No. 617,633. Patented Jan. 10, 1899.

H. BRINKMANN.

SHIFTING, REVERSING, AND CONTROLLING MECHANISM FOR VESSELS.

(Application filed June 7, 1898.)

(No Model.) 6 Sheets—Sheet 1.

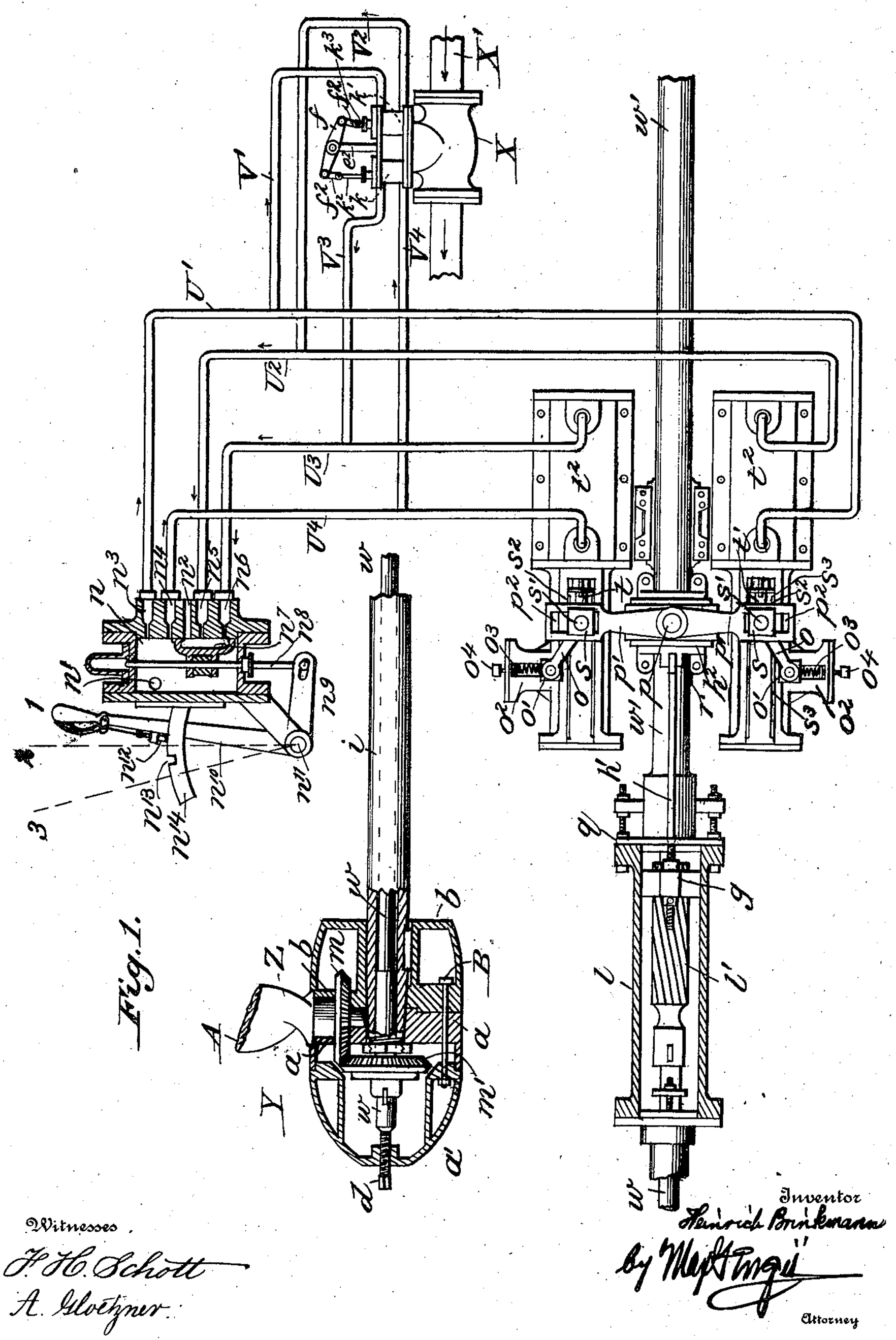

Fig. 1.

Witnesses.
F. H. Schott
A. Glovczner.

Inventor
Heinrich Brinkmann
By Munn & Co
Attorney

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(No Model.) 6 Sheets—Sheet 2.

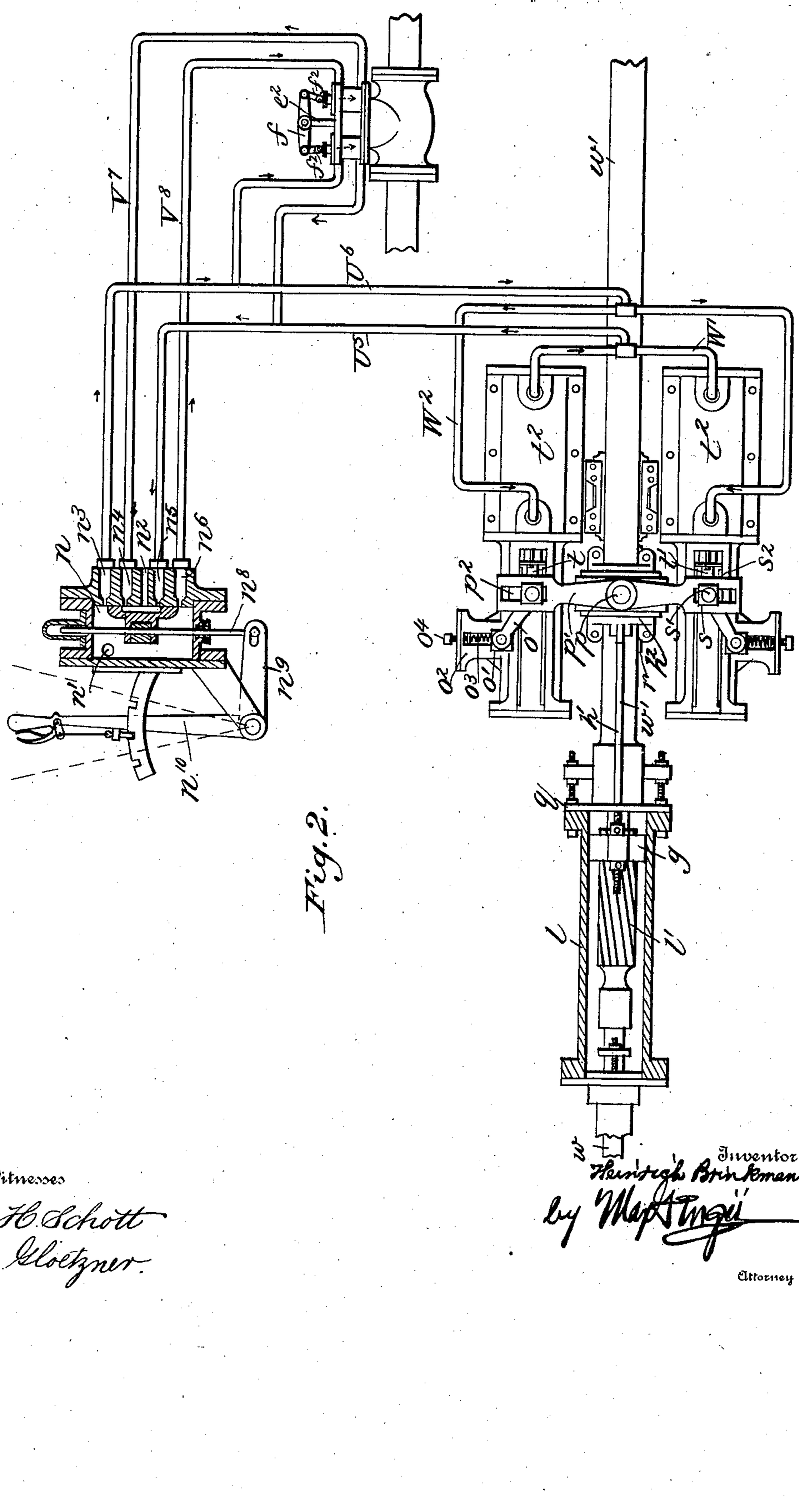

Fig. 2.

Witnesses
F. H. Schott
A. Gloetzner.

Inventor:
Heinrich Brinkmann
by Wright Brown & Quinby
Attorney

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(No Model.) 6 Sheets—Sheet 3.

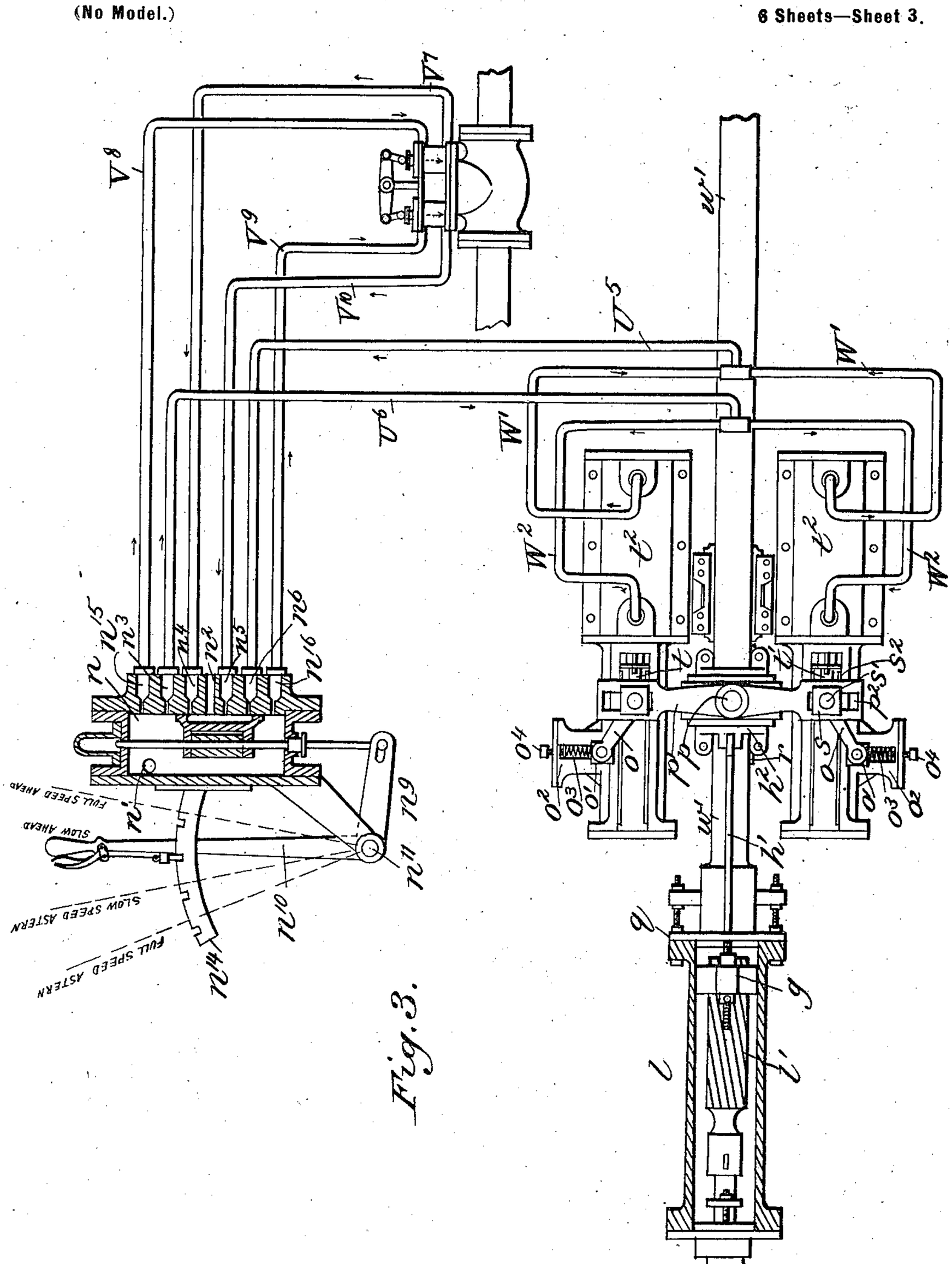

Fig. 3.

Witnesses
F. H. Schott
A. Bloetzner.

Inventor
Heinrich Brinkmann
by Wm. Singü
Attorney

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H. BRINKMANN.

SHIFTING, REVERSING, AND CONTROLLING MECHANISM FOR VESSELS.

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(No Model.) 6 Sheets—Sheet 4.

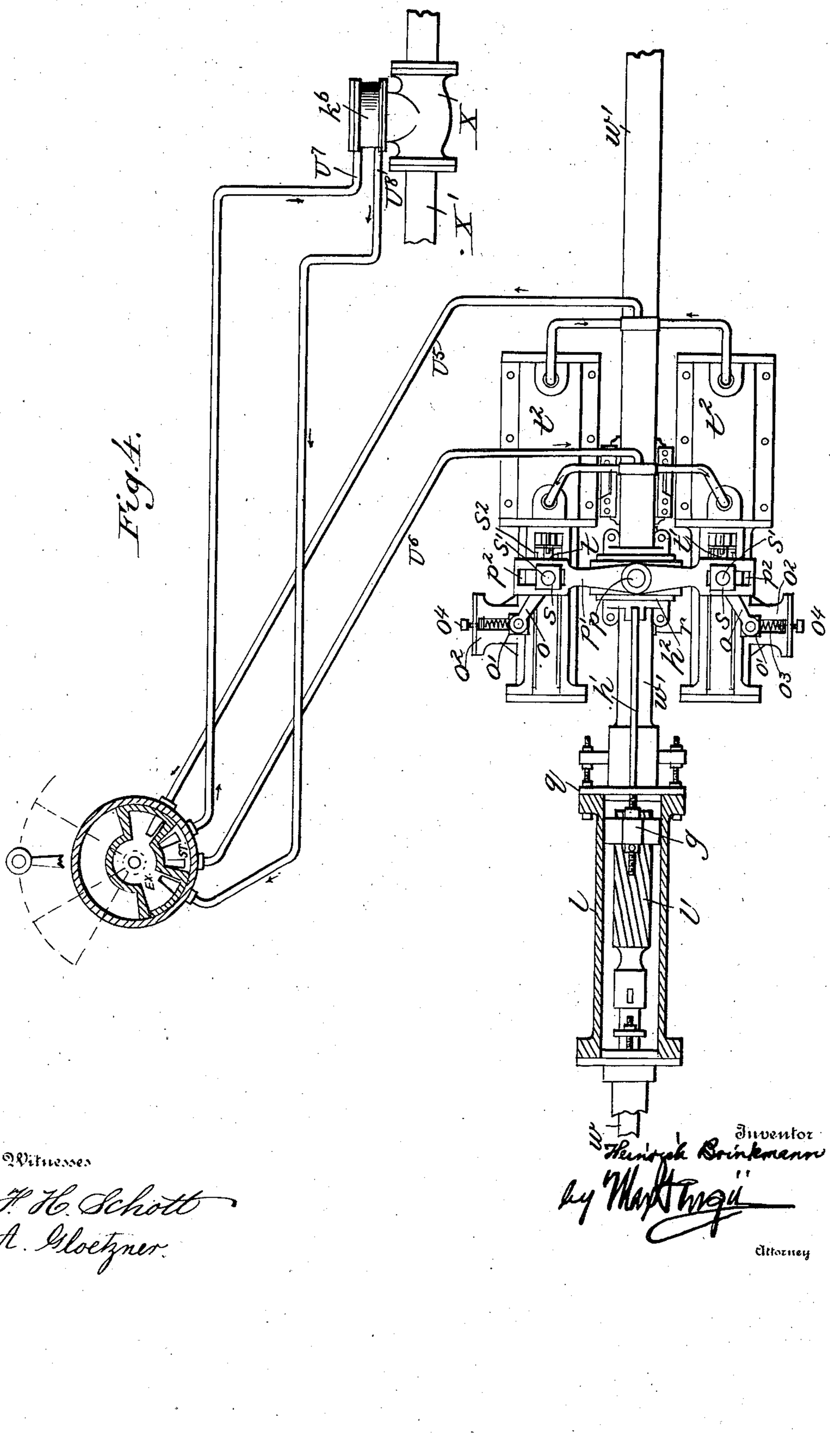


Fig. 4.

Witnesses
H. H. Schott
A. Gloetzner.

Inventor
Heinrich Brinkmann
by Marks Clark
Attorney

No. 617,633. Patented Jan. 10, 1899.

H. BRINKMANN.

SHIFTING, REVERSING, AND CONTROLLING MECHANISM FOR VESSELS.

(Application filed June 7, 1898.)

(No Model.) 6 Sheets—Sheet 5.

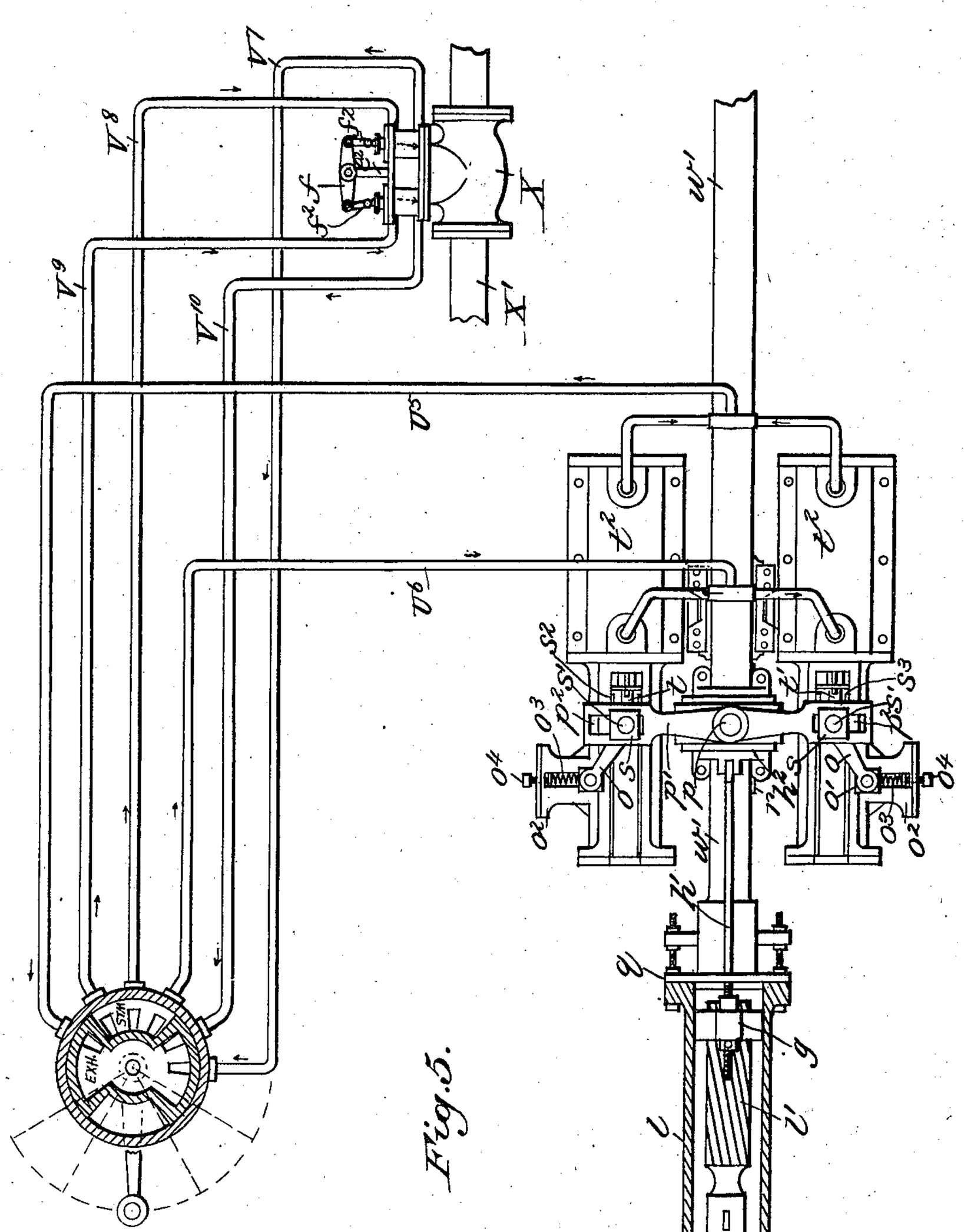


Fig. 5.

Witnesses
F. H. Schott
A. Stoetzner

Inventor
Heinrich Brinkmann
by Marshall Wright
Attorney

No. 617,633. Patented Jan. 10, 1899.

H. BRINKMANN.

SHIFTING, REVERSING, AND CONTROLLING MECHANISM FOR VESSELS.

(Application filed June 7, 1898.)

(No Model.) 6 Sheets—Sheet 6.

Fig. 7.

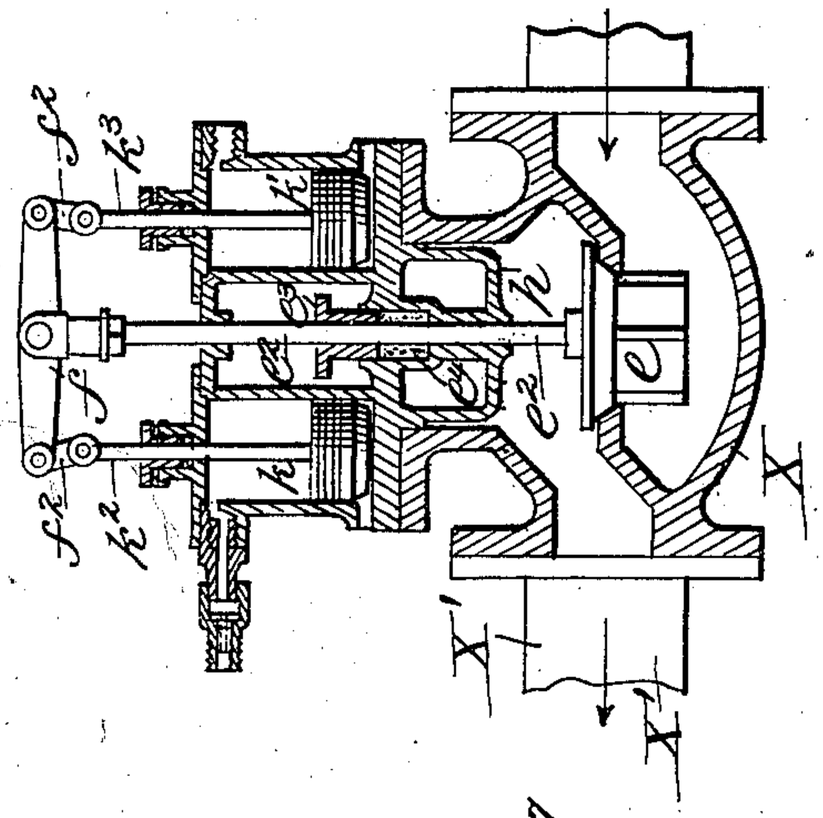


Fig. 8.

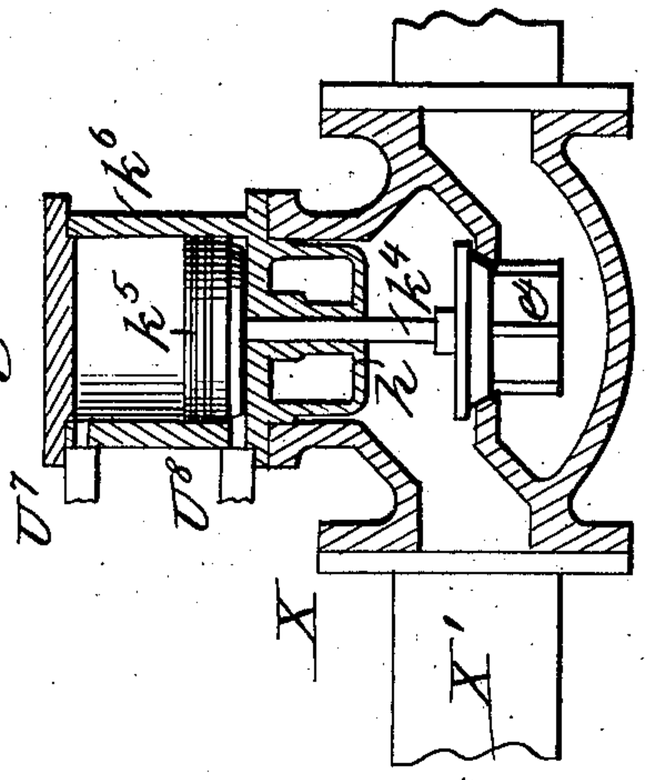
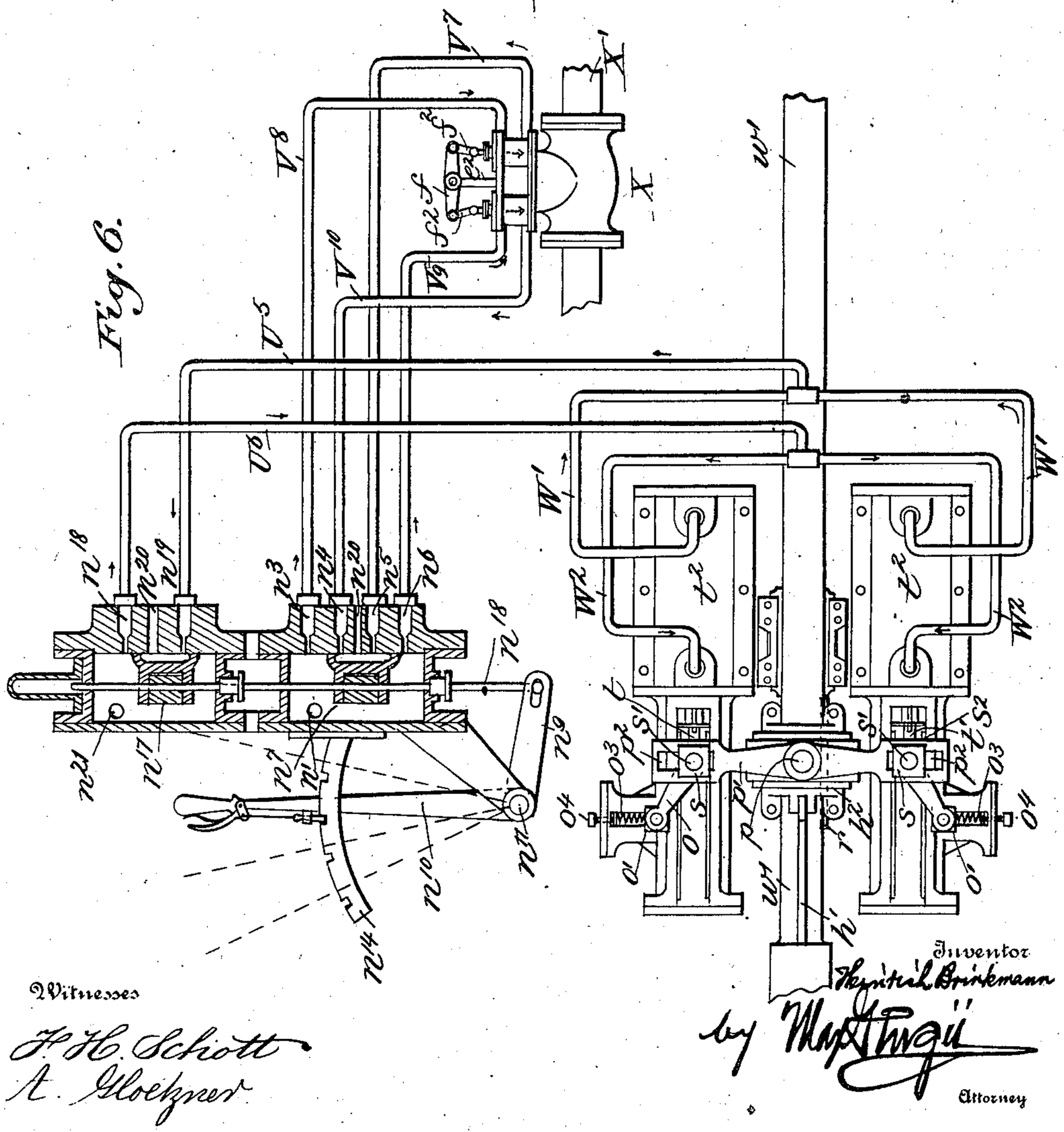


Fig. 6.



Witnesses

F. H. Schott

A. Gloeckner

Inventor

Heinrich Brinkmann

by Wright Brown & Quinby

Attorney

UNITED STATES PATENT OFFICE.

HEINRICH BRINKMANN, OF MUNICH, GERMANY.

SHIFTING, REVERSING, AND CONTROLLING MECHANISM FOR VESSELS.

SPECIFICATION forming part of Letters Patent No. 617,633, dated January 10, 1899.

Application filed June 7, 1898. Serial No. 682,853. (No model.)

To all whom it may concern:

Be it known that I, HEINRICH BRINKMANN, a citizen of Germany, residing at Munich, in the Empire of Germany, have invented certain new and useful Improvements in Shifting, Reversing, and Controlling Mechanism for Vessels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in shifting, reversing, and controlling mechanism for vessels.

The object of my invention is to provide means for permitting the control of the propeller-blades and the engine from a suitable remote point—as, for instance, from the bridge of a vessel or from its deck.

My invention consists in the features, details of construction, and combination of parts which will first be described in connection with the accompanying drawings, and then particularly pointed out in the claims.

In the drawings, Figure 1 is a diagrammatic view of an apparatus embodying my invention; Figs. 2, 3, 4, 5, and 6, similar views, each illustrating a separate embodiment of my invention. Fig. 7 is a detail view of the throttle-valve, and Fig. 8 a similar view of a throttle-valve device opened by one piston.

Referring to the drawings, X is a throttle-valve device placed in the main steam-pipe X', which leads from the boiler to the engines which are employed to rotate the propeller, said boilers and engines not being shown, as they constitute no part of the present invention. This throttle-valve is preferably of the form described in my application, Serial No. 663,326, filed December 24, 1897, and is as follows:

The steam-supply pipe X' is provided with a throttle-valve *e*, Fig. 7, in such a manner that the steam in the supply-pipe X' will tend to open the valve, the live steam passing in the direction of the arrows. On the upper portion of the throttle-valve body is secured the framework of the valve-operating mechanism, said framework being provided with a downward-extending plug *h*, which enters an opening in the top of the valve-body and serves as a stop device to limit the upward movement of the throttle-valve *e*, the latter having a stem e^2, which projects through the said framework and is provided with a cross-arm *f*, pivoted to its upper end, the stem being suitably packed where it passes through the framework, as by a gland e^3, screwed into an opening in the framework and bearing against packing e^4.

At each side of the valve-stem e^2 are arranged two cylinders, formed in the framework, within which are pistons *k k'*, having piston-rods k^2 k^3, respectively, connected by links f^2 to the ends of the cross-arm *f*. The cylinders are provided at each end with ports for a purpose hereinafter described.

Y, Figs. 1 to 6, is a propeller-blade-adjusting mechanism of any suitable construction—such, for instance, as shown and described in my application, Serial No. 660,949, filed December 6, 1897—this being connected to a propeller Z, also disclosed in said application. These parts are constructed, preferably, as follows:

The propeller head or body is composed of three sections *a*, *a'*, and *b*. The section *b* is screwed upon the shaft proper, which is hollow, while the section *a* is a circular piece firmly connected to the cap *b* by screws, one of which is shown at B. The third section *a'* is used as a rear cap to protect the end of the propeller.

The propeller-wings A, of which only one is shown, are journaled in sockets at the junction of the section *b* and the central section *a*, one half of each journal being formed in one section and the other half in the other section, whereby the propeller-blades may be readily inserted or removed by separating said sections. Each propeller-wing A carries a bevel-gear *m* at its lower end, which gears project beyond the central section *a* and mesh with a second bevel-gear *m'*, fixed upon an adjusting-shaft *w*, which extends through the central section *a* and is steadied at its outer end by means of a center screw *d*, screwed through the cap-section *a'*. The adjusting-shaft *w* extends through the propeller or driving shaft *i*, which is made hollow for this purpose, as shown. This hollow shaft *i* is coupled to the engine-shaft *w'* by a hollow coupler *l*.

The adjusting-shaft *w* is provided inside the coupler *l* with a screw-thread *l'* of high

pitch, the angle of the thread being preferably from sixty to eighty degrees. On this screw-threaded portion is placed a nut g, connected to two rods h', which extend through holes in the cap q, which forms the forward end of the hollow coupler. The said rods h' are connected at their outer ends to a sleeve h^2, movable longitudinally upon the shaft w', but held against lateral movement thereon by a spline r.

The sleeve h^2 is pivotally connected at p to a rock-lever p', having its ends provided with slots p^2, in which are movably mounted journal-boxes s, through which pass studs or pins s', fixed in cross-heads s^2, movable in slideways s^3 and secured to the ends of piston-rods $t\,t'$, whose pistons are movable in cylinders t^2, each of which is provided with a port at each end for a purpose hereinafter described. To the studs s' are also connected links o, which have their outer ends pivoted to slide-blocks o', movable in guides o^2, arranged at right angles to the direction of movement of the pistons. Outside these slide-blocks are placed springs o^3, adjustable in tension by means of screws o^4, bearing on the outer ends of the springs.

The pistons and rock-lever compose what I will term a "shifting and reversing mechanism," while the guides o^2, slide-blocks o', springs o^3, and the links o constitute a brake mechanism. The said shifting and reversing mechanism is similar in construction and operation to that disclosed in my Patent No. 585,649, issued July 6, 1897, while the brake mechanism resembles in general that shown and described in my Patent No. 571,745, issued November 24, 1896.

The present invention consists in means whereby by a single lever the shifting and reversing mechanism and the throttle-valve device are suitably operated simultaneously in such a manner as to adjust the propeller-blades as may be desired and correspondingly regulate the speed of the propeller-engines by controlling the supply of steam to said engines through the throttle-valves.

In Fig. 1 I have shown one manner of carrying out my invention. In this figure, n is a valve-chest having a steam-inlet n' supplied with steam from any suitable source. This valve-chest has an exhaust-port n^2, and at each side of it two outlet-ports n^3 n^4 n^5 n^6. Within the valve-chest is located a slide-valve n^7, of the usual D shape, arranged to control the supply of steam to the desired outlet-ports and moved by a valve-stem n^8, connected to and operated by a bell-crank arm n^9 on a hand-lever n^{10}, fulcrumed at n^{11} and provided with the usual spring-controlled dog n^{12}, arranged to engage a notch n^{13} in a segment n^{14}, whereby the lever may be locked in its middle position.

The outlet-ports n^3 and n^4, respectively, are connected to the corresponding ports at the rear ends of the cylinders t' of the shifting and reversing gear by steam-pipes U' and U^4, while the outlet-ports n^5 and n^6 are connected to the corresponding ports at the forward ends of the said cylinders by the pipes U^2 and U^3. The ports at the upper ends of the cylinders of the throttle-valve mechanism are connected by pipes V' and V^3 to the pipes U' and U^3, respectively, while the ports at the lower ends of said cylinders are connected by pipes V^2 and V^4 to pipes U^2 and U^4, respectively.

The operation of the device shown in Fig. 1 is as follows: When the hand-lever n^{10} is in the position shown in Fig. 1 at 1, steam will pass through the pipes U' and U^4 and through the pipes V' and V^4, while the pipes V^2 and V^3 and the pipes U^2 and U^3 will be in communication with the exhaust-port n^2. The rock-lever p' of the shifting and reversing mechanism will be held in the position shown in Fig. 1, so that the propeller-blades will be in a position to drive the vessel ahead. At the same time the piston k of the throttle-valve device will be raised, while the piston k' will be lowered, thereby opening the throttle-valve e and permitting the propeller-engines to receive a full supply of steam. If now it is desired to reverse the direction of movement of the vessel, the hand-lever n^{10} is shifted to the position 3, so as to move the slide-valve n^7 to a position opposite that shown in Fig. 1, during the progress of which movement the said slide-valve first connects the pipes U^4 and V^4 with the exhaust-port n^2 and simultaneously admits steam to the pipes U^3 and V^3, after which it also connects pipes U' and V' with the exhaust-port n^2 and admits steam to the pipes U^2 and V^2. As soon as the first-mentioned action takes place the steam passing through pipes U^3 forces the piston-rod t of the shifting and reversing mechanism rearward, thereby moving the corresponding end of the rock-lever p' rearward, and thus moving the sleeve h^2 to its intermediate position, whereby the nut g is also forced rearward and the adjusting-shaft w turned to a sufficient extent to rotate the propeller-blades to a position where they will have no tendency to propel the vessel in either direction. At the same time the steam entering pipe V^3 will force the piston k downward and close the throttle-valve e, thereby shifting off steam from the propeller-engines. This first action stops the propulsion of the vessel, and if it be desired to accomplish only this the hand-lever n^{10} is not thrown to its extreme position, but is held at its intermediate point 2, Fig. 1; but when the lever has been thrown fully over to the position 3, as previously described, the second action—viz., the admission of steam to pipes U^2 and V^2—causes the piston-rod t' to be forced rearward, thus pushing the corresponding end of the rock-arm p' rearward and moving the sleeve h^2 to its extreme position rearward, thereby moving the nut g still farther in the same direction and giving the adjusting-shaft w a further rota-

tion, whereby the propeller-blades are rotated to a position for forcing the vessel astern. At the same time the steam passing through pipe V^2 raises the piston k' and again opens the throttle-valve e, thus giving a full head of steam to the propeller-engines, so that they may drive the vessel astern at full speed.

The brake mechanism comprising the links o, slide-blocks o', and springs o^3 serves to prevent the force of the waves striking the propeller-blades from shifting the adjusting mechanism.

In the construction shown in Fig. 2 the shifting and reversing mechanism has the corresponding parts of its cylinders connected by pipes W' W^2, which are connected to pipes U^5 U^6, respectively, the latter pipes being in communication with the outlet-ports n^5 n^3, respectively, of the slide-valve. The remaining outlet-ports n^4 n^6 are not connected to the shifting and reversing mechanism, but are connected to the throttle-valve by pipes V^7 and V^8 in the same manner as in Fig. 1. The only difference in the operation of this construction from that shown in Fig. 1 is that there is no intermediate position in which the sleeve h^2 may be retained, the piston-rods t and t' being moved simultaneously rearward or forward, so that the propeller-blades must be shifted from a position for driving the vessel ahead to a position for driving it astern. The throttle-valve, however, will operate exactly as described in connection with Fig. 1, thus first shutting off the steam from the propeller-engines as the shifting and reversing mechanism moves from one position to the other and then turning it on again.

In Fig. 3 I have shown a construction in which the slide-valves are provided with two ports n^{15} and n^{16} in addition to those shown in Fig. 2. In this arrangement the throttle-valve receives its steam independent of the supply to the shifting and reversing mechanism, which has its steam-pipe U^5 connected to the outlet-port n^6. By this means the throttle-valve device has an intermediate position between its fully-closed and fully-opened positions, whereby the propeller-engines may be given full steam ahead or rearward or only a limited amount of steam in either direction, the lever n^{10} having five positions, as indicated in Fig. 3.

In Fig. 5 I have illustrated a construction similar to Fig. 3, with the difference that a rotary valve is employed and the throttle-valve device is somewhat altered. This throttle-valve device, Fig. 8, comprises a throttle-valve e^4, a piston-rod k^4, connected thereto, a piston k^5, and a cylinder k^6, in which the piston moves, the steam being supplied through pipes U^7 and U^8 to the upper and lower ends of the cylinder. In this arrangement the throttle-valve is moved at once from its position of entirely closed to full open.

In Fig. 5 is illustrated an arrangement similar to that shown in Fig. 3, with the exception that a rotary valve is employed in place of the slide-valve.

In Fig. 6 I have shown a construction wherein the throttle-valve is controlled by one slide-valve n^7, and the shifting and reversing mechanism is controlled by another slide-valve n^{17}, these two slide-valves being connected by a common valve-stem n^{18}, which is operated by a lever in the same manner as has been previously described.

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

1. The combination, with a propeller having adjustable blades, a propeller-blade-adjusting mechanism, and shifting and reversing mechanism for actuating the said propeller-blade-adjusting mechanism, of a throttle-valve device for controlling the supply of steam to the propeller-engines, means for actuating said throttle-valve, and mechanism arranged to simultaneously control the throttle-valve-actuating means and the shifting and reversing mechanism.

2. The combination, with a propeller having adjustable blades, a propeller-blade-adjusting mechanism, a fluid-operated shifting and reversing mechanism for actuating the said propeller-blade-adjusting mechanism, of a throttle-valve device for controlling the supply of steam to the propeller-engines, fluid-operated means for actuating said throttle-valve, and mechanism for controlling the supply of fluid to the said throttle-valve-actuating means and the shifting and reversing mechanism.

3. The combination, with a propeller having adjustable blades, a propelling-blade-adjusting mechanism, and a fluid-operated shifting and reversing mechanism for actuating the said propeller-blade-adjusting mechanism, of a throttle-valve device for controlling the supply of steam to the propeller-engines, fluid-operated means for actuating said throttle-valve, a slide-valve arranged to control the supply of fluid to the said throttle-valve-actuating means and to the shifting and reversing mechanism, and means for moving the throttle-valve.

4. The combination, with a propeller having adjustable blades, a propeller-blade-adjusting mechanism, and shifting and reversing mechanism for actuating the said propeller-blade-adjusting mechanism, of a throttle-valve device for controlling the supply of steam to the propeller-engines, means for actuating said throttle-valve, mechanism arranged to simultaneously control the throttle-valve-actuating means and the shifting and reversing mechanism, and a brake device for holding the said shifting and reversing mechanism in its adjusted position.

5. The combination, with a propeller having adjustable blades, a propeller-blade-adjusting mechanism, and shifting and reversing

echanism for actuating the said propeller-blade-adjusting mechanism, of a throttle-valve device for controlling the supply of steam to the propeller-engines, means for actuating said throttle-valve, mechanism arranged to simultaneously control the throttle-valve-actuating means and the shifting and reversing mechanism, and a yielding brake device for holding the said shifting and reversing mechanism in its adjusted position.

In testimony whereof I affix my signature in presence of two witnesses.

HEINRICH BRINKMANN.

Witnesses:

A. M. CUISUCHUNG,

CARL MAYER.