

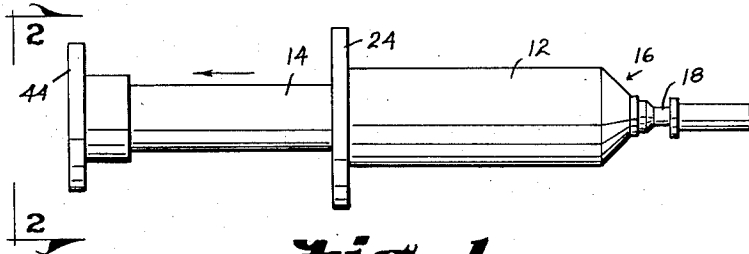
Jan. 20, 1959

K. A. RATCLIFF ET AL

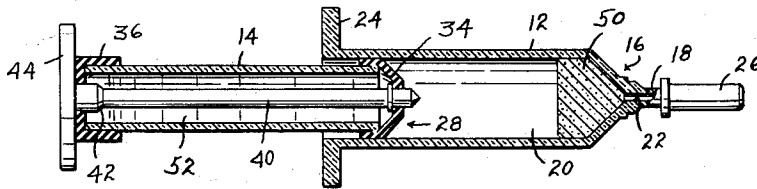
2,869,544

INJECTOR

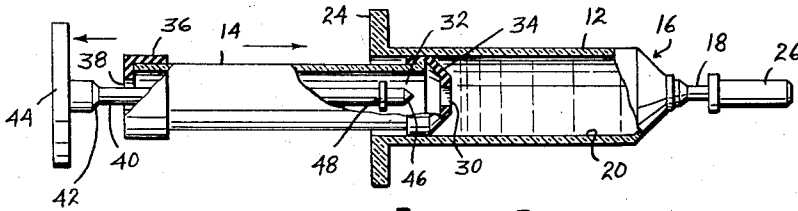
Filed Oct. 30, 1957



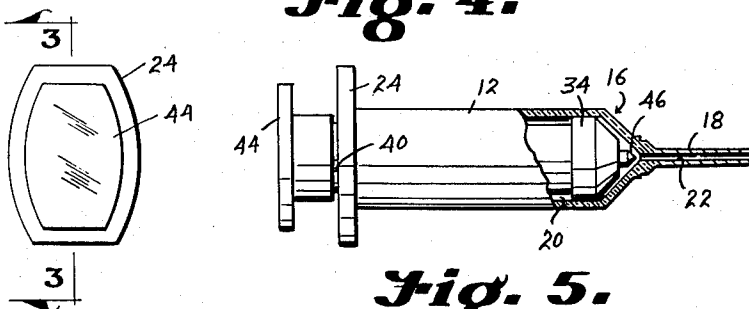
**Fig. 1.**



**Fig. 3.**



**Fig. 4.**



**Fig. 2.**

**Fig. 5.**

INVENTORS.

Karl A. Ratcliff

William A. Dorrance

BY: *Morton S. Adler*

Witness.

*A. G. Martin.*

ATTORNEY

1

2,869,544

INJECTOR

Karl A. Ratcliff and William A. Dorrance, Des Moines, Iowa, assignors to Iowa Cooperative Association, doing business as Diamond Laboratories, Des Moines, Iowa, a corporation of Iowa

Application October 30, 1957, Serial No. 693,356

4 Claims. (Cl. 128—220)

Our invention relates to improvements in injectors used in the administration of medicaments and while it was particularly designed for treatment of mastitis in cows requiring injection into the udder, its use is not limited thereto as will later appear. This application will disclose an improved structure over the injector described in our co-pending application filed August 23, 1957, Serial No. 679,869.

As presently practiced in the treatment for mastitis in cows a prepared powder compound is packaged ready for use in a syringe or injector type apparatus. Such compound not being stable in a water solution is suspended in an oil solution to properly maintain it for use over a reasonable period of storage or shelf life. Experience has demonstrated that the use of an oil solution has certain undesirable effects relative to the cow's milk which are not here material but which is mentioned to better understand the nature and purpose of this invention.

Having made the above observation over a long period of time it is one of the important objects of this invention to provide an injector for medicaments which includes means to store a medicinal compound in powder form, a reservoir for holding a suitable diluent or solvent for the powder, means to mix the powder and diluent when desired and means for ejecting the same.

Another object contemplated by this invention is the provision of an improved injector of the above class that is compactly formed, easy to use, and sufficiently economical in construction so that it can be discarded after being used.

Other objects and advantages of this invention reside in the details of construction and correlation of the various parts and will be apparent as the description proceeds.

This invention consists of novel parts and combination of parts to be hereinafter described whereby the objects set forth are attained, as pointed out in the claims, and illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevational view showing this injector ready for use,

Fig. 2 is an end view thereof taken from the line 2—2 of Fig. 1,

Fig. 3 is a longitudinal section view taken on the line 3—3 of Fig. 2.

Fig. 4 is a side elevational view of this injector showing the same manipulated for causing the admixture of powder and diluent as indicated by the part of this view in section, and,

Fig. 5 is a side elevational view partly in section showing the final position of the plunger units after the solution has been ejected.

Referring to the drawings this injector includes a first cylindrical barrel 12 and a second cylindrical barrel 14 concentrically smaller than barrel 12 and slidably disposed therein. The outlet end 16 of barrel 12 is tapered to a funnel shape and terminates in a projecting needle-like member 18 which communicates with the interior chamber 20 of barrel 12 by bore 22. The other end of

2

barrel 12 is formed with the integral flange 24 projecting perpendicularly therefrom in at least two opposite directions (Fig. 2) to provide a suitable finger gripping means as is well known. A removable cap 26 is provided for needle 18. Barrel 14 is formed generally similar to barrel 12 having the funnel like outlet end 28 in which there is the central outlet opening 30 (Fig. 4) communicating with the interior chamber 32 of barrel 14. A suitable flexible gasket or washer like cap 34 shaped to conform to end 28 of barrel 14 is mounted on such end and includes an opening which registers with opening 30, the purpose of such gasket being to provide a sealing contact between end portion 28 of barrel 14 and the inner surface of barrel 12. On the other end of barrel 14 is a resilient cap of rubber or the like 36 having a central opening 38.

Longitudinally movable within barrel 14 is the concentrically disposed plunger rod 40 which at one end extends through opening 38 in cap 36 to terminate in a concentrically enlarged tapered seat 42 attached to knob 44, and on the other end terminates in a tip end 46 which includes the annular washer like flange 48 spaced rearwardly from the free end thereof. Tip 46 is designed to penetrate opening 30 in gasket 34 at times with washer 48 seating against the inner side of such opening in sealing engagement therewith, and on the other end of rod 40, member 42 will seat in opening 38 of cap 36. This injector as disclosed is used in the following manner. It is packaged prepared for use and in such form will be substantially as shown in Fig. 3 where barrel 14 is partially inserted into barrel 12 with rod 40 in position to seal openings 30 and 38 as described above. Cap 26 is on needle 18 and thus chambers 20 and 32 in barrels 12 and 14 respectively are each a closed chamber with no communication therebetween. Chamber 20 is provided with a supply of the medicament to be used in powder form 50 and will normally be contained within the funnel shaped outlet end 16. A supply of a suitable diluent 52 is placed in chamber 32 for subsequent mixing with powder 50. For our particular use in treating mastitis in cows we have used an aqueous diluent for the reasons above mentioned, but it will be understood that the particular use for which we have designed this injector is merely illustrative and accordingly the diluent to be used may be of any type suitable to the particular medicament employed.

To mix the elements 50 and 52 for use, plunger rod 40 is partially withdrawn from barrel 14 by means of knob 44 sufficiently to unseal the openings 30 and 38 as shown in Fig. 4 and then a slight withdrawal of barrel 14 relative to barrel 12 will produce sufficient vacuum within barrel 12 to cause the transfer of diluent 50 from chamber 32 through opening 30 into chamber 20 and such transfer movement is aided by the fact that opening 38 is opened to the atmosphere since rod 40 is of less diameter than such opening. Rod 40 is then pushed into barrel 14 to close openings 30 and 38 as in its initial position shown in Fig. 3. The transfer movement of diluent 52 as described will generally result in a satisfactory admixture of powder 50 therewith but, if desired, the injector can be manually shaken for further mixing. With tip 46 reinserted in opening 30 to seal the same, barrel 14 with cap 34 becomes in effect a plunger and with cap 26 removed, the admixed solution in chamber 20 is discharged through needle 18 by pushing barrel 14 into barrel 12 as seen in Fig. 5.

It will be understood that the phraseology employed herein is for the purpose of description and not for limitation and that modifications and changes in the construction and arrangement of this invention can be made within the scope of what is claimed, without departing from the spirit and purpose thereof. It is thus intended to cover by the claims, any modified forms of structure

or mechanical equivalents which may be reasonably included within their scope.

We claim:

1. An injector device for administering a medicament, comprising first and second cylindrical barrels in telescopic relationship, said second barrel being movable longitudinally within the first, said first barrel provided with an outlet end, said second barrel provided with openings on respective opposite ends with one of said openings being an outlet disposed within said first barrel, closure means in said second barrel for selectively simultaneously opening and closing said openings therein, each barrel defining a separate chamber with the chamber in said first barrel designed to hold a supply of a powder medicament and the chamber in said second barrel designed to hold a diluent, the opening of the openings in said second barrel causing said diluent to become admixed with said powder, and the closure of said openings in said second barrel imparting to said second barrel the characteristics of a plunger which when forced into said first barrel ejects the admixed solution from the outlet therein.

2. An injector device for administering a medicament, comprising first and second cylindrical barrels in telescopic relationship, said second barrel being movable longitudinally within the first, said first barrel provided with an outlet end, said second barrel provided with openings on respective opposite ends with one of said openings being an outlet disposed within said first barrel, a plunger rod longitudinally movable in said second barrel, respective means on said plunger rod susceptible of sealing engagement with the respective openings in said second barrel whereby movement of said rod will selectively simultaneously open and close said openings, each barrel defining a separate chamber with the chamber in said first barrel designed to hold a supply of a powder medicament and the chamber in said second barrel designed to hold a diluent, the opening of the openings in said second barrel causing said diluent to become admixed with said powder, and the closure of said openings in said second barrel imparting to said second barrel the characteristics of a plunger which when forced into said first barrel ejects the admixed solution from the outlet therein.

3. A medicament injector comprising first and second barrels in telescopic relationship, said first barrel having an outlet port, a removable closure for said outlet port, said second barrel having an outlet port disposed within said first barrel, closure means for the outlet port on said second barrel, said second barrel serving as a closure means for one end of said first barrel to provide a chamber therein, said second barrel defining a second chamber, said closure means on the outlet port of said second barrel removable to afford communication between said chambers, and the closure of the outlet port in said second barrel giving said barrel the characteristics of a plunger movable to displace any contents in said first barrel by ejecting the same from the outlet therein.

4. A medicament injector comprising first and second barrels in telescopic relationship, said first barrel having an outlet port, a removable closure for said outlet port, said second barrel having an outlet port disposed within said first barrel, a rod member in said second barrel movable into and out of sealing engagement with the outlet port therein, said second barrel serving as a closure means for one end of said first barrel to provide a chamber therein, said second barrel defining a second chamber, the chamber in said first barrel designed to hold a supply of a powder medicament, the chamber in said second barrel designed to hold a supply of a diluent, movement of said rod member out of engagement with the outlet port of said second barrel and a partial withdrawal of said second barrel from the first barrel creating an air pressure differential causing the transfer of diluent to the chamber of said first barrel for admixture with the powder therein, and the closure of the outlet port in said second barrel giving said barrel the characteristics of a plunger movable to displace the admixed solution in said first barrel by ejecting the same from the outlet therein.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

743,743	McCulloch	Nov. 10, 1903
1,563,627	Hein	Dec. 1, 1925
2,490,552	Smith	Dec. 6, 1949
2,684,068	Orens	July 20, 1954