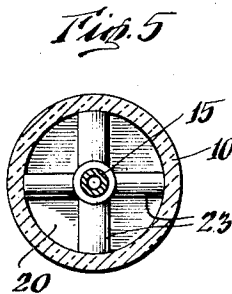
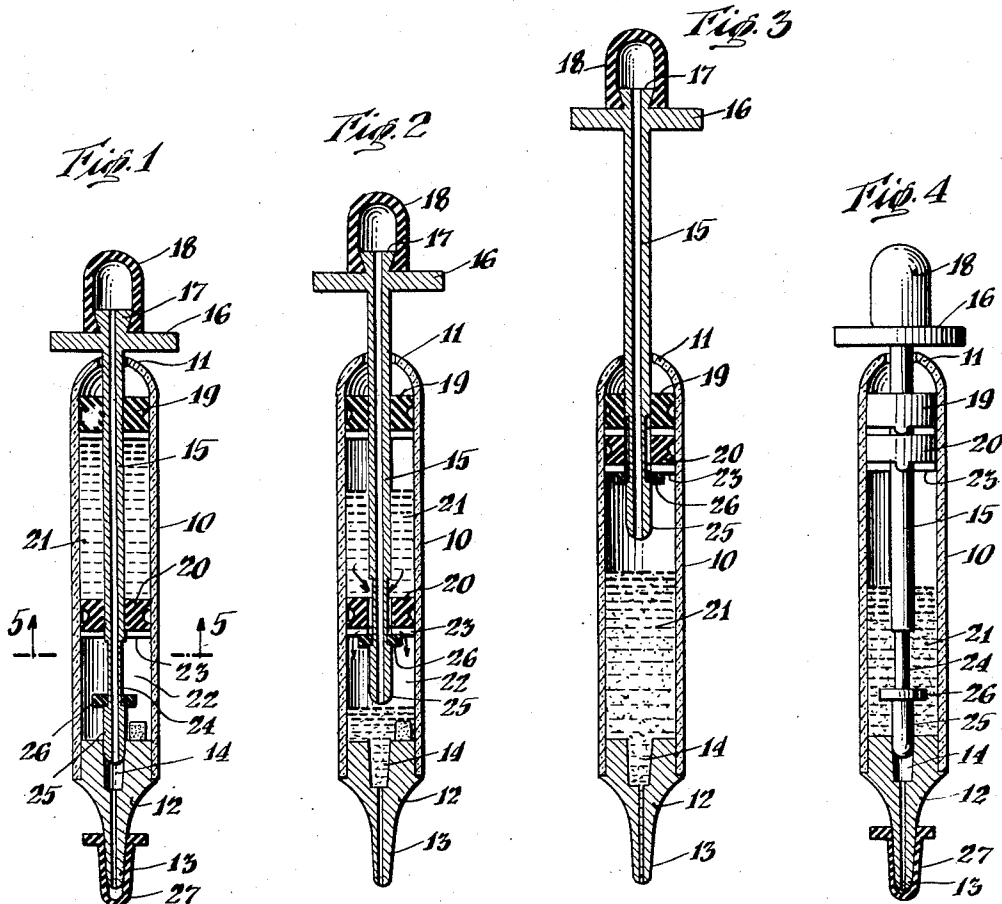


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MEDICAMENT DISPENSER

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MEDICAMENT DISPENSER

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This invention relates to a structurally and functionally improved medicament dispenser and especially a unit commonly known as a dropper by means of which drops of medicament may be placed on the surface of the eye, in the nasal passage, etc.

It is an object of this invention to furnish a unit of this type in which preferably a solution is not provided until the user deliberately manipulates the parts to achieve such a result. Accordingly, it will be feasible to furnish a dispenser containing, for example, dry powder or pellets and a liquid vehicle. Therefore, the unit may be stored for long periods of time without deterioration of the medicament.

A further object is that of providing a dispenser which after initial use may be carried as a self-contained unit in the pocket without danger of the solution being accidentally discharged or contaminated.

Still another object is that of providing an apparatus of this type which will include relatively few parts each individually rugged and simple in structure, such parts being capable of ready quantity manufacture and assembly to provide a compact dispenser which may be simply operated and the parts of which will readily respond to proper manipulation by the user.

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

Fig. 1 is a sectional side view showing the parts in their initial positions;

Figs. 2, 3 and 4, are similar views showing the elements in different positions; and

Fig. 5 is a transverse sectional view in enlarged scale taken along the line 5—5 and in the direction of the arrows as indicated in Fig. 1.

In these views the numeral 10 indicates the tubular body of the device which is conveniently formed of glass. The upper end of this body is defined by an integral wall 11 and the lower end is initially open. This lower end may be closed by a nozzle 12 terminating in a bored spout portion 13 of any desired length; the upper face of this nozzle preferably presenting a socket 14 which may be somewhat tapered in a downward direction.

A shiftable unit is provided and includes a tube 15 extending through an opening in wall 11. Adjacent its upper end this tube presents an outwardly extending gripping portion 16. Beyond this an anchoring portion 17 may be provided. The latter serves to secure against accidental detachment a bulb 18 having elastic and self-restoring characteristics. Disposed adjacent the upper end of body 10 is a partition member comprising a stopper 19 formed with a central aperture the diameter of which is such that it may have wiping and sealing contact with the outer face of tube 15. A similar partition member comprising a stopper 20 is provided intermediate the ends of body 10 to thus divide that body into an upper compartment 21 and a lower compartment 22. The former, as shown, conveniently receives a body of diluent such as sterile water. The latter may receive a pellet or mass of dry medicament.

As shown, stopper 20 is provided on its lower face with radially extending ribs 23. With the parts disposed in their initial position—as in Fig. 1—a by-pass comprising a reduced portion 24 of tube 15 lies below stopper 20 and within compartment 22. The lower end of tube 15 terminates in a nozzle 25 which has a diameter greater than the reduced portion 24 and is capable of extending

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into the tapered recess or socket 14. At a point adjacent the lower end of reduced portion 24 a washer 26 is mounted upon tube 15. This washer has its central opening of such reduced diameter that there will be no danger of it passing over the nozzle portion 25 of the tube. The overall diameter of this washer is such that it may not pass through the opening in stopper 20. As shown in Fig. 1 it may move upwardly with the tube 15 to a point to which it engages the ribs 23.

With diluent or a liquid vehicle in compartment 21 and medicament within compartment 22, the assembly may be stored for long periods of time with freedom from deterioration of the medicament. No air will enter the parts and a cap 27 is conveniently applied to the outer end of spout 13 to maintain the latter in sterile condition. This cap 27 as well as nozzle 12, stoppers 19 and 20, bulb 18 and washer 26 are all conveniently formed of plastic although, of course, other materials could be employed.

When the user desires to provide the proper solution and to dispense the same, all that is necessary is that flange 16 or its equivalent be grasped and tube 15 be shifted outwardly of body 10 as shown in Fig. 2. This will result in the reduced diameter portion 24 of the tube passing into the opening of stopper 20. Accordingly, communication will be established between compartments 21 and 22. Due to the provision of ribs 23, washer 26 will not obstruct a fluid flow from one compartment to the other.

Under continued outward movement of tube 15 washer 26 engaging the ribs 23 will shift stopper 20 into compartment 21. Accordingly, that stopper will function as a piston causing a displacement and transfer of the liquid diluent or vehicle from compartment 21 to compartment 22. Such transfer will occur through the bore of stopper 20 in view of the fact that the reduced portion 24 has a greater overall length than the height of that stopper. During all the foregoing operations it is apparent that stopper 19 has functioned as a seal to prevent the liquid from moving outwardly into the end portion of body 10 adjacent the wall 11.

When all diluent has been transferred from compartment 21 to compartment 22, the parts will have reached positions such as have been shown in Fig. 3. As will be noted in that view, stoppers 19 and 20 are adjacent each other and both are positioned adjacent the upper end of body 10. If, thereupon tube 15 is projected, its nozzle end 25 will be immersed in the body of liquid. Of course, prior to such immersion the parts will preferably be agitated to furnish a proper solution. With immersion occurring, if bulb 18 is compressed and then released, a certain amount of the solution within compartment 22 will be drawn into the bore of tube 15 in a manner similar to that achieved by a conventional eye or nose dropper. Thereupon bulb 18 is compressed and the solution will be discharged through the bore of nozzle 12 in the form of a series of drops or fine stream. If desired, tube 15 may, of course, during this operation be maintained in a position at which its nozzle portion 25 is not necessarily immersed in the body of solution. Under those circumstances, by simply compressing bulb 18 the pressure on the body of air above the solution is increased. Such increase will cause a discharge of the solution through the bore or passage of spout 13. As will be apparent, that passage is sufficiently fine to have a capillary action such that, except when a deliberate discharge of solution occurs, there will be little if any tendency of that solution to escape.

After the user has completed dispensing the quantity of medicament desired, then he may simply project tube 15 so that the parts occupy a position such as has been shown in Fig. 4. As will be noted in that view, nozzle 25 seats within the recess or socket 14 and thus functions as a valve to prevent a flow of the solution. In order to maintain the cleanliness of the parts and also to further safeguard against any seepage, cap 27 may be remounted upon the end of spout 13. Under these circumstances the entire unit may be carried in the pocket or otherwise with no danger of an accidental leakage occurring.

While it is preferred to employ a pressure generating unit such as the bulb 18, it is not essential to do so.

Rather, with the solution established if the tube 15 is reciprocated through the body of the device that tube in itself will create sufficient pressure differential to assure of the discharge of a series of drops from the spout as that tube is projected. Under these circumstances it would, of course, be feasible to substitute for a hollow tube a solid member. Accordingly, no bulb would be mounted on that member. In view of the obvious nature of this alternative structure it has not been illustrated. However, except where the claims call for a "tube" with a bulb or compressing structure associated therewith, it is to be understood that either a hollow or solid member might be employed.

Thus, among others, the several objects of the invention as 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 medicament dispenser including in combination, a tubular body presenting inner and outer ends, a nozzle at the outer end of said body, a partition member within said body between the ends of the same to divide said body into a diluent-containing compartment adjacent its inner end and a medicament-containing compartment adjacent its outer end, said partition member being shiftable into said diluent compartment, a shiftable unit extending from a point beyond the inner end of said member into the same through both said diluent compartment and an opening in said partition member, said unit sealingly engaging surfaces of said member and said unit being formed with a by-pass which—upon said unit being shifted—affords a passage for the flow of diluent from said diluent compartment to said medicament compartment, and means on said shiftable unit for contacting and moving said partition member into said diluent compartment.

2. A medicament dispenser including in combination, a tubular body presenting inner and outer ends, a nozzle at the outer end of said body, a partition member within said body between the ends of the same to divide said body into a diluent-containing compartment adjacent its inner end and a medicament-containing compartment adjacent its outer end, said partition member being shiftable into said diluent compartment, a shiftable unit extending from a point beyond the inner end of said member into the same through both said diluent compartment and an opening in said partition member, said unit sealingly engaging surfaces of said member, said unit being formed with a by-pass which—upon said unit being shifted—affords a passage for the flow of diluent from said diluent compartment to said medicament compartment, and means on said shiftable unit for contacting and moving said partition member into said diluent compartment, said dispenser presenting a passage adjacent the inner end of said nozzle and said unit being shiftable to have its outer end sealingly engage the surface of said passage to prevent a flow of fluid therethrough.

3. A medicament dispenser including in combination a tubular body presenting inner and outer ends, a nozzle at the outer end of said body, a partition member within said body between the ends of the same to divide said body into a diluent-containing compartment adjacent its inner end and a medicament-containing compartment adjacent its outer end, a shiftable unit extending from a point beyond the inner end of said member into the same through both said diluent compartment and an opening in said partition member, said unit sealingly engaging surfaces of said member, said unit being formed with a by-pass which—upon said unit being shifted—affords a passage for the flow of diluent from said diluent compartment to said medicament compartment, a second partition member disposed within said body at a point adjacent the inner end of the same to define the adjacent end of the diluent compartment and said second member being also formed with an opening through which said unit extends.

4. A medicament dispenser including in combination a tubular body presenting inner and outer ends, a nozzle at the outer end of said body, a partition member within said body between the ends of the same to divide said body into a diluent-containing compartment adjacent its inner end and a medicament-containing compartment adjacent its outer end, a shiftable unit extending from a point beyond the inner end of said member into the same

through both said diluent compartment and an opening in said partition member, said unit sealingly engaging surfaces of said member, said unit being formed with a by-pass which—upon said unit being shifted—affords a passage for the flow of diluent from said diluent compartment to said medicament compartment, a second partition member disposed within said body at a point adjacent the inner end of the same to define the adjacent end of the diluent compartment, said second member being also formed with an opening through which said unit extends and a projecting part extending from said unit to engage with said first-named partition member as said unit is moved in the direction of the inner end of said tubular body to move said first-named partition member towards said second partition member and force fluid through said by-pass into said medicament compartment.

5. A medicament dispenser including in combination a tubular body presenting inner and outer ends, a nozzle at the outer end of said body, a partition member within said body between the ends of the same to divide said body into a diluent-containing compartment adjacent its inner end and a medicament-containing compartment adjacent its outer end, said partition member being shiftable into said diluent compartment, a shiftable unit extending from a point beyond the inner end of said member into the same through both said diluent compartment and an opening in said partition member, said unit sealingly engaging surfaces of said member, said unit being formed with a by-pass which—upon said unit being shifted—affords a passage for the flow of diluent from said diluent compartment to said medicament compartment, and means on said shiftable unit for contacting and moving said partition member into said diluent compartment, said by-pass being formed on the outer face of said unit, the latter being formed with a bore extending throughout the length of its body and a bulb mounted by said unit at a point beyond the inner end of said tubular body to exert pressure within said medicament compartment.

6. A medicament dispenser including in combination a tubular body presenting inner and outer ends, a nozzle at the outer end of said body, a partition member within said body between the ends of the same to divide said body into a diluent-containing compartment adjacent its inner end and a medicament-containing compartment adjacent its outer end, said partition member being shiftable into said diluent compartment, a shiftable unit extending from a point beyond the inner end of said member into the same through both said diluent compartment and an opening in said partition member, said unit sealingly engaging surfaces of said member, said unit being formed with a by-pass which—upon said unit being shifted—affords a passage for the flow of diluent from said diluent compartment to said medicament compartment, and means on said shiftable unit for contacting and moving said partition member into said diluent compartment, said nozzle being formed with a tapered recess in its inner face and the outer end of said unit being insertable into said recess to engage with surfaces thereof to prevent a flow of fluid through said nozzle.

7. A medicament dispenser including in combination a tubular body presenting inner and outer ends, a nozzle at the outer end of said body, a partition member within said body between the ends of the same to divide said body into a diluent-containing compartment adjacent its inner end and a medicament-containing compartment adjacent its outer end, said partition member being shiftable into said diluent compartment, a shiftable unit extending from a point beyond the inner end of said member into the same through both said diluent compartment and an opening in said partition member, said unit sealingly engaging surfaces of said member, said unit being formed with a by-pass which—upon said unit being shifted—affords a passage for the flow of diluent from said diluent compartment to said medicament compartment, means on said shiftable unit for contacting and moving said partition member into said diluent compartment, a second partition member disposed within said body at a point adjacent the inner end of the same to define the adjacent end of the diluent compartment and said second member being also formed with an opening through which said unit extends.

8. A medicament dispenser including in combination a tubular body presenting inner and outer ends, a nozzle at the outer end of said body, a partition member within

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said body between the ends of the same to divide said body into a diluent-containing compartment adjacent its inner end and a medicament-containing compartment adjacent its outer end, a shiftable unit extending from a point beyond the inner end of said member into the same through both said diluent compartment and an opening in said partition member, said unit sealingly engaging surfaces of said member, said unit being formed with a by-pass which—upon said unit being shifted—affords a passage for the flow of diluent from said diluent compartment to said medicament compartment, said dispenser presenting a passage adjacent the inner end of said nozzle and said unit being shiftable to have its outer end sealingly engage the surface of said passage to prevent a flow of fluid therethrough, a second partition member disposed within said body at a point adjacent the inner end of the same to define the adjacent end of the diluent compartment and said second member being also formed with an opening through which said unit extends.

9. A medicament dispenser including in combination a tubular body presenting inner and outer ends, a nozzle at the outer end of said body, a partition member within said body between the ends of the same to divide said body into a diluent-containing compartment adjacent its inner end and a medicament-containing compartment adjacent its outer end, a shiftable unit extending from a point beyond the inner end of said member into the same through both said diluent compartment and an opening in said partition member, said unit sealingly engaging surfaces of said member, said unit being formed with a by-pass which—upon said unit being shifted—affords a passage for the flow of diluent from said diluent compartment to said medicament compartment, said by-pass being formed on the outer face of said unit, the latter being formed with a bore extending throughout the length of its body and a bulb mounted by said unit at a point beyond the inner end of said tubular body to exert pressure within said medicament compartment, a second partition member disposed within said body at a point adjacent the inner end of the same to define the adjacent end of the diluent compartment and said second member being also formed with an opening through which said unit extends.

10. A medicament dispenser including in combination a tubular body presenting inner and outer ends, a nozzle at the outer end of said body, a partition member within said body between the ends of the same to divide said body into a diluent-containing compartment adjacent its inner end and a medicament-containing compartment adjacent its outer end, a shiftable unit extending from a point beyond the inner end of said member into the same through both said diluent compartment and an opening in said partition member, said unit sealingly engaging surfaces of said member, said unit being formed with a by-pass which—upon said unit being shifted—affords a passage for the flow of diluent from said diluent compartment to said medicament compartment, said nozzle being formed with a tapered recess in its inner face and the outer end of said unit being insertable into said recess to engage with surfaces thereof to prevent a flow of fluid through said nozzle, a second partition member disposed within said body at a point adjacent the inner end of the same to define the adjacent end of the diluent compartment and said second member being also formed with an opening through which said unit extends.

11. A medicament dispenser including in combination

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a tubular body presenting inner and outer ends, a nozzle at the outer end of said body, a partition member within said body between the ends of the same to divide said body into a diluent-containing compartment adjacent its inner end and a medicament-containing compartment adjacent its outer end, said partition member being shiftable into said diluent compartment, a shiftable unit extending from a point beyond the inner end of said member into the same through both said diluent compartment and an opening in said partition member, said unit sealingly engaging surfaces of said member, said unit being formed with a by-pass which—upon said unit being shifted—affords a passage for the flow of diluent from said diluent compartment to said medicament compartment, means on said shiftable unit for contacting and moving said partition member into said diluent compartment, said nozzle being formed with a tapered recess in its inner face and the outer end of said unit being insertable into said recess to engage with surfaces thereof to prevent a flow of fluid through said nozzle, said by-pass being formed on the outer face of said unit, the latter being formed with a bore extending throughout the length of its body and a bulb mounted by said unit at a point beyond the inner end of said tubular body to exert pressure within said medicament compartment, a second partition member disposed within said body at a point adjacent the inner end of the same to define the adjacent end of the diluent compartment and said second member being also formed with an opening through which said unit extends.

12. A medicament dispenser including in combination a tubular body presenting inner and outer ends, a nozzle at the outer end of said body, a partition member within said body between the ends of the same to divide said body into a diluent-containing compartment adjacent its inner end and a medicament-containing compartment adjacent its outer end, a shiftable unit extending from a point beyond the inner end of said member into the same through both said diluent compartment and an opening in said partition member, said unit comprising a tube having an outer surface sealingly engaging surfaces of said member, said unit being formed with a portion of reduced diameter providing a by-pass which—upon said unit being shifted—affords a passage for the flow of diluent from said diluent compartment to said medicament compartment, a second partition member disposed within said body at a point adjacent the inner end of the same to define the adjacent end of the diluent compartment and said second member being also formed with an opening through which said unit extends.

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