

- [54] **REAGENT DISPENSER**
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128/218 C; 128/234; 128/278
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- [58] **Field of Search** 222/309, 340, 386, 250,
222/43, 49; 73/425.6; 128/234, 218 A, 218
C, 218 F, 218 PA, 278, 215

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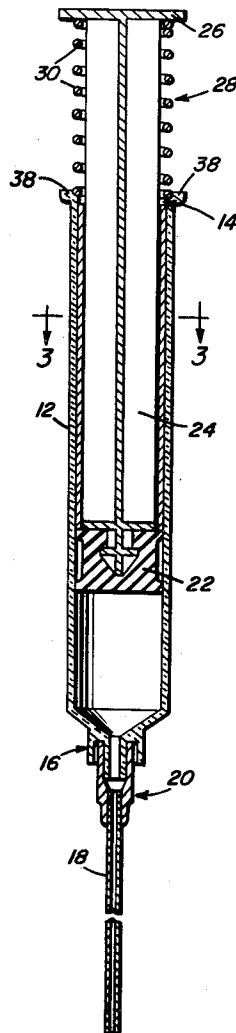
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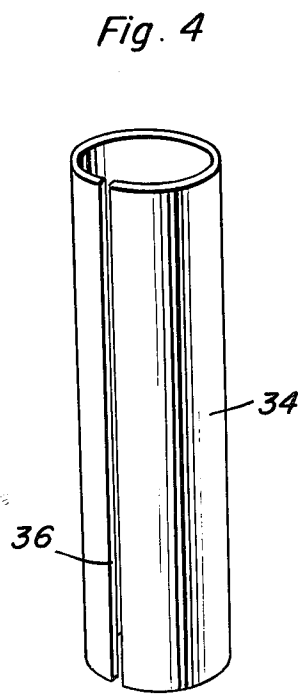
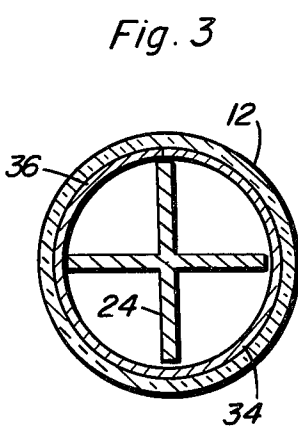
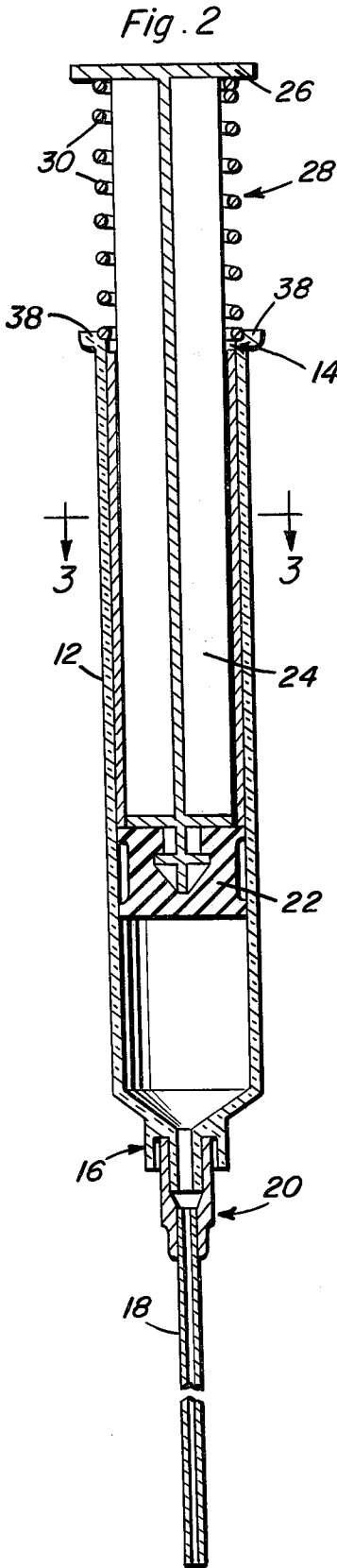
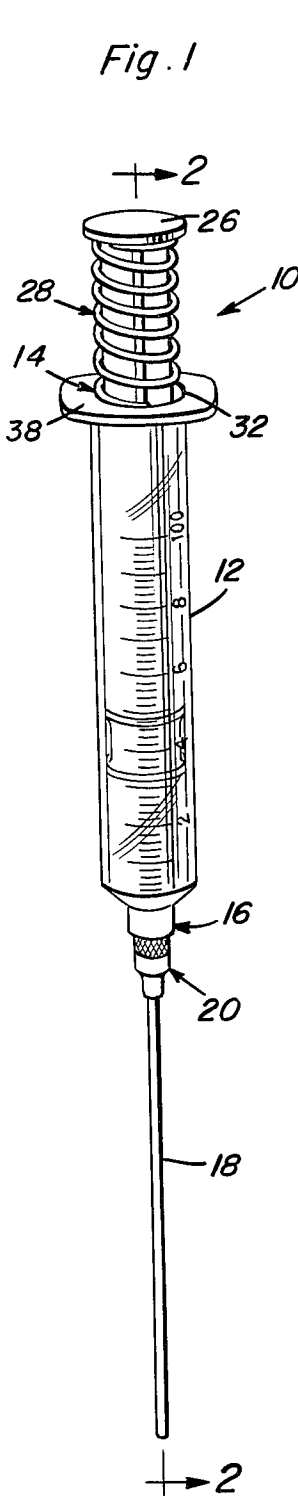
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ABSTRACT

A standard syringe is converted into a highly reproducible reagent dispenser by the addition of a coiled spring and a sleeve. The coiled spring is a compression spring arranged on the piston rod of the syringe between the finger actuating flange of the rod and barrel end of the syringe for biasing the piston toward the open end of the barrel, while the sleeve is arranged in the barrel between the open end thereof and the piston for limiting movement of the piston toward the open barrel end.

1 Claim, 4 Drawing Figures





REAGENT DISPENSER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to a reagent dispenser, and particularly to the conversion of a standard syringe to a highly reproducible reagent dispenser.

2. Description of the Prior Art

Devices for dispensing predetermined amounts of a liquid are generally known to those skilled in the pertinent art. See, for example, U.S. Pat. No. 2,530,909, issued Nov. 21, 1950 to G. S. Riggs, U.S. Pat. No. 3,343,539, issued Sept. 26, 1967 to J. H. Moorhouse, U.S. Pat. No. 3,327,904, issued June 27, 1967 to G. G. Goda et al., and U.S. Pat. No. 3,430,813, issued Mar. 4, 1969 to R. Gilmont. These known devices, however, are generally of special construction, and the cost for obtaining a desired level of reproducibility of dosage with these known devices is relatively high.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a reagent dispenser having simple yet economical construction of the dispenser and its constituent parts.

It is another object of the present invention to provide an inexpensive reagent dispenser having reproducibility that far exceeds that of much more elaborate commercially available devices.

It is yet another object of the present invention to provide a reagent dispenser constructed by converting a standard syringe.

These and other objects are achieved according to the present invention by providing a reagent dispenser having: a barrel member provided with an open end and a discharge end; a piston slidably arranged in the barrel for movement between the open end and the discharge end; a piston rod connected to the piston and arranged extending through the open end of the barrel; a spring for biasing the rod toward the open end of the barrel; and a sleeve arranged in the barrel for limiting movement of the piston toward the open end of the barrel. As will be appreciated from the following description, a reagent dispenser according to the present invention may be formed by adding a suitable spring and sleeve to a conventional syringe.

The open end of the barrel is advantageously constricted, with the sleeve being arranged in the barrel between the constricted open end and the piston. By forming the sleeve as a split sleeve from a bent sheet of suitable material, the sleeve may be slipped into the barrel of a syringe by reducing the size of the sleeve so as to fit between the constricted opening and the associated piston rod.

The piston rod is preferably provided with a finger actuating flange on an end of the rod extending out of the barrel, so that a coiled compression spring may be arranged on the piston rod between this flange and the open end of the barrel.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing a reagent dispenser according to the present invention.

FIG. 2 is a fragmentary, sectional view taken generally along the line 2—2 of FIG. 1.

FIG. 3 is a sectional view taken generally along the line 3—3 of FIG. 2.

FIG. 4 is a perspective view of a sleeve used in forming a reagent dispenser according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to FIGS. 1 and 2 of the drawings, a reagent dispenser 10 according to the present invention has a barrel 12 provided with finger grips 38, an open end 14 and a discharge end 16. Barrel 12, together with the ends thereof, may be a, for example, standard disposable plastic syringe, and the like, having a conventional cannula 18 attached thereto as by the standard luer fitting 20.

A piston 22 is slidably arranged in barrel 12 for movement between the ends 14 and 16 thereof. This piston may be of conventional construction, such as well known in the manufacture of the aforementioned disposable syringe. A piston rod 24 is connected to piston 22 in the conventional manner for moving the piston toward the discharge end 16. This piston rod 24, which is arranged extending through open end 14 of barrel 12, has provided on the end thereof extending out of barrel 12 a finger actuating flange 26. This flange 26 is conventionally provided on standard syringes for selectively depressing rod 24, and thereby piston 22, toward the discharge end 16 of the syringe barrel 12.

A coiled compression spring 28 is arranged with coils 30 of same around rod 24 and between flange 26 and open end 14 for resiliently biasing rod 24 and piston 22 toward the open end of the barrel. A recess 32 is desirably provided in open end 14 of barrel 12 adjacent finger grips 38 to assist in retaining spring 28 in position.

Open end 14 of barrel 12 is advantageously constricted, as is conventional with syringes, and a sleeve 34 arranged in barrel 12 between the constricted open end 14 and the piston 22 for limiting movement of piston 22 toward open end 14. Sleeve 34 is preferably a split sleeve formed by a sheet of suitable material, such as steel, bent to close on itself and form a split 36. In this manner, sleeve 34 may be reduced to a size which is less than the size of the constricted open end 14 for permitting passage of sleeve 34 through end 14 and into barrel 12. Thus, the constriction of open end 14 will retain sleeve 34 in place, while the construction of sleeve 34 will permit same to be inserted into a standard syringe.

A reagent dispenser according to the present invention can be made to dispense any desired volume up to the capacity of the syringe, which conventionally comes in different capacities. Such dispensing is repetitive because of the use of the split sleeve 34. By selecting a sleeve of appropriate size for a volume to be repetitively dispensed, a reagent dispenser according to the present invention can achieve reproducibility that far exceeds that of much more elaborate commercially available devices. Models have been constructed that dispense with a reproducibility better than plus or minus 1%.

As can be appreciated from the above description and from the drawings, when the insert or sleeve 34 is slipped into the barrel 12 of the syringe, the limited space available in constricted open end 14 forces the sleeve toward its closed, or even into an overlapping, position. Its tendency to open, however, causes the sleeve to be retained in position once inside of barrel 12.

Alternatively to the illustrated embodiment, it is also possible to construct an arrangement according to the present invention wherein the dispenser is sealed into the cap of a reagent bottle (not shown). When such an arrangement is employed, it has the further advantage of permitting inversion of the entire assembly during filling of the dispenser. Thus, it is possible in this manner to eliminate all air bubbles from the device in the process of filling it.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. In combination with a standard syringe including a barrel member provided with finger grips, a con-

stricted open end and a discharge end, a piston slidably arranged in the barrel, and a piston rod having a cross-shaped cross section and connected to the piston and arranged extending through the open end of the barrel, the open end being substantially larger than the cross section of the piston rod and a gap formed between the open end and the rod, a flange being provided on an end of the rod extending out of the barrel, and an annular recess being provided in the constricted open end adjacent the finger grips and arranged facing the flange; a coiled compression spring being arranged with coils of the spring around the rod and seated between the flange and the recess in the constricted open end of the barrel for biasing the rod and piston toward the open end; and a sleeve arranged in the barrel between the open end of the barrel and the piston for limiting movement of the piston toward the open end of the barrel, the sleeve being a split sleeve formed by a sheet having a thickness less than the gap between the piston rod and open end, and bent to close on itself and of a size which is less than the size of the constricted open end for permitting passage of the sleeve through the constricted open end and into the barrel, the constricted open end and the bias of the sleeve against the barrel causing the sleeve to be retained inside the barrel abutting the constricted end.

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