Sept. 20, 1971 R. O. ARCE 3,605,743

HYPODERMIC SYRINGE

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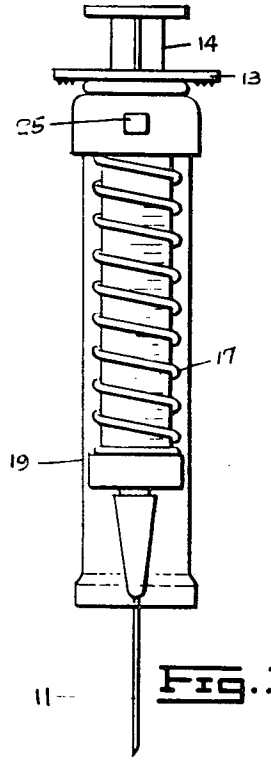


Fig. 1

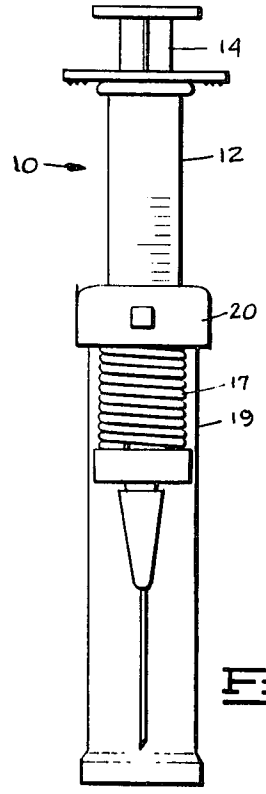


Fig. 2

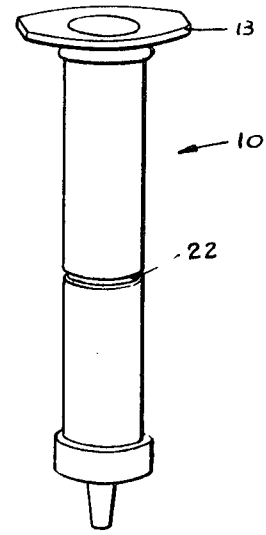


Fig. 3

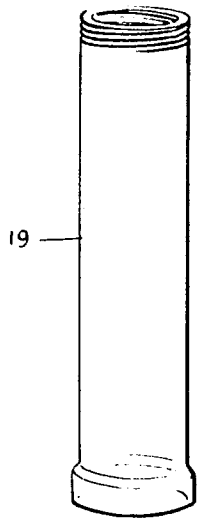


Fig. 4

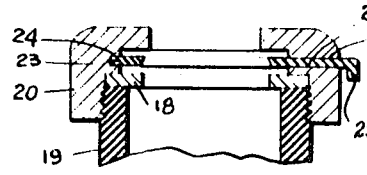


Fig. 5

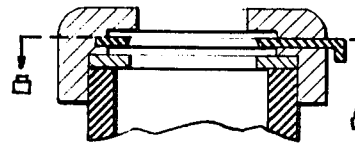


Fig. 6

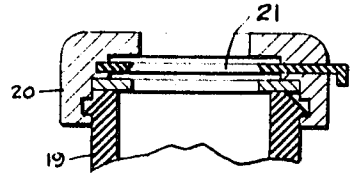


Fig. 7

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HYPODERMIC SYRINGE

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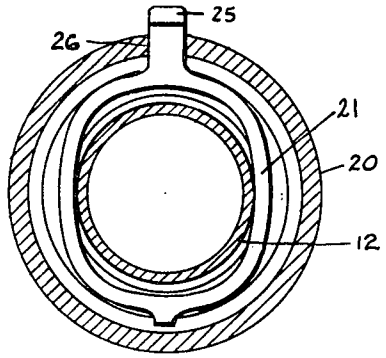


Fig. 8

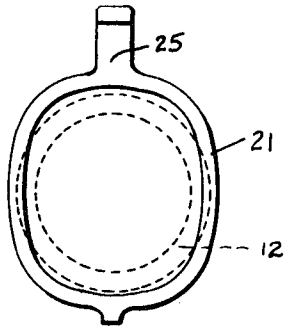


Fig. 9

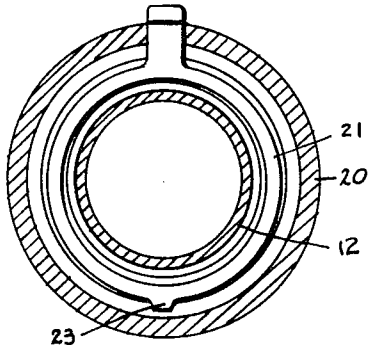


Fig. 10

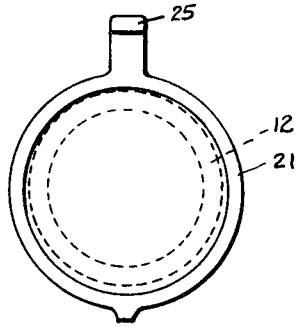


Fig. 11

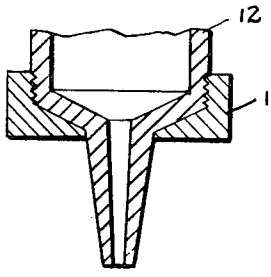


Fig. 12

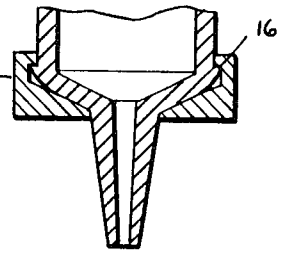


Fig. 13

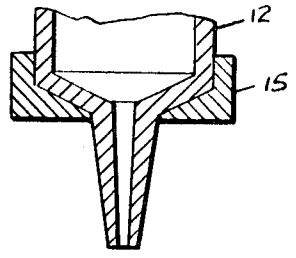


Fig. 14

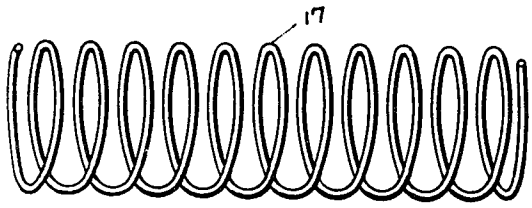


Fig. 15

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HYPODERMIC SYRINGE

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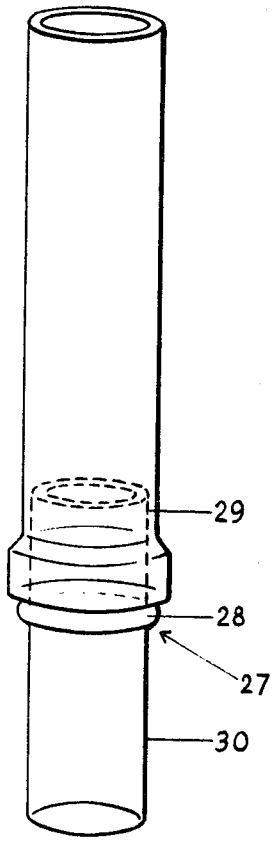


Fig. 16

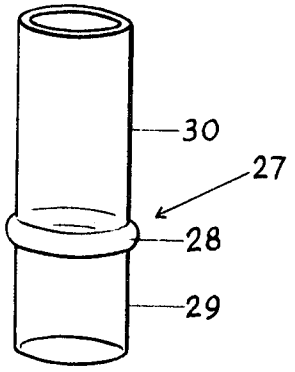


Fig. 17

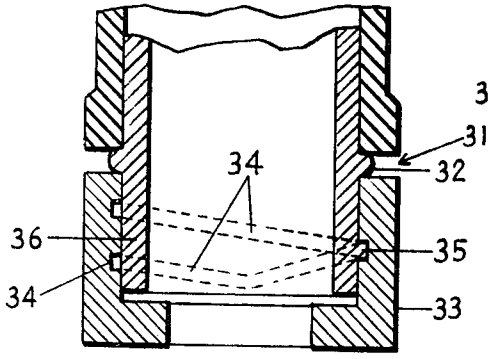


Fig. 18

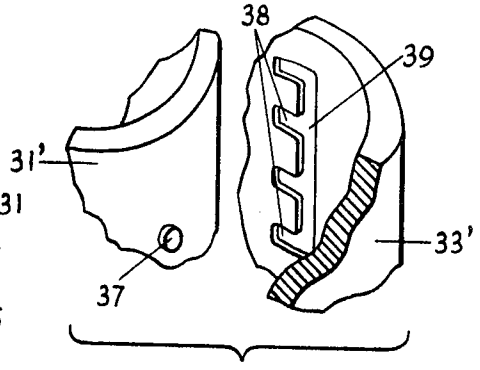


Fig. 19

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United States Patent Office 3,605,743 Patented Sept. 20, 1971

3,605,743

HYPODERMIC SYRINGE

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Filed Oct. 14, 1968, Ser. No. 767,271
Int. Cl. A61m 5/00
U.S. Cl. 128—218F 4 Claims

ABSTRACT OF THE DISCLOSURE

A spring loaded hypodermic syringe mounted within a cylinder and instantaneously releasable by manipulation of a release member for entrance of the hypodermic needle portion to a predetermined depth by use of an adjustable preset needle means preparatory to normal manipulation of the syringe.

BACKGROUND OF THE INVENTION

This invention relates in general to hypodermic syringes and in particular to an automatically injectable syringe which, after cocking manually, may be placed on the patient's skin and the needle portion injected to a predetermined depth merely by pressing a release member to permit the spring loaded syringe to instantaneously move to injection position, after which it can be manipulated in its normal manner.

Up until the time of my invention, insofar as I am aware, there has not been any manner of insertion of the needle for hypodermic injection other than by grasping the patient's skin and manually forcing the needle therein to what the manipulator of the hypodermic needle considers is the proper depth. Such application of a hypodermic needle is always painful as well as frightening to the patient, as much psychologically as physically, even though the person giving the injection tries to do it as rapidly and painlessly as possible.

SUMMARY OF THE INVENTION

It is therefore one object of my invention to provide a hypodermic syringe which is contained in an outer positioning and release member, which may be first filled with the fluid to be injected, then moved or "cocked" to pre-injecting position where it is retained by a "trigger" or release member and urged into injection position by a spring, the entire assembly being placed in position on the patient, and the needle instantaneously and rapidly released by pressing the "trigger" whereby the patient will not know when the needle penetration is to be made, after which the hypodermic needle is manipulated in the normal manner for injection of the fluid.

It is another object of my invention to provide such a hypodermic syringe and outer syringe containing member which can be made of plastic or other synthetic material at an extremely low cost whereby it may be disposable, being presterilized and packaged so that it is ready for use and then destroyed, eliminating the time consuming process of sterilization prior to each use, and the attendant storage problem in an antiseptic manner.

It is still another object of my invention to provide a hypodermic syringe and container therefor which will make it possible for even the most inexperienced person to give an injection as the application of the needle is automatic upon release of the trigger, there being little or no danger of movement of the needle after penetration of the skin thereby since the container rests with reasonable firmness against the skin of the patient and can be maintained in that position after needle penetration and during the injection of the fluid, the depth of injection being governed by the length of the needle employed, or by use of special fixed or adjustable adaptors.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will be apparent by reference to the following specifications and claims in connection with the accompanying drawings in which:

FIG. 1 is a vertical elevational view of the hypodermic syringe within its outer container, the syringe being shown in prefilling position or what could also be considered the needle injected position.

FIG. 2 is a similar view with the hypodermic syringe raised to pre-needle inserting position, the syringe having been charged with fluid.

FIG. 3 is an isometric view of the syringe cylinder or fluid containing body showing the retaining groove.

FIG. 4 is an isometric view of the outer container in which the hypodermic syringe is located.

FIG. 5 is a fragmentary cross sectional view through one form of the upper portion of the outer container assembly, without the syringe and showing the syringe release trigger, this form employing a threaded connection between the outer container and the cap thereof.

FIG. 6 is a similar view in which the outer container and cap can be cemented or thermally welded together, this being done after the hypodermic syringe has been inserted within the outer container.

FIG. 7 is a similar view in which the cap member may be snapped into place on an annular projection of the outer container.

FIGS. 8 and 10 are cross sectional views on the line 8—8 of FIG. 6, showing the pre-release and release positions of the "trigger."

FIGS. 9 and 11 shows the relationship of the release "trigger" with the hypodermic syringe cylinder.

FIG. 12 is a fragmentary sectional view which shows a threaded bottom retainer member on the syringe against which one end of the spring may rest.

FIG. 13 is a similar view in which the retainer member may be snapped into position on the syringe.

FIG. 14 is a similar view in which the retainer member may be cemented or heat welded to the syringe.

FIG. 15 shows the spring member used between the syringe and the outer container for urging the hypodermic syringe outwardly from the container to needle penetrating position.

FIG. 16 is an isometric elevational view of a portion of the outer container showing a needle depth adaptor received by the lower end of said container.

FIG. 17 is an isometric view of the double-ended needle depth adaptor.

FIG. 18 is a fragmentary enlarged sectional view of a modified means for needle depth adjustment.

FIG. 19 is a fragmentary disassociated view of another modified form of needle depth adjustment means.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings by numerals of reference **10** designates the hypodermic syringe which can be the disposable type now available on the market, said syringe being composed of the needle **11**, syringe container **12**, hand grip **13** and plunger **14**.

For use with my invention the lower end of the syringe container **12** is provided with a collar **15** which may be secured to the container by a threaded connection, as shown in FIG. 12, by a snap-on arrangement as shown at **16** in FIG. 13, the container being provided with projecting rim to receive the collar **15**, or by being cemented or heat welded as shown in FIG. 14, the collar being for the purpose of seating one end of coil spring **17** which surrounds the container **12** and is adapted to bear against the shoulder provided by annular member **18** held in posi-

tion against the upper end of syringe receiving cylinder **19** by cap **20**, which may be threaded, snapped on, cemented or heat welded as shown in FIGS. 5, 6 and 7.

The cap **20** is provided with a release member **21**, normally assuming the shape as shown in FIGS. 8 and 9 and adapted to engage the annular groove **22** in the body of the hypodermic syringe container **12** when said syringe is in preinjection position completely within the syringe receiving cylinder **19**.

The release member **21** has a projection **23** engaging an aperture **24** in the cap **20** and is further provided with a finger engaging portion **25** directly opposite the projection **23**, said finger engaging portion **25** extending through an aperture **26** in the opposite side of the cap **20** extending externally of the cap **20** for engagement by the operator of the hypodermic syringe.

The release member **21** is formed of a resilient material whereby pressure against the finger engaging portion **25** will change the form of said release member **21** to a substantially circular form where it will be clear of the annular groove **22** in the body of the hypodermic syringe container **12** permitting the spring **17** to force the syringe container longitudinally in the syringe receiving cylinder **19** causing the needle **11** to penetrate the skin of the patient being injected.

After the needle has penetrated the skin the plunger **14** is operated in the normal manner with this important difference, namely, the lower end of the syringe container **12** is resting firmly on the patient's skin and once the needle has penetrated the skin, the container **12** can be held steady with one hand while the other manipulates the plunger to force the fluid out through the needle. Other than the instantaneous and practically painless penetration by the needle, the latter function is one very important advantage of my invention. There is little or no movement of the needle during injection of the fluid. There is no change of depth or angle of the needle with my device. The depth of penetration of the needle may be controlled by use of the proper length of needle for the prescribed penetration, the longitudinal movement of the syringe always being the same regardless of the length of the needle; or in another manner by use of adaptors, fixed or adjustable as shown in FIGS. 16 to 19.

FIGS. 16 and 17 show a fixed double ended adaptor **27**, with an annular rib **28** dividing the adaptor into two different length portions **29** and **30**, insertion of the adaptor by one end or the other providing for different needle depth application.

In the modification shown in FIG. 18 the adaptor **31** has rib **32**, a rotatable ring **33** having spiral groove **34** in which the pin **35** of exposed portion **36** rides, adjustment being made by rotation of the ring **33** so that the relation between the bottom end of the ring **33** and the needle may be varied as desired.

FIG. 19 shows a further modification of the needle depth adjusting means, in which the adapter **31'** may be provided with a pin **37** which is adapted to ride in slots **38** in outer ring **33'**, said slots **38** being reached by connecting slot **39**.

What is claimed as my invention is:

1. A hypodermic syringe injector for use with a hypodermic syringe, comprising a hypodermic needle syringe receiving cylinder, a retaining means cooperating with the hypodermic syringe to hold it in an outwardly projecting relation to the cylinder, a spring means normally urging the syringe inwardly within the cylinder, and a release means for leasing the syringe within the cylinder for outward movement a predetermined distance for injection of the syringe needle to a predetermined depth, said retaining means comprising a recess means in the hypodermic syringe, said release means comprising a resilient recess means engaging member carried by the cylinder and having a configuration which normally urges it into the recess when the hypodermic syringe is moved to its internal position in the cylinder, said release means including means for removing the recess engaging member from its recess to permit the spring means to force the hypodermic syringe and needle outwardly from the cylinder, the recess engaging member comprising a substantially oval ring, said removing means including a finger engaging portion projecting from the ring and extending externally of the cylinder, pressure on the finger engaging portion deforming the ring from its normal oval configuration to a substantially circular configuration at which position it is disengaged from the recess means to permit release of the hypodermic syringe from the cylinder.

2. The structure as specified in claim **1** said needle penetration depth adjusting means comprising a removable element with an intermediate endless, circular rib between the ends of said element, and having an outer diameter greater than the internal diameter of said cylinder, said rib being closer to one end of the element than the other end of said element to divide said element into two unequal portions, each portion when inserted in the cylinder providing for a different needle penetration depth.

3. The structure as specified in claim **1** said needle penetration depth adjusting means carried by the outer end of said cylinder and comprising a removable element having a spirally ribbed portion, a rotatable ring having a pin riding in the spirally ribbed portion for adjustment of said ring in relation to the cylinder.

4. The structure as specified in claim **1** said needle penetration depth adjusting means comprising a removable element having a projecting pin, a rotatable ring about the removable element, the rotatable ring having a plurality spaced internal slots, and a single slot connecting the ends of said spaced slots, the projecting pin being adapted to ride in the slots for positioning in any desired one of the slots for vertical relation adjustment of the rotatable ring with the syringe receiving cylinder.

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JOSEPH S. REICH, Primary Examiner

U.S. Cl. X.R.

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