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B. KAHN

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HYPODERMIC SYRINGE AND THE LIKE

Filed April 23, 1929

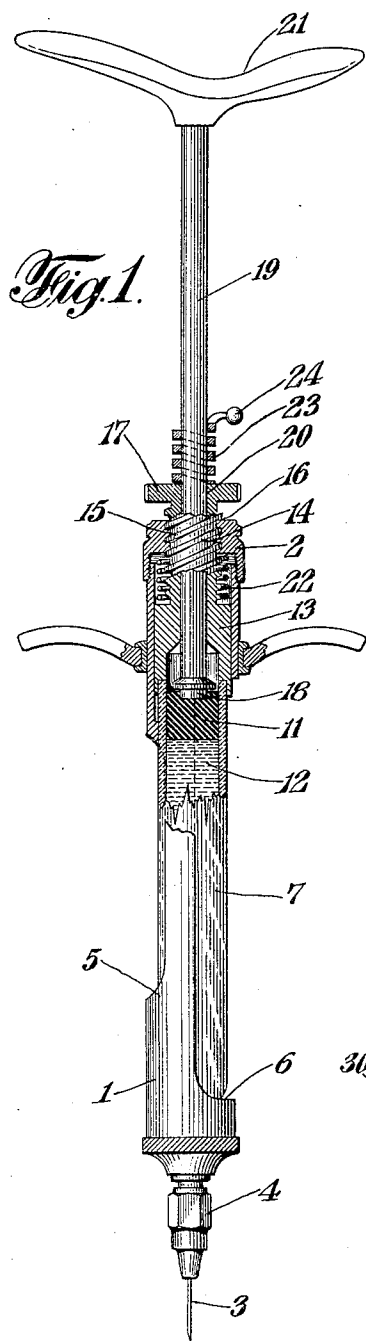


Fig. 2.

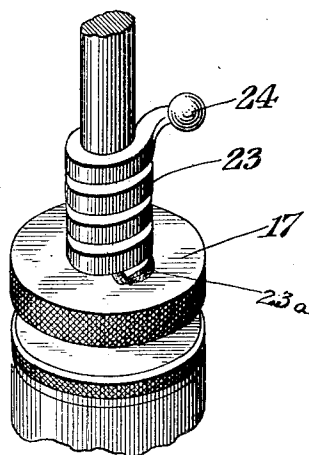


Fig. 3.

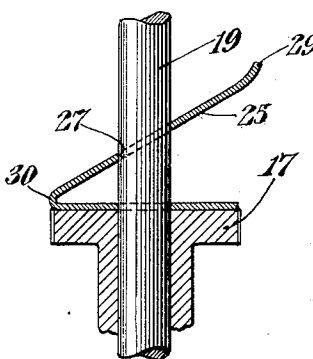
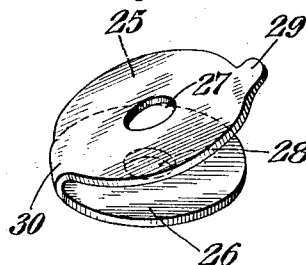


Fig. 4.



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HYPODERMIC SYRINGE AND THE LIKE

Application filed April 23, 1929. Serial No. 357,458.

This invention relates to hypodermic syringes and the like.

The liquid introduced hypodermically by a syringe should be prepared and maintained in aseptic condition; that is, it should be free from bacteria and similar bodies and should not contain toxic substances which if present in sufficient amount, might be harmful when introduced hypodermically into a patient. When a syringe is employed in an infected area, the tip of the needle may rest at a point where toxins are present. As long as the aseptic fluid is forced into this area through the needle, there is no chance for these toxins to enter into the needle and mount into the interior of the syringe, but when the pressure of the plunger on the liquid ceases due to release of pressure of the hand, the plunger tends to move back in the direction away from the needle and a back flow occurs sucking the objectionable matter back into the ampule, cartridge or other container of the liquid, thereby contaminating the liquid. When the syringe is then withdrawn, and plunged into a healthy area, the liquid now contaminated flows into this area and tends to set up an infection or to give it a toxic condition.

The principal object of the present invention accordingly is to provide a simple and inexpensive device to avoid contamination of the syringe liquid as indicated, comprising a few parts which may be easily operated and which may be easily attached to various types of syringes now in use.

Further and more specific objects, features and advantages will appear from a consideration of the drawings and the detail description hereinafter set forth, when taken in conjunction with the claims.

Preferred forms of the invention are shown in the drawings, in which

Fig. 1 is a longitudinal sectional view of a hypodermic syringe showing the invention embodied therein;

Fig. 2 is an enlarged detail view showing the coiled spring surrounding the plunger member and in position to prevent its backward movement away from the needle;

Fig. 3 is an enlarged fragmentary detail

view of a modification of the plunger holding means shown in Figs. 1 and 2. It is shown attached to the ampule-engaging member and in position to restrain the backward movement of the plunger; and

Fig. 4 is a perspective view of the device for preventing the motion of the plunger shown in Fig. 3.

Referring now to Figs. 1 and 2, the syringe comprises an elongated cylindrical barrel or frame 1, exteriorly threaded at one end to receive a cap 2, the other end of the barrel is provided with a hollow hypodermic needle 3 secured thereto by the usual nut or thimble 4.

The barrel 1 is cut away on each side thereof as shown at 5 and 6, and through the larger opening 6 there is inserted an ampule 7 preferably made of glass which before introduction is preferably broken. A plug or piston 11 of soft rubber is in the other end of the ampule.

The ampule 7 contains aseptic medicament 12 which is prepared and placed in the ampule and sealed therein under stringently antiseptic conditions. When the ampule is inserted in place it is engaged and held fast by means of a sleeve 13 in the upper end of the barrel having a stem 14 provided with exterior threads 15 with preferably large pitch to engage similar threads on bore 16 of cap 2. The outer end of the stem 13 is provided with a knurled head 17 by means of which the sleeve 13 may be moved downward or upward in the barrel to engage or disengage the ampule.

The lower end of the plug 13 is recessed to accommodate the head 18 which is screw-threaded on to the end of a piston rod or plunger 19 which slidably extends through the bore 20 of the head 17 which has an operating handle in its outer end. The end of the plug 13 which abuts the end of the ampule is provided with a depending peripheral flange extending down the side wall of the ampule, which abuts the upper end of the ampule 7 and holds it in place. In order to insure that the removable cap 2 be maintained in place on the end of the ampule 1, the spring 22 abuts against the under side of this cap 2 and seats on a shoulder of the sleeve 13.

Attached by soldering 23a or otherwise to the upper face of the knurled head 17 is a coiled spring 23 having several coils fitting tightly about and grasping the plunger 19. These coils advance from the point of attachment on the face 17 upwardly in a counter-clockwise direction. The end of the spring remote from the face 17 is unattached and is turned outwardly away from the plunger shaft and as here shown is formed as a ball 24 which may be grasped by the fingers to be moved clockwise to open the spring. On moving the ball in the clockwise direction, the spring is unwound so that its coils no longer grasp and hold the plunger and under these conditions the plunger may be freely moved towards or away from the needle. When the spring is in normal unopened position as shown in Figs. 1 and 2, the plunger may move freely down towards the needle but if attempt is made to withdraw the shaft the coiled spring prevents movement in the direction away from the needle. The result of the action of the spring mentioned is that when the plunger is forced down by the pressure of the hand on the handle 21 to expel liquid from the ampule through the needle 3, the plunger may freely move in that direction, but if the plunger is stopped by release of pressure of the hand, its tendency is to move backwards away from the needle and to suck in objectionable substances from an area in which the tip of the needle may be resting, is prevented by the action of the coil which clings to the plunger and instantly prevents its backward motion away from the needle.

In operation the ampule 7 after breaking off its tip, is placed in the barrel 1 through the opening 6 and the ampule-engaging sleeve is rotated until it engages the top of the ampule. In rotating the sleeve, the spring 23 and shaft 19 are also rotated and thus the plunger is advanced some distance toward the plug 11. When the ampule is engaged, pressure on the handle 21 moves the plunger forward until it contacts with the plug whereupon liquid is ejected from the ampule through the needle 3. Motion of the plunger is unimpeded by the spring 23 as long as the liquid is being ejected. If the hand pressure is released at any moment instantly the plunger's movement backwards is stopped thus avoiding sucking of contaminated substance into the ampule as pointed out above.

Referring now to Figs. 3 and 4, there is shown a somewhat more simplified device intended to allow the plunger to pass towards the needle and to prevent its motion away from the needle to avoid contamination of the liquid in the ampule 7. The plunger 19 as there shown, passes through the bore in the head 17 and to the head 17 is attached a clamp member comprising upper jaw 25 and lower jaw 26. Upper jaw 25 is pierced with

an aperture 27, and lower jaw 26 with an aperture 28. These jaws may be conveniently stamped out of one piece of spring metal, and as here shown are rounded to conform to the shape of the head 17, the upper jaw 25 being provided with a projection 29 for receiving a finger when the device is to be operated to withdraw the plunger away from the needle. The lower jaw, as shown, is affixed by rivets or otherwise to the top face of the head 17 so that its aperture 28 is aligned with the aperture in the head 17. The aperture 27 in the top jaw 25 will then be slightly out of alignment with aperture 28; by depressing the jaw 25 against the spring action of the hinge 30 by which the two jaws are connected, the apertures 27 and 28 may be brought into alignment and the plunger 19 then passed therethrough and the head 18 screwed thereon. When so assembled, if the plunger 19 is forced downwardly, it tends to move the upper jaw 25 downwardly against the spring action of the hinge 30, and under these conditions the plunger will pass freely downwardly towards the needle. If, however, pressure on the plunger is released and the plunger starts to move upwardly away from the needle, the jaw 25 will tend to move upwardly and as the apertures 27 and 28 come out of alignment there will be a binding on the shaft 19 by the pressure of the sides of the aperture 7 thereon which will instantly check the movement of the plunger in that direction.

The operation of this embodiment of the device is similar to that described in connection with Figs. 1 and 2 when the ampule 7 has been inserted in the barrel and injected by the sleeve 13 by rotation of the head 17 which advances both the spring clamp and the plunger. Upon pressure on the handle 21 the plunger will be advanced to expel liquid from the ampule through the needle 3 and the jaw 25 will be depressed to permit movement in that direction, but if the hand is removed and the pressure on the handle released, the plunger will tend to move backwards but such motion will be prevented by the binding action of the clamp on the plunger.

While I have described my improvements in detail and with respect to preferred forms thereof, I do not desire to be limited to such details or forms, since many changes and modifications may be made and the improvements embodied in widely different forms without departing from the spirit and scope of the invention in its broader aspects. Hence I desire to cover all modifications and forms coming within the language or scope of any one or more of the appended claims.

What I claim is:—

1. In combination a hypodermic syringe having a needle and a fluid-expelling means and means comprising a coiled spring oper-

ating on said fluid-expelling means to permit movement toward the needle and frictionally bind the fluid-expelling means against movement away from said needle thereby to prevent suctional action through the needle.

2. In combination a hypodermic syringe having a chamber, fluid-expelling means movable therein and a coiled spring movable into frictional engagement with said fluid-expelling means thereby to restrain said expelling means against movement in one direction and to prevent suctional action through the needle while the needle is in the wound.

3. In a device of the kind described in combination a syringe having a liquid chamber, a needle at one end of said chamber, a plunger at the other end, a coiled spring wound around the shaft of said plunger, said spring moving to permit motion of said plunger toward said needle and to prevent movement away from said needle.

4. In a device of the kind described, in combination, a syringe having a removable ampule, a needle at one end of said ampule, a plunger at the other end, a removable ampule-engaging member for holding the ampule in position to deliver liquid therefrom through said needle, a coiled spring wound around the shaft of said plunger having one end attached to the ampule-engaging member and the other end free, said spring moving to permit motion of said plunger towards said needle but while in binding position to prevent motion of said plunger away from said needle, and a device to permit release of the binding action of said spring on said plunger to thereby permit said plunger to move freely either towards or away from said needle.

5. In a device of the kind described, in combination, a syringe having a frame, a removable ampule, a needle at one end of said ampule, a rotatable ampule-engaging member, a plunger at the other end of said ampule and a spring tightly coiled around the shaft of said plunger, said spring having one end attached to said ampule-engaging member and free to move at its other end, said other end being provided with a knob to permit the spring to be moved to uncoil it, so that movement of the plunger away from the needle is prevented by the binding action of said spring, but on turning said knob opposite to the direction of coil of said spring, said spring is unwound, permitting said plunger to move freely toward or away from said needle.

In testimony whereof I have signed my name to this specification.

BENJAMIN KAHN.