July 7, 1953 F. E. BROWN 2,644,452

MEDICAMENT VIAL

Filed March 16, 1951

Fig. 1

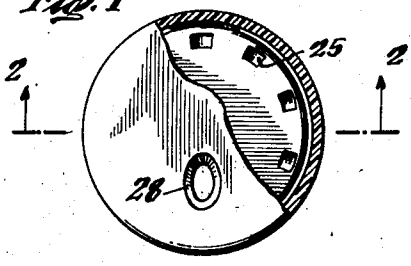


Fig. 2

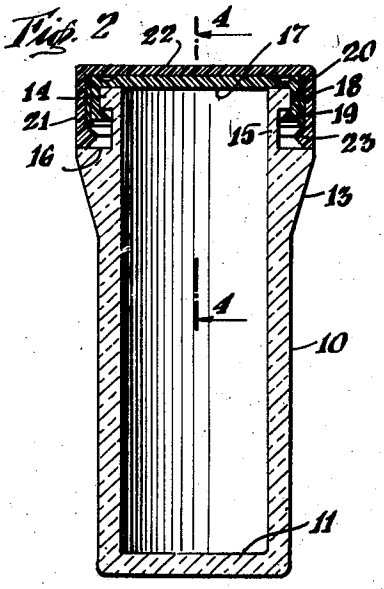


Fig. 3

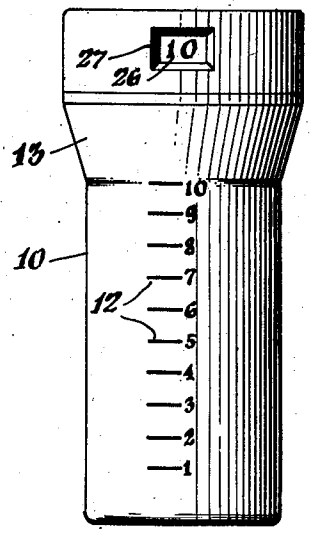


Fig. 4

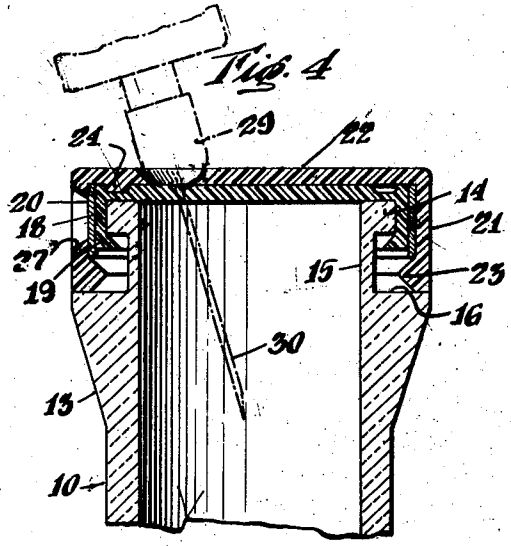


Fig. 5

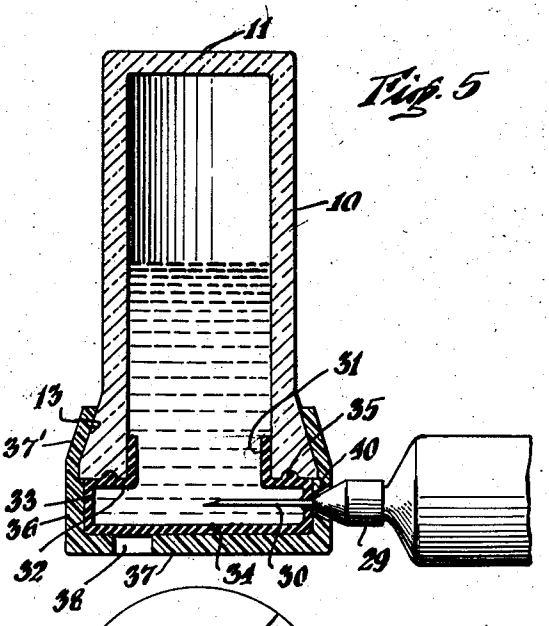
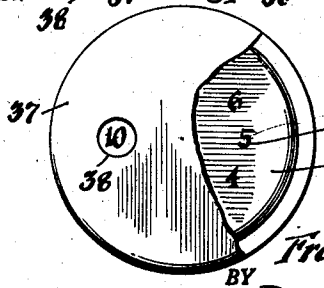


Fig. 6



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MEDICAMENT VIAL

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5 Claims. (Cl. 128—272)

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This invention relates to a vial embodying structurally and functionally improved characteristics and especially intended for the storing and dispensing of medicament. In certain instances it might, however, be employed for the packaging of liquids other than medicaments.

Numbered among primary objects of the present invention are those of providing a vial which may readily be carried by a physician and which will be instantly available for use, said unit permitting of the withdrawal of a hypodermic dosage embracing anywhere from a portion of the vial contents up to the entire body of liquid contained within the latter.

An additional object is that of furnishing a device of this type which will embody relatively few parts each capable of ready manufacture and when so produced allowing of ready assemblage to furnish an inexpensive and readily usable device which will safely retain medicament for desired periods of time.

With these and other objects in mind, reference is had to the attached sheet of drawings illustrating practical embodiments of the invention and in which:

Fig. 1 is a top plan view of a vial with a portion of the cap broken away to disclose underlying construction;

Fig. 2 is a sectional side view of the unit taken along the lines 2—2 and in the direction of the arrows as indicated in Fig. 1;

Fig. 3 is a side elevation of the device;

Fig. 4 is a fragmentary enlarged sectional view taken along the lines 4—4 and in the direction of the arrows as indicated in Fig. 2;

Fig. 5 is a view similar to Fig. 2 but showing an alternative form of structure; and

Fig. 6 is a view similar to Fig. 1 but showing the apparatus as illustrated in Fig. 5.

In these views the reference numeral 10 indicates the tubular body of the vial which is preferably formed with an integral wall 11 at one end. Conveniently these parts are made of glass. However, other materials might be employed. In any event it is preferred that the wall of body 10 be transparent or, at least, translucent. If, for example, the capacity of this body be ten cubic centimeters then, as shown in Fig. 3, a series of graduations 12 may be provided upon the outer face of the body which will indicate the volume of liquid remaining within the latter. Also, as shown in the several views, it is preferred that the outer face of body 10 adjacent its open end be flared outwardly as indicated at 13 to provide a gripping portion as hereinafter brought out.

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As shown in detail in Figs. 2 and 4, the open end of body 10 is defined by an outwardly extending bead or lip 14. Below this part a portion 15 of reduced diameter is present. This terminates in an outwardly extending surface 16 defining the upper edge of flared portion 13.

A penetrable member in the form of a diaphragm 17 extends across the upper surface of lip or bead 14. It is provided with a downwardly extending flange portion 18 which may have its lower edge enlarged as at 19. The length of this flange is in excess of the height of lip 14. Therefore, the inwardly extending portion 19 will be accommodated within the reduced diameter part 15 of body 10. To retain member 17 against movement with respect to body 10 a ring 20 preferably of metal extends in intimate contact with the outer face of flange 18 and constricts the latter into tight engagement with the outer face of lip 14. Rotatably bearing against the outer face of ring 20 is the flange 21 of a cap 22. Adjacent its lower edge flange 21 may be enlarged as at 23; this enlargement extending into the space provided by reduced portion 15 and below the lower edge of ring 20. This cap will therefore be rotatable with respect to the penetrable member 17 and body 10. Both that member and the cap are conveniently formed of rubber. If desired, cap 22 could be formed of more rigid material than member 17. For example, certain types of plastic would be satisfactory for this purpose. Likewise under certain circumstances member 17 might be formed of materials other than rubber.

It is preferred that a detent structure be provided such that cap 22 will not accidentally rotate with respect to the remainder of the assembly. Therefore as shown in Figs. 1 to 4 the lower face of cap body 22 is formed with a projecting portion 24. This rides within a series of recesses 25 formed in the upper face of penetrable member 17. These recesses are disposed in the form of a circle and as illustrated are preferably deeper at one end than at the other. Therefore they function as ratchets. Accordingly as the detent 24 rides into them they resist or prevent a rotation of cap 22 in a counterclockwise direction as viewed in Fig. 1 although permitting of rotation in a clockwise direction.

With a view to providing a registering mechanism as part of the assembly, the outer face of band or ring 20 is provided with indicia in the form of numerals corresponding to the indicia 12. One of these numerals has been indicated at 26 in Fig. 3. It will be understood that if, for example, the capacity of the vial be ten cubic

centimeters and the indicia 12 be graduated accordingly, the series of numerals 26 may again number from 1 to 10 and extend throughout the circumference of the ring. The side flange 21 of cap 22 is formed with a window or opening 27. This is disposed in line with the numerals 26. Accordingly as cap 22 is rotated the numerals upon the face of the ring or band 20 will be consecutively displayed through this window.

The upper face of penetrable member 17 is rendered accessible by forming the body of cap 22 with an opening 28 disposed to one side of the center of the cap. Preferably, and as shown, the side edges of this opening are bevelled. In other words, a somewhat wedge-shaped hole is provided. As shown in Fig. 4, this hole or opening receives the hub 29 of a needle 30 which has been caused to pierce member 17. Therefore, when the cannula is projected as in Fig. 4, the flared surfaces of opening 28 bear against the cone surfaces of the needle and its hub. This will ordinarily limit the amount of projection of the needle. Also, it will serve to somewhat flex member 17 away from the under face of cap 22. Accordingly, any tendency of the cap and diaphragm or penetrable member to remain in intimate frictional engagement will be relieved. Therefore, after this operation the cap may always be turned without difficulty with respect to the remainder of the assembly.

In the form of structure shown in Fig. 5, the open end of body 10 is defined by the outer surface of the flared portion 13. A penetrable member of rubber or similar material is rigidly connected to the body 10 by incorporating in the member a neck portion 31 extending into the mouth of body 10. This neck portion is continued in the form of an outwardly or radially extending portion 32, an axially extending portion 33 which is penetrable and an outer portion or end face 34. While this member should be formed of relatively soft material such as rubber, it should also incorporate sufficient rigidity to be self-sustaining. To prevent rotation of this member with respect to body 10, the outer faces of its outwardly extending portion 32 may be formed with any desirable number of projections 35. These may be received within corresponding recesses formed in the outer surface of the flared portion 13 of body 10. Obviously a suitable substance or layer of adhesion between the parts might also be employed.

A cap encloses the outer end of the assembly. This cap, as shown, may include an axially extending flange portion continued in the form of a constricted skirt 37'. The latter will lie in rotatable and retaining contact with the outer face of the flared portion 13. The outer end of the cap is defined by a transverse portion 37 lying beyond the penetrable part 33. An off-center opening 38 is formed in the body of the cap and registers with a series of numerals or other suitable indicia 39 on the outer portion 34 of the penetrable member. As the cap is rotated with respect to the assembly, consecutive numerals will appear through the window or opening 38. The side flange of the cap is formed with an opening 40 which, like the opening 28 in the device illustrated in Figures 1 through 6, is disposed to one side of the center In common with the opening 28, this opening may be flared or wedge-shaped so that as the needle 30 is introduced into the opening the cone surfaces of hub 29 will bear in proper relationship against the surfaces of the hole. In this form of construction a detent provision may or may not be incorporated in accordance with the desires of the manufacturer it being understood that, in certain instances, the detent structure as shown in connection with Figs. 1 to 4 might also be dispensed with.

A physician in using the apparatus as shown in Figs. 1 to 4 inclusive will have available a vial containing, for example, ten cubic centimeters of medicament. When it is desired to make a hypodermic injection he may remove a covering layer (not shown) which would extend over opening 28 and maintain the layer 17 below that opening in sterile condition. Thereafter, and as shown in Fig. 4, he may cause needle 30 to pierce the rubber cap or penetrable member 17. As afore brought out, the cone of the needle hub 29 may bear against the belevelled edge surfaces of opening 28 so that the parts properly cooperate. The syringe assembly may now be aspirated and the vial is conveniently inverted during this step. The syringe is now removed so that the needle is withdrawn and the hypodermic injection may be effected. In withdrawing liquid from the vial, the physician or other user will, of course, be able to check against the graduations 12 so that precisely the desired amount of medicament will be drawn into the barrel of the syringe.

Assuming such withdrawal to have been one cubic centimeter, then upon the vial being placed in an upright position, this will be evidenced by the upper level of the liquid being in line with the second graduation. If a subsequent injection is desired, then the user may simply rotate the selector cap 22 until the window or aperture 27 of the same registers with the indicia mark 26 embracing the numeral 9. The entire operation may now be repeated. It will be understood that in such repeating, the user will be presented with a fresh and unpunctured surface of the sealing cap 17 through the opening 28. This will make him aware of the fact that the outer cap has been indexed or shifted. The surface to be pierced will be sterile and the outside scale serve as a further check accounting for the body of fluid which remains within the vial. Due to the ratchet effect of the detent structure, the entire circular area of the penetrable member 17 is traversed by the zone defining opening 28 of cap 22. Therefore with the completion of one rotation of this cap the contents of the vial should be exhausted and the unit may be discarded. As the user grips the vial, his fingers will bear against the flared area 13. Therefore with the pressure which is exercised by causing needle penetration, there will be no danger of the unit slipping out of the grasp of the physician.

In the assembly as shown in Fig. 5 a similar procedure occurs. The cap 37 is rotated with respect to the body of the vial. In such rotation successive members or other indicia 39 are rendered visible through the opening 38. This will render the user aware of the volume of liquid which remains within the vial. Also, as relative rotation occurs, fresh areas of the flange 33 will constantly be presented through the opening 40 for penetration by the needle 30.

Thus, among others, the several objects of the invention as specifically aforenoted are achieved. Obviously numerous changes in construction and rearrangement of the parts might be restored to without departing from the spirit of the invention as defined by the claims.

I claim:

1. A vial including in combination a tubular open ended body, a member including a neck portion to extend into the bore of said body, an outwardly extending portion to bear against the end edge of said body, and an axially extending penetrable portion projecting beyond said outwardly extending portion, a cap rotatably mounted by said body, said cap comprising and end portion and an axially extending flange, said flange being formed with an opening exposing different areas of the axially extending portion of said member as said cap is rotated with respect to the latter.

2. A medicament vial comprising the combination of a tubular body open at one end and having an end edge; a penetrable member rigidly connected to said body and sealing the open end thereof, said member including a neck portion extending into said body, a radially extending portion bearing against the end edge of said body, an axially extending portion projecting beyond said radially extending portion, and an end face extending across said axially extending portion; a cap rotatably mounted on said body and encompassing the exposed surfaces of said penetrable member, said cap comprising an end portion and an axially extending flange, said flange having an opening closely adjacent said cap end portion, said opening exposing different areas of the axially extending portion of said member as said cap is rotated with respect to the latter and through which opening a hypodermic needle may be projected in a direction substantially parallel to said cap end portion to puncture said penetrable member and communicate with the medicament within said vial.

3. A medicament vial comprising the combination of a tubular body open at one end and having an end edge; a penetrable member rigidly connected to said body and sealing the open end thereof, said member including a neck portion extending into said body, a radially extending portion bearing against the end edge of said body, an axially extending portion projecting beyond said radially extending portion, and an end face extending across said axially extending portion, said end face being provided with indicia; a cap rotatably mounted on said body and encompassing the exposed surfaces of said penetrable member, said cap comprising an end portion and an axially extending flange, said flange having an opening closely adjacent said cap end portion, said opening exposing different areas of the axially extending portion of said member as said cap is rotated with respect to the latter and through which opening a hypodermic needle may be projected in a direction substantially parallel to said cap end portion to puncture said penetrable member and communicate with the medicament within said vial, and said cap end portion being provided with an aperture registering with said indicia to indicate the position of said cap with respect to said member.

4. A medicament vial comprising the combinabination of a tubular body open at one end, a member rigidly connected to said body and sealing the open end thereof, said member having an axially extending penetrable portion, a cap rotatably mounted on said body and encompassing the exposed surfaces of said penetrable portion, said cap comprising an end portion and an axially extending flange, said flange having an opening exposing different areas of the penetrable portion as said cap is rotated with respect to the latter and through which opening a hypodermic needle may be projected to puncture said penetrable portion and communicate with the medicament within said vial.

5. A medicament vial comprising the combination of a tubular body open at one end, a member rigidly connected to said body and sealing the open end thereof, said member being provided with indicia and having an axially extending penetrable portion, a cap rotatably mounted on said body and encompassing the exposed surfaces of said penetrable portion, said cap comprising an end portion and an axially extending flange, said flange having an opening exposing different areas of the penetrable portion as said cap is rotated with respect to the latter and through which opening a hypodermic needle may be projected to puncture said penetrable portion and communicate with the medicament within said vial, and said cap end portion being provided with an aperture registering with said indicia to indicate the position of said cap with respect to said member.

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