

[54] **MULTI-POSITIONAL PIPETTING DISPENSER**

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[51] Int. Cl. **G01f 11/06**

[58] Field of Search 222/1, 14, 31, 43, 222/50, 250, 309, 384, 400.8, 386; 73/425.4 P, 425.6; 141/25, 26, 27; 128/213, 224, 234, 235, 236, 237, 238, 239; 239/587; 138/89, 92; 124/13

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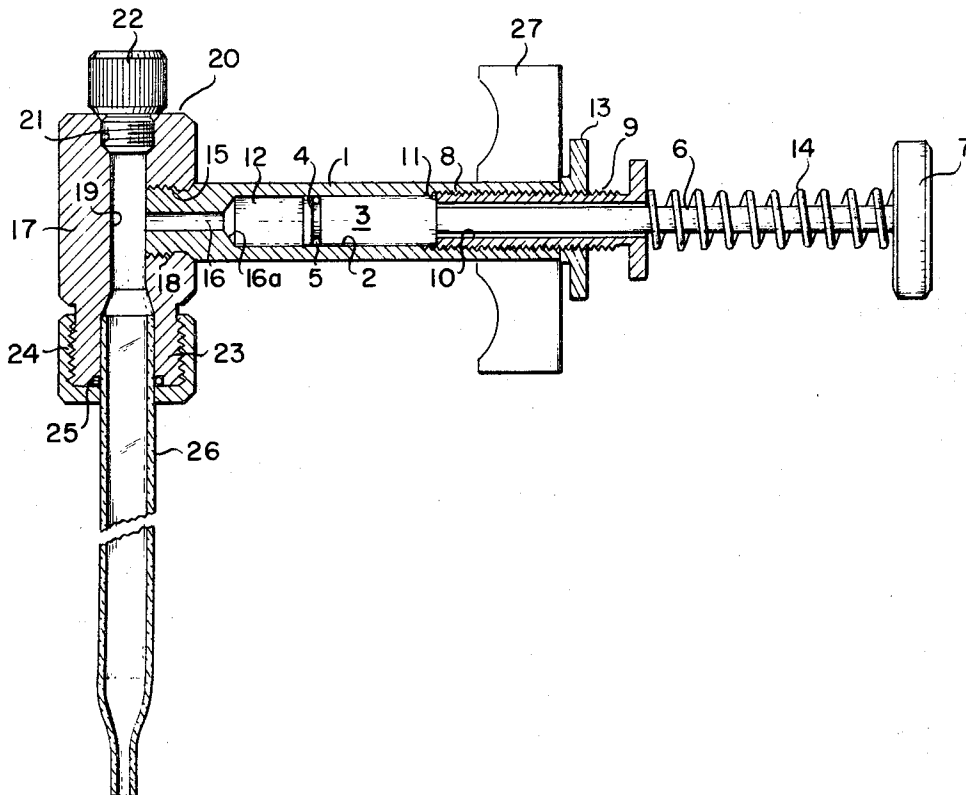
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[57] **ABSTRACT**

A pipetting dispenser of the piston-cylinder type with interchangeable fittings by which the operative movement of the piston may be arranged to be in line with or at an angle to the axis of an attached pipette and having adjustable stop means to limit travel of the piston within predetermined limits, together with means automatically retracting the piston from its discharge position to a position in engagement with said adjustable stop means, thereby insuring the repeated dispensing of like volumes of liquid from said pipette in successive operations of the dispenser, for any adjusted position of the stop means.

6 Claims, 4 Drawing Figures



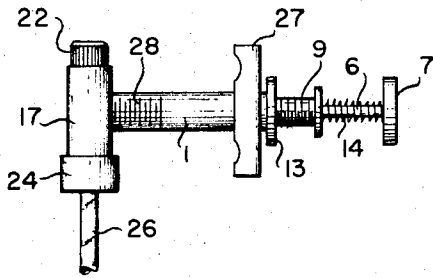


Fig. 1

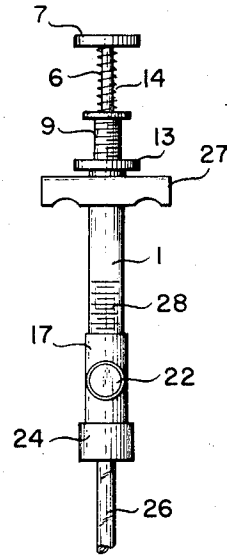


Fig. 3

Fig. 2

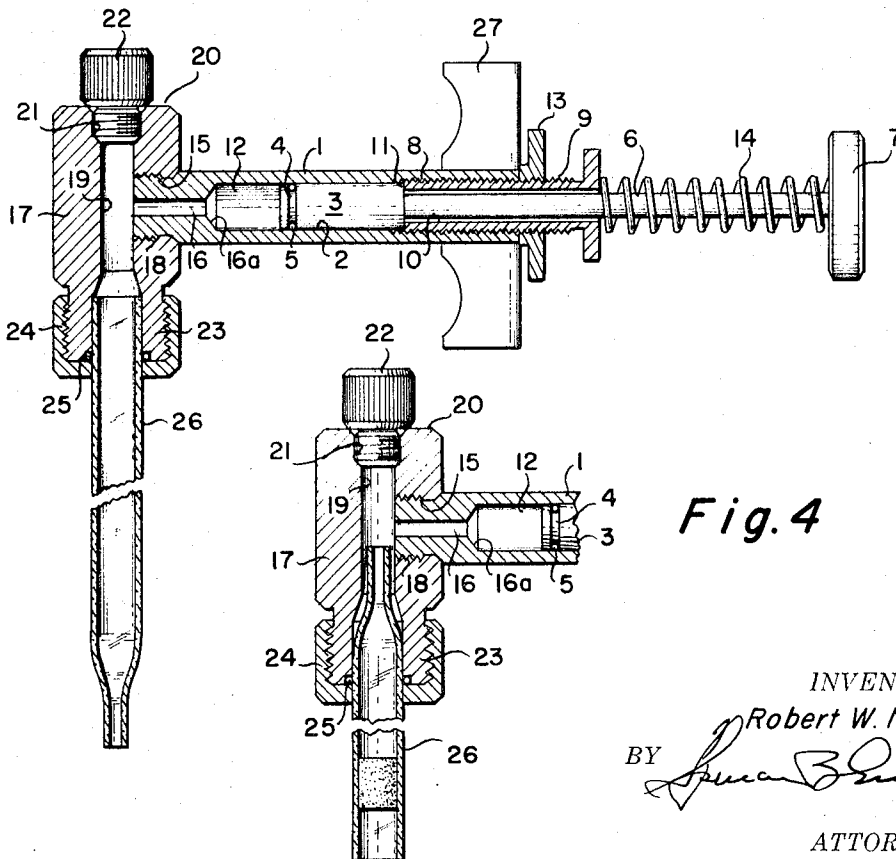


Fig. 4

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MULTI-POSITIONAL PIPETTING DISPENSER

This invention relates generally to pipetting dispensers and in particular to pipetting dispensers of the piston-cylinder type.

One object of the invention is to provide a pipetting dispenser of the character described wherein means are provided in the form of interchangeable fittings by which piston travel may be arranged to be in line with or at an angle to the axis of the dispenser pipette.

Another object of the invention is to provide in a pipetting dispenser of the character described, adjustable stop means for limiting piston travel within the cylinder to adjust the effective volume of the cylinder, within predetermined limits, as determined by the extent of piston travel.

A further object of the invention is to provide in the dispenser of the character described, means to retract the piston after each discharge stroke thereof to a position in engagement with the adjustable stop means whereby to accurately measure and repeatedly discharge successive equal amounts of liquid from the dispenser.

Another object of the invention is to provide lock means for maintaining the adjustable stop means in an adjusted position whereby to insure the discharge of accurately measured amounts of liquid by repeated and successive operations of the dispenser.

A further object of the invention is to provide means for attaching and replacing a pipette in operative position on the dispenser.

Another object of the invention is to provide a reliable pipetting dispenser for use with glass disposable pipettes as well as with standard laboratory pipettes.

A further object of the invention is to provide a repetitive pipetting dispenser which can be completely autoclaved.

A further object of the invention is to provide a pipetting dispenser in which the material being dispensed does not come in contact with the body of the dispenser but is always contained within the glass pipette attached thereto.

Another object of the invention is to provide a pipetting dispenser of the character described which can be used to eject the cotton plugs laboratory workers insert in the large or "mouth" end of pipettes to prevent mouth contamination by the material being pipetted when the last volume of material in the pipette is "blown out" as is customary.

These and other objects of the invention will become apparent from the following specification and drawings wherein I have described and illustrated a preferred form of my invention and wherein:

FIG. 1 is a side elevation of the invention with the parts thereof arranged so that the line of piston travel is disposed at an angle to the axis of the pipette,

FIG. 2 is an enlarged sectional view of the dispenser with the parts thereof arranged as shown in FIG. 1,

FIG. 3 is a side elevation of the invention with the parts thereof arranged so that the line of piston travel is aligned with the axis of the pipette, and

FIG. 4 is a view similar to FIG. 2 showing the dispenser arranged to eject a cotton plug from a pipette.

Referring to the drawings more particularly, the invention is shown comprising a body member 1 provided with an inner cylindrical cavity 2 opening out through one end of said body member and within which

a piston or plunger 3 is disposed with the cavity 2 and the plunger 3 accurately dimensioned to permit longitudinal movement of the plunger within the cylindrical cavity. The plunger 3 may be provided with a packing groove 4 within which is disposed a sealing ring 5 whereby to preclude leakage of the liquid being dispensed past the plunger.

The plunger 3 is provided with an operating rod 6 which may be threadedly attached to the right-hand end of the plunger as viewed in FIG. 2. The rod 6 is of a length to extend beyond the open end of the body which end terminates in an operating handle or button 7 by which the plunger may be reciprocated within the cylinder. The inner surface of the wall of the cylindrical cavity 2, at the open end thereof, and through which the operating rod 6 projects, is as shown, provided with an internal screw thread 8. An exteriorly screw-threaded sleeve 9 is threadedly engaged with the threaded portion 8 of the body 1 and the sleeve 9 is provided with a through longitudinally extending bore 10 dimensioned to receive and guide the rod 6 in its operative movements. The inner end 11 of the sleeve 9 is designed to function as an adjustable stop means to limit the travel of the plunger in one direction within the cylindrical cavity 2 and to this end has a radial wall thickness such as to overlap radially the transverse dimension of the plunger 3 as clearly shown in FIG. 2. Thus, by adjusting the sleeve longitudinally of the cylindrical cavity 2, the permissible travel of the plunger 3 to the right as viewed in FIG. 2 is adjustably defined, and thus the volume of the liquid charge drawn into that portion of the cavity 2 indicated by the reference 12 may be accurately determined. A jam nut 13 is provided on that portion of the sleeve 9 projecting beyond the body 1 to lock the sleeve 9 in adjusted position and thus insure accuracy in the volumetric amount of liquid dispensed in successive operations of the plunger 3 in any given position of adjustment of said sleeve. A coil spring 14 surrounds the projecting end of rod 6 and is placed under proper compressive force between the button 7 and the adjacent end of sleeve 9 to resiliently bias the plunger 3 into engagement with stop 11 and thus insure full retraction of the plunger 3 upon its release, following a full discharge stroke toward the left as shown in FIG. 2.

The opposite end of the body 1 is provided with mounting means comprising a reduced externally threaded portion 15 having a through central bore 16 in communication with the portion 12 of the cavity 2, by tapered section 16a which is dimensioned to provide fixed stop means to limit travel of the plunger 3 towards this end of the body member and thus in cooperation with the adjustable stop means 11, define the range of movement of the plunger 3 within the cavity 2. The terminal portion 15 of the body 1 is screw-threadedly attached to a body-member-attachment fitting 17 having a threaded bore 18 opening laterally of said fitting. The bore 18 thus communicates with a longitudinally extending through bore or channel 19 in the fitting 17. The upper end 20 of said fitting is provided with a threaded bore 21 of the same dimensions as that of the bore 16, whereby a screw-threaded plug 22 is interchangeable with the body member 1 in respect to the bores 16 and 21 so as to provide for the different arrangements of these parts as shown in FIGS. 1 and 3. This will allow the dispenser to be operated in areas where space limitations are restrictive.

The opposite end 23 of the fitting 17 is provided with pipette-supporting means for detachably connecting a pipette thereto, thus the end 23 is exteriorly threaded as shown to threadedly receive a screw-threaded packing gland 24 which serves to secure and maintain a fluid-tight seal between the packing seal 25 and the upper end of a pipette 26 fitted within the lower enlarged end of the channel 19.

The dispenser may be provided with calibrated indicia to indicate the volumetric contents of the portion 12 of the cavity 2 as determined by the setting of the stop member 11, and to this end calibrated indicia 28 may be inscribed on the wall of the body 1 when it is made of transparent or translucent plastic material as hereinafter suggested.

With the parts arranged for example as shown in FIG. 3, the operation of the dispenser is as follows: the operator depresses the rod 6 against the force of the spring 14 until the plunger 3 encounters the lower stop means 16a. The free end of the pipette 26 is immersed within a body of liquid to be pipetted and the plunger rod 6 then released whereupon the spring 14 retracts the plunger 3 into a position where it is engaged with the stop 11 which has been previously adjusted to define a predetermined volume within the portion 12 of the cavity 2. The dispenser is then positioned in discharging relation to the vessel or container into which the liquid is to be dispensed, and the plunger rod 6 depressed to discharge the liquid from the chamber 12. Repeated operation of the dispenser as described insures accurately measured volumes of the liquid being dispensed on successive operations thereof, for each adjusted position of the stop member. These operations are facilitated by the provision of the shaped finger piece 27 which may be press fitted to the body member 1 adjacent the upper end thereof. The finger piece may be engaged by the operator's first and second fingers while he presses the plunger rod 6 with his thumb.

Reference has been made herein to the fact that the material being dispensed does not come into contact with the body of the dispenser and to this end the plunger 3, the cavity 12, and the plunger travel are dimensioned and proportioned so that the maximum volumetric capacity of the cavity 12 as determined by the position of the plunger 3 never exceeds the volume of the pipette attached to the dispenser. Thus the material being pipetted never enters the body of the dispenser, but remains contained within the body of the pipette.

The dispenser may be made of metal, glass, or plastic material such as Nylon and the body member may be transparent or translucent so that the plunger 3 may be properly oriented within the cavity 2 as indicated by the calibrations 28.

Reference has been made herein to the use of the dispenser unit of my invention as a means of ejecting the cotton plugs which laboratory workers usually insert in the large or mouth end of the standard pipette, to prevent contamination by the material being pipetted when the last volume of material in the pipette is "blown out." These plugs are generally removed by the use of wires, hooks, tweezers, etc., and the operation is sometimes quite troublesome, and is always a nuisance. With the dispenser of my invention, the cotton plugs can readily be ejected by wetting or soaking the "plug" with water, and inserting the tip end of the plugged pi-

pette in the lower end 23 of the dispenser with a snug or air-tight fit and then rapidly depressing the plunger handle 6, whereupon the resulting air pressure built up in the chamber 19 between the plunger and the pipette tip readily ejects the soaked plug.

Having thus described my invention, it is apparent that I have provided a pipetting dispenser which provides means for realizing the several objects hereinbefore noted, and that the dispenser is simple in construction and reliable in operation.

What I claim as new is:

1. A pipetting dispenser comprising a body member having a cavity therein, a plunger mounted within said cavity for reciprocation therein, means defining fluid inlet and discharge passage means in said body member in communication with said cavity, means for reciprocating said plunger within said cavity to draw fluid into said cavity by movement thereof in one direction and to discharge fluid from said cavity by movement in the opposite direction adjustable stop means for variably limiting the plunger stroke in one direction and fixed stop means limiting the plunger stroke in the opposite direction means to support a pipette in operative fluid communication with said cavity in said body member, said pipette-supporting means including a body-member-attachment fitting having communicating fluid bores therein, each bore having fluid communication at one end with a pipette supported in said pipette support, each of said bores opening at their opposite ends out through distinct and spaced-apart wall portions of said body member, said body member having mounting means operatively and selectively connectable to either one or the other of said bore openings, and a closure plug for closing the other of said bore openings not connected to said mounting means.

2. The apparatus as described in claim 1 wherein both the fixed stop means and said adjustable stop means are disposed within the cavity in said body member, and wherein means are provided for resiliently biasing said plunger to a normally retracted position in engagement with said adjustable stop means.

3. The apparatus as described in claim 1 wherein said adjustable stop means comprises a sleeve threadedly mounted in the wall of said cavity in coaxial relation thereto and provided with a stop shoulder adjustably positionable within said cavity in the path of movement of said plunger.

4. The apparatus described in claim 3 wherein a threaded jam nut is provided and engaged with said sleeve to lock the sleeve in an adjusted position within said body member.

5. The apparatus as described in claim 1 wherein said pipette supporting means includes a threaded terminal portion on said body-member-attachment fitting provided with a recess dimensioned to receive an end portion of a pipette, and a screw-threaded packing gland engaged with said terminal portion for compressing a packing material within said gland into sealing engagement with a pipette fitted into said recess.

6. The apparatus as described in claim 1 wherein calibrated indicia are provided on said dispenser to indicate the effective volume of the cavity as defined by said adjustable stop means.

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