March 2, 1937. G. N. HEIN 2,072,366

REFLEX BULB SYRINGE

Filed Aug. 14, 1933

Fig. 1.

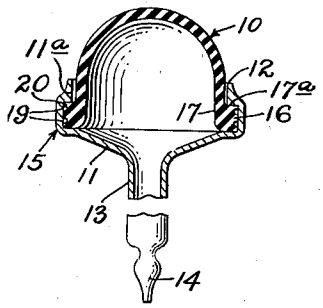


Fig. 2.

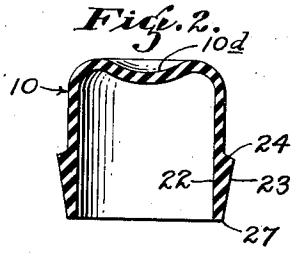


Fig. 4.

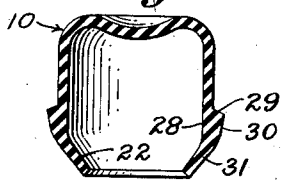


Fig. 3.

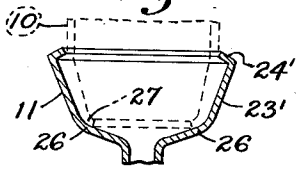


Fig. 5.

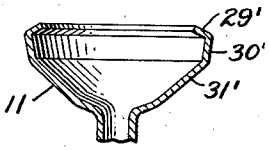


Fig. 6.

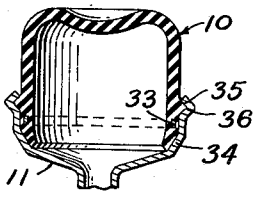


Fig. 7.

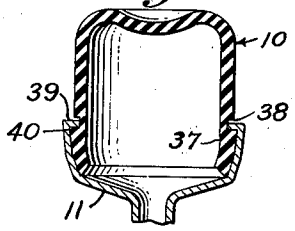


Fig. 8.

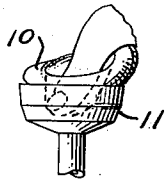


Fig. 9.

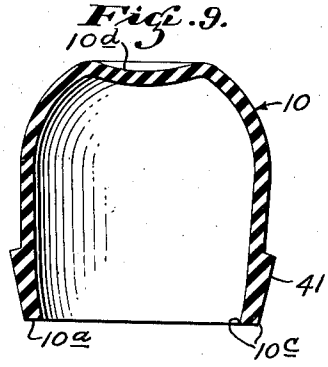


Fig. 11.

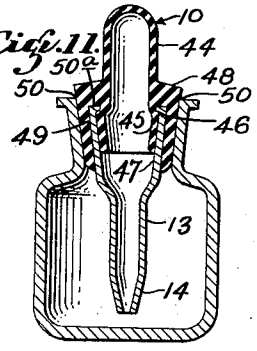


Fig. 13.

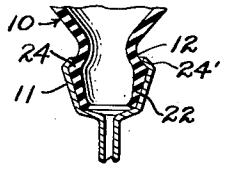


Fig. 10.

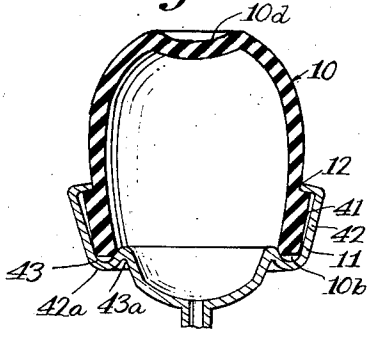
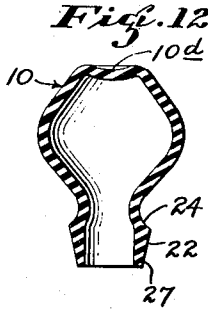


Fig. 12.



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2,072,366

UNITED STATES PATENT OFFICE

2,072,366

REFLEX BULB SYRINGE

George N. Hein, San Francisco, Calif.

Application August 14, 1933, Serial No. 684,966

6 Claims. (Cl. 128—232)

This invention relates to syringes of the type employing resilient reflex bulbs, and is a continuation in part of my copending application, Serial No. 476,293, filed August 19, 1930, and is a renewal in part of my application Serial No. 608,453 filed April 30, 1932.

It is one object of this invention to provide an improved syringe of the type employing a detachable resilient reflex bulb, having novel means for detachably fixing the bulb to the body of the syringe.

Another object is to provide a novel syringe of the type employing a resilient reflex bulb, in which the bulb is of such form that it may be molded in a unitary manner, and thereby overcome the difficulties that have been encountered in the manufacture of such bulbs in a spherical form.

Another object is to provide a syringe of the type employing a resilient reflex bulb, and novel means for detachably mounting the bulb on the body of the syringe, said means consisting of the novel construction of the body and the bulb, whereby the number of parts are reduced to a minimum, and providing an efficient connection therebetween which will be proof against leakage of either liquid or air either on the pressure or suction stroke of the bulb.

Another object is to provide a syringe employing a resilient reflex bulb of novel shape, which will effect both an even and regular expulsion of fluid or gas from the syringe, and providing a surface on which the syringe may be supported in an upright position, and also providing a desirable finger grip for holding the device and rendering it more efficient in operation as well as easier to manipulate.

Another object is to provide a syringe having the above characteristics, wherein the resilient reflex bulb is so constructed that it may be pushed into or snapped into detachable connection with the body of the syringe, which connection will be rigid and proof against leakage.

Another object is to provide in a syringe having as a medium to expel the contents thereof, a resilient reflex bulb in which the pressure of operation tends to more tightly seal the connection between the bulb and the body of the syringe.

Another object is to provide a syringe employing a bowl having a resilient reflex ejecting bulb, in which the bowl and bulb are of such construction that the bulb may be snapped or pushed into operating position and detached therefrom by means of lateral distortion of the bulb.

Another object is to provide in a syringe having the above characteristics, a detachable reflex bulb that may be operatively connected with the bowl of a syringe or pipette, in which the resilient bulb is further provided with a cork or stopper portion adapted to cover and rest in the mouth of a bottle or the like.

Another object is to provide a syringe having the above characteristics, which will operate with smoothness and evenness of resistance during its manipulation to expel the contents, and which provides a suitable finger grip for holding the device while operating the same, and also providing a supporting portion upon which the syringe may rest when not in use.

A further object is to provide a syringe having the above characteristics, which can be taken apart quickly and replaced together, that shall be leak-proof in action, sterilized by boiling or otherwise, which permits ready access to both the internal and external parts for both inspection and repair, which will provide the required rebound action, and which consists of a minimum number of parts, and inexpensive to manufacture.

A still further object is to provide a syringe having the above characteristics, that shall operate to effect a substantial complete expulsion of the medium from the syringe chamber, and possessed of the elastic rebound desired when the bulb is relieved of the operating pressure.

A still further object is to provide a novel syringe for medical, dental or relating practitioners, and which may be equally convenient for unskilled persons to operate and keep clean, and thus offer greater cooperation between the practitioner and the patient in combating disease, as well as to promote sanitation and hygiene in all forms where syringe treatment is required.

The above and other objects will be apparent throughout the further description of the invention when taken in connection with the accompanying drawing, wherein like reference characters refer to like parts. It is to be specifically understood that the drawing is not a definition of the invention, this being defined by the appended claims.

In the drawing:—

Fig. 1 is a front elevation, partly in section, of a syringe embodying the invention, in which the resilient bulb is mounted by its resiliency on the syringe body.

Figs. 2 and 3 are sectional views of a resilient bulb and syringe body respectively, embodying the invention.

Figs. 4 and 5 are views similar to Figs. 2 and 3, illustrating a modification of the invention.

Fig. 6 is a sectional view of a syringe body and bulb, illustrating another modification of the invention.

Fig. 7 is a sectional view of the syringe body and bulb, showing another modification of the invention.

Fig. 8 is an elevational view of a syringe body and bulb, showing the bulb in collapsed position.

Figs. 9 and 10 are sectional views of a bulb and syringe body respectively, showing another modification of the invention.

Fig. 11 is a sectional view, showing a syringe or pipette, wherein the bulb embodying the present invention includes a stopper or cork portion, the device being positioned in a bottle, and

Figs. 12 and 13 are sectional views of a syringe body and bulb respectively, showing still another embodiment of the invention.

In the preferred exemplified forms shown, the present invention comprises broadly a resilient reflex bulb 10, having an external shoulder intermediate its axial length, a body or bowl portion, 11, having an open end, 12, and terminating at its opposite end in an ejector portion, 13, the latter terminating to form a nozzle, 14. The ejector portion and nozzle does not form a part of the invention, and it is to be understood that the body, 11, ejector, 13, and nozzle, 14, may be formed integral, one with the other, or each may be formed separately and adapted for detachable connection, one with the other. Adjacent the open end, 12, the bowl has a radially inwardly formed flange, 11*a*, which provides an inner annular groove, 16, with the bowl underlying the flange. The means for connecting the bulb with the bowl is indicated in its entirety by 15.

In Fig. 1, the resilient bulb or closure member, 10, is provided with a resilient integral radially outward annular lip or flange, 17, which provides a shoulder, 17*a*, the circumferential outer face of the flange preferably having annular grooves, 19, therein, providing a series of baffle rings, 20, to prevent leakage. The exterior diameter of the flange, 17, is substantially the same as the interior diameter of the groove, 16, and the width of the flange, 17, is substantially the same as the width of the groove, 16, whereby a close snug fit is provided between the cooperating surfaces of the flange, 17, and groove, 16, with the shoulder 17*a* underlying the flange, 11*a*.

It will be observed from the drawing that the external diameter of the flange, 17, is greater than the opening, 12, in the bowl, which necessitates distorting or collapsing the flange, 17, laterally in order to insert the flange within the opening, 12, after which time the pressure applied for distorting the flange 17, is released, and the flange snaps into the groove, 16, by its own resiliency. When it is desired to detach the bulb from the bowl, it is only necessary to distort the flange, 17, by applying lateral pressure to the bulb, adjacent the top of the bowl, until the flange, 17, is distorted sufficiently to withdraw it through the opening, 12. That portion of the bulb forming the flange, 17, is of greater thickness than the wall of the bulb proper, which permits the bulb proper to be flexed as by thumb pressure, or collapsed for all useful purposes of operation without interfering with the operating position of the flange, 17.

Figs. 2 and 3 illustrate modifications of the bulb, 10, and bowl, 11, respectively, wherein the open end portion of the bulb body is provided with a thickened portion, 22, having its outer surface conically tapered, as shown at 23, and providing a shoulder, 24, which is preferably beveled inwardly and upwardly. The thickness of the bulb proper is considerably less, and, therefore, more flexible than the portion forming the conical taper, 23, and shoulder, 24. The external diameter of the truncated cone at open end of the bulb is less than the internal diameter of the opening, 12, of the bowl of Fig. 3, for permitting the open end of the bulb to be easily inserted so that the bulb may be pushed into the bowl, or the bulb may be distorted laterally and placed within the bowl, as in the case of Fig. 1. The bowl of Fig. 3, is formed with complementary portions, 23', and 24', for receiving the corresponding portions of the bulb of Fig. 2. It is to be noted, however, that the portion, 23' has a greater angle of inclination with the axis of the syringe than does the portion, 23, so that when the bulb is positioned or pushed into the bowl, the beveled portion, 23, of the bulb engages the interior portion of the bowl portion, 23', so that the beveled portion, 23, is caused to flex or wedge inwardly. This action effects a rigid tight connection between the cooperating surfaces of the portions, 23 and 23'. The bowl is further provided with the portion, 26, the latter having still a greater angle of inclination with the axis of the device, and adapted to flex the lip portion, 27, of the bulb further inwardly, and it can be seen from the drawing that when the bulb is placed in its operative position within the bowl, that the cooperating portions, 24 and 24', will prevent any outward movement of the bulb with respect to the bowl, and maintaining a rigid fixed non-leakable contact between the cooperating bulb and bowl portions. When it is desired to detach the bulb from the bowl, it is only necessary to distort the bulb laterally adjacent the shoulder, 24, until the shoulder, 24, is distorted sufficiently to be withdrawn from the opening, 12. This structure provides a convenient means for connecting the bulb with the bowl, either by pushing the bulb into the bowl or snapping the bulb within the bowl by distorting the bulb laterally.

It has been found in practice, that when a bulb of the type illustrated by Fig. 2 has been used for a sufficient length of time, the portion, 22 loses some of its resiliency, and takes on the form, as shown by the dotted lines in Fig. 3. This is due, more or less, to material fatigue or other conditions which the portion, 22, may be subjected to during use. Therefore, it has been found advisable for some installations and use to provide a bulb, as shown by Fig. 4, wherein the portion 22 is formed to be normally in substantially the position as shown by dotted lines in Fig. 3. Such a construction requires a modified bowl, as shown by Fig. 5. The preferred form of this modification consists of a bulb portion, 28, providing beveled portions 29 and 30, the portion 28 terminating in an inwardly turned lip portion 31. The bowl provides complementary portions 31', 30', and 29'. The portion 31' of the bowl provides a bevel having an angle of greater inclination to the axis of the syringe than does the portion 31 of the bulb, so that when the bulb is positioned into the bowl, the portion 31 is flexed inwardly, and by its resiliency causes the several cooperating portions 29, and 29', 30 and 30', and 31 and 31' to assume close contact relation. This construction provides a smaller open end of the bulb. However, such opening is sufficiently large so that the bulb can be vulcanized with an in-

ternal male die and permit the bulb to be turned inside out for cleansing.

Fig. 6 illustrates another embodiment of the invention, which embodiment is particularly adapted to permit ejection from the bowl by pressing the end with the thumb. This modification includes a ring member 33 embedded in the bulb adjacent the lip portion 34, the ring member 33 being adapted to prevent lateral distortion of the bulb at this point, and since the external diameter of the ring portion of the bulb is substantially the same as the internal diameter of the opening of the bowl, the bulb may be withdrawn from the bowl by laterally distorting the bulb sufficiently to distort the shoulder 35, from its seat in the V-shaped groove, 36, formed in the bowl, as may be clearly seen from the drawing.

Fig. 7 illustrates another form of the invention, wherein the sealing portion 37 is thicker than the main body portion of the bulb, and is further provided with the groove portion 38 adapted to receive an inwardly projecting annular flange, 39, formed on the periphery of the bowl opening, so that when the portion, 37, is positioned within the bowl, the shoulder, 40, of the portion, 37, formed by the greater thickness of the portion, 37, as well as the groove, 38, will engage the annular flange, 39, and maintain the bulb in rigid operating position. The groove, 38, further serves to make the bulb more flexible, and consequently causes the portion, 37, to be less responsive to lateral pressure on the bulb proper, and is permitted to maintain its operating position within the bowl when the bulb proper is laterally distorted during ejecting operation.

Fig. 8 shows a manner in which the bulb illustrated in Fig. 7 may be distorted without interferring with the connection between the bulb and bowl.

As brought out in connection with Figs. 4 and 5, under certain usage the elastic bulb at the flange end takes on the exact form of the bowl, that is, the bulb flange loses its rebound qualities or resiliency to a certain extent, which causes the device to leak during the suction action of the bulb.

Figs. 9 and 10 illustrate a modification of the invention, which successfully overcomes this difficulty. The bulb may be formed in the first instance, as shown by Fig. 9, having the beveled connection portion 41 adapted to be pushed into the elongated annular groove, 42, of the bowl, shown in Fig. 10. It is preferred that the external diameter of the open end of the bulb be slightly smaller than the internal diameter of opening 12, so that it may enter opening 12 readily and guide the beveled portion 41 to its seat by mere pressure. The lower portion, 42*a*, of groove 42 is retroverted upon itself forming in cross section an ogee curve, forming an annular channel, 43, interiorly at the bottom of the bowl and forming an upformed bead, 43*a*, exteriorly at the bottom face of the bowl. The channel, 43, receives the flat face 10*a* of the open end of the bulb in slightly spaced relation as indicated, 10*b*, and the terminating edges, 10*c*, of the face, 10*a*, form a narrow line of contact with the side walls of the channel, 43, the outer edge, 10*c*, tightly contacting the radially outward channel wall upon pressure of the bulb, and the inner edge, 10*c*, tightly contacting the radially inner channel wall on the suction stroke of the bulb. The upformed bead, 43*a*, provides a convenient finger grip for holding the device during operation thereof. The narrow line of contact referred to above eliminates wide areas of contact in which small high and low spots are bound to occur in commercial production and which would tend to produce leakage spaces.

Fig. 11 illustrates a modification of the invention, for use in connection with a pipette. In the form shown, the bulb 44 is provided at its open end with a lip 45, formed with a shoulder 46 for engaging the body or bowl 47 of a pipette with cooperating tapering walls in contact in a manner similar to that described above. The bulb is further provided with a cork or stopper portion, 48, which may be an integral part of the bulb, said stopper portion having an annular lip portion, 49, projecting downwardly and adapted to receive the bowl, 47, of the pipette. The external surfaces of the portion, 49, may be formed to fit snugly in the mouth of a bottle, as shown at 50. The bowl 47, is inserted between lips 45 and 49 and is held in rigid, fixed contact with the lips by the resiliency thereof and the engagement of shoulder 46 and flange 50*a*.

Figs. 12 and 13 illustrate a slightly different modification of the invention, showing a conventional bulb provided with the push-in or snap-in tapered portion, 22, of the type similar to that described for Fig. 2. This type of bulb is especially adapted for use with spouts or dispersing nozzles, and since the lip portion 27 is smaller than the opening 12 in the bowl of the spout or dispensing nozzle, the connection may be made by pushing the taper, 22, into the opening 12, until it is seated in its proper position, the flange 24' of the bowl cooperating with the shoulder, 24, acting to maintain it in operative connection. This embodiment is particularly adapted for lateral actuation of the elastic bulb, since many operators among doctors and dentists prefer, or are accustomed to lateral operation of syringe bulbs. The opening of the bulb is, however, large enough to permit sterilization and formation of the bulb by internal and external dies.

The upper or globular portion of the bulb, 10, (in Figs. 2, 9, and 12, for example) is preferably formed with a depressed portion indicated generally, 10*d*, thus providing a flat ring whereby the syringe may be stood on end when not in use, and the depression serving the further important purpose of eliminating a sudden and irregular ejection because the resilient material has already passed the chord of its arc and the pressure on side wall is to envelop them downwardly and not press them radially outwardly, as more fully explained in my co-pending application, Ser. No. 598,229 filed March 11, 1932.

While there has been only certain modifications of the invention illustrated and described, it will be apparent to those skilled in the art, that other changes, modifications, substitutions and omissions may be made in the structure, without departing from the spirit and scope of the invention, as defined by the appended claims.

I claim:—

1. In a syringe device, a bowl comprising a body having a bottom provided with a discharge outlet portion, and having a side wall extending upwardly from said bottom portion, the upper portion of said side wall terminating in a radially inwardly projecting flange defining an opening which is adapted for closure by a bulb member, said flange being adapted for releasably engaging thereunder a shoulder of the bulb member and said bowl having at the base of the side

wall an annular channel opening upwardly into the bowl, said annular channel being adapted for receiving therein the terminal edge of the bulb.

2. In a syringe device, a bowl comprising a body having a bottom provided with a discharge outlet portion and having a side wall extending upwardly from said bottom portion and terminating in an upper opening for receiving a bulb closure member, said bowl including at said opening means for engaging the bulb to releasably hold it on the bowl, and said bowl body having at the bottom of the side wall thereof an annular channel opening inwardly into the bowl, said annular channel underlying said upper opening and being adapted for receiving therein an edge of the bulb opening.

3. A syringe device comprising a bulb of resilient material having an open end, and a bowl comprising a body having a bottom provided with a discharge outlet portion and having a side wall extending upwardly from said bottom portion and terminating in an upper opening for receiving the bulb closure member, said bowl including at said opening means for releasably engaging the bulb to hold it on the bowl, and said bowl body having at the bottom of the side wall thereof an annular channel opening upwardly and inwardly into the bowl, said annular channel being adapted for receiving therein the end portion of the bulb wall.

4. A syringe device comprising a bulb of resilient material having an open end and a radially externally projecting resilient portion spaced from said open end providing an external resilient shoulder intermediate the axial length of the bulb, the external wall of the bulb being conically tapered radially inwardly from said shoulder toward the open end of the bulb, and a bowl comprising a body having a bottom provided with a discharge outlet portion, and having a side wall the inner face of which is tapered upwardly and outwardly from said bottom portion, the upper portion of said side wall terminating in a radially inwardly projecting flange defining an opening which is adapted to receive therethrough the tapered wall of the bulb member, said flange being adapted for releasably engaging thereunder the shoulder of the bulb member, and said bowl having at the base of the tapered side wall an annular channel opening upwardly into the bowl, the tapered side wall of the bulb being of sufficient length axially of the bulb so that when the shoulder of the bulb underlies the inward flange of the bowl the opposite end of the tapered wall of the bulb will be disposed in the annular channel of the bowl.

5. In a syringe device, a bulb of resilient material having an open end and a radially externally projecting resilient portion spaced from said open end providing an external resilient shoulder intermediate the axial length of the bulb, the external wall of the bulb being conically tapered radially inwardly from said shoulder toward the open end of the bulb.

6. In combination with a syringe bowl having a discharge opening at the bottom thereof and a side wall extending upwardly therefrom terminating in an inturned flange defining an opening for receiving a bulb member, a bulb of resilient material having an open end and a radially externally projecting resilient portion spaced from said open end providing an external resilient shoulder intermediate the axial length of the bulb, the external wall of the bulb being conically tapered radially inwardly from said shoulder toward the open end of the bulb.

GEORGE N. HEIN.