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P. A. RAICHE
HYPODERMIC INJECTOR
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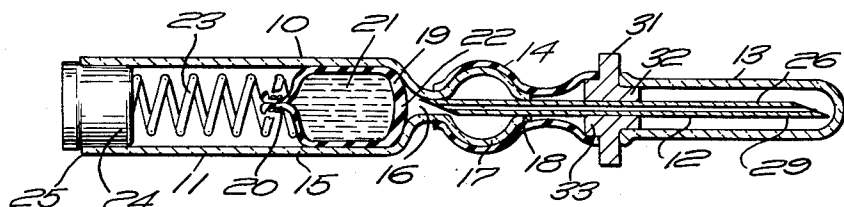


FIG. 1

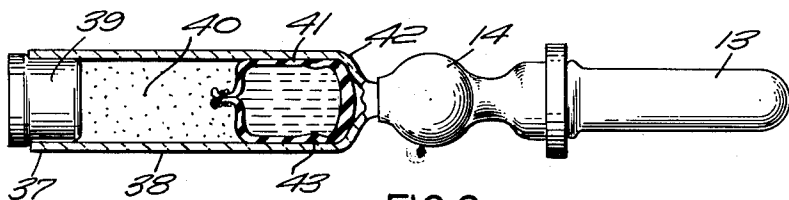


FIG. 2

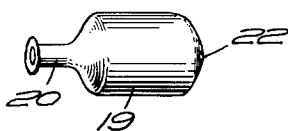


FIG. 3

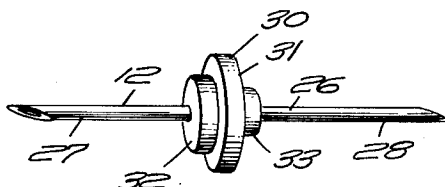


FIG. 4

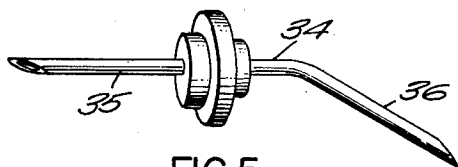


FIG. 5

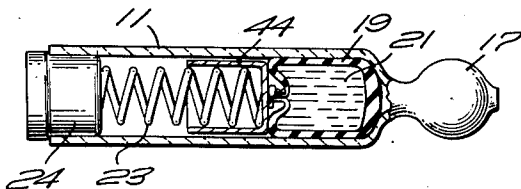


FIG. 6

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HYPODERMIC INJECTOR

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11 Claims. (Cl. 128—216)

The present invention relates to hypodermic injectors, and has particular reference to an automatic single dose injector construction.

Single dose injectors as used in military and hospital service include a sealed glass ampule having a breakable point, the ampule containing one dose of medical solution and an inert gas under pressure, such as helium; a hypodermic needle is attached to the vial through flexible rubber tubing, whereby breakage of the point forces the solution through the needle.

This type of construction has disadvantages in that a strainer of gauze or the like must be provided to prevent outflow of broken glass particles, and the ampule must be so held when in injecting position that the solution is forced out by the gas.

The principal object of the invention is to provide a simple construction for a single dose injector, in which the medical solution is retained in a collapsible sack continually maintained under collapsing pressure, the parts being arranged to permit the hypodermic needle to penetrate into the sack, whereupon the sack collapses and the solution is forced out through the needle.

Another object of the invention is to provide a single dose injector which may utilize mechanical pressure means or fluid pressure means for collapsing the solution sack.

A further object of the invention is to provide an injector which operates in any position.

An additional object of the invention is to provide a simple and inexpensive construction for a dispensible injector, utilizing a small number of readily assembled parts.

In the drawings,

Fig. 1 is a longitudinal sectional view through an illustrative injector embodying the invention;

Fig. 2 is a similar view, partly in section, of a modified construction;

Fig. 3 is a perspective view of the solution sack;

Fig. 4 is a perspective view of the hypodermic needle;

Fig. 5 is a perspective view of a modified form of needle; and

Fig. 6 is a sectional view through a modified construction of ampule.

The novel injector 10, see Fig. 1, includes an ampule 11, a hypodermic needle element 12, which has a removable glass shield 13, and a flexible rubber connector tube 14 for the ampule and the needle element.

The ampule 11, which is preferably of glass, but may be made of any suitable materials, such as plastic or the like, has a hollow elongated cylindrical body 15, a reduced neck 16, and an enlarged and preferably spherical tip 17 having a central opening 18.

Within the upper end of the ampule is a sack 19, of rubber or other suitable collapsible material, such as plastic, the sack having a filling neck 20 for receiving medical solution 21, the neck then being tied, as by a thread or the like; the sack has a thickened base 22 adjacent the ampule tip opening 18, which base may be integral or may be provided by a small patch cemented thereto, whereby the base is of the self-sealing type when penetrated by the sharp inner point of the hypodermic needle as hereinafter explained. A compression spring 23 is positioned in the ampule body to press against the sack 19, and a plug 24 of any suitable material closes the outer end 25 of the ampule and acts as a rear abutment for the spring 23.

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The needle element 12 includes a double ended hollow needle 26 having an inner end 27 adapted to be set in spaced relation to the sack 19, an outer injector end 28, and a through passage 29, the needle being mounted in a block 30 having a finger graspable disk 31, an inner annular flange 32, and an outer annular flange 33. A short section of rubber tubing forms the connector tube 14, which grips the ampule tip 17 at one end and the inner flange 32 at the other end, to securely connect the needle element to the ampule, with the inner needle end 27 in the tip opening 18. The finger type shield 13 of glass or other suitable material is positioned over the outer portion of the needle 26 to protect the outer end 28, and detachably engages the outer flange 33.

The parts when assembled as illustrated in Fig. 1, provide a dispensible one-shot hypodermic injector. For use, the shield 13 is removed, and the outer end 28 of the needle inserted into the patient after an appropriate skin area is sterilized. The disk 31 being held by the fingers, the ampule 11 is pushed forward, whereupon the inner needle end 27 pierces the base of the sack, which is collapsed by the spring to force the solution out through the needle 26. If desired, the needle end 27 may be inserted into the patient, until the disk 31 contacts the skin, whereupon the ampule 11 may be pressed down to complete the operation. Since it is preferred to incline the needle when injecting, a special needle 34, see Fig. 5, may be used, having a linear inner portion 35 and a bent outer portion 36.

Fluid pressure may be used in place of the spring 23, see Fig. 2. In this construction, the outer end 37 of the ampule 38 may be sealed by a plug 39, by fusing or by any other suitable means, an inert gas 40 such as helium being introduced to press on the sack 41. The sack 41 may, if desired, be cemented to the upper end 42 of the ampule as indicated at 43, to ensure holding of the gas pressure.

The pressure spring construction of Fig. 1 may be modified as illustrated in Fig. 6 to ensure a full discharge of the medical solution, by inserting a glass or metal cup-shaped cap 44 at the sack end interposed between the spring and the sack and receiving the inner end of the compression spring 23, whereby a full collapsing of the sack is assured.

Although I have described specific constructional embodiments of the invention, and preferred materials for the parts thereof, it is clear that the size, shape, arrangement and material of the parts may be changed to suit different injector requirements, without departing from the spirit and the scope of the invention as defined in the appended claims.

I claim:

1. A hypodermic injector, comprising a hollow ampule having an open tip, a collapsible sack containing medical solution and positioned in said ampule adjacent the tip, a double ended hypodermic needle element having an inner needle end in said tip in spaced relation to the sack, a flexible connector engaging the tip and the needle element and movable to permit penetrating insertion of the inner needle end into the sack, and expansible means in said ampule under compression pressure and exerting collapsing pressure on said sack.

2. A hypodermic injector, comprising a hollow ampule having an open tip, a collapsible sack containing medical solution and positioned in said ampule adjacent the tip, a double ended hypodermic needle element having an inner needle end in said tip in spaced relation to the sack, a flexible tubing connector engaging the tip and the needle element and movable to permit penetrating insertion of the inner needle end into the sack, and pressure means in said ampule exerting collapsing pressure on said sack.

3. A hypodermic injector, comprising a hollow ampule having an open tip, a collapsible sack containing medical solution and positioned in said ampule adjacent the tip, a double ended hypodermic needle element having an inner needle end in said tip in spaced relation to the sack, a connector engaging the tip and the needle element and movable to permit penetrating insertion of the inner needle end into the sack, and pressure means

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in said ampule exerting collapsing pressure on said sack, said pressure means including a compression spring.

4. A hypodermic injector, comprising a hollow ampule having an open tip, a collapsible sack containing medical solution and positioned in said ampule adjacent the tip, a double ended hypodermic needle element having an inner needle end in said tip in spaced relation to the sack, a flexible tubing connector engaging the tip and the needle element and movable to permit penetrating insertion of the inner needle end into the sack, and pressure means in said ampule exerting collapsing pressure on said sack, said pressure means including a compression spring.

5. A hypodermic injector, comprising a hollow ampule having an open tip, a collapsible sack containing medical solution and positioned in said ampule adjacent the tip, a double ended hypodermic needle element having an inner needle end in said tip in spaced relation to the sack, a connector engaging the tip and the needle element and movable to permit penetrating insertion of the inner needle end into the sack, and pressure means in said ampule exerting collapsing pressure on said sack, said pressure means including a compression spring and a cup shaped cap interposed between the spring and the sack.

6. A hypodermic injector, comprising a hollow ampule having an open tip, a collapsible sack containing medical solution and positioned in said ampule adjacent the tip, a double ended hypodermic needle element having an inner needle end in said tip in spaced relation to the sack, a flexible tubing connector engaging the tip and the needle element and movable to permit penetrating insertion of the inner needle end into the sack, and pressure means in said ampule exerting collapsing pressure on said sack, said pressure means including a compression spring, and a cup shaped cap interposed between the spring and the sack.

7. A hypodermic injector, comprising a hollow ampule having an open tip, a collapsible sack containing medical solution and positioned in said ampule adjacent the tip, a double ended hypodermic needle element having an inner needle end in said tip in spaced relation to the sack, a flexible connector engaging the tip and the needle element and movable to permit penetrating insertion of the inner needle end into the sack, and pressure means in said ampule exerting collapsing pressure on said sack, said pressure means comprising an inert gas under pressure.

8. A hypodermic injector, comprising a hollow ampule having an open tip, a collapsible sack containing medical solution and positioned in said ampule adjacent the tip, a double ended hypodermic needle element having an inner needle end in said tip in spaced relation to the

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sack, a flexible tubing connector engaging the tip and the needle element and movable to permit penetrating insertion of the inner needle end into the sack, and pressure means in said ampule exerting collapsing pressure on said sack, said pressure means comprising an inert gas under pressure.

9. In a hypodermic injector, a hollow ampule having an open tip, a collapsible sack containing medical solution and positioned in said ampule adjacent the open tip, a double ended hypodermic element having a block, a needle in said block with its inner end in said tip in spaced relation to the sack and its outer end projecting outwardly from said block, said block having an inner flange and an outer flange, a flexible tubing connecting the ampule tip and said block inner flange, and a protecting shield for the needle outer end detachably engaging the block outer flange, said ampule having pressure means exerting collapsing pressure on said sack.

10. In a hypodermic injector, a hollow ampule having an open tip, a collapsible sack containing medical solution and positioned in said ampule adjacent the open tip, a double ended hypodermic element having a block, a needle in said block with its inner end in said tip in spaced relation to the sack and its outer end projecting outwardly from said block, said block having an inner flange and an outer flange, a flexible tubing connecting the ampule tip and said block inner flange, and a protecting shield for the needle outer end detachably engaging the block outer flange, said ampule having spring pressure means exerting collapsing pressure on said sack.

11. In a hypodermic injector, a hollow ampule having an open tip, a collapsible sack containing medical solution and positioned in said ampule adjacent the open tip, a double ended hypodermic element having a block, a needle in said block with its inner end in said tip in spaced relation to the sack and its outer end projecting outwardly from said block, said block having an inner flange and an outer flange, a flexible tubing connecting the ampule tip and said block inner flange, and a protecting shield for the needle outer end detachably engaging the block outer flange, said ampule having fluid pressure means exerting collapsing pressure on said sack.

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