H. E. ATKINSON.

VALVE.

APPLICATION FILED MAR. 9, 1912.

1,029,097. Patented June 11, 1912.

Fig. 1.

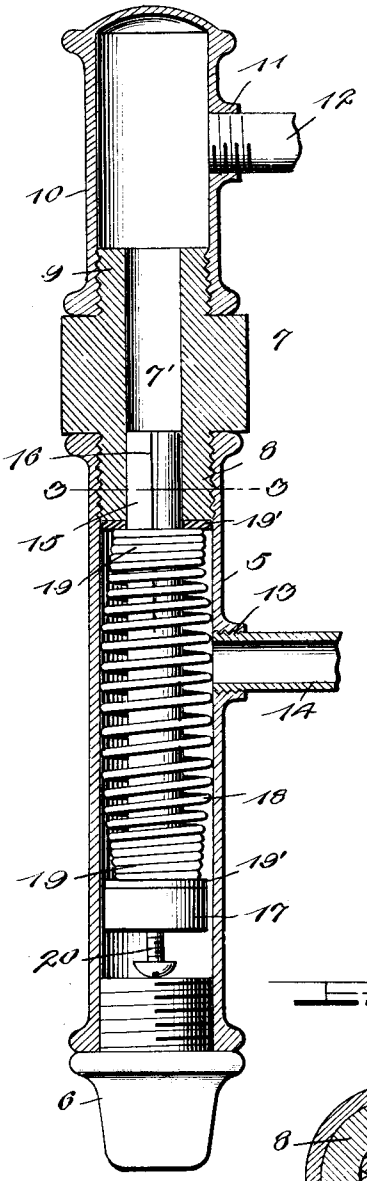


Fig. 2.

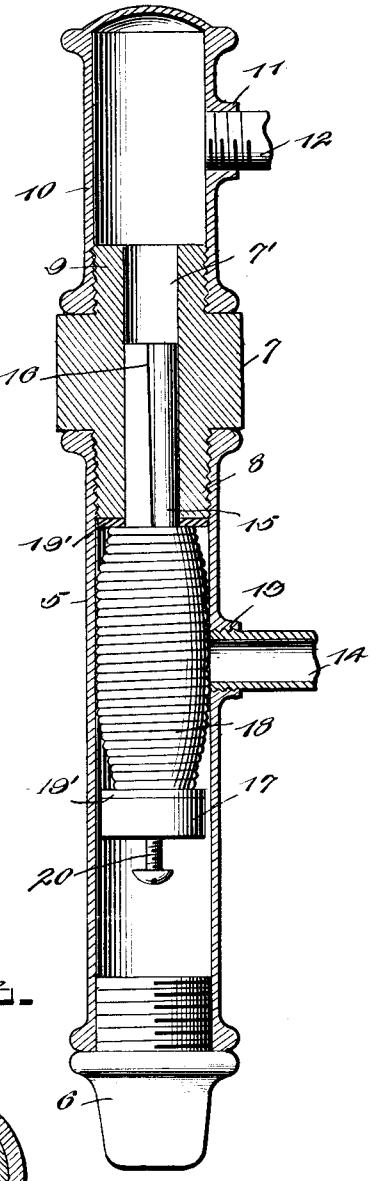
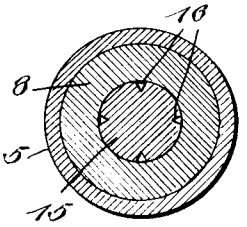


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

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VALVE.

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To all whom it may concern:

Be it known that I, HARRY E. ATKINSON, a citizen of the United States, residing at Traverse City, in the county of Grand Traverse and State of Michigan, have invented certain new and useful Improvements in Valves, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in pressure regulating valves for governing the use of water, steam, gas, etc., and has for its object to provide a device of this character consisting of comparatively few simply constructed parts whereby a uniform flow of the fluid from the outlet of the valve is automatically maintained irrespective of the varying pressures at the inlet thereof.

Another and more specific object of the invention is to provide a longitudinally movable piston arranged within the valve casing, one end of said piston being provided with tapering grooves through which the fluid passes to the outlet and a spring arranged upon said piston and adapted to be compressed in the movement of the piston upon the increase of pressure to gradually diminish the flow of the pressure fluid into the grooves in the end of the piston.

A further object of the invention is to provide a pressure regulating valve which is entirely automatic and very positive in its action, the parts of which may be easily and quickly assembled or disassembled for purposes of repair and which can be manufactured at comparatively small cost.

With the above and other objects in view, the invention consists of the novel features of construction, combination and arrangement of parts hereinafter fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of a pressure regulating valve embodying the present invention; Fig. 2 is a similar view showing the position of the movable piston when the spring surrounding the same has been compressed by the increase of fluid pressure beneath the piston; and Fig. 3 is a section taken on the line 3—3 of Fig. 1.

Referring in detail to the drawing 5 designates a casing which is preferably cylindrical in form and is internally screw threaded at each end. In one end of this casing a closure plug 6 is threaded and in the other end thereof a threaded nipple or extension 8 upon the end of a connecting sleeve 7 is engaged. This sleeve is also provided with a second reduced extension or nipple 9 upon which one end of the fluid receiving pipe 10 is removably threaded. This pipe is provided with an outlet port 11 to which one end of the conducting pipe 12 is connected. The casing 5 is also provided intermediate of its ends with an inlet port 13 to which the fluid supply pipe 14 is connected.

Within the cylindrical casing 5 a longitudinally movable piston 15 is arranged, one end of said piston being disposed for movement in the bore 7′ of the sleeve 7. This end of the piston is provided with a plurality of longitudinally extending grooves or channels 16, the alternate channels being of the same length. These peripheral channels in the piston 15 gradually become shallower from the end of said piston upon which they open, inwardly to the intermediate portion thereof. It will be obvious that any desired number of such outlet channels for the fluid may be provided in the piston. This piston fits closely within the bore of the sleeve 7, so that a substantially water-tight connection between the sleeve and piston is maintained. The other end of the piston 15 is provided with a head 17 which is of slightly less diameter than the internal diameter of the casing 5. A coiled spring 18 is arranged upon the piston and the end coils or turns thereof are permanently secured together as indicated at 19 so that they form what are practically continuous metallic sleeves at opposite ends of the spring. The intermediate coils of the spring 18 are of slightly greater diameter than the connected end coils thereof, being practically the same as the internal diameter of the casing 5. These larger intermediate coils of the spring extend upon opposite sides of the inlet port 13 and are adapted to form a substantially water-tight casing between said inlet port and the grooves or channels in the piston 15 upon an abnormal increase of pressure so as to entirely close communication between the piston casing and the outlet pipe 10. Leather washers 19′ are preferably arranged between the opposite ends of the spring and the sleeve 7 and head 17 of the piston respectively. In the headed end of the piston 15 a screw 20 is adjustably threaded and bears upon the closure plug 6 in the end of the casing 5. By adjusting this screw 20

in the end of the piston 15, the grooved end of the piston may be so disposed in the bore of the sleeve 7 as to regulate the passage of the fluid through said grooves whereby a greater or less volume may be obtained at the outlet.

From the foregoing the operation of the device will be understood as follows. Upon the admission of steam, water or other pressure fluid to the casing 5, the same passes between the spaced intermediate coils of the spring 18 and flows downwardly around the head 17 of the piston and beneath the same. When sufficient pressure has accumulated beneath the piston to overcome the action of the spring 18, said piston is moved longitudinally in the casing 5 and into the bore of the sleeve 7. As this pressure increases, the flow of the fluid through the grooves 16 in the end of the piston proportionately increases in speed so that it will be obvious that by reducing the area of the passages for the fluid as the pressure increases, a constant volume of fluid at the outlet may be obtained irrespective of the varying pressure. When there is but little pressure in the casing 5, the spring 18 acts upon the piston 14 to position the grooved end thereof with the wider ends of the grooves 16 disposed in the end of the bore of the sleeve 7 so that the volume of the fluid passing therethrough is the same as in the case of a high pressure, although the speed of its passage through the groove is diminished. In this manner a constant uniform flow of the fluid at the outlet is automatically maintained. The device is particularly devised for use in connection with what is known as a bubble drinking fountain. In such use, the pipe 14 is connected to the water main and as the pressure is constantly varying, it will be obvious that at times there would be a waste of water at the fountain and at other times the supply would practically be entirely cut off, unless some means were provided to regulate the flow. My improved valve will efficiently accomplish this end and the same may be positioned close to the outlet of the fountain or at a distant point therefrom as desired. Owing to the few elements employed in the construction of the valve, it will be seen that the same is extremely positive in its operation. When there is an abnormal pressure of water in the main, the spring 18 is forced to the limit of its compression in the movement of the piston 15 to engage the intermediate coils thereof with each other and form a practically watertight casing between the main casing 5 and the periphery of the piston. The expansion of this spring overcomes the pressure of water beneath the piston and allows the same to slowly flow between the coils of the spring and into the tapered inner ends of the longer grooves in the end of the piston 15. It will be readily seen that owing to the increased diameter of the intermediate coils of the spring when the same are engaged with each other, they effectually prevent any further flow of the pressure fluid beneath the piston head 17.

While I have shown and described the preferred construction and arrangement of the various elements, it will be understood that the invention is susceptible of considerable modification without departing from the essential feature or sacrificing any of the advantages thereof.

Having thus described the invention what is claimed is:—

1. In a pressure regulating valve, a casing having an inlet, a piston movable in the casing, a sleeve arranged in one end of said casing in which one end of the piston is movably disposed, said piston having longitudinal grooves in its periphery gradually diminishing in area from the end of the piston inwardly, a coiled spring arranged upon said piston yieldingly holding the same against movement under the action of the pressure fluid, said spring having intermediate coils of substantially the same diameter as the interior diameter of the casing adapted to gradually decrease the flow of pressure fluid into said casing upon compression of the spring.

2. In a pressure regulating valve, a casing, a piston longitudinally movable in said casing provided with means to maintain a uniform volume of flow at the outlet irrespective of the variation of pressure within the casing, and a compressible spring arranged upon said piston the coils of which are adapted to be closely engaged upon an abnormal increase of pressure to gradually decrease the flow of pressure fluid into said casing.

3. In a pressure regulating valve, a casing having a fluid inlet, a sleeve in one end of said casing, a piston having a head on one end, the other end of said piston being provided with longitudinally extending tapering grooves and disposed for movement in said sleeve, a spring arranged upon said piston and extending upon opposite sides of the inlet port, the end coils of the spring being closely engaged and the intermediate coils thereof spaced apart to permit the flow of the fluid through the same and beneath the piston head and also into the outlet grooves in the end of the piston between the same and the sleeve.

4. In a pressure regulating valve, a casing having an inlet port, a sleeve threaded in one end of said casing, a piston provided with a head on one end and having longitudinally extending tapering grooves in its other end, said latter end of the piston being movable in the sleeve, a coiled spring arranged upon the piston and having the

end coils thereof secured together and spaced from the casing walls, the intermediate coils of the spring being of substantially the same diameter as the interior diameter of the casing and extending upon opposite sides of the inlet port, said spaced coils admitting of the flow of the pressure fluid between the same and beneath the head of the piston and into the outlet grooves in the opposite end of the piston, increase of pressure in said casing moving the piston into said sleeve, an abnormal increase of pressure in the casing engaging the intermediate coils of the spring with each other to gradually reduce the flow of the pressure fluid through said coils and beneath the piston.

5. In a pressure regulating valve, a casing having an inlet port intermediate of its ends, a closure plug threaded in one end of the casing, a sleeve threaded in the other end of said casing, a piston arranged in said casing having a head on one end and provided with a plurality of longitudinal peripheral grooves in its other end, said grooves tapering from the end of the piston inwardly, an adjusting screw threaded in the other end of the piston and bearing upon said closure plug, a coiled spring arranged upon the piston, the end coils of said spring being connected and bearing against the sleeve and piston head respectively, said piston head being of less diameter than the internal diameter of the casing, the intermediate coils of the spring being spaced apart and engaging the casing walls, the pressure fluid being adapted to flow between said spaced coils of the spring and beneath the piston head to act upon the piston and move the grooved end thereof into the sleeve, the compression of the spaced intermediate coils of the spring upon an increase of fluid pressure in the casing gradually diminishing the flow of the pressure fluid through the coils of the spring and beneath the piston head.

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

HARRY E. ATKINSON.

Witnesses:
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