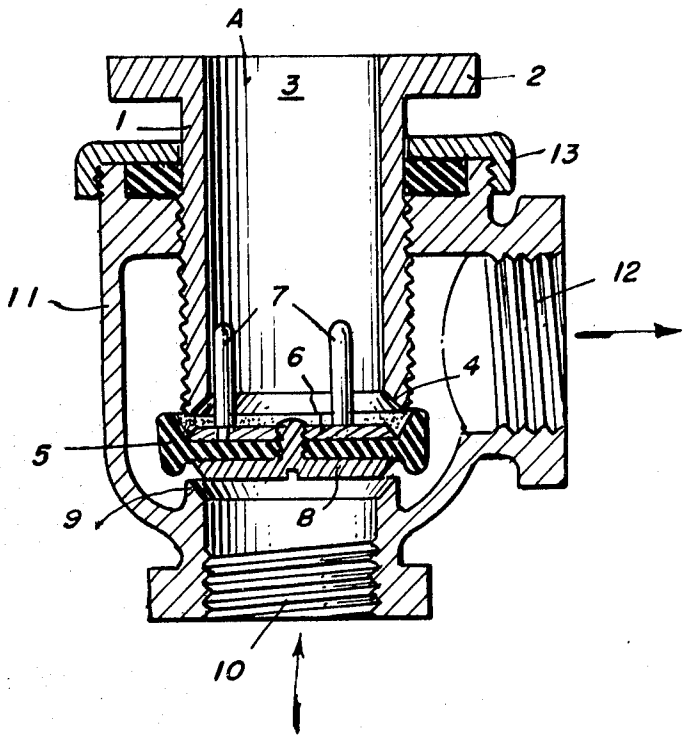
Oct. 7, 1969 J. D. LANGDON 3,470,898

HOLLOW STEM SHUTOFF VALVES

Filed July 24, 1964 2 Sheets-Sheet 1

FIG. 1



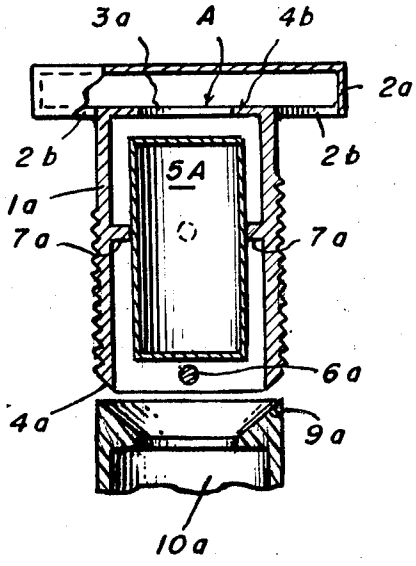


FIG. 2

INVENTOR

J. D. Langdon

Oct. 7, 1969 J. D. LANGDON 3,470,898

HOLLOW STEM SHUTOFF VALVES

Filed July 24, 1964 2 Sheets-Sheet 2

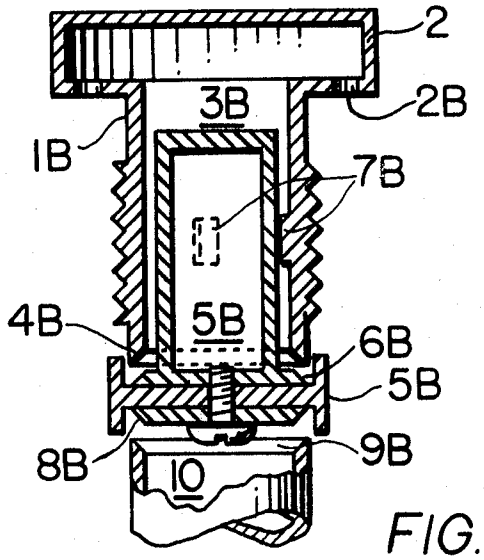


FIG. 3

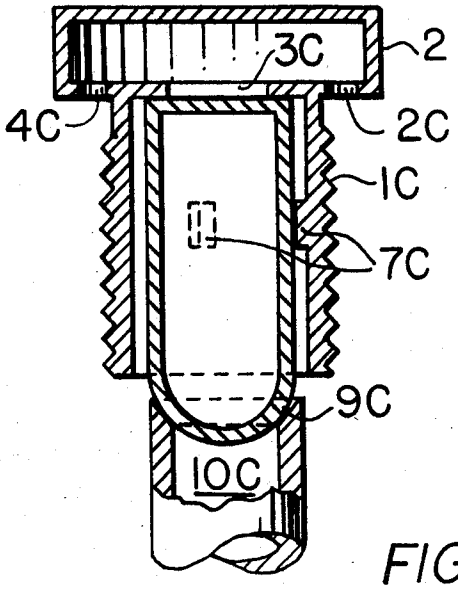


FIG. 4

INVENTOR.
J. D. LANGDON

United States Patent Office 3,470,898 Patented Oct. 7, 1969

3,470,898

HOLLOW STEM SHUTOFF VALVES

Jesse D. Langdon, East Rockaway, N.Y.
(R.F.D. 250, Lafayette, Red Hook, N.Y. 12571)

Filed July 24, 1964, Ser. No. 386,482
Int. Cl. E03c 1/10; F16h 45/00; F16k 1/00
U.S. Cl. 137—218 4 Claims

This application is a refile of original application Ser. No. 49,987 filed Aug. 16, 1960 and held abandoned on Apr. 9, 1964, and includes other improvements and species of the invention developed and invented during pendency of original application.

This invention relates to vacuum breakers and backflow preventive shutoff valves for interrupting liquid pressure supply lines.

The primary purpose of the invention is to prevent backflow of contaminated fluid into a fluid pressure supply pipe.

One object is creation of a simple and efficient structure utilizing the stem of a shutoff valve made in a special way, as the medium of conducting air into a supply line to neutralize a condition of negative pressure therein.

Another object is to utilize a valve member of unique form made of deformable material, having oppositely disposed recessed seating faces to alternate between, open and close valve seat means provided for opposed openings, one communicating with a liquid pressure supply source and the other opening communicating with atmosphere via an adjustable hollow stem for controlling fluid flow thru a casing having an inlet and discharge ends.

A further object is to construct other species of hollow stemmed shutoff or control valves wherein a float valve is incorporated within the hollow stem to control ingress of atmosphere into the valve casing and preclude egress of liquid under pressure thru the hollow of the stem, under minimal pressure conditions.

Other and further objects and purposes will appear during progress of specification as illustrated by the drawing, depicting four distinct generically related species forms of reduction to practice of the invention which may be changed within scope of the claims.

Of the drawing:

FIG. 1 is a vertical median section of one species of the invention showing one form of floating valve means 5, combined with hollow stem means 1.

FIG. 2 is a vertical median section showing an alternative species form of floating valve means 5A, combining hollow float means with hollow stem means 1*a*.

FIGURE 3 is a vertical median section showing a third species of the invention depicting hollow stem 1B and floating valve means 5B in section with seat 10 partially cut away in section.

FIG. 4 is a vertical median section of the invention showing a fourth alternative species form depicting hollow float valve means forming floating valve means 5C combined with hollow stem means 1C.

The four species of the invention illustrated by FIGS. 1, 2, 3 and 4 are generically associated as follows:

Like numerals indicate like elements thruout the figures of the drawing, letter characters added to the numerals indicating modified forms of substantially identical elements shown by the various figures of the drawing, as follows:

Adjustable hollow stem means 1, 1*a*, 1B, 1C.

Manual stem adjusting means 2, 2*a*.

Vent means communicating with atmosphere 2*b*, 2B, 2C.

Hollow stem passage communicating with atmosphere 3, 3*a*, 3B, 3C.

Annular valve seat 4, 4*b*, 4B, 4C, inside hollow stem 3, 3*a*, 3B, 3C.

Float valve mans 5, 5A, 5B, 5C reciprocating within stem 1, 1*a*, 1B, 1C.

Retaining means 6, 6*a*, 6B, holding float valve 1, 1*a*, 1B, in operative position.

Float valve guide elements 7, 7*a*, 7B, 7C, for float valve means.

Coniform recess washer 8, 8B, forming self aligning seating means.

Casing inlet seat 9, 9*a*, 9B, 9C, arranged to align float valve means.

Casing inlet passage 10, 10*a*, 10C.

Valve casing means, 11.

Valve casing outlet means, 12.

The elements combined to form the invention as recited supra are arranged in such a manner as to be interdependent and interrelated for coactive functioning as a self contained unit forming a hollow valve stem assembly capable of use with any type of valve closing against fluid pressure, liquid in particular.

The importance of maintaining concentric axial alignment of the float valve elements 5, 5A, 5B and 5C with respective seats 9, 9*a*, 9B and 9C, cannot be too strongly stressed as the commercial value of this invention depends upon the leakproof qualities of the device, which must not leak upon the floor of buildings where the device is installed to prevent back-siphonage and eliminate plumbing cross-connections as a health hazard.

Persuant to eliminating this problem of leakage FIG. 1 shows the annular shoulder 4 as converging concentrically toward the axial center of passage 3, the base 6 of guide means 7 being coniform, matching the face of annular valve seat 4, the sharp terminal end of stem 1 projecting into a groove formed within the upwardly extended rim or skirt of a deformable washer provided for floating valve 5, whereby the hollow stem means 1 and valve 5 are guided to perfect concentricity made necessary by the fact that in order to prevent sticking and freezing due to corrosion or building up of a coating such as lime and alkali on the opposed surfaces of guide means 7, 7*a*, 7B, or 7C and the respective surfaces of float valves 5, 5A, 5B and 5C, ample clearance must be provided to permit free movement between the respective opposed surfaces including the threads of hollow stem means 1, 1*a*, 1B, and 1C, rotating within the matching respective threads of casing 11, thus it will be seen that it is vitally essential to devise improvements to meet the necessities of practical use of the invention by providing centralizing means as set forth herein. Every form of the invention depicted by the drawing being provided with essentially the same centralizing means, namely apposed concentrically disposed self guiding seating means concomitant float valve means reciprocally arranged inside of hollow stem means adjustably inserted into casing means in the manner illustrated and described.

FIG. 1 illustrates one species of the invention including basic means comprising hollow stem 1 adjustably inserted into casing 11 arranged as set forth supra, and forming valve closure means terminating in seat means 4 float valve means 5 guidably combined concomitant hollow stem means 1, wherein the floating valve means is formed by guided valve means 5 reciprocally disposed to float between the annular seat inside of the terminal end of inlet passage means 10 forming seat means 9 and the inner terminal end of hollow stem means 1. Floating valve means 5 is made of deformable material having oppositely disposed annular recessed faces with rims surrounding the respective faces and rigid means 6 concomitant guide means 7 juxtadisposed within terminal end 4 and hollow 3 of stem 1. Rigid means 8 is provided with a threaded stem extended thru valve means 5, securing rigid means 6 and guide means 7 concomitant respective recessed faces of valve means 5 to

limit the seating depth of a sharpened edge provided for seat means 4 and 9.

A second species of the invention illustrated by FIG. 2 generically described supra, wherein the valve closure means includes floating valve means 5A for closing against annular seat 4*b* wherein hollow stem 1*a* under influence of pressure fluid contained in casing 11 or by rising upon the surface of liquid entering casing 11. The floating valve means 5A being of hollow construction and reciprocally disposed in the hollow of stem 1*a* is supported concomitant hollow stem means 1*a* by pin 6*a*. Hollow stem 1*a* and float valve 5A forming valve closure means manually adjustable to meet requirements of use.

A third species of the invention illustrated by FIG. 3 generically defined supra, wherein valve closure means comprises floating valve mans 5 identical with deformable valve means 5 of FIG. 1 concomitant rigid means 6B and hollow float means 5B forming guide means concomitant spacing means 7B projecting inwardly of the wall of hollow 3B of stem 1B, seating means 4B being sharpened and terminating the lower end of the stem 1B. Floating valve means 5B being united concomitant deformable valve means 5, rigid means 6B and 8B; the floating valve means 5B being of hollow construction is effective to float deformable valve member 5 upon the surface of liquid rising within casing 11 and into the hollow 3B of stem 1B, thereby closing valve 5 against seat 4B.

Guide means 7 formed by prongs as of FIG. 1 is replaced by hollow float means 5A concomitant projections forming spacing means 7B inside stem 1B combined to form valve closure means adjustable as a unit for resting against valve seat means 10 designating identical inlet passage means shown by FIGS. 1 and 3.

A fourth form of the invention illustrated by FIG. 4 shows hollow stem 1C concomitant hollow float means forming float valve means 5C guidably assembled concomitant hollow 3C of manually adjustable stem means 1C together forming valve closure means generically set forth supra; upper seat means 4C and lower seat means 9C being provided to impinge the upper and lower ends of hollow float valve means 5C respectively when stem 1C is in closed position. Valve closure means formed by stem 1C and float valve 5C being adjustable as a unit to meet contingencies of use. The lower end of floating valve means 5C being rounded to form a hair-line seat against a beveled inner surface provided inside the terminus of valve seat 9C. Rounded lower end of float valve means 5C may be made coniform if desired to create a self lapping valve seat surface. Both the rounded and beveled seat means are self centering.

This valve comprising the invention, when installed interrupting a liquid pressure supply line, between a source of supply and sewer connected plumbing fixture, is opened manually by the adjustable hollow stem 1–1*a*–1B or 1C, according to exigencies of use; liquid pressure entering casing 11 via inlet 10—10 of FIGS. 1 and 3, impinges the recessed inlet side of float valve means 5—5 against seat 4 or 4B.

Using the species form illustrated by FIG. 1, liquid pressure within casing 11 being insufficient to raise valve means 5 against seat 4, liquid will rise and bypass valve means 5, same being heavier than liquid rising thru hollow 3 of stem 1, liquid will leak or dribble from top of stem 1, unless:

The form of invention illustrated by FIG. 3 is used, wherein hollow float means 5B is shown integral with float valve means 5 identical with valve 5 shown by FIG. 1. Hollow float valve means 5B floats on liquid rising under low pressure within casing 11, effective to seat the upper recessed face of valve 5 against seat 4B to prevent leakage or dribbling.

FIG. 2 illustrates a species form of the invention wherein hollow float valve means 5A is closed against annular seat 4*b*, either by fluid pressure or liquid rising within casing 11 and hollow 3*a* of stemla. Hollow float valve means A being impinged by seat 4*b* is manually adjusted moving concomitant stem 1*a* provided with seat means 4*a* impinging seat means 9*a* to close passage 10*a*.

FIG. 4 illustrates a species form of the invention wherein the float valve means 5C is arranged to move in unison with stem 1C, this combination forming the adjustable valve closure means generically identical with all species of the invention as illustrated and described herein.

Therefore the following claims are made:

1. A device of the character described including casing means having an inlet terminating in valve seat means inside said casing, an outlet projecting from said casing, manually adjustable hollow valve stem means inserted into said casing between said inlet and outlet, the hollow of said stem means communicating between the inside of said casing and atmosphere, float valve means reciprocally deposed within and movable concomitant said hollow stem means and arranged to close said inlet, wherein the float valve means is formed with a convergent end arranged to seat with a wedging effect within confines of flared seat means provided by the proximate inside end of the inlet, that end of the float valve means that is opposite to the inlet seat being arranged to seat against annular seat means provided within the confines of the hollow of the stem means, the annular seat means arranged to impinge the proximate end of said float valve means in a manner to urge same toward the inlet seat means, manual closure of said hollow stem means being effective to close said inlet of said casing means against the ingress of pressure fluid, whereby when said hollow stem means is in open position, said float valve means is permitted to reciprocate within said hollow stem means between the annular seat means and the inlet seat means, according to conditions of pressure prevailing within said inlet.

2. A hollow valve stem assembly for adjustable insertion into a valve casing in alignment with an inlet provided for the casing having an outlet, said assembly comprising float valve means reciprocally inserted into the hollow of the stem, annular seat means formed by shoulder means circumscribing the inside of the hollow, a seat portion of said float valve projecting into said hollow for seating against the annular shoulder means, guide means provided for said float valve means and being disposed within said hollow, the entire float valve means arranged to move as a unit with and within the hollow stem during manual closure when said float valve means is impinged against said annular valve seat effective to urge that side of said float valve means that is away from said annular seat means against valve seat means provided by the inner terminus of the inlet means, whereby when said hollow stem is in open position, positive pressure existing within said inlet means is effective to hold said float valve means against said annular seat means when said hollow stem is in any position of open adjustment, atmospheric pressure exerted against that portion of said float valve means that is within said hollow stem means being effective to close said inlet when a negative pressure exists within the inlet passage, the hollow of said stem clearing said float valve means and providing passage means communicating with atmosphere.

3. A device of the nature defined by claim 2, wherein the annular seat means of the hollow stem is formed within its inner terminal end, the float valve means being formed by the combination of a valve member of deformable material having rim means surrounding oppositely disposed recessed faces, the annular seat means being beveled and sharpened for embedment in the material of the floating valve member, rigid means secured within opposite annular recesses of the float valve means surrounded by the deformable rim means to limit embedment of the sharp seat means into the material of said float valve means, whereby fluid pressure existing within the casing effective against the outer circumference of

said rim means urges same concentrically around and against the outer circumference of the inner terminal end of said hollow stem to prevent leaking and dribbling of pressure fluid thru the hollow of said stem.

4. A shutoff valve assembly comprising adjustable hollow stem means for communicating with atmosphere and provided with annular valve seat means circumscribing the inside of the hollow, float valve means guidably aligned for reciprocal movement within said hollow and concomitant the annular seat means, said float valve means within said adjustable hollow stem means arranged to coact as a unit concomitant said float valve means forming valve means for closing the inlet passage of a valve casing providing with an inlet and outlet constituting part of the assembly, said float valve means arranged to close against said annular seat at all times regardless of the adjusted position of said hollow stem means when positive pressure exists within the inlet, whereby, a negative pressure existing within said inlet, said hollow stem means communicating with atmosphere same being effective against

that portion of said float valve means that is toward said annular seat means to close said inlet passage.

References Cited

UNITED STATES PATENTS

2,282,188	5/1942	Horne	137—218
2,133,804	10/1938	Brooks	137—609 X
2,590,386	3/1952	Dobrick	137—218
2,814,304	11/1957	Sloan	137—218
2,850,034	9/1958	Svabek	137—218
3,180,352	4/1965	Kersten	137—218
726,575	4/1903	Rothchild	251—332 X
802,642	10/1905	Huxley	251—332

HAROLD W. WEAKLEY, Primary Examiner

U.S. Cl. X.R.

251—332