Oct. 2, 1956 N. D. HELMER ET AL 2,764,981

MULTIPLE DOSAGE SYRINGE

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FIG. 1.

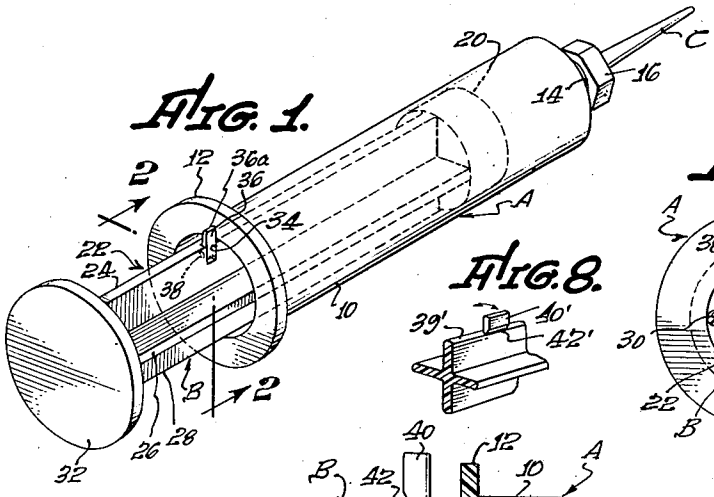


FIG. 8.

FIG. 2.

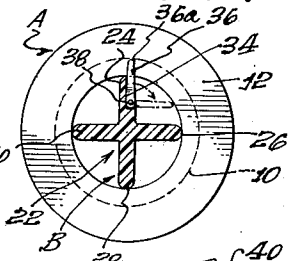


FIG. 3a.

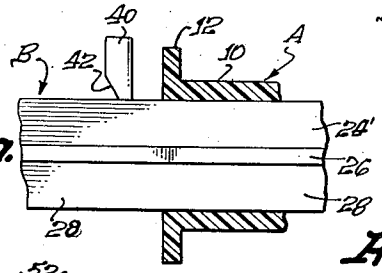


FIG. 3b.

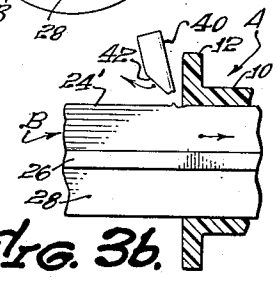


FIG. 4.

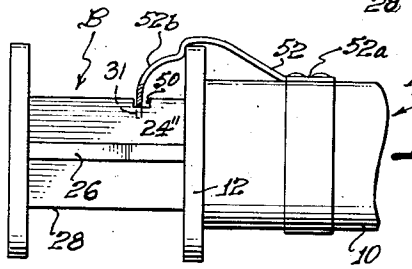


FIG. 6.

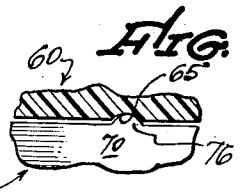


FIG. 5.

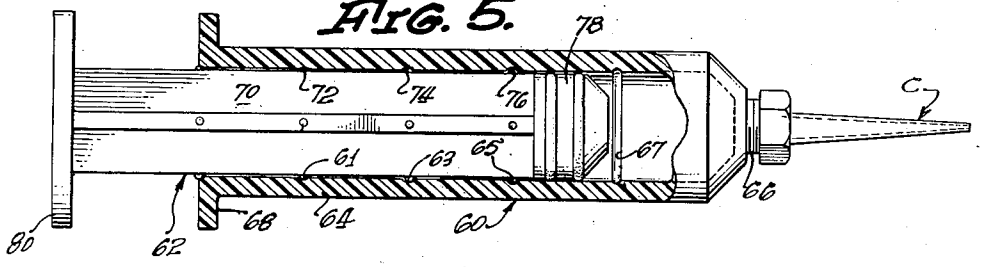
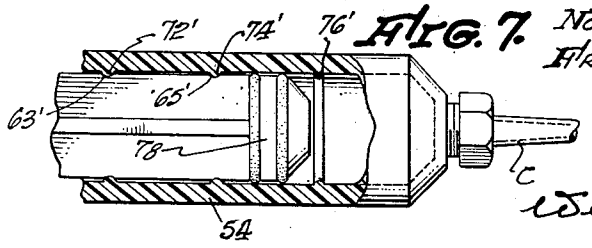


FIG. 7.



NORMAN DONALD HELMER,
FRED H. EASTON,
INVENTORS.

BY

William C. Babcock

ATTORNEY.

United States Patent Office

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MULTIPLE DOSAGE SYRINGE

Norman D. Helmer, Long Beach, and Fred H. Easton, Los Angeles, Calif.

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5 Claims. (Cl. 128—218)

The present invention relates generally to the field of dispensing devices, and more particularly to an improved multiple dosage syringe that automatically indicates when each of a number of doses of predetermined volume has been dispensed therefrom.

In the dairy industry, cows frequently are infected by mastitis, a disease which is combated by the injection of certain fluid materials into the teats by means of a syringe. A present practice in marketing such fluid materials is to package four disposable syringes filled therewith in a suitable box, with each syringe being discarded after use. Such disposable syringes are normally formed of a synthetic plastic material such as polyethylene, or the like.

Disposable syringes of the type above described are convenient to use and assure that but a predetermined quantity of fluid material will be administered as a dose. However, one very real disadvantage of such disposable syringes resides in the fact that the dosage cost to the dairyman is unduly high.

The primary purpose in devising the present invention is to provide a disposable syringe that is not only as convenient to use as previously available plastic devices, but one that provides a lower per dose cost to the dairyman in that the cost of each syringe is prorated over four doses rather than one.

A major object of the present invention is to furnish a multiple dosage syringe that automatically indicates when a dose of predetermined volume has been dispensed therefrom, and one that in structure is but slightly more complicated than the structure of those disposable syringes employed heretofore in the administration of single doses.

Another object of the invention is to furnish a multiple dosage syringe that so operates as to impart a signal to the feel of the user that a dose of predetermined volume has been dispensed therefrom.

Yet another object of the invention is to provide a multiple dosage syringe that permits a dose of predetermined volume to be dispensed therefrom in the dark or in poorly illuminated areas.

A further object of the invention is to supply a syringe that permits single, double, triple or quadruple doses to be discharged therefrom by simple manual operations on the part of the user.

A still further object of the invention is to provide a multiple dose syringe that lowers the per dose cost of the fluid material dispensed thereby to the extent that this mode of administration will create an ever increasing demand therefor.

These and other objects and advantages of the invention will become apparent from the following description of a preferred and certain alternate forms thereof, and from the drawings illustrating same in which:

Figure 1 is a perspective view of a syringe embodying one form of the invention;

Figure 2 is a vertical cross-sectional view of the device taken on line 2—2 of Figure 1;

Figure 3*a* is a fragmentary vertical cross-sectional view of the plunger and barrel shown in Figure 1, illustrating a second form of dosage regulating device embodied as a part thereof;

Figure 3*b* is a second view of the device shown in Figure 3*a*, after the stop has been severed from the plunger

Figure 4 is a fragmentary side elevational view of the plunger and barrel shown in Figure 1, but modified to include a third form of dosage regulating device;

Figure 5 is a longitudinal cross-sectional view of a multiple dosage syringe embodying a fourth form of dosage regulating device;

Figure 6 is an enlarged fragmentary cross-sectional view one of the dosage regulating devices shown in Figure 5; and

Figure 7 is a fragmentary cross-sectional view of the device shown in Figure 5, but with a modified form of dosage regulating device included as a part thereof.

Figure 8 is a perspective view of a modified form of the plunger shown in Figures 3*a* and 3*b*.

Referring now to the drawings for the general arrangement of the invention, it will be seen that the first form thereof as illustrated in Figures 1 and 2, includes an elongate barrel A in which a plunger B is slidably mounted, with the plunger when moved inwardly causing fluid contained in the barrel to be discharged through a suitable projecting tubular member C or hollow needle. The barrel A is preferably molded as a one-piece unit from one of the numerous transparent synthetic resins commercially available for such purposes. The structure of the barrel includes an elongate tubular shell **10** that has an outwardly extending ring-shaped flange **12** formed on the rearward end thereof. The forward end portion of shell **10** tapers inwardly to develop into a short tube **14** having threads formed on the exterior surface thereof.

Tubular member C is provided with a nut **16** on the rearward end, which nut removably engages threaded tube **14**. Barrel A and tubular member C when nut **16** and tube **14** are so engaged, are held together as a rigid integral unit.

As can be seen in Figure 1, plunger B includes a piston **20** that is slidably mounted within the confines of shell **10**. Piston **20** has a rigid elongate member **22** affixed to one side thereof, which member is sufficiently long to project from shell **10** even when the piston **20** is at its most inwardly disposed position therein. Member **22**, as shown in Figure 2, has a cross-shaped transverse section defined by four normally disposed legs **24**, **26**, **28** and **30**. The outer end of member **20** terminates in a handle **32** that is in the form of an annular plate, or other desired configuration.

Leg **24** has a number of longitudinally spaced, inwardly extending narrow cavities **34** formed therein (Figure 1) in each of which a stop **36** is disposed that is pivotally mounted on a pin **38**. The ends of each pin **38** are supported by leg **24** and extend longitudinally across one of the cavities **34**. Each stop **36** fits snugly within one of the cavities **34**, and due to this tight engagement, tends to at all times remain in the upwardly extending position shown in solid line in Figures 1 and 2. When one of the stops **36** is in an upright position, the upper portion **36***a* of the stop contacts the outer face of flange **12** when plunger B is moved inwardly. However, each stop can be manually rotated 90° to the position shown in phantom line in Figure 2 where the stop is so disposed that it does not contact flange **12** as the plunger B is moved inwardly.

When the multiple dosage syringe above described is filled with fluid material all of the stops **36** are disposed in upwardly extending position situated outside the confines of shell **10**. Upon application of the first dose contained in the syringe, the innermost stop **36** is rotated

from the upright position shown in Figure 2 to the horizontal position shown in phantom line in the same figure, and the handle 32 is pressed inwardly until the next upright stop contacts the outer face of flange 12. This inward movement of member 22 advances member 22 with its piston 20 to the extent that a dose of predetermined volume is discharged from tubular member C. Should it be desired to administer double or triple doses, additional stops are manually moved from the upright to the horizontal position as above described.

A second form of the invention is shown in Figures 3*a* and 3*b* which is identical to the first form with the exception that the pivotally mounted stops 36 and cavities 34 are eliminated. In lieu of the eliminated stops and cavities a leg 24' is provided that has a number of longitudinally spaced stops 40 projecting upwardly therefrom. Each stop 40 has an undercut portion 42 as shown in Figure 3*a*. Leg 24' is preferably formed of a brittle plastic material whereby when manual pressure is applied to each stop 40, the stop can be snapped off (Figure 3*b*) to permit inward movement of plunger B to discharge a dose of fluid material through tubular member C.

A third form of the invention is shown in Figure 4 which embodies a different stop and construction for leg 24. Instead of leg 24, a leg 24'' is employed that has a number of longitudinally spaced notches 50 formed along the upper edge portion thereof. As seen in this figure, a curved bow spring 52 is provided, one end portion 52*a* of which is rigidly affixed to the exterior surface of shell 10, with an outer end portion 52*b* thereof being so disposed that it normally engages one of the notches to prevent inward movement of plunger B. When the spring 52 is manually raised from engagement with one of the notches and plunger B is moved inwardly slightly, the outer end of the spring slidably engages the upper edge of leg 24''. The spring will so engage the upper edge until the plunger B has been moved inwardly to the extent that the spring moves downwardly in one of the notches. Such notch engagement of the spring signals that a dose of predetermined volume has been discharged from tubular member C. The engagement of the spring and one of the notches also prevents further inward movement of plunger B until such time as the spring end portion is manually raised as previously described.

A fourth form of the invention is shown in Figure 5 which embodies an elongate barrel 60, tubular discharge member C and a plunger 62. Barrel 60 includes a cylindrical shell 64 that terminates at one end in a threaded tube 66 identical to tube 14 of the first form of the invention. The end of shell 64 opposite tube 66 terminates in an outwardly extending ring-shaped flange 68. Four longitudinally spaced transversely extending grooves 61, 63, 65 and 67 are formed on the interior surface of shell 64.

Plunger 62 is formed from an elongate, rigid, somewhat deformable member 70 of transverse cross-shaped section that is defined by four identical legs. Each of the legs has longitudinally spaced protuberances 72, 74 and 76 formed thereon which can seat in the grooves 61, 63, 65 and 67. The forward end of plunger 62 terminates in a piston 78 that is slidably mounted within the confines of shell 64, and the outer end of plunger 62 terminates in a handle 80.

When barrel 60 is filled with a liquid material, piston 78 is disposed in its outermost position to permit the maximum amount of fluid to be contained within the confines of the barrel. Movement of the piston 78 is prevented by the protuberance 76 seating in the most outwardly disposed groove 61. When it is desired to dispense a single dose of fluid from the syringe, pressure is applied to the handle 80 to the degree that protuberance 76 is dislodged from groove 61. The piston 78 and plunger 62 are then moved inwardly to dispense fluid through tubular member C until protuberance 76 seats in groove 63 and protuberance 74 concurrently seats in groove 61. The seating of the protuberances in the grooves indicates to the user of the invention by the sense of feel that a single dose of fluid has been discharged from the device. It will be apparent that with tubular member C in place in an animal that double, triple or quadruple doses of the fluid medication may be administered if desired.

A modification of the fourth form of the invention is shown in Figure 7. This modification is identical to the form illustrated in Figure 5 except that three protuberances 72', 74' and 76' are provided on the interior surface of a shell 54, and four grooves are formed on the edge portions of each of the legs. Only two of these grooves are shown, these being 63' and 65', the other two corresponding to the reverse construction shown in Fig. 5. The above described modification operates in the same manner as the fourth form of the device illustrated in Figure 5.

The use and operation of the invention are extremely simple. In any one of the four different forms of the device as delivered for use, the barrel A is completely filled with fluid and the plunger outwardly positioned to the extent that the barrel A holds a multiple dosage of fluid material. When it is desired to use the invention, the tubular fluid discharge member C is inserted into the appropriate portion of the animal to be treated, and the plunger moved inwardly until resistance to further movement is encountered. The resistance so encountered indicates to the user of the device that a dose of predetermined volume has been discharged through member C. Double, triple or quadruple doses are easily administered without withdrawing member C from the fluid injecting position by either applying additional pressure to the plunger after a signal has been received that a dose has been discharged from the tubular member C, or performing a simple manual operation after the signal is received as previously described.

A modification of the second form of the invention is shown in Figure 8 in which the leg 39' has a number of longitudinally spaced stops 40' mounted thereon, with each stop having undercut portions 42' along the sides thereof. By pressure applied to the sides of stops 40', they can be snapped off and separated from leg 39' in the same manner as the stops 40.

To prevent the spring 52 used in conjunction with the third form of the invention from becoming inadvertently displaced out of contact with leg 24'', the free end portion of the spring has a recess formed therein that defines two transversely spaced arms 31. Arms 31 are disposed on opposite sides of leg 24'' and prevent transverse movement of the spring relative thereto.

Although the invention herein shown and described is fully capable of achieving the objects and providing the advantages hereinbefore mentioned, it is to be understood that the forms of the invention herein shown and described are merely the presently preferred embodiments thereof and that there is no intention of limiting same to the details of construction herein shown and described other than as defined by the appended claims.

We claim:

1. A multiple dosage syringe that automatically signals to the user's sense of feel when a dose of predetermined volume has been discharged therefrom, including: an elongate barrel capable of holding a plurality of such doses of a liquid material; tubular means mounted on one end of said barrel through which each of said doses can be discharged from said barrel; a piston slidably mounted in said barrel: an elongate member affixed to said piston and extending outwardly from the end of said barrel opposite that on which said tubular means is mounted; and stop means operatively associated with said barrel and member that tend to restrict inward movement of said piston after a dose of said liquid material is discharged through said tubular means, said stop means comprising a plurality of longitudinally spaced stops formed on said elongate member, each of which stops projects outwardly thereupon to the extent that it will

strike the end of said barrel opposite that on which said tubular means is mounted when said elongate member is moved in a liquid discharging direction and each of said stops being movable from its outwardly projecting position to permit said elongate member and piston to move further into said barrel.

2. A syringe as defined in claim 1 in which each of said stops are pivotally supported on said elongate member.

3. A syringe as defined in claim 1 in which each of said stops are pivotally supported on said elongate member in a plurality of spaced cavities in said elongate member.

4. A syringe as defined in claim 1 in which said stops are formed of a sufficiently brittle material that each of said stops can be separated from said elongate member upon application of force thereto.

5. A syringe as defined in claim 1 in which said stops are formed of a sufficiently brittle material that each of said stops can be separated from said elongate member upon application of force thereto, each of said stops being undercut in the part thereof adjacent said elongate member.

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