July 11, 1950 G. N. HEIN ET AL 2,514,576

RESILIENT BULB SYRINGE

Filed Feb. 25, 1947

Fig. 1.

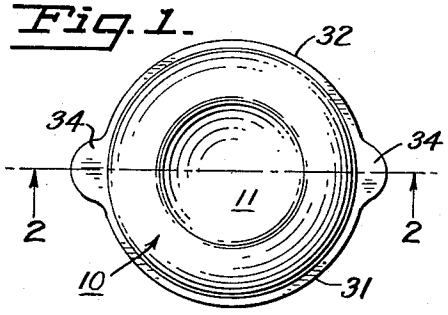


Fig. 2.

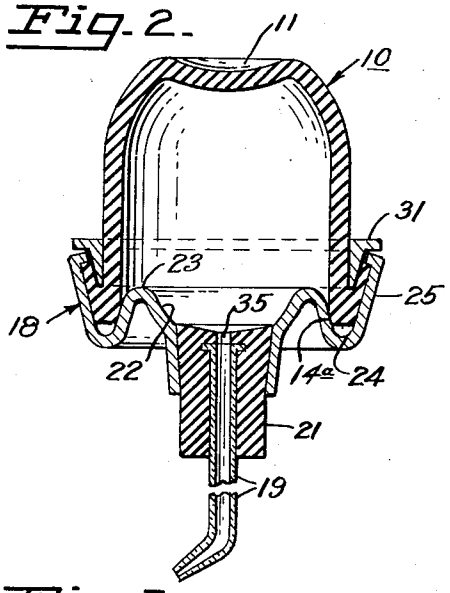


Fig. 3.

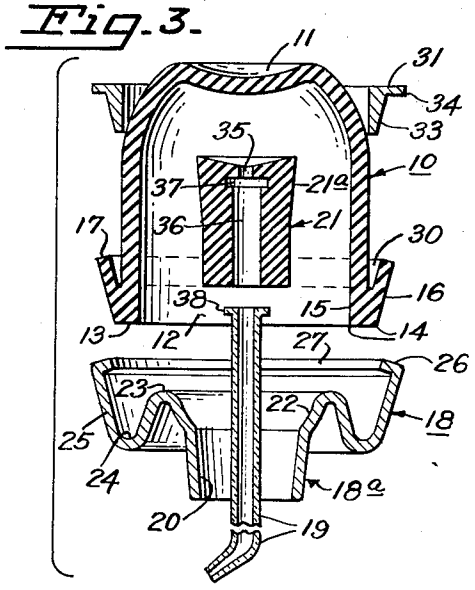


Fig. 4.

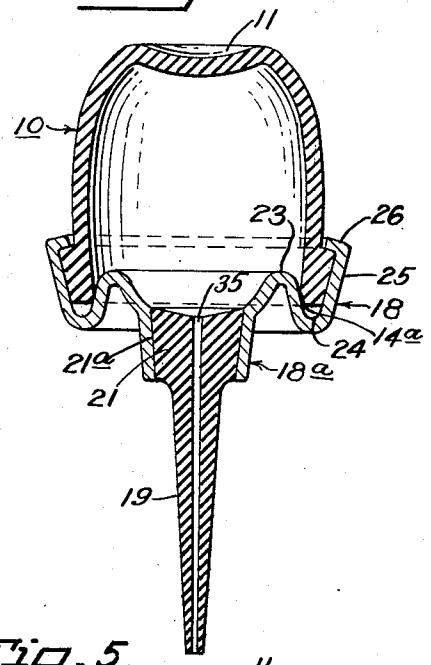
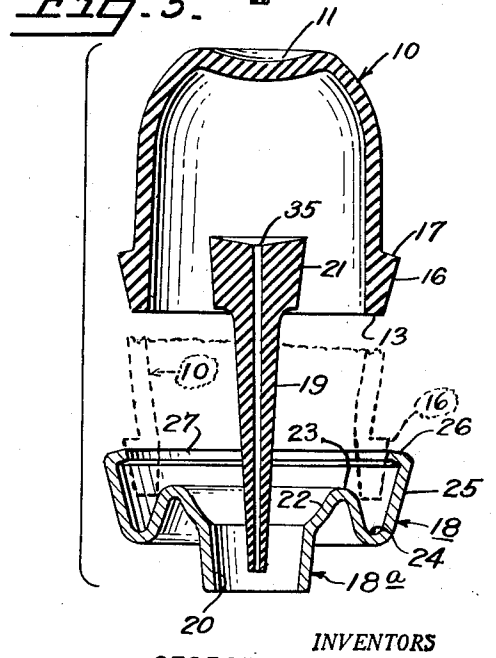


Fig. 5.



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Patented July 11, 1950 2,514,576

UNITED STATES PATENT OFFICE

2,514,576

RESILIENT BULB SYRINGE

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Application February 25, 1947, Serial No. 730,692

6 Claims. (Cl. 128—231)

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This invention relates broadly to syringes of the type employing a bowl and a resilient reflex bulb mounted thereon, commonly called bulb syringes. In more specific aspects, it particularly relates to such syringes which have readily interchangeable discharge nozzles.

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

Another object is to provide a syringe of the type employing a resilient reflex bulb, with means for detachably mounting the bulb on the bowl of the syringe, and providing an efficient connection therebetween, and which will be efficient against leakage of either liquid or air on either the pressure or suction stroke of the bulb.

Another object is to provide a syringe employing a bowl for mounting a resilient reflex ejecting bulb in which the bowl and bulb may be readily snapped or pushed into operating position and detached therefrom to facilitate cleaning, or interchange of nozzles.

Further objects are to provide a syringe having the above characteristics, all parts of which can be quickly and easily taken apart and replaced together for change of discharge nozzles, and which shall be leakproof in action, sterilizable by boiling or otherwise, which permits ready access to both the internal and external portions for both inspection and repair, which will provide smooth and uniform ejection action, which consists of a minimum number of parts which are easily assembled and demounted, and to improve generally upon syringes of this type.

A still further object is to provide a novel efficient syringe for medical, dental or related 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 by promoting sanitation and hygiene in all instances where a bulb syringe is efficiently useful.

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 operatively similar parts.

In the drawing:

Fig. 1 is a top plan view showing the generally circular plan characteristic of the devices shown in other figures.

Fig. 2 is a vertical transverse section, on line 2—2 of Fig. 1, with nozzle shown fragmentarily.

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Fig. 3 is an exploded view in vertical transverse section of parts shown in Fig. 2.

Fig. 4 is a vertical transverse section of a modified form of the invention.

Fig. 5 is an exploded view in vertical transverse section of parts shown in Fig. 4, and showing in dotted lines a stage of assembly of parts.

The present invention, as exemplified by all figures of the drawing, comprises broadly a reflex bulb 10 of resilient material such as rubber, generally circular in top plan view. Preferably the bulb has a depression in its closed end 11 and has its opposite end 12 open in substantially circular form, the end wall 13 being transversely flat and providing circumferential edges or lips 14. The inner wall 15 of the bulb which has connection at end wall 13 is substantially perpendicular to the plane of the open end, and the adjacent outer wall portion 16 is inclined outwardly and upwardly from the end wall 13, terminating in a circumferentially outwardly extended shoulder 17 which is spaced from the end wall 13. The general form of the bulb is somewhat semispherical, but preferably somewhat elongated relative to the dimension of its diameter.

The open end of the bulb is adapted to seat in a syringe bowl 18 which may be formed of any suitable material, such as sheet metal or plastic if a substantially rigid bowl is desired, or of relatively stiff rubber if some degree of pliability is desired, though the rigid bowl is preferred. Centrally of its bottom the bowl has an opening 18a for mounting a discharge nozzle. As herein illustrated, the opening 18a is a tubular extension which mounts therein the discharge nozzle 19. It is preferred that the opening through the tubular extension be tapered upwardly with its greater diameter extending upwardly adjacent the bottom of the bowl, thus providing a conical seat 20 for the base plug 21 of the nozzle, the base plug being correspondingly tapered. Thus, the nozzle, while seating tightly and firmly, as is characteristic of such a conical seat, against pressure within the bulb, nevertheless is readily interchangeable and demountable from the bowl by pressing it axially upwardly from its seat. To this end the specific type of bulb and bowl are especially adapted by the structure thereof for separating and reassembling them to facilitate the demounting and remounting of the discharge nozzle from the inside of the bowl.

The bowl bottom wall inclines upwardly and outwardly from the central discharge opening, as at 22, forming a basin which has a rounded

rim or ridge 23 from which the bowl wall is retroverted downwardly upon itself to a rounded groove 24, from which the bowl is again retroverted upwardly upon itself to provide a circumferential outer side wall 25 which inclines upwardly and outwardly, and terminates at its upper end in a radially inturned flange 26 which surrounds the top opening 27 of the bowl.

It is to be observed that the inturned flange 26 is of a width approximately similar to the width of the outwardly extended shoulder 17 of the bulb, and also that the vertical length of the side wall 25, combined with the groove 24, provides a depth of side wall to the bowl somewhat in excess of the length of the outer inclined wall 16 at the open end of the bulb, so that when the bulb is seated in the bowl, the shoulder 17 underlies the flange 26 and the end wall 13 of the bulb stops slightly short of seating in the bottom of the groove 24, the bottom edges or lips 14 of the open end wall of the bulb bearing against the inclined walls of the groove where they converge and make a relatively narrow space adjacent the bottom of the groove. When the bulb is seated on the bowl in this manner, the open end wall of the bulb is slightly deformed at lips 14, as at 14a. Thus, a narrow line of engagement is provided between lips 14 and the wall of the groove 24, which has been found to form a leakproof contact, even upon exertion of great pressure upon the bulb, and yet, due to the relative incline of the bowl walls, the open end of the bulb seats in the groove and also releases therefrom without any appreciable friction or resistance to the mounting or the removal of the bulb relative to the bowl.

The resiliency of the bulb permits it to be snapped into its seat merely by slight pressure at its closed end 11, and snapped out of its seat merely by lateral pressure and deformation adjacent to the shoulder 17 of the side wall. In order to facilitate the mounting of the bulb on the bowl, it is also preferred that the maximum diameter of the outer wall of the bulb at the open end 13 shall be slightly less than the diameter of the top opening 27 of the bowl, approximately 1/64 to 1/32 of an inch, just sufficient to start the open end of the bulb into the opening of the bowl, whereupon by a slight pressure at the opposite or closed end of the bulb it may be readily snapped to its seat, as in Figs. 2 and 4. This action is due to the fact that the open end of the resilient bulb deforms radially inwardly when pressed through the top opening 27, and thereby decreases its maximum diameter sufficiently for the inclined wall 16 and shoulder 17 to pass through that opening. In so doing, it will be noted, as illustrated in dotted lines in Fig. 5, that the ridge or rim 23 of the bowl is spaced inwardly from the circumferential wall of the bowl so that the diameter of the ridge is less than the diameter of the top opening of the bowl, and also that the inner wall of the groove is inclined outwardly from the ridge to the bottom of the groove. Therefore, the open end of the bulb, when being inserted, will not strike upon the apex of the ridge, but rather upon the inclined wall, whereby the end of the bulb is turned outwardly and directed to its seat in the lower portion of the groove 24. It is also to be noted that the peak of the ridge 23 is approximately one-half of the height of the circumferential side wall, for the three purposes of guiding the open end of the bulb to its seat, and to prevent the open end of the bulb from

jumping the peak of the ridge if strong lateral pressure should be exerted radially inwardly on the side wall of the bulb adjacent the top of the bowl, particularly in that type of bulb and bowl shown in Fig. 4 in which no locking means is employed, such as the locking ring 31 employed in Fig. 2, and for the further purpose of shielding the narrow line of sealing engagement 14a from radially outward pressure when the upper portion of the bulb is collapsed by depressing with the finger of the operator into the central basin of the bowl to completely discharge the contents of the syringe.

Thus far the characteristics of the embodiments of the invention, as shown in all views of the drawings, are substantially the same. Referring more particularly to the forms of the invention shown in Figs. 2 and 3, it will be noted the the bulb is provided with a circumferential grooved channel 30 recessed in the shoulder portion 17, in a direction parallel to the axis of the bulb or longitudinally in respect of such axis. The opposed walls of this channel may be parallel or in such other form in vertical section as will receive the flanged-down collar or wedge of a locking ring to be described, but it is preferred that the channel shall have its walls provided with relative incline or angle, since this provides a cuneiform seat which is convenient and efficient for receiving and releasing a locking ring 31. In such a form of channel the inner wall of the channel is the same as the outer wall of the bulb, and the outer wall of the channel is inclined outwardly and upwardly from the bottom of the channel 30 to the face of the shoulder 17. In this instance it is preferable that the shoulder 17 be slightly wider than the inturned flange 26. The locking ring 31 is snugly but slidably mounted upon the exterior of the bulb body, and is provided with a radial flange 32, and a relatively perpendicularly depending collar-like flanged down portion 33 which is herein termed a wedge, using that term more broadly than being restricted to a tapered member and to distinguish in terms from the previously mentioned ring 31 and its flange 32. This so-called wedge may be of any suitable shape in vertical section to engage within the channel 30, and since a V-shaped channel has been preferred, it is also preferred that the inner wall of the wedge be straight to correspond with the inner wall of the channel, and that the outer wall of the wedge be angled to correspond generally with the radially outward inclined wall of the channel. The ring 31 is also provided with finger-grip ears or tabs 34 by which the ring may be conveniently pressed in to and released from the channel 30.

Upon pressure of the wedge or collar 33 into the channel 30, the shoulder 17, which, as stated, is in this instance preferably wider than the inturned flange 26, is pressed and securely locked under the flange, and the ring is also thereby held against inadvertent removal by the frictional engagement. It may be stated also that when the bulb is being depressed in operation of the syringe the resilient side walls of the bulb bulge outward slightly so that the ring could not work upward out of the groove or channel during operation of the syringe, even though the seating of the wedge in the channel were not securely tight. So long as the collar or wedge of the ring is frictionally positioned in the channel the bulb is locked in the bowl against removal axially or by deformation of its side wall inwardly. But upon

removal of the ring from within the channel the bulb may be readily removed from the bowl by deforming its side wall sufficiently to clear the shoulder 17 from under the flange 26, as is also the case in the devices of Figs. 4 and 5.

The nozzles in the several exemplifications shown in the drawings, though somewhat different in specific structure, are illustrative of the special cooperation of this type of bulb, with the quick and easy removal and replacement of the bulb, to facilitate the interchange of nozzles of various types, by means of the conical seat and conical base plug which permits the nozzle to be mounted and demounted from the inside of the bowl by removal of the bulb. It is preferred that the nozzle base be of resilient material, rubber being preferred, though with the conical seat, other materials may be employed if the respective parts are accurately fitted, such as plastics, metals and glass.

It is believed obvious that for syringe purposes the base plug should have an opening 35 therethrough. In Fig. 2 the resilient base plug 21 has the opening therethrough enlarged at its free or protruding end portion, as at 36, and is provided within the length of the enlarged portion of the opening with an annular groove 37, so that the tubular separate nozzle member 19 may be removably inserted therein and firmly but removably held by its end flange 38 seating in the groove 37, as well as by the resilient frictional engagement of the nozzle tube by the side walls of the enlarged opening of the plug. Thus, the nozzle in the apparatus shown in Fig. 2 may be interchanged with various types of nozzles by use of the same base plug. In the device of Fig. 4 the nozzle 19 and its conically tapered base plug 21 are integral, but the types of nozzles in the several views may also be interchanged by reason of the uniformity of the conical seat and the conical base plug in each of the devices.

Since the conical seat for the nozzle base plug has its greater diameter at the juncture with the bottom wall of the bowl, the nozzles are removable and interchangeable merely by snapping the bulb from its seat in the bowl and pressing the nozzle and plug axially upwardly to release the conical seat mounting. This facility for readily changing nozzles is an important factor in bulb syringes, and the simplicity and ease with which such change of nozzle may be accomplished by employment of a snap-in and snap-out bulb greatly enhances the scope of usefulness of bulb syringes, since the delay and inconvenience of manipulating threaded joints may be thus eliminated in relatively assembled mounting of bowl, bulb and nozzle. Such threadless mounting also eliminates the unsanitary factor always present in the ridges and grooves of a threaded joint in syringes wherein the very essence of efficiency is elimination of crevices and joints where unsanitary foreign matter may accumulate and which may not be readily reached at all times for cleaning and sterilization.

Having described the invention, we claim:

1. In a syringe device, a bulb for mounting on a syringe bowl, comprising a body of resilient material having an open end and a radially externally projecting resilient portion spaced from said open end providing an external annular resilient shoulder intermediate the axial length of the bulb, an annular channel in said shoulder having as its center a point on the axis of the bulb and adapted for receiving therein a locking ring when the bulb is mounted on a suitable bowl,

and the external wall of the bulb being conically tapered radially inwardly from said shoulder toward the open end of the bulb.

2. A syringe comprising a bowl having an open top and a bottom closure wall which latter has an opening for mounting a discharge nozzle centrally thereof, said bowl having a circumferential side wall terminating in a flange inturned radially at the open top, the bottom wall of the bowl having an inner annular groove at the bottom of its side wall and the opposed walls of the groove converging relatively towards bottom, and a resilient bulb having an open end for seating in the groove of the bowl, the outer wall of the bulb adjacent the open end having an annular shoulder extending radially outward and adapted for seating under the inturned flange of the bowl, said annular shoulder of the bulb having an annular channel recess therein, and a locking ring for encircling the bulb and having a wedge for seating in said annular channel of the bulb and within the opening of the flange at the open top of the bowl.

3. A syringe comprising a bowl circular in plan, said bowl having a circumferential side wall terminating in a flange inturned radially at the open top of the bowl, the bowl having an inner annular groove at the bottom of its side wall and the bottom closure wall of the bowl having a conical opening, a nozzle base plug for mounting in said conical opening, said plug having an opening therethrough, a tubular discharge nozzle connected to said plug and communicating with the opening therein, and a resilient bulb having an open end for seating in the groove of the bowl, the wall of the bulb adjacent the open end having an annular shoulder extending radially outwardly and adapted for seating under the inturned flange of the bowl, said shoulder of the bulb having an annular channel recess therein longitudinal in respect of the bulb axis, and a locking ring for encircling the bulb and having a wedge for seating in said annular channel of the bulb and within the opening of the flange at the top of the bowl.

4. In syringe apparatus, a bowl for mounting a resilient bulb thereon, said bowl being circular in plan and having an open top and a bottom closure wall which latter has a tubular extension having a conical opening for mounting a discharge nozzle, said bowl having a circumferential outwardly and upwardly inclined side wall terminating in a flange inturned radially at the open top, the bowl having an inner annular groove at the bottom of its side wall, the opposed walls of the groove converging relatively from top towards bottom, and the conical opening in the tubular extension having its greater diameter at the bottom closure wall of the bowl.

5. In a syringe structure which includes a resilient bulb having an open end for seating at the bottom of a syringe bowl and the outer wall of the bulb having, spaced adjacent its open end, an annular shoulder extending radially outwardly, a bowl having an open top and a bottom closure wall which latter has an opening centrally thereof, the opening being surrounded by an extended tapered tubular wall portion providing a seat for a discharge nozzle, the taper having its greater diameter at the bottom closure wall of the bowl, said bowl having a circumferential side wall the inner face of which is inclined outwardly from bottom toward the open top and terminating in a flange inturned radially at the open top to receive thereunder the shoulder of

the bulb, the bottom wall of the bowl having an inner annular groove at the bottom of its side wall and the opposed walls of the groove converging relatively from the top toward bottom, an annular ridge radially inwardly of the groove, said ridge being substantially half the height of the circumferential side wall and having the diameter of its peak less than the diameter of the top opening of the bowl, the groove being adapted for receiving therein the open end edge of the bulb and the ridge being adapted for resisting radially inward movement of the wall of the open end portion of the bulb; and a discharge nozzle having a base plug of resilient material tapered complementally to fit in the tapered opening in the bottom closure wall of the bowl.

6. A syringe structure having the elements defined in claim 5 and in which the discharge nozzle is releasably mounted in the base plug.

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