W. F. KRICHBAUM.

AUTOMATIC SHUT-OFF VALVE.

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1,395,586.

Patented Nov. 1, 1921.

2 SHEETS—SHEET 2.

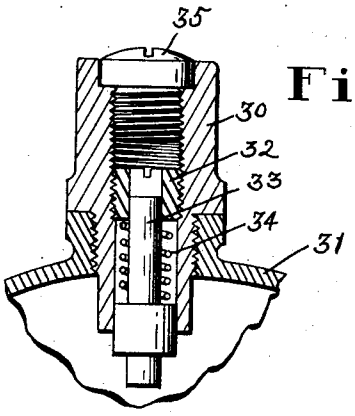


Fig. 5.

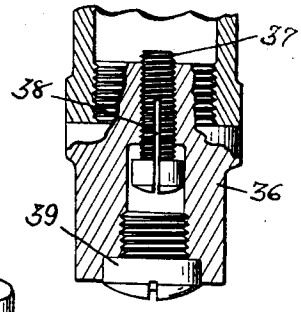


Fig. 6.

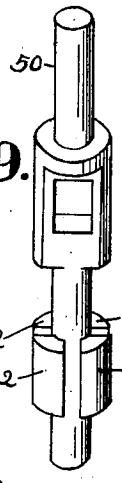


Fig. 9.

Fig. 7.

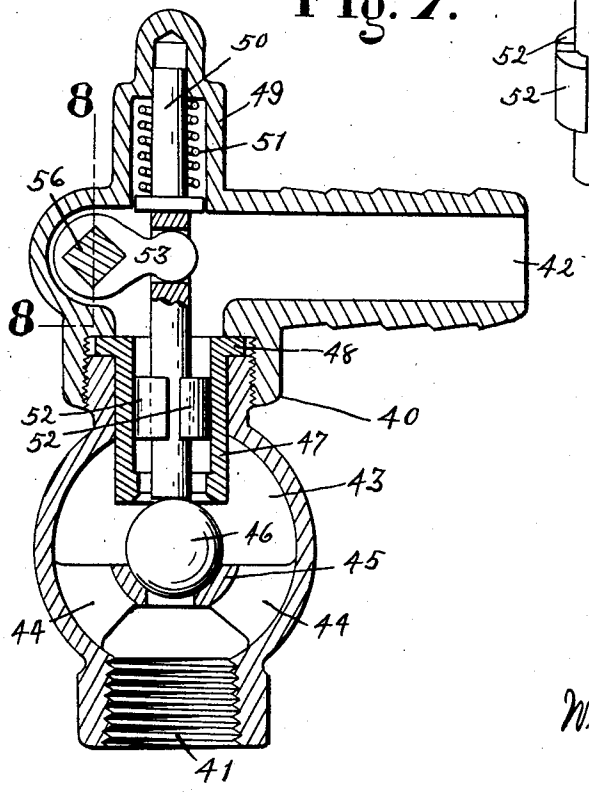
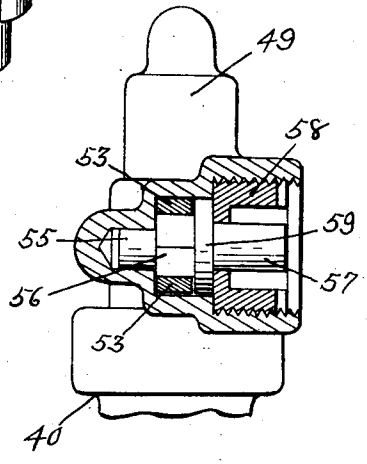


Fig. 8.



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AUTOMATIC SHUT-OFF VALVE.

1,395,586. Specification of Letters Patent. Patented Nov. 1, 1921.

Application filed July 20, 1918. Serial No. 245,882.

To all whom it may concern:

Be it known that I, WILLIAM F. KRICHBAUM, a citizen of the United States, and a resident of Irvington, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Automatic Shut-Off Valves, of which the following is a specification.

This invention relates to valves for pipes carrying compressed air, ammonia, fuel oil or any other fluid whose escape in event of a break in the pipe is dangerous, and the objects of the invention are to secure an improved valve of that type which will automatically close in event of a break beyond it; to enable the valve proper to be directly seated by the unbalanced pressure when a break occurs; to provide means for opening the valve again while under pressure; to avoid leakage at such opening means; to provide means for varying the closing point as desired; to enable such closing means to be conveniently adjusted, while under pressure; to secure simplicity and compactness, and to obtain other advantages and results as may be brought out in the following description.

Referring to the accompanying drawings, in which like numerals of reference indicate the same parts throughout the several views,

Figure 1 is a side elevation of a valve embodying my invention;

Fig. 2 is a central longitudinal section of the same;

Fig. 3 is a cross-section on line 3—3, Fig. 2;

Fig. 4 illustrates a way of adjusting the closing point of the valve;

Fig. 5 is a central section of means for adjusting the spring tension of the valve proper;

Fig. 6 is a central section of means for variably determining the lift of the valve proper;

Fig. 7 is a view similar to Fig. 2 of an elbow type of valve;

Fig. 8 is a cross-section of the same on line 8—8, Fig. 7, and

Fig. 9 is a perspective view of the plunger.

In the specific embodiment of the invention shown in said drawings, 1 indicates the valve casing provided at its opposite ends with threaded openings 2, 3 for inlet and outlet pipes respectively. Intermediate said ends the casing has an interior partition 4 with an aperture 5 providing at the inlet side a valve seat 6. The valve proper is shown with a head 7 adapted to fit the seat 6 and an extension 8 projecting into the aperture 5 and thus partially obstructing its capacity, as will be more fully explained later. The stem 9 of the valve is shown extending through the apertured end of an arm 10, by which the valve can be unseated against pressure as hereinafter described, the reduced end 11 of the stem receiving a nut 12 to secure the valve proper loosely to the arm and the aperture in said arm being flared toward the valve seat to allow the valve proper to rock slightly and fit said seat.

Normally the valve stands open, in the position shown in Fig. 2, the reduced end of its stem striking against a stop 13 which I have shown as formed on the inner end of the plug 14, and the valve is held in this open position by a spring 15 which tends to project a plunger 16, at the outlet side of the valve aperture 5, against the extension 8 of the valve proper, said spring actuated plunger being shown mounted in a plug 17 in the valve casing and which plug in the specific construction being described is opposite the plug 14.

It will be understood that the strength of the spring 15 is such as to hold the valve open under normal conditions, but when a break occurs in the service pipe connected to the outlet end 3 of the valve casing the pressure falls at that side of the valve and the valve proper seats or closes against the pressure of said spring 15, thus stopping any further flow to the service pipe. Obviously the point of closing, or difference of pressure at the inlet and outlet sides of the valve which will cause it to close, can be varied by varying the power of the spring 15. It can also be varied by varying the extent to which the extension 8 of the valve proper obstructs the valve opening 5, it being understood that generally speaking the more said opening is obstructed the less difference of pressure will be required at the two sides of the valve to close it.

It is to enable the valve proper to be un-

seated against the pressure at the supply side of the valve, after the break in the service pipe has been repaired, that the arm 10 is provided, and for that purpose said arm has a hub-like end 18 transverse to the direction of swing of the arm, which is bored out at one end as at 19 to receive as a pivot the reduced end 20 of a plug 21 which screws into the wall of the valve casing, see Fig. 3. The other end of the hub lies adjacent the head 22 of an alined turning stem 23, the adjacent ends of said hub and head having suitable clutch means so that they will rotate together and yet have a slight independent longitudinal movement, such as a transverse rib 24 or one adapted to enter a corresponding slot 25 in the other. The turning stem 23 rotates in a bearing 26 in the valve casing, and its outer end 27 is suitably shaped to receive a wrench or key for turning. Preferably this end 27 does not project from the socket formed by the end of the transverse chamber in which the parts just described are located, as shown in Fig. 3, and therefore a special socket wrench must be employed. To prevent leakage, the head 22 of the turning stem may seat against the bearing partition 26 with a ground joint under pressure alone, or a plug 28 may be employed to close the outer end of the stem socket, as shown in Fig. 3, where it is particularly desirous to guard against leakage.

The extension of the valve proper into the valve seat aperture of the partition of the valve, may be enlarged in any suitable manner to more completely fill the said aperture and thus cause the valve to close more promptly in event of a break on the delivery side, but in Fig. 4 I have shown such enlargement effected by opposite radial wings 29, 29, which serve to guide the valve proper as well as obstruct the opening.

In Fig. 5 I have illustrated means for adjusting the tension of the spring which normally holds the valve open, the plug 30 which screws into the valve body 31 in this construction having an interior sleeve 32 adjustable in and out by screwing and providing a slideway for the plunger 33 as well as a stop for the upper end of the spring 34. Obviously by adjusting this sleeve 32 the tension of the spring can be varied as desired, and for closing the end of the plug through which access is had to said sleeve for adjusting it, a plug cap 35 is provided which can be solder-sealed in place or otherwise secured.

In Fig. 6 I have illustrated an adjustable stop for the valve proper at the inlet side of the valve, so that the obstruction of the valve seat aperture can be varied by allowing the valve proper to open a greater or less distance. In this construction, the screw plug 36 is cored centrally to carry at its inner end a stop screw 37 adapted to engage the lower end of the valve stem. This screw 37 is accessible from the outer end of the plug 36 and is preferably slotted as at 38 so as to hold itself frictionally in any position. The outer end of the central chamber of the plug 36 is closed by a plug cap 39 which can be soldered or otherwise secured in place.

In Figs. 7 and 8 I have illustrated the application of my invention to an elbow-shaped valve casing 40 having its inlet at 41 and its delivery at 42. Here the body portion of the valve casing, next the inlet, in a general way, is spherical and provides an interior chamber 43 in which arms 44 from the walls support a cage 45 which holds a ball valve 46 when in its normally open position. Adjacent said ball 46 is the valve seat end of a bushing 47 which fits into the neck of the body portion of the valve casing and is supported upon the upper end thereof by a peripheral flange 48.

The elbow part of the valve casing screws onto said neck, exteriorly, and is adapted to clamp the said flange 48 of the bushing 47 between the two portions of the valve casing. Said elbow part of the valve casing has in alinement with said neck an opposite extension 49, which receives a plunger 50, as well as a spring 51 surrounding the same to normally press it against the ball valve 46 and open the same. This plunger has within the bushing 47 lateral projections 52 which serve the double purpose of affording a lateral bearing for the plunger and also obstructing the effective passage through said sleeve for the fluid more or less as said projections are made larger or smaller.

Intermediate of said spring 51 and projections the plunger is provided with a transverse aperture which receives the head of an arm 53 for sliding the plunger to unseat the ball 46 under pressure, and this arm is rotatably mounted upon a stub shaft 54 rotatably mounted in the elbow part of the valve casing, or an enlargement thereof, transverse to the plunger 50 and preferably at the side of the same opposite the delivery hose connection. This stub shaft is shown as having an inner pivotal end 55, see Fig. 8, a squared portion 56 to receive the arm 53, an outer key stem 57 rotatable in a key socket bushing 58 screwed into the outer end of the chamber in the valve casing, and a flange 59 which seats with a ground joint against said bushing to prevent leakage. Obviously, if desired, the chamber could be provided at is outer end with a plug or cap as shown and described in connection with the construction shown in Fig. 3 more especially.

Various departures from the detail construction described may be made in manufacturing my improved valve, by those skilled in the art, without departing from the spirit and scope of the invention, and I do not wish to be understood as restricting

myself except as required by the following claims when construed in the light of the prior art.

Having thus described the invention, what I claim is:

1. In a valve of the character described, the combination of a casing having an inlet, an outlet and a valve port connecting said inlet and said outlet, a valve controlling said port and mounted upon one side thereof to close the same upon a preponderance of pressure upon that side of the port on which the valve is mounted, a rigid plunger on the other side of the port for holding said valve open, guides independent of the valve for holding said plunger against lateral displacement, a spring normally actuating said plunger to hold the valve yieldingly open, and means for opening said valve against pressure.

2. In a valve of the character described, the combination of a casing having an inlet, an outlet and a valve port connecting said inlet and said outlet, a valve controlling said port and mounted upon one side thereof to close the same upon a preponderance of pressure upon that side of the port on which the valve is mounted, a spring actuated plunger on the other side of the port normally holding said valve yieldingly open, guides independent of the valve for holding said plunger against lateral displacement, and means at one side of said plunger for sliding the same to open the valve against pressure.

3. In a valve of the character described, the combination of a casing having an inlet, an outlet and a valve port connecting said inlet and said outlet, a valve controlling said port and mounted upon one side thereof to close the same upon a preponderance of pressure upon that side of the port on which the valve is mounted, a reciprocating plunger engaging said valve to yieldingly hold the valve in open position, and means connected with said plunger for reciprocating the same against said valve to open the valve against pressure.

4. In a valve of the character described, the combination of a casing having an inlet, an outlet and a valve port connecting said inlet and said outlet, a valve controlling said port and mounted upon one side thereof to close the same upon a preponderance of pressure upon that side of the port on which the valve is mounted, a reciprocating plunger engaging said valve to yieldingly hold the valve in open position, and a rotary member projecting from the valve casing having an arm connected with said plunger, rotation of said member serving to reciprocate said plunger against the valve to open the valve against pressure.

WILLIAM F. KRICHBAUM.