

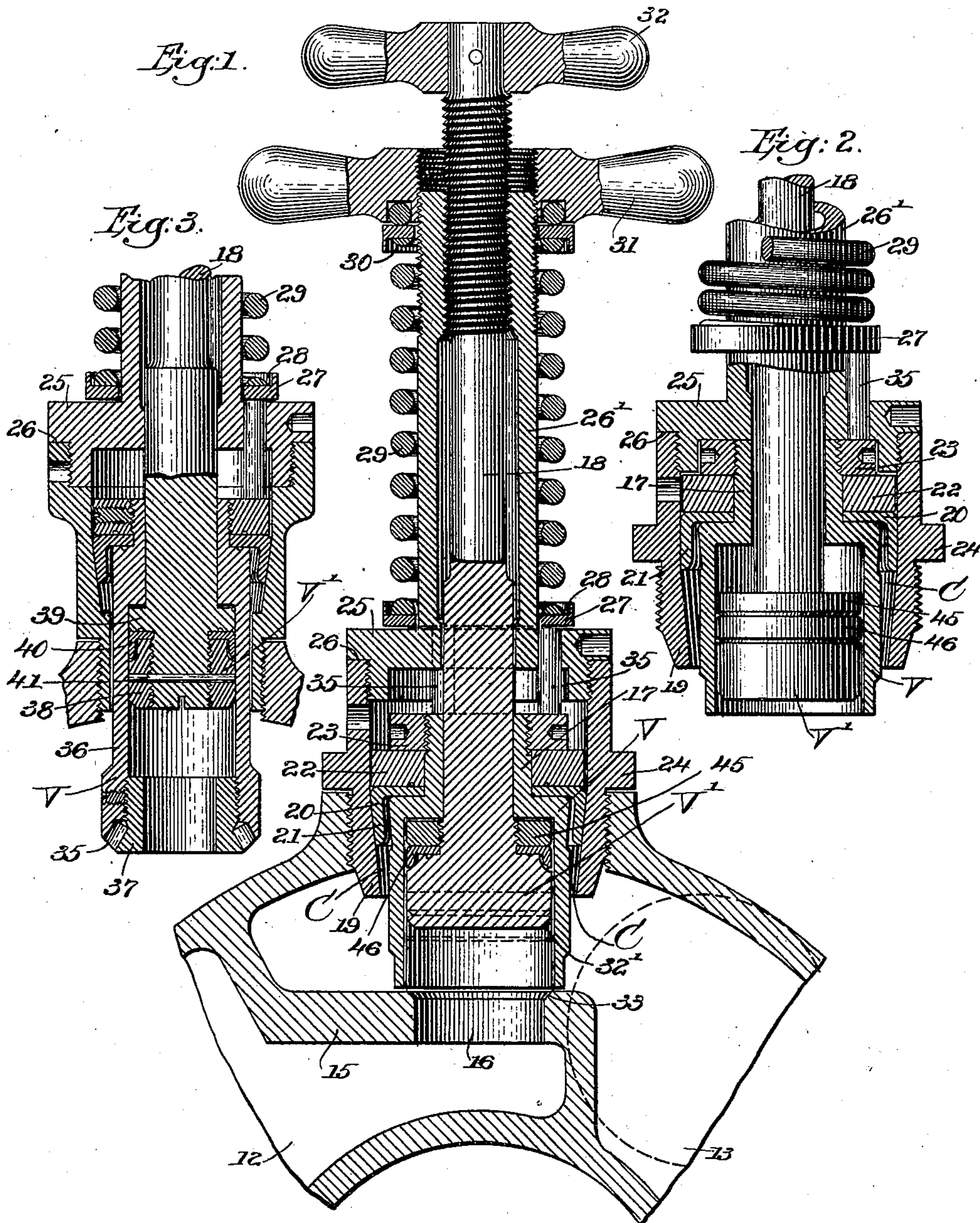
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F. S. BEAN.
ADJUSTABLE AUTOMATIC RELIEF VALVE.

(Application filed Oct. 16, 1899.)

(No Model.)



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ADJUSTABLE AUTOMATIC RELIEF-VALVE.

SPECIFICATION forming part of Letters Patent No. 644,271, dated February 27, 1900.

Application filed October 16, 1899. Serial No. 733,765. (No model.)

To all whom it may concern:

Be it known that I, FRED S. BEAN, a citizen of the United States, residing at Manchester, county of Hillsborough, State of New Hampshire, have invented an Improvement in Adjustable Automatic Relief-Valves, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to valve mechanism, and more especially to controlling means therefor, the organization being such that any back pressure that may take place from any cause—for example, by the shutting off of a valve in a pipe at a distant point from the pump—will be properly and automatically compensated for without the possibility of such pipe bursting under abnormal pressure. My improved apparatus is of prime utility in connection with a fire-engine, as the back pressure resulting in flexible hose-pipes when the discharge-valves for the latter are shut or when they are suddenly bent frequently causes them to burst; but this is not possible with my apparatus, which, as before stated, relieves the back pressure.

In the drawings, Figure 1 is a cross-sectional detail of a portion of a suction-pump barrel, showing vacuum and discharge chambers therein and provided with relief-valve mechanism constructed in accordance with my invention in a simple embodiment thereof. Fig. 2 is a similar view of the valve mechanism and certain adjacent parts, showing the valve in the position it occupies when forced from its seat. Fig. 3 is a view corresponding to Fig. 2 and shows a modified type of valve mechanism.

The relief-valve mechanism is capable of many different uses; but it is of importance in connection with a fire-engine, in which case it can properly compensate for any back pressure that may ensue from cutting off the water at the nozzles of the hose-pipe or the sudden flexing or bending of the latter, and when such back pressures occur the piping not being constructed to resist them frequently bursts.

In the drawings, Fig. 1, I have illustrated a portion of the barrel or casing of a vacuum-pump of well-known construction having alternate vacuum and discharge chambers, as

12 and 13 communicating through a main-valve chamber, the water being taken into the vacuum-chamber 12 from a hydrant or like source of supply and passing into the discharge-chamber 13, and from the latter into a hose, where it can be directed to suit the fireman or other person handling the hose.

The suction-pump partially illustrated is one of a known type, and I have not deemed it necessary to illustrate the valve controlling the flow of water from the chamber 12 to the chamber 13. I have illustrated a duplex valve as a means for also governing communication between the two chambers, the latter being separated by a wall 15, having at a suitable point a port 16, through which the water from the discharge-chamber 13 can pass and enter the communicating vacuum-chamber 12, provided the pressure of the water is beyond normal.

The relief-valve is denoted in a general way by V, and it is represented as being tubular or cylindrical, and the lower end thereof is adapted to bear against the wall 15, as shown in Fig. 1, and to be held normally in such position by means of a suitable nature. The means for holding the valve seated or closed consists, preferably, of a spring of such strength as to hold the valve closed under normal pressure, but which will permit the yielding of the valve under abnormal pressure by the water itself, it being evident from this that the valve is automatically unseated by the excessive pressure. The upper end of the main or relief valve V is closed, except at its center, from which the boss or tubular stud 17 of the stem 18 of the auxiliary valve V' extends.

The valve-chamber is denoted by C and is of progressively-increased cross-sectional area in the direction of the opening movement of the valve V.

The main or relief valve V carries a suitable device adapted when the valve is closed to fit snugly against the tapered wall 19 of the valve-chamber C, as shown clearly in Fig. 1, thereby to secure a perfectly water-tight joint. The device just referred to may be of any suitable type. It is shown consisting of a washer 20, fitted snugly over the tubular projection 17 of said valve and engaging the upper closed end thereof and provided with

a downturned circular flange 21, adapted to bind against the contiguous tapered surface of the valve-chamber. The washer is held firmly against the upper closed end of the valve by the ring 22, the outer edge of which is straight and which slides upon the straight portion of the wall of the valve-chamber. The ring 22 is held in place by the nut 23, which is in threaded engagement with the upper end of the tubular projection 17 and has a series of spanner-openings in its periphery, by which it may be screwed firmly home and tightly against the said ring 22, so that the latter may serve to hold the washer 20 in place.

The chamber or casing C is screw-threaded into the pump-barrel and is provided with an annular shoulder 24, adapted to fit against the same, as shown in Fig. 1. The upper open end of the chamber or casing C, which houses the valve V, is closed by the cap 25, the two parts being in threaded engagement and the shouldered portion 26 of the cap fitting against the chamber and having one or more spanner-recesses, by which it can be turned into or out of its seat. The tube 26' extends perpendicularly from the cap 25 and incloses the stem 18 for the auxiliary valve V', which, it will be seen upon inspection of the drawings, is inclosed by and slidable within the automatically-operative relief-valve. The stem 18, adjacent the valve, is provided with the nut 45, which holds the washer 46 in place against the valve V' and against the adjacent wall of the tubular relief-valve, so that a snug water-tight fit between these two parts is secured.

What is shown in the drawings as the lower end of the tubular projection or sleeve 26' is surrounded by the ring 27, which normally fits against the adjacent face of the cap 25, said ring being annularly recessed, as at 28, to receive the lower coil of the protractile spring 29, the upper coil being fitted within an annular recess 30 upon the under side of the handle or nut 31, which is threaded upon the upper end of the tubular sleeve 26'. The ring 27 is provided upon its under side with a series of downwardly-disposed pins 35, suitably fixed thereto and extending through openings in the cap 25 and bearing at their lower free ends against the nut 23.

By turning the handle 31 the tension of the spring can be regulated so that the valve V will yield under abnormal pressure.

The stem 18 of the auxiliary valve V', which is shown consisting of a solid cylinder, is in threaded engagement with the inner wall of the tube 26' and is provided at its upper end with the handle 32, by which it may be turned, thereby to advance or retract the cylindrical valve. The said valve is shown, respectively, in its retracted and advanced positions by full and dotted lines, respectively, in Fig. 1, and it is beveled along its lower edge, as at 32', to fit when closed against the correspondingly-beveled portion 33 around the upper

end of the port 16, thereby obtaining a close joint.

The valve V' is retracted by the action of the backing water, and when it is desired to use the same the valve V' will be opened wide, as shown by the full lines in Fig. 1, so that when the main or relief valve opens the water can pass from the chamber 13 into the chamber 12 through the communicating port or passage 16. When, however, it is desired to dispense with the automatic action of the appliance, the valve V' will be forced firmly against its seat, so as to close the port 16, whereby even should the valve V from any purpose be lifted water cannot pass from the chamber 13 to the chamber 12.

It will be seen upon reference to Figs. 1 and 2 that the valve chamber or space in which the valve V slides is of progressively-increasing area, which action permits a very free movement of the valve the instant the same is forced from its seat, as the flexible ring or washer 20 will have a greater space in which to expand, thereby reducing the friction between the two parts, and, as before stated, permitting a materially-freer retraction of the valve.

It will be understood that the function of the coiled spring 29 is to hold the main or relief valve V against its seat under normal pressure and that this tension should be such that it will be compressed under abnormal pressures, which happen frequently through the causes hereinbefore set forth. When the excessive pressure is relieved, the valve V will be closed at once by the relaxing spring 29.

It will be assumed that the water from the chamber 13 has been suddenly shut off. In some cases back pressure might ensue, and ordinarily this is sufficient to burst a rubber hose. In the present case, however, the water as it backs up will strike the washer 20 upon the valve, and thereby automatically unseat the latter, so that the excess water can pass from the chamber 13 into the chamber 12 through the port 16.

In Fig. 2 the automatically-active valve is shown as occupying its retracted position. Not only can the backing water flow into the vacuum-chamber 12, but it can also pass into the valve-chamber C by reason of the gradually-increasing area of the latter as the valve opens, such area permitting the specified function.

In Fig. 3 I have shown a modified form of the appliance, wherein the relief-valve V is made in two sections and is beveled off upon its lower edge, as at 35. The two parts of the modified type of valve are denoted by 36 and 37, the part 37 being of ring shape and being screw-threaded within its companion. The auxiliary valve V' (shown in modified form) includes a nut or ring 38 in threaded engagement with the stem of the valve, and between which and the shoulder 39 upon the stem 18 the washer 40 is fitted. The valve proper, 38, is held in place by means of the pin 41, ex-

tending transversely through the same and the stem 18. The auxiliary valve V' is adapted to be seated against the ring 37, and when it is in such position it serves to hold the main valve V firmly against its seat, so that the latter cannot be moved backward.

The invention is not limited to the parts previously set forth nor to their arrangement in the manner indicated, for both these points may be modified within the spirit of the appended claims.

While the valve mechanism previously set forth is of prime utility for securing the advantageous function previously set forth in connection with a fire-engine, it is obvious that it can be employed to equal advantage in many other connections.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A valve apparatus having vacuum and discharge chambers and a valve-chamber, the latter being of progressively-increased area in the direction of the opening movement of the valve, a valve provided with a device fitted snugly against said valve-chamber, and means for holding the valve closed under normal pressure and yieldable under abnormal pressure.

2. A valve apparatus having vacuum and discharge chambers and a valve-chamber, the latter being tapered inward toward its lower end, a valve provided with a device fitted snugly against said valve-chamber, and means for holding the valve closed under normal pressure and yieldable under abnormal pressure.

3. A valve apparatus having vacuum and discharge chambers and a valve-chamber, the latter being of progressively-increased area in the direction of the opening movement of the valve, a valve provided with a device fitted snugly against said valve-chamber, and a spring for holding the valve closed under normal pressure and yieldable under abnormal pressure.

4. A barrel, a casing therein and tapered interiorly, a valve movable in the casing and provided with an annular member adapted to

snugly fit against said casing, and yieldable means for holding the valve closed under normal pressure.

5. A barrel having vacuum and discharge chambers, and a wall separating the same provided with a port, a cylindrical valve, a casing connected with the barrel and adapted to inclose said cylindrical valve, and the casing being of greater cross-sectional area than the valve, an annular flexible member carried by the valve and adapted to snugly fit against the wall of its casing, a hand-operated valve controlling said port, and means operating against the cylindrical valve and serving to hold it closed under normal pressures.

6. A valve apparatus having vacuum and discharge chambers, and a valve-chamber, a valve having a stem and of less cross-sectional area than the valve-chamber, a flexible ring or washer surrounding the stem and having a downturned flange to fit snugly against the wall of the valve-chamber, and means for securing said flexible ring or washer in place, a second ring surrounding the valve-stem and engaging the said flexible ring or washer, and a nut in threaded engagement with the stem and serving to hold said second ring in place.

7. A barrel having vacuum and discharge chambers, a casing fitted to the barrel, and having a cap-piece provided with a perpendicular projection, a ring surrounding said perpendicular projection and having a series of pins extending through the cap-piece, a valve movable in said casing and provided with means adapted to be operated by said pins, a device connected to said perpendicular projection, and a spring acting against said device and ring, and means cooperative with the valve and serving to unseat the same when acted upon by the water during its backward pressure.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRED S. BEAN.

Witnesses:

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FREDERIC S. NUTTING.