

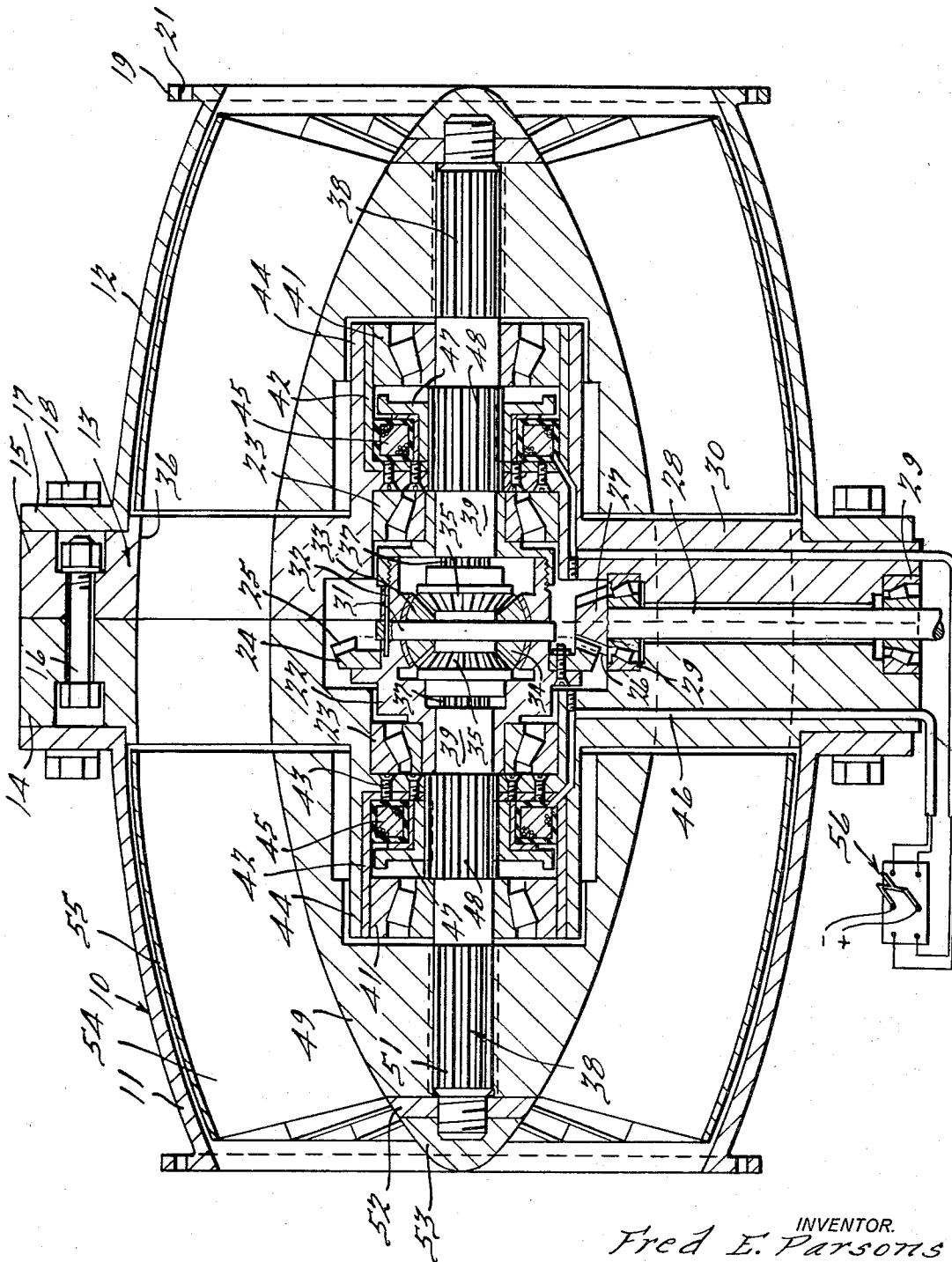
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F. E. PARSONS

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BOW THRUSTER

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INVENTOR.
Fred E. Parsons
BY
Harmon Dickey & Paine
ATTORNEYS.

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BOW THRUSTER
Fred E. Parsons, 1656 Keller Lane,
Bloomfield Hills, Mich. 48013
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ABSTRACT OF THE DISCLOSURE

The invention pertains to a device which provides a flow of water from either side of the bow of a ship for propelling the bow to the right or to the left to assist in maneuvering the ship in a small area.

This invention relates to fluid propulsion devices and particularly to a propulsion device which produces right and left thrust to the bow of a boat.

Because of the length of boats, ships and liners relative to their width, it is difficult to handle the boat in limited areas. Tugs are usually depended upon for moving the large steamers and liners into and out of dock facilities and otherwise maneuvering them in cramped areas. The bow thruster of the present invention moves the bow of the boat transversely of its length and permits the large crafts to be controlled and maneuvered in restricted areas.

The bow thruster of the present invention has like right and left hand housings in which rotors are mounted along with drive and brake mechanisms for locking one of the rotors while driving the other so that the flow of water through the device may either be to the right or to the left. The direction of flow of the water may be quickly changed by releasing one brake and applying the other. In the example illustrated a differential drive is employed which drives one rotor when the other is maintained stationary. Magnetic brakes are illustrated as being the holding means for the rotors.

Accordingly, the main objects of the invention are: to provide a bow thruster having like fluid propelling means at each end thereof; to employ drive means for the propelling means at each end of the propelling device with brake means for retaining one of the propelling means stationary while the other is being driven; to provide a device for propelling a like flow of water from either end thereof controlled by the application of brake means to one of two like propelling means, and in general, to provide a bow thruster which is simple in construction, positive in operation and economical of manufacture.

Other objects and features and novelties of the invention will be specifically pointed out or will become apparent when referring, for a better understanding of the invention, to the following description taken in conjunction with the accompanying drawing, wherein:

The figure is a sectional view of a bow thruster embodying features of the present invention.

The bow thruster of the present invention has an outer shell 10 made up of a left-hand truncated conical housing 11 and a right-hand truncated conical housing 12 of the same shape and dimensions. A central section 13 is made up in two parts 14 and 15 which are secured together by a series of bolts 16. The housing sections 11 and 12 have flanges 17 thereon which are secured to the central section 13 by a series of bolts 18. A similar flange 19 is provided in the forward end of the housing sections 11 and 12 having apertures 21 therethrough by which the flange is secured to an intake and outlet conduit.

The central section 13 supports a drive differential 22 on bearings 23. The differential 22 is driven by a ring gear 24 having sloping teeth 25 which mate with sloping teeth 26 of a bevel, hypoid or like gear 27. The gear 27 is supported on a shaft 28 which is mounted in bearings

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29 on the central section 13. The shaft extends through one of a plurality of webs 30 which provide passageways 36 for the water through the central section 13 in continuation of the axial passageways through the housing sections 11 and 12. The web 30 herein illustrated is of greater width near the center portion to enclose the shaft 28 and is streamlined to reduce resistance of the passage of water thereover. The other webs are thinner and preferably of uniform thickness.

The differential 22 carries a stub shaft 31 which is secured against rotation by a pin 32. Bevel gears 33 and 34 are mounted for rotation on the shaft 31 with their teeth in engagement with side bevel gears 35. The latter gears are splined to splines 37 of shafts 38 which are supported in sleeve bearings 39 and by outboard truncated roller bearings 41. The bearings 41 engage the inner surface of cup-like sleeves 42 which are secured by screws 43 within the aperture in extending arms 44 provided on the central section 13.

Electrically energizable coils 45 are carried on the inner or closed end of the sleeve 42 to provide a magnetic flux when energized by a circuit including a pair of leads within conduits 46. The flux path is completed by a Z-shaped annular member 47 which is splined to a splined section 48 of the shaft 38. Upon the energization of the coil 45, the magnetic flux produced thereby forms a path about the coil through the sleeve 42 and member 47 to lock the sleeve and member together and secure the shaft to the arm 44 against rotation. An ogive shaped hub 49 is secured to splines 51 on each shaft 38 locked in position by a nut 52 and end cap 53. The hubs 49 carry a plurality of vanes 54 extending outwardly thereof and preferably enclosed within a shroud 55. The vanes may be straight, located parallel to the axis of the shaft, or may be curved a limited amount since the flow of liquid from one of the sections to the other will pass between the vanes and function somewhat as straightening vanes in the section having the rotor which is retained stationary to function as a stator.

In operation the shaft 28 is driven from a suitable source of power and one of the magnetically operated brakes will be energized so that the other will be driven. If the magnetic brake in the left-hand section 11 is energized, its hub 49 and vanes 54 will be retained stationary while the hub and vanes of the right-hand section 12 will be rotated forcing the water from the right through the central section and out through the left-hand section to force the bow of the boat to the right. When the electromagnetic brake on the left-hand side is deenergized and that on the right-hand side is energized, the hub and vanes on the left-hand section will be driven thus causing the flow of water from the left to the right and forcing the bow of the boat to the left. The circuits through the leads of the conduits 46 are preferably interlocked, as by a switch 56, so that both of the circuits cannot be energized at the same time, otherwise damage could occur to the driving mechanism and the driven parts of the device. With the left and right-hand sections of the device constructed exactly alike, the same flow of water will occur whether the hub of the left or right-hand section is rotated and the same thrust will be produced either to move the bow of the boat to the right or to the left. It is to be understood that the driving differential and the magnetic brakes have been shown more by way of example and that turbines and other types of drives as well as differential brake mechanisms known in the art to be suitable may be substituted for those herein illustrated.

What is claimed is:

1. A bow thrusting device having substantially identical housings at each end joined to a central section, drive means housed within the central section, a pair of axially

disposed shafts rotatable within the housings selectively driven by said drive means, rotors on said shaft of substantially identical construction, and brake means for locking one or the other rotor so that the drive means will drive the unlocked rotor to produce a flow of water over the locked rotor which functions as a stator.

2. A device as recited in claim 1 wherein the drive means embodies a differential housing for driving side gears from a pair of driven pinion gears.

3. A device as recited in claim 1 wherein brake means is carried between the central section and each of the shafts.

4. A device as recited in claim 3 wherein the brake means are magnetically operated brake devices.

5. A device as recited in claim 1 wherein the brake means for locking one shaft is interlocked with that for locking the other shaft so that only one brake means can be operated at one time to lock a rotor.

6. A device as recited in claim 2, wherein brake means

is carried between the central section and each of the shafts.

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HENRY F. RADUAZO, *Primary Examiner.*