

No. 686,019.

Patented Nov. 5, 1901.

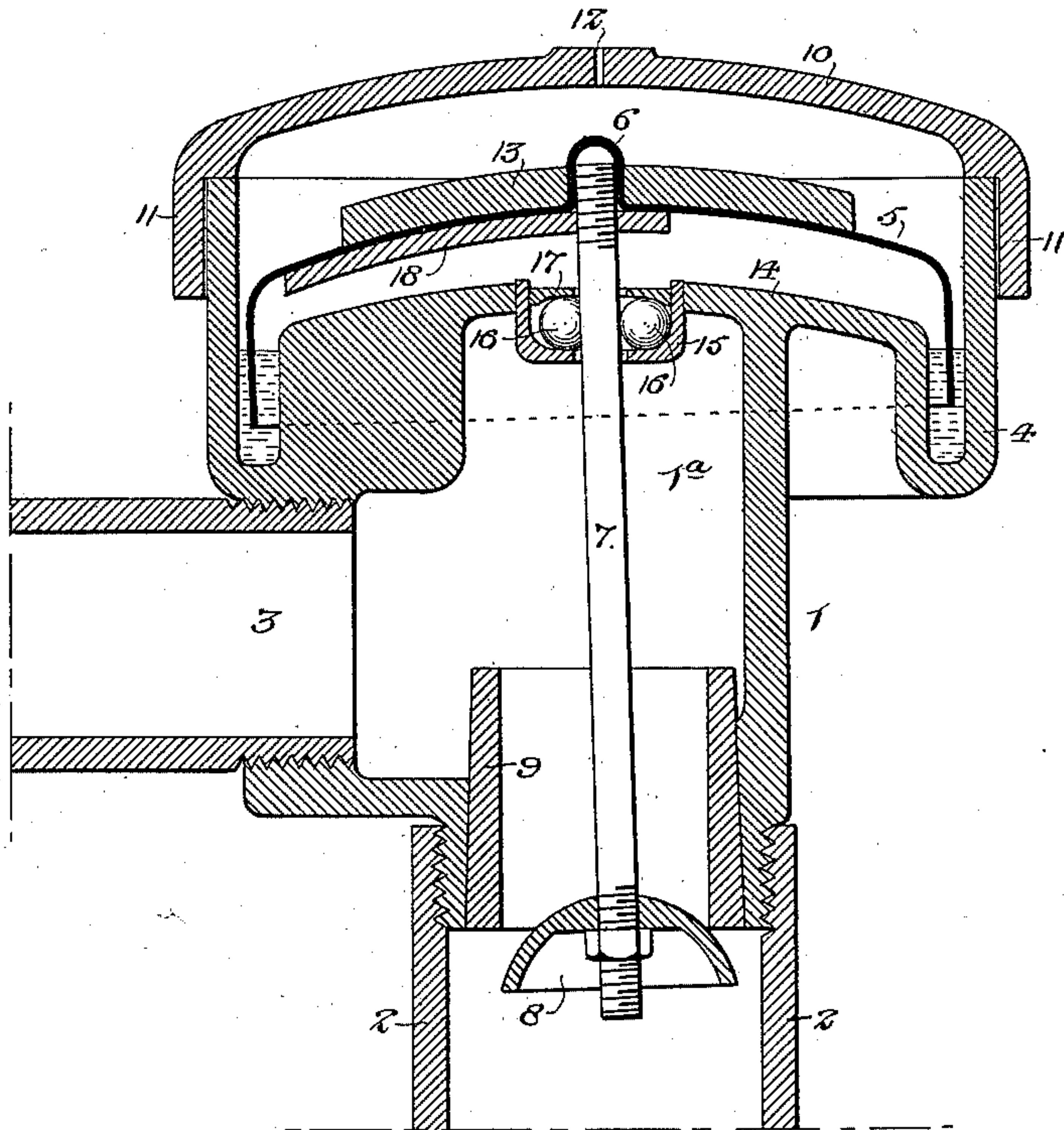
J. S. L. ALEXANDER & A. G. SCHOONMAKER.

PRESSURE REGULATOR.

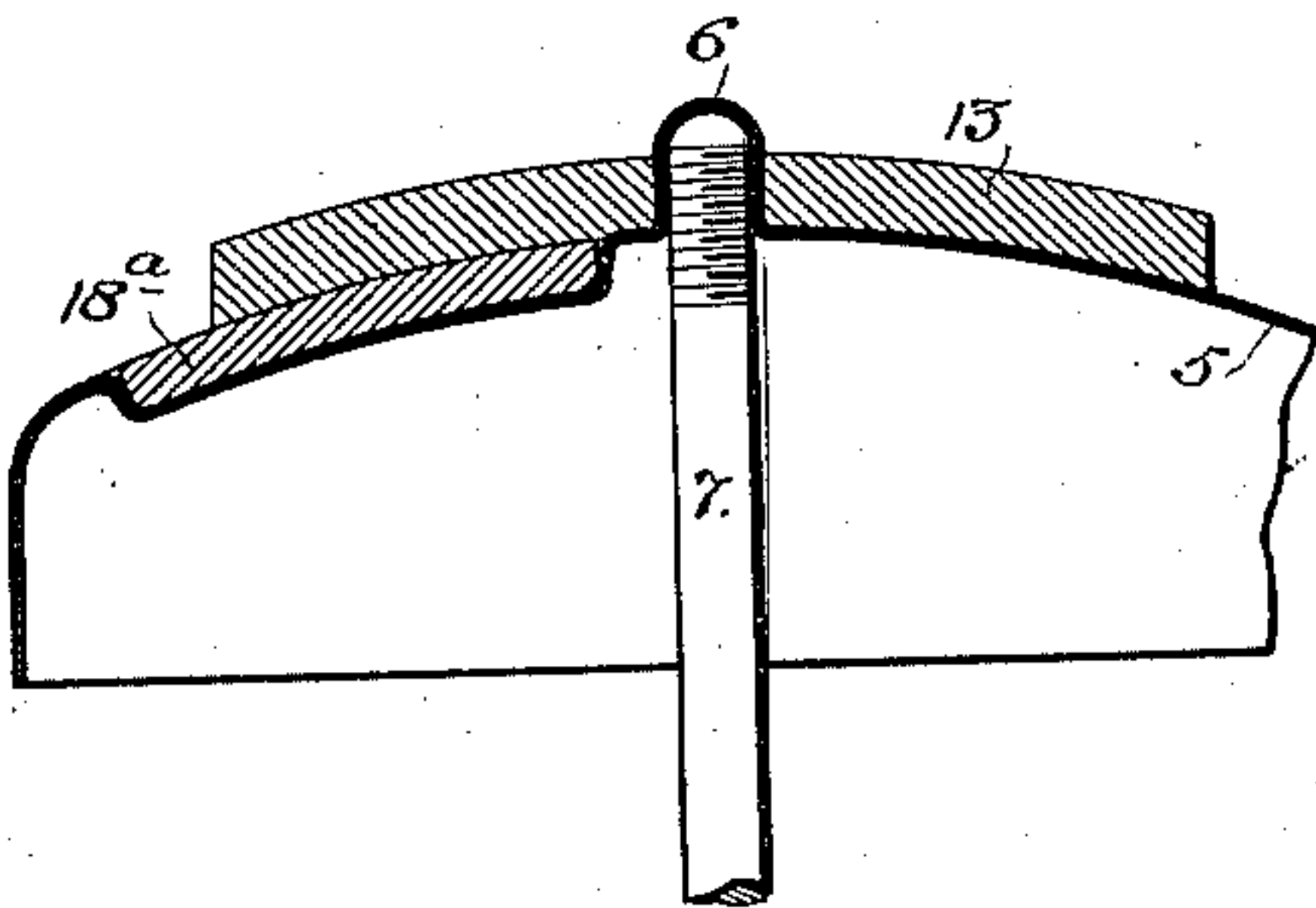
(Application filed Oct. 30, 1899.)

(No Model.)

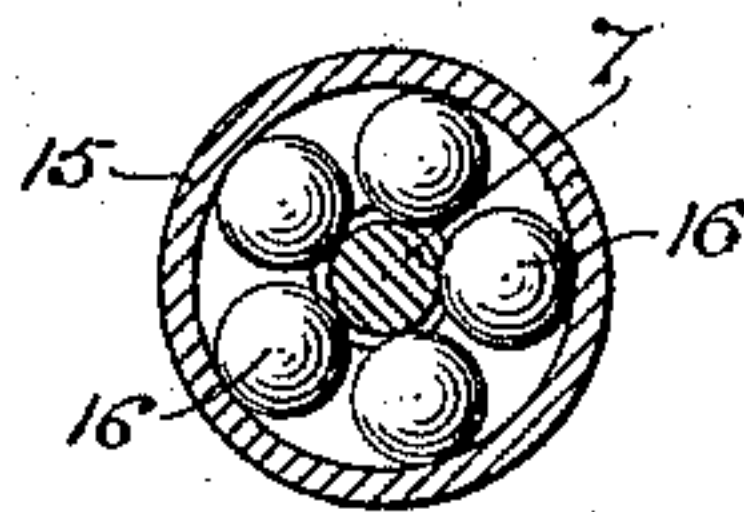
*Fig. 1.*



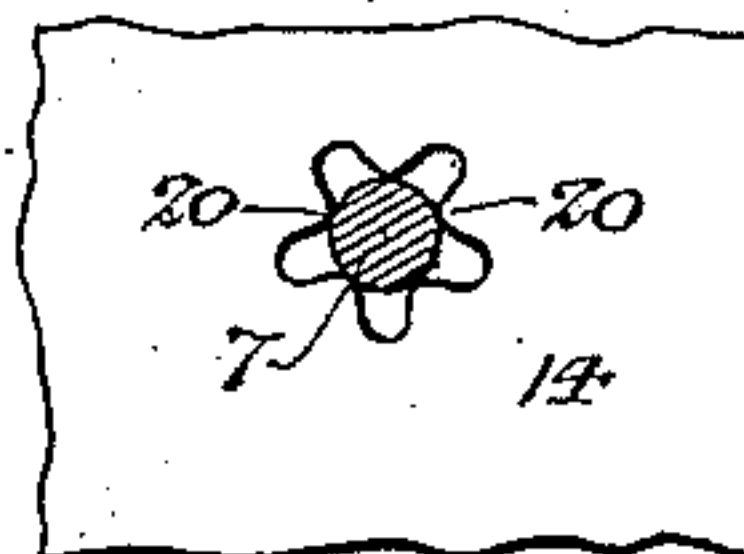
*Fig. 3.*



*Fig. 2.*



*Fig. 4.*



*Witnesses:-*

*Louis H. F. Whitehead.*

*Chas. De Bow.*

*Inventors:*

*Alfred A. Schoonmaker.*

*John S. L. Alexander.*

*by their Attorneys:-*

*Howson & Howson*



# UNITED STATES PATENT OFFICE.

JOHN S. L. ALEXANDER AND ALFRED G. SCHOONMAKER, OF PHILADELPHIA, PENNSYLVANIA.

## PRESSURE-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 686,019, dated November 5, 1901.

Application filed October 30, 1899. Serial No. 735,235. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN S. L. ALEXANDER and ALFRED G. SCHOONMAKER, citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Pressure Reducing and Regulating Devices, of which the following is a specification.

The object of our invention is to provide a cheap and simple form of pressure reducing and regulating device constructed with especial reference to securing sensitiveness and ease of action, preventing leakage, and obviating pulsations in the flow of the fluid at reduced pressure, which might otherwise be caused by vibration of the device or of the building in which it is contained. This object we attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 represents a longitudinal sectional view of a pressure reducing and regulating device constructed in accordance with our invention. Fig. 2 is a sectional plan view of the valve-stem bearing, and Figs. 3 and 4 are views illustrating modifications of the invention.

The valve-chest 1 has formed in it a right-angled chamber 1<sup>a</sup>, one branch of the casing 30 being threaded for the reception of the threaded end of the inlet or high-pressure pipe 2, while the other branch is threaded for the reception of the threaded end of the outlet or low-pressure pipe 3, the top portion of the chest being enlarged in diameter, so as to form a hollow depending annular flange 4, in which is deposited a supply of mercury or other available sealing liquid. Into this liquid dips the lower edge of an inverted bell 40 5, which has a hollow boss 6 struck up from the center of the same, this boss being internally threaded for the reception of the upper threaded end of the valve-stem 7. This valve-stem carries at its lower end a valve 8, 45 consisting of the segment of a sphere, said valve being adapted to work in conjunction with a tubular valve-seat 9, tapered externally and driven into a correspondingly-tapered opening in the lower branch of the valve-chest 1—that is to say, the branch 50 which receives the threaded end of the inlet

or high-pressure pipe 2. The enlarged upper end of the valve-chest is closed by a cap or cover 10, which is seated upon the upper edge of said enlarged upper portion of the chest 55 and has a flange 11 depending below said seat, a central opening 12 in said cap or cover 10 serving to provide for the inflow or outflow of air as the inverted bell 5 rises or falls. Resting upon the top of the inverted bell 5 is 60 an annular weight 13, of lead or other metal, this weight having a central opening for the reception of the hollow raised boss 6 at the center of the bell. The partition 14 between the bell-chamber at the top of the chest and 65 the low-pressure chamber 1<sup>a</sup> has a central cup 15, containing a series of balls 16, which are retained in position vertically by a cap 17 and constitute a ball-bearing for the valve-stem 7, the opening in the cup 15 and cap 17 70 being somewhat greater in diameter than the valve-stem, so that the latter bears solely against the balls. The device being thus constructed, the pressure of fluid in the low-pressure chamber 1<sup>a</sup> of the valve-chest and in the 75 outlet-pipe 3 will lift the weighted bell 5 sufficiently to maintain such relation of the valve 8 and valve-seat 9 as will only permit a flow of fluid between the two sufficient to maintain the desired predetermined pressure in the low- 80 pressure chamber and outlet-pipe. If the pressure falls below the predetermined limit, the weighted bell 5 will sink, and thereby open the valve 8 to such an extent as to provide for a freer flow between the same and the 85 valve-seat 9 until the predetermined pressure in the chamber 1<sup>a</sup> is restored, whereupon the bell 5 will be again lifted, so as to restore the valve 8 to its normal position. If there is an excess of pressure in the chamber 1<sup>a</sup>, the 90 weighted bell 5 will be lifted, so as to further close the valve 8, and thereby restrict the flow of fluid between the same and the seat 9 until such excessive pressure is reduced, whereupon the bell 5 will again fall to restore 95 the valve to its normal position.

Variation in the pressure desired to be maintained in the chamber 1<sup>a</sup> and outlet-pipe 3 may be effected by changing the weight 13 on the bell 5, the cap or cover 10 being readily removable for this purpose. 100

It will be observed that the structure which



we have described is extremely simple in construction and not liable to get out of order and, moreover, that the bell 5 is seamless, so there can be no escape of gas or other fluid from beneath the same, as there is likely to be when the bell has one or more joints.

In order to prevent variations of pressure, or rather pulsations, in the fluid in the chamber 1<sup>a</sup> and outlet-pipe due to vibration of the valve-chest or of the building containing it, we apply to the under side of the bell 5 a block 18, the preponderance of weight being on one side of the center, so that it will slightly tip or tilt the bell, valve-stem, and valve and bring the latter into contact with the valve-seat at one side, so as to prevent shaking or trembling of the same. The block 18 is screwed upon the threaded stem of the valve and bears upon the under side of the bell 5, thus serving as a lock to prevent accidental unscrewing of the said bell.

When it is not desired to use the block 18 as a nut-lock, it may be let into a recess in the top of the bell 5, as shown at 18<sup>a</sup>, Fig. 3, for instance.

The balls 16 not only serve to lessen the friction upon the valve-stem 7, but they also serve to hold said stem in its proper central position at the point where it is guided, and at the same time they permit a free upward flow of fluid to the space beneath the bell 5, so that the device is rendered very sensitive in its action.

The maintenance of the valve-stem 7 in a central position is necessary in order to prevent lateral movement of the bell 5, such as would cause said bell to come into contact with the casing when a narrow mercury-well is employed, and thus cause friction, which would detract from the sensitiveness of the regulator.

While the use of the balls is always preferred, a rigid bearing which will provide separated points of contact for the valve-stem, with intervening spaces for the flow of fluid, may in some cases be used. For instance, in Fig. 4 we have shown a modification in which the partition 14 has a star-shaped opening therein, a number of rounded and separated points of bearing 20 being presented to the valve-stem.

Having thus described our invention, we

claim and desire to secure by Letters Patent—

1. The combination of the valve-chest having a sealing-pit, the bell, the valve-seat, the valve having a stem connected to said bell, and a bearing for said stem located adjacent to the bell so constructed as to permit the lower or valve-carrying end of the stem to swing laterally and bring the valve into contact with the valve-seat on one side, substantially as specified.

2. The combination of the valve-chest having a sealing-pit, the bell, the valve having a stem connected to said bell, a bearing for said stem located adjacent to the bell so as to permit the lower or valve-carrying end of the stem to swing laterally, and a weight applied to the bell so as to exert preponderance on one side of the center, thereby tilting the bell and throwing the valve against its seat at one side, substantially as specified.

3. The combination of the valve-chest having a sealing-pit, the valve and its stem, the bell screwed onto said stem, and a weight likewise screwed onto the stem and bearing upon the bell so as to act as a lock-nut therefor, said weight having a preponderance on one side of the center of the bell, substantially as specified.

4. The combination of the valve-chest having a sealing-pit, and a low-pressure chamber separated therefrom by a partition, the bell, the valve-seat, the valve having a stem connected to said bell, and a bearing for said valve-stem located adjacent to the bell and composed of balls bearing against the valve-stem so constructed as to permit the lateral swinging of the lower or valve-carrying end of the stem to carry the valve into contact with the valve-seat on one side and at the same time provide for the upward flow of fluid through the bearing, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN S. L. ALEXANDER.  
ALFRED G. SCHOONMAKER.

Witnesses:  
F. E. BECHTOLD,  
JOS. H. KLEIN.