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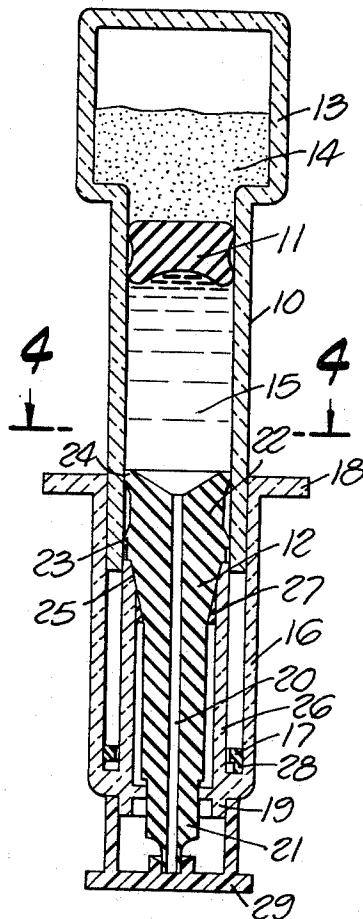
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[54] **MULTIDROP ADAPTER**  
10 Claims, 8 Drawing Figs.

[52] U.S. Cl. .... 222/145,  
128/218, 222/420  
[51] Int. Cl. .... B67d 5/60  
[50] Field of Search ..... 222/137,  
160, 145, 162, 386, 340, 385, 420, 525; 128/220,  
272, 218M

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**ABSTRACT:** A multidrop adapter or dispenser in which a tubular member which may have an enlarged head for containing a powder or substance to be mixed with a liquid in the remainder of the tubular member is telescopically received in a second tubular member which seals one end of a piston which extends into the first tubular member and has a bore which extends out of said second tubular member to expel a drop of liquid when said first tubular member is telescopically moved into said second tubular member and over said piston; and resilient means biasing said first tubular member out of said second tubular member. A plug in said first tubular member is dispelled into said enlarged head upon movement of said first tubular member over said piston when said enlarged head is employed in the invention.



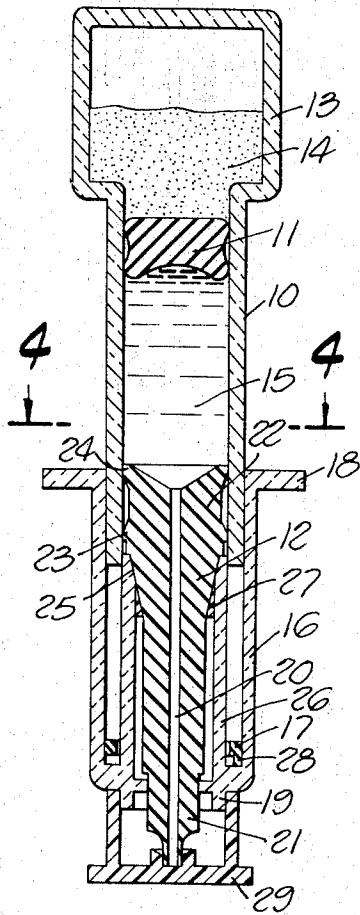


FIG. 1.

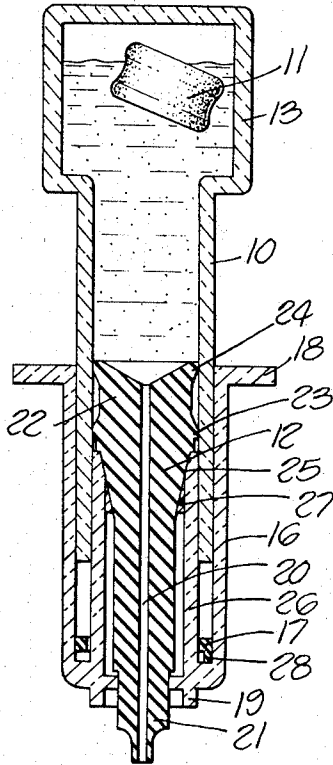


FIG. 2.

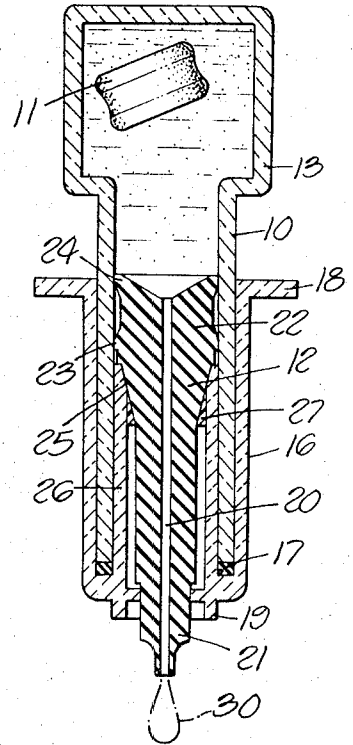


FIG. 3.

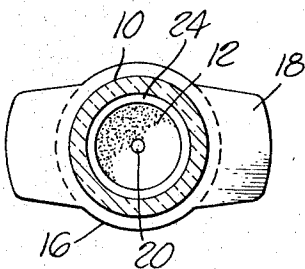


FIG. 4.

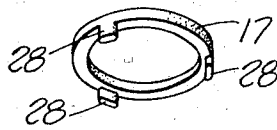


FIG. 5.

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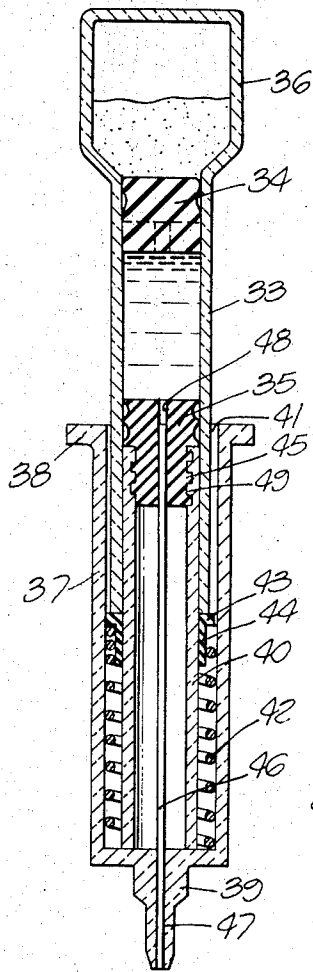


FIG. 7.

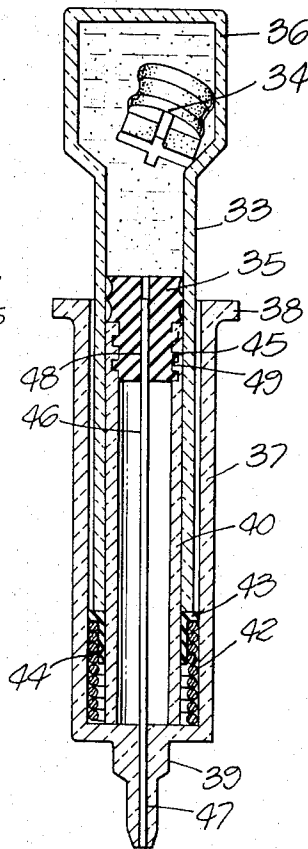


FIG. 8.

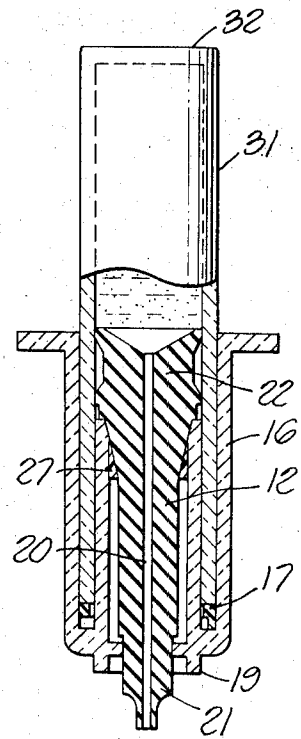


FIG. 6.

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## MULTIDROP ADAPTER

## BACKGROUND OF INVENTION

Devices for dispensing repeated drops of medicine or other liquids for a variety of purposes are of great antiquity hence the man skilled in the art has a wealth of historic development from which to draw. Perhaps the simplest such device constitutes a mere short length of tubing, such as a straw, which can be filled or partially filled with water or other liquid and drops dispensed by alternately placing and removing a finger from the upper end of such an inverted straw. The eyedropper with its squeezable rubber bulb affixed to a glass tubing dispenser is a familiar occupant of nearly every medicine cabinet. Nevertheless, when it is desired for example, to give a vaccination by applying a drop of vaccine over an opened portion of the skin of a patient it is still common practice to resort to a syringe or other costly or complicated device for dispensing the single drop of vaccine required. More particularly, the problem becomes compounded when the liquid to be dispensed is one which must be made up just before it is dispensed, as for example, where a powder is mixed with a liquid just before application or where two liquids which are not compatible over any extended period of time are to be mixed just prior to application.

Accordingly, it is one object of the present invention to provide a multidrop adapter which retains the traditional simplicity of such devices and yet is capable of dispensing a plurality of carefully measured single drops of liquid, which may be in one of the embodiments of this invention a liquid which has just been constituted, in situ, by mixing together a powder and a liquid or two liquids just prior to their use.

These and other objects and advantages of this invention will be apparent from the more detailed description which follows.

## DESCRIPTION OF PREFERRED EMBODIMENTS

Turning to the drawings:

FIG. 1 is a sectional view of a preferred embodiment of the present invention;

FIG. 2 is a view similar to FIG. 1 showing the plug after displacement;

FIG. 3 is a view similar to FIGS. 1 and 2 after a complete depressing of the cylinder and the formation of a drop of liquid about to be released;

FIG. 4 is a vertical section of the device illustrated in FIG. 1 and taken along the line 4-4;

FIG. 5 is a perspective view of a preferred form of resilient means utilized in the present invention;

FIG. 6 is a vertical section of another embodiment of the invention;

FIG. 7 is a vertical section of a further embodiment of the invention; and

FIG. 8 is a vertical section of the device shown in FIG. 7 in a fully depressed condition of the cylinder.

Referring now more particularly to the drawings, there is illustrated a multidrop adapter in the preferred embodiment of which there is utilized a device 10 which is termed herein a cylinder because it receives a plug 11 and a piston 12 but which has an enlarged, hollow head 13 as illustrated. The plug 11 normally fits in the cylinder 10 as indicated in FIG. 1 but is displaced into the head 13 prior to the dispensing of a drop of liquid as hereinafter described.

Head 13 is normally partially filled with a dry substance or powder 14 but the number 14 can be taken to illustrate a liquid other than the liquid 15 which fills the space between the piston 12 and the plug 11.

The remaining parts constituting the preferred embodiment are the applicator 16 and the compression pad 17.

The applicator 16 is in the form of a cylinder having a flange 18 and an annular skirt 19 the interior of which cylinder receives in sliding fit the exterior of the cylinder 10.

Piston 12 is generally in the form of a solid flexible member of rubber or rubberlike material having a longitudinal central passage or bore 20. A nose 21 of reduced cross section, and an enlarged upper end 22 having a pair of spaced sealing rings 23 and 24 formed thereon and adapted to sealingly engage the exterior of the cylinder 10. The tapered underside 25 of end 22 is cemented or glued to inner cylinder 26 by joining material 27 so that piston 12 is effectively held in place during operation of the device.

The compression pad 17 is preferably made of rubber and has the form of a ring with three downturned legs 28 which in use rest upon the bottom of applicator 16 in the annular space between the outer wall of applicator 16 and cylinder 26.

For storage, the device may be provided with a cap 29 which seals on both skirt 19 and nose 21 to maintain sterility. The cap is removed prior to operation of the device.

The operation of the above-described device is as follows: Assuming the device illustrated to be filled with a liquid 15 between the plug 11 and the piston 12 and a powder 14 in the head 13. The device is held in an upright position with the head 13 low and the nose 21 high. In this position a collapsing of the device by pressing the cylinder 10 into the applicator 16 and over the piston 12 will cause the plug 11 to be blown into the head 13 as indicated in FIG. 2. In this condition the liquid 15 may mix with the powder 14 (or two liquids may mix). Thereafter, the device is inverted, the nose 21 is pointed at the spot where a drop of liquid 30 is desired and the device is further collapsed to the condition shown in FIG. 3 in which the end of cylinder 10 contacts the ring portion of pad 17, collapses the legs 28 thereof and forces a drop or bead of liquid 30 to fall from the nose 21. Thereafter, the head 13 may be released and the device will return to its original expanded condition, with the plug 11, however, still in head 13, under the force of the resilience of the legs 28 of pad 17. The return of the device to the expanded position draws air into the head 13 through bore 20 to permit the forming of a succeeding drop.

Referring now more particularly to FIG. 6, there is shown an embodiment of the invention wherein the cylinder 31 differs from the cylinder 10 by not having an enlarged head 13 and by having a closed end 32 instead of a plug 11. Obviously, this device merely dispenses a drop of liquid and does not perform any mixing function. All of the remaining parts are identical with those of the previous embodiment.

Turning now to FIGS. 7 and 8, there is shown a further embodiment of the invention wherein a cylinder 33 has a plug 34, a piston 35 and an enlarged head 36 generally comparable to the correlative numbers 10-13 of the first embodiment. An applicator 37 similar to the applicator 16 has a flange 38 and a reduced hub 39. The applicator 37 includes an integral upstanding cylindrical portion 40 preferably formed integrally with the remainder of the applicator 37 and spaced inwardly from the sidewall of the applicator to leave an annular space 41. A coil spring 42 surrounds the member 40 in the annular space 41 and has its upper end engaging the flange 43 of a member 44. Member 44 is preferably formed of plastic and is a cylindrical sleeve adapted to fit over the upstanding member 40 and have its flange 43 also engaged by the end of the cylinder 33 as clearly shown in FIGS. 7 and 8. The upstanding member 40 may be internally threaded as at 49 to receive the external threads 45 of a rubber piston 35 threaded therein as indicated. A tube 46 is cemented in the bore 47 of the hub 39 and extends upwardly within the member 40 and into the bore 48 of piston 35 as shown.

The operation of the device shown in FIGS. 7 and 8 is identical with that of FIGS. 1-6 with the coil spring 42 replacing the collapsing legs 28 of pad 17 and serving to bias the cylinder 33 towards expanded position just as the legs 28 bias the cylinder 10.

The foregoing constitutes the best known means of carrying out the present invention and describes the same with such particularity as is deemed necessary to enable one skilled in the art to practice the invention. The monopoly asserted herein is that set forth in the appended claims.

I claim:

1. A multidrop dispenser comprising:

a first tubular member having an open end and a closed end;  
 a second tubular member having an open end and a partially  
 closed end, said first tubular member being telescopically  
 slidable in said second tubular member;  
 a piston in said first tubular member and having a portion  
 extending into and through the partially closed end of  
 said second tubular member;  
 a central bore in said piston; and  
 resilient means having extended and collapsed positions  
 carried by said second tubular member and adapted to  
 engage said first tubular member and biasing said first tu-  
 bular member towards extended rather than collapsed  
 position of said resilient means.

2. A multidrop dispenser as set forth in claim 1 in which said  
 first tubular member is provided with an enlarged head and a  
 stopper adapted to be forced into said enlarged head upon  
 partial telescopic movement of said first tubular member into  
 said second tubular member.

3. A multidrop dispenser as set forth in claim 1 in which said  
 piston terminates in a nose upon which a bead, a drop, of  
 liquid is formed upon expulsion of such liquid from said first  
 tubular member through said bore by telescopic movement of  
 said first tubular member into said second tubular member  
 and over said piston.

4. A multidrop dispenser as set forth in claim 2 in which said  
 piston terminates in a nose upon which a bead, a drop, of  
 liquid is formed upon expulsion of such liquid from said first  
 tubular member through said bore by telescopic movement of

said first tubular member into said second tubular member  
 and over said piston.

5. A multidrop dispenser as set forth in claim 1 in which said  
 resilient means comprises a rubberlike ring member adapted  
 to be compressed upon movement of said first tubular  
 member into said second tubular member.

6. A multidrop dispenser as set forth in claim 2 in which said  
 resilient means comprises a rubberlike ring member adapted  
 to be compressed upon movement of said first tubular  
 member into said second tubular member.

7. A multidrop dispenser as set forth in claim 3 in which said  
 resilient means comprises a rubberlike ring member adapted  
 to be compressed upon movement of said first tubular  
 member into said second tubular member.

8. A multidrop dispenser as set forth in claim 1 in which said  
 resilient means comprises a coil spring seated in said second  
 tubular member and adapted to engage the partially closed  
 end thereof at one end and the inner end of said first tubular  
 member at the other end thereof.

9. A multidrop dispenser as set forth in claim 2 in which said  
 resilient means comprises a coil spring seated in said second  
 tubular member and adapted to engage the partially closed  
 end thereof at one end and the inner end of said first tubular  
 member at the other end thereof.

10. A multidrop dispenser as set forth in claim 4 in which  
 said resilient means comprises a coil spring seated in said  
 second tubular member and adapted to engage the partially  
 closed end thereof at one end and the inner end of said first tu-  
 bular member at the other end thereof.

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