

1,362,535.

FIG.1

FIG. 3

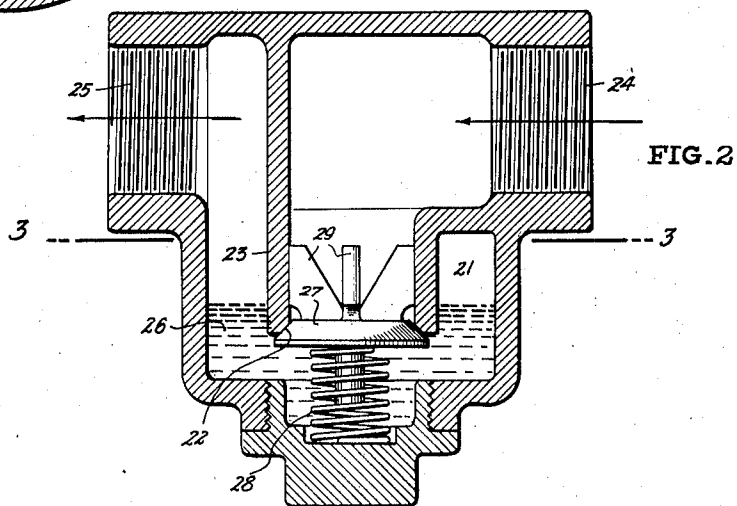


FIG. 2

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UNITED STATES PATENT OFFICE.

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LIQUID-SEAL CHECK-VALVE.

1,362,535.

Specification of Letters Patent.

Patented Dec. 14, 1920.

Application filed December 2, 1918. Serial No. 264,946.

To all whom it may concern:

Be it known that I, WILLIAM MARTIN HUGHES, subject of the King of Great Britain and Ireland, residing at "Anona", 5 Gipps street, Arncliffe, near Sydney, New South Wales, Australia, have invented certain new and useful Improvements in Liquid-Seal Check-Valves, of which the following is a specification.

10 This invention relates to check valves for gases, vapors, and gasoline and like volatile hydrocarbon oils, and it consists in a loaded valve of puppet or mushroom type fitted in a casing which is formed with a pocket 15 below and around the valve seat adapted to contain an oil or other viscous non-vaporizable liquid which is not soluble in and is of higher gravity than the volatile oil passing through the service in which the valve is 20 fitted. It is well-known that flow of gases, vapors, and gasoline and like volatile oils can be checked absolutely by a lightly loaded check valve only when the valve and its seating are in perfect condition, and that 25 ordinarily a leak flow past the valve face occurs owing to the susceptibility of gases, vapors, and such liquids to trickle through very small orifices. On the other hand a lightly loaded check valve in fair condition is effective for preventing leak flow 30 of liquids having a viscosity valve of the same order as water of a higher viscosity. Consequently, it has been conceived that if a lightly loaded check valve be arranged to 35 work in a seal of non-volatile viscous liquid it will under all working conditions effectively prevent a leak flow of gases, vapors, and volatile oils such as gasoline which otherwise would trickle past it.

40 It will be obvious that the design of the valve casing may be conformed to the conditions and situation of use so long as the essential condition is satisfied that the valve is surrounded by a pocket in which the 45 liquid seal is contained and that said pocket is proportioned and arranged so that when the valve is opened the volatile liquid may bubble through the seal liquid and when the valve is closed the seal liquid will im- 50 merse the valve and the valve face and effectively check leak flow of the gas, vapor, or volatile fluid.

The sealing liquid may be mercury, glycerin, castor oil, or other liquid material which is of greater gravity than and

is insoluble in and immiscible with the fluid the flow of which the valve is intended to control.

In the accompanying drawing Figure 1 is a vertical section through a lift-up check 60 valve according to the present invention; Fig. 2 a similar section through a drop-down check valve according to the same; and Fig. 3 a horizontal section on the plane 3-3, Fig. 2.

65 In Fig. 1 the valve seat 10 is formed in the bottom of the chamber 11, which is closed above by the coupling socket 12; the lower part of the socket 12 is lanterned by lateral ports 13 and formed at the foot as a guide sleeve 14 for the valve spindle 15 70 and for the valve loading spring 16. When the valve is sufficiently weighty and the conditions of use permit, the spring 16 may be omitted. 17 is a cup surrounding the valve 75 seat and carried up sufficiently high to form a pocket of sufficient capacity to hold the charge of sealing liquid. This cup is carried by brackets or lugs 18 on the inclosing casing 19. The casing 19 terminates at the 80 foot in the pipe socket neck 20.

In the arrangement shown in Figs. 2 and 3, the seal liquid pocket 21 surrounds the valve seat 22 which is formed in the lower end of the tubular throat 23, into which the 85 intake socket end 24 of the fitting connects. The delivery socket end 25 of the fitting connects into the upper part of the seal pocket 21, and said pocket is made of sufficient capacity below the socket 25 to carry 90 the charge of sealing liquid 26. The valve 27 is loaded by a spring 28 and is fitted with guide vanes 29 which work in the tubular throat 23.

95 In operation, the flow of gas, vapor, gasoline, or other volatile liquid passes in the direction indicated by the arrows, moving the valve off its seat and bubbling through the sealing liquid. When the normal flow ceases, the valve closes on its seat and the 100 seat joint is sealed above and below the valve head by the relatively viscous sealing liquid which immerses it and which cannot flow through the joint and therefore effectively locks the gas, vapor, or volatile liquid 105 and prevents loss of same by leak flow and by creeping.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A check valve comprising a valve seat, 110

- a valve fitted thereto, means for holding said valve lightly on said seat, a casing surrounding said seat and valve and adapted to carry sealing liquid immersing the valve, and
5 being also provided with an inlet orifice, and a pocket on the inlet side of the seat intermediate said seat and the inlet orifice and adapted to hold sealing liquid which passes over the face of the valve.
- 10 2. A check valve comprising an external casing provided with inlet and delivery connections, a cup pocket supported in said casing, a valve chamber formed within said casing and positioned partially within said
15 cup pocket, a valve seat formed in the lower part of said valve chamber, a valve in said chamber co-acting with said seat, means for lightly loading said valve, and means for guiding said valve, substantially as described.
- 20 3. In a check valve, a lightly loaded valve and its seating immersed in a body of a relatively viscous sealing liquid in such a manner that the liquid also acts to close the valve,
25 substantially as described.
4. A check valve comprising an external casing formed within an inlet, a cup pocket

having a portion formed integral with the bottom of the casing so as to be supported centrally thereof and in spaced relation thereto, a valve chamber formed integral with the top of the casing and having its lower portion positioned in spaced relation to the bottom and walls of the cup pocket and in turn provided in its bottom with a
35 valve seat, a delivery connection detachably connected to the top of the valve chamber, the lower part of the connection being lanterned by lateral ports, a guide sleeve formed at the foot of the connection, a valve mounted
40 in the chamber for co-acting with the seat and having its stem slidably arranged in the guide sleeve and a loading spring surrounding the stem of the valve and the sleeve and having its ends arranged against the valve
45 and the lower part of the delivery connection.

In testimony whereof I have affixed my signature in the presence of two witnesses.

WILLIAM M. HUGHES.

Witnesses:

ROBT. ZEY,
W. J. HUMPHREYS.