(No Model.) 3 Sheets—Sheet 1.

C. E. ONGLEY.

ELECTRICALLY CONTROLLED BOAT STEERING APPARATUS.

No. 563,304. Patented July 7, 1896.

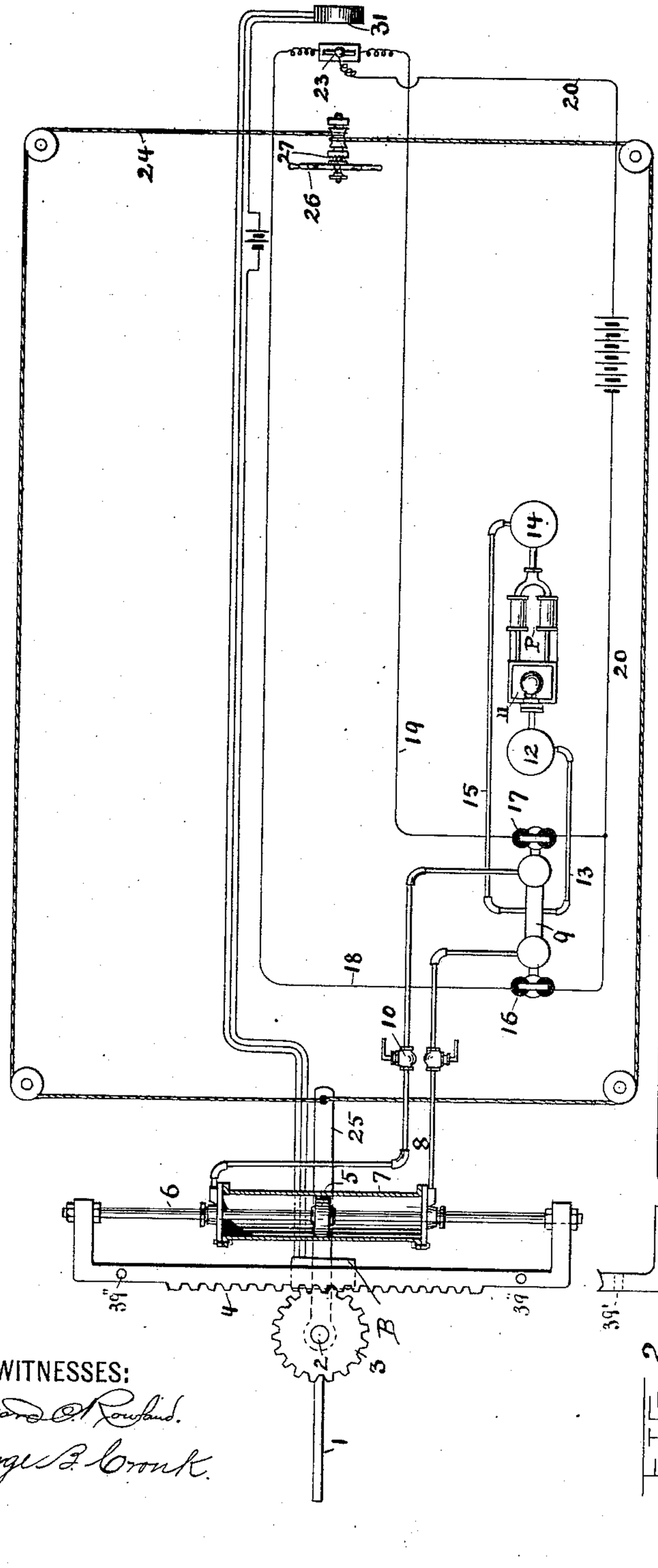

FIG. 1.

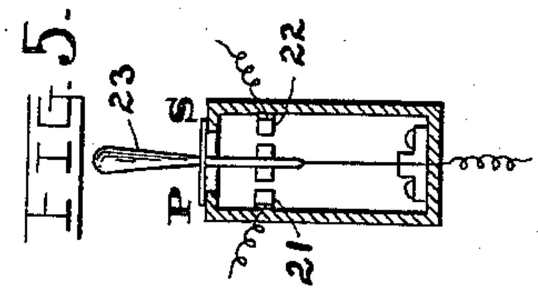

FIG. 5.

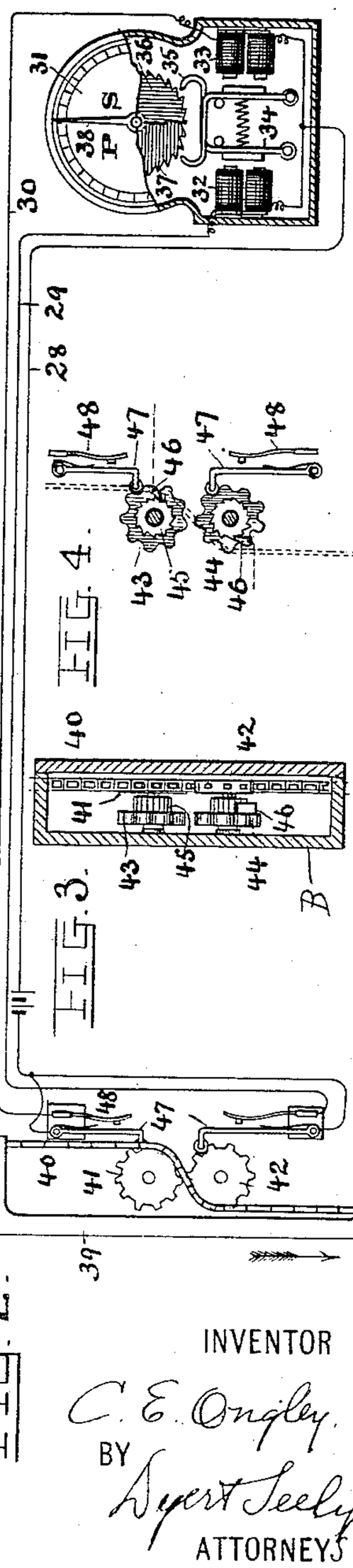

FIG. 4.

FIG. 3.

FIG. 2.

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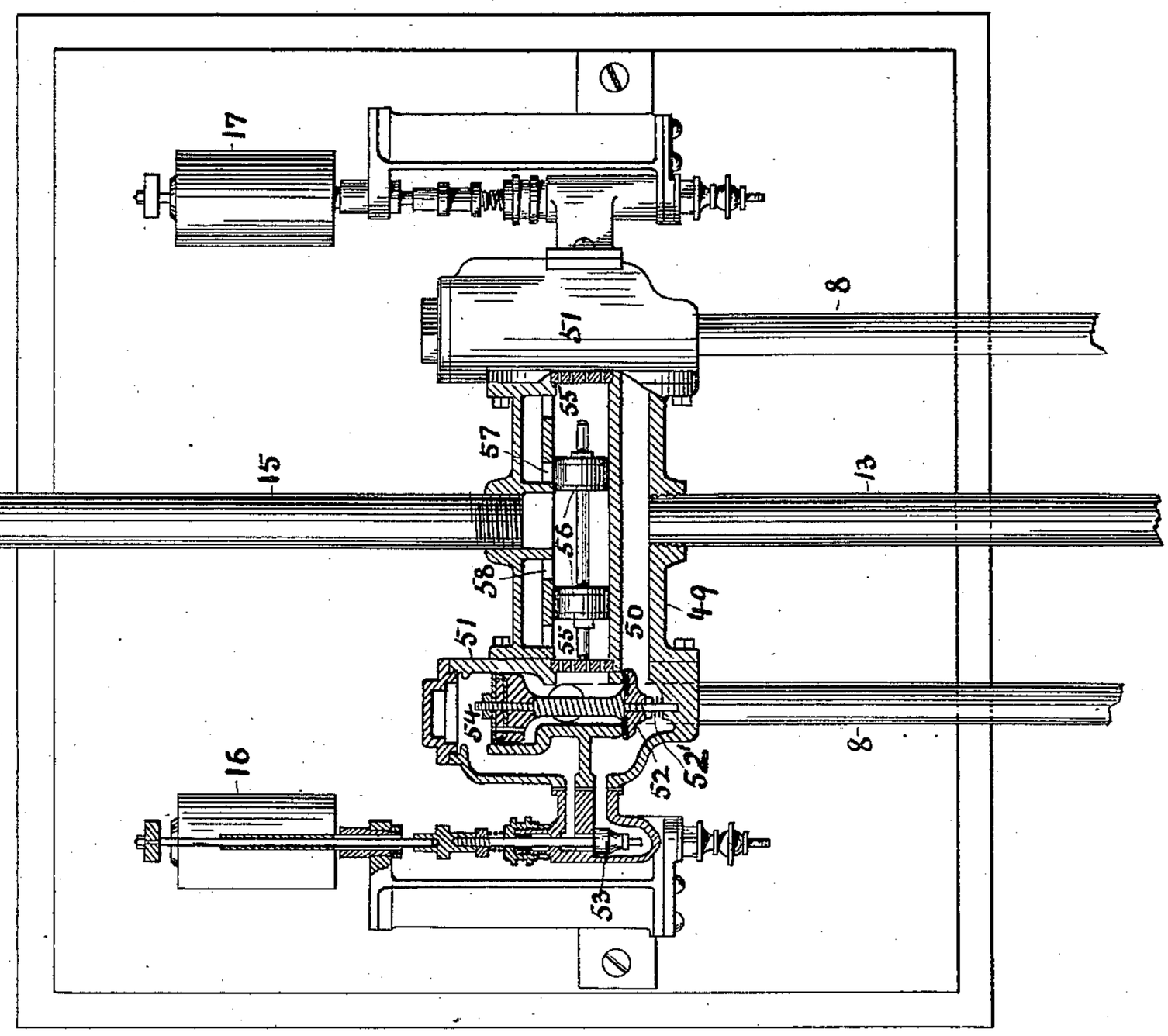
FIG. 6.



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ELECTRICALLY CONTROLLED BOAT STEERING APPARATUS.

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Fig. 7.

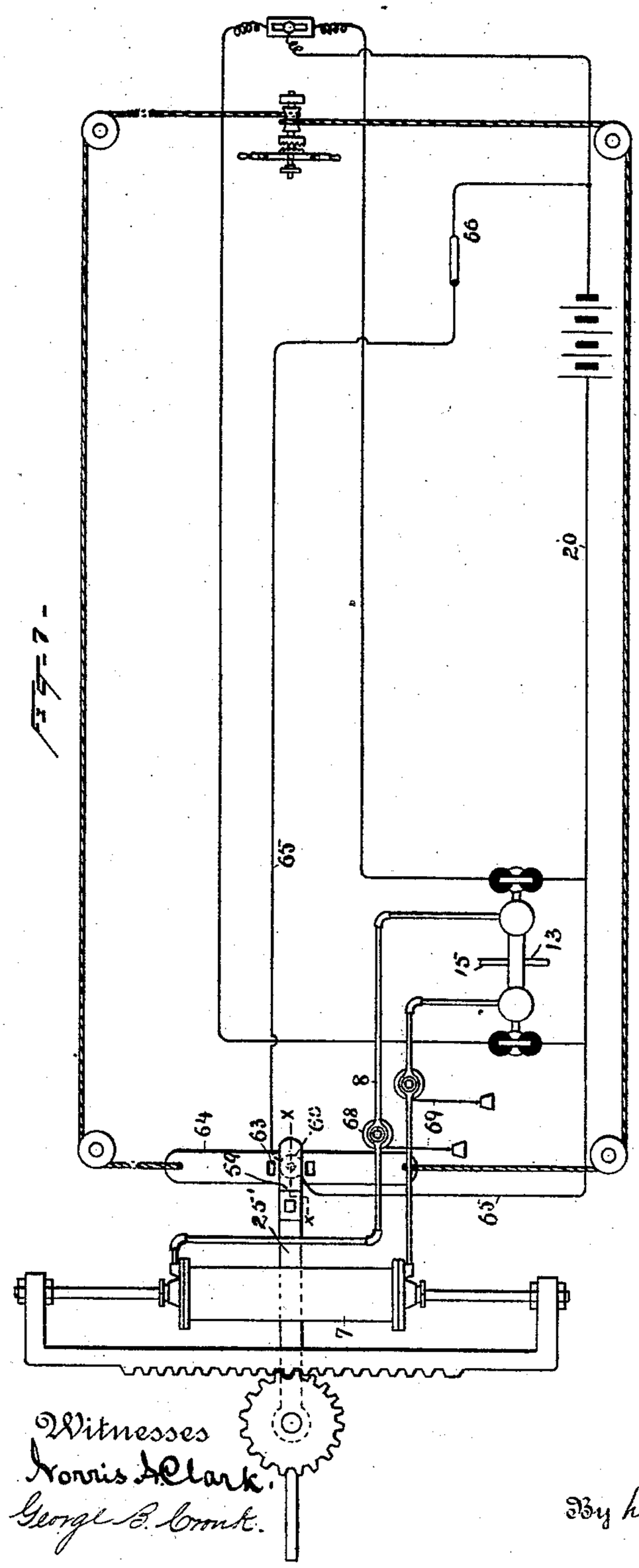

Fig. 8.

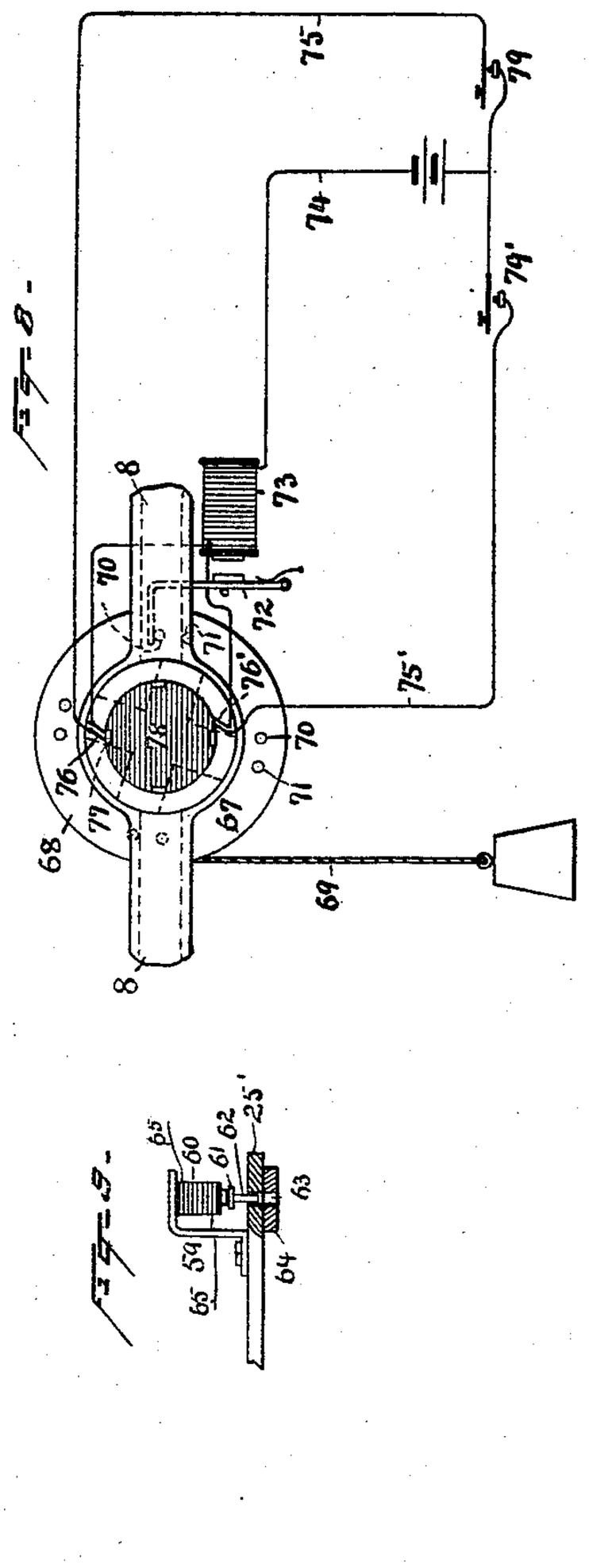

Fig. 9.

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UNITED STATES PATENT OFFICE.

CHARLES E. ONGLEY, OF NEW YORK, N. Y., ASSIGNOR TO GEORGE J. SCHOEFFEL, OF SAME PLACE.

ELECTRICALLY-CONTROLLED BOAT-STEERING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 563,304, dated July 7, 1896.

Application filed December 20, 1892. Serial No. 455,800. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. ONGLEY, a citizen of the United States, residing in New York, county and State of New York, have invented a certain new and useful Improvement in Electrically-Controlled Boat-Steering Apparatus, of which the following is a specification.

The present invention relates to means especially designed for steering boats or vessels.

The main objects of the invention are to provide means giving more perfect control of the steering apparatus than has heretofore existed; to provide alternative devices for controlling the rudder, and to provide improved means for indicating in the wheel-house or other suitable place the position of the rudder at any moment; and the invention consists in means for accomplishing these and other subsidiary objects, as hereinafter described, and set forth in the claims.

In the accompanying drawings, Figure 1 is a view, partly diagrammatic, illustrating the general arrangement of apparatus employed. Fig. 2 is a detached view, on a larger scale, of the telltale or indicator circuits and apparatus. Fig. 3 is a section of the box inclosing the circuit-controllers for said circuit and showing the operating mechanism therefor in place. Fig. 4 is a detail of the circuit-controller. Fig. 5 is a section of a circuit-closing switch for use in the wheel-house. Fig. 6 is a view, partly in section, of an improved duplex-valve controller employed in the arrangement of Fig. 1. Fig. 7 is a view similar to Fig. 1, but including additional features. In this figure the telltale or indicator circuit is omitted. Fig. 8 is an enlarged view of a valve-controlling apparatus employed; and Fig. 9 is a view on line x x of Fig. 7, showing means for maintaining the rudder-arm disconnected from the operating-rope and for connecting it thereto when desired.

In the drawings the steering apparatus is indicated by the rudder 1, extending from the rudder-post 2, on which is secured a gear-wheel 3, engaging with the rack 4, which is adapted to be moved longitudinally in either direction by means of the piston 5, whose rod 6 is connected to said rack 4. From either end of the fixed cylinder 7 extends a pipe 8 to the duplex-valve-controlling apparatus 9, which will be hereinafter more fully described.

10 are valves in pipes 8, by means of which the size of the passage can be varied to control the passage of the operating fluid to the cylinder 7. While a plain cylinder and piston are shown any suitable motor device of the character herein indicated may be used.

P is a pump with any suitable driving mechanism, (indicated at 11.)

12 is a pressure-tank connected by pipe 13 to the inlet-pipe of the duplex-valve-controlling apparatus, and 14 is an exhaust-tank connected by the pipe 15 to the exhaust-outlet of said duplex-valve-controlling apparatus.

16 17 are magnets forming a part of the valve mechanism, and are included in the wires 18 19, leading, respectively, from the wire 20, connected to the electric generator, to two terminals 21 22 of the switch or circuit maker and breaker. The movable member 23 of said switch is connected to the generator-wire, as shown.

In connection with the electric and hydraulic or similar apparatus already described for moving the rudder, I prefer to provide also hand-operated apparatus, (indicated in the drawings by the cable 24, passing around suitable guide-pulleys and connected to a rudder-arm 25, projecting forward from the rudder-post.)

26 is a hand-wheel, by means of which the cable may be operated. Preferably the wheel and the pulley on which the cable is wound are connected through a clutch 27, which is normally out of engagement, as shown, so that when the cable moves, owing to movement of the rudder by means of the electric and hydraulic mechanism, the wheel will not turn.

The battery-wire 28 and the two wires 29 30 constitute indicator or telltale circuits leading to the telltale or indicator 31, preferably located in the wheel-house. The wire 29 includes the magnet 32, and the wire 30 the magnet 33. These magnets have armature-levers 34, which terminate in hooks or pawls 35, one being adapted to engage the ratchet-wheel 36, and the other adapted to engage and operate the opposite ratcheted

wheel 37, both of said wheels being on the spindle of the pointer 38, extending over a suitable dial, the sides of which are marked, preferably, "P" and "S" or "Port" and "Starboard."

39 is a bar which is secured to the rack-bar 4 by means of bolts in holes 39′ 39″ or otherwise, and moves back and forth with rack-bar, and carrying a chain or similar device 40, passing over the wheel 41 and under the wheel 42 in the box B, which box is fixed in a central position above or below the rack-bar, and serving to turn the same as the bar is reciprocated. On the spindle of these wheels are cam-wheels 43 44, loose on said spindles, one being connected when the ratchet 45 adjacent thereto is turned in one direction, and the other being connected when its ratchet is turned in the opposite direction, by means of the oppositely-arranged connection-pawls 46, in the well-known manner.

47 are levers carrying antifriction-rollers, which rest against the periphery of the cam-wheels, and 48 are springs against which said levers move when they are raised up by the cam-teeth of the wheels. The levers 47 are connected to the battery-wire 28, and the springs 48 are connected to the two wires 29 30. These circuit-controlling devices are preferably also within box B.

Turning to Fig. 6, the duplex-valve mechanism will be described. 49 is a valve-body, having a passage 50, to which the inlet-pipe 13 connects, and having at either end thereof a valve-chamber 51, in which are piston-valves 52, normally held closed by the spring 52′ and by fluid-pressure under them. Pipes 8 of this figure correspond to those having the same numeral in Fig. 1. These pipes connect above the valves 52, as shown. 53 is an auxiliary valve, which can be opened by means of the magnet 16 when the circuit of the latter is closed, thereby admitting fluid to the space 54 above the piston-valve 52, opening the latter and allowing fluid to pass directly from the space 50 to the pipe 8 on the side of the valve apparatus on which the magnet 16 or 17 is energized. The upper end of the valve-stem carries a piston, but has no carefully packed or fitted valve, as in the construction shown in my Patent No. 429,318, June 3, 1890. 55 are perforated plates, partially closing the outlet to the exhaust-pipe 15, but being sufficiently open to allow the necessary passage of fluid. In the chamber between said plates is a sliding valve or piston 56, which need not be packed or very carefully fitted, controlling the two ports 57 58 in the condition shown, the former being closed and the latter open. In this case fluid is supposed to be passing from pipe 13 to the pipe 8 on the right, and escape of water to the exhaust-pipe is prevented by the sliding valve or piston at the same time the exhaust-passage of the other side is opened by movement of said valve. When the magnet 16 is energized and the valve 52 at the left is opened, the pressure on the left end of the piston 56 will overbalance the pressure on the opposite end, moving it to the right and closing the exhaust-passage 58. Thus it will be seen that the exhaust is closed during part of each operation of the valve apparatus and open during the rest of the time. The plates 55 serve as stops to limit the motion of piston 56.

While the operation of the devices has already been partially set forth, it will now be briefly stated in a more connected manner.

If it is desired to turn the rudder in one direction, the handle 23 is moved so as to connect wire 18 to wire 20 at the switch, thus energizing magnet 16. This opens the auxiliary valve, which in turn opens the valve 52 and admits fluid from the pressure-tank 12 to the cylinder 7 below the piston 5, thus moving the piston up and through the rack, turning the rudder. The same movement, by means of the chain, wheels, and circuit-controllers makes and breaks the indicator-circuit and advances the pointer 38 step by step in a direction corresponding to the movement of the rudder. If it is desired to turn the rudder in the opposite direction, the handle 23 is moved so as to connect wire 19 with wire 20 at the switch, thereby energizing magnet 17 and admitting fluid to the pipe leading to the upper end of cylinder 7. Should the source of electricity become inoperative, or should the circuits become disarranged, or should the valve mechanism or other parts become inoperative, the wheel 26 can be moved forward to engage the clutch, and the rudder can then be operated by hand.

While in Fig. 1 I have shown the cable permanently connected with the rudder-arm, so that the rope has to move with the rudder even though the latter is operated by the electric and hydraulic or other mechanism, I prefer to normally disconnect the cable and rudder-arm, but to provide means whereby said parts may be put in connection instantly, when desired. Such means are shown in Figs. 7 and 9, in which 25′ is the rudder-arm, having a bracket 59, carrying a magnet 60, the armature 61 of which carries a downwardly-projecting pin 62, adapted to pass into hole 63 in the bar 64, which is interposed in the length of the rope, as shown in Fig. 7. Preferably, several of these holes are placed along side by side, as indicated in Fig. 7, so that if the pin fails to drop into the central hole it will drop into a succeeding one. The magnet is preferably in a multiple-arc branch 65 from the main circuit 20, and said branch includes a normally-closed switch 66. With this arrangement, if the source of current stops, or the circuit breaks accidentally, or if the circuit is opened purposely at switch 66, the magnet 60 becomes at once deënergized, dropping its armature, and the rudder-arm will become connected with the bar 64, so that the rudder can be operated by the rope, as will be evident. Other connecting devices can evidently be used. If the circuit is broken

when the rudder is turned to one side, the rudder-arm and bar 64 will not be connected until, by the movement of the boat, the rudder has been brought substantially to its central position. This arrangement of devices avoids the necessity of moving the cable back and forth when the rudder is operated by the electrical and hydraulic mechanism and at the same time avoids the necessity of sending a man to the stern to connect the rudder and rudder-arm in case of emergency.

As hereinbefore indicated, the valve in pipes 8 are adjusted so that the size of the passages can be varied. I prefer to normally have these valves half-way open and to provide means whereby the valves can be more widely or fully opened from the wheel-house or other point, and then again brought to the position in which they are half-way open, and so on alternately, as many times as desired. Such mechanism is indicated in Fig. 8, in which is shown a side view of a section of pipe 8, with a valve interposed therein. The valve-passages are indicated in dotted lines at 67, there being two such passages passing through the valve at right angles to each other. As indicated by the position of the dotted lines indicating the passages, the valve in the position shown is half-open, that is, half of one of the valve-passages only registers with the pipe 8.

At the rear end of the valve-body, but connected thereto so as to move with said body, is a pulley 68, on which is a weighted cord 69. On the face of this pulley are a series of detent-pins 70 71, adapted to coöperate with the detent armature-lever 72, controlled by magnet 73 in circuit 74, preferably extending to the wheel-house. The other wire 75 of one operating-circuit extends from the source of current to the circuit-closer 79, to a circuit-closing spring 76, connected to a similar spring by a conducting-segment 77 in the periphery of the insulating-disk 78 on the front end of the valve-body. The wire 75′ of a second circuit extends from just above magnet 73 to a second pair of springs 76′, normally insulated from each other, and to a second circuit-closing key or spring 79, also at the wheel-house. If the vessel is being steered under circumstances not requiring special haste, these valves will be left in their half-open condition, but in cases of emergency, when great haste is required, the circuit will be closed at 79, energizing magnet 73, releasing the weight, and allowing it to turn the valve to its wide-open position. As the valve moves springs 76 pass off from the metal plate which connects them, thus breaking the circuit and allowing armature-lever 72 to move back, and this must happen in time to arrest the valve by means of the adjacent stop 71, thus leaving the valve wide open, so that fluid can be passed to the cylinder 7 more rapidly than in the normal operation. When the emergency is over, the circuit may be closed at 79′ through magnet 73 and spring 76′, thus again energizing the magnet. The next detent-pin 70 is placed at such a distance that the valve will this time be stopped in its half-open position, and this action may be repeated as many times as desired.

I claim—

1. The combination with a rudder, of a fluid-operated motor for actuating it, pipes leading thereto on opposite sides and connected with a valve-chest, electrically-controlled retarding-valves in said pipes, a slide-valve in said valve-chest adapted to control the passage of the actuating fluid through said pipes, auxiliary valves for controlling said slide-valve, and an electromagnet for operating each auxiliary valve, substantially as set forth.

2. The combination with a rudder, of a fluid-operated motor for actuating it, pipes leading thereto on opposite sides and connected with a valve-chest, electrically-controlled retarding-valves in said pipes, a slide-valve in said valve-chest adapted to control the passage of the actuating fluid through said pipes, two auxiliary valves for controlling said slide-valve, an electromagnet for operating each auxiliary valve, and a single operating-lever controlling both electromagnets, substantially as set forth.

3. The combination of a rudder, a cable and means for moving it, means for connecting the cable and rudder and a magnet in a suitable circuit normally holding said means out of engagement with the rudder, substantially as described.

4. The combination of a rudder, electrically-controlled means for operating it, a cable and means for moving it, means for connecting the cable and rudder and a magnet in a suitable circuit normally holding said means out of engagement with the rudder, substantially as described.

5. In a boat-steering apparatus, the combination with a fluid-motor for moving the rudder, of inlet and outlet pipes for said motor, valves for controlling the admission or exit of the actuating fluid to and from said pipes, and a retarding-valve in the inlet-pipe for controlling the passage of fluid through the same, said controlling-valve being controlled from a distance, substantially as set forth.

6. In a boat-steering apparatus, the combination with a fluid-motor for moving the rudder, of inlet and outlet pipes for said motor, valves for controlling the admission or exit of the actuating fluid to and from said pipes, a retarding-valve in the inlet-pipe for controlling the passage of fluid through the same, and electrical means for operating said controlling-valve from a distance, substantially as set forth.

7. In a boat-steering apparatus, the combination with a fluid-motor for moving the rudder, of inlet and outlet pipes for said motor, valves for controlling the admission or exit of the actuating fluid to and from said pipes, a rotary retarding-valve in the inlet-pipe for

controlling the passage of fluid through the same, means tending to rotate said controlling-valve, and an electromagnet normally locking said controlling-valve against rotation, but adapted to be energized so as to allow said valve to rotate, substantially as set forth.

8. In a boat-steering apparatus, the combination with a fluid-motor for moving the rudder, of inlet and outlet pipes for said motor, valves for controlling the admission or exit of the actuating fluid to and from said pipes, a rotary retarding-valve in the inlet-pipe for controlling the passage of fluid through the same, said valve having a plurality of passages therein, means tending to rotate said controlling-valve, whereby the passages therein will register successively with the inlet-pipe, and an electromagnet for operating said valve, substantially as set forth.

9. In a boat-steering apparatus, the combination with a fluid-motor for moving the rudder, of inlet and outlet pipes for said motor, valves for controlling the admission or exit of the actuating fluid to and from said pipes, a valve in the inlet-pipe for controlling the passage of fluid through the same, means tending to constantly rotate said valve, a catch for locking said valve against rotation, an electromagnet for actuating said catch, a circuit-breaker carried by said valve and in an electric circuit with said magnet, whereby upon the closure of said circuit by the operator, the magnet will be energized to free the valve which upon rotating will break said circuit to allow said catch to again lock said valve against rotation, substantially as set forth.

10. In a boat-steering apparatus, the combination with a fluid-motor for moving the rudder, of inlet and outlet pipes for said motor, valves for controlling the admission or exit of the actuating fluid to and from said pipes, a valve in the inlet-pipe for controlling the passage of fluid through the same, means constantly tending to rotate said valve in one direction, a series of stops carried by said valve and corresponding to the different positions which said valve is adapted to occupy, a catch engaging one of said stops to hold the valve against rotation in one position, an electromagnet for disengaging said catch, a circuit-breaker carried by said magnet and provided with contact-plates through which a plurality of circuits through said electromagnet are completed, whereby upon the completion of any one of said circuits by the operator, said magnet will be energized to disengage said catch so as to allow the valve to partially rotate until the particular circuit is broken by the circuit-breaker, whereupon said magnet will be deënergized so as to allow the catch to engage with the proper stop and hold the valve in the desired position, substantially as set forth.

This specification signed and witnessed this 19th day of December, 1892.

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