preferred embodiment of the invention has herein been illustrated and described, this has been done by way of illustration and not limitation, and the invention should not be limited except as required by the scope of the appended claims.

I claim:

1. A manually-operated propulsion device for use on a water craft and including a boom adapted to be mounted on the craft with an outboard end disposed rearwardly of the craft; means for reciprocating the

boom in a sculling action; a pivot shaft mounted adjacent the outboard end of the boom; a blade secured to the pivot shaft and operable to propel the craft as the boom is reciprocated; means operatively connected to the pivot shaft for selectively orienting the blade with respect to the boom to steer the craft while the boom is reciprocated; the last-mentioned means including laterally and oppositely-extending arms secured to the pivot shaft adjacent the outboard end of the boom, and control cables attached to said arms to selectively rotate the pivot shaft; stop means on the boom for engaging said oppositely-extending arms to limit the rotation of the pivot shaft and hence the orientation of the blade with respect to the boom; the boom being hollow and having ingress openings for the cables inboard of the location of the stop means; and a portion of the length of the cables being disposed inside the hollow boom.

2. A manually-operated propulsion device for use on water craft comprising, in combination: a frame; means for mounting the frame on a water craft; a seat carried by the frame; a swingable boom pivotally mounted on the frame via a drive yoke and extending rearwardly of the water craft; manually-operable means associated with the boom to enable the boom to be swung back and forth by an operator seated in the seat; the manually-operable means including a laterally-extending drive bar pivotally mounted on the frame forwardly of the seat, and a cable attached to the drive bar and extending from each end thereof to the drive yoke, so that reciprocation of the drive bar reciprocates the drive yoke and swings the boom; an upright shaft pivotally mounted adjacent the outboard end of the boom; a blade secured to the shaft and disposed in a generally upright plane to propel the water craft in a sculling action as the boom is swung; and means selectively operable by the operator and operatively connected to the rotatable shaft for orienting the blade with respect to the boom to steer the water craft while the boom is swung back and forth including control cables operatively connected to the pivot shaft to selectively rotate the same; the boom being hollow and having ingress openings for the cables adjacent its outboard end; and a portion of the length of the cables being disposed inside the hollow boom.

3. The combination of claim 2 including a single clamp on the yoke for holding the cables from the drive bar.

4. The combination of claim 2 wherein the means for orienting the blade with respect to the boom includes control lever means on the frame forwardly of the seat for manipulation by an operator; and wherein the cables egress from the boom at the inboard end thereof, extend along the underside of the frame, and are attached to said control lever means.

5. The combination of claim 4 wherein the means for orienting the blade with respect to the boom includes laterally and oppositely-extending arms secured to the pivot shaft adjacent the outboard end of the boom; and including a stop on the boom for engaging said oppositely-extending arms to limit the rotation of the pivot shaft and hence the orientation of the blade.

6. A manually-operated propulsion device for use on water craft comprising, in combination:

a frame including a longitudinal member having fore and aft ends, and a cross member at each end; means on the cross members for mounting the frame on a water craft;

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a seat mounted intermediate the ends of the longitudinal member;

sculling apparatus including a rearwardly-extending boom, a blade carried by the outboard end of the boom, and means for pivotally mounting the boom on the frame, said last-mentioned means including a drive yoke secured to the boom and having portions extending laterally thereof;

a laterally-extending drive bar pivotally mounted adjacent the fore end of the longitudinal member;

means connecting the drive bar to the drive yoke to reciprocate the latter as the drive bar is reciprocated to swing the sculling apparatus generally equal amounts on opposite sides of the longitudinal axis of the water craft; and

means for selectively changing the position of the blade with respect to the boom and holding the blade at said changed position during the sculling operation.

7. A manually-operated propulsion device for use on a water craft and including a boom adapted to be mounted on the craft with an outboard end disposed rearwardly of the craft; means for reciprocating the boom in a sculling action generally equal amounts on opposite sides of the longitudinal axis of the water craft; a pivot shaft mounted adjacent the outboard end of the boom; a blade secured to the pivot shaft and operable to propel the craft as the boom is reciprocated; and means operatively connected to the pivot shaft for selectively orienting the blade with respect to the boom and holding the blade at said oriented position to steer

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the craft while the boom is reciprocated.

8. A propulsion device for water craft as set forth in claim 7 wherein the last-mentioned means includes laterally and oppositely-extending arms secured to the pivot shaft adjacent the outboard end of the boom, and control cables attached to said arms to selectively rotate the pivot shaft.

9. A propulsion device for water craft as set forth in claim 8 including stop means on the boom for engaging said oppositely-extending arms to limit the rotation of the pivot shaft and hence the orientation of the blade with respect to the boom.

10. A propulsion device for water craft as set forth in claim 9 wherein the boom is hollow and has ingress openings for the cables inboard of the location of the stop means, and a portion of the length of the cables are disposed inside the hollow boom.

11. A manually-operated propulsion device for use on a water craft and including: a boom adapted to be mounted on the craft with an outboard end disposed rearwardly of the craft; means for reciprocating the boom in a sculling action; a pivot shaft mounted adjacent the outboard end of the boom; a blade secured to the pivot shaft and operable to propel the craft as the boom is reciprocated; means for operating the blade in one of two modes, the first mode in which the blade is free to swing to opposite sides of the boom during the sculling action, and the second in which the blade is held in a preselected position on either side of the boom to effect steering of the craft while the boom is reciprocated.

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