

Dec. 30, 1958

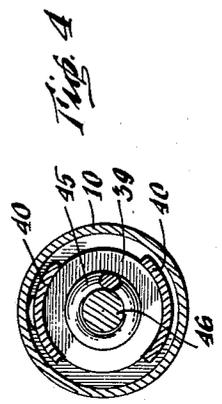
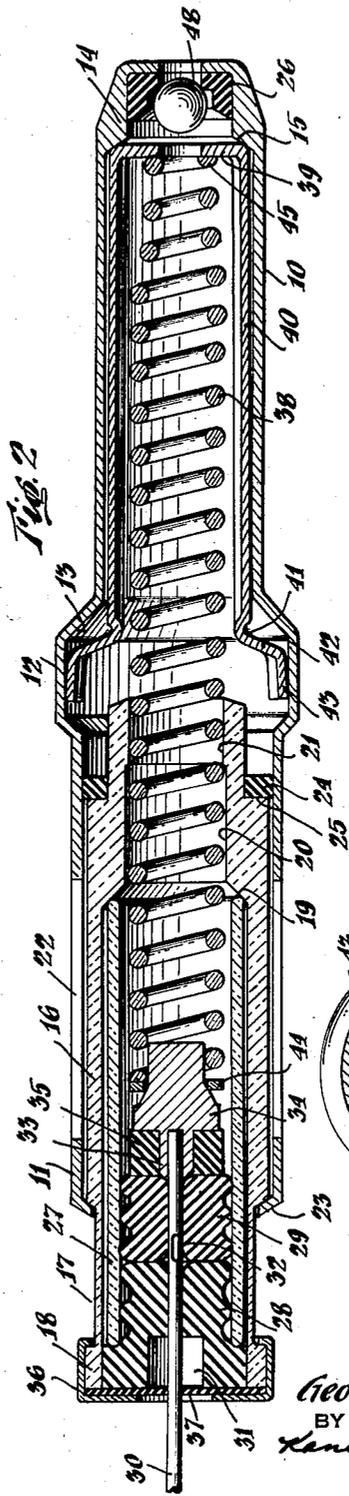
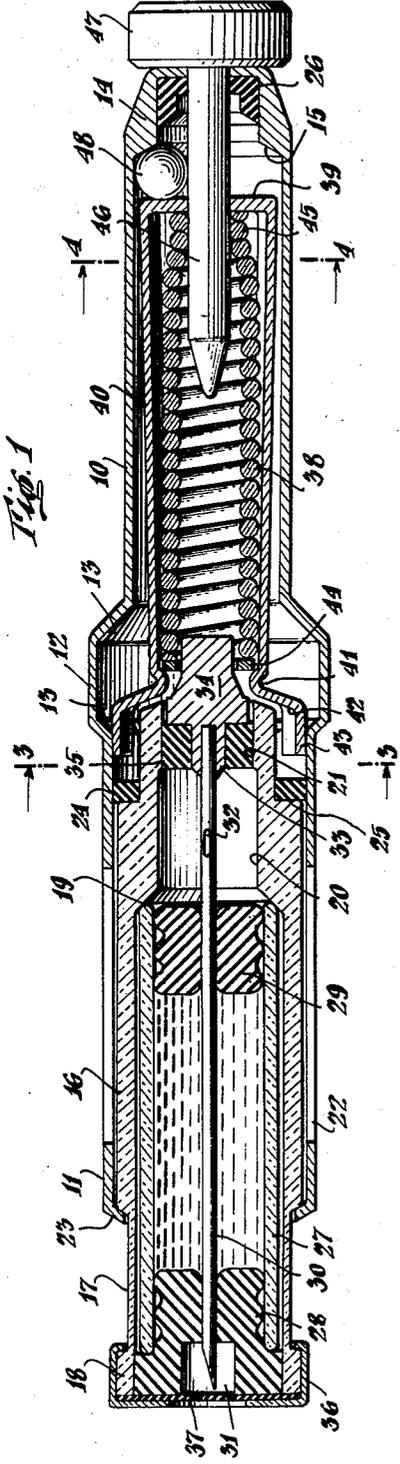
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2,866,458

HYPODERMIC ASSEMBLY

Filed May 9, 1956

4 Sheets-Sheet 1



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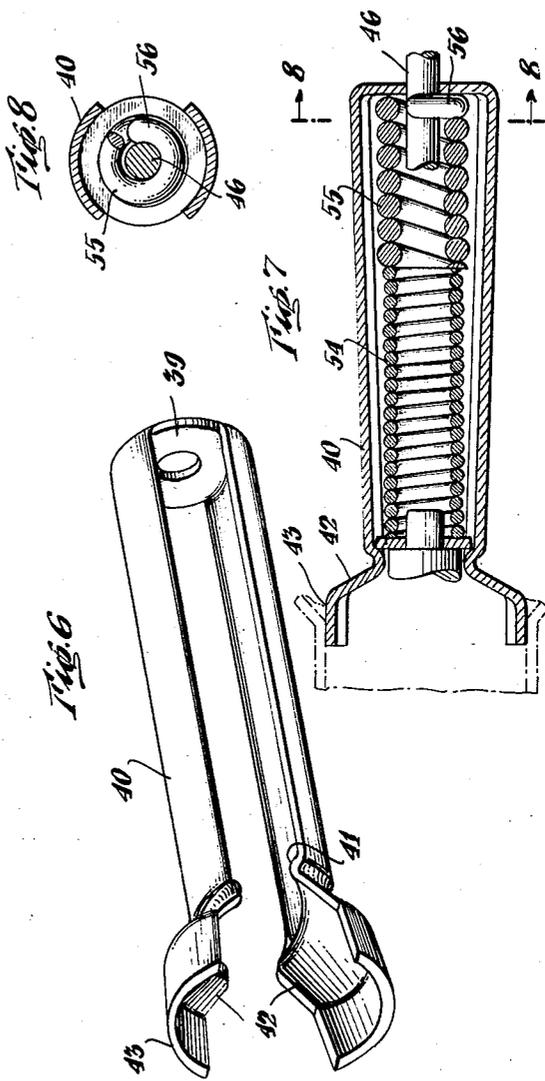
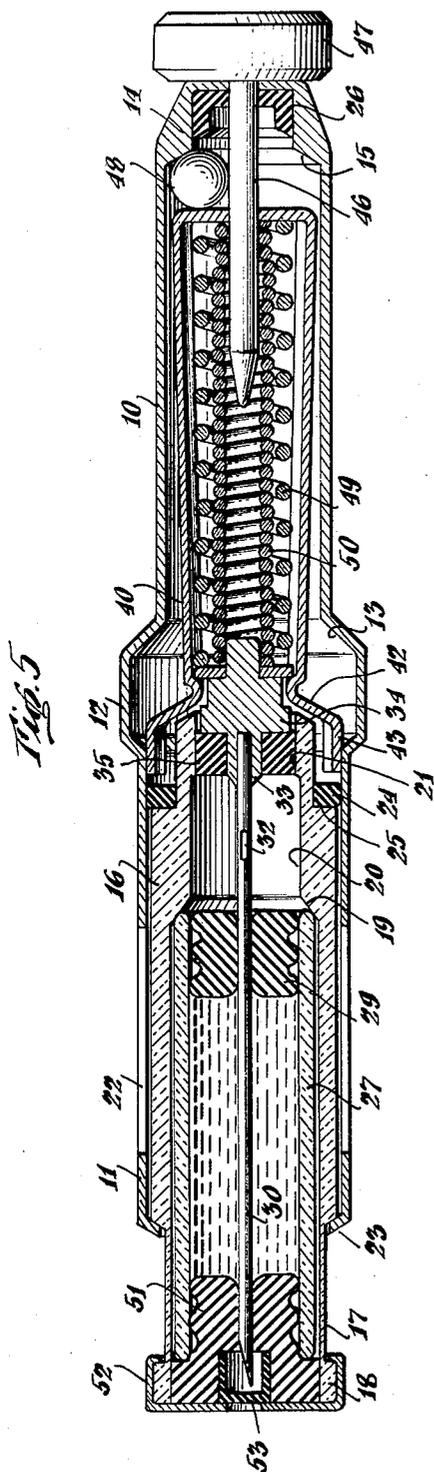
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4 Sheets-Sheet 2



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Fig. 9

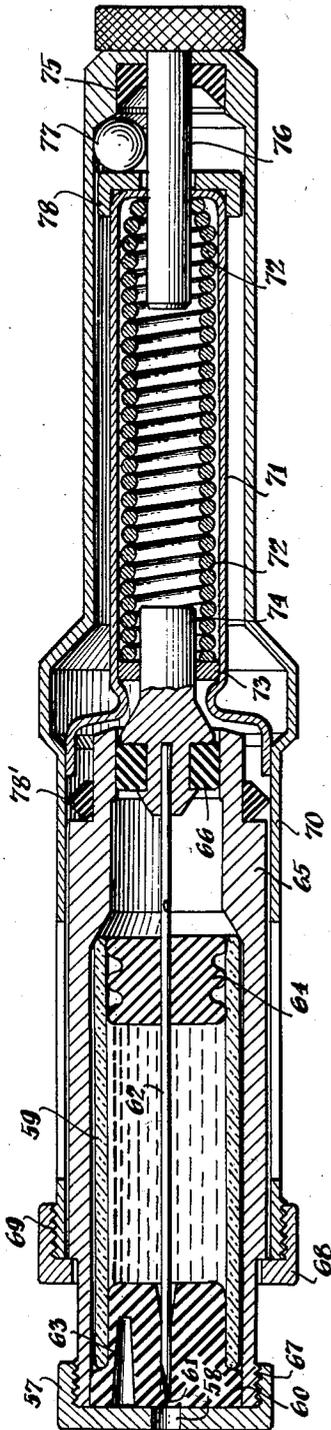


Fig. 11

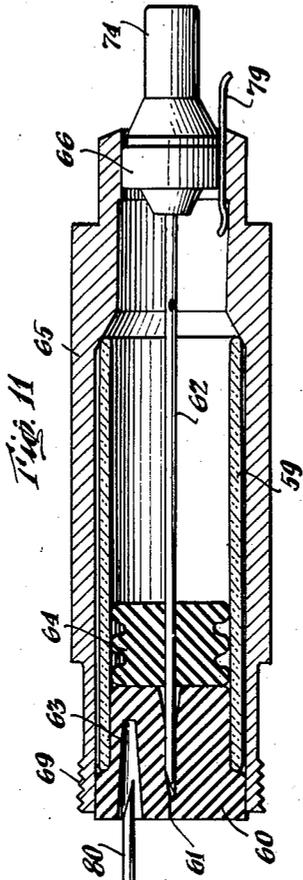


Fig. 10

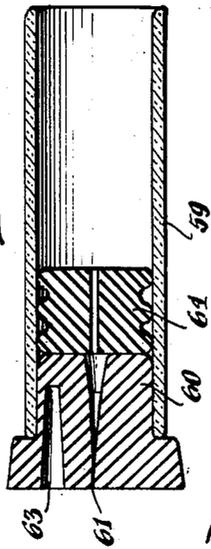
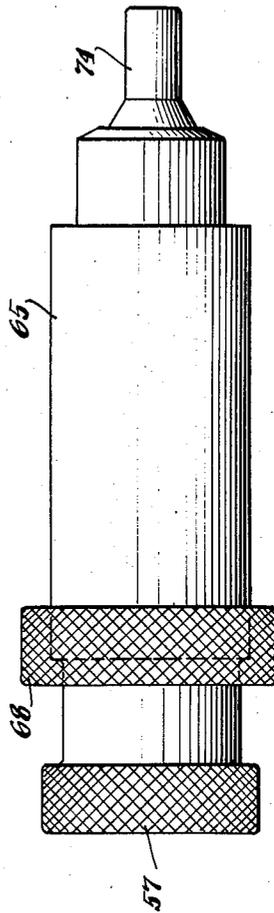


Fig. 12



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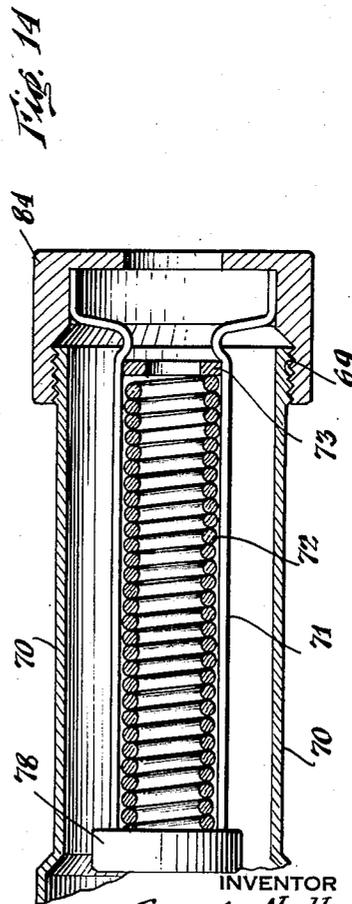
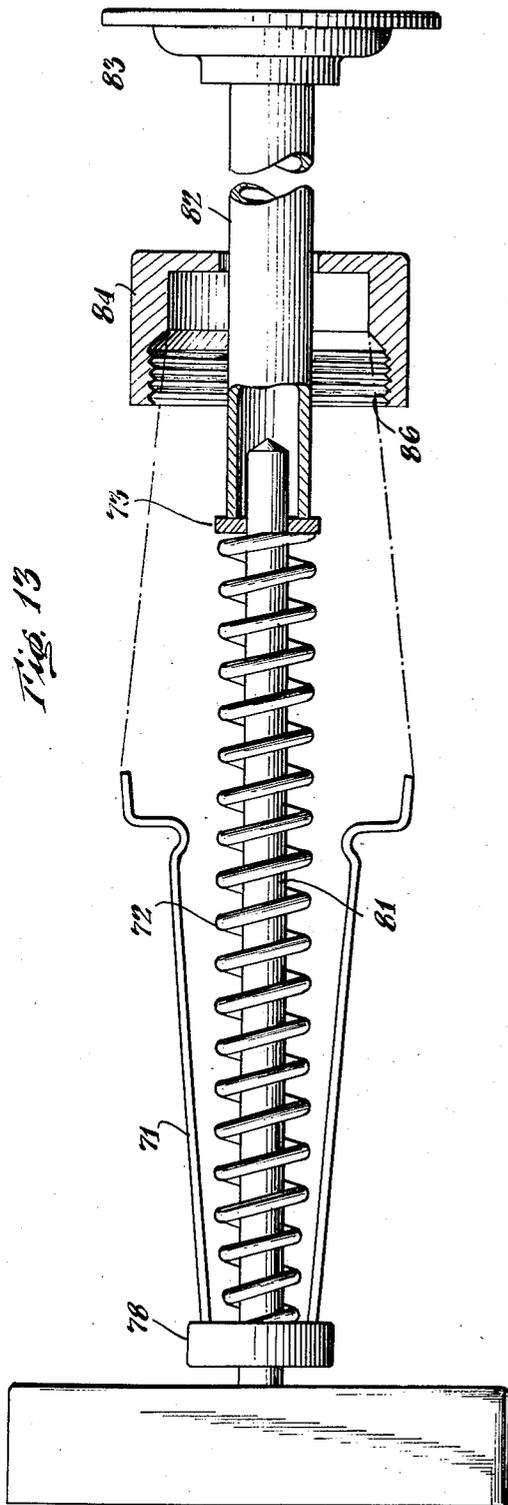
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HYPODERMIC ASSEMBLY

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4 Sheets-Sheet 4



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2,866,458

HYPODERMIC ASSEMBLY

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Application May 9, 1956, Serial No. 583,804

20 Claims. (Cl. 128—218)

This invention relates to a structurally and functionally improved medicament injection assembly.

This application is a continuation in part of my prior application for United States patent on Hypodermic Assembly, Serial No. 433,392, filed June 1, 1954 (now abandoned).

It is a primary object of the invention to furnish an assembly which may be used for hypodermic self-injection by an unskilled person who, in fact, may be handicapped by injury or shock and by means of which the desired injection will be effectively achieved.

A further object is that of furnishing a mechanism, the parts of which may readily be cleaned, sterilized, filled and loaded. When in this condition the operating parts will be maintained against contamination. Moreover, even if the unit is carelessly carried or stored, foreign materials will not enter it so that its functioning will be impaired.

An additional object is that of providing a hypodermic injection unit which will be automatic in nature but in which unless the parts are deliberately manipulated there will be no danger of accidental firing or medicament-discharge occurring. Therefore, the unit may be subjected to shocks and other abuse without impairing its functioning. At the same time, the present invention furnishes a mechanism in which, by means of the simplest sequence of operations, the device may be fired with assurance that a proper injection is achieved, even although this may be effected through layers of clothing or covering.

Still another object is that of providing an assembly which will include relatively few components each individually simple and rugged in construction, such components being capable of ready assemblage and when so assembled furnishing a unitary structure susceptible to being stored or carried for indefinite periods of time without affecting the working of the apparatus.

Still further objects are those of providing an assembly in which the medicament containing ampule may be replaced when necessary without discharging the apparatus; the present teachings also contemplating an improved technique whereby the ampule may be filled and the assembly "loaded" and rendered ready for use.

With these and other objects in mind, reference is had to the attached sheets of drawings illustrating practical embodiments of the invention and in which:

Fig. 1 is a sectional side view of the assembly and showing the same in its initial condition;

Fig. 2 is a similar view but showing that assembly after it has been "fired";

Figs. 3 and 4 are transverse sectional views taken, respectively, along the lines 3—3 and 4—4 of Fig. 1;

Fig. 5 is a view similar to Fig. 1 but illustrating an alternative form of structure;

Fig. 6 is a perspective view of the spring collet or housing member which may form a part of the assembly;

Fig. 7 is a sectional side view of an alternative form of spring arrangement;

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Fig. 8 is a transverse sectional view taken along the line 8—8 in the direction of the arrows as in Fig. 7;

Fig. 9 is a sectional side view of a still further form of construction;

Fig. 10 is a similar view of the ampule or cartridge assembly prior to filling;

Fig. 11 is an additional sectional side view illustrative of the filling step and showing the cartridge disposed within its holder;

Fig. 12 is a side elevation of the ampule and holder ready for inclusion in the assembly;

Fig. 13 is a partly sectional side view of the mechanism employed to properly relate the units of the power assembly; and

Fig. 14 shows certain of the parts illustrated in the preceding view and after they have been subjected to additional assembly procedure.

In these views, an outer casing is provided. This casing is preferably formed of metal such as aluminum, although other materials may be utilized. It includes a rear portion 10 and a forward portion 11. These parts are preferably integrally united by a central portion 12 which has an enlarged diameter and conveniently includes inclined inner faces 13 connecting it with the forward and rear portions. The outer end of the rear portion may be thickened as at 14 and the inner face of this part may embrace an inclined surface 15.

Disposed within the forward portion 11 is an ampule holder or carrier including a main cylindrical body 16, a forward part 17 of reduced diameter and an outer end portion defined by a flange or lip 18 having a diameter greater than that of the forward part 17. This holder or carrier presents a central bore, which adjacent the rear end of the same is reduced; such reduction being defined by a shoulder 19. Accordingly, to the rear of this shoulder a reduced bore portion 20 is furnished. The end of that bore portion is defined by an inwardly extending flange or surface 21 providing a bore of still more reduced diameter. The carrier or holder 16 is preferably formed of a transparent material such as polystyrene. Again, it will be understood, that other materials might be employed. However, by having this part transparent and by forming the forward portion 11 with sight openings or windows 22, it will be possible to view the interior of the assembly adjacent this zone. At this time it is to be noted that axial movement of the carrier or holder 16 with respect to the forward portion 11 is prevented by, for example, turning the edge of the outer casing or shoulder inwardly as at 23 to overlie and engage the surface of the shoulder providing the zone of demarcation between the main body portion 16 and the reduced forward part 17.

Also, it is to be noted, that the main bore of body 16 preferably has a substantially constant diameter and extends from the outer flange portion 18 through to the shoulder 19. Additionally, it will be observed that a sealing ring 24 is conveniently interposed between the outer casing portion 11 and the adjacent face of holder 16. This ring is formed of any suitable material and lies adjacent a flange 25 formed in the outer face of the holder adjacent the bore zone 20. A similar seal 26 is conveniently disposed within the bore defined by the thickened end 14 of the rear portion 10. Accordingly, if seals of this type are employed, foreign materials which might impede or prevent the proper operation of the parts will be prevented from entering through the openings defined by windows 22 or otherwise. This will be despite the fact that the unit may be carried with other articles in, for example, the garment pocket of the user.

The ampule which forms a part of the present assembly and contains medicament should, as shown, conveniently include a cylindrical body 27 formed of glass and

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mounted adjacent its forward end a sealing stopper 28 embracing head and plug portions. The latter lies within the forward end of the ampule bore and presents leakage of medicament past the stopper. The head of that stopper overlies the end of the ampule and is disposed preferably in the zone of flange 18. The rear end of the ampule is sealed by a piston-type stopper 29. This unit, in common with the first stopper, is conveniently formed of molded rubber of a natural or synthetic type. Also, it is provided with a central bore. A needle 30 has its body passing through the bore of stopper 29. Its pointed forward end extends through the bore of stopper 28 and lies within a recess 31 defined in the forward face of the latter.

The rear end of the needle beyond stopper 29 lies within bore 20. It is formed with a side or other convenient opening 32 communicating with its lumen. The adjacent end portion of the needle is mounted in a boss 33 forming a part of a rearwardly tapered plug 34 which constitutes what might be termed the hub of the needle. Encircling boss 33 and forming part of the hub assembly is a seal 35. The latter has an outside diameter such that it will frictionally bear against the inner face defined by the inwardly extending portion or flange 21. It will be noted that hub 34 has an outside diameter of lesser dimensions. If seal 35 be formed of rubber or similar material (and this is preferably the case) its expanded diameter should be less than that of bore 20. It is, therefore, apparent that the rear end of the ampule assembly is normally anchored against movements with respect to the carrier or holder 16 due to the contact existing between seal 35 of the hub assembly and the inner face of flange or reduced part 21.

Also, with the rear end of the ampule or cartridge 27 bearing against shoulder 19, the former is supported against rearward motion. Movement of the parts in a forward or outer direction is prevented first because of the frictional engagement which may exist between the peripheral edge of stopper plug 28 and the adjacent inner face of carrier 16. However, such movements of the parts are definitely prevented by, for example, furnishing ring 36 which is spun over the surface of flange 18 and overlies the forward end or head of the stopper. Interposed between this forward end of the ring 36 is a layer of material 37. A thin sheet of pierceable plastic is employed in this connection or else this layer may embrace material such as rubber. In this manner, it is apparent that an assembly is furnished in which the parts are permanently united. It is obvious that any suitable alternative structure might be employed to connect the parts in any desirable manner consistent with the accomplishment of the desired functions.

Interposed between plug 34 and the rear end of the assembly is a spring 38. This spring is housed within a collet or mounting member which, as especially shown in Fig. 6, includes a head portion 39, a pair of arms 40 which may be arcuate in section and which terminate in head portions embracing inwardly extending parts 41, outwardly sloping portions 42 and guiding portions 43. This collet is preferably formed of metal having resilient characteristics such that its arms tend to spring outwardly with respect to each other.

As shown in Figs. 1 to 4, only a single spring 38 may be employed. Preferably there is interposed between the forward end of this spring and the inwardly extending parts 41 a washer 44. The rear end of the spring has its convolutions constricted as at 45. Thus, they firmly embrace the shank 46 of a safety pin which projects through the opening in the head portion 39 of the collet. Beyond this head portion, shank 46 extends through seal 26 and outwardly of thickened portion 14. It terminates in a head 47 of suitable configuration. Interposed between thickened portion 14 and the head portion 39 of the collet is a retaining member 48. This, as shown, may be in the form of a sphere of metal or any other suitable material which is substantially non-deformable. As illustrated in Fig. 1, this member lies within the space inter-

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vening the rear face of head 39 and portion 15 and bears against the shank of pin 46. Therefore, it cannot be displaced from this position and will serve to maintain the outer face of head portion 39 in spaced relationship with respect to thickened part 14. As will be apparent, that part might be functionally provided in one of any number of desirable manners, especially if the shell of the casing is drawn.

It is primarily to be understood that while the present teachings might be employed to advantage in numerous manners, the present assembly is ideally suited for self-injection and injection under emergency conditions such as might prevail in the case of a national disaster where it will be necessary for persons exposed to gas, for example, of the nerve type, to be immediately injected with a medicament such as atropine. As afore brought out, the device shown in Fig. 1 may be carried in the pocket of a user with other materials and articles. Under those conditions its working parts will not become contaminated in that the contents of the ampule will remain sterile, as will also the point of the needle. Moreover, foreign materials such as grit, dust, etc. will not lodge with respect to the movable parts of the assembly in a manner such that the latter will be jammed and inoperative. Due to the detent structure existing as a consequence of the constricted convolutions 45 of spring 38 and the gripping by the former parts of shank 46, the safety pin will remain in position. In fact, the parts may be formed and proportioned in a manner such that a very definite effort will be necessary before that pin may be withdrawn. The head 47 of that pin should be designed so that it can be readily grasped between the thumb and finger for the purpose of effecting such withdrawal or even be gripped between the teeth to obtain this result.

With the pin deliberately withdrawn, it is apparent first, that its shank will no longer support the retaining element 48. The latter bearing against face 15, which is preferably inclined, will be subjected to a camming action. Therefore, this member will shift inwardly and rearwardly into the bore defined by thickened portion 14 and rest against seal 26. Otherwise the parts will not alter their positions. Prior to, during and after injection the interior of the ampule or cartridge 27 may be observed through the openings 22, transparent walls of holder 16 and the similar walls of the cartridge.

The user may under emergency conditions effect a hypodermic injection into his or another person's flesh through clothing. Regardless of whether such a procedure is resorted to, it is apparent that the user's hand may, for example, encircle rear portion 10 and bear against the surface merging from that part into central portion 12. By applying the outer or forward end of the unit to the surface of the site selected for the injection, forward movement of that contacting end portion is prevented. Therefore, a thrust in a forward direction upon casing 10 will primarily have the effect of a rearward thrust being transmitted through carrier 16 and the hub assembly of the needle against the adjacent end of the spring collet or its equivalent. Therefore, this element—which is no longer restrained from shifting within rear portion 10 by the retaining member 48 will move axially and rearwardly of the casing. With such movement, the guiding portions 43 will shift out of contact with the bore defined by forward portion 11 of the casing and over the inclined faces 13 into the enlarged central portion 12. Under these circumstances, arms 40 of the collet will be free to expand into this central portion 12 due to the inherent resiliency which they incorporate. With such expansion the detent or locking structure provided by the inwardly extending parts 41 in cooperation with the spring end or washer 44 no longer exists. Therefore, spring 38 is now free to act on plug 34 of the hub assembly and thrust the same forwardly or to the left, as viewed in Fig. 1.

The spring is, of course, under full compression under

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 these initial conditions. Therefore, it exerts its maximum power and will force hub seal 35 axially of the restricted bore 21 within which it is confined and into bore 28. Simultaneously, the pointed end of needle 30 will penetrate the diaphragm or disk 37. Especially, if the latter be formed of rubber, there will be no danger of "plug-cutting." As seal 35 moves through bore 20, there will be no restraint (other than a small frictional drag between the needle and stoppers) on the parts. Therefore, the hub assembly will strike against the outer face of piston stopper 29 with considerable force. Also, air within bore portion 20 will readily escape past the periphery of seal 35 as the latter moves through this bore part. Aperture 32 in the side wall of the needle will pass through the bore of piston stopper 29. Simultaneously with seal 35 striking that stopper, this aperture will be within the body of medicament confined within ampule 27.

Even if the device has been loaded several years prior to the time of its use, it is apparent that with the impact occurring between the seal 35 and piston 29 the latter will be freed from slight adhesion to the bore surface of ampule 27. With aperture 32 disposed forwardly of the piston 29, the liquid medicament will be discharged from the ampule interior through the aperture, the bore of the needle and thence beyond its forward pointed end. The distance traversed by seal 35 prior to engaging the piston will not alone assure that the piercing point of the needle has penetrated seal 37, but has also passed through any layers of clothing which may be covering the person to be injected. To this end, assuming that $\frac{3}{8}$ " of movement occurs prior to engagement of the hub assembly with the piston, then aperture 32 may be in communication with the ampule interior after having traveled $\frac{5}{16}$ ". It is apparent that the movement of piston 29 will continue as shown in Fig. 2 until it engages the rear or inner end of the plug of stopper 28.

Under certain circumstances and especially where the unit has been stored or carried by the ultimate user for a long period of time, there may be danger of the parts failing to operate due, for example, to firm adhesion between seal 35 and the adjacent bore surface, as well as adhesion between piston 29 and the ampule bore. To overcome this and as shown in Fig. 5, a pair of springs 49 and 50 may be employed. The inner spring 50 will correspond to spring 38 and similar thereto may embody an expansive force when fully compressed of, for example, 18 pounds and a force when expanded to the position shown in Fig. 2 of, for example, 10 pounds. Spring 49 when compressed as shown in Fig. 5, may embody an expansive force of around 30 pounds. The main parts are otherwise constructed identically with those shown in the preceding figures. As will be apparent, however, with the shifting of the spring collet or holder, the expansive force of both springs will act against the hub assembly of the needle. Under these circumstances, that assembly will pass into bore 20, in that sufficient force exists to break any adhesion between seal 35 and the surface which it initially contacts. Again an "impact-loading" will occur as the hub assembly moves through bore portion 20. Accordingly, piston stopper 29 will be struck with such force that it will shift with respect to the ampule bore. At this point, spring 49 will have reached substantially its fully expanded position and solely spring 50 will continue the projection of the piston. Therefore, the medicament will not be injected with undue violence. Also, if the pointed end of the needle should strike against the bore surface the needle will not penetrate that bore.

It will be noted in this view that a different forward seal may be employed. Thus, the numeral 51 indicates a headed stopper closing the outer end of the ampule. This stopper has the face of its head formed with a recess. Within the latter a cup-shaped member 53 is disposed to cover and protect the needle point. That member is readily pierceable by the needle. It is retained in position by a sealing ring 52.

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 Referring to Figs. 7 and 8, an arrangement of springs different from that illustrated in Fig. 5 has been shown. The numeral 54 indicates a spring, which in fully compressed condition will, for example, exert a thrust of eighteen pounds. Spring 55 of heavier stock is arranged in abutting or tandem relationship with respect to spring 54. The end convolution of spring 55 may be constricted as at 56 to encircle pin 46. In this manner, it will act as a detent to prevent other than a deliberate withdrawal of that safety pin. Spring 55 will, for example, impart a thrust of thirty pounds. Its force will be superimposed on the force exerted by the expansion of spring 54. It will function throughout at least that portion of the working stroke which will assure a freeing of piston 29 and an initiation of projection of the latter. Accordingly, the same results are achieved as aforedescribed in connection with Fig. 5 and no difficulty will be experienced in incorporating proper portions in the springs and have them perform their required tasks.

Referring to Fig. 9, it will be seen that an apparatus has been illustrated which in many respects is quite similar to the assemblies heretofore described and which will operate in an almost identical manner. In that view, the numeral 57 indicates the cap of the apparatus which is provided with a central opening 58 and also preferably a seal (not shown) similar to that heretofore designated at 37 and 53. The ampule 59 again preferably includes a tubular glass section filled with medicament. Its forward end is closed by a headed stopper 60 in which, if desired, a bore 61 may be provided extending from end to end. This bore will preferably be formed by perforating the stopper with an instrument which will have a diameter less than needle 62. The stopper being formed of rubber, this bore will close especially as the stopper is placed under compression incident to being inserted in the forward end of ampule 59. The bore, however, being provided, the needle will extend into this bore under the assembly of the parts. The bore beyond the needle will remain closed until the needle is projected. With such projection, the needle will extend entirely through and beyond the bore. It is obvious, however, that incident to the preferably preforming of the bore, there will be no danger of the needle cutting a plug and becoming clogged.

It is to be noted that stopper 60 is formed with a recess 63 in its outer face and the base of it terminates short of the inner end of the stopper plug. This will seal the forward end of ampule 59. A piston-type stopper 64 seals the rear end of the ampule and has extending through it the shank of needle 62. In common with the structures heretofore described, the carrier 65 has a bore which involves diameters such that a rest is furnished for the rear end of the ampule and also slidably accommodates the hub seal 66. Contrary to the previous structures, cap 57 is mounted on the holder 65 by means of screw threads 67 or another detachable connection. Also a collar 68 is furnished which conveniently is supported by screw threads 69 upon the outer case 70 to retain carrier 65. In this manner, access may be had to the interior of the latter as well as to the interior of the holder 65.

The outer case may also provide sight openings in its forward end and continued rearwardly to furnish an impeller housing structure. That structure may again include a collet 71 containing a spring 72 acting against a washer 73 in turn thrusting against the hub 74. At the extreme rear end, a seal 75 may be contained by the outer case and through it the shank 76 of a safety pin extends. The spherical or other retaining element 77 is disposed to one side of shank 76 between the seal 75 and the head 78 of the collet assembly 71. Finally, it will be observed that a seal 78' may enclose the inner or rear end of the cartridge holder 65.

Considering the technique involved in filling the ampule, it will be understood that as shown in Fig. 10, stop-

pers 60 and 64 are disposed within the bore of tube section 59 and adjacent one end of the same. Thereafter, and as illustrated in Fig. 11, the hub seal 66 is mounted on the needle hub 74. The cartridge or ampule 59 is now inserted into the holder 65 and the needle is caused to have its point extend into the bore 61 of stopper 60 as well as through the bore of stopper 64. Under these circumstances, the hub seal 66 is disposed adjacent the rear end or inner end of the bore of holder 65. A wire or other suitable implement 79 is inserted between the hub seal and the surface of that bore.

A filling needle 80 is introduced into the recess 63 and caused to perforate the base of the latter so as to extend between stopper 60 and 64. For example, 1.1 cc. of medicament is now injected through the bore of needle 80 into this space. Under these circumstances stopper 64 will shift to a point adjacent the rear of ampule 59 and thus assume a position as illustrated in Fig. 9. Air which would otherwise be trapped is vented past wire 79. During the injection of medicament through needle 80, care should be used not to dispense any air into the cartridge. The filling needle 80 is now withdrawn as is also the vent wire 79. Thereupon, by disposing collar 68 upon the holder 65 and mounting cap 57 upon that holder by means of the threads 69, the cartridge assembly and the filling thereof is completed.

In Fig. 13, there has been shown the manner in which the power assembly of the device may have its parts properly set. To obtain this result, a fixture is utilized which is provided with a central post 81. The collet 71 is ensleeved over this post in the manner shown, as is also the spring 72 and spring washer 73. A hollow pushrod 82 is thereupon applied to the face of washer 73 and projected so as to telescope over post 81. Rod 82 conveniently has an actuator 83 secured to its outer end. Also, it suitably mounts a holding sleeve 84.

Now by bringing pressure to bear on actuator 83, washer 73 is caused to move inwardly over post 81 to a point at which the edge of the washer is aligned with the retaining portions at the end of the collet arms. These arms are caused to shift towards each other. Thereupon, they may be introduced into the space existing within the bore of the holding sleeve 84. When this occurs, rod 82 may be withdrawn from the post and the collet and spring assembly may be removed as a unit with sleeve 84.

As shown in Fig. 14, the head portion 78 of the assembly is introduced through the open forward end of the outer case 70. This movement of the parts is continued until holding sleeve 84 is engaged with threads 67. Under those conditions, the free ends of the collet arms will slide in contact with the bore of outer case 70 until they reach a position such as has been shown in Fig. 9. Therefore, the arms will not be free to separate and release the spring.

Prior to the assembly being introduced into the case, seal 75 will have been suitably cleaned (using, for example, benzine) and by a suitable tool will have been disposed adjacent the rear end of case 70. The shank 76 of the safety pin may have been lubricated with silicone grease and pushed into place by twisting action. Thereupon, an element such as sphere 77 will have been dropped into the case to occupy a position such as has been shown in Fig. 9.

In the placement of the power end in the case, it is, of course, obvious that the arms 71 are disposed at 90° with respect to the windows or sight openings which might be formed in the forward end of the case. With the power end fully assembled as shown in Fig. 9, the cartridge seal 78' may also be lubricated and placed over the rear end of the holder 65 containing the seal cartridge and needle assembly. The cartridge is now disposed within casing 70 with its hub end 74 inwardly. Now by securing collar 68 to threads 69, the assembly is completed.

It is apparent that after the elapse of a certain interval of time, should it be desirable to renew the ampule and its contents without firing the apparatus, this may be accomplished by simply loosening collar 68 and removing the entire cartridge and holder from the outer case. This entire assembly may now be replaced by an entirely new assembly. Otherwise, the holder 65 may simply receive a freshly filled ampule and needle associated therewith throughout. In the latter instance, it is, of course, apparent that after removal of the holder 65 from the case, this result may readily be achieved by simply removing cap 57 and withdrawing the ampule.

Thus, among others, the several objects of the invention as specifically aforementioned are achieved. Obviously, numerous changes in construction and rearrangement of the parts might be resorted to without departing from the spirit of the invention as defined by the claims.

I claim:

1. A hypodermic syringe including in combination an ampule, piston and hollow needle assembly operatively connected and relatively movably to cause projection of said piston and needle and a discharge of medicament through the latter from the interior of said ampule, a structure providing a casing enclosing said assembly, a mounting member within and axially shiftable with respect to said casing, an expansible coil spring within said member to act against said casing and assembly to project and discharge the latter, spring retaining means connected to said mounting member and releasing upon the latter shifting, a pin slidably supported with respect to said casing and extending beyond the same, retaining means controlled by said pin and engaging said mounting member to prevent a shifting of the latter and at least certain of the coils of said spring being constricted to engage said pin and restrain the latter from being slid with respect to said casing.

2. A hypodermic syringe including in combination an ampule, piston and hollow needle assembly operatively connected and relatively movable to cause projection of said piston and needle and a discharge of medicament through the latter from the interior of said ampule, a structure providing a casing enclosing said assembly and provided with a window through which the latter is visible, a mounting member within and axially shiftable with respect to said casing, an expansible coil spring within said member to act against said casing and assembly to project and discharge the latter, spring retaining means connected to said mounting member and releasing upon the latter shifting, a pin slidably supported with respect to said casing and extending beyond the same, retaining means controlled by said pin and engaging said mounting member to prevent a shifting of the latter and at least certain of the coils of said spring being constricted to engage said pin and restrain the latter from being slid with respect to said casing.

3. A hypodermic syringe including in combination an ampule, piston and hollow needle assembly operatively connected and relatively movable to cause projection of said piston and needle and a discharge of medicament through the latter from the interior of said ampule, a structure providing a casing enclosing said assembly, a mounting member within and axially shiftable with respect to said casing, an expansible coil spring within said member to act against said casing and assembly to project and discharge the latter, spring retaining means connected to said mounting member and releasing upon the latter shifting, a pin slidably supported with respect to said casing and extending beyond the same, a retaining element interposed between said member and casing, said pin extending adjacent said retaining means to normally prevent a shifting of said mounting member, a surface of said casing accommodating said retaining element in inoperative position when unsupported by said pin and a head portion forming a part of said pin and extending beyond said casing whereby said pin may be

slid to a position such that it does not support said retaining element.

4. A hypodermic syringe including in combination an ampule, piston and hollow needle assembly operatively connected and relatively movable to cause projection of said piston and needle and a discharge of medicament through the latter from the interior of said ampule, a structure providing a casing enclosing said assembly, a mounting member within and axially shiftable with respect to said casing, an expansible coil spring within said member to act against said casing and assembly to project and discharge the latter, a latch structure forming a part of said mounting member and engaging said spring to prevent an expansion of the same, relatively projecting and recessed parts included in said mounting member and casing and cooperating to maintain said latch structure in operative condition, said mounting member including portions movable with respect to each other to release said latch structure and said casing being shiftable with respect to said mounting member to shift said projecting and recessed parts to positions such that said latch structure is released to correspondingly release said spring.

5. A hypodermic syringe including in combination an ampule, piston and hollow needle assembly operatively connected and relatively movable to cause projection of said piston and needle and a discharge of medicament through the latter from the interior of said ampule, a structure providing a casing enclosing said assembly, a mounting member within and axially shiftable with respect to said casing, an expansible coil spring within said member to act against said casing and assembly to project and discharge the latter, said casing being formed with a recess in its inner face, said mounting member including relatively movable parts restrained from shifting with respect to each other by engagement with the inner face of said casing at points adjacent said recess, a latch structure forming a part of said mounting member and normally operative to restrain said spring from expanding and said latch structure being rendered inoperative upon said mounting member shifting with respect to said casing to have its parts enter said recess.

6. A hypodermic syringe including in combination an ampule, piston and hollow needle assembly operatively connected and relatively movable to cause projection of said piston and needle and a discharge of medicament through the latter from the interior of said ampule, a structure providing a casing within said assembly, a mounting member axially shiftable in said casing, an expansible coil spring within said member to act against said assembly and project and discharge the latter, spring retaining means connected to said mounting member and releasable upon the latter shifting, a pin slidably supported by said casing and extending beyond the same, retaining means controlled by said pin and engaging said mounting member to prevent a shifting of the latter, a holder for said ampule interposed between the latter and said casing, said holder presenting a bore portion receiving said ampule, a second bore portion to the rear of said ampule and a more constricted bore to the rear of said second bore portion, a hub assembly associated with said needle to receive the thrust of said spring and said assembly being initially disposed in said latter constricted bore portion and having a diameter less than that of the adjacent bore portion of said holder.

7. A hypodermic syringe including in combination an ampule, piston and hollow needle assembly operatively connected and relatively movable to cause projection of said piston and needle and a discharge of medicament through the latter from the interior of said ampule, a structure providing a casing enclosing said assembly and provided with a window through which the latter is visible, a mounting member within and axially shiftable with respect to said casing, an expansible coil spring within said member to act against said casing and assembly

to project and discharge the latter, spring retaining means connected to said mounting member and releasing upon the latter shifting, a pin slidably supported with respect to said casing and extending beyond the same, retaining means controlled by said pin and engaging said mounting member to prevent a shifting of the latter and seals preventing the entrance of foreign material by way of said window and the opening through which said pin extends into said casing.

8. In a hypodermic syringe in combination a relatively movable ampule, piston and needle for expelling medicament, a casing enclosing the same and providing on its inner face a recessed portion, a source of power for removing said piston, a latch engaging with said casing to one side of said recessed portion and connected to said source in inoperative condition and a part of said latch being shiftable with respect to said casing to enter the recessed portion of the latter whereby to release said power source.

9. In a hypodermic syringe in combination a relatively movable ampule, piston and needle for expelling medicament, a casing enclosing the same and providing on its inner face a recessed portion, a source of power for moving said piston, a latch engaging with said casing to one side of said recessed portion and connected to retain said source in inoperative condition, a part of said latch being shiftable with respect to said casing to enter the recessed portion of the latter whereby to release said power source and releasable means for normally preventing such shifting of said latch part.

10. A hypodermic syringe including in combination an ampule, piston and hollow needle assembly operatively connected and relatively movable to cause projection of said piston and needle and a discharge of medicament through the latter from the interior of said ampule, a structure providing a casing enclosing said assembly, a mounting member within and axially shiftable with respect to said casing, an expansible coil spring within said member to act against said casing and assembly to project and discharge the latter, spring retaining means connected to said mounting member and releasing upon the latter shifting, a pin slidably supported with respect to said casing and extending beyond the same, retaining means controlled by said pin and engaging said mounting member to prevent a shifting of the latter and a second spring also associated with said member and acting against said assembly to cause relative shifting of certain of the parts of the same throughout a predetermined zone.

11. In a hypodermic syringe in combination a relatively movable ampule, piston and needle for expelling medicament, a casing enclosing the same, a spring within said casing and acting against said piston, a holder for said spring slidably bearing against the inner face of said casing, said holder including a part movable with respect to other portions of the same, a latch preventing expansion of said spring and connected to be controlled by the movement of said part and the inner casing face being interrupted whereby upon said holder being shifted with respect to said casing, said part will align with the interruption of the casing face resulting in movement of said holder part and release of said latch and spring.

12. In a hypodermic syringe in combination a relatively movable ampule, piston and needle for expelling medicament, a casing enclosing the same, a spring within said casing and acting against said piston, a holder for said spring slidably bearing against the inner face of said casing, said holder including a part movable with respect to other portions of the same, a latch preventing expansion of said spring and connected to be controlled by the movement of said part, the inner casing face being interrupted, whereby upon said holder being shifted with respect to said casing, said part will align with the interruption of the casing face resulting in movement of said holder part and release of said latch and spring and means for preventing shifting of said holder.

13. In a hypodermic syringe in combination a relatively movable ampule, piston and needle for expelling medicament, a casing enclosing the same, a spring within said casing and acting against said piston, a holder for said spring slidably bearing against the inner face of said casing, said holder including a part movable with respect to other portions of the same, a latch preventing expansion of said spring and connected to be controlled by the movement of said part, the inner casing face being interrupted, whereby upon said holder being shifted with respect to said casing, said part will align with the interruption of the casing face resulting in movement of said holder part and release of said latch and spring, a retaining member interposed between surfaces of said holder and casing to normally prevent a shifting of the former and means for rendering said member inoperative.

14. A hypodermic syringe including in combination a medicament injecting assembly comprising a relatively movable ampule, piston and needle, a casing mounting said assembly and continued beyond the same, a collet axially shiftable within said casing, said collet embracing a part movable with respect to the remainder of the same and restrained from said movement by engagement with the inner casing face, said casing face being formed with an interruption, a spring disposed adjacent said collet, a latch restraining said spring from expansion and operated by movement of said part and said collet being shiftable within said casing to cause said part to shift into the zone of interruption of said casing to thereby release said latch.

15. A hypodermic syringe including in combination a medicament-injecting assembly comprising a relatively movable ampule, piston and needle, a casing mounting said assembly and continued beyond the same, a collet axially shiftable within said casing, said collet embracing a part movable with respect to the remainder of the same and restrained from such movement by engagement with the inner casing face, said casing face being formed with an interruption, a spring disposed adjacent said collet, a latch restraining said spring from expansion and operated by movement of said part, said collet being shiftable within said casing to cause said part to shift into the zone of interruption of said casing to thereby release said latch and a retaining member engaging said collet and movable to permit the shifting of the latter.

16. For use in a hypodermic syringe assembly an ampule comprising a tube shaped body, a stopper sealing one end of said tube, a piston-type stopper sealing the opposite end of said tube, the space intervening such seal being filled with medicament, a hypodermic needle extending through said piston stopper and the bore of said ampule to a point adjacent the first-named seal, the rear end of said needle extending beyond said piston-type stopper and being formed with an opening, a hub assembly mounted on the rear end of said needle beyond said opening, a carrier for said ampule comprising a main bore portion receiving the body of said tube, a reduced bore portion rearwardly of said tube and a con-

stricted part beyond said latter bore portion and the hub of said needle lying within said constricted part.

17. In a hypodermic injection assembly in combination a tubular member containing medicament, a seal at one end of said member, a piston at the opposite end of the same, a hypodermic needle having a piercing end and a base end, the latter extending through and to the rear of said piston and beyond the medicament contained in such tubular member, said needle extending into the bore of said member towards said seal and being formed with a medicament inlet to the rear of said piston, a casing surrounding said tubular member, power means within said casing and acting against that end of the needle opposite the piercing end to initially project the piercing end thereof through said seal and to a position at which its inlet communicates with the medicament contained in said member and subsequently projects said piston to express medicament through such inlet and beyond the piercing end of said needle and means for releasing said power means.

18. For use in a hypodermic syringe assembly, a tubular member containing medicament, a seal at one end of said member, a piston at the opposite end of the same, a hypodermic needle having a piercing end and a base end, the latter extending through and to the rear of said piston and beyond the medicament contained in such tubular member and said needle extending into the bore of said member towards said seal and being formed with a medicament inlet adjacent and to the rear of said piston, the piercing end of said needle extending through said seal and means for maintaining said seal against displacement with respect to said tubular member.

19. For use in connection with the administration of hypodermic injections, a casing to mount a syringe barrel containing a piston, power means within said casing for projecting said piston, means for retaining said power means against movement, a pin mounted by said casing to maintain said retaining means in operative position and said pin being shiftable with respect to said casing to render said retaining means inoperative.

20. For use in connection with the administration of hypodermic injections, a casing, a compressed spring therein, an expansible mounting member enclosing the same and prevented from expanding by engagement with said casing, said mounting member in constricted condition preventing a release of said spring, a part of said casing normally not engaged by said mounting member providing a zone for the expansion thereof and means whereby said mounting member is shiftable into such zone to cause expansion of said member and release of said spring.

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