

No. 767,732.

PATENTED AUG. 16, 1904.

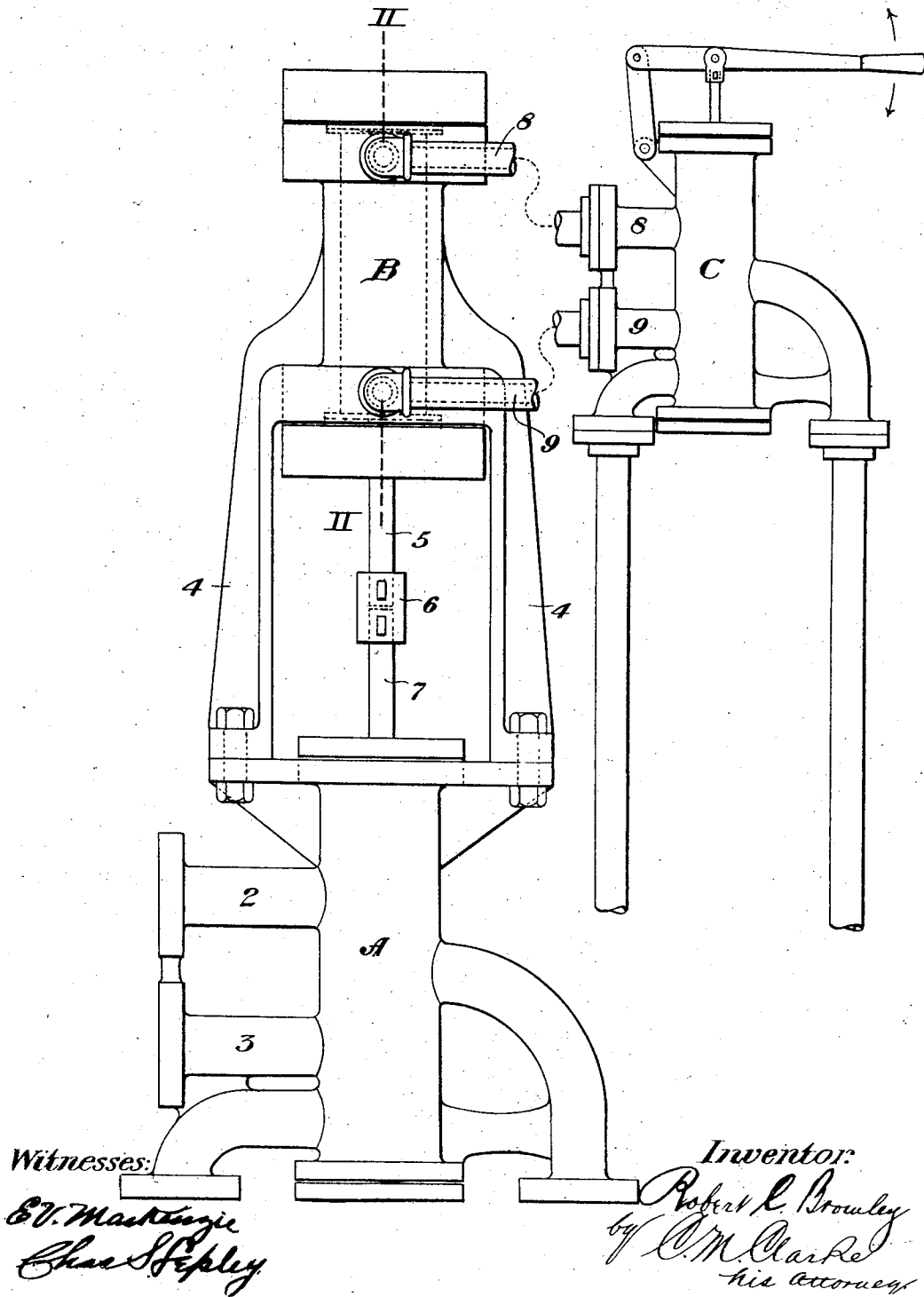
R. C. BROMLEY.
CENTRALIZING OPERATING MECHANISM FOR VALVES.

APPLICATION FILED JULY 10, 1902.

NO MODEL.

4 SHEETS—SHEET 1.

Fig. 1.



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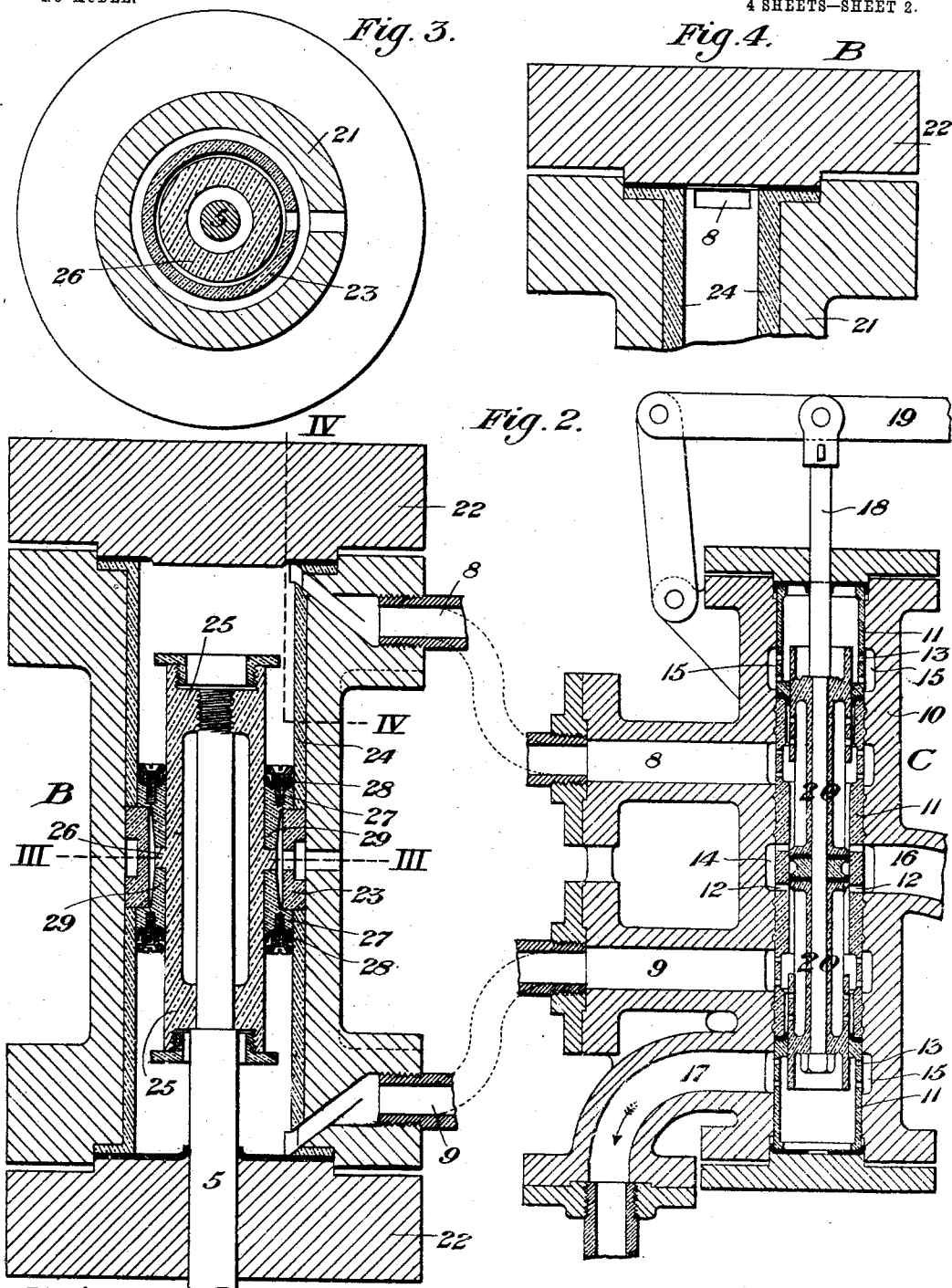
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4 SHEETS—SHEET 2.



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4 SHEETS--SHEET 3

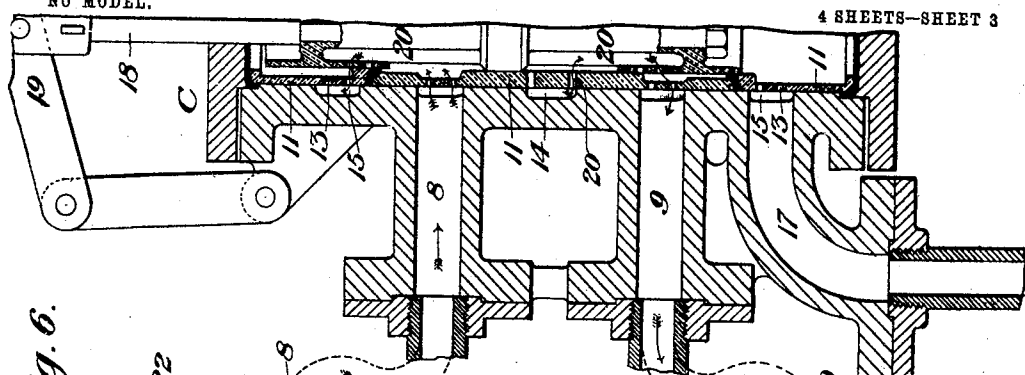


Fig. 6.

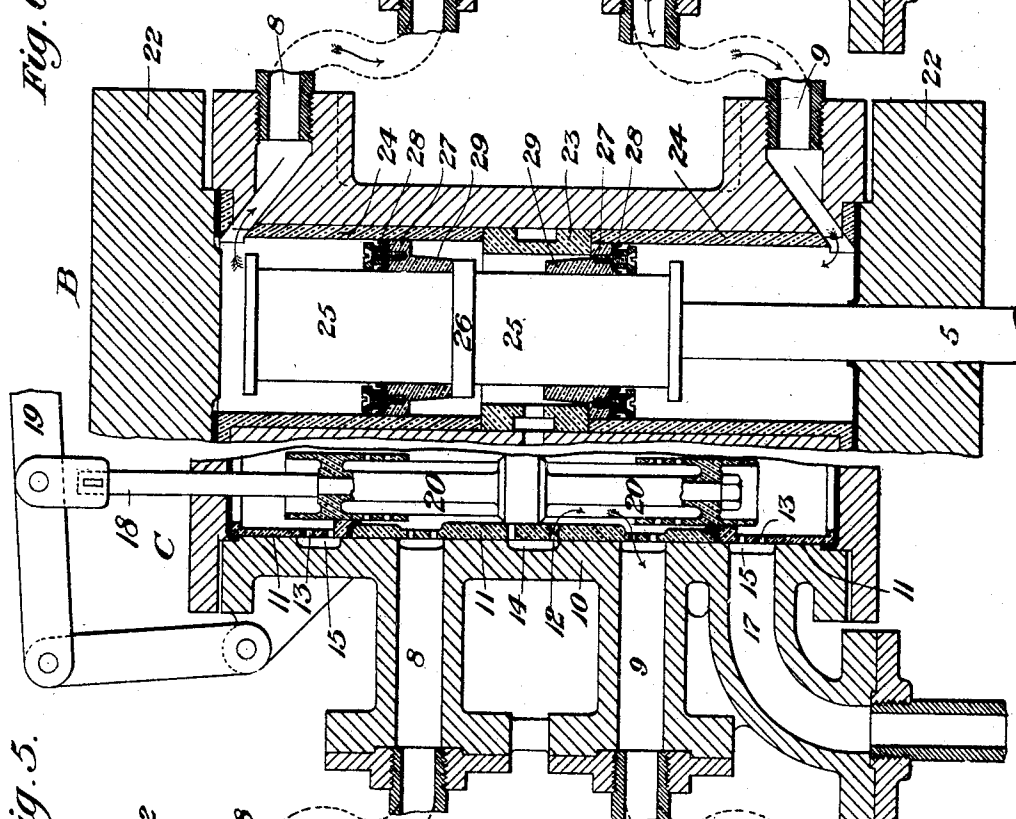


Fig. 5.

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NO MODEL.

4 SHEETS—SHEET 4.

Fig. 8.

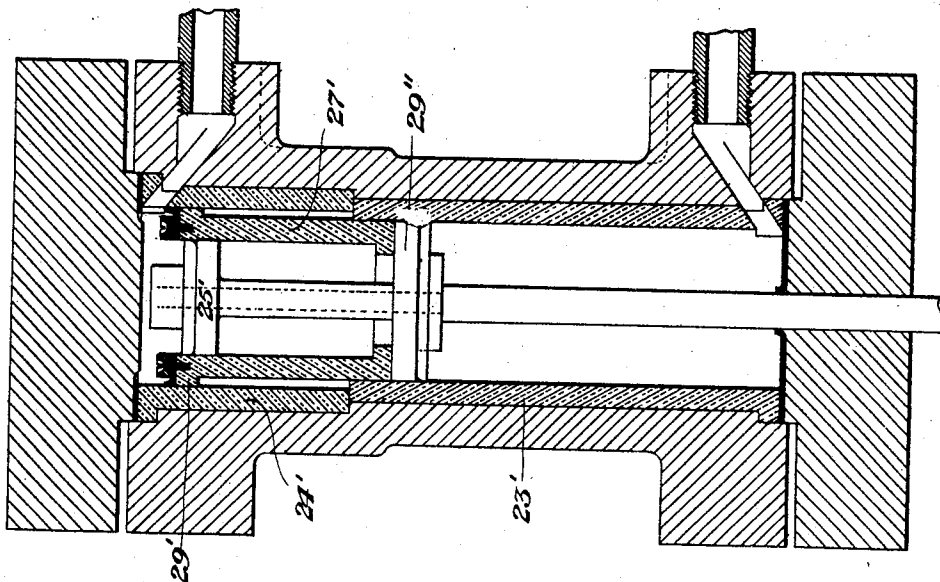


Fig. 7.

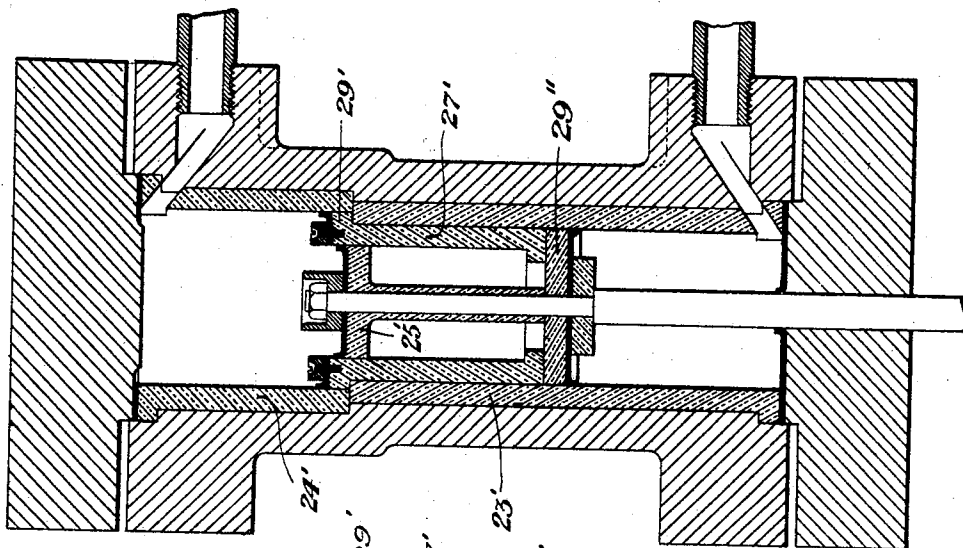
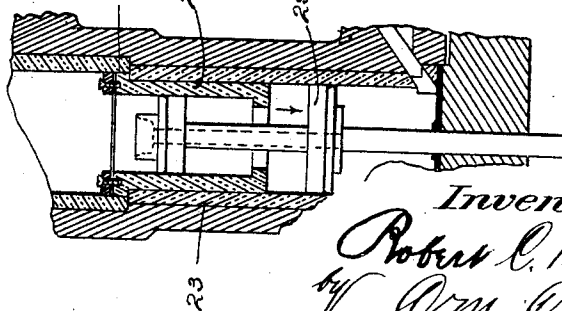


Fig. 9.



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UNITED STATES PATENT OFFICE.

ROBERT C. BROMLEY, OF PITTSBURG, PENNSYLVANIA.

CENTRALIZING OPERATING MECHANISM FOR VALVES.

SPECIFICATION forming part of Letters Patent No. 767,732, dated August 16, 1904.

Application filed July 10, 1902. Serial No. 115,006. (No model.)

To all whom it may concern:

Be it known that I, ROBERT C. BROMLEY, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Centralizing Operating Mechanism for Valves, of which the following is a specification, reference being had therein to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a view in side elevation showing the general arrangement of my improved centralizing operating mechanism with the connected operating-valve and the controlling-valve. Fig. 2 is a central vertical section through the mechanism, on an enlarged scale, indicated by the line II II of Fig. 1, the controlling-valve also being shown in vertical section and in its normal inoperative position. Fig. 3 is a cross-sectional view indicated by the line III III of Fig. 2. Fig. 4 is a vertical sectional detail view indicated by the line IV IV, showing one of the inlet-ports. Fig. 5 is a view similar to Fig. 2, but showing the controlling-valve partially raised, maintaining pressure to the under side of the plunger, but not raised sufficiently high to establish communication from the upper side to the waste-outlet. Fig. 6 is a view similar to Figs. 4 and 5, but showing the controlling-valve farther raised, maintaining pressure to the under side of the plunger and establishing communication from the upper side to the waste-passage. Figs. 7, 8, and 9 are vertical sectional views illustrating a modified construction of the centralizing operating mechanism.

My invention consists in means for operating hydraulic or other valves adapted to establish communication from a source of fluid-power, whereby the operation of said valve is produced and governed by a fluid-actuated plunger connected with the piston of the valve, the movements of said plunger being generated and accurately controlled by an operating-valve manipulated by the operator.

The invention especially relates to the mechanism for actuating the hydraulic valve or other operative device the movements of which are desired to be produced at varying

speeds and under positive and accurate control comparatively independent of the skill or judgment of the operator. Ordinarily devices of this character are operated by a hand-lever connected with the piston or plunger of the valve; but where the valve and its connections are of large dimensions and the moving parts are of considerable weight there is great difficulty in controlling the flow of the fluid from the valve to the cylinders or other operating devices, while the work itself involves considerable labor.

Referring now to the drawings, A represents the hydraulic valve, which may be of any suitable type to control the flow of fluid through the connections 2 and 3 to and from the end of the working cylinder and which valve for convenience of illustration is of the design shown and illustrated in my patent dated May 29, 1900, No. 650,777.

B is the centralizing operative mechanism, which I shall denominate as the "pilot," which is conveniently mounted upon valve A by standards 4 4 and the piston or plunger rod 5 of which is connected by coupling 6 with the valve-rod 7 of valve A, which it is adapted to operate.

C is the controlling-valve, which, like valve A, may be of any suitable type adapted to deliver and receive a flow of motive fluid to and from the pilot B through pipe connections 8 and 9, and this valve also may conform in construction to the valve of my prior patent referred to. Briefly referring to the construction of said valve, 10 is its case or body, provided with the internal cylindrical valve-shell 11, through which ports 12 and 13 communicate with annular supply-chambers 14 14' and similar exhaust or waste chambers 15 15, supplied by the inlet or feed opening 16 and drained by the exhaust-passage 17, respectively, said exhaust-passage communicating by a vertical port (not shown) with both of the annular exhaust-chambers 15.

18 is the valve-stem connected with operating-lever 19, upon which stem, in the interior of the valve-shell is, mounted the reciprocating valve 20, adapted to establish communication through ports 12 and 13 to or from the sup-

ply or exhaust passages, as will be readily understood and as more fully described in the patent referred to.

Referring now to the pilot B, its body portion consists of a cylinder 21, mounted upon or cast integrally with the standards 4 and provided with the usual heads 22 22. The interior of cylinder 21 is bored out, and at the middle portion thereof is inserted a ring or annular abutment 23, against which bears on opposite sides the ends of the bushings 24 24 of somewhat less thickness, thereby providing an internal annular abutment formed by the ring 23, adapted to provide a bearing at each end for the supplemental piston-heads hereinafter referred to.

The bushings 24 are tightly held against the ring 23 by heads 22, so that when assembled as shown in the drawings these parts are rigidly incorporated together. 25 is a cylindrical plunger mounted on stem 5, provided with an annular abutment, collar, or ring 26 at its middle portion, while surrounding the plunger on either side of said ring are slidingly mounted the supplemental piston-heads 29 29, provided with suitable packing-gaskets 28. These supplemental piston-heads extend inwardly and in the normal middle position of the plunger bear against the ring 26 and also by offset flanges 27 against each end of ring 23. As thus constructed but one or the other of said supplemental piston-heads is operative at one time, as when lifted away from engagement from the ring, as shown in Fig. 6, whereupon if pressure be admitted to both ends of cylinder B, the area of the upper supplemental piston being added to that of the plunger, the combined areas will overbalance the opposite end of the plunger below, since the other supplemental piston-head will under pressure remain seated against its bearing on ring 23 and will be entirely ineffective as to imparting movement to the plunger while so seated. Upon reversing the plunger these conditions will be exactly similar as to the opposite end and opposite supplemental piston-head.

In the normal middle position of the plunger and operating-valve pressure is communicated to both ends of the plunger and the supplemental piston-heads, Fig. 2. In operation, as when the valve 20 is raised, pressure is first cut off from the upper end of the plunger while still being admitted underneath the plunger, and for a portion of the upward travel of the controlling-valve the upper connection is closed to the exhaust-passage 15, as shown in Fig. 5, and upon continuing to raise the valve communication is established from the top of the plunger with the waste-passage 15, pressure continuing underneath the plunger, whereupon it will rise, as shown in Fig. 6, actuating the operating-valve A. After valve A has been opened sufficiently far to effect the desired feed the controlling-valve C is reversed sufficiently far to cut off the

waste, whereupon the plunger 25 is stopped and will remain so until the valve C is again moved. When it is desired to stop the flow of fluid through valve A, the controlling-valve C is returned to its normal central position, whereupon the pressure-supply passing to the upper side of the plunger and acting on it and its suspended supplemental piston-head will overcome the effective pressure on the lower end of the plunger alone, whereupon the plunger will resume its normal middle position, producing the desired operation in valve A. The operation in the downward movement of the plunger below its normal position is exactly the same as that just described in all respects. It will thus be seen that the movement of the plunger and likewise of the operating-valve A is within the easy and accurate control of the operator. He is enabled to move the valve as rapidly or slowly as desired and to stop the operation instantly at any point. When it is desired to restore the main valve to its central position, the operator merely returns the controlling-valve C to its normal central position, whereupon the plunger will also automatically instantly assume its normal central position, as has been described.

In Fig. 7 I have shown a construction wherein the plunger 25' is mounted within a supplemental piston-head 27', having a bearing in an upper bushing 24' and flanges 29', adapted to seat upon shoulders formed at the upper end of a bushing 23' of reduced diameter, in which the body portion 27', also of reduced diameter, of the supplemental piston-head has its bearing. At the lower end of the plunger and rigidly mounted with it is an enlarged supplemental head 29'', and all of these elements correspond to and operate in relation to each other in the same manner as that just described—that is to say, when pressure is admitted underneath to raise the plunger the supplemental piston 27' will likewise be raised, and its area will be added to the area of plunger 25' to effect its downward movement. When the plunger travels down from its normal middle position, the supplemental piston 27' will be left suspended on the shoulders, and the greater area of the lower head 29'' will result in its automatic return. With either construction, therefore, the operation of the plunger is to resume its middle position when pressure is applied to both ends of the cylinder, and such middle position will be maintained as long as pressure on both ends continues. Similar operations and results may be secured by dispensing with the upper supplemental piston 29 of the present construction—i. e., a supplemental piston on the side farthest from the stem 5—if this end of the plunger is properly packed. This is due to the fact that the cross-area of the stem 5 reduces by this much the effective area of the lower side of the plunger 25.

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

1. Centralizing operating mechanism consisting of a cylinder provided with an internal limiting device and a pressure connection at each end, and a plunger provided with a supplemental piston adapted to receive pressure from the end of the cylinder and to travel inwardly toward and against the limiting device, substantially as set forth.

2. Centralizing operating mechanism consisting of a cylinder provided with a limiting-abutment between its ends, a plunger in said cylinder provided with a supplemental piston adapted to engage said abutment, and a pressure connection at each end of the cylinder adapted to admit pressure toward the middle of the cylinder, substantially as set forth.

3. Centralizing operating mechanism consisting of a cylinder provided with an internal limiting device, a plunger mounted in the cylinder provided with pressure areas and a supplemental piston adapted to be engaged by and to cooperate with the plunger and to engage the limiting device, and a pressure connection at each end of the cylinder adapted to admit pressure toward the middle of the cylinder, and to force the plunger and piston inwardly to a middle position, substantially as set forth.

4. In centralizing operating mechanism, the combination of a cylinder, a plunger mounted therein provided with a supplemental piston, pressure connections at each end of the cylinder adapted to admit pressure toward the middle of the cylinder, and means for arresting the movement of the supplemental piston at or about its middle position, substantially as set forth.

5. Centralizing operating mechanism for valves consisting of a cylinder provided with pressure connections at each end, and a plunger mounted therein provided with a middle annular abutment, supplemental piston-heads mounted on the plunger and engaging said abutment, and means for arresting the movement of either of the supplemental pistons, substantially as set forth.

6. Centralizing operating mechanism for valves consisting of a cylinder provided with pressure connections at each end, and a plunger mounted therein provided with a middle annular abutment, supplemental piston-heads mounted on the plunger and engaging said abutment, and an internal annular abutment adapted to engage and arrest either of the supplemental piston-heads, substantially as set forth.

7. In combination with an operating device; a centralizing controlling mechanism having a plunger connected with the operating device, provided with a supplemental piston and an intermediate abutment therefor, for automatically returning the main operating device to a central position, and an independent controlling-valve with connections to the centralizing controlling mechanism, substantially as set forth.

8. In combination with an operating device; a centralizing controlling mechanism having a plunger connected with the operating device and provided with a supplemental piston, means for applying pressure to each end of the plunger to force it toward the middle position, and limiting means for the supplemental piston intermediate of such pressure-supplying means, substantially as set forth.

9. The combination of a cylinder provided with an abutment about midway of its length and having pressure connections at each end, and a plunger mounted therein having a supplemental piston adapted to be engaged by said abutment, substantially as set forth.

10. The combination of a cylinder provided with an abutment about midway of its length and having pressure connections at each end, and a plunger mounted therein having a supplemental piston adapted to be engaged by said abutment, with an extended stem projecting through one of the cylinder ends, substantially as set forth.

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

ROBERT C. BROMLEY.

Witnesses:

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C. M. CLARKE.