

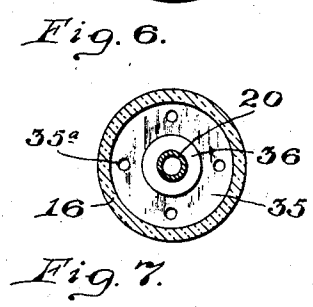
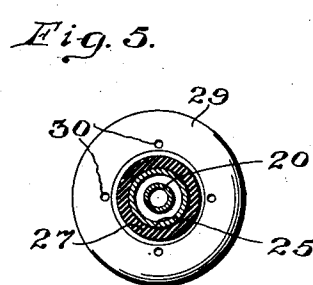
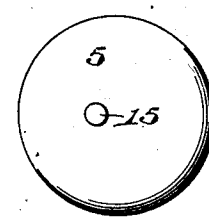
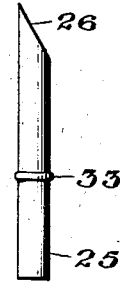
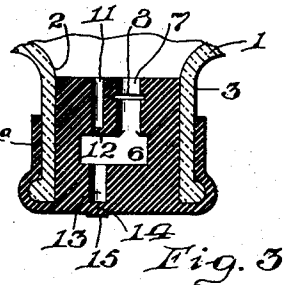
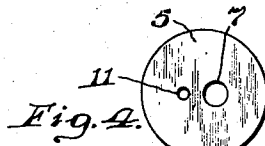
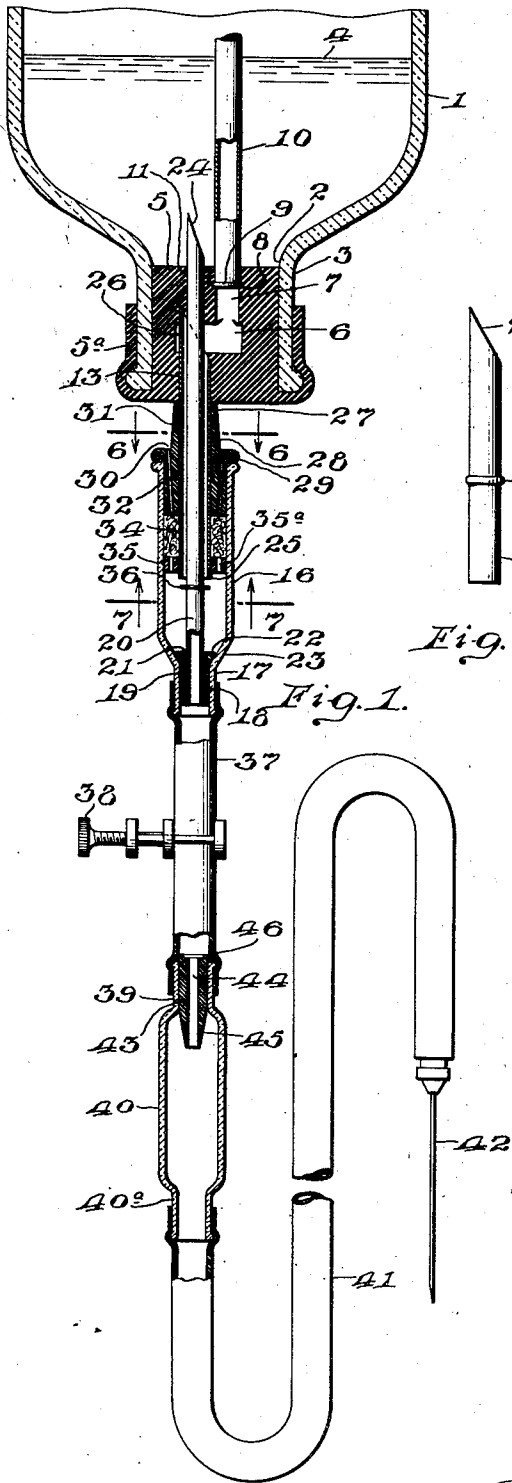
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HYPODERMIC-INJECTION APPARATUS

Filed Nov. 21, 1936



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HYPODERMIC-INJECTION APPARATUS

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18 Claims. (Cl. 128—214)

The object of the invention is to provide improvements in hypodermic-injection apparatus, and more particularly in the combination of a reservoir-container with a new design of elastic closure, and a most efficient canula or stylus unit, whereby liquid is led from said reservoir-container into the usual flexible tube, to the opposite end of which any desired or available form of hypodermic needle is attached.

Another object is to provide an elastic closure, which normally seals the outlet of the reservoir, but through which a sharpened tubular stylus may be inserted for leading liquid from such reservoir, while a surrounding tubular inlet stylus which is also pointed enters a chamber within the body of said closure, said chamber having an opening preferably spaced from the inner end of said first stylus, by which air may enter said reservoir other than by way of said first or discharge stylus, thereby preventing any of such air from entering the tube which leads to the hypodermic needle, there being preferably connected to said chamber opening a freely upwardly extending tube, operative to lead the entering air upwardly away from said first or discharge stylus, to a point above the surface of whatever liquid may be within said reservoir.

A further object is to provide an improved stylus unit, of which the two styli mentioned form unitary parts, and by way of which air is first filtered before being led to and through the said inlet stylus, and which unit is of a construction involving exceedingly low expense to make, and therefore, replace, as well as being designed to permit ready disassembly, cleansing, reassembly and sterilization.

Still another object is to provide a simplified form of flow meter, by which the flow through the apparatus can be readily visualized and determined in drops per minute, and which flow can be regulated by any suitable form of clamp, valve, or other form of flow-regulating means.

With the objects of the invention thus broadly stated, the invention comprises numerous additional details of construction and operation, which are hereinafter fully brought out in the following description, when read in conjunction with the accompanying drawing, in which Fig. 1 is a vertical sectional view, partly in elevation, showing the complete apparatus in operative association with the normal lower portion of a suitable reservoir-container; Fig. 2 is an elevational view of the outer or discharge stylus per se; Fig. 3 is a diametrical sectional view of the improved closure and adjacent portions of the reservoir

per se; Fig. 4 is a top plan view of said closure, when in the position shown in Fig. 3; Fig. 5 is a bottom plan view of the said closure when in the same position; Fig. 6 is a transverse section on the line 6—6 of Fig. 1; and Fig. 7 is a similar section on the line 7—7 of Fig. 1.

Referring to the drawing, the normal lower portion of any suitable form of reservoir container 1 is shown as comprising an outlet opening 2, surrounding by an annular flange or neck 3, said reservoir being adapted to hold any desired type of liquid represented by the level 4. It is to be understood, however, that the particular type of reservoir here shown is not to be considered as in any way limiting the invention hereinafter described, as the reservoir itself may be of any desired type, and is, therefore, merely represented by a portion of such a reservoir as is shown in greater detail in co-pending application Serial No. 85,253, filed June 15, 1936.

The improved closure here illustrated comprises a body portion 5, having an internal chamber 6, from which a channel opening 7 leads through the normally upper or inner surface of said closure, the surface of said channel opening being preferably provided with an annular groove 8, in which is adapted to be positioned a radially enlarged flange 9, carried by the normal lower end of a glass or similar tube 10, which extends as far as may be desired above the uppermost level 4 of the liquid within the container 1. Extending into said body 5 from said upper or inner surface is a relatively slender channel 11, which terminates in spaced relation with the chamber 6, and is separated from said chamber by means of a puncturable diaphragm section 12.

A second channel 13, preferably somewhat larger than the channel 12 and coaxial therewith, extends downwardly from said chamber 6, towards, but terminates in spaced relation with the normal lower or outer surface of said body 5, providing a second puncturable diaphragm section 14. The position of the said larger channel 13 may be indicated by means of a suitable surface irregularity 15 upon the outer surface of said closure body, and may comprise, for instance, a slight extension or boss, as shown in Figs. 3 and 5, or may comprise a depressed area, so far as the invention is concerned, except that the depressed area or recess would provide greater opportunity for the collection of undesirable impurities or foreign matter, than does an extension or boss, such as that shown.

Said closure is also preferably provided with an elastic flange 5a, which normally surrounds

the reservoir neck 3, to thereby doubly insure a hermetic sealing of the reservoir outlet 2, and positively prevent the entrance of foreign matter into or the uncontrolled escape of liquid from, said reservoir.

A stylus unit is shown as comprising a preferably cylindrically shaped glass or other form of hollow member 16, having a preferably restricted, downwardly extending, open end 17, in which is positioned a closure 18 of rubber or other suitable material, provided with a preferably axial bore 19, in which is positioned the lower end portion of a tubular stylus 20, said stylus preferably being provided with an annular flange 21, which engages and may be embedded within the inner enlarged end portion 22 of said closure 18, all of which construction operates to prevent said stylus from shifting downwardly, when pressure is applied to the adjacent conical surface 23 of said hollow member, to force the opposite freely extending pointed end portion 24 of said stylus through the puncturable diaphragms 14 and 12, consecutively, as well as through the preferably aligned channels 13 and 11, until said free end of the stylus extends above the inner surface of said closure body 5 and into the liquid within said reservoir. The diameter of the upper channel 13, being less than the outside diameter of said stylus, the elastic walls of this channel bindingly grip said stylus and thus prevent either liquid or air from flowing in opposite directions by the outer surface of said stylus.

A second tubular stylus 25 surrounds said first stylus and in spaced relation therewith, the inner end of said second or larger stylus communicating with the interior of the hollow member 16, and being also provided with a pointed terminal portion 26, which is adapted to follow the terminal portion 24 of said first stylus, through the puncturable diaphragm 14 and adjacent channel 13, but ceases such inward movement through the body of said closure, when its inner open end is positioned within and communicates with the interior of the closure chamber 6. The proper limit of movement of said styli inwardly is predetermined by means of a freely extending reduced end portion 27, carried integrally by a closure 28 for the otherwise normally open upper end portion of said hollow member 16, said last-named closure being also provided with an annular flange 29, to limit its movement into said hollow member, and with a plurality of substantially longitudinally extending bores 30, providing apertures by means of which air is adapted to enter the interior of said hollow member.

Said last-mentioned closure 28 is provided with an axial bore 31 of sufficient size to receive the larger stylus 25, while preferably midway between its ends, it is provided with an annular recess 32, adapted to receive the relatively shallow annular flange, with which said larger stylus is provided, in order to thereby prevent longitudinal movement of said larger stylus with respect to said last-mentioned closure. Surrounding said larger stylus, and adjacent to the inner end of this closure, is positioned an annular filter medium 34, which may be held in operative position by any suitable means, such for instance, as a rubber washer 35, or the like, carried by the inner end portion of said larger stylus, and provided with a plurality of apertures 35a, which are sufficiently large to permit the passage of air past said washer, but too small to permit the free passage of liquid which might otherwise wet the

filter medium, as when shifting the apparatus from upright to inverted position.

It will also be noted that the first-mentioned stylus 20 is preferably provided with an annular flange 36, adjacent to, but normally spaced from contact with the inner end of the larger stylus, the function of this flange being to prevent the longer inner stylus from being pulled outwardly from the stylus unit, when the operator grips either the hollow member 16 or its closure 28, to withdraw said styli from said reservoir closure 5. The filter 34 obviously spans the entire radial distance between the outer stylus and the inner surface of said hollow member, in order to insure effective filtering of air entering said hollow member by way of the channel-like apertures 30 in the closure 28, and before such air passes through said larger stylus 25, and enters the reservoir 1 by way of the chamber 6, channel opening 7 and tube 10.

To the lower restricted end of the hollow member 16 is secured a section of rubber tubing or the like 37, with which may be operatively associated any suitable form of flow-controlling means, such as is represented by the variable clamp 38, the opposite end of this section of tubing being attached to the upper and preferably restricted open end 39 of a transparent hollow member 40, which is preferably formed of glass and frequently referred to as a drip meter, or flow-indicating device. The lower end 40a of said device is then connected by any desired length of flexible tubing 41 to an ordinary hypodermic needle 42. Into the upper end of the transparent member 40 is removably inserted a nozzle 43, preferably formed of rubber and having an axial bore 44, which emerges downwardly through the preferably tapered end 45 of said nozzle, extending freely into the member 40 and from which liquid flowing from the reservoir 1 is adapted to drip at variable rates of flow, usually indicated and designated by the number of drops per minute, under control of the flow-regulating means 38. This nozzle is also preferably provided with a transversely enlarged or flanged head 46, which normally rests upon the annular edge of the upper portion 39 of the member 40, to prevent said nozzle from being forced by liquid pressure, gravity, or otherwise, into the member 40, and being normally maintained against said upper edge by the elastic binding nature of the tubular section 37.

In the operation of this device, the several parts are assembled and inter-connected, as shown in Fig. 1, the flow controlling means 38 being initially in closed position. With the opening and adjustment of said last-named means, the weight of the liquid within said reservoir tends to flow therefrom by gravity through the inner stylus 20, tubing section 37, nozzle 43, flow-indicating member 40, tube 41 and needle 42. This uninterrupted flow is permitted by air being enabled to freely enter said reservoir to replace the liquid withdrawn therefrom, first through the bores 30 of the closure of the hollow member 16, the filter 34, hollow member 16, and thence upwardly through the outer or shorter stylus 25, reservoir closure chamber 6 and tube 10, as hereinbefore described.

Furthermore, in interpreting the appended claims, it is to be understood that the particular form of the device hereinbefore described, and illustrated in the accompanying drawing, is merely illustrative of one embodiment of the invention, and that said invention is capable of being modified in many ways, as to the exact de-

tails of its construction and operation, without departing from the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to protect by Letters Patent of the United States is:

1. In a hypodermic-injection apparatus, an elastic reservoir closure, comprising a body portion having an internal chamber, an outlet from said chamber leading through the normal inner surface of said body, a channel leading from said chamber towards but terminating short of the normal outer surface of said body, and a second channel leading from the inner surface of said body but terminating short of said chamber.

2. In a hypodermic-injection apparatus, an elastic reservoir closure, comprising a body portion having an internal chamber, an outlet from said chamber leading through the normal inner surface of said body, a channel leading from said chamber towards but terminating short of the normal outer surface of said body, a second channel coaxial with said first channel and leading from the inner surface of said body but terminating short of said chamber.

3. In a hypodermic-injection apparatus, an elastic reservoir closure, comprising a body portion having an internal chamber, an outlet from said chamber leading through the normal inner surface of said body, a channel leading from said chamber towards but terminating short of the normal outer surface of said body, a second channel leading from the inner surface of said body but terminating short of said chamber, a tubular stylus adapted to extend into said chamber by way of said second channel, and a second stylus adapted to extend through said body by way of said first channel, said first stylus being operative to lead air into said chamber and through said closure, as liquid flows outwardly through said second stylus.

4. In a hypodermic-injection apparatus, an elastic reservoir closure, comprising a body portion having an internal chamber, an outlet from said chamber leading through the normal inner surface of said body, a channel leading from said chamber towards but terminating short of the normal outer surface of said body, a second channel leading from the inner surface of said body but terminating short of said chamber, a tubular stylus adapted to extend into said chamber by way of said second channel, a second stylus adapted to extend through said body by way of said first channel, said first stylus being operative to lead air into said chamber and through said closure, as liquid flows outwardly through said second stylus, and a tube extending into said chamber outlet and operative to lead entering air to a point remote from said second stylus.

5. In a hypodermic-injection apparatus, an elastic reservoir closure, comprising a body portion having an internal chamber, an outlet from said chamber leading through the normal inner surface of said body, a channel leading from said chamber towards but terminating short of the normal outer surface of said body, a second channel co-axial with said first channel and leading from the inner surface of said body but terminating short of said chamber, and a pair of coaxial styli of different lengths adapted to extend through said first channel, the outer stylus being shorter than the inner and terminating in said chamber, while the inner stylus being longer continues through said second channel to the inner surface of said body.

6. In a hypodermic-injection apparatus, an

elastic reservoir closure, comprising a body portion having an internal chamber, an outlet from said chamber leading through the normal inner surface of said body, a channel leading from said chamber towards but terminating short of the normal outer surface of said body, a second channel coaxial with said first channel and leading from the inner surface of said body but terminating short of said chamber, a pair of coaxial styli of different lengths adapted to extend through said first channel, the outer stylus being shorter than the inner and terminating in said chamber, while the inner stylus being longer continues through said second channel to the inner surface of said body, and a tube extending into said chamber outlet and operative to lead entering air to a point remote from said last-mentioned stylus.

7. In a hypodermic-injection apparatus, a stylus unit comprising a hollow member, a tubular stylus extending through and beyond one end of said member without communicating with the interior thereof, and a second tubular stylus extending from a terminus within the interior of and beyond the same end of said member but of less extent outwardly than said first stylus, means to close one end of said member adjacent to said styli except for an air-inlet passage, and the opposite end of said member being closed except for said first stylus.

8. In a hypodermic-injection apparatus, a stylus unit comprising a hollow member, a tubular stylus extending through and beyond one end of said member without communicating with the interior thereof, a second tubular stylus extending from a terminus within the interior of and beyond the same end of said member but of less extent outwardly than said first stylus, means to close one end of said member adjacent to said styli except for an air-inlet passage, and the opposite end of said member being closed except for said first stylus, and means to filter air which enters said member and passes therefrom through said second stylus.

9. In a hypodermic-injection apparatus, a stylus unit comprising a hollow member having oppositely directed open ends, a tubular stylus terminating adjacent to one end and extending freely through the opposite end of said member, means to seal the space between the first end of said stylus and the adjacent open end of said member, a second stylus larger than and surrounding the first stylus and communicating with the interior of said member, said second stylus also extending through the said opposite end of said member but terminating short of said first stylus, and apertured means to seal the space between said second stylus and the adjacent end portion of said member.

10. In a hypodermic-injection apparatus, a stylus unit comprising a hollow member having oppositely directed open ends, a tubular stylus terminating adjacent to one end and extending freely through the opposite end of said member, means to seal the space between the first end of said stylus and the adjacent open end of said member, a second stylus larger than and surrounding the first stylus and communicating with the interior of said member, said second stylus also extending through the said opposite end of said member but terminating short of said first stylus, apertured means to seal the space between said second stylus and the adjacent end portion of said member, and a filter medium within said member to filter air entering said

member through said apertured sealing means before it leaves said member by way of said second stylus.

11. In a hypodermic-injection apparatus, a stylus unit comprising a hollow member having oppositely directed open ends, a tubular stylus terminating adjacent to one end and extending freely through the opposite end of said member, means to seal the space between the first end of said stylus and the adjacent open end of said member, a second stylus larger than and surrounding the first stylus and communicating with the interior of said member, said second stylus also extending through the said opposite end of said member but terminating short of said first stylus, apertured means to seal the space between said second stylus and the adjacent end portion of said member, and an annular filter medium surrounding said second stylus upon the inner side of said apertured sealing means, to filter air entering said member through said apertured means before it leaves said member by way of said second stylus.

12. In a hypodermic-injection apparatus, a stylus unit comprising a hollow member having oppositely directed open ends, a tubular stylus terminating adjacent to one end and extending freely through the opposite end of said member, removable means to seal the space between the first end of said stylus and the adjacent open end of said member, a second stylus larger than and surrounding the first stylus and communicating with the interior of said member, said second stylus also extending through the said opposite end of said member but terminating short of said first stylus, apertured means to seal the space between said second stylus and the adjacent end portion of said member, an annular filter medium surrounding said second stylus upon the inner side of said apertured sealing means, to filter air entering said member through said apertured means before it leaves said member by way of said second stylus, and means to prevent said filter medium from shifting with respect to said second stylus.

13. In a hypodermic-injection apparatus, a stylus unit comprising a hollow member having oppositely directed open ends, a tubular stylus terminating adjacent to one end and extending freely through the opposite end of said member, removable means to seal the space between the first end of said stylus and the adjacent open end of said member, a second stylus larger than and surrounding the first stylus and communicating with the interior of said member, said second stylus also extending through the said opposite end of said member but terminating short of said first stylus, apertured means to seal the space between said second stylus and the adjacent end portion of said member, and means to prevent said second stylus from shifting with respect to said apertured sealing means.

14. In a hypodermic-injection apparatus, a stylus unit comprising a hollow member having oppositely directed open ends, a tubular stylus terminating adjacent to one end and extending freely through the opposite end of said member, removable means to seal the space between the first end of said stylus and the adjacent open end of said member, a second stylus larger than and surrounding the first stylus and communicating with the interior of said member, said second stylus also extending through the said opposite end of said member but terminating short of said

first stylus, apertured means to seal the space between said second stylus and the adjacent end portion of said member, means to prevent said second stylus from shifting with respect to said apertured sealing means, and means to prevent said first stylus from shifting outwardly with respect to second stylus.

15. In a hypodermic-injection apparatus, a stylus unit comprising a hollow member having oppositely directed open ends, a tubular stylus terminating adjacent to one end and extending freely through the opposite end of said member, removable means to seal the space between the first end of said stylus and the adjacent open end of said member, a second stylus larger than and surrounding the first stylus and communicating with the interior of said member, said second stylus also extending through the said opposite end of said member but terminating short of said first stylus, apertured means to seal the space between said second stylus and the adjacent end portion of said member, means to prevent said second stylus from shifting with respect to said apertured sealing means, and means to prevent said first stylus from shifting a substantial distance in either opposite direction longitudinally.

16. In a hypodermic-injection apparatus, a stylus unit comprising a hollow member having oppositely directed open ends, a tubular stylus terminating adjacent to one end and extending freely through the opposite end of said member, removable means to seal the space between the first end of said stylus and the adjacent open end of said member, a second stylus larger than and surrounding the first stylus and communicating with the interior of said member, said second stylus also extending through the said opposite end of said member but terminating short of said first stylus, apertured means to seal the space between said second stylus and the adjacent end portion of said member, and means to prevent said apertured means from entering said member farther than a predetermined distance.

17. In a hypodermic-injection apparatus, an elastic reservoir closure, comprising a body portion having an internal chamber, an outlet from said chamber leading through the normal inner surface of said body, a channel leading from said chamber towards but terminating short of the normal outer surface of said body, a second channel leading from the inner surface of said body but terminating short of said chamber, and a peripherally extending elastic flange carried by said closure, and operative when surrounding the otherwise open end of a reservoir to hermetically seal the same.

18. In a hypodermic-injection apparatus, the combination of a reservoir-container having an opening surrounded by a flange, with a closure comprising an elastic body having an internal chamber and a peripherally extending elastic flange, which when surrounding said reservoir flange being operative with said body to hermetically seal the opening therein, said body being provided with an outlet into said reservoir through the inner surface of said body, a channel leading from said chamber towards but separated from the outer surface of said body by a stylus-puncturable diaphragm, and a second channel leading from the inner surface of said body towards but separated from said chamber by a stylus-puncturable diaphragm.

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