April 8, 1952 T. A. BLACKMAN 2,592,381

HYPODERMIC SYRINGE

Filed Oct. 13, 1949

Fig. 1.

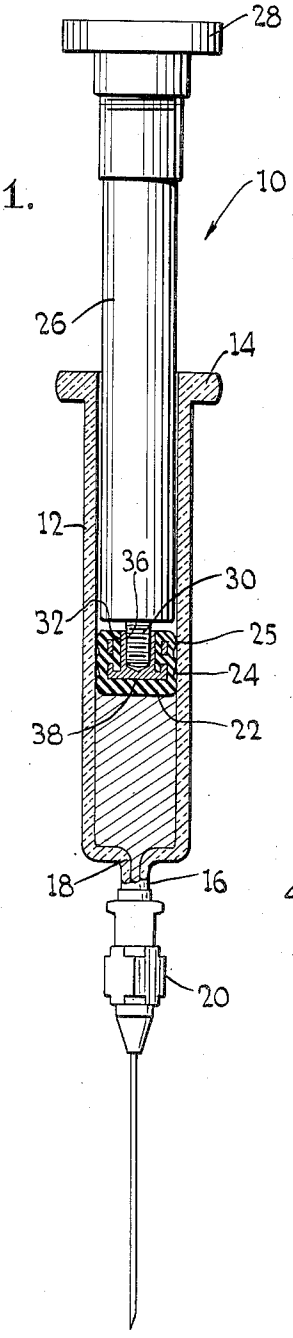


Fig. 2.

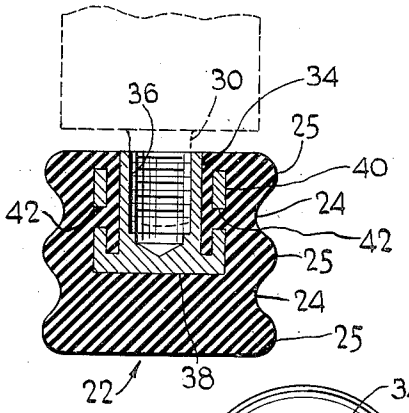


Fig. 3.

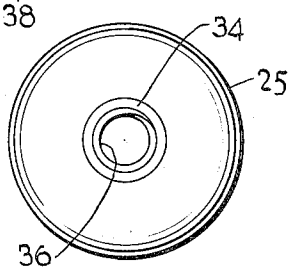


Fig. 6.

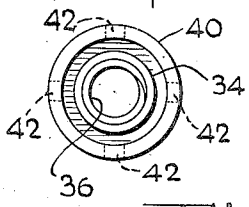


Fig. 4.

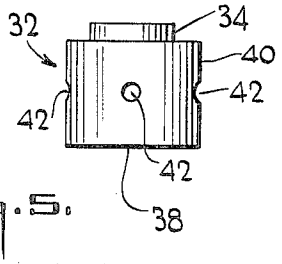
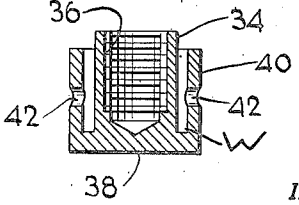


Fig. 5.



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HYPODERMIC SYRINGE

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Application October 13, 1949, Serial No. 121,119

2 Claims. (Cl. 128—218)

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This invention relates to hypodermic syringes. More particularly my invention pertains to hypodermic syringes of the type in which an elastomeric plunger is detachably secured to a plunger rod.

It is an object of my invention to provide in a syringe of the character described an improved arrangement for anchoring a detachable securing insert in the elastomeric plunger.

Other objects of this invention will in part be obvious and in part will be pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts, which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the appended claims.

In the accompanying drawings, in which is shown one of the various possible embodiments of the invention,

Fig. 1 is a side view in partial section of a hypodermic syringe embodying my invention;

Fig. 2 is an enlarged vertical central section through the plunger of said syringe;

Fig. 3 is a top view of the plunger;

Fig. 4 is an elevational view of an insert adapted to be anchored in the plunger;

Fig. 5 is a vertical central sectional view through said insert; and

Fig. 6 is a top view of said insert.

Referring now in detail to the drawings, the reference numeral 10 denotes a hypodermic syringe including a conventional syringe barrel 12 which may be of the glass Luer, lock or recorder type having an outwardly extending finger flange 14 at its top and a ground conical tip 16 at its base. A passageway 18 extends from the free end of the tip into the barrel. Said tip is adapted to frictionally engage the bore of a standard hypodermic needle 20.

A plunger 22 is slidable within the barrel 12. Said plunger is fabricated from an elastomeric material such as rubber, butadiene-styrene copolymers, butadiene-acrylonitrile copolymers, isobutylene-diolefin copolymers, polychloroprene or organic polysulphides. More specifically the plunger constitutes a cylindrical elastomeric plug having a set of parallel annular grooves 24 which break up the cylindrical surface of the plug into several parallel ridges 25. The diameters of the ridges are slightly in excess of the interior diameter of the barrel 12 so that the plunger has a snug sliding fit in the syringe.

To reciprocate the plunger within the syringe,

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a plunger rod is provided, said rod optionally constituting a metal tube 26 having a head cap 28 on its upper end. The lower end of the rod consists of a threaded stub shaft 30 which is designed to threadably engage the plunger 22.

Inasmuch as the material of the plunger is comparatively soft, said plunger is formed or molded with a metal insert 32 which, pursuant to my invention, is fashioned in a special shape that enables the same to be firmly anchored in the plunger. Said insert consists of a central tubular sleeve 34 whose bore 36 is tapped to threadably secure the shaft 30. The bottom of the sleeve is closed by a wall 38. A second tubular sleeve 40 concentrically surrounds the sleeve 34, its inside diameter being larger than the outside diameter of the inner sleeve. The sleeve 40 likewise is closed by the base wall 38 thus forming a tubular well W between the two sleeves whose bottom constitutes said base wall. The upper edge of the sleeve 40 is below the upper edge of the sleeve 34. The outer sleeve is fashioned with a plurality of transversely extending through-holes which constitute passageways from the outside of the insert to the tubular well W between the two sleeves. Desirably the insert is made in one piece.

When anchored in the plunger, the top edge of the inner sleeve of the insert is substantially flush with the top surface of the plug. Accordingly, the elastomeric material of the plug covers the top edge of the outer sleeve, fills the tubular well W between the two sleeves and extends through the several holes 42. I have found that with an arrangement of this sort the insert remains firmly imbedded in the plug even when very substantial displacing forces are exerted.

By way of example and without limiting my invention thereto it may be mentioned that an insert constructed in accordance with my invention and having the following dimensions, functions in a most suitable manner: For the outer sleeve an external diameter of $\frac{1}{4}''$ and a thickness of about $\frac{3}{128}''$, a distance of $\frac{1}{32}''$ from the top edge of the outer sleeve to the top edge of the inner sleeve, making the holes 42 $\frac{3}{64}''$ in diameter and locating the same half-way down the outer sleeve, for the base wall a thickness in the order of $\frac{1}{32}''$ and for the tubular well W, a depth of $\frac{11}{64}''$ and breadth of $\frac{3}{28}''$.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made

of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein described or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. For use in a hypodermic syringe of the type wherein a plunger has a plunger shaft detachably secured thereto: a plunger of elastomeric material having a metallic insert imbedded therein, said insert including a pair of nested sleeves, the inner sleeve being internally formed to detachably couple with the tip of the plunger shaft and the outer sleeve being spaced from the inner sleeve to provide a tubular well, said outer sleeve having a plurality of through-holes extending transversely of said sleeve and running outwardly from the well, said holes being below the top edge of said sleeve, the top edge of the outer sleeve being lower than the top edge of the inner sleeve and the top edge of the inner sleeve being adjacent the top of the plunger, the material of the plunger filling the tubular well and said holes and covering the upper edge of the outer sleeve.

2. For use in a hypodermic syringe of the type wherein a plunger has a plunger shaft detachably threaded thereto: a plunger of elastomeric material having a metallic insert imbedded therein, said insert including a pair of concentrically

nested sleeves, the inner sleeve being tapped and the outer sleeve being spaced from the inner sleeve to provide an annular well, said outer sleeve having a plurality of through-holes extending transversely of said sleeve and running outwardly from the well, said holes being below the top edge of said sleeve, the top edge of the outer sleeve being lower than the top edge of the inner sleeve and the top edge of the inner sleeve being adjacent the top of the plunger, the material of the plunger filling the annular well and said holes and covering the upper edge of the outer sleeve.

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