

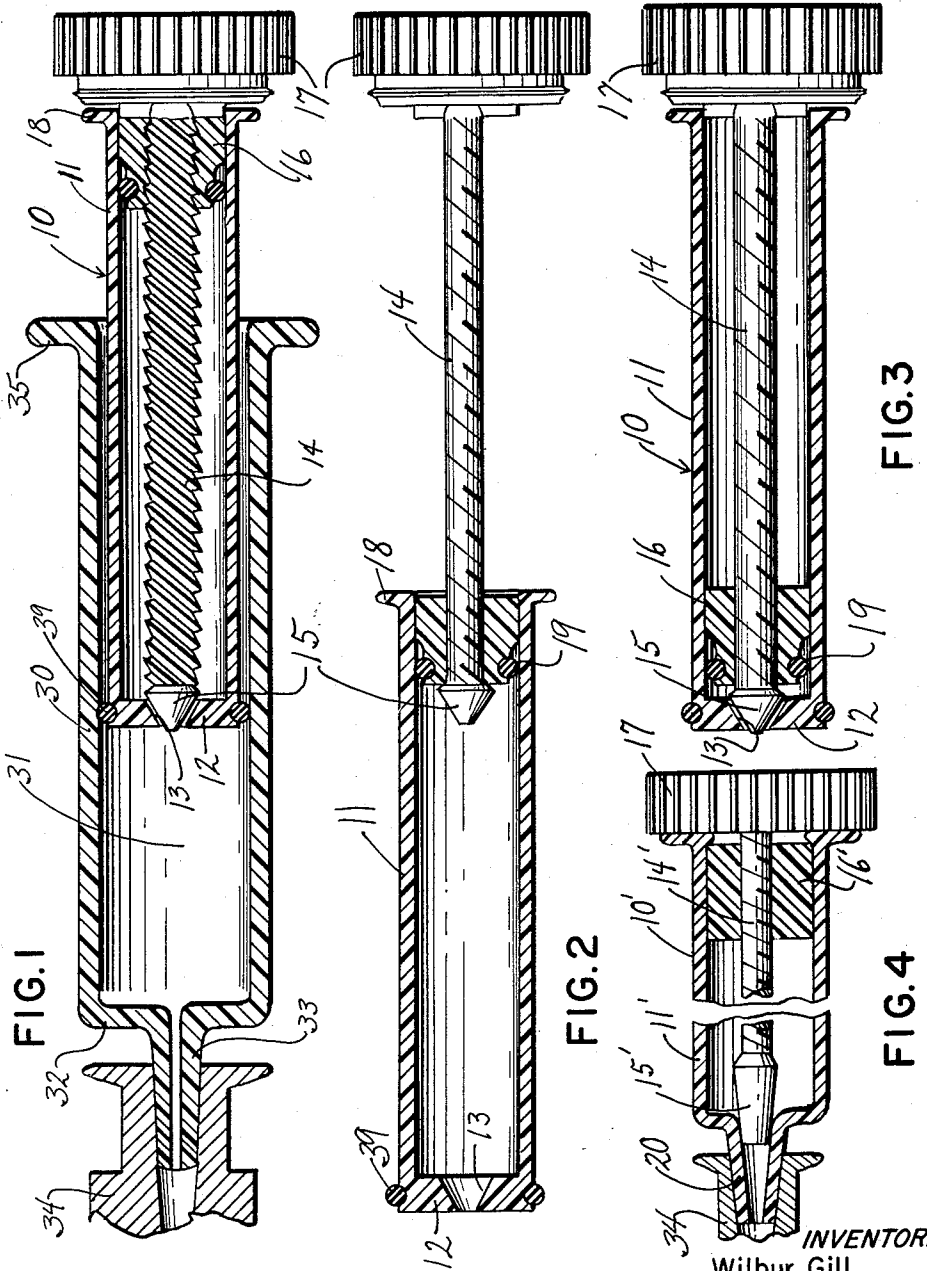
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MIXING AND DISPENSING DEVICE

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MIXING AND DISPENSING DEVICE

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This invention relates to a device for holding and dispensing liquid and powder products, more particularly it relates to a device for mixing liquid and powder products, and thereupon immediately dispensing the same.

Among the objects of the invention is to provide a tubular holder device for holding a liquid or flowable paste which can include means to open the tubular holder and discharge the liquid or paste.

Among other objects of the invention is to provide a two compartment device, one compartment of which is adapted to hold a liquid and the other compartment of which is adapted to hold another liquid or a powder, which device comprises means to discharge the contents of one compartment into the other compartment and means adapted to discharge the resultant mixture into or onto an appropriate body.

This application is a continuation-in-part of my U.S. application Serial No. 772,339, filed November 6, 1958.

In the injecting of solutions into the animal body it is frequently desirable to make up the solution to be injected immediately prior to the injecting operation. For example, in the case of solid vitamins which are made suitable for injecting into the body by dissolving in a solvent such as tocopherol, it is necessary to dissolve the vitamin or vitamins immediately before injection because the vitamins lose their potency if stored for any length of time after dissolving. In many cases a degree of the potency can be retained after dissolving by refrigeration but this again is troublesome and one can never be sure of the potency of such a refrigerated solution unless he knows the complete history of the solution.

Also, in employing polymerizable, resinous, liquid mixtures which are to be hardened by a catalyst, it is necessary to mix the catalyst with the resinous liquid just before the resin is to be applied or employed. Many catalysts are of a poisonous or toxic nature and breathing the fumes or contact with the skin should be avoided.

Among other objects of the invention is to provide a container suitable for mixing a liquid and a powder or two liquids or pastes while both components are retained within the container.

The objects of the invention are obtained by providing a liquid or paste containing tubular container having an opening at one end of the tube and a movable plug at the opposite end; threaded into the plug is a long screw shaft extending the length of the tube and having a closure means at its end adapted to plug or close the opening in the tube from the inside. The end of the screw shaft which extends outside of the tubular container contains a knob or cap for rotating the screw shaft and upon rotation of said shaft the plug at the end of the shaft is first removed from the opening in the tube and upon further rotation the screw shaft is made to extend almost its full length beyond the plug end of the tube whereupon said shaft acts as a shaft to push the end plug of the tube which acts as a plunger to discharge the contents of the tube.

The liquid or paste containing tube is adapted to fit tightly, concentrically and slidably into a similar tube which is adapted to hold a powder or a second liquid that is to be mixed with the first liquid.

In the drawing:

FIG. 1 is a side cross-sectional view of a two compartment device made according to the invention as it is assembled ready for use.

FIG. 2 is a side cross-sectional view of the first com-

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partment of the device of FIG. 1 with the screw shaft in its operative position.

FIG. 3 is a view similar to FIG. 2 but showing the first compartment after the contents have been discharged therefrom.

FIG. 4 is a side cross-sectional view of a one compartment device made according to the present invention.

The assembled device of FIG. 1, as shown, is primarily designed for the injection of a vitamin solution into an animal body, for example, but it will be understood that only slight modifications, if any, would be required to provide a device for mixing a catalyst with a resin and then discharging the mixture onto a suitable surface to be adhered, for example.

In the device as shown in FIG. 1, the tube means 10 is adapted to contain a liquid, a solvent or a catalyst for example. The tube means 30 is adapted to contain a powder or another liquid in the compartment 31 thereof. At the end 32 of the tube means 30 is a nozzle 33 adapted to retain a tubular conduit portion 34 of a hypodermic needle (only partly shown) thereon. The end opposite the nozzle 33 contains a flange 35 adapted to be held between the first two fingers so that the thumb can press tube means 10 into the tube 30 at the appropriate time.

The tube means 10 comprises a tube element 11 which is closed at one end by the disk 12 and open at the opposite end. The disk 12, however, contains a central opening 13 of conical shape. The opening 13 is normally closed by the plug 15 which is attached to the end of the screw shaft 14.

At the open end of tube 11 is the plug-plunger 16 which is internally threaded to fit the threads of the screw shaft 14. The screw shaft 14 has the valve-like plug 15 at one end and the knob or cap 17 at the opposite end. Preferably, the screw shaft 14 contains left-handed screws so that rotation of the knob 17 to the right causes the shaft to move to the right as shown in FIGS. 1 and 2. However, the normal right-handed screw threads operate equally well. When rotated to the right as far as possible the tube 11 and screw shaft 14 are in the position shown in FIG. 2. The tube 11 includes the peripheral flange 18 at the end thereof so that the contents of tube 11 can be discharged by grasping the knob 17 and flange 18 between the thumb and first two fingers and pressing the thumb toward the first two fingers in the customary manner. The plug-plunger 16 may include a gasket means 19 to provide a tight seal between the plug and the tube 11. The outside of tube 11 also contains an annular gasket 39.

In the operation of the device, the device 10 is loaded with the catalyst or solvent liquid desired. This unit may be shipped or stored separately and need not be assembled with the tube means 30 until it is desired to make use of the same. To employ the device 10, a suitable powder is introduced into compartment 31 of tube means 30 and the device 10 is inserted in the open end thereof. The powders employed, such as vitamin powders or resinous powders are usually stable in powder form so that no special precautions other than the normal precautions against contamination are required.

When the devices are assembled as shown in FIG. 1, the cap 17 is rotated to open the discharge orifice 13 and to extend screw shaft 14 to the position shown in FIG. 2. Thereupon the contents of tube 11 are discharged into compartment 31. It may be desirable to shake the contents in compartment 31 to make sure that a thorough solution is obtained. Thereafter, the needle 34 is fixed to nozzle 33, introduced into the body of the animal and the contents of compartment 31 are discharged.

As shown in the modification illustrated in FIG. 4, the liquid or paste carrying tube 10' may be provided with a nozzle 20 for direct injection into an animal body. In

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this case the plug-stopper 15' is made to fit the internal shape of the nozzle 20. The device operates as described above except that the contents of tube 11' are discharged directly into the animal body through hypodermic needle device 34. Thus, this device, by itself, provides a very compact form of a ready-to-use vial which does not need to be broken to open the same and which cannot be accidentally discharged.

In the devices of the invention, the tubes 11 and 30 may be made of glass or of plastic material such as polyethylene, polypropylene, cellulose esters and ethers, polymers of tetrafluorethylene or trifluoromonoethylethylene, etc. The stopper-plugs 15 and 15' may be made of chemically resistant plastic material which is preferably elastomeric. Depending on what contents are to be employed the plug-stopper 15 and 15' may be of natural rubber, synthetic rubber, silicone rubber, etc. The end plug 16 or 16' may be of plastic material similar to that of the tube 11 or 30. The gaskets 19 and 39 are of similar materials to plug-stopper 15 and 15'.

The features and principles underlying the invention described above in connection with specific exemplifications will suggest to those skilled in the art many other modifications thereof. It is accordingly desired that the appended claims shall not be limited to any specific feature or details thereof.

I claim:

1. A dispensing device for holding and discharging a liquid, comprising a tubular container means with a tube portion, said tube portion having a closure means at the first end thereof containing a central axial orifice, a plug-plunger means at the second end of said tube portion, said plug-plunger containing an internally threaded central opening, a screw shaft having a cap adjacent the plug-plunger end of the tube portion and a plug-stopper at the other end, said screw-shaft having external threads extending for a length substantially equal to the length of said tube portion and adapted to fit with the internal threads of said plug plunger, said cap and screw-shaft being adapted to move away from the plug-plunger end of the tube upon rotation of the cap and screw shaft in one direction, whereby said plug stopper of the screw shaft is adapted to extend into the orifice of said closure means from the inside in one position of said screw shaft and said cap and screw shaft is adapted to unplug said orifice and extend back of the plug-plunger to provide a shaft for pushing the latter in another position of said screw shaft so that axial movement of the cap and screw

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shaft forces the plug plunger axially along said tube to discharge the contents thereof, gasket means surrounding said tube portion adjacent the first end thereof whereby said tube portion may be fitted into a second tube to act as a plunger in the second tube.

2. A combination dispensing device for holding and discharging a liquid comprising a first tubular container having a closure means at the first end thereof containing a central axial orifice, a plug-plunger means at the second end of said tube portion, said plug-plunger containing an internally threaded central opening, a screw shaft having a cap adjacent the plug-plunger end of the tube portion and a plug-stopper at the other end, said screw-shaft having external threads extending for a length substantially equal to the length of said tube portion and adapted to fit with the internal threads of said plug-plunger, said cap and screw-shaft being adapted to move away from the plug-plunger end of the tube upon rotation of the cap and screw shaft in one direction, whereby said plug-stopper of the screw shaft is adapted to extend into the orifice of said closure means from the inside in one position of said screw shaft and said cap and screw shaft is adapted to unplug said orifice and extend back of the plug-plunger to provide a shaft for pushing the latter in another position of said screw shaft so that axial movement on the cap and screw shaft forces the plug plunger axially along said tube to discharge the contents thereof, and in combination with a second tubular container having a first end which is open and a second end which is closed except for a relatively small discharge opening in the central portion thereof, said second tubular container surrounding at least the first end portion of the first tubular container, gasket means about the first end of the first tubular container whereby said first tubular container acts as a plunger for the second tubular container.

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