No. 812,017. PATENTED FEB. 6, 1906.

A. CARMICHAEL, DEC'D.

A. B. CARMICHAEL, ADMINISTRATOR.

PRESSURE REGULATOR.

APPLICATION FILED JAN. 16, 1905.

Fig. 2.

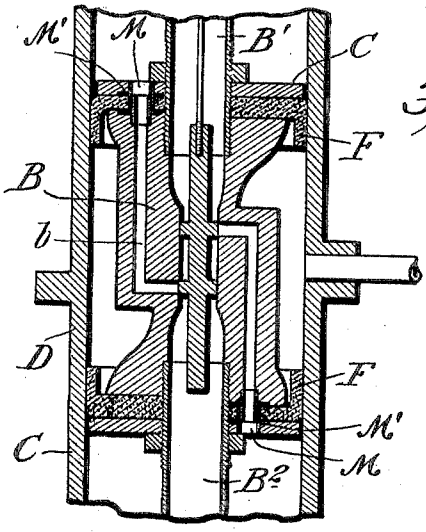



Fig. 1.

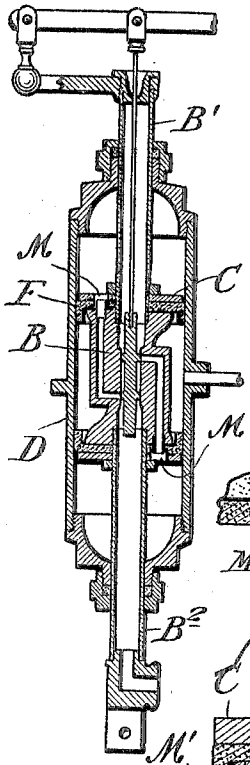



Fig. 3.

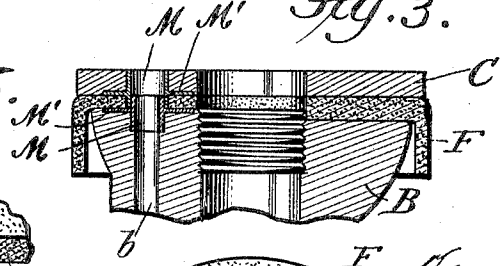



Fig. 5.

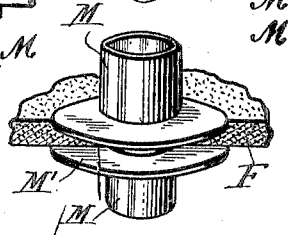



Fig. 4.

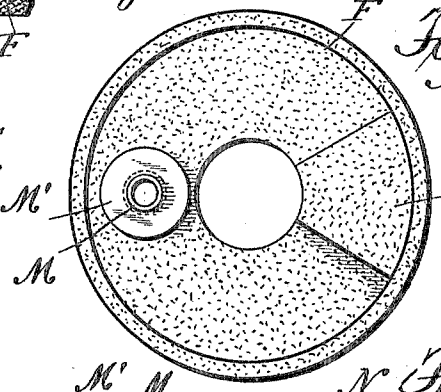



Fig. 7.

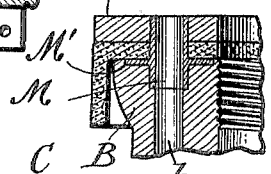



Fig. 8.

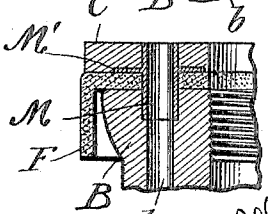
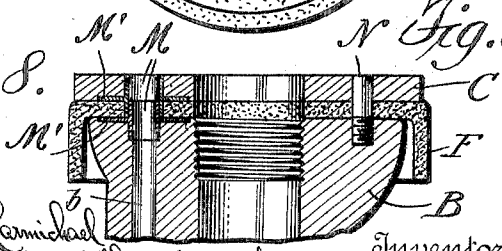



Fig. 6.




Witnesses
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By his Attorney
Thomas Drew Stetson

Inventor

# UNITED STATES PATENT OFFICE.

ALBERT B. CARMICHAEL, OF WESTERLY, RHODE ISLAND, ADMINISTRATOR OF ALEXANDER CARMICHAEL, DECEASED.

## PRESSURE-REGULATOR.

No. 812,017. Specification of Letters Patent. Patented Feb. 6, 1906.

Application filed January 16, 1905. Serial No. 241,400.

*To all whom it may concern:*

Be it known that ALEXANDER CARMICHAEL, deceased, late a citizen of the United States, and a resident of Westerly, in the county of Washington and State of Rhode Island, did invent a certain new and useful Improvement in Pressure-Regulators, of which the following is a specification.

The improvement relates to a piston of peculiar construction. It may apply to the pistons of all sizes and styles of regulators of the general construction set forth in the patent to said ALEXANDER CARMICHAEL, dated January 6, 1903, No. 717,810. All details not herein set forth will be understood to be in accordance with the corresponding details in that patent.

As in the former patent, a soft packing-sheet in the form sometimes known as "cup-leather" is used and held by compressing it axially. The hole to allow the small flow of water required is continued through the soft material, and the hole is kept open by applying a small tube of metal to guard the hole by which it passes the soft material. All this was in the previous patent. Now a flange of metal extending from the tube, providing a countersink in the hard material to accommodate it, is added. In the most complete form of the invention there are two such flanges, and the hard material is recessed to receive both. To attain this condition with facility for applying and removing, each tube is made in two short lengths, telescoped one within the other. The flanges guard very efficiently against the tube becoming tilted or inclined. Another safeguard against the displacement of these parts is attained by making the soft material with one or more sectors thicker than the other portion and correspondingly recessing the metal adjacent.

The following is what is considered the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a general longitudinal section through the piston and the adjacent parts. Fig. 2 is a corresponding section of the parts involving the novelty on a larger scale. Fig. 3 is a section corresponding to Fig. 2 on a still larger scale. Fig. 4 is a plan view corresponding to Fig. 3 seen from below, and Fig. 5 is a perspective view of one of the metallic thimbles with a section of the immediately-adjacent portions of the soft layer. Fig. 6 is a section showing an additional pin. Figs. 7 and 8 are sections corresponding to Fig. 3, but showing modifications.

Similar letters of reference indicate corresponding parts in all the figures where they appear.

B is the piston; B′ $B^2$, the ordinary hollow cylindrical extensions. It will be understood that the piston works within the corresponding hollow cylinder D in the same manner as in the previous patent referred to.

C C are plates of iron or other suitable rigid material, one of which is secured upon each end of the piston B, respectively, by a nut.

F is soft sheet of vulcanized rubber serving as a packing. This packing is compressed between each plate C and the adjacent end of the piston B. It is mainly a disk extending outward, but having its edge flanged in the manner of a cup-leather.

The improvement is applied at each end of the piston; but description of one end will serve for both.

Around the hole which forms a portion of a passage *b*, through which the water flows when required, a short tube of hard metal M, extending through the soft packing and a little way into the adjacent hard parts, is provided, these latter parts being counterbored to receive them. The short tube M is in two lengths, differing just enough in diameter to allow one to extend within the other. Each has a flange near its mid-length. This avoids the difficulty heretofore experienced in short tubes becoming sometimes tilted over on one side, with the effect to nearly stop the passage.

The means described will serve well alone; but the invention provides further security against any turning motion of the soft packing around the axis of the piston. The adjacent face of the piston is sunk or recessed in a segmental form, and the rubber of the soft disk is cast with a corresponding segment thickened. In applying the parts together the thick portion of the packing-disk locks in the recess in the piston and forbids its turning.

The invention does not increase materially the labor or cost of the manufacture or add any difficulties in assembling and separating the parts. It gives a certainty never before attainable that the device will remain in

condition for successful working for a long period.

In what is esteemed the most complete form of the invention each of the tubes M is made in two parts, one part telescoped within the other part. These may be made with a web on each part. Figs. 1, 2, 3, 4, 5, and 6 show such compound construction, one part of the tube with its web applying from the inside and the other part applying from the outside of the soft disk, and both the body of the piston and the adjacent hard plate C being recessed to allow the web to be received without disturbing the nice fit of the several parts together.

Modifications may be made without departing from the principle or sacrificing the advantages of the invention. The flanges on the edges of the soft packing-disk F can be widened or they can be narrowed until they have disappeared altogether. The thickness of the plates C can be varied. Care is taken to make the sector of increased thickness F′ in the soft disk (one sixth or other fraction of the disk) always of such dimensions as to fill or very nearly fill the corresponding recess provided in the hard part adjacent.

Fig. 6 shows the same as Fig. 3, with the addition of a pin N, corresponding to the pin similarly marked in the previous patent referred to. There is no objection to this pin, a corresponding hole always being made in the packing layer and also in the plate C and how such can be used, if desired is herein shown.

Parts of the invention can be used without others. Instead of making the tube M with its web M′ in two parts applied to the soft packing from both the outside and inside and telescoping together the invention can be made to serve usefully in a simpler form by having the whole of each short tube in one piece with only one web M′. Fig. 7 shows such with the tube applied from the inside. Fig. 8 shows such with the tube applied from the outside. For such use only one of the adjacent parts B or C need be recessed. The form shown in Figs. 1 to 6 is preferred.

The figures show only one of the thickened sections on each of the soft packings. There may be two or still more, if desired, always taking care to have same number and the same form and arrangement of the recesses.

What I claim is—

1. In a piston having a passage, a soft disk having a corresponding passage and a follower counterbored as described, and a tube having a web near its mid-length combined and arranged to serve substantially as herein specified.

2. The tube M in separable parts of different diameter and one having a web M′ in combination with a soft disk, having an aperture adapted to receive it, and with a piston and a follower having each a passage and one counterbored, all substantially as herein specified.

3. A soft disk having a thick segment and an aperture in combination with a short tube having a web near its mid-length and with a correspondingly-apertured piston and follower, one of which is recessed to match, all substantially as herein specified.

Signed by the administrator of the estate of the said ALEXANDER CARMICHAEL at Westerly aforesaid, in the county of Washington and State of Rhode Island, this 31st day of December, A. D. 1904.

ALBERT B. CARMICHAEL,
*Administrator.*

Witnesses:
LOUIS FARERIO,
BERNARD LYNCH.