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2,660,171

VIAL

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Fig. 1

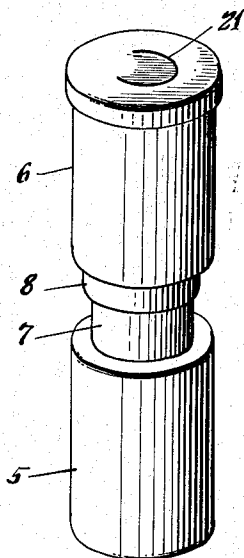


Fig. 2

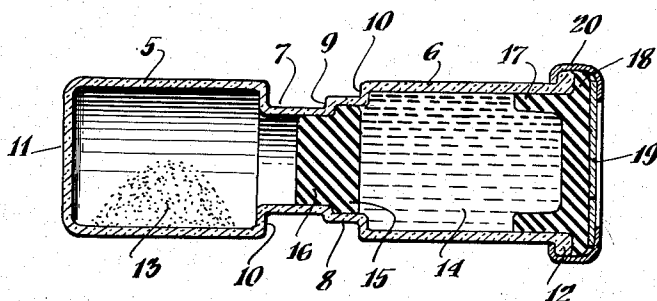


Fig. 3

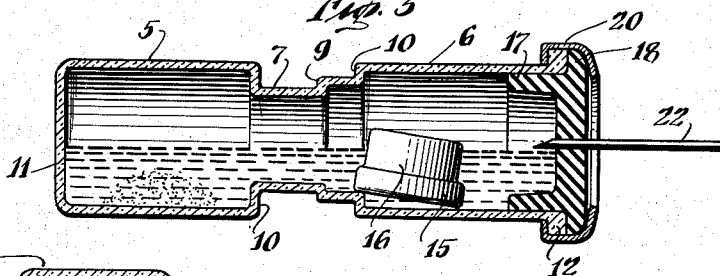
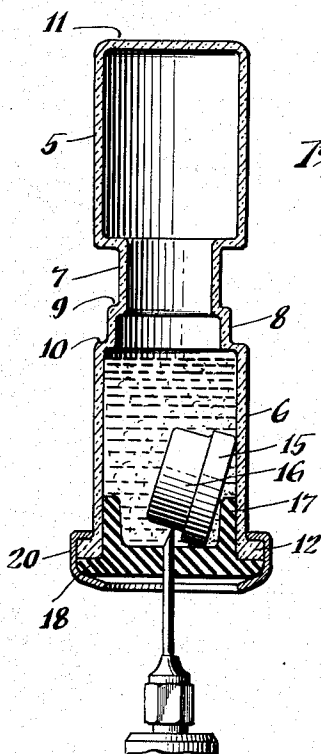


Fig. 4



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VIAL

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5 Claims. (Cl. 128-272)

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This invention relates to a structurally and functionally improved vial for use in connection with medicaments.

It is an object of the invention to furnish a unit of this character by means of which, for example, a diluent and a dry medicament may be maintained in mutually isolated condition without any danger of intermixing; the physician or other user being presented with a structure which may readily be operated when desired so that proper intermixing will occur. Thereupon the resultant solution may be drawn into a syringe and be hypodermically injected.

A further object is that of providing an assembly of this type which will include relatively few parts, each capable of ready manufacture by quantity production methods to produce an inexpensive unit for satisfactorily accomplishing the desired results.

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

Fig. 1 is a perspective view of a vial;

Fig. 2 is a sectional side view thereof; and

Figs. 3 and 4 are views similar to Fig. 2 but illustrative of steps taken by the user preparatory to hypodermically injecting the solution.

As shown in these views the vial includes a body embracing two compartment portions respectively indicated at 5 and 6. These portions are joined by a reduced neck embracing a tubular section 7 of minimum diameter, a slightly larger section 8 which is also tubular and an intervening flange or connecting portion 9. The neck connects compartments 5 and 6 and is conveniently defined by outwardly extending portions 10.

As illustrated the vial may embrace merely two compartments; compartment 5 being closed by an imperforate base 11. The outer end of compartment 6 may be defined by a laterally extending lip 12. All of these parts are preferably formed of glass although, in certain instances, other materials might be employed. They will also be integral with each other. Compartment 5 receives a medicament which may be in the form of a powder 13 and compartment 6 receives a diluent or vehicle 14 for the powder 13.

Communication between compartments 5 and 6 is normally prevented by means of a sealing means in the form of a stopper. This stopper conveniently embraces a head 15 and a plug 16. That stopper should be formed of rubber or simi-

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lar material. Its dimensions are such that the plug firmly bears against the inner face of the constricted tubular portion 7 and the adjacent head surfaces bear against the inner face of tubular portion 8 and the intervening connecting portion 9. In this manner it will be understood that a very effective seal is provided extending throughout the stopper plug, the edge of its head and the lateral surface connecting these parts. Such a seal will preclude against any danger or accidental leakage from one compartment to the other.

The outer end of compartment 6 is also closed by a seal formed by a stopper which may again include a plug 17 and a head portion 18, both conveniently formed of rubber. The inner face of head portion 18 bears against the outer surface of flange 12 if such a flange is employed. As shown, this latter stopper is of the type embodying a diaphragm portion capable of ready penetration by a needle. The parts may be held against movement and the outer surface of head portion 18 may be maintained in sterile condition by means of a disk 19 which is retained by a sealing cap 20 enclosing the lip 12 and adjacent surfaces of head 18. Both the disk and cap are conveniently formed of foil or of any other suitable sheet material and are provided in accordance with well known techniques. Also in accordance with those techniques and as shown in Fig. 1 a tongue portion may be provided as part of the cap and be defined by an arcuate slit as indicated at 21. As will finally be understood, it will ordinarily be preferable to have the interior of the vial body at atmospheric pressure, although, under certain circumstances, pressure higher than atmospheric might desirably be embraced within compartment 5.

In any event, in use a physician will, in the usual manner, remove at least the center part of the disk 18 or other protecting member by raising the tongue portion defined by slit 21 and tearing the material of the cap so that the latter may be removed after which disk 19 may be discarded. Thereupon he will introduce the end of a hypodermic needle 22 through the diaphragm of the outer cap as shown in Fig. 3. The needle being attached to a hypodermic barrel and piston assembly, that assembly may be actuated to cause an aspiration. The stopper may not move into the inner compartment because the enlarged part of that stopper will—in cooperation with the neck surfaces—prevent such movement. The aforedescribed aspiration will withdraw a part of the liquid diluent 14 from compartment 6. Under

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these circumstances, a sub-atmospheric pressure will exist within that compartment. An atmospheric or slightly higher than atmospheric pressure existing within compartment 5, it follows that air pressure will act against the inner face of plug portion 16 thus forcing the latter into compartment 6. This unseating of the central stopper will occur quite suddenly and will be complete. In other words, there will be no danger of a slight or partial unseating occurring with consequent sluggish flow or seepage of the diluent 14 into the compartment 5 containing the powder 13 or medicament in other form. Such unseating has also been shown in Fig. 3 in which it is apparent that the diluent has flowed from one to the other compartment.

Accordingly, the physician—while preferably leaving the needle in place—may primarily discharge such diluent as he has withdrawn in connection with the aforementioned aspirating action. He may then agitate the assembly to assure of the creation of a proper solution with the medicament either dissolved or in correct suspension. Finally, in accordance with the conventional technique and as shown in Fig. 4, he may support the vial in up-ended condition and by aspiration withdraw the solution into the barrel of the syringe. Thereafter he may proceed with the hypodermic injection in the usual manner. As will be understood due to the fact that the larger or flared end of the connecting portion extends towards the outer compartment 6 and it is only necessary to move the stopper for the length of the plug portion 16, rather than for the over-all length of the stopper, no difficulties will be experienced in causing a substantially immediate unseating of the stopper 15—16. This will be true despite the multiple-surface seal existing between the connecting portion and that stopper.

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

I claim:

1. A vial including in combination a hollow body embracing an inner compartment having its outer end closed, an outer compartment having its outer end open, a neck portion connecting said compartments, said neck portion having a width less than the width of said outer compartment, the inner face of said neck portion presenting an uninterrupted substantially smooth seating surface adjacent said outer compartment, a stopper of a width less than the internal width of at least said outer compartment, said stopper extending in the direction of said outer compartment and bearing in sealing relationship against said seating surface, an enlarged part incorporated in said stopper and bearing against surfaces of said neck portion to prevent movement of said stopper into said inner compartment, a further stopper mounted adjacent the open end of said outer compartment and in conjunction with said first-named stopper sealing said outer compartment and said further stopper being perforable by a cannula through which pressures in the outer compartment may be reduced to cause the resultant higher pressure in the inner compartment to force said first-named stopper from its seat into said outer compartment.

2. A vial including in combination a hollow

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body embracing an inner compartment having its outer end closed, an outer compartment having its outer end open, a neck portion connecting said compartments, said neck portion having a width less than the width of said outer compartment, an inner face of said neck portion presenting a reduced bore adjacent said inner compartment, an enlarged bore adjacent said outer compartment and an outwardly extending flange portion providing a seat between said bores, a headed stopper having its stem bearing in sealing relationship against said reduced bore and its head bearing in similar relationship against said flange and enlarged bore, a further stopper mounted adjacent the open end of said outer compartment and in conjunction with said first-named stopper sealing said outer compartment and said further stopper being perforable by a cannula through which pressures in the outer compartment may be reduced to cause the resultant higher pressure in the inner compartment to force said first-named stopper from its seat into said outer compartment.

3. A vial including in combination a hollow body embracing an inner compartment having its outer end closed, an outer compartment having its outer end open, a neck portion connecting said compartments, said neck portion having a width less than the width of said outer compartment, the inner face of said neck portion presenting an uninterrupted substantially smooth seating surface adjacent said outer compartment, a stopper of a width less than the internal width of at least said outer compartment, said stopper extending in the direction of said outer compartment and bearing in sealing relationship against said seat, an enlarged part incorporated in said stopper and bearing against surfaces of said neck portion to prevent movement of said stopper into said inner compartment, a further stopper mounted adjacent the open end of said outer compartment and in conjunction with said first-named stopper sealing said outer compartment, liquid within said outer compartment, non-liquid medicant within said inner compartment and said further stopper being perforable by a cannula through which liquid from the outer compartment may be withdrawn to reduce the pressure within such compartment and cause the resultant higher pressure in the inner compartment to force said first-named stopper from its seat into said outer compartment.

4. A vial including in combination a hollow body embracing an inner compartment having its outer end closed, an outer compartment having its outer end open, a neck portion connecting said compartments, said neck portion having a width less than the width of said outer compartment, the inner face of said neck portion presenting a plurality of uninterrupted substantially smooth seating surfaces extending substantially at right angles with respect to each other and adjacent said outer compartment, said surfaces receiving in sealing relationship a stopper adapted solely for movement into said outer compartment, the outer end of said outer compartment being adapted to receive a further stopper perforable by a cannula whereby with said stoppers in position, the pressure within said outer compartment may be reduced to cause said first-named stopper to unseat and move into said outer compartment.

5. A vial including in combination a hollow body embracing an inner compartment having its outer end closed, an outer compartment having

its outer end open, a neck portion connecting said compartments, said neck portion having a width less than the width of said outer compartment, the inner face of said neck portion presenting an uninterrupted substantially smooth seating surface adjacent said outer compartment, said seating surface embracing a reduced bore portion adjacent said inner compartment, an enlarged bore portion adjacent said outer compartment and an outwardly extending flange between said bore portions, both said bore portions being parallel to the vial axis and said flange being disposed at right angles to said bore portions, said neck portion being adapted to receive a headed stopper, the stem of which extends in sealing relationship with said reduced bore portion and the head of which is to bear in sealing relationship with said flange and enlarged bore portions and said outer compartment adjacent its outer end pro-

viding a seat for a further stopper perforable by a cannula through which the pressure in the outer compartment may be reduced to cause an unseating of the first-named stopper and a movement of the latter into said outer compartment.

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