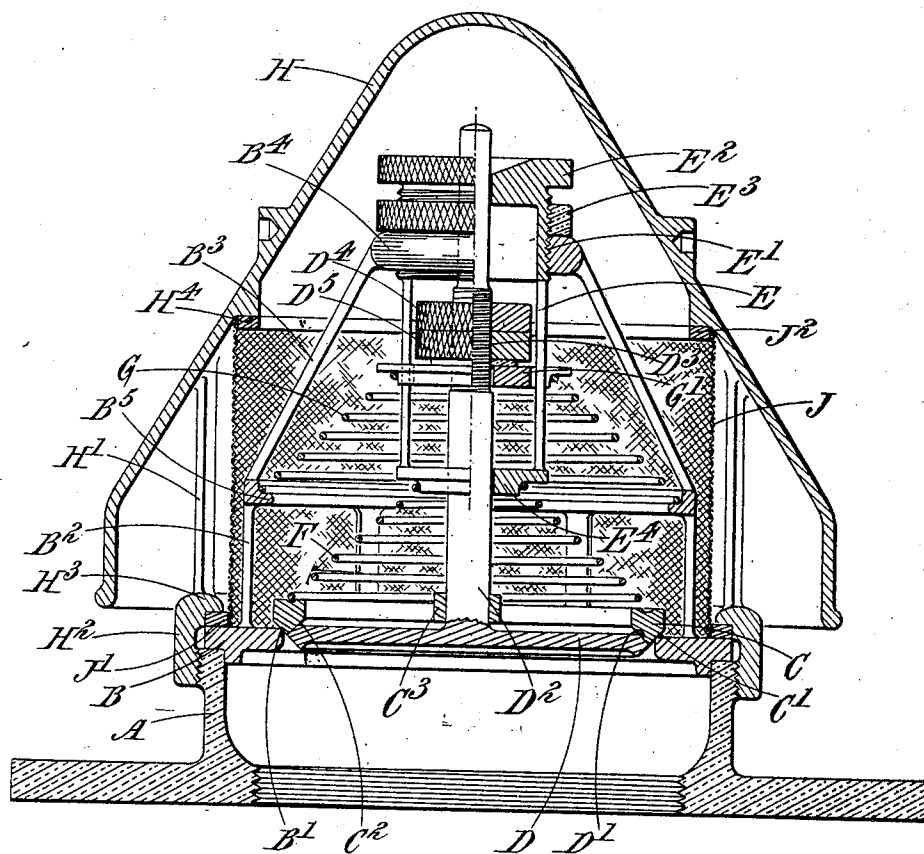


T. A. CROMPTON, JR.
DOUBLE ACTING VALVE.
APPLICATION FILED MAY 10, 1917.

1,240,682.

Patented Sept. 18, 1917.



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UNITED STATES PATENT OFFICE.

THOMAS ALBERT CROMPTON, JR., OF LONDON, ENGLAND.

DOUBLE-ACTING VALVE.

1,240,682.

Specification of Letters Patent. Patented Sept. 18, 1917.

Application filed May 10, 1917. Serial No. 167,841.

To all whom it may concern:

Be it known that I, THOMAS ALBERT CROMPTON, JR., a subject of the King of England, residing in London, England, have invented certain new and useful Improvements in Double-Acting Valves, of which the following is a specification.

This invention is for improvements in double-acting valves and has for its object to provide double-acting valves for use with containers of volatile substances, such as petrol, so that the valve may operate both as a vent to allow the escape of gas when the pressure in the container rises, and also to admit air when the pressure in the container is lowered, as for example when emptying the container. Various double-acting valves have been proposed for this purpose and they are used on tank steamers and the like, the valve being usually mounted at the end of a conduit which extends down into the reservoir of the container. This conduit is sometimes connected with a second conduit provided with a valve so that steam can be admitted through the second conduit for cleaning purposes and the valve at such times automatically closed to prevent the steam from escaping by the double-acting valve to which the present invention applies.

The object of the present invention is to provide a double-acting valve for connection to such a conduit which may be readily accessible from outside, is well protected from damage, and has the adjustment means for the control of the valve so situated as to be readily accessible.

In the accompanying drawing, which illustrates one method of carrying out this invention, the end of the conduit to be controlled by the double-acting valve is indicated by an externally screwthreaded portion A on which the whole of the valve-parts is mounted. Resting on the end of this part A, which for convenience will be referred to as the end of the conduit, is an annular valve-seat element B. The valve-seat element has a seating face at B¹ which receives an annular valve C. This valve has an external seating face C¹ for coöperating with the valve-seat face B¹ to open outwardly, that is away from the conduit, and an internal seating face C² which receives a second valve D having an exterior seating face D¹ for coöperation with the face C² and to open inwardly. Both of these valves

are of the mushroom type, the valve D having a perpendicular stem D² which extends outwardly from it and the valve C having a central boss C³ which is guided on the stem D².

The valve-seat element B has an outwardly extending frame formed on that side which is away from the conduit, which frame comprises perpendicular arms B² from the top of which extend inwardly inclined arms B³ carrying at their upper ends an internal screw-threaded socket B⁴.

Screwed into the socket B⁴ is a stirrup E. The upper end of the stirrup is screw-threaded at E¹ to engage the socket B⁴ and has at its top a thumb-piece E² by which it can be rotated. On the screw-threaded portion a lock-nut E³ is provided. The stirrup depends from the socket B⁴ and the stem D² of the valve D extends through the foot or cross-piece E⁴ of the stirrup and also through the thumb-piece E², both of which parts are made to serve as guides for the stem D². The stem D² is screw-threaded at D³ and receives on this screw-threaded portion nuts D⁴ D⁵ which are of such size as to lie between the limbs of the stirrup E.

A compression-spring F bears at one end against the outer side of the valve C and at the other end against the underside of the foot E⁴ of the stirrup. A second compression-spring G bears at its bottom against an internal flange B⁵ formed at the top of the arms B² and its upper end bears against a plate G¹ which slides on the stem D² of the valve D and on the limbs of the stirrup E; the plate G¹ is thus thrust by the spring G against the nut D⁵.

Inclosing the whole of the valve-mechanism is a conical hood H which is supported by arms H¹ from a ring-nut H². The ring-nut is internally screw-threaded to engage the conduit member A and has an internal flange H³ which lies over the annular valve-seat element B, so that when the nut is screwed home, it can grip the latter against the end of the conduit.

Surrounding the valve-mechanism is a gauze screen J, the lower end of which is secured to a fastening-ring J¹ which rests on the valve-seat element and also lies under the lip H³ of the ring-nut H². The top of the screen is secured to a ring J² which bears against a shoulder H⁴ formed on the interior of the hood H.

From the above description it will be

seen that all the parts of the valve-mechanism are carried by the annular valve-seat element B which seats on the end of the conduit A to which the valve is to be applied and thus all of the parts can be instantly secured to, or removed from, the conduit by screwing the hood H into place or removing it therefrom. The flange H³ on the ring-nut H², which forms an integral part of the hood H, grips the bottom of the screen J, and also the valve-seat element B, firmly when the ring is screwed home so that all the parts are held in position, but when the hood is removed, the screen J can be lifted off or without removing the screen the adjustment of the springs can be effected by means of the nuts D⁴ D⁵ or the thumb-piece E² and nut E³.

The operation of the valve is as follows:—

When pressure is set up within the container, this tends to force both valves D and C outward. All that prevents these valves from moving outward is the one spring F and when the pressure in the container is sufficient to overcome this spring, the valves D and C rise bodily as a single valve, the spring G offering no resistance to this movement. The compression of the spring F is adjusted by screwing the whole stirrup E up or down and when the proper compression has been arrived at, the position of the stirrup is fixed by means of the lock-nut E³.

When the pressure in the container is lowered, as for example by change of temperature or by emptying the container, the valve C remains stationary but the valve D opens inwardly against the action of its spring G. The compression of the spring G is adjusted by operating the nut D⁵ and when the proper position is found, this is locked by the nut D⁴.

The gauze screen J is to prevent the contents of the container being set fire to, when these are inflammable, by the vapors escaping from the valve being ignited and then the flame being carried back through the valve. It will be seen that the gauze lies outside the valves so that no such back-firing can take place.

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

1. In a compound double-action valve, the combination of, a valve-seat element provided with means for connection to the end of a conduit, and having on that side which is to face away from the conduit a frame supporting a screw-threaded socket whose through axis is situated centrally relatively to the valve-seating, a stirrup having an external screw-thread whereby it is engaged with the aforesaid socket, the cross-piece of the stirrup lying at a point between the said socket and the valve-seat, a valve of the mushroom type mounted concentrically in the valve-seat and having an external seal-

ing face coöperating with the valve-seat to open outward and an internal sealing face and a throughway provided with a valve-seating on that side which is toward the conduit, a second mushroom-valve mounted concentrically relatively to the first and bedding on this second valve-seating to open inward, said valve having a stem which extends outward perpendicularly from it, passes through the cross-piece of the aforesaid stirrup as a guide and is screw-threaded at its upper end where it receives a nut, a compression spring operating between the bottom of the stirrup and the outwardly opening valve, a second compression-spring thrust at one end against a support provided for it by the aforesaid socket-carrying frame and controlled at the other end by the nut on the valve-stem, and means for locking the nut and the stirrup in any position in which each is set, substantially as set forth.

2. In a compound double-action valve, the combination of, an annular valve-seat element, an internally flanged and screw-threaded nut for connection to the exterior of the conduit, the valve-seat element having an exterior flange which can bed against the end of the conduit and be gripped between this and the internal flange of the said nut, the said element further having on that side which is to face away from the conduit a frame supporting a screw-threaded socket whose through axis is situated centrally relatively to the valve-seating, a stirrup having an external screw-thread whereby it is engaged with the aforesaid socket, the cross-piece of the stirrup lying at a point between the said socket and the valve-seat, a valve of the mushroom type mounted concentrically in the valve-seat and having an external sealing face coöperating with the valve-seat to open outward and an internal sealing face and a throughway provided with a valve-seating on that side which is toward the conduit, a second mushroom-valve mounted concentrically relatively to the first and bedding on this second valve-seating to open inward, said valve having a stem which extends outward perpendicularly from it, passes through the cross-piece of the aforesaid stirrup as a guide and is screw-threaded at its upper end where it receives a nut, a compression-spring operating between the bottom of the stirrup and the outwardly opening valve, a second compression-spring thrust at one end against a support provided for it by the aforesaid socket-carrying frame and controlled at the other end by the nut on the valve-stem, and means for locking the nut and the stirrup in any position in which each is set, substantially as set forth.

3. In a compound double-action valve, the combination of, a valve-seat element provided with means for connection to the end

of a conduit, and having on that side which is to face away from the conduit a frame supporting a screw-threaded socket whose through axis is situated centrally relatively to the valve-seating, a stirrup having an external screw-thread whereby it is engaged with the aforesaid socket, the cross-piece of the stirrup lying at a point between the said socket and the valve-seat, a valve of the mushroom type mounted concentrically in the valve-seat and having an external sealing face cooperating with the valve-seat to open outward and an internal sealing face and a throughway provided with a valve-seating on that side which is toward the conduit, a second mushroom-valve mounted concentrically relatively to the first and bedding on this second valve seating to open inward, said valve having a stem which extends outward perpendicularly from it, passes through the cross-piece of the aforesaid stirrup as a guide and is screw-threaded at its upper end where it receives a nut, a compression-spring operating between the bottom of the stirrup and the outwardly opening valve, a second compression-spring thrust at one end against a support provided for it by the aforesaid socket-carrying frame and controlled at the other end by the nut on the valve-stem, means for locking the nut and the stirrup in any position in which each is set, and a domed hood secured over the whole valve-device, the base of the dome being larger in diameter than the valve-device and allowing free access of air to the interior, substantially as set forth.

4. In a compound double-action valve, the combination of, an annular valve-seat element, an internally flanged and screw-threaded nut for connection to the exterior of the conduit, the valve-seat element having an exterior flange which can bed against the end of the conduit and be gripped between this and the internal flange of the said nut, the said element further having on that side which is to face away from the conduit a frame supporting a screw-threaded socket whose through axis is situated centrally relatively to the valve-seating, a stirrup having an external screw-thread whereby it is engaged with the aforesaid socket, the cross-piece of the stirrup lying at a point between the said socket and the valve-seat, a valve of the mushroom type mounted concentrically in the valve-seat and having an external sealing face cooperating with the valve-seat to open outward and an internal sealing-face and a throughway provided with a valve-seating on that side which is toward the conduit, a second mushroom valve mounted concentrically relatively to the first and bedding on this second valve-seating to open inward, said valve having a stem which extends outward perpendicularly from it, passes through the cross-piece of

the aforesaid stirrup as a guide and is screw-threaded at its upper end where it receives a nut, a compression-spring operating between the bottom of the stirrup and the outwardly opening valve, a second compression-spring thrust at one end against a support provided for it by the aforesaid socket-carrying frame and controlled at the other end by the nut on the valve-stem, means for locking the nut and the stirrup in any position in which each is set, and a domed hood which covers the whole valve-mechanism and is rigidly secured to the flanged nut whereby the annular valve-seat element is secured in place, the base of the hood lying approximately at the same level as this fastening nut but being of larger diameter and open at the large end to allow free access of air, substantially as set forth.

5. In a compound double-action valve, the combination of, a valve-seat element provided with means for connection to the end of a conduit, and having on that side which is to face away from the conduit a frame supporting a screw-threaded socket whose through axis is situated centrally relatively to the valve-seating, a stirrup having an external screw-thread whereby it is engaged with the aforesaid socket, the cross-piece of the stirrup lying at a point between the said socket and the valve-seat, a valve of the mushroom type mounted concentrically in the valve-seat and having an external sealing-face cooperating with the valve-seat to open outward and an internal sealing-face and a through-way provided with a valve-seating on that side which is toward the conduit, a second mushroom-valve mounted concentrically relatively to the first and bedding on this second valve-seating to open inward, said valve having a stem which extends outward perpendicularly from it, passes through the cross-piece of the aforesaid stirrup and through the center of the threaded portion of the stirrup both of which parts are shaped to serve as guides for the stem and is screw-threaded at a point which lies within the stirrup where it receives a nut, a compression-spring operating between the bottom of the stirrup and the outwardly-opening valve, a second compression-spring thrust at one end against a support provided for it by the aforesaid socket-carrying frame and controlled at the other end by the nut on the valve-stem, and means for locking the nut and the stirrup in any position in which each is set, substantially as set forth.

6. In a compound double-action valve, the combination of, a valve-seat element provided with means for connection to the end of a conduit, and having on that side which is to face away from the conduit a frame supporting a screw-threaded socket whose through axis is situated centrally relatively

to the valve-seating, a stirrup having an external screw-thread whereby it is engaged with the aforesaid socket, the cross-piece of the stirrup lying at a point between the said socket and the valve-seat, a valve of the mushroom type mounted concentrically in the valve-seat and having an external sealing-face coöperating with the valve-seat to open outward and an internal sealing face and a throughway provided with a valve-seating on that side which is toward the conduit, a second mushroom-valve mounted concentrically relatively to the first and bedding on this second valve-seating to open inward, said valve having a stem which extends outward perpendicularly from it, passes through the cross-piece of the aforesaid stirrup as a guide and is screw-threaded at its upper end where it receives a nut, a compression-spring operating between the bottom of the stirrup and the outwardly opening valve, a second compression-spring thrust at one end against a support provided for it by the aforesaid socket-carrying frame and controlled at the other end by the nut on the valve-stem, means for locking the nut and the stirrup in any position in which each is set, a domed hood secured over the whole valve-device the base of the dome being larger in diameter than the valve-device and allowing free access of air to the interior, and a cylindrical gauze screen round the valve-mechanism engaged at its base with the valve-seat element and bearing at its upper end against the interior of the aforesaid domed hood, substantially as set forth.

7. In a compound double-action valve, the combination of, an annular valve-seat element, an internally flanged and screw-threaded nut for connection to the exterior of the conduit, the valve-seat element having an exterior flange which can be engaged against the end of the conduit and be gripped between this and the internal flange of the said nut, the said element further having on that side which is to face away from the conduit a frame supporting a

screw-threaded socket whose through axis is situated centrally relatively to the valve-seating, a stirrup having an external screw-thread whereby it is engaged with the aforesaid socket, the cross-piece of the stirrup lying at a point between the said socket and the valve-seat, a valve of the mushroom type mounted concentrically on the valve-seat and having an external sealing-face coöperating with the valve-seat to open outward and an internal sealing face and a throughway provided with a valve-seating on that side which is toward the conduit, a second mushroom-valve mounted concentrically relatively to the first and bedding on this second valve-seating to open inward, said valve having a stem which extends outward perpendicularly from it, passes through the cross-piece of the aforesaid stirrup as a guide and is screw-threaded at its upper end where it receives a nut, a compression-spring operating between the bottom of the stirrup and the outwardly opening valve, a second compression-spring thrust at one end against a support provided for it by the aforesaid socket-carrying frame and controlled at the other end by the nut on the valve-stem, means for locking the nut and the stirrup in any position in which each is set, a domed hood which covers the whole valve-mechanism and is rigidly secured to the flanged nut whereby the annular valve-seat element is secured in place, the base of the hood lying approximately at the same level as this fastening-nut but being of larger diameter and open at the large end to allow free access of air, and a cylindrical gauze screen surrounding the valve-mechanism and having its lower end clamped between the flange of the fastening-nut and the valve-seat element which the nut secures and its upper end bearing against the interior of the domed hood, substantially as set forth.

In testimony whereof I have signed my name to this specification.

THOMAS ALBERT CROMPTON, JUNIOR.