

No. 820,701.

PATENTED MAY 15, 1906.

C. J. COLEMAN.

POWER DEVICE.

APPLICATION FILED JULY 11, 1903.

Fig. 3

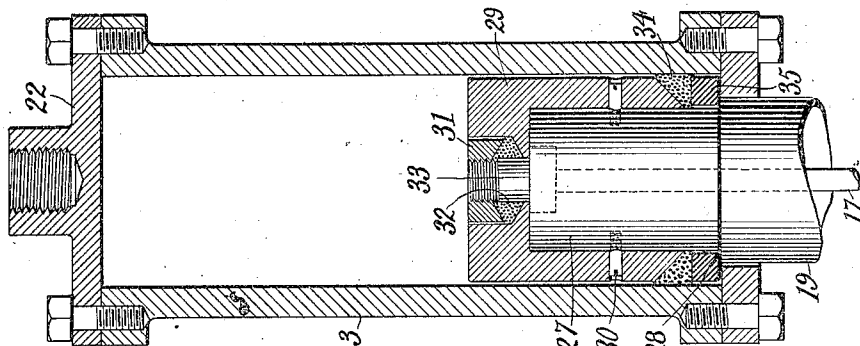


Fig. 2

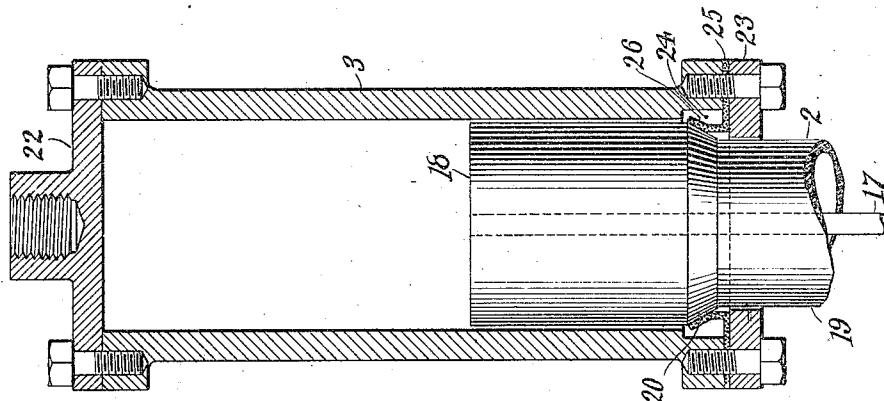
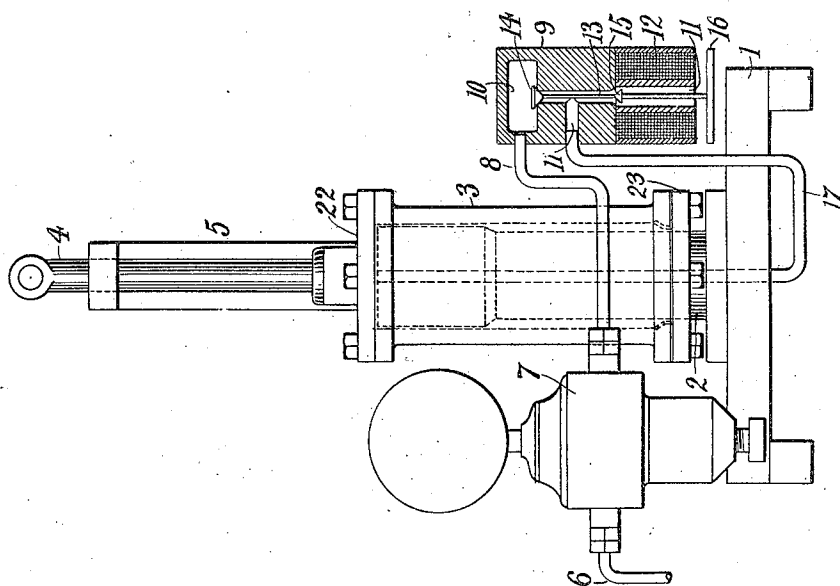


Fig. 1



Witnesses:

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UNITED STATES PATENT OFFICE.

CLYDE J. COLEMAN, OF ROCKAWAY, NEW JERSEY, ASSIGNOR TO THE
HALL SIGNAL COMPANY, A CORPORATION OF MAINE.

POWER DEVICE.

No. 823,731.

Specification of Letters Patent.

Patented May 15, 1906.

Application filed July 11, 1903. Serial No. 165,093.

To all whom it may concern:

Be it known that I, CLYDE J. COLEMAN, a citizen of the United States, residing at Rockaway, in the county of Morris and State of New Jersey, have invented certain new and useful Improvements in Power Devices, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to fluid-pressure motive-power apparatus comprising a fluid-pressure cylinder or pressure-fluid chamber, together with a piston or chamber-sealing part coöperative with such pressure-fluid chamber, and in which motive-power apparatus it is necessary or desirable both to provide free relative movement of the piston and cylinder and free drainage from the cylinder or pressure-fluid chamber and also to maintain a tight juncture between the pressure-fluid chamber and its coöperating chamber-sealing part in order to prevent wasteful leakage of pressure fluid from such chamber while the parts are held in their relative positions into which they are moved by pressure of the pressure fluid.

My invention has one particularly advantageous application in its adaptation to railway appliances, such as railway-traffic-controlling apparatus and systems, including railway signaling apparatus and railway-switch-operating apparatus and like apparatus and systems which are required to operate reliably and positively and with little personal attendance and oftentimes at long intervals, during which long intervals the apparatus may be subjected to severe weather conditions, such as intense cold, which may incur liability to freezing of condensed moisture in the pressure-fluid chamber and consequent locking or jamming of the movable portions of the apparatus, so as to prevent their operation when they are required to move.

To the attainment of the foregoing ends my invention comprises an inverted pressure-fluid chamber or cylinder which is normally open at its lower end, so as to permit free drainage of moisture which tends to accumulate in the cylinder by condensation upon its walls. Fluid-pressure motive-power devices which are operated by compressed air or other compressed gas are peculiarly liable to this trouble, since the moisture is directly

carried into the apparatus, together with the compressed fluid which operates it.

My invention also comprises a means for sealing or tightly closing the pressure-fluid chamber or cylinder after the movable parts of the apparatus have been moved to a given position by pressure of the pressure fluid, but not until such given position has been attained, so that while the movable parts of the apparatus are not in such sealing or chamber-closing positions the cylinder shall be freely open to permit the drainage which has been mentioned.

I will now describe the accompanying drawings, showing devices embodying my invention, and will thereafter point out my invention in claims.

Figure 1 is a side elevation of my device in partial section. Figs. 2 and 3 are views, partially in section, of the operating-cylinder, illustrating two methods of hermetically sealing the same.

My device is shown in a form adapted for the actuation of railway-signals. Upon a suitable standard 1 is rigidly attached a plunger 2, upon which reciprocates a movable cylinder 3. The cylinder is provided with an arm 4, which may be secured to the up-and-down rod of a railway-signal semaphore or may be connected with any device to which motion is to be imparted, and the arm 4 is guided in a slide-bearing in a brace 5.

Fluid or gas at high pressure enters at a pipe 6 from a suitable storage tank or reservoir into a reducing-valve 7 of any suitable construction and from thence at the desired reduced pressure by a pipe 8 into a chamber 10. The operative valve 9 comprises the fluid or gas inlet chamber 10 and a supply and exhaust port 11 and is provided with a helix or coil 12 and a bar 13, bearing the supply-valve 14 and an exhaust-valve 15. The bar 13 also carries a cross-piece 16 in the nature of an armature. The valve is also provided with a pipe 17, which is designed to extend through the center of the fixed plunger 2 into the cylinder-chamber and form a supply and exhaust fluid duct.

I have found in practice that notwithstanding the necessity for providing free drainage for the motive-power cylinder or chamber it is also necessary that the cylinder or chamber should be tightly sealed during the time which it is required to hold the actu-

ated parts of the apparatus in the fixed or operating positions to which they are moved by pressure of the pressure fluid. This is necessary in order to prevent wasteful leakage of the pressure fluid from the cylinder during that period of time when it is most imperatively necessary that the pressure therein should be maintained.

In the construction shown in Figs. 1 and 2 I employ a plunger 2, which consists of a piston portion 18 and a shank 19, of diminished diameter, and a beveled shoulder 20, joining the two diameters. A recess 24 is provided in the cylinder and between the cylinder and the cylinder-head 23, and suitably secured therebetween is a thin annular metallic piece 25, provided with an annular conical projection 26. This annular projection is of a diameter sufficient to permit the free passage of the shank portion 19 of the plunger, but will be spread upon the beveled shoulder 20 when the cylinder reaches the end of its stroke by the pressure of the power medium, and any motive medium which leaks into the recess 24 will assist in forcing the annular conical projection tightly against the beveled shoulder to seal the cylinder.

In Fig. 3 I have shown a modified construction wherein the shank 19 of the piston is provided with a stud 27, that permits of a shoulder 28, and upon this stud is located a sleeve 29, suitably secured to the stud by pins or screws 30, and the upper portion is provided with a ring 31, having a beveled inner surface that is adapted to abut a ring 32 of soft material, and the said ring 31 is adapted to be secured upon a projection 33, attached to or connected with the power-medium duct. The lower end of the sleeve forming the piston is beveled and abuts a soft packing-ring 34, which normally contracts by its own elasticity to an outside diameter considerably less than the inner diameter of the cylinder and which in turn abuts a metallic ring that abuts the shoulder 28 and completes the piston end of the plunger. The action of this device is similar to that of the device of Fig. 2 in that the pressure of the power medium causes the sealing of the chamber. In this instance the chamber is sealed by the diametric expansion of the soft packing due to compression between the lower or beveled end of the sleeve 29 and the metallic ring 35, which is engaged by the lower cylinder-head and acts as a stop to limit the upward movement of the cylinder, which presses upward on the metallic ring and forces it against the soft packing.

My device, as shown in the drawings, is electrically controlled. The power medium, which may be carbon dioxide, may be supplied from a suitable storage-tank containing this fluid in liquid form and will enter the reducing-valve 7 through the pipe 6. The reducing-valve 7 is adjusted to the desired operative pressure, and the fluid at the desired re-

duced pressure enters the inlet-chamber 10 through the pipe 8. When the coil 12 is excited and the armature 16 attracted, the exhaust-valve 15 closes the exhaust-port, and as the armature 16 is attached to a bar 13, which carries both the exhaust-valve 15 and the supply-valve 14, the supply-valve will be opened simultaneously with the closing of the exhaust-valve. The power medium then enters through the supply and exhaust pipe 17, through the plunger, and into the cylinder-space and forces the cylinder away from the piston. This operation continues until the cylinder has reached its limit of movement, and the pressure between the piston and cylinder then operates the sealing mechanism to maintain the power medium between the elements, and the effective sealing permits this limit position to be maintained without loss or waste of power medium. When the coil is deenergized, the armature 16 falls and the inlet is closed and the exhaust opened and the power medium is allowed to exhaust through the pipe 17 and exhaust-port 11 until the device resumes its normal position. When the device has resumed its normal position, there is a free drainage-path from the pressure-fluid chamber or cylinder through its lower end, which is only partially closed by the shank 19 of the piston.

It is obvious that various modifications may be made in the constructions shown and above particularly described within the spirit and scope of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. Fluid-pressure motive-power apparatus comprising a pressure-fluid chamber and a chamber-sealing part contained therewithin, the chamber and chamber-sealing part being movable relatively to each other by pressure of pressure fluid in the chamber, and the chamber-sealing part fitting the chamber loosely and with clearance between the chamber-sealing part and the chamber to permit free movement of the parts and drainage of moisture from such chamber.

2. Fluid-pressure motive-power apparatus comprising a pressure-fluid chamber and a chamber-sealing part, the chamber and chamber-sealing part being movable relatively to each other by pressure of pressure fluid in the chamber and the chamber-sealing part not engaging the walls of the chamber but having a drainage clearance, and a sealing-surface secured relatively to the chamber in position to be engaged by the chamber-sealing part at the limit of its stroke so as to close the path of fluid efflux through the drainage clearance.

3. Fluid-pressure motive-power apparatus comprising a pressure-fluid chamber and a chamber-sealing part contained therewithin, the chamber being movable by pressure of pressure fluid within it, and the chamber-

sealing part fitting the chamber loosely and with clearance between the chamber-sealing part and the chamber to permit free movement of the parts and drainage of moisture from such chamber.

4. Fluid-pressure motive-power apparatus comprising a pressure-fluid chamber and a chamber-sealing part, the chamber being movable by pressure of pressure fluid within it, and the septum not engaging the walls of the chamber but having a drainage clearance, and a sealing-surface secured relatively to the chamber in position to engage the chamber-sealing part at the limit of the stroke of the chamber so as to close the path of fluid efflux through the drainage clearance.

5. Fluid-pressure motive-power apparatus comprising a vertical pressure-fluid cylinder normally open for drainage at its lower end, a piston contained within the pressure-fluid cylinder but not engaging the sides of the cylinder but having a drainage clearance to permit drainage of moisture from the cylinder through its lower end, the cylinder and piston being movable relatively to each other by pressure of pressure fluid in the cylinder.

6. Fluid-pressure motive-power apparatus comprising a vertical pressure-fluid cylinder normally open for drainage at its lower end, a piston contained within the cylinder with a drainage clearance between piston and cylinder to permit drainage of moisture from the cylinder through such drainage clearance and through the lower and normally open end of the cylinder, such cylinder and piston being movable relatively to each other by pressure of pressure fluid in the cylinder, and a cylinder-sealing surface fixed relative to the cylinder in position to engage the piston at the end of the relative movement of the parts in order to close the path of fluid efflux through the drainage clearance and lower end of the cylinder.

7. A power device comprising a piston and cylinder movable relatively to each other and

means for introducing a power medium into the cylinder, the piston having a shoulder, and a flexible sealing-ring carried by the cylinder and located so as to be pressed against the shoulder of the piston by the power medium at the end of the expansive stroke.

8. Fluid-pressure motive-power apparatus comprising a vertical pressure-fluid cylinder normally open for drainage at its lower end, a piston contained within the pressure-fluid cylinder but not engaging the sides of the cylinder but having a drainage clearance to permit drainage of moisture from the cylinder through its lower end, the cylinder being movable by pressure of pressure fluid within it.

9. Fluid-pressure motive-power apparatus comprising a vertical pressure-fluid cylinder normally open for drainage at its lower end, a piston contained within the cylinder with a drainage clearance between piston and cylinder to permit drainage of moisture from the cylinder through such drainage clearance and through the lower and normally open end of the cylinder, such cylinder being movable by pressure of pressure fluid within it, and a cylinder-sealing surface fixed relative to the cylinder in position to engage the piston at the end of the relative movement of the parts in order to close the path of fluid efflux through the drainage clearance and lower end of the cylinder.

10. A power device comprising a piston and cylinder movable relatively to each other, means for introducing a power medium into the cylinder, the piston having a conical shoulder thereon, and a flexible sealing-ring carried by the cylinder and arranged to coact with the shoulder of the piston.

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

CLYDE J. COLEMAN.

Witnesses:

HENRY D. WILLIAMS,
JOHN F. STICKLE.