

2,583,059

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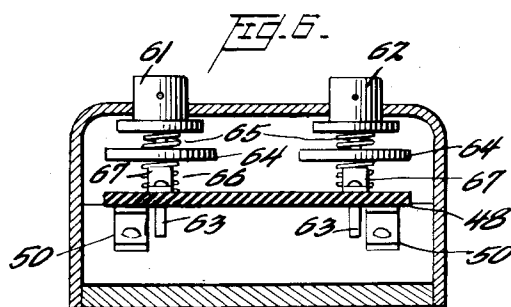
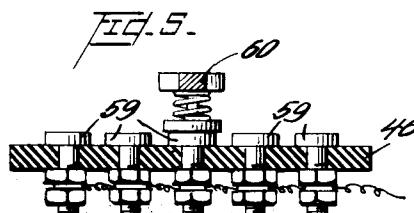
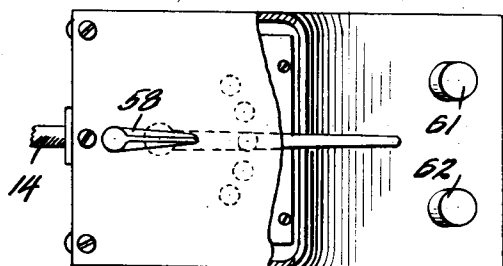
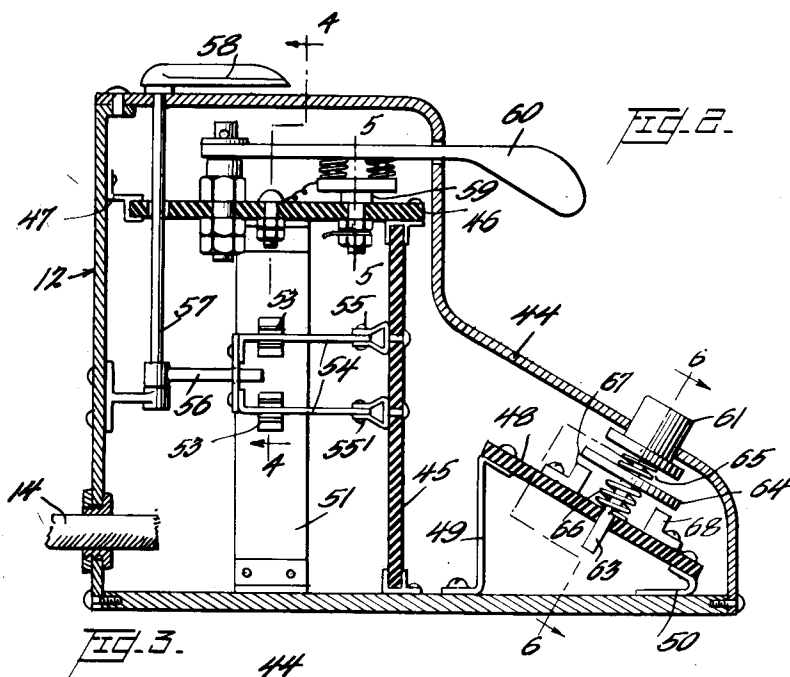
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W. H. NEVILLE
OUTBOARD MOTOR

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Filed June 30, 1948

3 Sheets-Sheet 2



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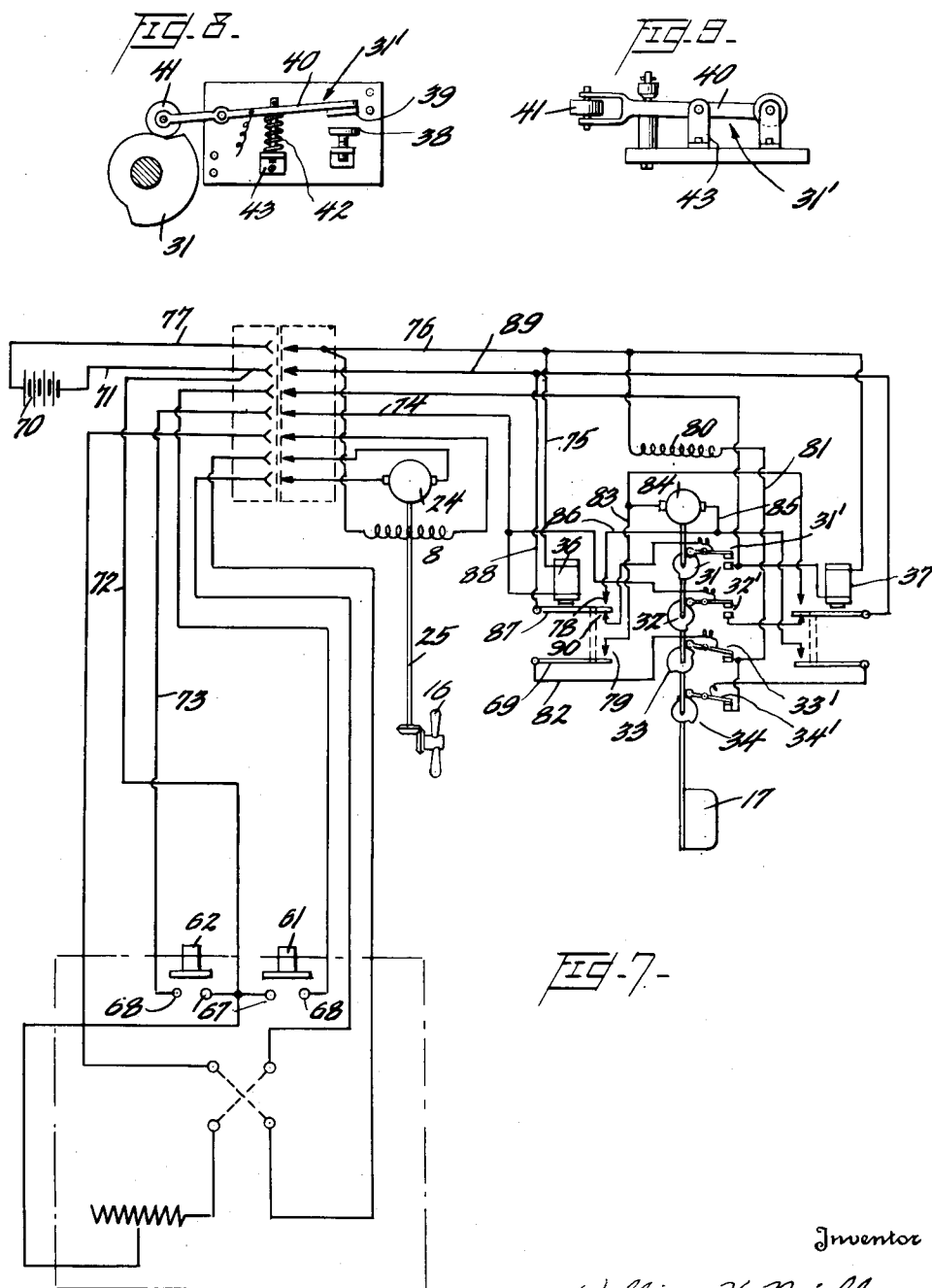
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UNITED STATES PATENT OFFICE

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OUTBOARD MOTOR

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1 Claim. (Cl. 318—467)

1

This invention relates to electric steering and propelling apparatus for boats, and more particularly to electric outboard motors adapted for slow speed propulsion of small boats. Such craft are employed by anglers and others and particularly for trolling and casting for fish.

The general object of the present invention is the provision of electrical propelling and steering apparatus, and remote control means therefor, said remote control device being preferably arranged in such a way as to be foot-operable, so that the craft may be started, stopped, reversed, or steered in any direction from any convenient position in the boat, and without the use of the hands.

More specifically, it is an object of the present invention to provide a steering apparatus for small boats comprising a rudder, a motor for turning the rudder, alternate electric circuits for energizing the motor to run in opposite senses, an energy source, control means connecting the energy source and the motor for energizing the latter, and means associated with the rudder for opening the closed circuit when the rudder has turned through a predetermined angle.

Another object is the provision of an apparatus of the character described in the preceding paragraph, in combination with means adapted to come into operation when the foot-controlled rudder actuating circuit is deenergized, for automatically returning the rudder to neutral or in-line position, causing the craft to proceed in a straight line in the direction to which it has been turned.

Another object is the provision, in an apparatus of the character described, of a plurality of cam operated switches associated with the rudder shaft for controlling the steering motor circuits, a pair of relay devices each of which is also included in one of the motor circuits, and foot-operated remote control switches included in said respective circuits.

Other and further objects, features and advantages will be apparent from the description which follows, read in connection with the accompanying drawings in which

Figure 1 is a longitudinal vertical section of an apparatus constructed in accordance with the present invention, installed in operative position on the stern portion of a boat;

Figure 2 is a vertical section through the remote control device of Figure 1;

Figure 3 is a plan view of the remote control device;

Figure 4 is a section on line 4—4 of Figure 2;

2

Figure 5 is a section on line 5—5 of Figure 2;

Figure 6 is a section on line 6—6 of Figure 2;

Figure 7 is a circuit diagram;

Figure 8 is a plan view of one of the cam-operated switches; and

Figure 9 is a side elevation of the device illustrated in Figure 8.

In order to facilitate an understanding of the invention, reference is made to the embodiment thereof shown in the accompanying drawings and detailed descriptive language is employed. It will nevertheless be understood that no limitation of the invention is thereby intended and that various changes and alterations are contemplated such as would ordinarily occur to one skilled in the art to which the invention relates.

Referring first to Figure 1 it will be noted that the apparatus of the present invention comprises generally an energy source, which may conveniently be a storage battery 10, an assembly comprising the motor driven mechanisms hereinafter described which, apart from the rudder and propeller themselves, are enclosed within a waterproof casing 11, and a remote control station or device 12, the storage battery 10 and control station 12 being connected to each other and to the mechanisms within the casing 11 through the medium of cables 13 and 14, and receptacle 15. The latter comprises any convenient arrangement of detachable plugs and sockets for providing the necessary connections between the control device, the storage battery and the several circuits within the casing 11, so that the three main elements may be conveniently disconnected from each other for ready portability, and may be as easily reconnected when the apparatus is installed on a boat. The casing 11, from which extend the propeller 16 and its mechanical connections, and the rudder 17 and rudder shaft 18, 18', is provided with the usual angularly adjustable mounting bracket 19 and clamping screw 20 by means of which the casing and its associated members may be clamped to the transom of the boat and adjusted to any desired vertical angle relative to the transom. The upper portion 18 and lower portion 18' of the rudder shaft are connected by a coupling 21 which is independently secured to the respective portions of the shaft by set screws 22 and 23 in order that the rudder 17, which is fixedly secured at the lower end of the shaft portion 18', may be adjusted to an initial position such as to effect the necessary steering compensation in case the casing 11 and associated mechanism is mounted out of alignment with the keel or center line of

the boat. The neutral position to which the rudder is initially adjusted is, of course, that position which will cause the boat to move straight ahead without actuation of the steering motor.

An electric motor 24 is connected with the propeller 16 by means of a shaft 25 and bevel gears 26, 27, enclosed within suitable casing members, all of which is conventional and well known. A second motor 23, of smaller size, is operatively connected through the medium of bevel pinion 29 and bevel gear 30 with the upper portion 18 of the rudder shaft and, through the coupling member 21 and lower portion 18' of the rudder shaft, with the rudder 17. The upper portion 18 of the rudder shaft carries cams 31, 32, 33 and 34 for operating switches 31', 32', 33' and 34', the latter being mounted on suitable brackets adjacent the respective cams. The brackets for the aforesaid cam operated switches are carried on a vertical transverse partition 35, on the opposite side of which are mounted relays 36 and 37.

Each of the cams 31-34 is shaped, in plan, substantially as shown in Figure 8 and has two generally semi-circular portions of different diameters, the portion of smaller diameter corresponding to the open position of the cam operated switch, and the portion of larger diameter corresponding to the closed position of the switch. The switch in question comprises a fixed contact member 38 and a movable contact member 39 the latter being carried on a pivoted lever 40, at the opposite end of which is journaled a cam follower in the form of a roller 41. A small spring 42 under compression between the lever 40 and an upstanding bracket 43, urges the switch toward open position.

The remote control device illustrated in Figures 2-6, inclusive, comprises a casing 44 containing a vertical panel 45, a horizontal panel 46 supported on the upper edge of the panel 45 and, at its opposite edge, by a bracket 47, and an inclined panel 48 supported on brackets 49 and 50. The panels 45, 46 and 48 are formed of any suitably rigid insulating material. As best seen in Figures 2 and 4 vertical supports 51 and 52 extend from the floor of the casing 44 to the lateral edges of the panel 46 on opposite sides of the latter and each carries the sockets 53 for the blades of a knife switch 54. The latter is pivoted to the panel 45 at 55, 55' and is adapted to be actuated in either direction by the arm 56 secured to shaft 57, a reversing lever 58 being secured to the latter at its upper end, externally of the casing 44. The switch 54 may, of course, be moved to either of its three positions, "forward," reverse" or "off."

The panel 46 also supports the several contact members 59 of a rheostat operated by lever 60 which projects through a slot in the casing 44. By means of the rheostat the propelling motor may be adjusted as to speed and also stopped and started.

The panel 48, as best seen in Figure 2 and 6, supports the steering buttons 61 and 62. Each button is secured to a rod 63 which also carries a contact disc 64, the latter being suspended intermediate its button 61 or 62 and the panel 48, by means of coil springs 65 and 66. When the contact disc 64 is depressed, it is adapted to bridge the contact members 67 and 68, each pair of which is in one of the steering motor circuits, for energizing the relay 36 or 37, as the case may be. The cable 14 carries the conductors for all of the control connections within the casing 44,

which are connected as illustrated by the circuit diagram of Figure 7.

The operation of the reversing lever and the speed control for the propelling motor will be obvious from the foregoing description and, except as to some constructional details, these controls are conventional. The operation of the steering control is as follows:

Assuming that the device is installed on a boat and the rudder has been adjusted to such angular position as will compensate for the location of the installation, in order that the boat will travel in a straight line when the rudder is in neutral position, and assuming that it is now desired to turn the boat to starboard (to the right), the steering button 62 is depressed by the foot, closing the circuit through the contact member 68 and 67. Current will then flow from the battery 70 through conductors 71 and 72, contact members 67, 68, conductors 73 and 74, relay 36, conductors 75 and 76, and thence back to the battery through conductor 77. Relay 36 will thus be actuated closing the contacts 78 and 79. Current will then flow from the battery 70 through the conductors 77 and 76, through the field coil 80 of the steering motor, conductor 81, normally closed cam switch 33', conductor 82, arm 69 of the relay 36, through conductor 83, armature 84 of the steering motor, conductors 85 and 86, arm 87 of the relay 36, conductors 88 and 89 and back to the battery through conductor 71. The steering motor, thus energized, operates in a direction to turn the rudder anti-clockwise to an extent dictated by the position of the cams 31 and 33. The cam switch 31' is open when the relay 36 is energized but will close as soon as the rudder shaft begins to turn. When the rudder shaft has been turned to a predetermined extent, say 30°, the cam 33 opens the circuit through the motor by opening cam switch 33' thus breaking the circuit through the steering motor field. The rudder has thus been turned by 30° and, with the motor stopped, will remain in this position, causing a continuous turning movement of the boat until the foot pressure upon the button 62 is released.

When the pressure on button 62 is released the circuit through the relay 36 is, of course, opened and the contacts at 78 and 79 are broken, and contact is made at 90 energizing the relay 37 through the cam switch 31' which has been closed during the turning movement of the rudder shaft. Actuation of relay 37 initiates a turning movement of the rudder to the port, or left, to bring the rudder back into neutral position, the operation of the motor being interrupted when the rudder returns to neutral by opening of the contact through the cam switch 34.

A similar but reverse sequence of operations takes place when the button 61 is depressed in order to turn the boat to port, and is released after the boat has turned to the desired extent. Thus, the boat may be steered in either direction by depressing the proper button 61 or 62, and will automatically resume a straight course when the button is released.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

Steering apparatus for small boats including in combination a rudder, a motor operatively connected for turning said rudder, a pair of circuits adapted to be alternatively closed, for energizing said motor for turning said rudder in alternative senses, relay-operated switches in said re-

spective circuits, manually operated means for selectively energizing said relays, a normally closed cam operated switch in each said circuit adapted to open the same after a predetermined turning movement of the rudder, a second, normally open cam-operated switch in each said circuit adapted to be closed upon the initiation of a turning movement, and means associated with each said relay for closing the circuit through the normally open cam-operated switch of the opposite circuit when said relay is de-energized, to return said rudder to neutral position.

WILLIAM H. NEVILLE.

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