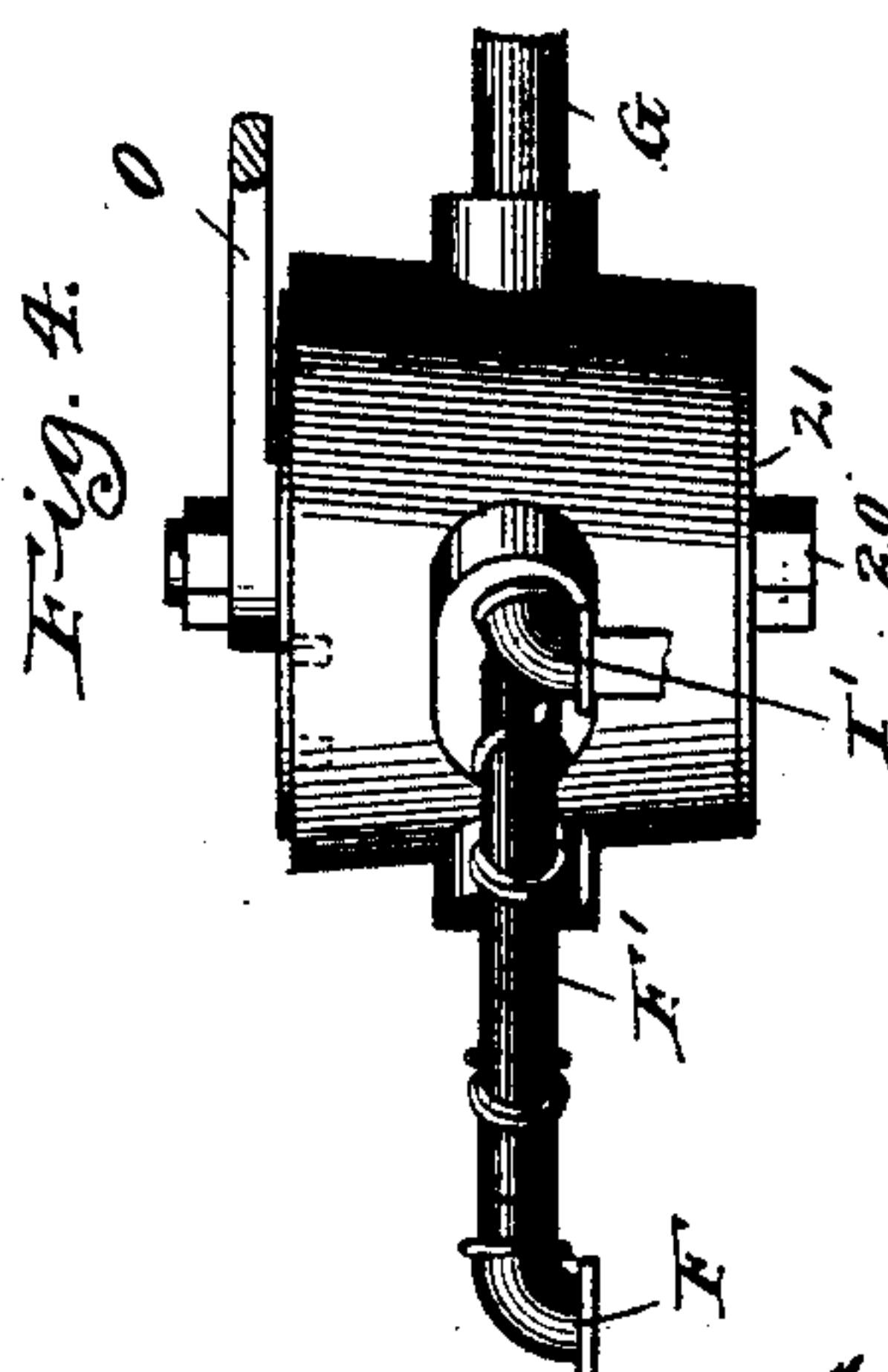
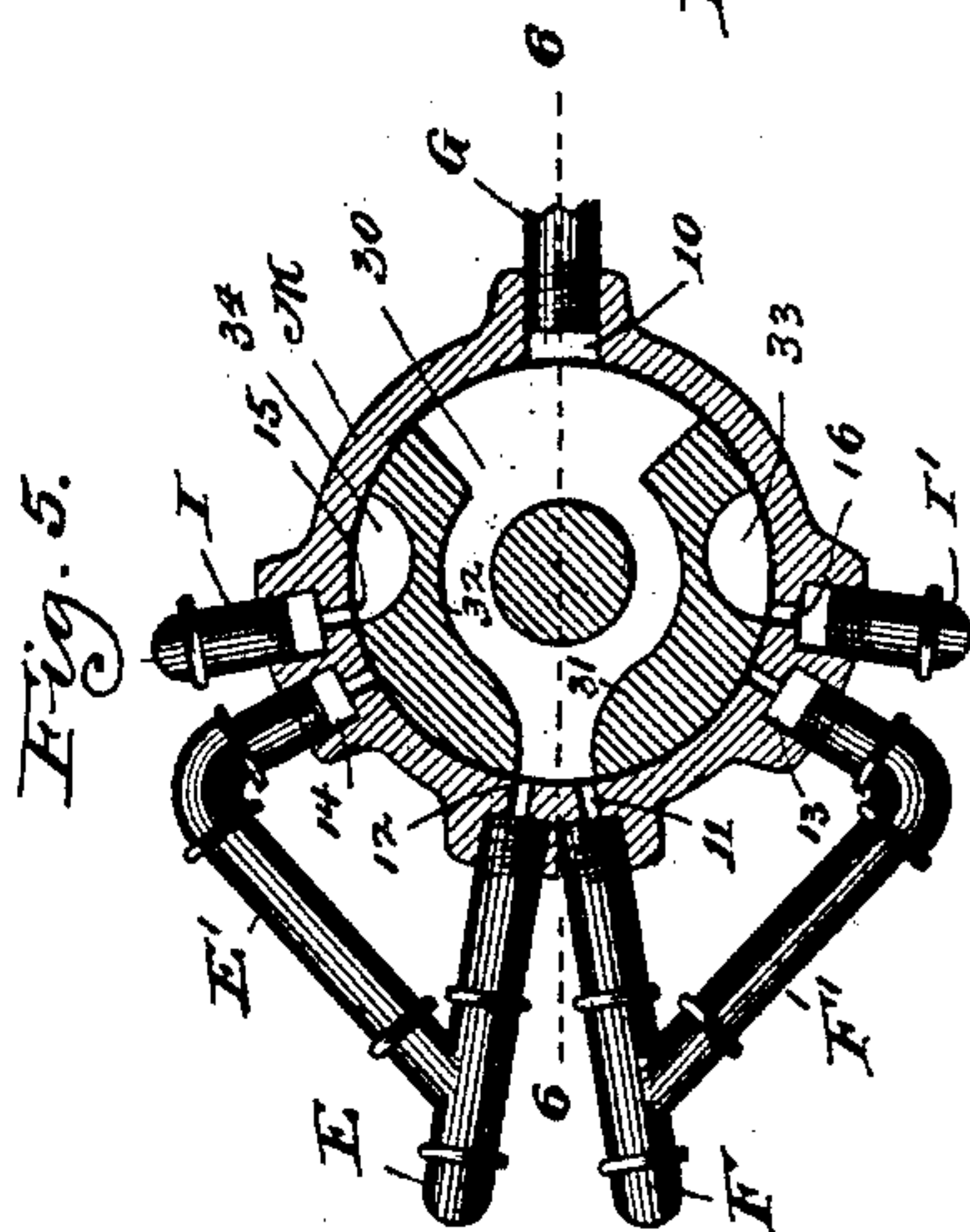
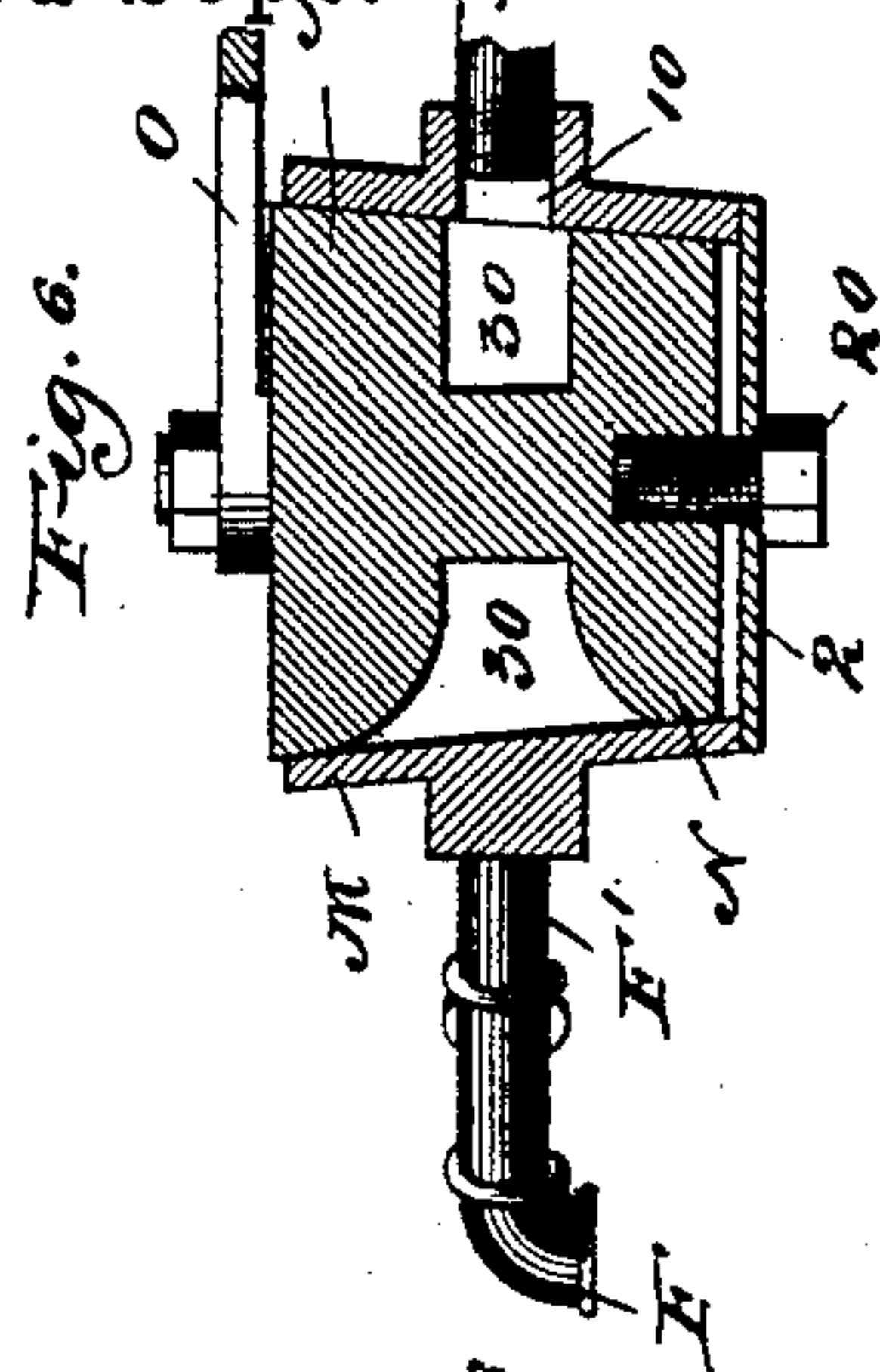


2 Sheets—Sheet 1.

MECHANISM FOR EFFECTING THE MOVEMENT OF SHIPS' RUDDERS.

Patented Sept. 2, 1890.



By

Inventor,
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By Price & Fisher
Attys,

(No Model.)

2 Sheets—Sheet 2.

J. B. ODELL.

MECHANISM FOR EFFECTING THE MOVEMENT OF SHIPS' RUDDERS.

No. 435,608.

Patented Sept. 2, 1890.

Fig. 7.

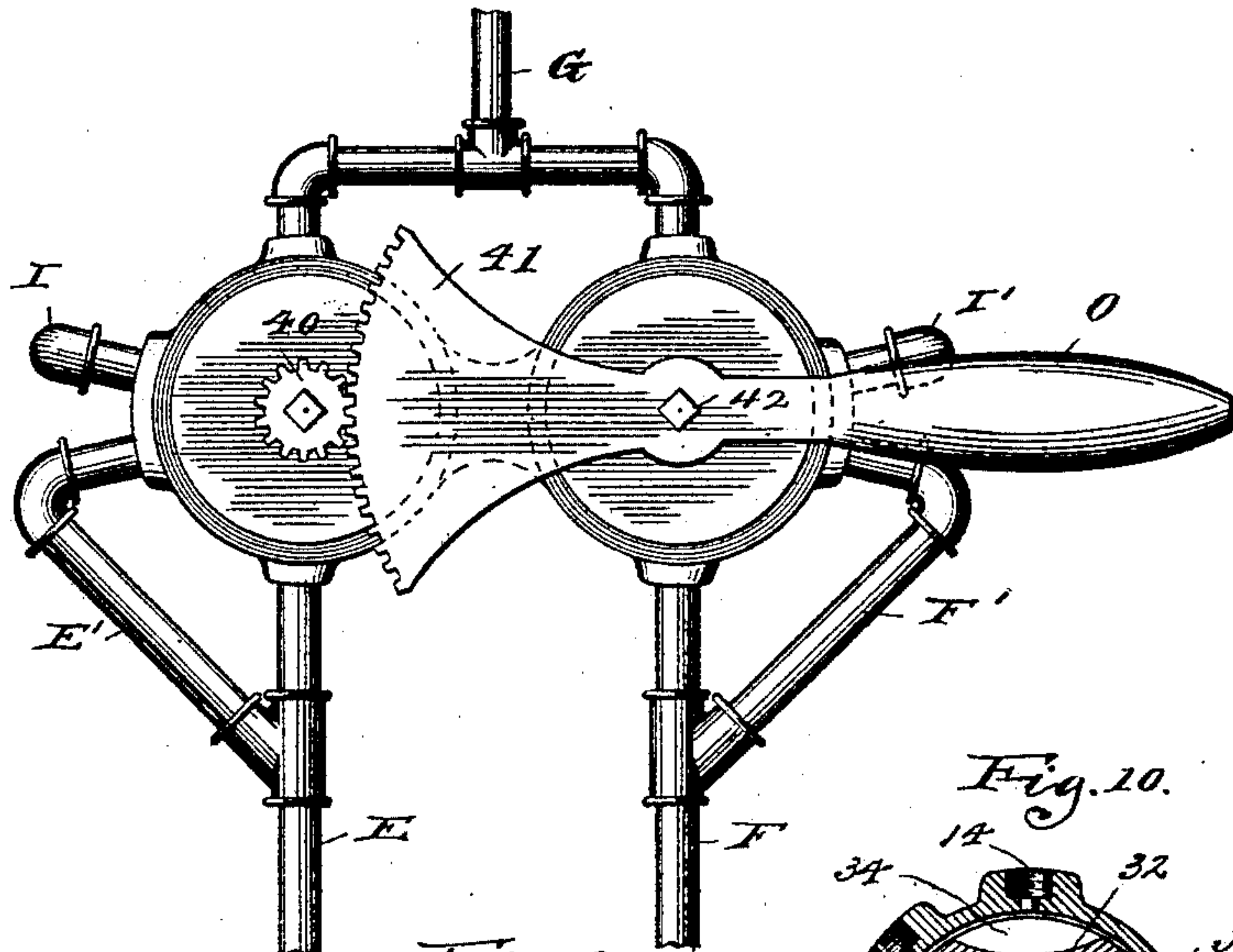


Fig. 9.

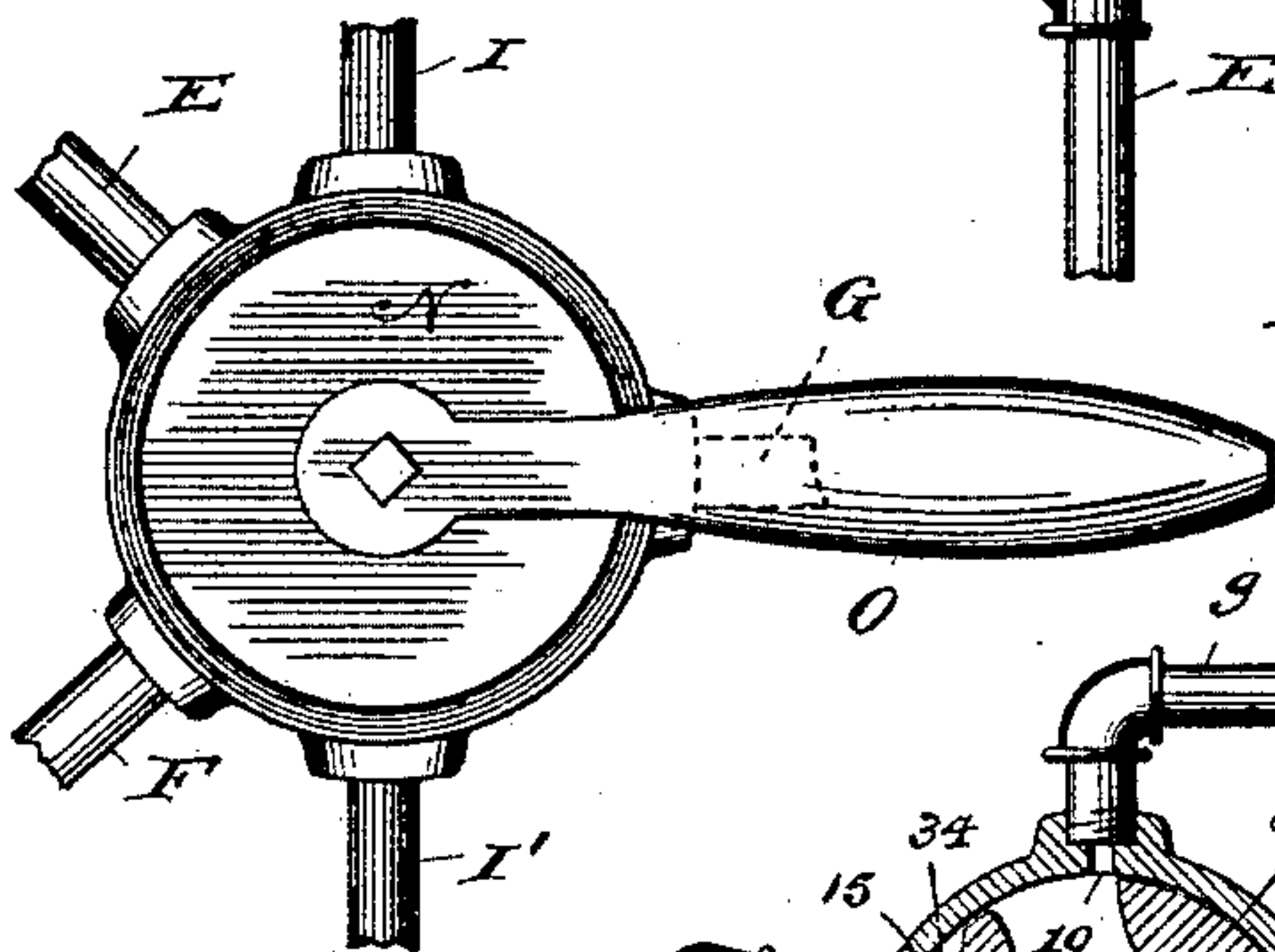


Fig. 8.

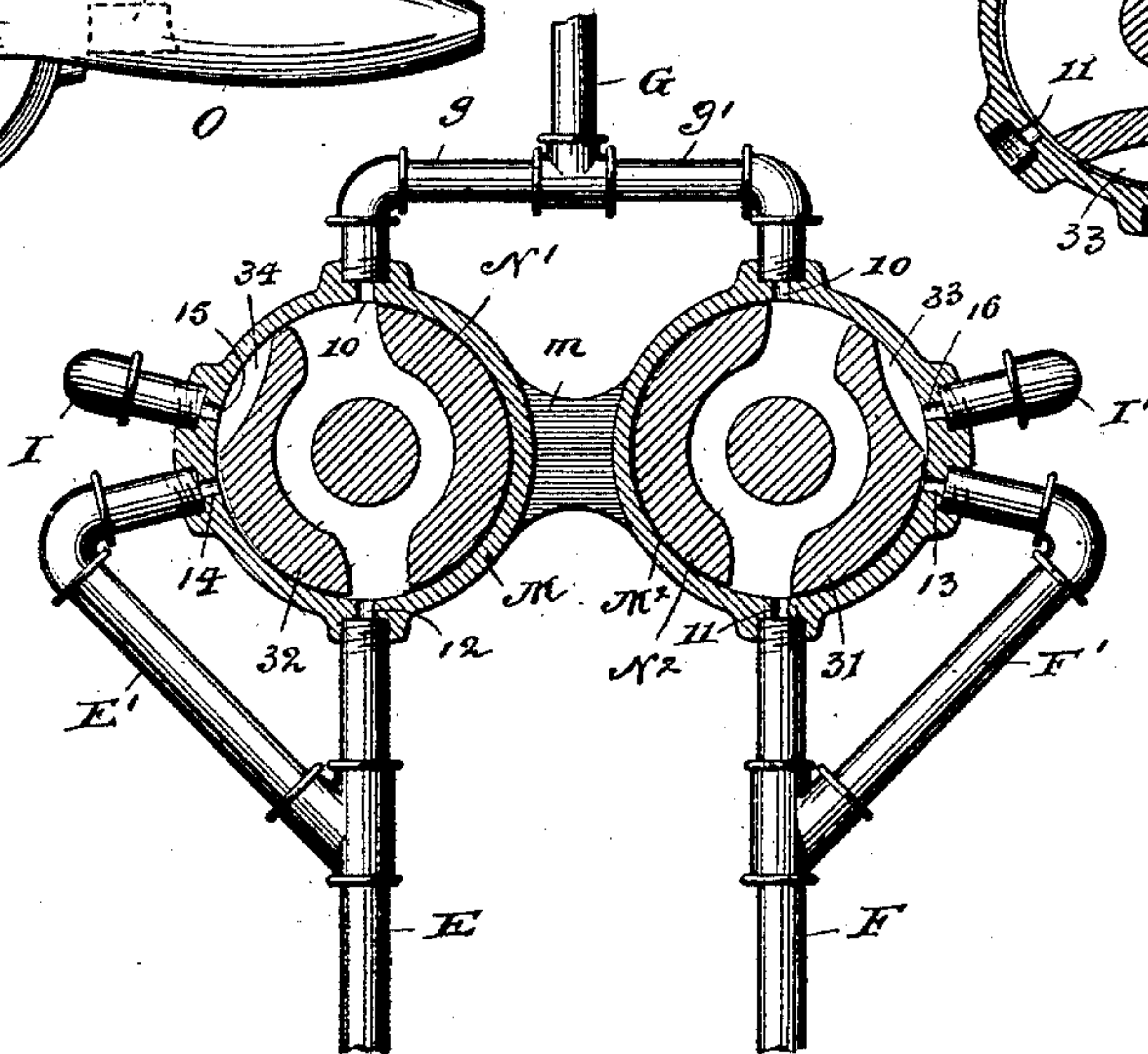
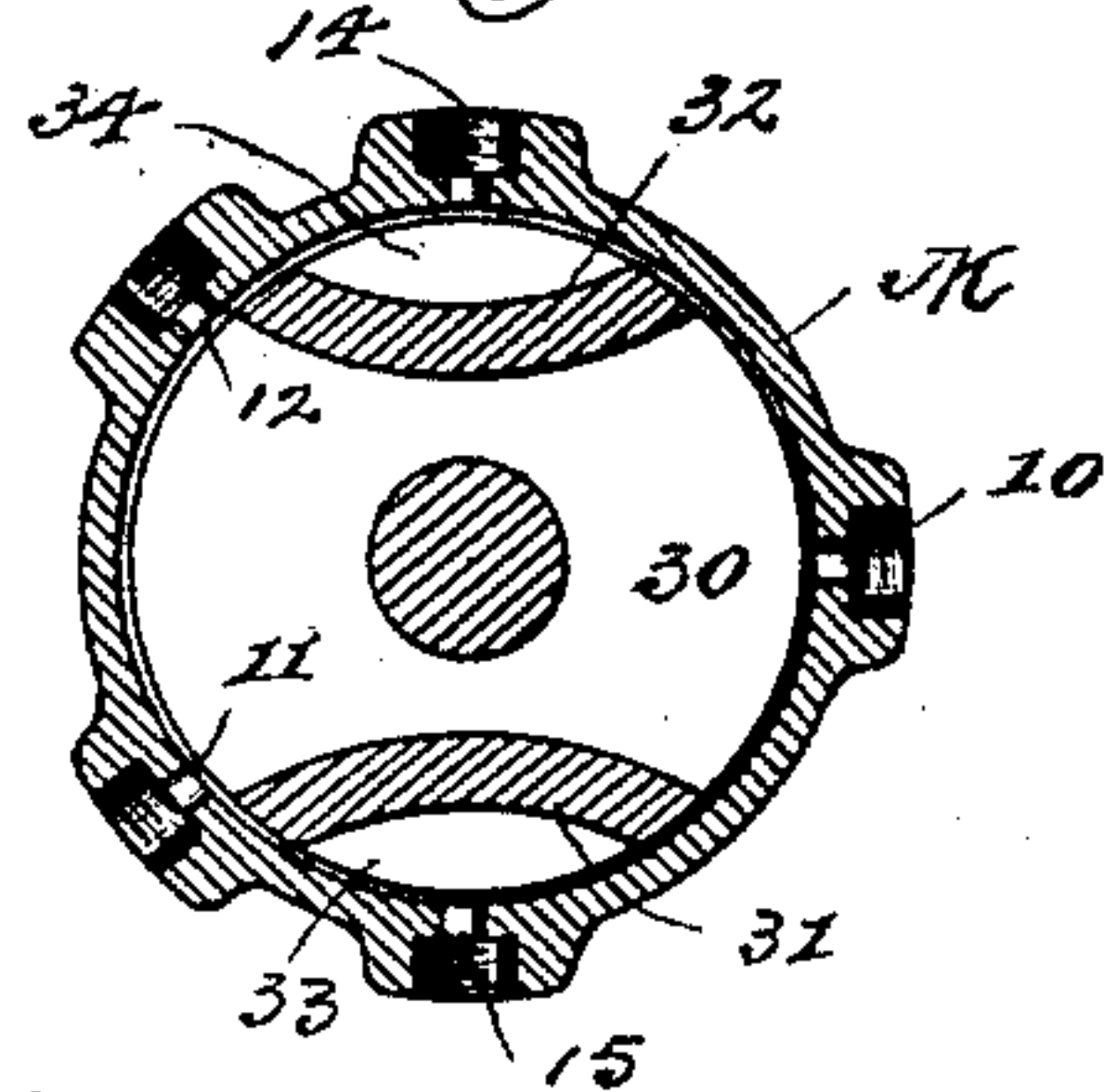


Fig. 10.



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JOHN B. ODELL, OF CHICAGO, ILLINOIS,

MECHANISM FOR EFFECTING THE MOVEMENT OF SHIPS' RUDDERS.

SPECIFICATION forming part of Letters Patent No. 435,608, dated September 2, 1890.

Application filed November 30, 1889. Serial No. 332,152. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. ODELL, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful
5 Improvements in Mechanism for Effecting the Movement of Ships' Rudders and for other Purposes, of which I do declare the following to be a full, clear, and exact description, reference being had to the accompanying draw-
10 ings, forming part of this specification.

My present invention has for its object to provide an improved construction of mechanism whereby the movement of the ship's rudder may be effected for the purpose of
15 steering the vessel by power derived from its steam-boiler through the medium of the air-pump and through the medium of the steam from the boiler, so that in controlling the movements of the rudder it is only necessary
20 for the pilot to shift a valve mechanism to determine the direction of the flow of air or steam into a power-applying cylinder the piston of which is suitably connected with the rudder.

25 My invention consists in the novel features of construction hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the claims at the end of this specification.

30 Figure 1 is a diagrammatic view of a steamship having my invention applied thereto. Fig. 2 is a plan view of the rack-and-pinion connection by which movement is imparted from the power-applying piston to the rudder.
35 Fig. 3 is a view in side elevation of this rack-and-pinion mechanism. Fig. 4 is a view in side elevation of one form of valve mechanism for controlling the delivery and escape of the air or steam into and from the power-applying cylinder. Fig. 5 is a view of this
40 valve mechanism in central horizontal section. Fig. 6 is a view of this form of valve mechanism in vertical transverse section on line 6 6 of Fig. 5. Fig. 7 is a plan view of a modified form of valve mechanism for controlling the delivery and escape of the air or
45 steam into and from the power-applying cylinder. Fig. 8 is a view in central longitudinal section through this last-mentioned form of valve mechanism. Fig. 9 is a plan view of
50 still another form of valve mechanism, and Fig. 10 is a view in central horizontal section

through this last-mentioned form of valve mechanism.

A designates the hull of the ship, which is provided in the usual manner with a rudder
55 B. The stem *b* of the rudder B is shown as having a pinion 2 keyed thereto, with which engages a segmental rack-bar 3, that is suitably pivoted, as at 4, and has an extended
60 arm 5, that is connected to the end of the operating piston-rod C. Any other suitable form of connection between the rudder-stem and the operating piston-rod may, however,
65 be employed.

The cylinder D, within which the piston of the rod C works, is connected at one end with a pipe E and at the opposite end with a pipe F, these pipes being designated as "conducting-pipes," since they serve to conduct the air
70 or steam to and from the power-applying cylinder D. The conducting-pipes E and F connect with a valve mechanism, to be presently described, which in turn connects by a delivery-pipe G with a suitable reservoir H, into
75 which air may be forced under pressure by means of an air-pump K, operated by the steam-boiler L, in well-known manner.

As the construction and arrangement of the reservoir H, the air-pump K, and the boiler L
80 are familiar, I have not deemed it necessary to illustrate the same except in conventional manner.

Several forms of improved valve mechanism for controlling the flow of air or steam
85 under pressure through the pipes E and F into and from the power-applying cylinder D are shown in the accompanying drawings, and the form illustrated in Figs. 4, 5, and 6 will be first described. This construction of
90 valve mechanism comprises a casing M, provided with a port 10, with which connects the end of the delivery-pipe G, that leads from the reservoir H, and provided also with the delivery-ports 11 and 12, that connect, respectively, with the conducting-pipes E and F, and
95 with the ports 13 and 14, that connect with the branch pipes E' and F', that lead from the conducting-pipes E and F, and with the escape-ports 15 and 16, that communicate with
100 the escape-pipes I and I', through which the waste steam will pass. Within this casing M is suitably held—as, for example, by the screw 20 and plate 21—the plug N, this plug being

suitably shaped to form the air or steam passage or channel 30 and the valves 31 and 32. The channel 30 serves to permit the passage of air or steam from the delivery-pipe G directly into the conducting-pipes E and F, and by reference to Fig. 5 it will be seen that when the parts are in the normal position there shown the air or steam under pressure will be delivered into both of the pipes E and F, thereby holding the piston within the operating-cylinder D at a normally central position. The movement of the valves 31 and 32 is simultaneously controlled by the handle O connected to the top of the plug N. The valves 31 and 32, as seen in Fig. 5, are provided with the cavities 33 and 34 to permit the escape of steam when either of these cavities is brought opposite both the ports 13 and 16 or 14 and 15.

From the foregoing description it will be seen that when the valves 31 and 32 are in the normal position illustrated in Fig. 5 of the drawings the pressure of air or steam will be equal upon each side of the piston within the operating-cylinder D, and as the valves 31 and 32 at such time close the escape-ports 13 and 14 the operating piston-rod C and the rudder B will be held against movement. When, however, it is desired to shift the rudder in the steering operation from one side to the other, it is only necessary to move the valve-plug N in order to so shift the valves 31 and 32 as to permit the escape of steam from one end of the power-applying cylinder D through one of the conducting-pipes, while allowing the delivery of air or steam to continue through the other conducting-pipe to the opposite end of said cylinder, thereby destroying the equilibrium of pressure within the cylinder and causing a corresponding movement of the piston and the piston-rod. Thus, for example, if by turning the handle O the valves 31 and 32 be shifted until the valve 31 closes the port 11 and brings the cavity 33 opposite the escape-ports 13 and 16 the delivery of air or steam through the channel 30 into the conducting-pipe E and thence into one end of the power-applying cylinder D will occur, while the escape of air or steam from the opposite end of said cylinder will take place through the conducting-pipe F, the branch pipe F', cavity 33, and escape-pipe I. Hence the piston and piston-rod C will be moved, thereby effecting a corresponding movement through the rack and pinion of the rudder B. By this means the shifting of the rudder can be instantly effected to any desired extent by merely operating the handle O, which serves to control the movements of both valves 31 and 32.

In the form of valve mechanism illustrated in Figs. 7 and 8 the conducting-pipes E and F and their respective branch pipes E' and F' are shown as connected to separate casings M' and M², suitably united, as by a tie-plate m, and the main delivery-pipe G is shown as provided with branch pipes g and g', leading by ports 10 into these separate casings. In

this construction the casing M' is provided with a port 12, communicating with the conducting-pipe E, and with a port 14, communicating with the branch pipe E', and with a port 15, communicating with the escape-pipe I, and so also the casing M² is provided with the ports 11, 13, and 16, communicating, respectively, with the pipes F, branch pipe F', and escape-pipe I'.

Within the casing M' is a plug N', provided with a valve 32, which controls the passage of air or steam through the ports 12, 14, and 15 in the same manner as the valve 32, (illustrated in Fig. 5,) and this valve is furnished with a cavity 34 for the escape of air or steam. In like manner also the casing M² is provided with a plug N², having a valve 31, adapted to control the passage of air or steam through the ports 11, 13, and 16 in the same manner as the valve 31, (illustrated in Fig. 5,) and provided also with the escape-cavity 33.

In order to secure the simultaneous operation of the valves 31 and 32, I have provided the plug N' at its top with a pinion 40, with which engages a segmental rack 41, formed upon the end of the handle O, this handle being fixed to the stem 42 of the plug N². From this construction it will be seen that by turning the handle O the movements of the valves 31 and 32 can be simultaneously controlled, in order to determine the flow of air or steam through the respective conducting-pipes E and F and the escape of air or steam through the corresponding escape ports and pipes.

In Figs. 9 and 10 a further modification of my invention is illustrated. In this construction a single valve-casing M is employed, this valve-casing being provided with a port 10, with which will communicate the main delivery-pipe G, with a port 11, with which will connect the conducting-pipe F, with a port 12, with which will connect the conducting-pipe E, and with the escape-ports 14 and 15, with which will connect, respectively, the escape-pipes I and I'. In this construction the valve-plug N is formed with a central passage or channel 30, through which the air or steam will pass from the delivery-pipe G into the conducting-pipes E and F, and on either side of the passage 30 are formed the valves 31 and 32, corresponding to the similarly-designated valves in the hereinbefore-described constructions. The valve 31 serves to control the flow of air or steam through the conducting-pipe F, and to control also the escape of air or steam through the escape-pipe I', while the valve 32 performs a similar function with respect to conducting-pipe E and the escape-pipe I. In this form of my invention, however, the branch pipes E and F' are dispensed with, the valves 31 and 32 being provided with cavities 33 and 34 of sufficient area to include the delivery and escape port corresponding to each conducting-pipe. Hence it will be seen that when the valves 31 and 32 are in the normal position shown in Fig. 10, the air or steam will pass from the delivery-

pipe G through the channel 30 into both of the conducting-pipes E and F, and as these conducting-pipes extend to opposite sides of the power-applying cylinder it is plain that the piston of the cylinder will be held in fixed position by reason of the equilibrium of pressure upon its opposite sides. When, however, it is desired to shift the position of the piston and operate the rudder, it is only necessary to turn the operating-handle O of the valve-plug until the valve 31 has passed over and beyond the port 11 of the conducting-pipe F, so as to bring the port 11 and port 15 both within the range of the escape-cavity 31. When the parts are in such position, the flow of air or steam to the power-applying cylinder will occur entirely through the conducting-pipe E, and the flow from such cylinder-pipe F and port 11 into the cavity 33, and thence through port 15 into the escape-port I'.

By either of the above-defined constructions of valve mechanism the operation of the steering apparatus can be quickly and easily controlled, since the valves which determine the flow of air or steam through both sets of conducting-pipes are operated by the same movement of a single handle.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a suitable tank for containing air or other fluid under pressure and with a power-applying piston and its cylinder, of conducting-pipes leading from opposite ends of said cylinder and valve mechanism for controlling the flow of fluid through each of said conducting-pipes, said valve mechanism being connected with said tank and being provided with ports through which the fluid may be delivered into each of said conducting-pipes and with separate escape-ports for waste fluid from said conducting-pipes and separate valves for controlling the passage of fluid through said conducting-pipes and through said escape-ports, said valves being so arranged with respect to each other and with respect to the delivery-pipe

and conducting-pipes that when the valves are at their central position a free passage for steam or air is formed between both of the conducting-pipes and the delivery-pipe to maintain a constant equilibrium of pressure upon each side of the power-applying piston, and a single operating handle for simultaneously operating the valves, substantially as described.

2. In steering apparatus, the combination, with a rudder, of a power-applying piston and cylinder, said piston being suitably connected with said rudder, conducting-pipes leading to each end of said cylinder, valve mechanism for controlling the flow of air or steam through said conducting-pipes, comprising a casing connected with said conducting-pipes and provided with escape-ports and with a main delivery-port, and a plug provided with the valves 31 and 32, having separate exhaust-cavities, and having a main channel 30, through which the air or steam may pass from the delivery-pipe to each of said conducting-pipes, substantially as described.

3. The combination, with a ship's rudder, of steering apparatus comprising a piston-rod suitably connected with said rudder, a power-applying piston and cylinder for imparting movement to said rod, conducting-pipes leading from opposite ends of said cylinder, a suitable tank for containing air or other fluid under pressure, and valve mechanism for controlling the flow of fluid through each of said pipes, said valve mechanism being connected with the said tank and being provided with ports connecting with each of said conducting-pipes and with escape-ports for waste fluid, and being provided with an operating-handle within the pilot's house and with a supplemental operating-handle and rod extending through the top of the pilot-house, substantially as described.

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