Nov. 2, 1954 W. M. RIKER ET AL 2,693,186

DISPOSABLE HYPODERMIC INJECTION SYRINGE

Filed May 18, 1953 4 Sheets-Sheet 1

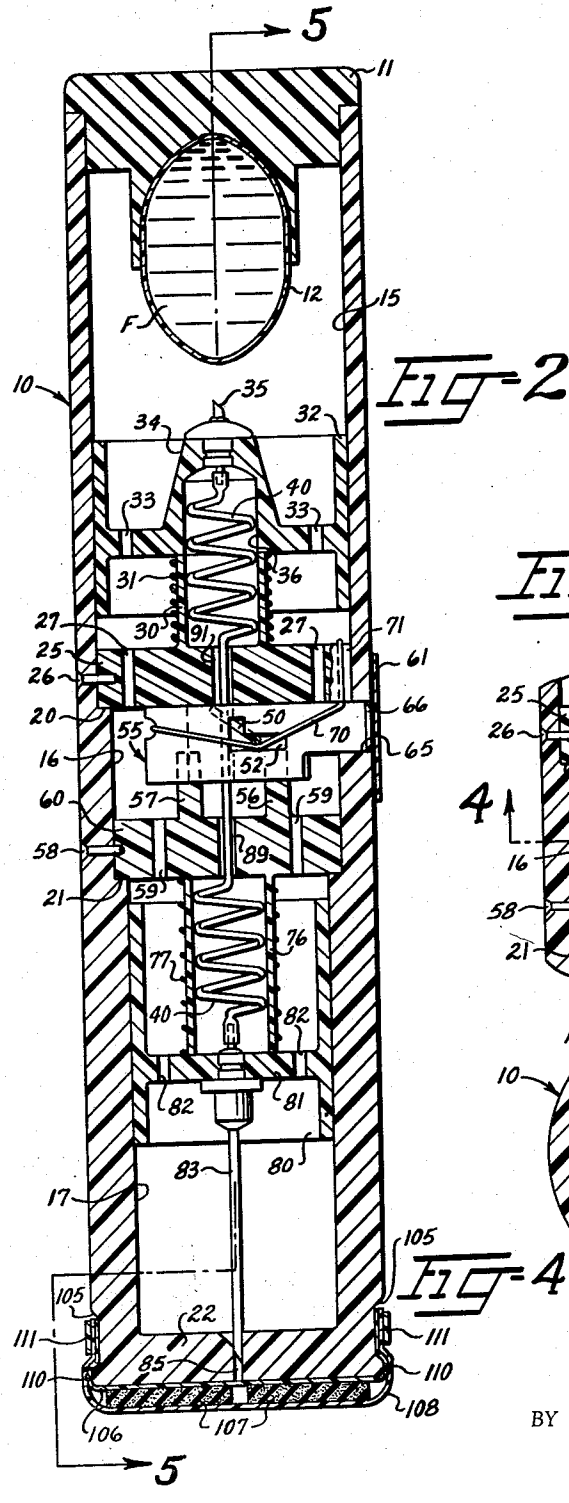


Fig-2

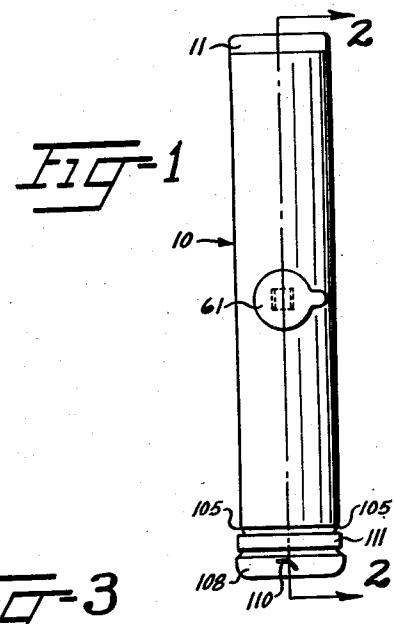
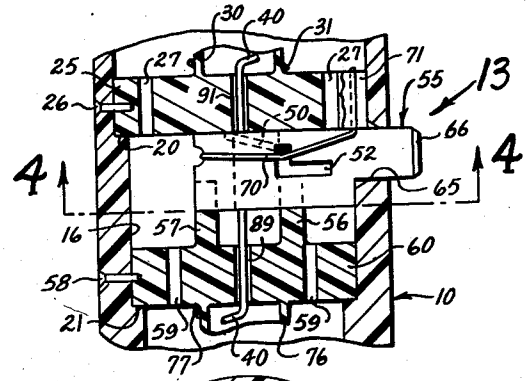


Fig-1

Fig-3



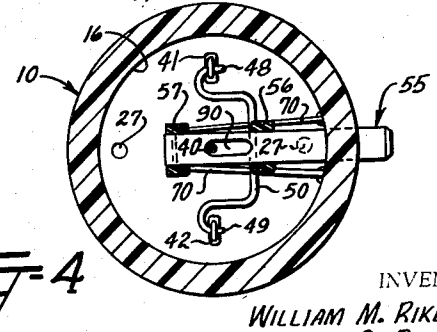


Fig-4

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DISPOSABLE HYPODERMIC INJECTION SYRINGE

Filed May 18, 1953 4 Sheets-Sheet 2

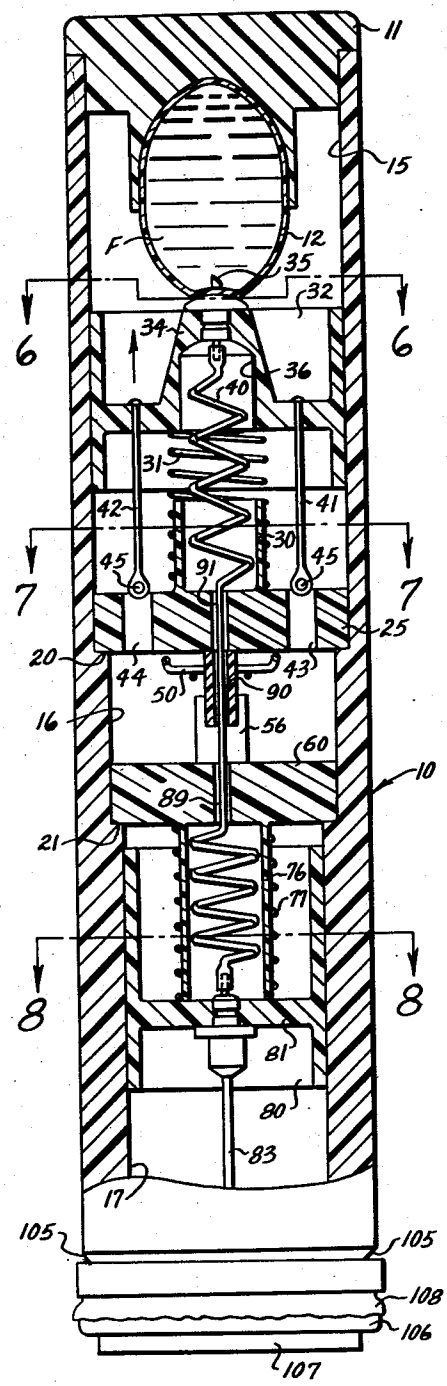


Fig-5

Fig-6

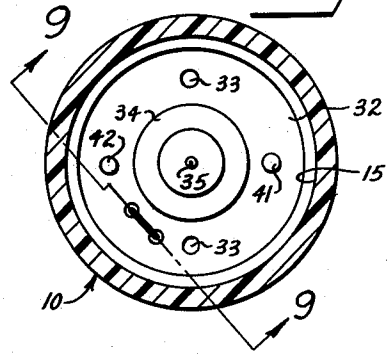


Fig-7

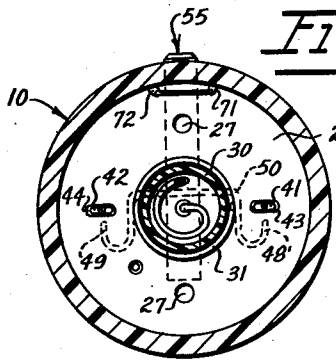
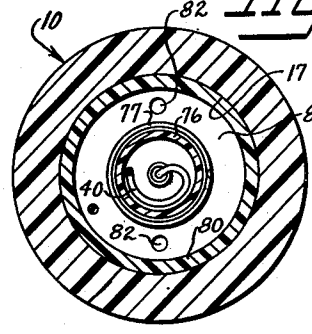


Fig-8



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DISPOSABLE HYPODERMIC INJECTION SYRINGE

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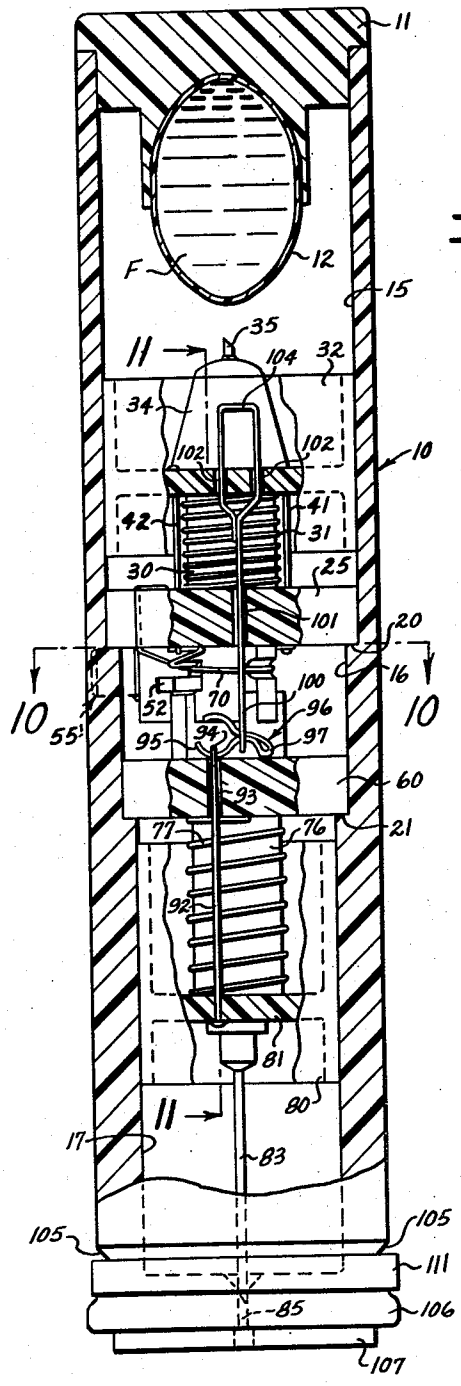


Fig-9

Fig-11

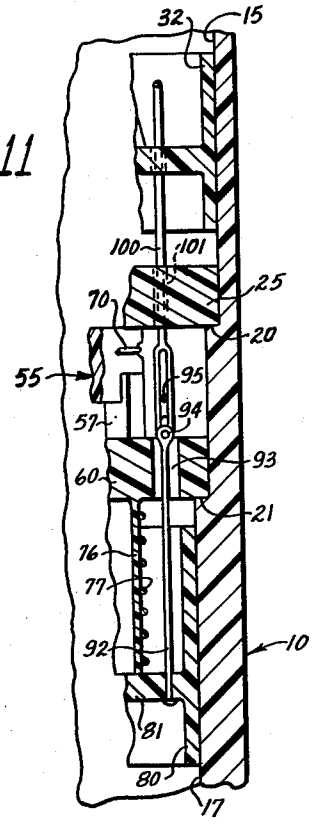
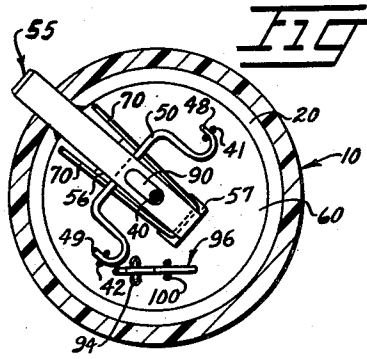


Fig-10



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DISPOSABLE HYPODERMIC INJECTION SYRINGE

Filed May 18, 1953 4 Sheets-Sheet 4

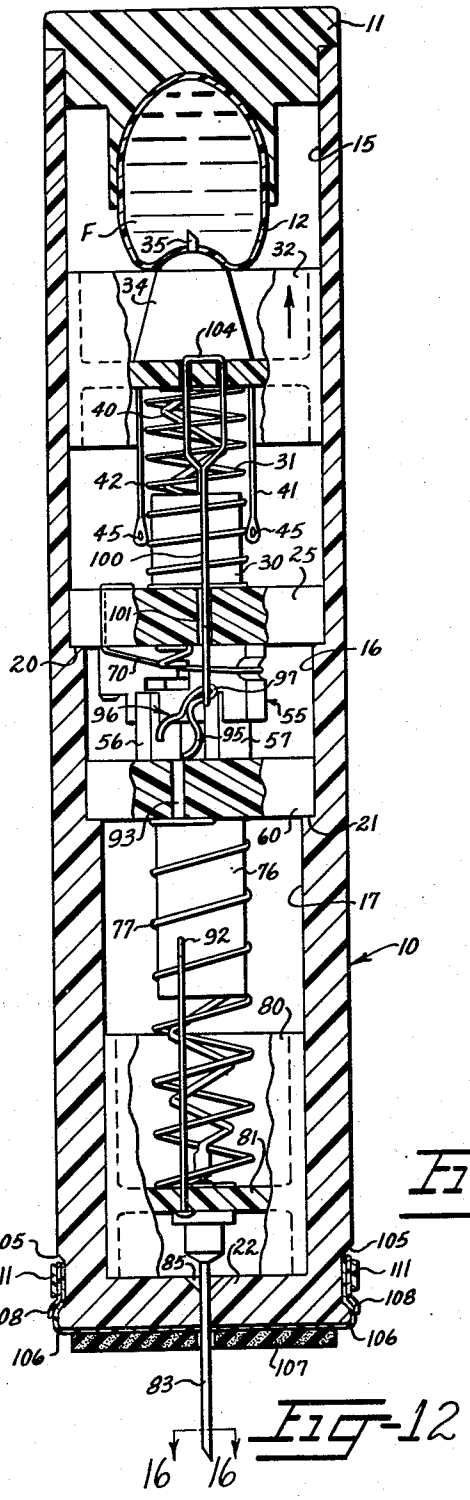


Fig-12

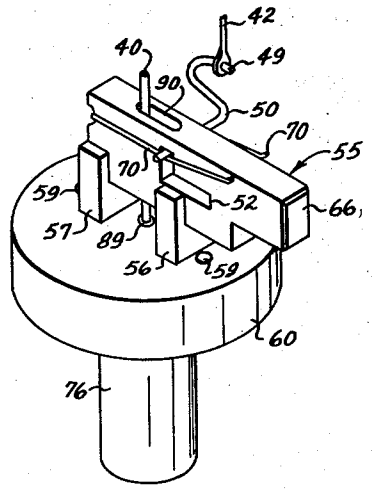


Fig-13

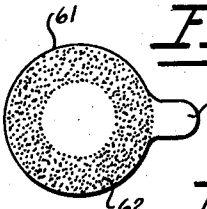


Fig-14



Fig-16

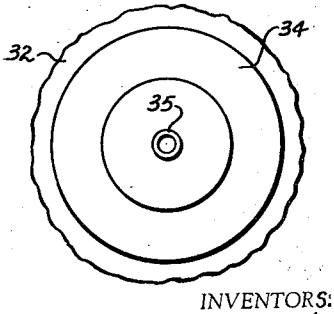


Fig-15

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United States Patent Office 2,693,186 Patented Nov. 2, 1954

2,693,186

DISPOSABLE HYPODERMIC INJECTION SYRINGE

William M. Riker and Frankie C. Riker,
Charlotte, N. C.

Application May 18, 1953, Serial No. 355,472

12 Claims. (Cl. 128—218)

This invention generally relates to hypodermic syringes and more especially to an improved automatic syringe so designed as to facilitate self-administration of the desired liquid medicament by the patient.

Hypodermic syringes currently in use require manual insertion of the needle into the patient, which is often quite painful, and then manual actuation of a plunger causes injection of the dose through the needle and into the patient. This type of hypodermic syringe is useful only when operated by a skilled attendant.

It is the primary object of this invention to provide a compact hypodermic injection apparatus including a sealed pierceable ampule or capsule and a tubular hypodermic needle, which are mounted in a sealed casing, with manually releasable trigger operated means normally retaining the needle in withdrawn position in the casing and wherein a trigger is provided which will automatically release the needle to cause the same to be automatically inserted under the skin of the patient and wherein means are provided which operate automatically immediately preceding insertion of the needle under the skin of the patient for piercing the ampule and directing the medicament therefrom through the needle and thus into the patient thereby enabling subcutaneous, or intra-muscular injections to be effected single-handed by the patient himself or by anyone skilled or unskilled in the use of hypodermic syringes.

It is another object of this invention to provide an automatic disposable hypodermic injection syringe of the character last described which is sufficiently sturdy to enable its use for a one-shot operation, but which is compact and may be economically produced for sale at such a relatively low cost as to manifest its use in emergency first-aid kits, particularly of the type which may be carried in air-craft, trains, automobiles, boats and the like.

It is another object of this invention to provide a syringe of the type described wherein means are provided for automatically insuring that the system is purged of air immediately upon the device being activated and prior to the hypodermic needle being inserted into the skin of the patient, thus automatically eliminating the danger of introducing air into the bloodstream of the patient.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of the improved hypodermic injection syringe showing the same with the movable parts thereof in inoperative position;

Figure 2 is an enlarged longitudinal sectional view taken substantially along the line 2—2 in Figure 1;

Figure 3 is a fragmentary view similar to the central portion of Figure 2, but showing the trigger and associated parts in position preparatory to actuation of the trigger;

Figure 4 is a transverse sectional view looking up along the line 4—4 in Figure 3;

Figure 5 is a longitudinal sectional view taken substantially along the line 5—5 in Figure 2, but wherein the trigger has been depressed and the capsule pierced to direct liquid to the needle;

Figure 6 is a transverse sectional view taken substantially along the line 6—6 in Figure 5;

Figure 7 is a transverse sectional view taken substantially along the line 7—7 in Figure 5;

Figure 8 is a transverse sectional view taken substantially along the line 8—8 in Figure 5;

Figure 9 is a longitudinal section through the hypodermic syringe similar to Figure 2, but being taken substantially along the line 9—9 in Figure 6;

Figure 10 is a transverse sectional view taken substantially along the line 10—10 in Figure 9;

Figure 11 is a fragmentary vertical sectional view, with parts broken away, taken substantially along the line 11—11 in Figure 9;

Figure 12 is a view similar to Figure 9, but showing the capsule puncturing means and the hypodermic needle in operative positions;

Figure 13 is an isometric view of portions of the trigger mechanism and being taken looking in the direction indicated by the arrow 13 in Figure 3;

Figure 14 is an elevation of the sealing tab which normally closes the trigger push button opening shown in Figure 1, but looking at the inner or reverse side thereof;

Figure 15 is an enlarged view of the central portion of Figure 6 showing the piercing needle;

Figure 16 is an enlarged sectional view through the hypodermic needle taken along line 16—16 in Figure 12.

Referring more specifically to the drawings, the numeral 10 broadly designates a cylindrical casing or housing of the disposable hypodermic syringe, which is preferably made of plastic. The casing 10 is closed at its upper end by a plastic cap 11 which is shown as being fused to the casing 10, but may be threaded thereon and which cap contains a resilient ampule or capsule 12 of an injection fluid or serum F. The capsule 12 may be adhesively secured in the concavity provided therefor in the cap 11 or may merely be frictionally retained therein. The capsule may be of the well known type having a soluble gelatinous wall containing approximately one cubic centimeter of fluid or any amount which will equal a normal injection according to medical practice.

The casing 10 is provided with an upper or first smooth bore or circular cavity 15, a slightly smaller medial or second bore or cavity 16 and a slightly smaller lower or third bore or cavity 17 therein which communicate with each other and form shoulders 20 and 21 at their junctures. The lower end of casing 10 is closed by a closure member 22. The upper bore 15 is provided with an upper or first circularly-shaped platform or partition 25 which is suitably secured against the shoulder 20, as by a plurality of plastic pins 26. The upper platform or partition 25 is provided with a plurality of holes or openings 27 so that air may pass through the platform 25. The platform 25 is also provided with an upwardly extending tubular portion 30 surrounded by a coiled compression spring 31 whose lower end bears against platform 25 and whose upper end bears against, and normally urges upwardly, an upper or first needle guiding sleeve or piston 32. The first piston is slidable in the bore 15 of the cylindrical casing 10. The piston 32 is also provided with air-vent holes 33 and an inverted conical central portion 34 in whose rounded free end a tubular upper or capsule piercing needle 35 is fixedly mounted.

The conical portion 34 has a cavity 36 therein in which the coiled upper portion of a tube 40 is disposed. The lower end of the upper needle 35 is connected to one end of the coiled tube 40. The lower end of the tube 40 communicates with the upper end of a lower or hypodermic needle to be later described. The upper needle guiding sleeve or first piston 32 is normally restrained against upward movement, otherwise effected by the compression spring 31, by a pair of pins 41 and 42 (Figures 4, 5, 7, 10, 12 and 13), whose upper ends are fixed to the piston 32 and which extend downwardly through respective slots 43 and 44 in the first or upper platform 25. The pins 41 and 42 are provided with eyes 45 at their lower ends which are normally engaged by legs 48 and 49 of a substantially W-shaped actuating arm or latch member 50 (Figures 3, 4, 5, 7, 9, 10 and 13). It is thus seen that, when the legs 48 and 49 of the actuating arm 50 are in the eyes 45 of the pins 41 and 42, the first piston 32 is restrained from upward movement.

The medial portion of the actuating arm 50 passes through a lateral substantially L-shaped slot 52 in an

actuating trigger broadly designated at 55. The actuating trigger 55 is slidably mounted in a pair of guide blocks 56 and 57 which, as best shown in Figures 2, 3, 4, 5, 10 and 13, are integral with a lower or second platform or partition 60. The lower platform 60 is circular and fits in the bore 16 of the casing 10 and is suitably secured against the shoulder 21, as by a plurality of plastic pins 58 which extend through the wall of casing 10. The lower platform 60 is also provided with air passage holes 59 therein.

The actuating trigger 55 is normally urged outwardly, away from the center of the casing 10, against a pliable sealing element 61 (Figures 1, 2 and 14) which preferably has a circular adhesive surface 62 thereon and a pull tab 63 integral therewith. The sealing element 61 is adapted to be placed over and seal an opening 65 in the casing 10. The actuating trigger 55 has a reduced portion 66 thereon which is adapted to move outwardly to cocked position, through the opening 65, upon removal of element 61. The reduced portion 66 of the actuating trigger 55 may also be termed a push button and is normally urged through the opening 65 in the casing 10 by an endless resilient or elastic band 70 (Figures 2, 3, 4, 9, 10, 12 and 13) which passes across the inner end of the trigger 55, over the medial portion of the actuating arm 50 at each side of the actuating trigger 55 and upwardly through a pair of slots 71 and 72 in the upper or first platform 25 (see Figures 2, 3 and 7). It is thus seen that, upon removing the sealing element 61 from the casing 10, the actuating trigger 55 is moved from the position shown in Figure 2 to the position shown in Figure 3 by the resilient band 70 which also causes the medial portion of the actuating arm or latch member 50 to move upwardly into the vertical or axial leg of the L-shaped slot 52 to thus cock the trigger mechanism.

The lower or second platform or partition 60 is also provided with a downwardly projecting tubular portion 76 surrounded by a coiled compression spring 77. The upper end of spring 77 bears against the platform 60 and the lower end thereof bears against a lower or second piston or needle guiding sleeve 80 mounted for longitudinal or axial sliding movement in the lower or third bore 17. The lower piston 80 is provided with an intermediate web portion 81 having air-vent holes 82 therein in which a tubular lower or hypodermic needle 83 is fixedly mounted. The outer or lower end of needle 83 is slidably mounted in an opening 85 in the lower end 22 of the casing 10.

The inner end of the hypodermic needle 83 has the lower end of the coiled tube 40 communicatively connected thereto. The tube 40 has a straight central portion which loosely extends through an opening 89 formed in the lower platform 60, through an elongated slot 90 formed in the trigger 55, and upwardly through an opening 91 formed in the upper platform 25. The lower piston 80 is normally restrained from downward movement, otherwise effected by the compression spring 77, by a pin 92 (Figures 9, 11 and 12) whose lower end is fixed in the web 81 of the lower piston 80 and whose upper end passes through a slot 93 formed in the lower or second platform 60.

The pin 92 extends upwardly beyond platform 60 and has an eye 94 therein which is loosely penetrated by a curved leg 95 of a second latch member broadly designated at 96 (Figures 9, 10 and 12). The latch 96 is preferably made from a light material, such as a small wire, and has a curved leg 97 which passes through the lower open end of a latch actuating member 100. The member 100 passes upwardly through a slot 101 formed in the upper platform 25 and is formed with a loop 104 whose side portions loosely pass through a pair of passageways 102 in the upper needle guiding sleeve or first piston 32. It is thus seen that the leg 95 of latch 96 normally prevents the eye 94 of the pin 92 from passing downwardly through the slot 93 in the lower platform 60 to thus prevent the lower needle 83 from being moved downwardly by the compression spring 77, until the pin 92 is released from the latch 96.

The lower end of the casing 10 is provided with an annular groove 105 in which a thin-walled inner cap 106 is mounted. The cap 106 is made from a material which is easily penetrated by the needle 83, such as plastic, aluminum foil or the like. The cap 106 is circular and covers the lower end of the casing 10 of the hypodermic syringe to seal the lower end of the hypodermic syringe. The inner cap 106 is provided with a circularly-shaped sponge 107 fixed to its outer surface, as by an adhesive, and which may be saturated with alcohol or any other antiseptic solution. An outer cap 108, also preferably made from the same material as the inner cap 106, is placed around the sponge rubber disc 107 and is preferably heat-sealed to the inner cap 106 at its outer edges.

A cord, rip wire or tear-strip 110 is sealed between the caps 106 and 108 and the free end thereof extends through the outer cap 108 and may be pulled by the patient to rip away the outer cap 108, as shown in Figure 5. The side walls of the inner cap 106 and the outer cap 108 are sealed together in the annular groove 105 around the lower end of the casing 10 of the hypodermic syringe and held in this groove by an adhesive band 111 preferably made from a viscose material.

Method of operation

Since this hypodermic syringe is adapted to be used for emergency use and carried in an emergency first-aid kit aboard airplanes and the like, it is essential that it be easily operable with one hand, although this hypodermic syringe may be used by doctors and professional attendants for administering drugs or other liquid medicaments to others. In operation, upon removing the tab 61, the resilient band 70 causes the actuating trigger 55 to slide outwardly in the guide blocks 56 and 57 and the reduced portion or push button 66 thereof moves through the opening 65 in the casing 10 to the position shown in Figure 3. This action causes the vertical or axial leg of the L-shaped slot 52 to become alined with the medial portion of the first latch or actuating arm 50, which then moves upwardly into the vertical leg of the slot 52 to cock the trigger mechanism. Thus, upon inward movement of the push button 66 by an operator, the actuating arm 50, along with the legs 48 and 49, is moved to the left of the position shown in Figure 4 or to the position shown in broken lines in Figure 7.

As soon as the tab 61 has been removed and the plunger moved outwardly by the resilient band 70 in the manner just described, the pull cord or wire 110 at the lower end of the casing 10 of the hypodermic syringe should be pulled around the outer periphery thereof to tear the outer cap 108 apart from the lower end of the hypodermic syringe so the sponge 107 is exposed and may be rubbed on the area to be punctured by the hypodermic needle 83 to sterilize and cleanse the area of the skin into which the hypodermic needle is to be inserted. The circularly-shaped sponge 107 is then centered upon the portion of the patient's skin into which the needle is to be inserted and the actuating trigger 55, which is then in the position shown in Figure 3, is moved inwardly by the operator to cause the actuating lever 50 and the legs 48 and 49 to move from the position shown in Figure 4 to the broken line position shown in Figure 7. This moves the legs 48 and 49 out of the eyes 45 in the respective pins 41 and 42 to release the upper needle guiding sleeve or first piston 32, which then darts upwardly or outwardly to substantially the position shown in Figure 5 by virtue of the compression spring 31. In so doing, the upper needle 35 pierces the capsule 12 and the pressure of the spring 31 forces the injection fluid F, under pressure, into the hollow capsule puncturing needle 35, through the coiled tube 40, into and through the hypodermic needle 83 to thereby exhaust any air from the hypodermic needle 83. As the pins 41 and 42 are released by the actuating arm 50, the spring 31 initially imparts rapid movement to the needle 35 from substantially the position shown in Figure 5, thus quickly piercing the capsule 12. However, as the capsule 12 is pierced, the lower end of the capsule 12 is engaged by the inverted conical portion 34 of the upper needle guiding sleeve or first piston 32 and, since there is some resistance to the flow of fluid through the small coiled tube 40, the compression spring 31 slowly moves the upper needle 35 into the capsule 12, thus collapsing the capsule 12 and forcing the fluid F slowly through the upper needle 35, the coiled tube 40, the lower or hypodermic needle 83 and into the patient. It might be stated that the desired rate of flow of the injection fluid F may be controlled by varying the size of the compression spring 31.

When the upper needle 35 has reached the position shown in Figure 5 the injection fluid F will have entered the tube 40 and the lower needle 83, and by this time, only a drop of injection fluid is forced from the lower

end of the lower needle **83**, thus insuring that all air has been forced from the upper needle **35**, the line **40** and the hypodermic needle **83** prior to actuation of the latch **96** and the resultant administration of the fluid F to the patient. At this time, the upper end or lateral portion of the loop **104** of the upper release pin **100** is engaged by the first piston **32** and further movement of piston **32** moves the upper release pin **100** from the position shown in Figure 9 to substantially the position shown in Figure 12. In so doing, the latch member **96** swings away from partition **60** while rotating enough so that the leg **95** is withdrawn from the eye **94** at the top or free end of the pin **92** (Figures 9, 10, 11 and 12) to thus release the pin **92**. This permits the compression spring **77** to move the lower needle guiding sleeve or second piston **80** downwardly or outwardly very rapidly to pierce the skin of the patient. This relatively fast insertion of the hypodermic needle into the skin of the patient renders the injection itself relatively painless.

It is thus seen that, as the hypodermic needle **83** is inserted into the skin of the patient, the upper or first compression spring **31** continues to force the upper or first needle guiding sleeve or piston **32** upwardly to collapse the capsule **12** and force the injection fluid F through the upper needle **35**, the coiled tube **40**, the lower needle **83** and into the patient. After the capsule **12** has been collapsed and the fluid F forced into the patient, the needle **83** may then be extracted and the disposable syringe may then be discarded.

It is thus seen, that we have provided a disposable hypodermic syringe which is so compact, so easily operated and may be so economically produced as to manifest its use in emergency first-aid kits and which has a sealed container in which a single shot of liquid medicament is provided so that, when the injection is administered, the possibility of air being introduced into the patient's bloodstream, or of the patient receiving an overdose of medicament is obviated. Thus, the medicament may be procured from druggists by authority of a doctor's prescription. Particularly in the case of transients, the improved syringe may be used for self administration of insulin for diabetic patients, for self administration of an anaesthetic, as may be required by military personnel in combat or by sportsmen and for many other purposes.

The improved syringe may be sterilized while it is being assembled and the operating parts thereof will be maintained sterile until the fluid F is discharged through the hypodermic needle **83**. The possibility of its re-use by the patient is quite remote, since it would have to be substantially completely disassembled and re-assembled with a new capsule substituted for the original capsule **12**, thus practically obviating fradulent use of the device.

In the drawings and specification there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only, and not for purposes of limitation, the scope of the invention being defined in the claims.

We claim:

1. A hypodermic injection syringe comprising a casing, an upper needle and a lower needle slidably mounted in said casing, a resilient capsule normally spaced from said upper needle, communicative means between said upper needle and said lower needle, resilient means normally urging said upper needle upwardly toward said capsule, manually releasable restraining means for restraining said upper needle against upward movement, resilient means urging said lower needle downwardly, releasable restraining means for restraining said lower needle against downward movement, and means operable automatically in the course of upward movement of said upper needle for releasing said lower needle from the latter restraining means.

2. A hypodermic injection syringe comprising an elongated casing, a first needle and a second needle mounted for longitudinal movement in said casing, communicative means between said first and second needles, a resilient capsule fixed in said casing adjacent said first needle and containing an injection fluid, resilient means normally urging said first needle toward said capsule, manually releasable restraining means for restraining said first needle from engaging said capsule, resilient means normally urging said first needle outwardly relative to said casing, releasable restraining means for restraining said second needle against outward movement, and means operable automatically in the course of movement of said first needle into piercing engagement with said capsule for releasing said second needle from the latter restraining means.

3. In a hypodermic syringe having an elongated casing adapted to support a resilient pierceable ampule of injection fluid adjacent one end thereof; the combination of a tubular hypodermic needle and a tubular piercing needle mounted for relative substantally axial movement in said casing, spring means normally urging the two needles away from each other, manually releasable means normally maintaining the piercing needle in inward position spaced from the ampule, restraining means connecting the piercing needle with the hypodermic needle and being so arranged as to maintain the hypodermic needle in inward position when the piercing needle is in inward position, an extensible tubular element communicatively connecting the piercing needle with the hypodermic needle whereby the piercing needle will be released and moved outwardly by said spring means upon being released from said releasable means, and means operable automatically upon outward movement of the piercing needle a predetermined distance for releasing the hypodermic needle from the restraining means whereby the hypodermic needle is subsequently urged outwardly by said spring means.

4. A hypodermic syringe comprising a casing, a resilient pierceable capsule containing an injection fluid therein carried by said casing, first and second tubular needles mounted for relative movement in said casing, a tube communicatively connected to corresponding ends of said needles, resilient means for urging the first tubular needle toward the capsule and for urging the second needle outwardly relative to said casing, means for maintaining the first and second needles in withdrawn position relative to the capsule and the casing respectively, manually operable means for releasing the means for maintaining the first and second needles in withdrawn position, and said means for maintaining the first and second needles in withdrawn position being so arranged as to permit the first and second needles to move outwardly in succession upon operation of said manually operable means whereby the first needle penetrates the capsule to direct fluid therefrom into and through the second needle preceding outward movement of the second needle relative to said casing.

5. A hypodermic syringe comprising a casing, a resilent pierceable capsule for containing an injection fluid therein, first and second tubular needles mounted for relative movement in said casing, an extensible tube communicatively connected to corresponding ends of said needles, said casing having means for supporting said capsule adjacent said first tubular needle, first resilient means for urging the first needle toward the capsule, second resilient means for urging the second needle outwardly relative to said casing, means for maintaining the first and second needles in withdrawn position relative to the capsule and the casing respectively, manually operable means for releasing the means for maintaining the first and second needles in withdrawn position, and said means for maintaining the first and second needles in withdrawn position being so arranged as to permit successive outward movement of the first and second needles upon operation of said manually operable means under the impetus of said resilient means whereby the first needle penetrates the capsule to direct fluid therefrom into and through the second needle preceding outward movement of the second needle relative to said casing.

6. A hypodermic syringe comprising an elongated casing, a pierceable resilient ampule of injection fluid fixed adjacent one end of said casing, a tubular hypodermic needle and a substantially axially alined tubular piercing needle mounted for relative axial movement in said casing, spring means normally urging the two needles away from each other, a trigger mechanism, means engaged by the trigger mechanism for normally maintaining the piercing needle in inward position spaced from the ampule, a latch means connecting the piercing needle with the hypodermic needle and being so arranged as to maintain the hypodermic needle in inward position when the piercing needle is in inward position, an extensible tube communicatively connecting the proximal ends of the piercing needle and the hypodermic needle, said trigger mechanism being operable to release the piercing needle from said means engageable thereby

upon manipulation thereof whereby the piercing needle will be moved outwardly by said spring means to pierce said ampule and direct fluid to said hypodermic needle, and means operable automatically upon said piercing needle entering said ampule for releasing the hypodermic needle from the latch means whereby the hypodermic needle is urged outwardly by said spring means.

7. A hypodermic syringe comprising a casing having means for supporting a pierceable resilient capsule of injection fluid therein adjacent a first end thereof, said casing having a second end remote from the first end, first and second substantially axially alined needle guiding elements mounted for axial movement in said casing adjacent the respective first and second ends of said casing, a tubular capsule piercing needle carried by the first needle guiding element, a tubular hypodermic needle carried by the second needle guiding element, manually releasable means normally maintaining the capsule piercing needle in spaced relation from said capsule, latch means normally restraining the hypodermic needle from moving outwardly through said second end of said casing, an extensible tubular connection between the capsule piercing needle and the hypodermic needle, resilient means automatically operable upon releasing said releasable means for moving the piercing needle into the capsule for directing the fluid from the capsule into said hypodermic needle, means responsive to the movement of the capsule piercing needle into the capsule for releasing the hypodermic needle from said latch means, and resilient means for urging the hypodermic needle outwardly through said second end of the casing upon said latch means being released.

8. A hypodermic syringe comprising a casing having means for supporting a pierceable resilient capsule of injection fluid therein adjacent one end thereof, first and second needle guiding elements mounted for relative movement in said casing adjacent opposite ends of said casing, a tubular capsule piercing needle carried by the first needle guiding element and extending toward said capsule, a tubular hypodermic needle carried by the second needle guiding element, manually releasable means normally maintaining the capsule piercing needle in spaced relation from said capsule, latch means normally restraining the hypodermic needle from moving outwardly through said casing, a tubular connection between the capsule piercing needle and the hypodermic needle, resilient means automatically operable upon releasing said releasable means for moving the piercing needle into piercing engagement with the capsule for directing the fluid from the capsule into said hypodermic needle, said first guiding element having a portion thereon adjacent the piercing needle for exerting pressure on said capsule to thereby force the fluid into the needles, means responsive to the movement of the capsule piercing needle into the capsule for releasing the hypodermic needle from said latch means, and resilient means for urging the hypodermic needle outwardly relative to said casing upon said latch means being released.

9. A hypodermic syringe comprising a cylindrical casing provided with a partition intermediate the ends thereof, a first piston mounted for axial movement in said casing adjacent one side of said partition, a second piston mounted for axial movement in said casing adjacent the other side of said partition, a pierceable resilient capsule for containing injection fluid, means supporting said capsule in the cylinder and being spaced from the side of the first piston remote from said partition, a first tubular needle carried by said first piston and extending outwardly therefrom toward said capsule, a second tubular hypodermic needle carried by the second piston and extending outwardly therefrom away from said partition, first and second latch means normally maintaining the respective first and second pistons in inward position whereby the first needle is spaced from said capsule and the hypodermic needle is enclosed within said casing, a pliable tube connected at its distal ends to the proximal ends of said first and second needles, manually operable means for releasing the first piston from the first latch means, resilient means for urging the first piston away from the partition upon operation of said manually operable means whereby the first needle will penetrate said capsule and the pressure of said first piston against the capsule will cause the fluid to flow from the capsule into said hypodermic needle under pressure, means operable automatically upon the piston engaging said capsule for releasing the second piston from the second latch means, and resilient means for urging the second piston and its needle away from the partition upon the second piston being released from the second latch means.

10. A hypodermic syringe comprising a sealed cylindrical casing provided with a partition intermediate the ends thereof, a first piston mounted for axial movement in said casing adjacent one side of said partition, a second piston mounted for axial movement in said casing adjacent the other side of said partition, means for supporting a resilient capsule containing injection fluid in the cylinder adjacent the side of the first piston remote from said partition, a first tubular needle carried by said first piston and extending outwardly therefrom toward said capsule, a second tubular hypodermic needle carried by the second piston and extending outwardly therefrom away from said partition, means penetrable by said second needle for closing the end of said casing adjacent the outer end of the second needle, first and second latch means normally maintaining the respective first and second pistons in inward position whereby the first needle is spaced from said capsule and the second needle is enclosed within said casing, a coiled pliable tube connected at its distal ends to the proximal ends of said first and second needles, manually operable means for releasing the first piston from the first latch means, resilient means for urging the first piston away from the partition upon operation of said manually operable means whereby the first needle will penetrate said capsule and the pressure of said first piston against the capsule will cause the fluid to flow from the capsule into said second needle under pressure, means operable automatically upon the first piston engaging said capsule for releasing the second piston from the second latch means, and resilient means for urging the second piston and its needle away from the partition upon the second piston being released from the second latch means whereby the second needle will dart outwardly through said penetrable means.

11. A hypodermic syringe comprising a casing having a cylindrical wall and a cover closing a first end thereof and a closure member closing a second end thereof opposite from the first end, a pierceable resilient capsule adapted to contain a supply of injection fluid carried by said cover and projecting inwardly therefrom, a first tubular capsule piercing needle mounted for longitudinal movement in said casing adjacent said capsule, a second hypodermic needle mounted for axial movement in said closure member, first and second resilient means for respectively urging said first and second needles apart from each other, an actuating arm, a releasable connection between said actuating arm and the first needle whereby said actuating arm normally maintains the first needle in spaced relationship from the capsule, a trigger mechanism movably mounted in said casing and having a portion radially movable through the wall of said casing, manually operable means normally maintaining the trigger mechanism in uncocked position, means responsive to movement of said manually operable means for moving the trigger mechanism to cocked position, said portion of the trigger mechanism being movable outwardly relative to said casing when the trigger mechanism is moved to cocked position, means operable automatically upon subsequent inward movement of said portion of the trigger mechanism for releasing said connection from the actuating arm whereby the first resilient means causes the first needle to pierce the capsule, a tubular connection between the first and second needles for directing the fluid from the capsule, through the first needle and thence through the second needle, latch means for maintaining the second needle in withdrawn position relative to said closure member, and means operable automatically upon said first needle piercing said capsule for releasing the second needle from the latch means whereby the second needle will be projected outwardly through the closure member by the second resilient means.

12. In a structure according to claim 11, said manually operable means normally maintaining the trigger mechanism in uncocked position comprising a thin pliable element adhesively secured to the exterior surface of said cylindrical wall and covering the outer end of said portion of the trigger mechanism, resilient means

for urging said trigger mechanism outwardly upon said pliable element being torn away from said portion, said trigger mechanism having an irregular opening therethrough through which a portion of said actuating arm loosely extends, said irregular opening defining a shoulder which is off-set relative to the portion of said arm extending therethrough when said trigger mechanism is uncocked, and the latter resilient means also serving to urge said portion of said arm into the path of said shoulder when the trigger mechanism is cocked whereby subsequent depression of said portion of the trigger mechanism will move the actuating arm out of engagement with said connection extending to the first needle to release the same.

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