E. E. BAILEY AND J. H. JACOBS.

APPARATUS FOR CASTING DENTAL INLAYS.

APPLICATION FILED MAY 20, 1918.

1,320,824.

Patented Nov. 4, 1919.

2 SHEETS—SHEET 1.

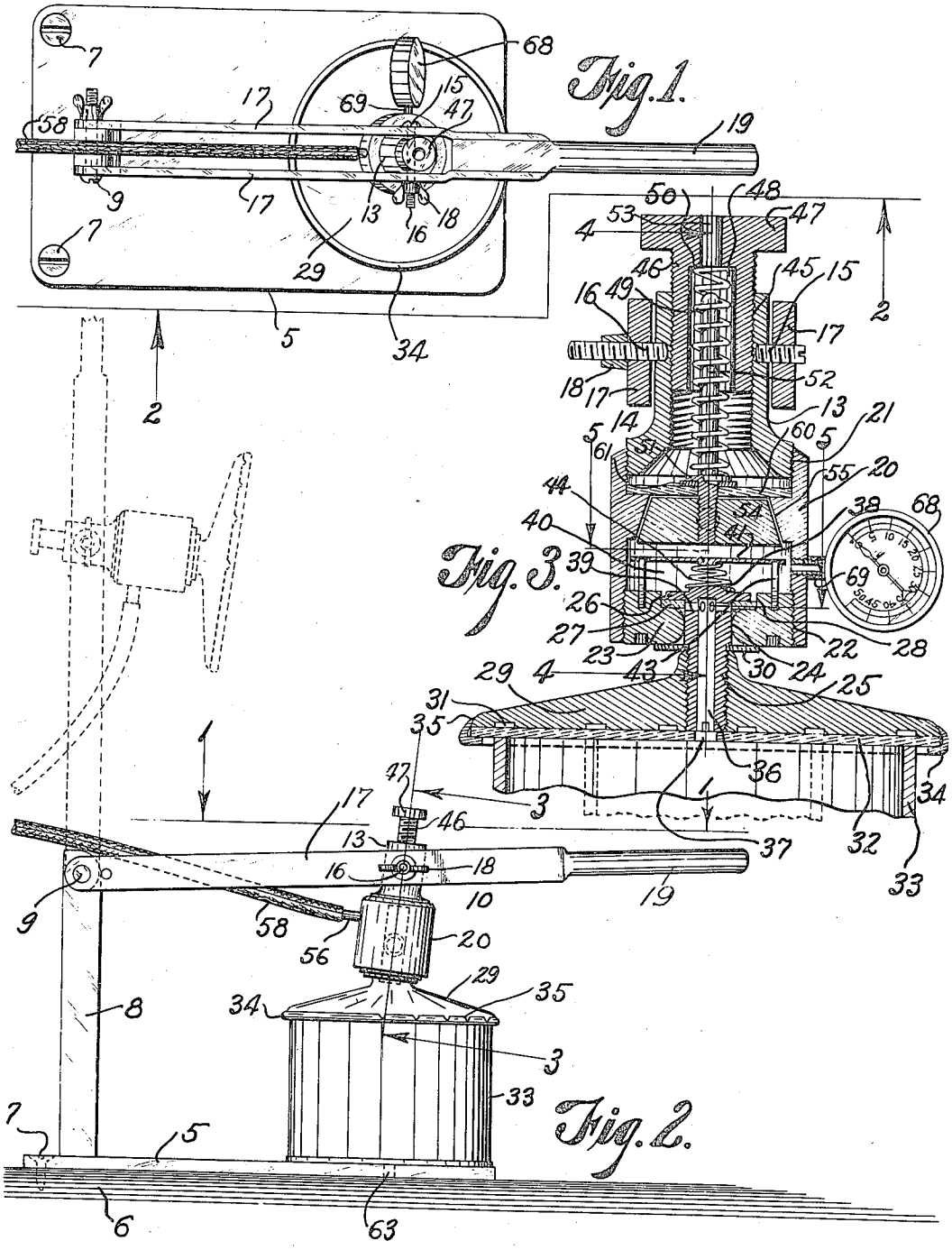


Fig. 1.

Fig. 3.

Fig. 2.

Inventor

E. E. Bailey and J. H. Jacobs.

By A. J. [illegible]

Attorney

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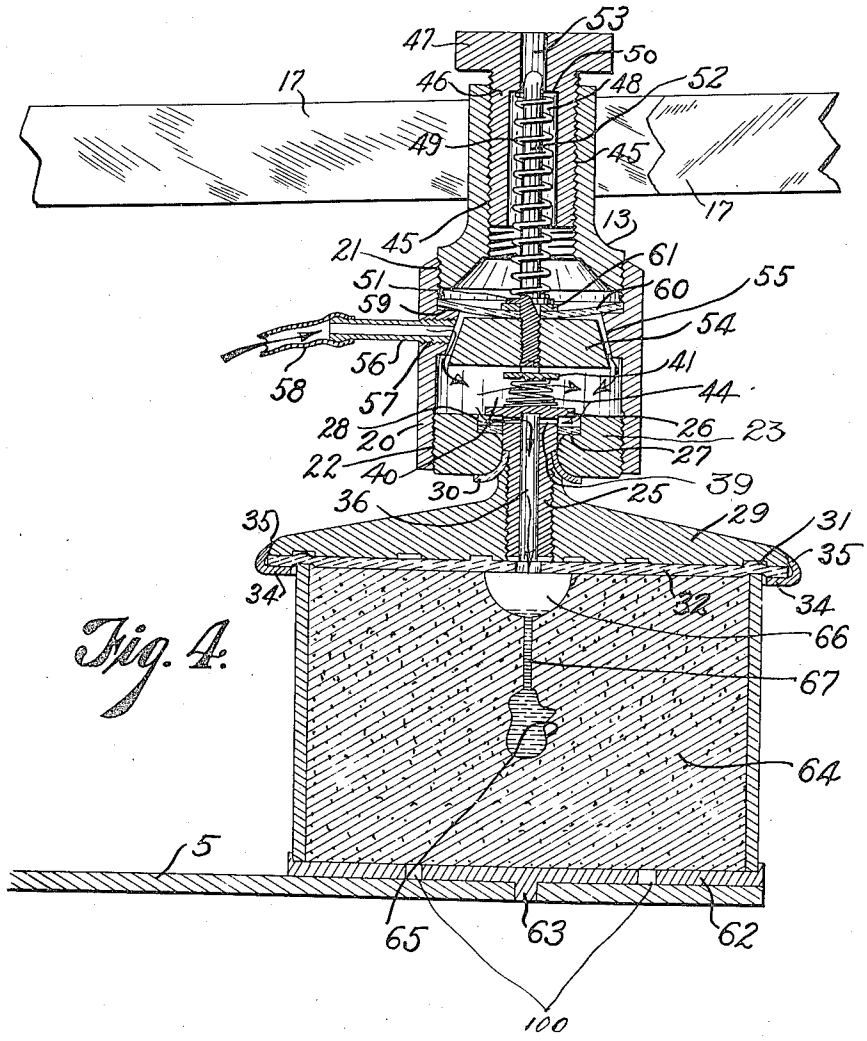


Fig. 4.

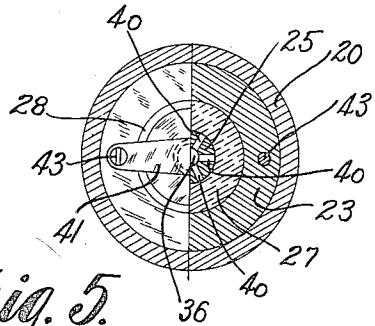


Fig. 5.

Inventor

E. E. Bailey and J. H. Jacobs.

By A. J. Brown

Attorney

UNITED STATES PATENT OFFICE.

ELPHA E. BAILEY AND JOSEPH H. JACOBS, OF DENVER, COLORADO, ASSIGNORS OF ONE-HALF TO THE JACOBS SPECIALTIES MANUFACTURING COMPANY, A CORPORATION OF COLORADO, AND ONE-HALF TO SAID JACOBS.

APPARATUS FOR CASTING DENTAL INLAYS.

1,320,824. Specification of Letters Patent. Patented Nov. 4, 1919.

Application filed May 20, 1918. Serial No. 235,522.

To all whom it may concern:

Be it known that we, ELPHA E. BAILEY and JOSEPH H. JACOBS, citizens of the United States, residing at the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Apparatus for Casting Dental Inlays; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

Our invention relates to improvements in casting apparatus, but is especially adapted for casting dental fillings ordinarily referred to as inlay fillings, together with other dental work as bridge work, crowns, plates and the like, our object being to provide an apparatus of this class which shall be well adapted for casting various articles of the character indicated, and to this end is constructed for use with flasks of varying size depending on the size of the article to be cast. Our further object is to provide a device of the character indicated, which shall be adapted for use with air pressure regardless of the degree of the pressure supplied. In other words, our device may be employed with air under pressure taken from the general plant in buildings, the valve mechanism of our structure being adapted to automatically cut off the air pressure when it reaches the predetermined degree.

It will be understood that in casting work of this character, the cavity in which the casting is formed is surrounded by an investment inclosed by the flask, of such character that an excessive pressure would expand the investment and therefore, make the casting inaccurate. For this reason, it is important, particularly where the air under pressure must be taken from a general source of supply, that provision be made for preventing an excess pressure.

In order to carry out the aforesaid purpose, we connect with our improvement a register which is acted on by the air under pressure as it passes through the valve mechanism into the flask so that the operator by inspecting the register may set the valve mechanism so that it will automatically close when the proper pressure has been reached. This is accomplished through the medium of a valve piece which is under spring tension, the latter being capable of such variation as to accomplish the aforesaid purpose.

Having briefly outlined our improvement we will proceed to describe the same in detail, reference being made to the accompanying drawing in which is illustrated an embodiment thereof. In this drawing:

Figure 1 is a top plan view of our improved machine.

Fig. 2 is a side elevation of the same, or a view looking in the direction of arrows 2, Fig. 1.

Fig. 3. is a section taken on the line 3—3, Fig. 2, looking toward the left, the parts being shown on a larger scale.

Fig. 4 is a section taken on the line 4—4, Fig. 3 illustrating the manner of forcing the molten metal into the cavity in the investment in order to form a dental filling.

Fig. 5 is a section taken on the line 5—5, Fig. 3 looking downwardly.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a base plate which may be secured to a suitable stationary support 6 by means of suitable fastening devices, as screws 7. Upon this base is mounted a post 8 to the upper extremity of which is pivotally connected, as shown at 9, a lever arm 10 which is bifurcated, as shown, to receive the upper interiorly threaded part 13 of the valve mechanism 14 of our improved apparatus, the said part 13 being trunnioned upon the lever arm on opposite sides through the medium of screw studs 15 and 16 which are threaded into perforations formed in opposite sides of the part 13, said studs passing through unthreaded openings formed in the parts 17 of the bifurcated portion of the arm 10. The screw stud 16 is somewhat longer than the stud 15, and is equipped with a wing nut 18 for the purpose of locking the valve mechanism in the desired position of adjustment as hereinafter more fully explained. The arm 10 extends beyond the trunnions and terminates in a hand piece 19 for convenience of manipulation. The part 13 of the valve mechanism is threaded into the upper extremity of a cylindrical casing member 20, the latter

being interiorly threaded, as shown at 21 for the purpose.

The lower extremity of the casing part 20 is also interiorly threaded, as shown at 22, to receive a plug 23, which is perforated as shown at 24, to receive a stem 25 whose upper extremity is provided with a flange 26 which supports the stem within the plug 23, a packing ring or gasket 27 being arranged below the said flange and within a recess 28 in the upper portion of the plug. To the lower portion of the stem 25 is threaded a cap 29 between which and the plug is arranged a packing washer or gasket 30. The cap 29 is of such size that it may be employed with flasks of varying size and for this purpose the lower surface of the cap is provided with a number of circumferential recesses 31 which are adapted to conform to the size of the various flasks. Detachably applied to the lower surface of the cap 29 is a disk 32 composed of asbestos or other suitable material adapted to seal the top of the flask 33. The disk 32 is held in place by a spring ring 34 whose upper edge is formed into a series of yielding lips 35 to facilitate the removal and insertion of the disk.

The stem 25 is perforated longitudinally as shown at 36, the lower extremity of the perforation registering with an opening 37 formed in the disk 32. The upper extremity of the perforation 36 of the stem is closed, as shown at 38, but is in communication with a series of lateral orifices 39 which communicate with a chamber 40 within the casing member 20. The stem 25 is acted on from above by a spiral spring 44 which engages a stop plate 41 supported by screws 43 whose lower extremities are threaded into the plug 23 and extend above the same, whereby the stop plate is spaced from the top of the stem. The spring is thus positioned between the plate 41 and the upper extremity of the stem 25 and places the stem 25 together with the cap 29 supported thereby under tension to move downwardly to bring the flange 26 of the stem into engagement with the gasket 27. When however, the cap 29 is forced tightly down upon the flask by means of a handle 19, the upper extremity of the stem 25 is raised above the gasket 27 and allows the compressed air from the chamber 40 to pass downwardly into the flask by way of the orifices 39, the perforation 36 and the opening 37.

The part 13 of the valve mechanism is interiorly threaded as shown at 45, to receive a tension nut 46 whose upper extremity is enlarged, as shown at 47, and whose outer surface is milled or roughened to facilitate manipulation. The lower reduced portion of this nut is bored, as shown at 48, to receive a spiral spring 49 whose upper extremity bears against the shoulder 50 formed at the upper extremity of the counterbore, the lower extremity of the spiral spring engaging a shoulder 51 formed upon a stem 52 which extends both above and below the said shoulder. The upper portion of this stem enters the counterbore 48 of the nut and is also adapted when the nut is properly adjusted to enter an opening 53 which extends through the upper portion of the nut, being in communication with the bore 48 but reduced in size. The portion of the stem 52 below the shoulder 51 is threaded into a perforation formed in a frustum-shaped valve piece 54, whose lower surface is of greater area than its upper surface, the said valve piece being arranged within the cavity of the casing member 20, the wall of the portion of the cavity in which the valve piece 54 is located, being beveled as shown at 55 to conform to the bevel of the adjacent surface of the valve piece, so that when the latter is at its upward limit of movement, the cavity will be closed against the entrance of compressed air or gas which is adapted to enter said cavity through a tube 56 which is threaded into a lateral perforation 57 formed in the casing member 20, the tube 56 being connected with a flexible conduit 58, the latter being in communication with a source of compressed air or gas, not shown.

The casing member 20 is provided above the valve piece 54 with a shoulder 59 which forms a support for a gasket 60 composed of rubber or other suitable material. This gasket fits closely around the stem 52 below the shoulder 51, a washer 61 being arranged between the shoulder 51 and the said gasket. When the tension nut is screwed down in order to place the valve piece 54 under tension in order to regulate the degree of pressure required to close the same and cut off the compressed air from the flask, the gasket 60 will be bent downwardly, as shown in Fig. 4, the space between the wall 55 of the casing and the adjacent face of the valve piece being correspondingly widened from the normal space shown in Fig. 3.

It should be explained that the cap 29 of the structure is mounted to have a limited rocking movement in the plug 23 to allow the cap to automatically adjust itself when pressed into position upon the top of the flask.

As illustrated in the drawing (see Fig. 4) the flask 33 rests upon a centering plate 62 which is mounted on the base plate 5 of the machine, the plate 62 having a depending stud 63 which enters an opening of counterpart shape formed in the base 5. As shown in this view, the flask 33 is filled with a suitable investment 64 containing a cavity 65 which conforms to the shape of the dental filling to the cast, the upper

portion of the investment containing a cavity 66 which is in communication with the cavity 65 by a sprue hole 67. When the device is in use, the perforation 36 of the stem 25 is in communication at its lower extremity by way of the opening 37 in the disk 32, with the cavity 66. This cavity is adapted to receive a piece of metal, as gold, for instance, which is subjected to the necessary heat to melt it before the cap is applied to the flask. As shown in Fig. 4 the gold has been melted in the cavity 66 and the top flask sealed by downward pressure upon the hand piece 19 of the lever arm 10. This downward pressure has also raised the upper extremity 26 of the stem 25 from the gasket 27, thus allowing the air which enters through the tube 56 to pass freely into the cavity 66 for the purpose of forcing the molten metal into the cavity 65 in which the gold filling or inlay is cast.

From the foregoing description the use and operation of our improved apparatus will be readily understood. Assuming that the tube 56 is connected with a source of air under pressure, the tension nut 46 is adjusted (see Fig. 4) to place the valve piece 54 under a predetermined tension, that is such a tension as will require a certain air pressure acting upon its lower enlarged surface in order to close the valve piece or cause its outer surface to seat tightly against the adjacent wall of the casing member 20. As the nut 47 is adjusted, the operator will watch a register 68 which is in communication through a tube 69 with the chamber 40 of the valve casing. The operator will know the pressure which he desires to employ in order to force the molten metal into the cavity 65 of the investment, such pressure only being permitted as will properly perform this function without expanding the cavity 65 in the investment. By watching the register while adjusting the tension nut, the device may be set so that the valve piece 54 will close when the pressure exceeds the predetermined amount required, as aforesaid.

It will be understood that when the operator presses downwardly upon the handle 19, the cap 29 by virtue of its connection with the valve mechanism as heretofore described, will be forced into sealing relation with the upper edge of the flask 33, as illustrated in Fig. 4.

The centering plate 62 which supports the flask is provided with a number of perforations 100 for the escape of a small quantity of air which must pass into and through the investment, as the molten metal enters the cavity 65. It will be understood that as the center plate 62 rests upon the metal surface of the base 5, that the two metal contact surfaces do not form a fluid tight seal. Hence, provision is made for the escape of the small quantity of air required during the casting operation.

As soon as the casting act has been accomplished and the cap is lifted from the top of the flask, the action of the spiral spring 44 upon the upper extremity of the stem 25, will force the flange 26 of the stem tightly against the gasket 27, thus preventing the escape of the compressed air from the chamber of the casing 20.

Having thus described our invention, what we claim is:

1. In casting apparatus, the combination with a flask, and a source of fluid under pressure, of means arranged between the said source and the flask for automatically limiting the pressure of fluid supply to the flask.

2. In casting apparatus, the combination with a flask, and a source of fluid under pressure of means arranged between the said source and the flask for introducing fluid to the flask and automatically cutting off such fluid at a predetermined maximum pressure.

3. In apparatus of the class described, the combination with a flask, and a source of fluid under pressure, of means arranged between the said source and the flask for introducing fluid to the flask, said means being adjustable to predetermine the maximum degree of such pressure.

4. In apparatus of the class described, the combination with a flask, and a source of fluid under pressure, of means arranged between the said source and the flask for introducing fluid to the flask, said means being adjustable to predetermine the maximum degree of such pressure and serving to automatically cut off such fluid when such pressure is attained.

5. In apparatus of the class described, the combination with a flask, and a source of fluid under pressure, of means arranged between the source and the flask for introducing fluid to the flask and adjustable to predetermine the maximum degree of such pressure, said means serving to automatically prevent the fluid in the flask from attaining a greater degree of pressure.

6. Casting apparatus comprising a source of fluid under pressure, a flask, a sealing cap for the flask, and valve mechanism arranged between the said source and the cap for introducing fluid to the flask through the cap, said valve mechanism being adjustable for limiting the maximum pressure of fluid delivered to the flask.

7. Casting apparatus comprising a source of fluid under pressure, a flask, a sealing cap for the flask, valve mechanism arranged between the said source and the cap for introducing fluid to the flask through the cap, said valve mechanism being adjustable for determining and limiting the maximum pressure of fluid to be delivered to the flask,

and a connection between the cap and said valve mechanism for automatically opening communication between the flask and the fluid source as the cap is applied to the flask.

8. Casting apparatus comprising a source of fluid under pressure, a flask, a sealing cap for the flask, valve mechanism arranged between the said source and the cap for introducing fluid to the flask through the cap and adjustable for determining the maximum supply of fluid pressure admitted to the flask, the cap having a loose fluid-tight connection with the valve to facilitate its proper positioning upon the flask.

9. In casting apparatus, the combination with a source of fluid under pressure, a flask and a sealing cap for the latter, of valve mechanism arranged between the fluid source and the cap for introducing fluid to the flask through the cap, the said mechanism being constructed to close automatically when a predetermined pressure is reached in the flask and being adjustable to permit a predetermined degree of pressure in the flask before closing.

10. The combination of a flask, a sealing cap for the flask, valve mechanism, said mechanism including a casing with which the cap is connected, the valve chamber communicating with the flask through the cap, a frustum shaped valve piece whose surface toward the flask is of greater area than its opposite surface, the casing forming a seat for the valve piece which is normally open, means for introducing fluid under pressure to the valve chamber, and means for placing the valve piece under tension to remain open until the desired predetermined pressure in the flask is attained.

11. In casting apparatus, the combination with a flask, of a lever arm, valve mechanism trunnioned on said arm, and a sealing cap connected with said mechanism and cooperating with the latter to introduce fluid to the flask, the cap having an oscillatory fluid-tight connection with the said valve mechanism for self-adjusting purposes.

12. In casting apparatus, the combination with a flask, of a lever arm, valve mechanism supported by said arm and including a casing, a frustum shaped valve piece, a stem connected with the valve piece, a flexible diaphragm carried by the stem and supporting the valve piece, means for placing tension on the diaphragm for regulating the closing pressure of the valve piece, and a sealing cap for the flask connected with the valve casing and forming communication between the valve chamber and the flask.

13. In casting apparatus, the combination with a flask, of a lever arm, valve mechanism supported by said arm and including a casing, a frustum shaped valve piece, a stem connected with the valve piece, a flexible diaphragm carried by the stem and supporting the valve piece, means for placing tension on the diaphragm for regulating the closing pressure of the valve piece, and a sealing cap for the flask connected with the valve casing and forming communication between the valve chamber and the flask, the cap being loosely connected with the casing for self adjusting purposes.

14. In casting apparatus, the combination with a flask, of a lever arm, valve mechanism supported by said arm and including a casing, a frustum shaped valve piece, a stem connected with the valve piece, a flexible diaphragm carried by the stem and supporting the valve piece, means for placing tension on the diaphragm for regulating the closing pressure of the valve piece, and a sealing cap for the flask connected with the valve casing and forming communication between the valve chamber and the flask, the cap being connected with the casing to open communication between the valve chamber and the flask when the cap is applied and to cut off the passage of fluid through the cap when the latter is removed from the flask.

15. The combination with a flask, valve mechanism, a movable support therefor, said mechanism including a casing in communication with a source of fluid under pressure, a frustum shaped valve piece, a stem connected with said piece, a flexible diaphragm connected with the stem and forming a support for the valve piece, a spiral spring surrounding the stem, the latter having a stop which one extremity of the spring engages, a tension nut acting on the spring for regulating the flowing pressure of the valve piece, and a sealing cap connected with the valve casing and open for the passage of fluid to the flask.

16. The combination with a flask, valve mechanism, a movable support therefor, said mechanism including a casing in communication with a source of fluid under pressure, a frustum shaped valve piece, a stem connected with said piece, a flexible diaphragm connected with the stem and forming a support for the valve piece, a spiral spring surrounding the stem, the latter having a stop which one extremity of the spring engages, a tension nut acting on the spring for regulating the closing pressure of the valve piece, and a sealing cap for the flask, a stem connected with the cap, a plug in the valve casing through which the stem passes and in which the stem is movable, the cap stem having a passage communicating at one extremity with the flask and at its opposite extremity with the valve chamber.

17. The combination with a flask, valve mechanism, a movable support therefor, said mechanism including a casing in communication with a source of fluid under

pressure, a frustum shaped valve piece, a stem connected with said piece, a flexible diaphragm connected with the stem and forming a support for the valve piece, a spiral spring surrounding the stem, the latter having a stop which one extremity of the spring engages, a tension nut acting on the spring for regulating the closing pressure of the valve piece, a sealing cap for the flask, a stem connected with the cap, a plug in the valve casing through which the stem passes and in which the stem is movable, the cap stem having a passage communicating at one extremity with the flask and at its opposite extremity with the valve chamber, and a spring acting on the cap stem to cut off communication with the valve chamber when the cap is removed from the flask.

In testimony whereof we affix our signatures.

ELPHA E. BAILEY.
JOSEPH H. JACOBS.