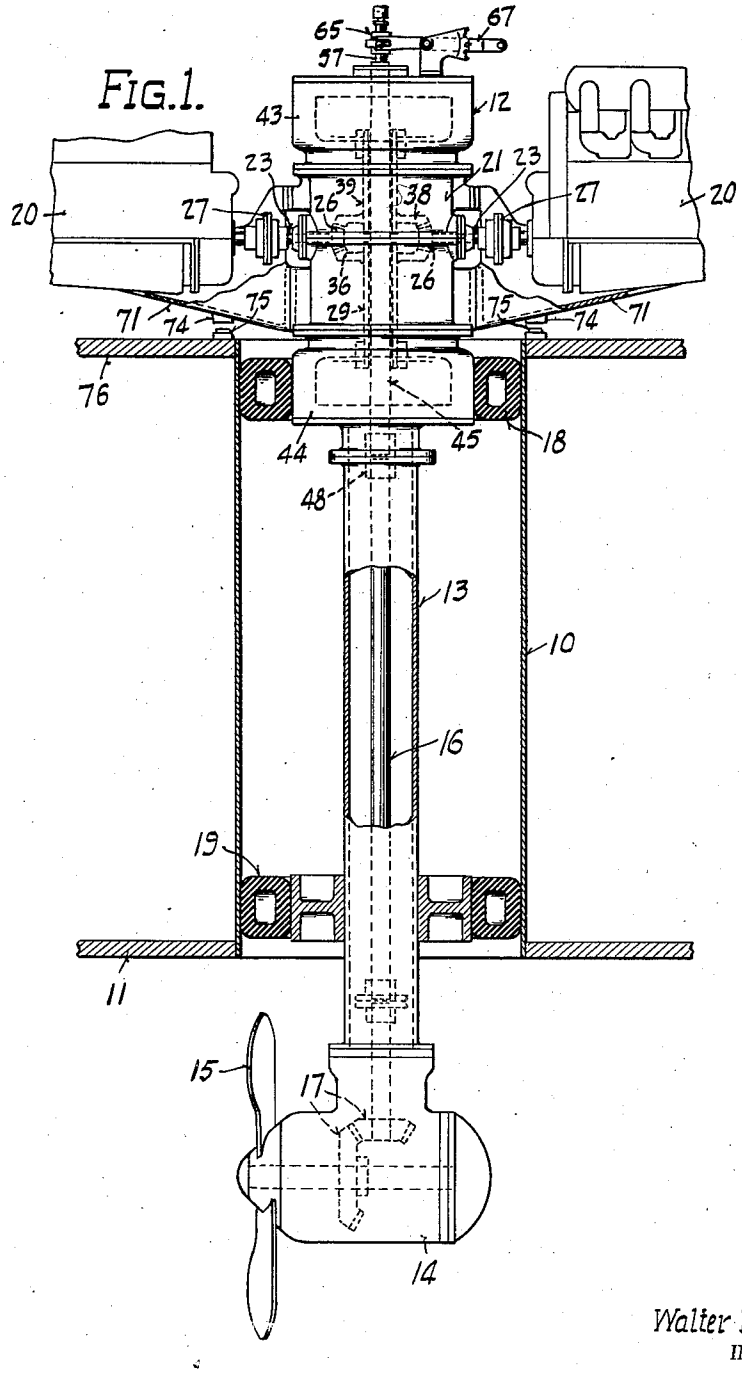
Feb. 6, 1945. W. P. SCHMITTER 2,368,885

MARINE DRIVE

Filed July 21, 1941 3 Sheets-Sheet 1

FIG. 1.



Walter P. Schmitter
INVENTOR.

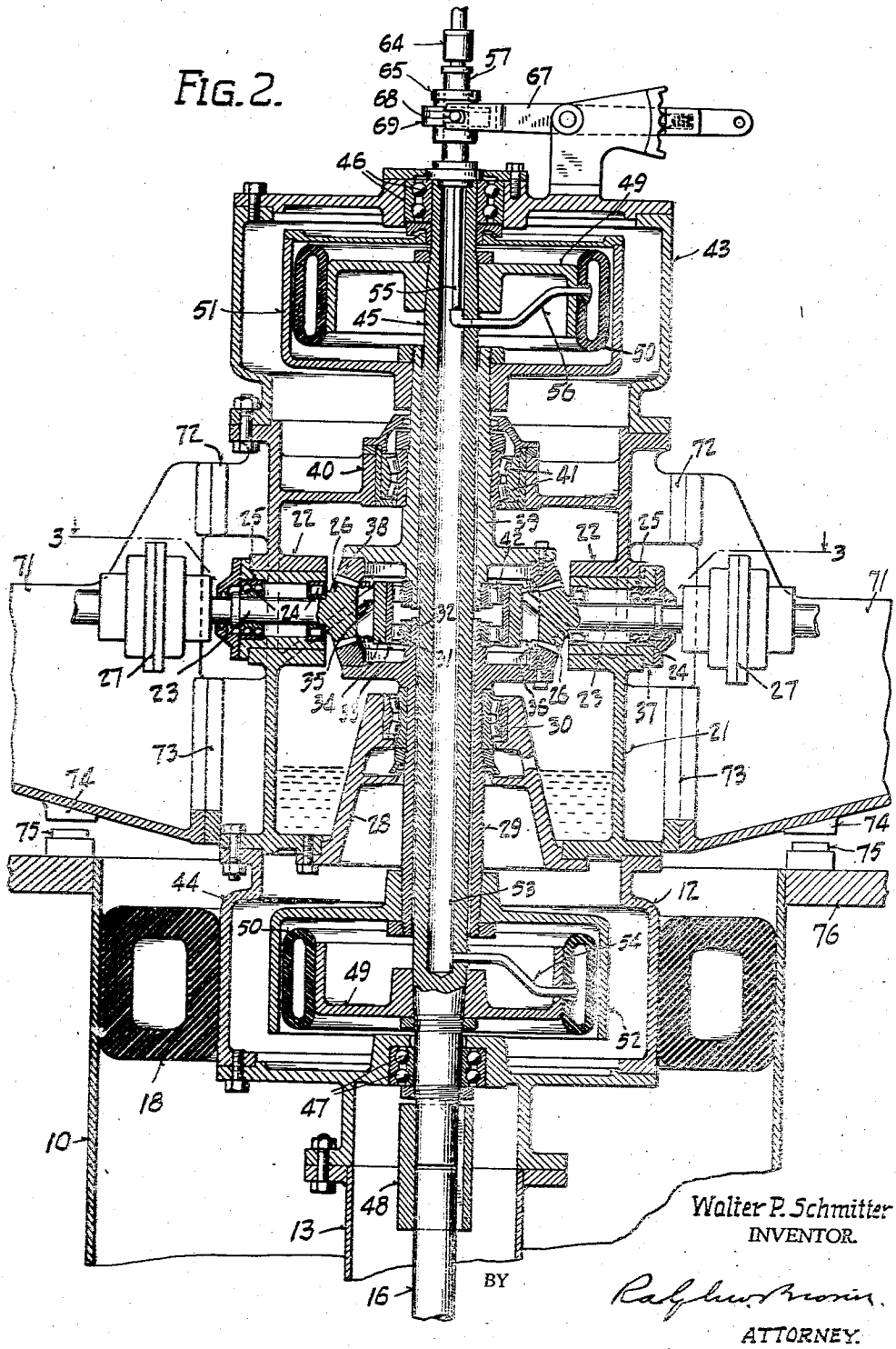
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MARINE DRIVE

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FIG. 2.



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MARINE DRIVE

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FIG. 3.

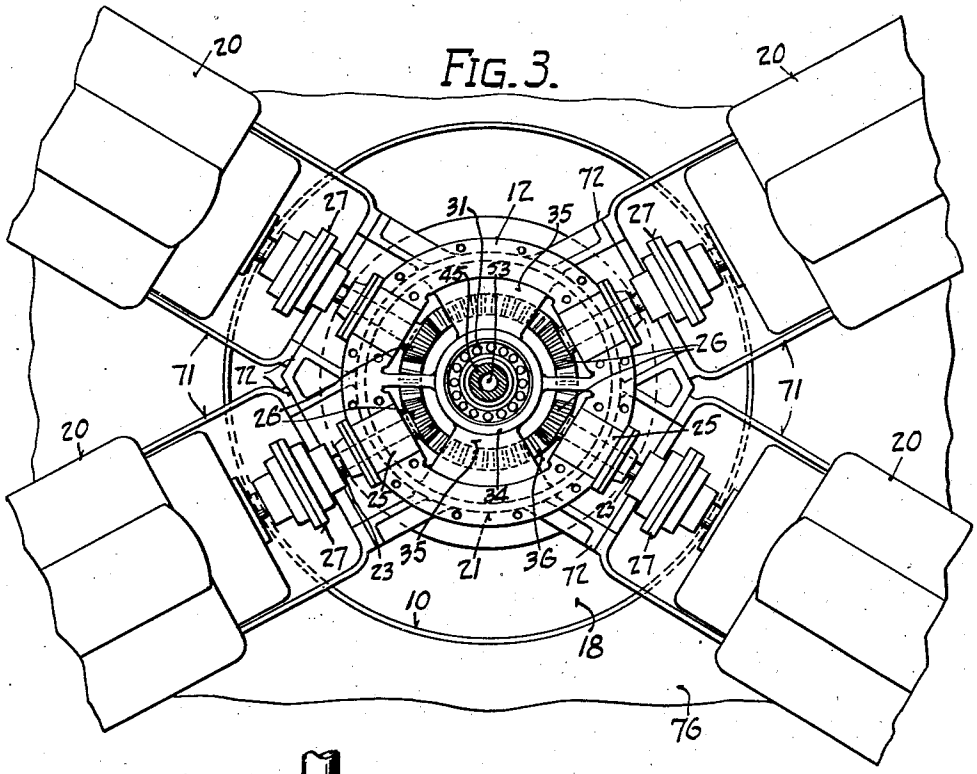
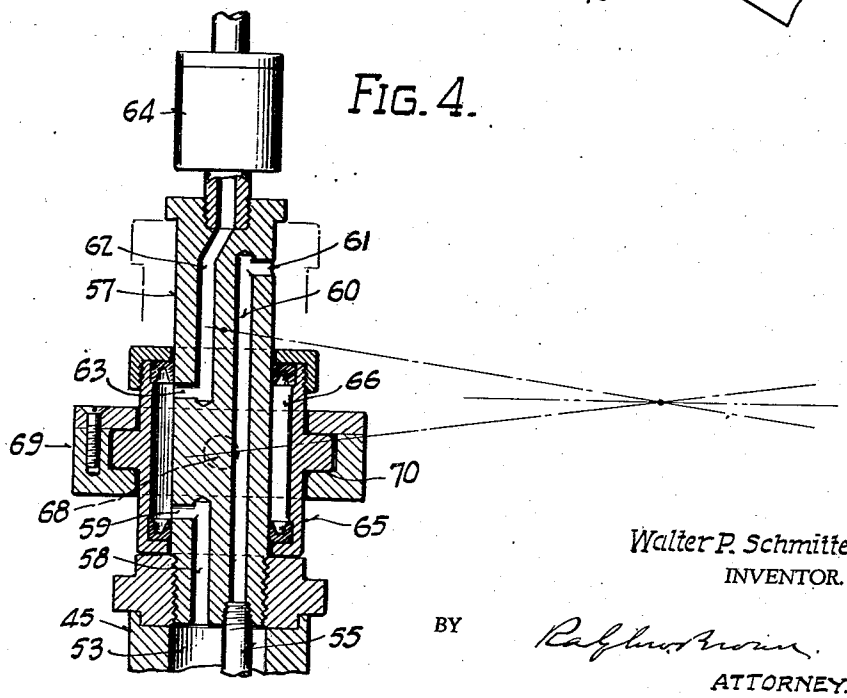


FIG. 4.



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2,368,885

UNITED STATES PATENT OFFICE

2,368,885

MARINE DRIVE

Walter P. Schmitter, Wauwatosa, Wis., assignor to The Falk Corporation, Milwaukee, Wis., a corporation of Wisconsin

Application July 21, 1941, Serial No. 403,335

3 Claims. (Cl. 115—34)

This invention relates to marine drives.

An object of the present invention is to structurally combine a plurality of driving motors and a single driven propeller shaft into a compact assembly which can be readily applied, as a unit, to a ship.

Another object is to provide a multi-motor support with a self-contained power transmission structurally combined into a compact unit for marine use.

Another object is to provide a compact power transmission unit for transmitting the power derived from a plurality of motors to a single driven shaft and selectively operable to drive said shaft in either direction.

Other more specific objects and advantages will appear from the following description of a marine driving unit constructed in accordance with the present invention.

In the accompanying drawings:

Figure 1 is a side elevation of a marine driving unit embodying the present invention and shown applied to a ship.

Fig. 2 is a vertical sectional view, on a larger scale, of the power transmission mechanism employed in the unit shown in Fig. 1.

Fig. 3 is a horizontal plan view on a somewhat smaller scale of that part of the mechanism shown below the reference line 3—3 of Fig. 2 with the upper half of the main housing removed.

Fig. 4 is an enlarged sectional view of the control valve shown in Fig. 1.

The marine driving unit selected for illustration is shown mounted in a tubular structure 10 constituting a well that penetrates the bottom 11 of the ship. One or more such wells may be provided with a separate driving unit in each. The driving unit shown comprises a main housing 12, a tube 13 extending downwardly therefrom through the bottom of the well 10, and a conventional gear housing 14 carried by the lower end of the tube 13 and supporting a propeller. The main housing 12, tube 13, and gear housing 14 are connected to form a rigid unit. A propeller shaft 16, extending loosely through the tube 13, drives the propeller 15 in a conventional manner through bevel gears 17 in the housing 14.

The unit is removably anchored in the well 10 by suitable means, such as two vertically spaced fluid pressure annular containers 18 and 19, which in this instance are shown encircling and attached to the main housing 12 and tube 13, respectively, and expanded into frictional gripping engagement against the interior walls of the well 10. The containers 18 and 19 are preferably formed of rubber reinforced with fabric or cords, as in ordinary pneumatic tire construction, and they may be deflated to permit insertion and withdrawal of the unit to and from the well.

The main housing 12 provides support for a plurality of motors 20, preferably of the automotive type, and also provides a support and enclosure for a power transmission through which the total power derived from the several motors 20 is transmitted to the shaft 16.

The main housing 12 includes an intermediate section 21 having a plurality of radially directed bearing hubs 22 (see Fig. 2) formed in the upright cylindrical wall thereof. This section of the housing is preferably horizontally split in a plane passing through the centers of the hubs 22. Each hub 22 constitutes a support for a pinion shaft 23 journalled in appropriate bearings 24 fixed in a cage 25 within the hub. Each shaft 23 carries at its inner end a bevel pinion 26 and at its outer end a suitable coupling 27 for connection with one of the motors 20 with which it is aligned.

The lower half of the intermediate housing section 21 constitutes a lubricant reservoir and is closed at its bottom by the base of a hollow pedestal 28 attached thereto and extending upwardly to a point above the lubricant level. The pedestal 28 provides support for a vertical quill shaft 29 journalled in suitable end thrust bearings 30 seated in the upper end of the pedestal. The shaft 29 is additionally radially supported by a set of anti-friction rollers 31 axially confined by an inner race 32 and in rolling and sliding engagement with an outer race 33. The inner race 32 is fixed to the shaft 29 and the outer race 33 is fixed to a collar 34 carried by an integral substantially conical web structure 35 which projects upwardly from the side walls of the lower half of section 21 and which is cut away to accommodate the several pinions 26.

The quill shaft 29 carries a bevel ring gear 36 disposed beneath the several pinions 26 and meshing therewith. The fact that the anti-friction rollers 31 are axially movable with respect to the outer race 33 makes it possible to effect axial adjustment of the quill shaft 29 in a manner to effect proper meshing of the ring gear 36 with the pinions 26, this being accomplished by the insertion of suitable shims between the base of the pedestal 28 and the bottom of the housing section 21. It will be understood of course that axial adjustment of each individual pinion 26 may also be had by the in-

sertion of suitable shims between the end flange 37 of its cage 25.

The several pinions 26 also mesh with a bevel ring gear 38 disposed above them and carried by an upper quill shaft 39 aligned with the lower quill shaft 29. The upper quill shaft is supported by a hub 40 carried by the upper half of the housing section 21, and for that purpose the shaft 39 is journalled in suitable thrust bearings 41 fixed in the hub 40. The upper quill shaft is additionally radially supported by a set of anti-friction rollers 42 which are in rolling and sliding engagement with a race in the collar 34 in a manner similar to the rollers 31 and for a similar purpose. The upper quill shaft 39 and ring gear 38 may be axially adjusted into proper meshing relation with the pinions 26 by the use of suitable shims between the upper and lower halves of the housing section 21.

The main housing 12 also includes upper and lower housing sections 43 and 44 fixed to the intermediate section 21. A driven shaft 45 extends loosely through the upper and lower quill shafts 39 and 29. Shaft 45 is journalled in suitable bearings 46 in the upper housing section 43 and in suitable bearings 47 in the lower housing section 44, and is connected in driving relation with the propeller shaft 16 through an appropriate coupling 48.

From the foregoing it will be understood that the ring gears 36 and 38 and their quill shafts 29 and 39 are simultaneously driven in opposite directions by the several pinions 26. Provision is made for connecting the shaft 45 to one or the other of the quill shafts selectively in order to effect operation of the shaft 45 and consequently the propeller 15 in one direction or the other. In the device shown this is accomplished by the use of appropriate clutches such for instance as will now be described.

Two fluid pressure clutches of like construction are shown enclosed in the upper and lower housing sections 43 and 44, respectively. Each includes a drum 49 fixed to the driven shaft 45 and carrying an expandible fluid pressure member 50 in the form of a hollow annular gland of reinforced rubber or like flexible material. Each also includes a drum 51 or 52 loosely encircling the gland 50, drum 51 being fixed to and carried by the upper quill shaft 39, and drum 52 being fixed to and carried by the lower quill shaft 29. The gland 50 of the lower clutch communicates with a central channel 53 in the shaft 45 through a conduit 54, and the gland 50 of the upper clutch communicates with a conduit 55 in the shaft 45 through a conduit 56.

The arrangement is such that when fluid under pressure is directed through the channel 53 to the gland 50 of the lower clutch, the latter is expanded into gripping engagement with the drum 52 and the shaft 45 is thereby caused to rotate with the quill shaft 29 in one direction. Similarly the gland of the upper clutch may be expanded into gripping engagement with the drum 51 to effect rotation of the shaft 45 with the upper quill shaft 39 in the opposite direction, by the admission of fluid pressure through the conduits 55 and 56. It will of course be understood that whenever either of the clutch glands 50 is thus inflated the other must be deflated. Provision is made for controlling the application of fluid pressure to the clutch glands and for exhausting the same.

In the device shown, the mechanism for this purpose comprises a valve having a substantially cylindrical core 57 having one end fixed to the end of the shaft 45 for rotation therewith. A longitudinal duct 58 in said end of the core 57 communicates with the channel 53 in the shaft and terminates in a port 59 in the side of the core. A similar duct 60 communicates with the conduit 55 and terminates in a port 61 axially spaced from port 59. A third duct 62 in the opposite end of the core terminates in a port 63 intermediate the ports 59 and 61 and communicates at all times with a suitable source of fluid pressure through rotary slip joint 64 of a well known type. The core 57 is encircled by a sleeve 65 adjustable lengthwise thereof and having an inner annular channel 66 in permanent communication with the intermediate port 63.

The arrangement is such that the sleeve 65 may be shifted into one position to uncover the port 61, so as to open the conduit to exhaust, and to cover port 59, so as to connect the channel 53 with the fluid pressure in the duct 62; or the sleeve may be shifted into another position to uncover port 59 and thereby open channel 53 to exhaust and to cover port 61 and thereby connect the conduit 55 to the pressure in the duct 62. The sleeve 65 may be shifted and controlled through appropriate means, such as a forked lever 67 engaged with trunnions 68 on a non-rotating ring 69 supported by an appropriate bearing 70 fixed to and encircling the sleeve.

As above noted, the main housing 12 provides support for the several motors 20. In this instance each motor 20 is mounted upon an appropriate bracket 71 securely attached at one end to suitable pads 72 and 73 formed on the upper and lower halves of the intermediate housing sections 21. The several brackets 71 extend radially from the housing so that the motors supported thereby are aligned respectively with the pinion shafts 23 with which they are connected. The bottom of each bracket 71 is preferably provided with a lug 74 adapted to be disposed immediately above a pad 75 on the deck 76 of the ship to serve as a limiting stop and as a temporary support for the unit during installation and removal of the unit in and from the ship.

Various changes may be made in the embodiment of the invention hereinabove specifically described without departing from or sacrificing the advantages of the invention as defined in the appended claims.

I claim:

1. In a reversible transmission the combination of a housing, a plurality of driving pinions therein, said pinions being disposed with their axes in a common plane, said housing being split in said plane to form upper and lower housing sections, a quill shaft supported in said upper housing section, a second quill shaft supported in said lower housing section and aligned with said first named quill shaft, means carried by one of said housing sections for radially positioning the adjacent ends of said quill shafts, two gears carried by said quill shafts respectively, said gears meshing with said pinions at opposite sides thereof, a shaft extending loosely through said quill shafts and journalled in said upper and lower housing sections, and two clutches selectively operable to connect said last named shaft to one or the other of said quill shafts alternatively.

2. In a marine drive the combination of a main housing, an auxiliary housing depending therefrom, a propeller supported by the lower end of said auxiliary housing, a ring gear supported in said main housing, a shaft extending lengthwise

of said auxiliary housing and driven by said ring gear for driving said propeller, means on said main housing for supporting a plurality of motors at a common level about said main housing, a plurality of motor driven pinions supported in said main housing and meshing with said ring gear to drive the same, and means for attaching said main and auxiliary housings as a unit to the hull of a ship.

3. In a marine drive the combination of a main housing, an auxiliary housing depending therefrom, a propeller supported by the lower end of said auxiliary housing, a shaft extending lengthwise of said auxiliary housing for driving said propeller, two concentric ring gears in said housing, means on said main housing for supporting a plurality of motors at opposite sides thereof, a plurality of motor driven pinions supported in said main housing each meshing with both of said ring gears to drive the same in opposite directions, means operable to selectively connect said shaft with one or the other of said ring gears to thereby drive said shaft and propeller in either of two directions, and means for attaching said main and auxiliary housings as a unit to the hull of a ship.

WALTER P. SCHMITTER.