

No. 666,170.

Patented Jan. 15, 1901.

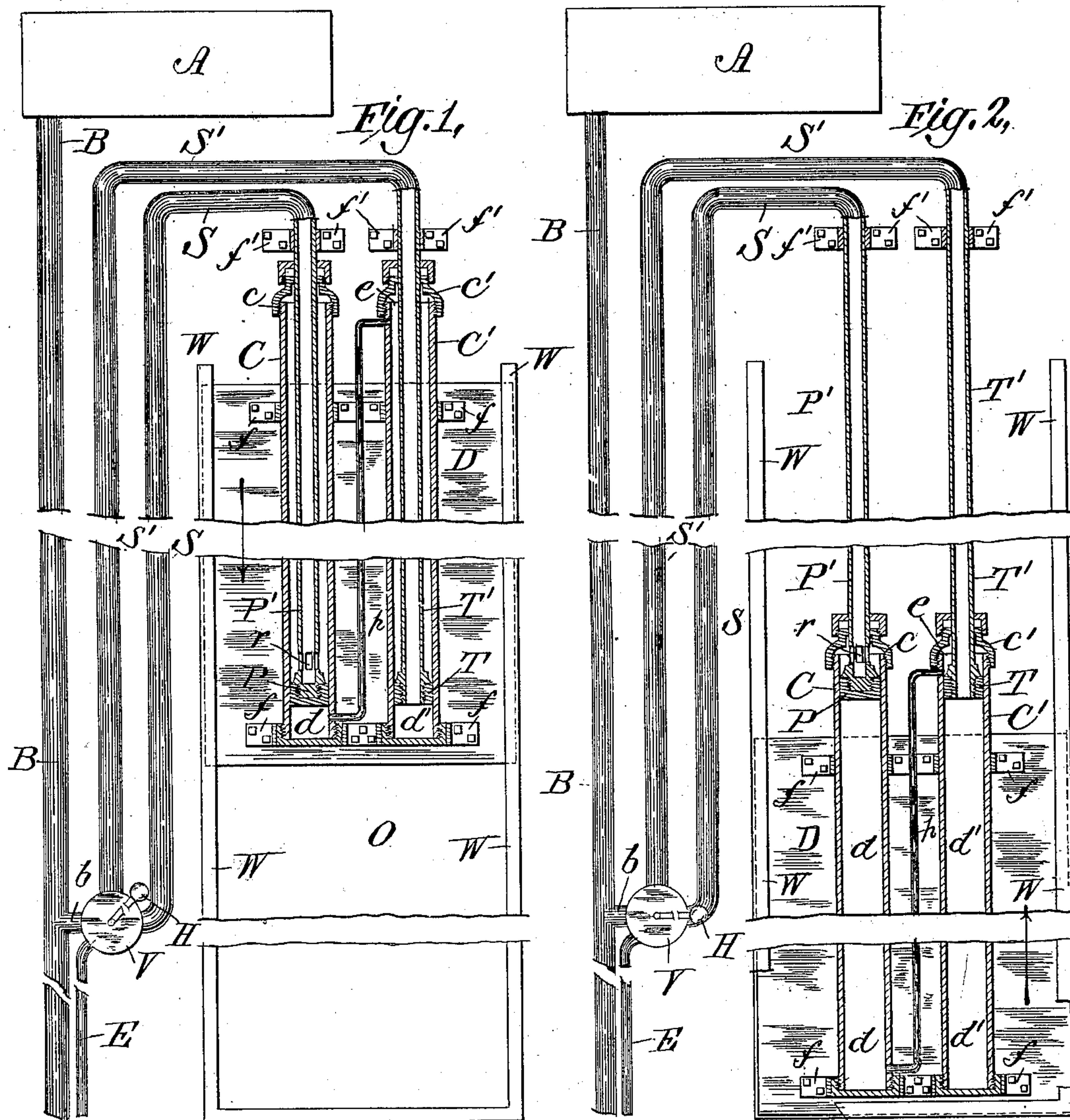
A. L. WEBSTER.

RECIPROCATING MECHANISM FOR OPENING OR CLOSING BARRIERS CONTROLLING OPENINGS.

(Application filed Oct. 25, 1900.)

(No Model.)

2 Sheets—Sheet 1



WITNESSES:

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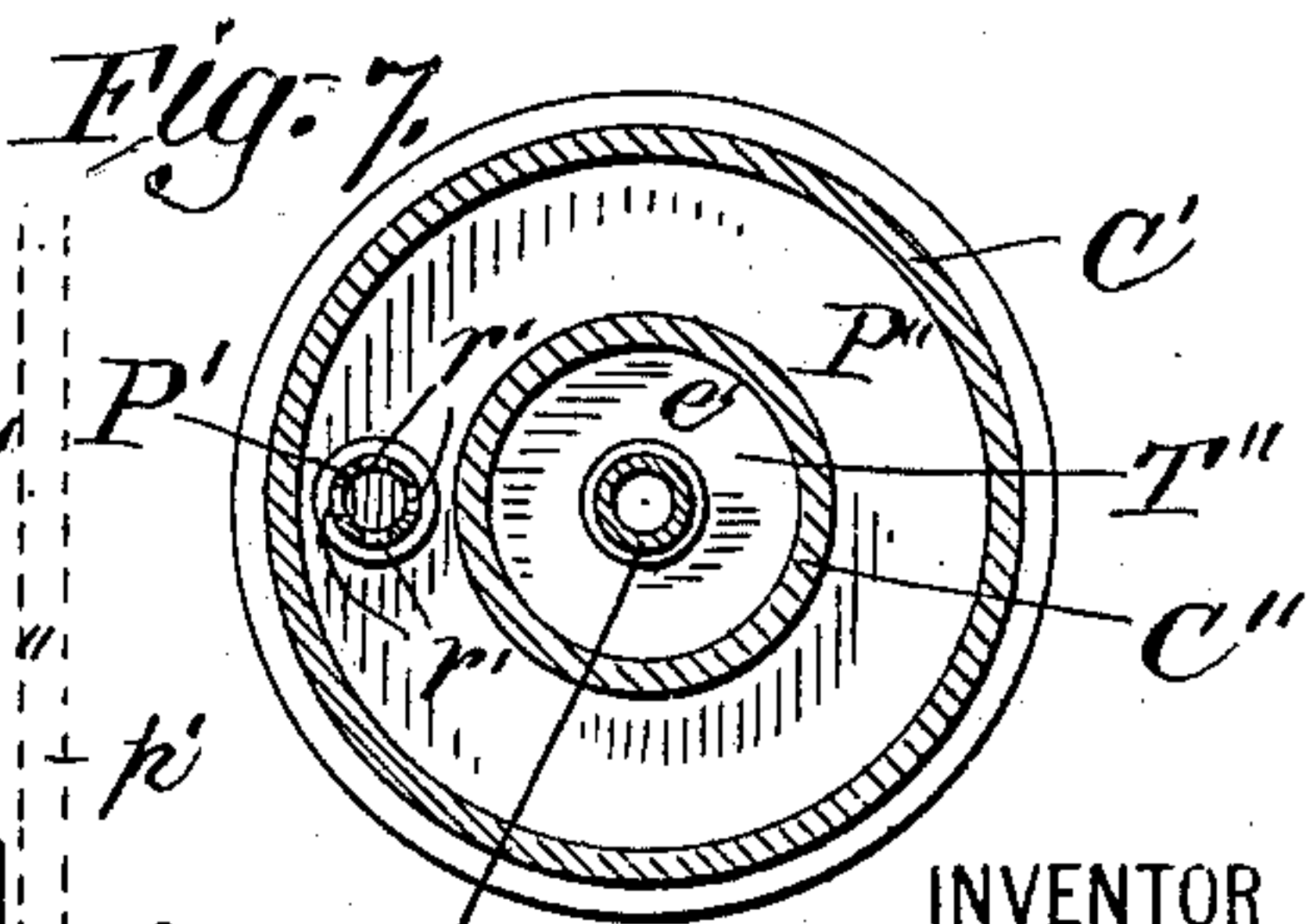
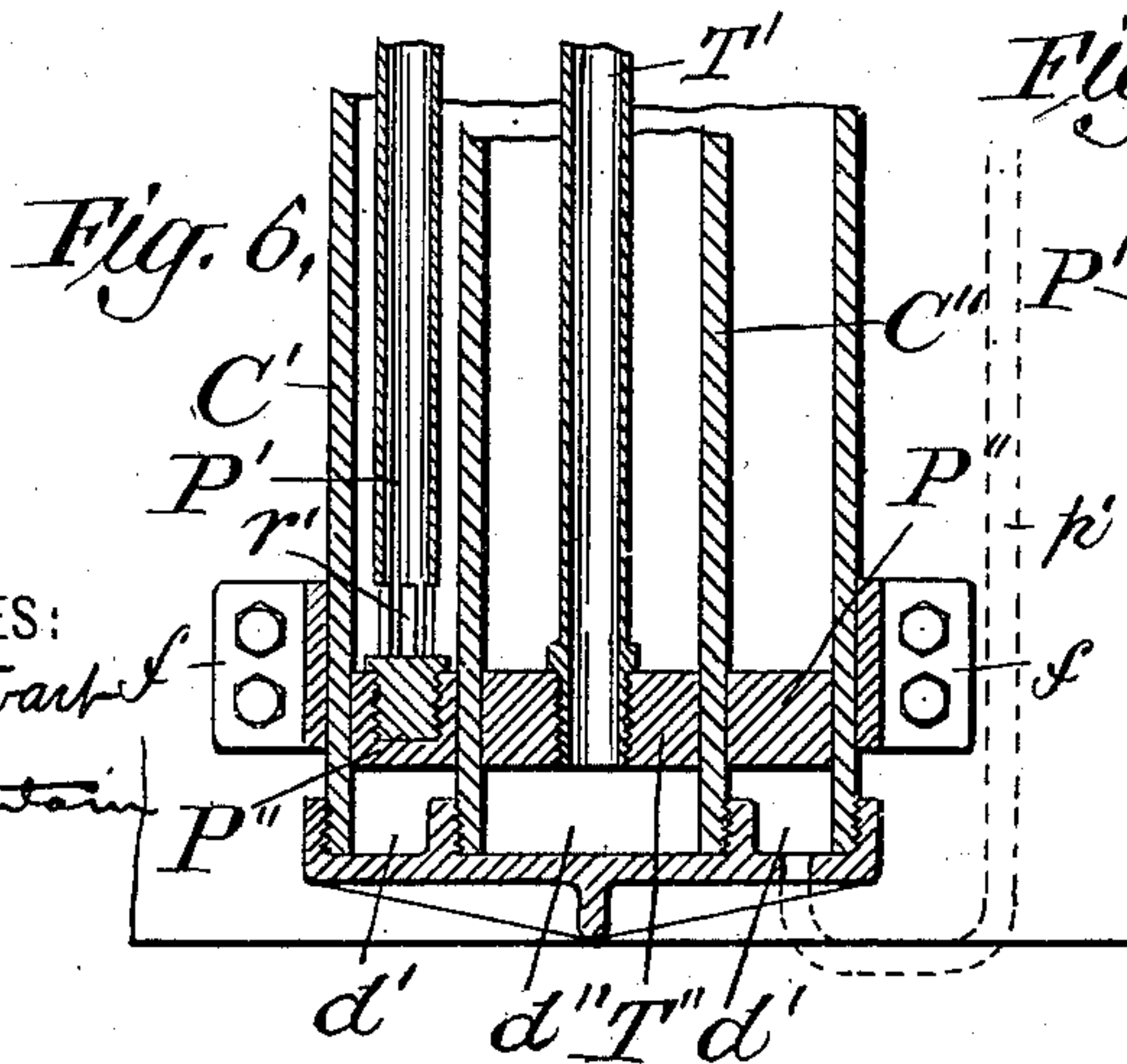
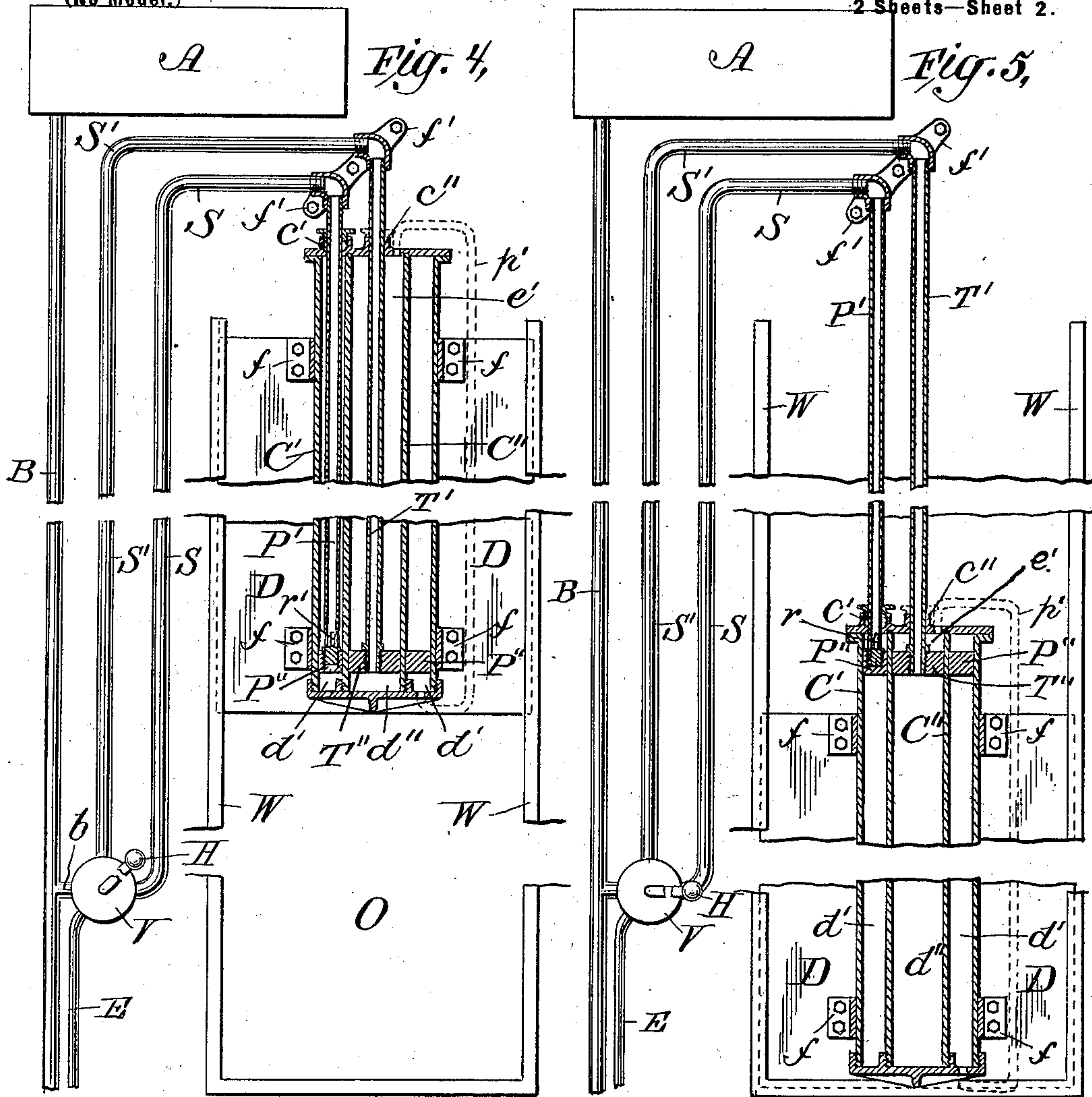
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RECIPROCATING MECHANISM FOR OPENING OR CLOSING BARRIERS CONTROLLING OPENINGS.

SPECIFICATION forming part of Letters Patent No. 666,170, dated January 15, 1901.

Application filed October 25, 1900. Serial No. 34,269. (No model.)

To all whom it may concern:

Be it known that I, ALBERT L. WEBSTER, a citizen of the United States, residing in the city of New York, borough of Manhattan, and State of New York, have invented a new and useful Improvement in Reciprocating Mechanism for Opening and Closing Barriers Controlling Openings, of which the following is a specification.

My invention relates to improvements in apparatus for opening and closing all kinds of barriers covering or controlling all kinds of openings, such as bulkhead-doors, hatches, ports, valves, and gates on shipboard and the doors, windows, and openings in factories, large buildings, or any other place where such mechanism is necessary or desirable.

The objects of my invention are to provide means for applying force, first, to move the barrier; second, to return it to its original position, and, third, for controlling the application of the force, so that the barrier may be moved, held, and returned at the will of the person operating it or by any automatic operating device actuated near by or at a distance. I attain these objects by means of an apparatus which is simple, durable, positive in its action, reliable, and not likely to get out of order, and which is operated by the application of the pressure of a liquid or a gas or other fluid medium or through a vacuum or a combination of any of these acting into vessels, tubes, cylinders, or other closed chambers attached to the barrier, each of said closed chambers containing in its interior a piston attached to a hollow piston-rod which passes through either or both extremities of the closed chamber, the said piston-rod being attached to the stationary surface or wall upon which the barrier moves and being connected with a pipe which serves alternately as the supply and exhaust pipe for the ingress and egress of the impelling medium, the control of the impelling medium used being effected by means of one or more valves or other device so constructed and arranged with reference to the ingress and egress pipes that a single movement of the former by the operator or by any automatic operating device will permit the ingress and egress of the impelling medium to and from the closed

chambers and a consequent movement of the barrier.

Reference is had to the accompanying drawings, in which the same parts are indicated by the same letters throughout the several views.

Figure 1 represents a diagrammatic view of one form of my system as applied to a single barrier when such barrier is raised, so as to leave the opening uncovered. Fig. 2 represents a diagrammatic view when such barrier is closed, so as to leave the opening covered. Fig. 3 is an enlarged view of a portion of the same form, showing in section the pistons, a portion of the cylinders containing said pistons, and a portion of the rods contained within said cylinders and attached to said pistons. Figs. 4, 5, 6, and 7 illustrate another form of my system, in which Fig. 4 is a diagrammatic view of such form as applied to a single barrier when such barrier is raised. Fig. 5 is a diagrammatic view of the same form when such barrier is closed. Figs. 6 and 7 are enlarged views of the same form, showing, respectively, in section and in plan the pistons, a portion of the cylinders containing said pistons, and a portion of the rods contained within said cylinders and attached to said pistons.

I have illustrated in the drawings a vertically-sliding door; but it will be obvious that my system may be readily adapted to operate various forms of doors, gates, ports, or valves other than that herein specifically described.

In Figs. 1, 2, and 3, D represents the door, which slides vertically in the ways or guides W. Two cylinders C and C' are secured to the door D, as by means of the plates and bolts f, and extend the whole length of and a little above the door. Within the cylinder C a piston P is arranged, having the hollow piston-rod P', containing the ports r therein, extending therefrom through the entire length of the cylinder C and through the upper cylinder-head c, which is provided with the usual packing, and the said hollow piston-rod is secured as by means of the plates and bolts f', to the stationary surface or wall upon which the barrier moves. The upper end of the hollow piston-rod P' communicates with a pipe S, running to the valve V, through a chamber in which (when the valve is opera-

tively turned) it connects with a branch pipe *b* from the main service-pipe *B*, and thence to the reservoir *A* or other source of supply for the impelling medium, or in turn through the connecting-channel in the valve *V* with the exhaust-pipe *E*, which may lead directly or indirectly either to the outside air or back to the source of supply, (if gas or vapor be the impelling medium used,) or either to waste or to a reservoir or back to the source of supply, (if a liquid be the impelling medium used,) or the pipe *E* may be omitted, if desired, and its port in the valve *V* may be used as the vent. If, however, the valve *V* be operated from a distance, such as the bridge or conning-tower of a vessel, the exhaust gas, vapor, or fluid from the pipe *E* may be advantageously used by running that pipe to a cylinder and scale or to a bell or other tell-tale at such distant station, as is well understood, or, if the device is acting as a vacuum-machine, the reservoir *A* should be in an exhaust condition of whole or partial vacuum, according to the conditions that may exist. Again, the cylinder *C'* is secured to the door *D*, as by means of the plates and bolts *f*, and extends the whole length of and a little above the door. Within the cylinder *C'* is arranged a hollow piston *T*, through which the hollow piston-rod *T'* extends at its lower end into the chamber *d'* below the piston *T*. The hollow piston-rod *T'* extends upward through the entire length of the cylinder *C'* and through the upper cylinder-head *c'*, which is provided with the usual packing and is secured, as by means of the plates and bolts *f'*, to the wall or surface upon which the door moves. The hollow piston-rod *T'* communicates at its upper end with the pipe *S'*, running to the valve *V*, and thence either according as the valve is operatively turned through the branch pipe *b* to the main service-pipe *B* and reservoir *A* or to the exhaust-pipe *E*.

O is the opening to be closed by the barrier or door *D*. The pipe *p* connects the space *d* below the piston *P* in the cylinder *C* with the space *e* in the cylinder *C'* lying between the piston *T* and the cylinder-head *c'* for the purpose hereinafter specified.

The valve *V* is arranged to operate as follows: In one position it connects the piston-pipe *S* with the main supply-pipe *B*, and at the same time it connects the pipe *S'* with the exhaust-pipe *E*. In another position it connects the pipe *S'* with the main supply-pipe *B*, and at the same time it connects the pipe *S* with the exhaust-pipe *E*. The details of this valve are not shown, as they may be varied, and any form of valve that will accomplish the same result may be used. The valve is provided with a handle *H* to permit its being moved into the desired position, and this motion may be accomplished by hand or automatically nearby or at a distance.

The operation of the device, which may be operated as above indicated either by a gas, vapor, or liquid or as a vacuum mechanism, is

as follows: When the device is to be operated by a gas or fluid under pressure, when the barrier is in the position shown in Fig. 1, with the barrier raised above the opening, the valve *V* is set by the handle or device *H*, so that the pipe *B* is in communication, through the branch pipe *b*, valve *V*, and pipe *S'*, with the interior of the piston-rod *T'*, while the interior of the piston-rod *P'* communicates, through the pipe *S* and a passage in the valve *V*, with the exhaust-pipe *E*, running to the outside air or a reservoir for the fluid, as described. In this position of the valve *V* the impelling medium will be admitted from the source of supply *A* through pipe *B*, branch pipe *b*, valve *V*, and pipe *S'* to the interior of the hollow piston-rod *T'*, and thence to the space *d'* lying between the piston *T* and the lower head of the cylinder *C'*. The pressure thus exerted on the lower head of the cylinder *C'* tends to force down that cylinder, together with the door, and thus close the opening. Meanwhile the gas or fluid lying between the piston *T* and the upper head of the cylinder *C* is forced out through the pipe *p* into the space *d* lying between the lower surface of the piston *P* and the lower head of the cylinder *C*, and as the spaces *d* and *e* remain substantially constant in volume during any movement of the barrier the escaping gas or fluid from the cylinder *C'* will just serve to fill the space *d* as it enlarges through the closing of the barrier. At the same time the gas or fluid that is confined in the cylinder *C* between the upper surface of the piston *P* and the upper head of the cylinder *c* is driven out through the ports *r* in the piston-rod *P'* and through the interior of the piston-rod *P'* into the pipe *S*, and thence through the passage in the valve *V* into the exhaust-pipe *E*.

When the device is in the position shown in Fig. 2, with the opening closed by the barrier or door *D*, and it is desired to raise the barrier, the operation is as follows: The impelling medium is admitted from the source of supply *A* through the pipe *B*, branch pipe *b*, valve *V*, and pipe *S* through the interior of the hollow piston-rod *P'* and ports *r* therein to the space between the upper surface of the piston *P* and the upper head *c* of the cylinder *C*. The pressure thus exerted tends to raise the cylinder *C* and with it the barrier or door *D*, while the gas or fluid confined between the under surface of the piston *P* and lower end of the cylinder *C* in the space *d* is forced out through the pipe *p* into the space between the upper surface of the piston *T* and the upper head *c'* of the cylinder *C'*, which enlarges as the door rises sufficiently to receive this escaping gas or fluid. Meanwhile the impelling medium lying in the space *d'* between the lower surface of the piston *T* and the lower head of the cylinder *C'* is forced out through the interior of the hollow piston-rod *T'* into the space *S'*, and thence through the passage in the valve *V* into the exhaust-pipe *E*, connecting with the outer air or fluid

reservoir, as described, or the pipes S and S' may be made to serve through branch pipes to several barriers simultaneously, and in this case the valve V may operate any desired number of barriers, or the two methods may be used concurrently.

Figs. 4, 5, 6, and 7 show another arrangement of my system which is in general similar in its construction and operation to the form shown in Figs. 1, 2, and 3; but in this second arrangement the separate cylinders in which the pistons P'' and T'' operate are placed substantially concentrically one within the other, but have no connection with each other other than that effected by the pipe p', (shown in dotted lines,) which serves to communicate the space below the lower surface of the piston P'', operating in the cylinder C', with the space above the upper surface of the piston T'' in the cylinder C'; otherwise the construction and operation of this form of the device are similar to the first form illustrated. Either of the cylinders may be placed within the other without altering the operation, as the volume of fluid displaced by each piston should be equal to that of the other. There is some advantage in this second form of the device in that the two cylinders are placed opposite the middle line of the door, thus averting a side thrust and any tendency to rack. This form is of special utility with vertically-sliding doors, but not so much so with those that slide horizontally and where in consequence the cylinders are preferably located near the top of the door.

I have described my system as applied to a single barrier only; but it will be understood that any convenient number of barriers may be simultaneously operated by duplicating the apparatus and having them all connect by branch pipes with the main service-pipe B, so that the impelling medium admitted in sufficient quantity and under sufficient pressure to the service-pipe B will pass through the branch pipes to the several valves and pipes leading to each barrier.

For convenience of illustration I have shown the cylinders on the doors or barriers as placed side by side; but in practice on vertical barriers it would be preferable to place one in front of the other, so that both of the cylinders would act on the middle line of the door, so as to avoid lateral thrust, thereby avoiding friction, racking, and jamming, while in some cases the method illustrated is preferable. I have also described my device as supplied with the pipe p, connecting the space d with the space e in the cylinder C' lying above the upper surface of the piston T, and I prefer this arrangement, so as to

supply some back pressure on the pistons P and T in operation, and thus avoid thumping, as well as to close these spaces against the admission of dust or moisture; but the pipe p is not essential to the operation of my device, for these spaces may open, respectively, by ports to waste or to reservoirs. So, too, if the pipe p be employed it will be understood that it need not run directly from the space d to the upper interior portion e of the cylinder C'; but it may pass through some intermediate device—such as an indicator placed at a distant station or other intermediate apparatus, as desired—before passing to the interior of the cylinder C'.

If my mechanism be operated as a vacuum device, it will be understood that a reverse operation takes place to that obtaining where the pipe B contains the impelling medium under pressure. In this case a vacuum is established in the pipe B and the pressure operating the mechanism is atmospheric pressure acting through the pipe E and the corresponding ports in the valve V, communicating with the pipes S and S', or the mechanism may be operated by both pressure and vacuum.

My invention is not necessarily limited to a sliding barrier, as above described, for the reason that by making the cylinders C and C' and the piston-rods P' and T' curved and attaching the piston-rods to the surface or wall in which the opening is placed a swinging barrier may be opened and closed in substantially the same manner.

Having thus described my invention, what I claim is—

1. A movable barrier operated by mechanism consisting of two separate independent chambers attached to the barrier, each chamber containing a stationary piston and hollow piston-rod connected to pipes, and means whereby the impelling medium is alternately admitted to and discharged from either end of each of said pistons to open and close the barrier, substantially as described.

2. A movable barrier operated by mechanism consisting of two separate independent chambers placed one within the other and attached to the barrier, each chamber containing a stationary piston and hollow piston-rod connected to pipes, and means whereby the impelling medium is alternately admitted to or discharged from either end of each of said pistons to open and close the barrier, substantially as described.

ALBERT L. WEBSTER.

Witnesses:

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