Sept. 12, 1944. W. P. GRUETTER 2,358,159

MEDICINE DROPPER

Filed April 18, 1942 2 Sheets-Sheet 1

FIG. 1.

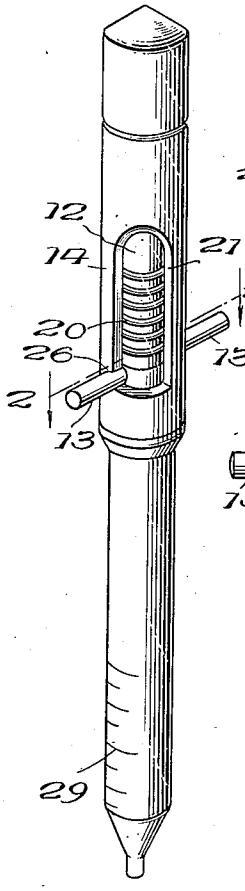


FIG. 3.

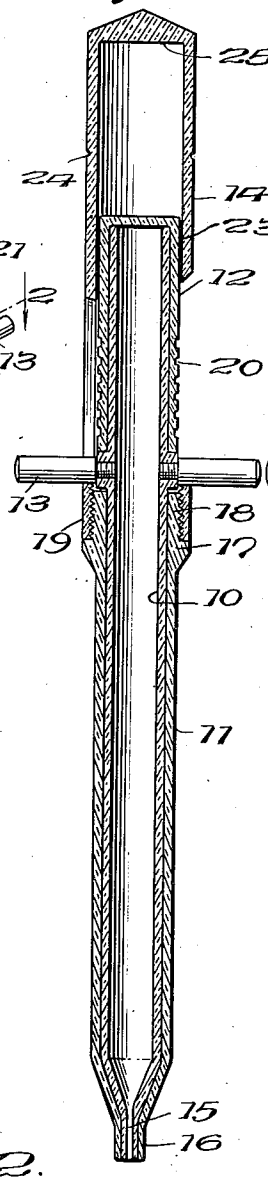


FIG. 4.

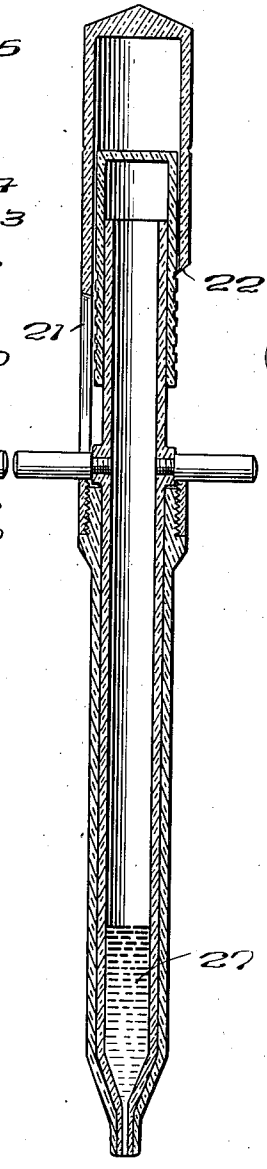


FIG. 5.

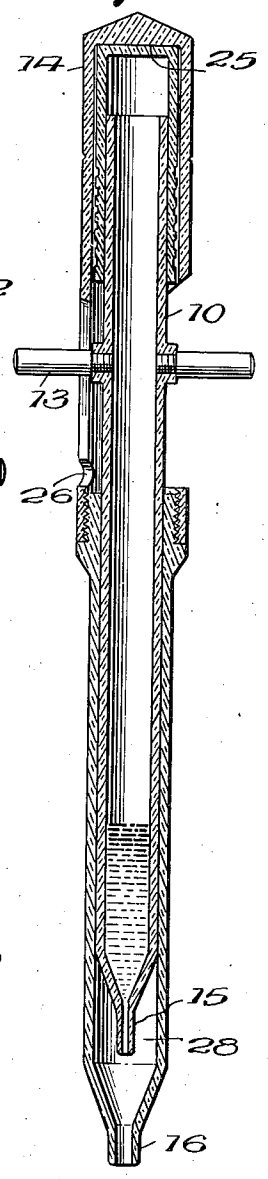
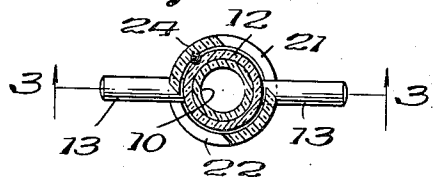


FIG. 2.



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Sept. 12, 1944. W. P. GRUETTER 2,358,159

MEDICINE DROPPER

Filed April 18, 1942 2 Sheets-Sheet 2

Fig. 6.

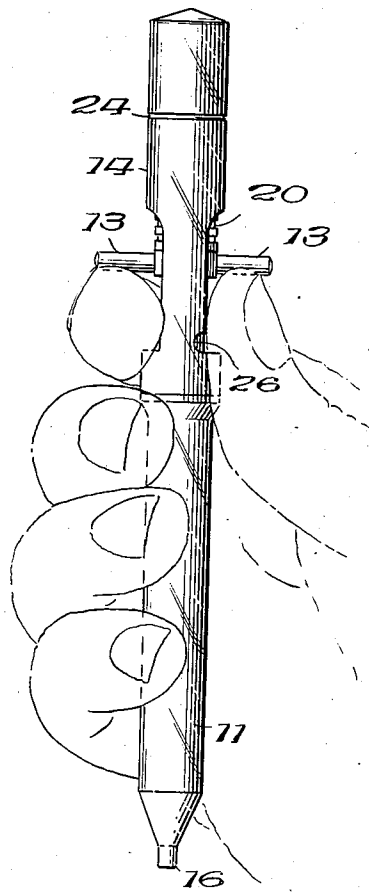


Fig. 7.

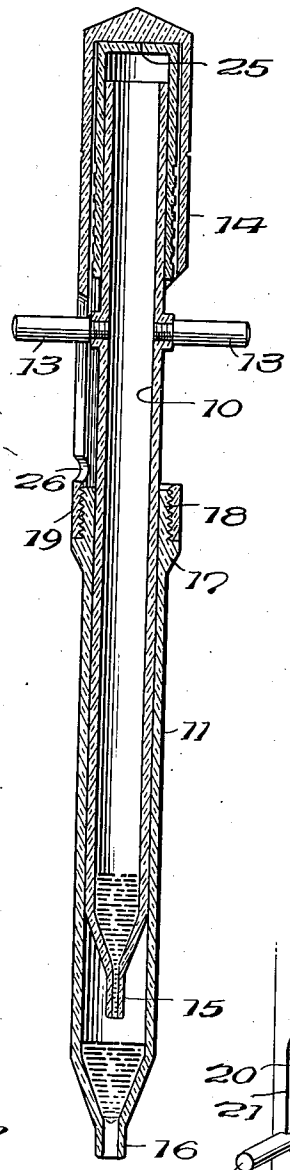


Fig. 8.

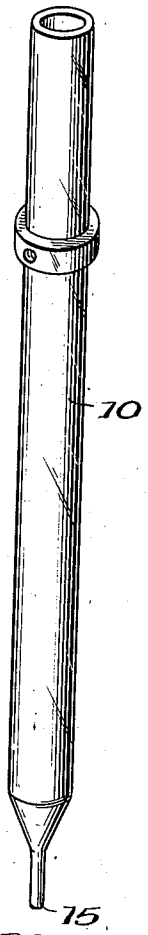
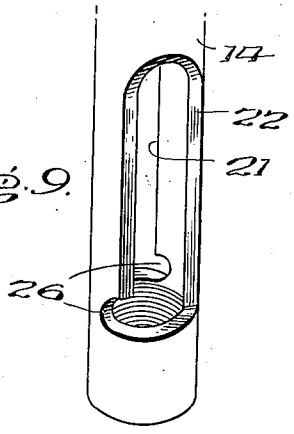


Fig. 9.



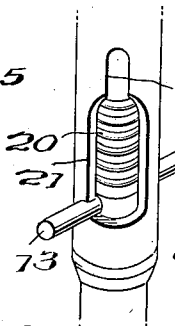


Fig. 10.

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Patented Sept. 12, 1944

2,358,159

UNITED STATES PATENT OFFICE

2,358,159

MEDICINE DROPPER

William P. Gruetter, Chattanooga, Tenn.

Application April 18, 1942, Serial No. 439,605

10 Claims. (Cl. 128—234)

The present invention relates to medicine droppers and has as its object the provision of a dropper capable of accurate control of the number of drops and rate of dropping as well as affording a clear vision of a preliminary measurement of a dosage in drops within itself before actual use of the measured dose, thus finding great usefulness, for example, in the administration of medicinal fluids in the nose where the flow of the medicine from the dropper is obscured from the user, and enabling the user to recover a miscount without waste, by return of an incorrectly measured dose to the source for subsequent recount.

A further object is the provision of a device whereby the counting of the drops may be effected from a drop delivery chamber to a temporary retaining chamber from which, after accurate measurement, the measured liquid may be used all at one time or intermittently or slowly as desired without attention to counting.

These objects of the invention are attained in general by the provision of a pair of telescopically nested tubular chamber elements so arranged that the medicine may be dropped under accurate control from the inner chamber into the outer chamber to be subsequently discharged therefrom in the full measured dose, the inner chamber element being arranged to receive its charge of the medicine without removal from the assemblage and directly through its discharge end independently of the discharge passage of the outer chamber.

The device is capable of being formed of relatively rigid, stable material as distinguished from the use of a live rubber bulb as heretofore required, which material is preferably some suitable transparent plastic or condensation product although it may be made of some non-plastic transparent material such as glass.

The above and various other objects and advantages of the invention will be more clearly comprehended from a perusal of the following specification and the drawings accompanying the same.

In the drawings

Figure 1 is a perspective view of the complete dropper;

Figure 2 is a section on the line 2—2 of Figure 1, slightly enlarged;

Figure 3 is a longitudinal axial section on the line 3—3 of Figure 2 showing the inner tube in its lowermost position relative to the outer tube;

Figure 4 is a similar view showing the cylindrical filling and discharge cap elevated to the charging position;

Figure 5 is a similar view showing the inner tube raised ready for discharging the fluid into the outer tube in counted drops;

Figure 6 is a side elevation showing the device in operating position in a user's hand;

Figure 7 is an enlarged axial section showing a measured dose of the fluid held in the outer tube ready for delivery;

Figure 8 is a perspective view of the inner tube alone;

Figure 9 is a fragmentary detailed perspective of the guard housing showing the finger opening and locking notches.

Figure 10 shows a modified form of the finger openings.

Referring to the drawings in detail, the device comprises in general a pair of inner and outer telescoping tube members 10 and 11, respectively, a cylindrical cap member 12 telescopically slidable over the upper end of the inner tube member, a handle 13 for effecting said relative telescopic movement between the inner and outer tube members, and a guard housing 14 for guarding the upper or free end of the inner tube and cap member and controlling their operation.

The inner tube member 10 is arranged to slide telescopically in the outer tube member 11 with an air and liquid tight joint so as to have a piston or plunger relation with respect to the outer tube for displacing liquid therefrom. The lower ends of both inner and outer tubes are tapered and terminate in nozzles 15 and 16, respectively. To effect a complete displacement of the space within the lower end of the outer tube and its nozzle 16 by the lower end of the inner tube and its nozzle 15, the latter lower end and nozzle, are made to fit snugly into the lower end and nozzle 16 of the outer tube. The end rim of the nozzle 15 extends substantially to (or beyond, if desired) the outer rim of the nozzle 16 so as to bring the end of the inner nozzle into communication with the outside space wholly independently of the interior cavities of the outer tube and its nozzle.

Charge and discharge of the inner or dropper tube 10 is effected by means of the cylindrical sliding cap 12 telescopically mounted on the upper open end of the inner tube with a substantially air and liquid tight fit so as to act to increase the space within the tube and cap upon upward movement of the cap to and reduce such space upon lowering of the cap. The guard housing 14 is mounted on the top of the outer tube 11 in clamping engagement therewith by means of the stop shoulder 17 and the threaded upper end

18 of the outer tube which engages with internal threads in the lower tubular end 19 of the guard housing. An annular ridge formation 20 about the sides of the cap 12 afford a suitable finger grip for operation of the cap, access to which is facilitated by the opposed elongated finger openings 21 and 22 in the sides of the guard housing. These finger openings also afford clearance for vertical movement of the handles 13 in the up and down movement of the inner tube. A free, non-frictional movement of the cap member 12 within the upper portion of the guard housing 14 is permitted by the allowance of a suitable slight clearance therebetween as indicated at 23, the clearance being made sufficient to permit free movement of the cap without undue friction or resistance due to air cushioning, but at the same time sufficiently close to act as a guide and prevent undue lateral displacement of the upper end of the inner tube and cap. A suitable stop-guage mark in the form of an annular groove 24 is provided on the guard housing midway of the total extent of travel of the cap element 12 to aid in guaging a predetermined amount of partial movement for a purpose to be hereinafter described.

It is also to be noted at this point that the inner top portion 25 of the guard housing acts as a stop for the upward movement of the cap element.

The fit between the cap element 12 and the inner tube 10 is made with sufficient tightness or frictional engagement to cause the cap to remain in any adjusted position on the tube and to be carried upwardly with the tube in such position until the upward movement of the cap is arrested by the top of the guard housing. To prevent accidental raising of the inner tube during upward adjustment of the cap the guard housing is provided with a pair of lock notches 26, one at the bottom of each of the diametrically opposite edges of the hand openings 21 and 22 for locking the operating handles 13 in the lowermost position. As indicated above, the device is made preferably wholly of transparent material, at least the outer and inner tubular members and the guard housing.

In operation, it being desired to measure a dose of a given number of drops, the user positions the parts as indicated in Figures 1 and 3 where it will be seen that the inner tube 10 is in its lowermost position within the outer tube, substantially wholly filling the space between it and the outer tube and between the nozzles 15 and 16. This brings the rim of the nozzle 15 into direct communication with outside space independently of the outer nozzle 16 and with the inner tube locked or held positively in its lowermost position by engagement of the handles 14 and the lock notches 26. The cap 12 is also moved down into its lowermost position as shown in Figures 1 and 3. The user now places the nozzle end of the device in the medicinal fluid to be measured and draws a charge of the fluid into the inner tube 10 by engaging the cap 12 with the fingers through the finger openings of the guard housing 14 and sliding the cap up along the inner tube to the stop gauge 24, the rigid cap thus functioning in the manner of the usual rubber bulb of the ordinary dropper.

This operation brings the parts into the position shown in Figure 4 where the cap 12 is shown elevated to the stop gauge 24 with a charge of medicinal fluid 27 in the lower end of the inner tube drawn in by the reduction of pressure in the inner tube due to the relative upward movement of the cap. It will be noted here that this charge has been drawn into the inner tube wholly independently of the passage in the outer nozzle 16 and with avoidance of deposit of any of the fluid in the outer tube. It will also be noted that any tendency for the inner tube to move upwardly during this charging is guarded against by the interlocking engagement between the handles 13 and the lock-notches 26. After thus charging the inner tube, the user withdraws the lower end of the device from the fluid supply and unlocks the inner tube by a slight turn of the handles 13 about the axis of the tube to withdraw them from the lock-notches. The inner tube is then raised into the position shown in Figure 5 carrying with it the cap 12 into the position as shown where it is just in engagement with or about to engage the top or abutment 25 of the guard housing. This relative movement between the inner and outer tubes produces a space 28 within the lower end of the outer tube into which the fluid may now be discharged in drops, by slow, regulated, upward movement of the upper end of the inner tube 10 into the cap element 12 forcing the liquid out of the inner tube in drops into the space 28 in the lower end of the outer tube. This accurately controlled upward movement of the inner tube is effected by holding the device as indicated in Figure 6 where it will be seen the operator is afforded a firm hold of the outer tube with the fingers and an accurate control of the upward movement of the inner tube, through the handles 13, by the thumb and forefinger.

The device with the measured dose of a predetermined number of drops contained in the lower portion of the outer tube is shown in Figure 7. The device is thus made ready for discharge of the measured dose without requirement of further attention to the counting of drops. Delivery of the dose may now be effected without releasing the hold on the device simply by pressing down on one or both of the handles 13, moving the inner tube (together with the cap 12) downwardly into its lowermost position within the outer tube 11 to displace the measured dose from the lower end of the outer tube, which delivery may be effected quite rapidly or slowly or in drops as desired and without having to view the flow of the medicine from the dropper.

To enable the device to be used for volumetric measurement of fluids other than in drops, as for example, in cubic centimeters or in teaspoons full, the lower end of the outer tube may be graduated in such units of volume, as indicated at 29 in Figure 1, and the inner tube used as a piston plunger for directly charging the outer tube to the desired graduation while the outer nozzle is maintained below fluid level in a container of the fluid to be measured, after which the device may be removed from the source and the measured charge discharged by downward movement of the inner tube.

To avoid dependence upon a stop gauge mark such as the mark 24 for gauging a limited upward movement of the cap member 12 and render the device automatic as to the limiting of this movement, the finger openings 21 and 22 may be shortened as indicated in Figure 10 to a distance that, when the cap 12 is grasped between two fingers through said slots at their lower ends, the upward movement of the cap 12 is limited by the upper ends of the slots which the fingers engage in manipulating the cap upwardly, this distance of movement bringing the cap 12 to or approximately to the gauge mark 24. In such

case, the upper ends of the finger openings are provided with relatively narrow slots 29 to permit upward movement of the handles 13 beyond the top of the finger openings so that the cap 12 may be moved into engagement with the stop 25, when the inner tube 10 is raised as previously explained.

While the device is here shown as built up of parts assembled by threaded joints as, for example, the joining of the handles to the inner tube and the joining of the guard housing to the outer tube, it will be understood that other methods of joining parts may be used, for example the handles 13 may be cast or otherwise formed integral with the inner tube, the guard housing being slotted through to its bottom rim to permit assembling of the parts. Likewise instead of a threaded joint between the lower end of the guard housing and the outer tube 11, a simple friction joint may be used.

While I have herein shown and described a preferred embodiment of my invention for the sake of disclosure, it is to be understood that the invention is not limited to such embodiment but contemplates all such modifications and variations thereof as fall fairly within the scope of the appended claims.

What is claimed is:

1. A medicine dropper comprising an outer tube having a discharge opening, an inner dropper-tube having a nozzle and arranged to be moved within the outer tube as a plunger piston, said nozzle being arranged to close and extend through the discharge opening in the outer tube into direct communication with space outside the discharge opening of the outer tube so that liquid will not enter the outer tube when the liquid is drawn into the inner tube, means for drawing a charge of fluid into the inner dropper tube through the said nozzle, means for withdrawing the nozzle of the inner dropper tube from the discharge opening in the outer tube to within the outer tube to leave a space within the outer tube between the said nozzle of the inner tube and the said discharge opening of the outer tube, means for discharging a measured amount of fluid from the inner dropper tube into the said space within the outer tube to be subsequently discharged therefrom.

2. A medicine dropper comprising a pair of inner and outer telescoping tubes having internesting nozzles at one end so proportioned that the nozzle of the inner tube will extend through that of the outer tube into direct communication with space outside the outer tube, a sleeve-like cap for the other end of the inner tube slidable telescopically thereupon for varying the volume of the space within the inner tube and cap, and means for limiting the movement of the cap.

3. A medicine dropper comprising a pair of inner and outer telescoping tubes having internesting nozzles at one end so proportioned that the nozzle of the inner tube will extend through that of the outer tube into direct communication with space outside the outer tube, a sleeve-like cap for the other end of the inner tube slidable telescopically thereupon for varying the volume of the space within the inner tube and cap, and means for holding the inner tube stationary relative to the outer tube during movement of the cap away from the nozzle of the inner tube.

4. A medicine dropper comprising a pair of inner and outer telescoping tubes having internesting nozzles at one end so proportioned that the nozzle of the inner tube will extend through that of the outer tube into direct communication with space outside the outer tube, a tubular cap for the other end of the inner tube slidable telescopically thereupon for varying the volume of the space within the inner tube and cap, means for moving the inner tube and the cap as a whole away from the nozzle end of the outer tube to leave a space within the outer tube between the nozzle ends of the outer and inner tubes and means for arresting the movement of the cap to permit the inner tube to move relative to the cap to reduce the volume of the space within the inner tube and cap after a predetermined movement of the inner tube.

5. A medicine dropper comprising a pair of inner and outer telescoping tubes having internesting nozzles at one end so proportioned that the nozzle of the inner tube will extend through that of the outer tube into direct communication with space outside the outer tube, a tubular cap for the other end of the inner tube slidable telescopically thereupon for varying the volume of the space within the inner tube and cap, means for moving the inner tube and the cap as a whole away from the nozzle end of the outer tube to leave a space within the outer tube between the nozzle ends of the outer and inner tubes, a guard housing for said cap carried by the outer tube, and stop means on said housing for limiting the movement of the cap.

6. A medicine dropper comprising a pair of telescoping tubular elements having relatively sliding movement when operated, the inner tubular element having a nozzle at one end and a filler means thereon at the other end, and the outer tubular element having a dropper opening in one end, said inner tubular element having its nozzle arranged to close and extend into the opening at the end of the outer tubular element at least to the outer rim of the latter.

7. A medicine dropper comprising a tubular dropper element having a nozzle at one end and a filler cap at the other end, an outer tubular element having the dropper element slidably telescoping therein, one end of the outer tubular element being provided with a nozzle and said dropper element having its nozzle end arranged to fit snugly into the nozzle end of the outer tubular element with the nozzle of the dropper element extending at least to the outer end of the nozzle of the outer element into direct communication with space outside the latter nozzle.

8. A medicine dropper comprising a pair of inner and outer telescoping tubes having internesting nozzles at one end so proportioned that the nozzle of the inner tube will extend into that of the outer tube into direct communication with space outside the outer tube, a tubular cap for the other end of the inner tube slidable telescopically thereupon for varying the volume of the space within the inner tube and cap, a guard housing for said cap carried by the outer tube, a handle for sliding said inner tube in said outer tube, said housing having a finger opening to facilitate manipulation of the cap and limited in longitudinal extent to limit the movement of the finger of an operator in manipulating the cap, said handle protruding through said finger opening in the housing and said housing having a narrow extension of the finger opening to permit longitudinal movement of the handle to an extent greater than the finger opening.

9. A medicine dropper as set forth in claim 10 further characterized by operable means for holding the inner tube stationary within the

outer tube when the filler cap is moved to fill the inner tube.

10. A medicine dropper comprising a pair of inner and outer tubes having a sliding fit, said outer tube having a discharge dropper-opening at one end and an abutment at its other end, said inner tube terminating in a nozzle at one end corresponding to the discharge dropper opening of the outer tube to extend into the latter and being open at its other end, and a filler cap slidably adjustably fitted on said other end of said inner tube to draw liquid into the inner tube, when the nozzle of the latter extends into the discharge opening of the outer tube, said filler cap being adapted to engage said abutment on the outer tube, when the inner tube is moved toward said abutment, whereby liquid is expelled from the inner tube into the outer tube.

WILLIAM P. GRUETTER.