No. 869,794. PATENTED OCT. 29. 1907.

G. W. MEYER.

STEAM ACTUATED VALVE.

APPLICATION FILED JUNE 25, 1906.

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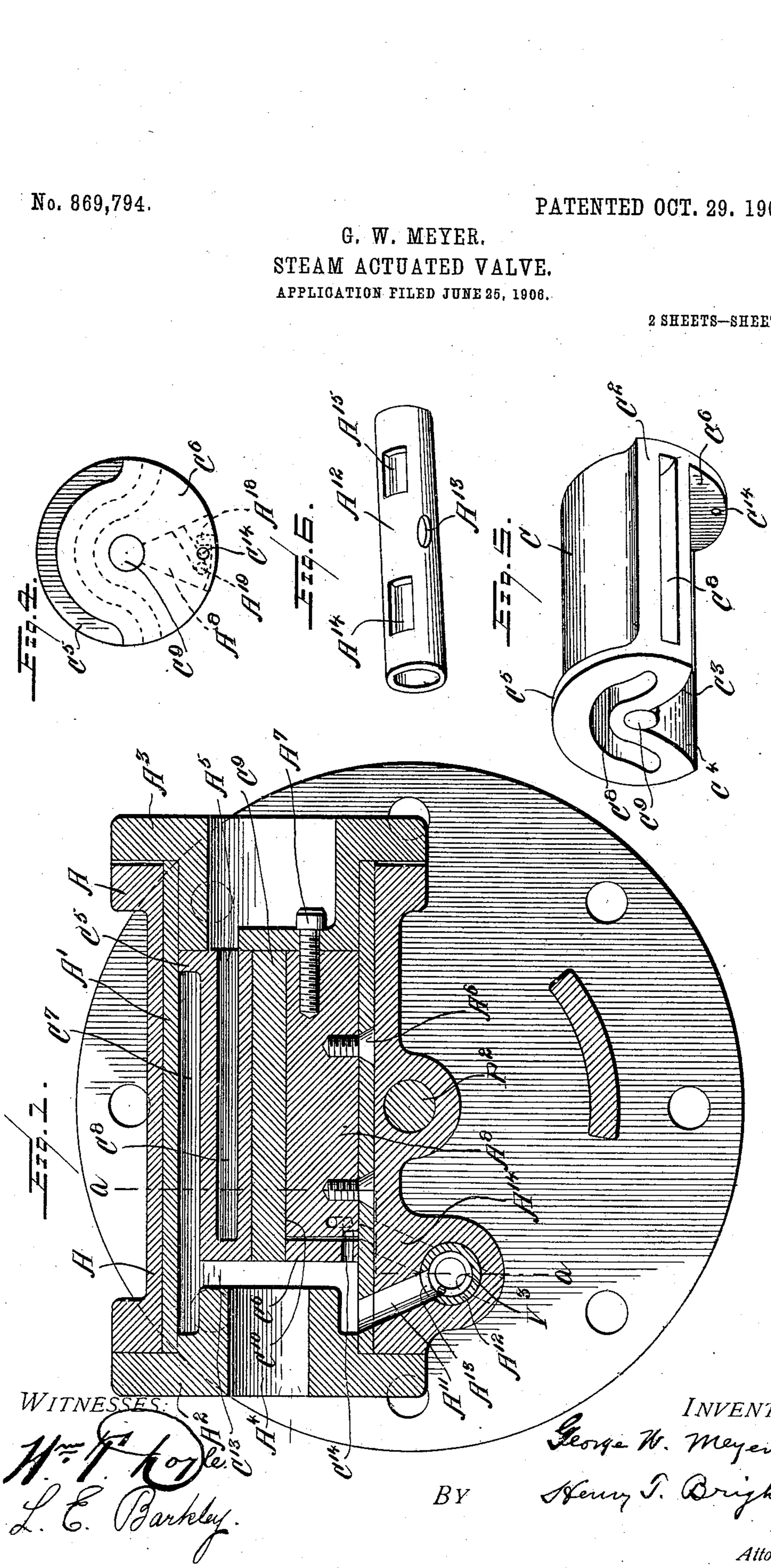

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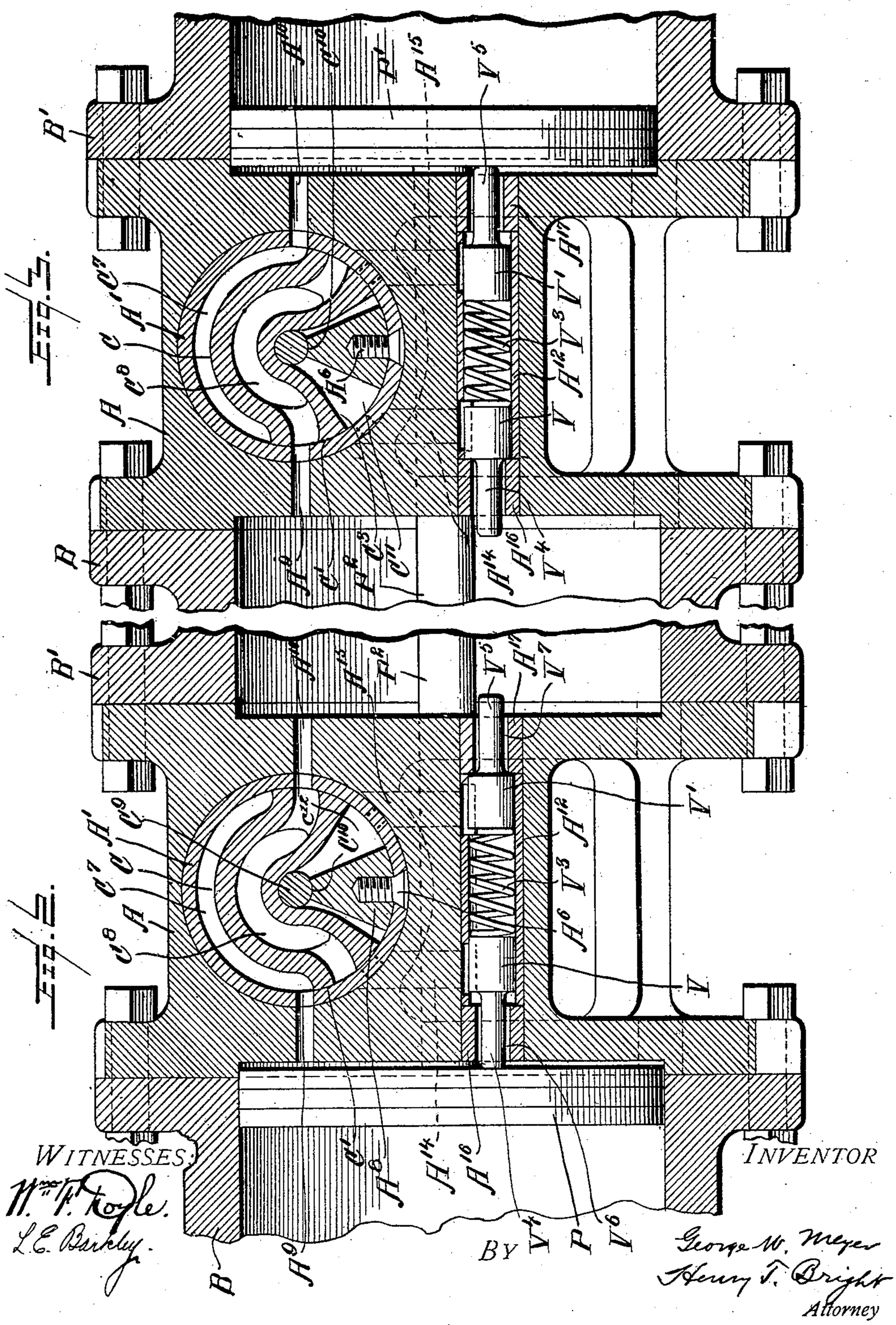

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GEORGE W. MEYER, OF SPARROWS POINT, MARYLAND.

STEAM-ACTUATED VALVE.

No. 869,794. Specification of Letters Patent. Patented Oct. 29, 1907.

Application filed June 25, 1906. Serial No. 323,352.

To all whom it may concern:

Be it known that I, GEORGE W. MEYER, a citizen of the United States, residing at Sparrow's Point, in the county of Baltimore and State of Maryland, have invented certain new and useful Improvements in Steam-Actuated Valves, of which the following is a specification.

My invention relates to valves for controlling fluid pressure.

The object of my invention is the construction of a valve of the character named adapted to alternately effect either the distribution and exhaust to and from different points such as is present in the operation of the pistons of a duplex pump or to transfer fluid pressure from the point of production to the point of storage; in the latter instance the valve performs the office of a compressor valve. In fact the valve can be utilized efficiently in all cases where fluid pressure is to be transmitted from one point to another.

A further object of my invention is the construction of a valve in which the transmission of fluid pressure is controlled by a movable member; said member being maintained in a balanced state by the fluid pressure and actuated in opposite directions by direct pressure upon the member as a result of exhausting the pressure at suitable points on the member, thus essentially producing a "balanced Corliss valve."

I shall here describe my invention in the best form known to me at present and as applied to a duplex pump similar to that described and claimed in my U. S. Letters Patent, No. 740,892 granted October 6, 1903; but it should be understood that it is susceptible to improvement in forms, proportions, and details of construction, (and to desirable additions) by the exercise of ordinary mechanical skill and without departing from the spirit of the invention.

In describing the invention in detail reference will be had to the accompanying drawings, which form a part of this specification, and wherein like characters of reference denote corresponding parts in the several views and in which—

Figure 1 is a longitudinal section of the valve mounted in the center-head of a duplex pump; Fig. 2, a transverse section on the line *a*—*a* of Fig. 1, showing the position of the various parts when the piston P reaches the limit of its rearward movement; Fig. 3, a view similar to Fig. 2, showing the position of the various parts when the piston P^1 reaches the limit of its rearward movement; Fig. 4, a front end view of the valve; Fig. 5, a detail perspective view of the valve looking from the rear and Fig. 6, a detail perspective view of the trick valves' bushing.

In the drawings A represents the center-head of the duplex pump having the usual cylinders B and B^1 (shown in fragment) mounted on the opposite sides thereof and in which travel the pistons P and P^1 respectively, which are connected by a common rod P^2. The remaining portions of the pump are not shown but are precisely the same as those described in my U. S. Letters Patent No. 740,892. The center-head A has a cylindrical opening extending therethrough in which is mounted a bushing A^1; said bushing being secured in place by a front cap A^2 and a back cap A^3, the cap A^2 having a central opening A^4 for connection with the pressure supply and the cap A^3 having an opening A^5 leading from the exhaust passage of the valve to be hereinafter described. Secured to the bushing A^1 and the back cap A^3 by screws A^6 and A^7 respectively is a lug A^8. Ports A^9 and A^{10} lead from the cylindrical opening in the center-head through the bushing and center-head into the piston cylinders B and B^1 respectively.

The valve is formed of an integral member having the curved longitudinal surfaces C, C^1 and C^2 and the straight longitudinal surfaces C^3 and C^4. The surface C is depressed and is limited by a flange C^5 on the rear end of the valve said flange conforming to the contour of the bushing A^1, while the surfaces C^1 and C^2 register with the outer edge of the flange C^5 and also conform to the contour of the bushing A^1. The straight longitudinal surfaces C^3 and C^4 extend approximately radially of the valve and are limited at the front by a flange C^6 which follows the contour of the bushing A^1 on the opposite side of the longitudinal axis of the valve from the flange C^5. It will thus be seen that the curved surfaces C^1 and C^2 abut the bushing A^1 at all times. The depressed surface C, the bushing A^1 and the flange C^5 form the pressure supply passage C^7 which is adapted to be shifted so as to alternately communicate with the ports A^9 and A^{10} in a manner to be hereinafter described. An exhaust passage C^8 is formed through the interior of the valve and passes both through the rear of the valve to the atmosphere and through the lateral surfaces C^1 and C^2 between their limiting longitudinal edges; likewise the exhaust passage C^8 is adapted to be shifted so as to alternately communicate with the ports A^9 and A^{10} in a manner to be hereinafter described. A journal C^9 is secured longitudinally of the valve approximately at the point of convergence of the straight surfaces C^3 and C^4 and is adapted to rest in a groove C^{10} in the top of the lug A^8 which forms a journal bearing and permits a partial rotation of the valve in opposite directions. Non-communicating chambers C^{11} and C^{12} are formed by the lug A^8 and the surfaces C^3 and C^4 of the valve into and from which pressure is adapted to be alternately supplied and exhausted. A chamber C^{13} is formed between the forward end of the valve and the inner face of the front cap A^2 through which pressure is free to pass in an upward direction into the passage C^7 and in a downward direction through the port A^{11} which extends through the bushing A^1 and the center-head A into a cylindrical transverse opening which passes through

the forward portion of the center-head. A bushing A^{12} is inserted in said cylindrical transverse opening in which two oppositely disposed trick valves V and V^1 are slidably mounted. A spring V^3 in said bushing is interposed between the inner ends of the trick valves and normally tends to force the valves apart so that their outer ends will project beyond the center-head into the piston cylinders B and B^1 respectively whereby they are respectively shifted from their normal position by the pistons P and P^1 at the termination of their inward stroke. It will be noted however that the spring V^3 can be entirely dispensed with if desired as the pressure which is constantly present in the space between the inner ends of the valves V and V^1 will be sufficient to move said valves outwardly; so as to be respectively actuated by the pistons P and P^1 as heretofore mentioned. An opening A^{13} centrally of the bushing A^{12} registers with the port A^{11} whereby pressure is admitted through the bushing into the space between the inner ends of the trick valves V and V^1. Ports A^{14} and A^{15} (shown in dotted lines) communicate with the chambers C^{11} and C^{12} respectively and pass through the bushing A^1, center-head A and bushing A^{12} and are respectively controlled by the valves V and V^1. The outward movement of the valves V and V^1 is limited respectively by the plugs A^{16} and A^{17} which also serve to secure the bushing A^{12} in place. The valves V and V^1 have forwardly projecting stems V^4 and V^5 respectively of less diameter than the openings in the plugs A^{16} and A^{17} whereby passages V^6 and V^7 respectively are formed between the surface of the opening in the plug A^{16} and the surface of the stem V^4; and the surface of the opening in the plug A^{17} and the surface of the stem V^5. It will thus be obvious that when the valve V is in its outward position out of engagement with the piston P communication between the port A^{14} and the passage V^6 is closed while communication between the port A^{14} and the space between the inner ends of the valves V and V^1 is open thereby permitting pressure to enter the chamber C^{11}, but when the valve V is forced rearward by the piston P communication with the space between the inner ends of the valves V and V^1 and the port A^{14} is closed and no pressure can reach the chamber C^{11}, while pressure already in the chamber is released by way of port A^{14} and passage V^6 into the cylinder B. Likewise the valve V^1 controls communication of the chamber C^{12} with the pressure supply in the space between the inner ends of the valves V and V^1 through port A^{15} and with the cylinder B^1 through port A^{15} and passage V^7.

Assuming the parts to be in the position shown in Fig. 2 the operation of the valve is as follows: Fluid pressure passing through the opening A^4 will enter the chamber C^{13} and pass by way of supply passage C^7 through the port A^9 and act upon the piston P forcing same outwardly; said outward movement of the piston P will at the same time cause the piston P^1 to move rearwardly; the fluid pressure in cylinder B^1 having previously passed out through the port A^{10} and exhaust passage C^8 to the atmosphere. When the piston P^1 reaches the limit of its rearward movement it engages the valve V^1 and forces same inwardly and connects the port A^{15} and passage A^{17} whereby the pressure in chamber C^{12} is exhausted into the cylinder B^1 and thence through the port A^{10} and exhaust passage C^8 to the atmosphere. When such reduction of pressure in chamber C^{12} takes place a partial rotation to the right is immediately imparted to the valve by reason of the fact that the pressure in passage C^7 is many times greater than the atmospheric pressure remaining in chamber C^{12}; such partial rotation of the valve causing the surface C^4 to abut the lug A^8, the supply passage C^7 to register with the port A^{10} and the exhaust passage C^8 to register with the port A^9 as shown in Fig. 3. Immediately this position is assumed by the valve the pressure supply enters the cylinder B^1 through the passage C^7 and port A^{10} and moves piston P^1 forward; the pressure in cylinder B being exhausted by way of port A^9 and exhaust passage C^8. In the meantime chamber C^{11} has filled with pressure by reason of the fact that the valve V has moved outward when released by the piston P and opened communication between the port A^{14} and the space between the inner ends of the valves V and V^1. When the piston P reaches the limit of its rearward movement it engages the valve V and forces same inwardly and thereby connects the port A^{14} and passage A^{16} and exhausts the pressure in chamber C^{11} into the cylinder B and thence through the port A^9 and exhaust passage C^8 to the atmosphere. When such reduction of pressure in chamber C^{11} takes place a partial rotation to the left is immediately imparted to the valve and the several parts again assume the position shown in Fig. 2 and the phases of the operation heretofore described are repeated. A force of considerable strength is exerted to partially rotate the valve in opposite directions due to the great pressure exerted on the surface C and it has been found expedient to cushion the termination of these movements of the valve to prevent the sudden arresting of same by the lug A^8. To this end I provide a port C^{14} in the front face of the valve and two independent passages A^{18} and A^{19} adapted to register with the port C^{14} and leading to the chambers C^{11} and C^{12} respectively. The port C^{14} and the passages A^{18} and A^{19} are so related that when the valve assumes the position shown in Fig. 2 the port C^{14} registers with the passage A^{18} and sufficient pressure is admitted in chamber C^{11} from chamber C^{13} to cushion the movement of the valve at the termination of its movement to the left; likewise when the valve assumes the position shown in Fig. 3 the port C^{14} registers with the passage A^{19} and sufficient pressure is admitted in chamber C^{12} from chamber C^{13} to cushion the movement of the valve at the termination of its movement to the right.

I claim:

1. The combination with a cylindrical valve chamber having a steam inlet through one head thereof and an exhaust outlet through the other head thereof, of a lug fixed in position along one side of said chamber and having a journal bearing along its outer side, a rotary valve fitted in the chamber and so formed as to leave a compartment at either side of said lug and having fixed at its axis a rod journaled in said bearing, the valve chamber being provided with inlet and exhaust ports communicating with said compartments and also having lateral ports, and the valve having transverse inlet and exhaust ports communicating respectively and continuously with said inlet and exhaust outlet through the heads of the chambers and communicating alternately with said lateral ports, and means for controlling the exhaust from said compartments alternately.

2. The combination with adjacent cylinders provided with pistons and a piston rod common to both pistons, of a cylindrical valve chamber located between said cylinders

and at right angles thereto, said chamber being provided with steam inlet and exhaust ports, a rotary valve located in said chamber and having transverse inlet and exhaust ports, the heads of the cylinders having ports so located as to communicate alternately with said transverse ports and means operated by said pistons to alternate the rotation of said valve, for the purpose set forth.

3. The combination with adjacent cylinders provided with pistons and a piston rod common to both pistons, of a cylindrical valve chamber located between said cylinders and at right angles thereto, said chamber being provided with steam inlet and exhaust ports, of a rotary valve located in said chamber and having transverse inlet and exhaust ports, the heads of the cylinders having ports so located as to communicate alternately with said transverse ports, a lug located along the lower side of said valve chamber, said valve being journaled upon said lug and so constructed as to form a compartment upon either side of said lug, ports communicating with said compartments and with the inlet of the valve chamber and with said cylinders, and valves in said last-named ports actuated by the pistons whereby to effect the operation of the rotary valve.

4. In a rotary steam actuated valve, the combination with a cylindrical valve chamber having an inlet through one head thereof and an exhaust outlet through the other head thereof, of a stationary lug on one side of said chamber, a rotary valve journaled along the outer edge of said lug and provided with a pressure supply passage extending from one end thereof to a flange at the other end thereof and provided with an exhaust passage extending from the end of the valve bearing said flange to a wall at the other end of said valve and communicating with the exhaust outlet, lateral ports through the walls of the cylindrical chamber communicating alternately with said supply and exhaust passages, and automatic means for rotating said valve to effect said alternate communication.

5. In a rotary steam actuated valve, the combination with a cylindrical valve chamber having an inlet through one head thereof and an exhaust outlet through the other head thereof, of a stationary lug on one side of said chamber, a rotary valve journaled along the outer edge of said lug and provided with a pressure supply passage extending from one end thereof to a flange at the other end thereof and provided with an exhaust passage extending from the end of the valve bearing said flange to a wall at the other end of said valve and communicating with the exhaust outlet, lateral ports through the walls of the cylindrical chamber communicating alternately with said supply and exhaust passages, ports leading from the inlet of said chamber to either side of said lug and trick valves alternately controlling these last-named ports, for the purpose set forth.

6. In a rotary steam actuated valve, the combination with a cylindrical valve chamber having an inlet through one head thereof and an exhaust outlet through the other head thereof, of a stationary lug on one side of said chamber, a rotary valve journaled along the outer edge of said lug and provided with a pressure supply passage extending from one end thereof to a flange at the other end thereof and provided with an exhaust passage extending from the end of the valve bearing said flange to a wall at the other end of said valve and communicating with the exhaust outlet, lateral ports through the walls of the cylindrical chamber communicating alternately with said supply and exhaust passages, said valve and said lug being so constructed and arranged as to leave a compartment on either side of said lug, said compartments being closed at one end by a portion of the head at the exhaust outlet of the cylinder and said valve having a flange for closing said compartments at the opposite end, and automatic means for alternately connecting said compartments with the exhaust outlet of said valve.

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

GEORGE W. MEYER.

Witnesses:

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JOHN E. NAUDOIN.