

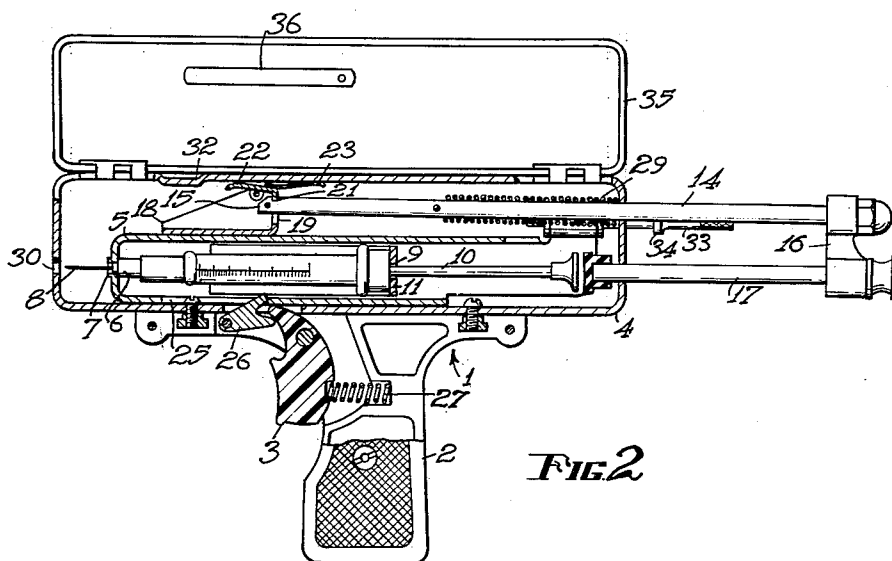
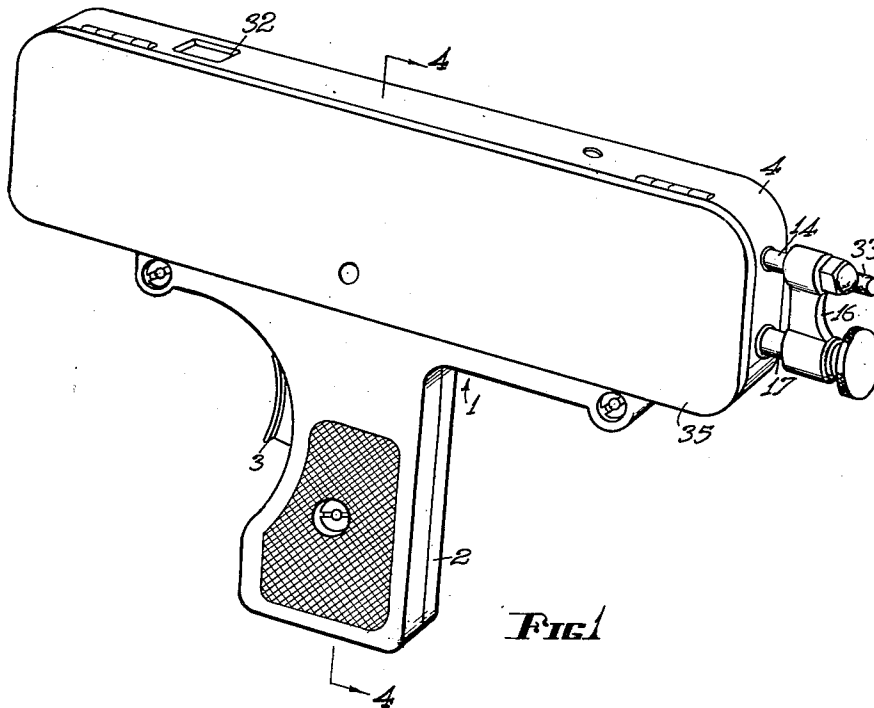
Nov. 20, 1962

D. T. LEWIS
DEVICE FOR AUTOMATICALLY EFFECTING INJECTIONS
WITH A HYPODERMIC SYRINGE

3,064,650

Filed April 15, 1959

2 Sheets-Sheet 1



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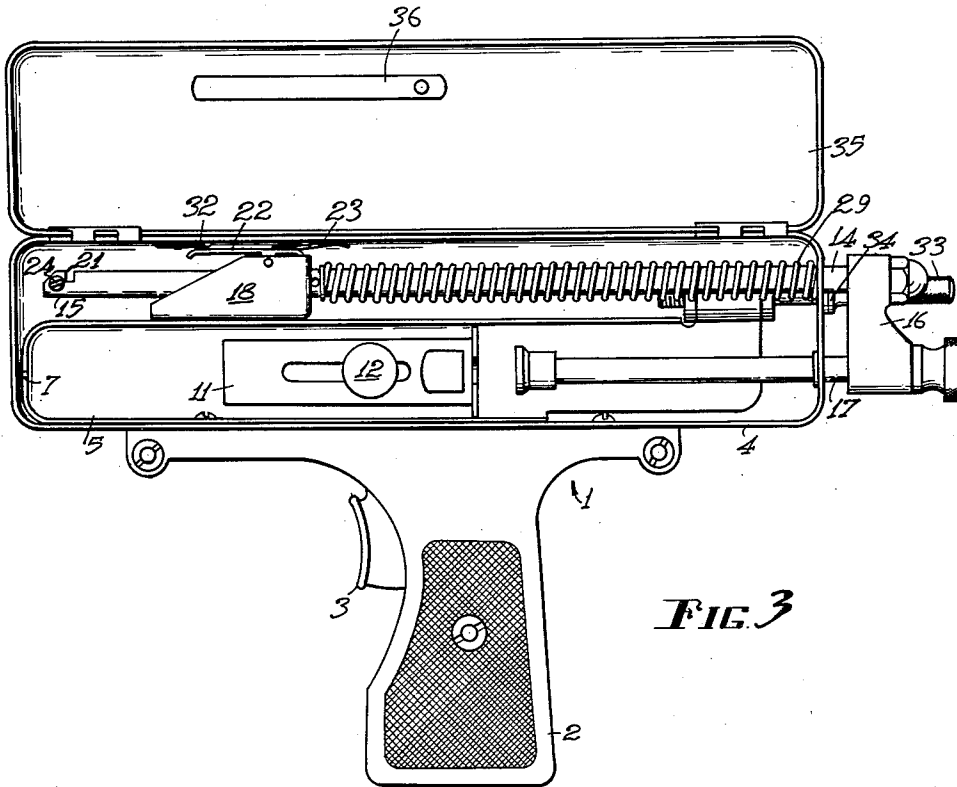


FIG. 3

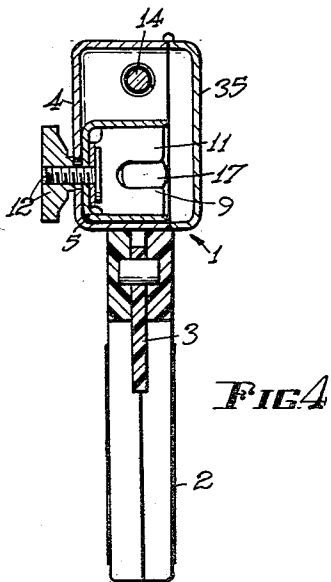


FIG. 4

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DEVICE FOR AUTOMATICALLY EFFECTING INJECTIONS WITH A HYPODERMIC SYRINGE

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Filed Apr. 15, 1959, Ser. No. 806,522

Claims priority, application Australia Apr. 17, 1958

3 Claims. (Cl. 128-218)

This invention relates to a device for automatically effecting injections with a hypodermic syringe.

When using hypodermic syringes it is necessary to insert the needle into the patient for the required distance and then discharge the contents of the syringe through the needle, and when this operation is done by hand there is a large number of variables which are most undesirable and which are difficult to control. Firstly, it is found that pain is experienced and there is a tendency for the flesh surrounding the point of injection to swell unduly and remain sore for some hours after the injection is given if the needle is injected slowly, secondly it becomes necessary in many cases to accurately gauge the depth to which the needle will enter the flesh.

It will be seen that these two problems are difficult to solve under any circumstances, but when circumstances arise that a patient is required to give himself an injection it becomes quite difficult to control them to any appreciable extent and the patient is frequently subjected to a great deal of unnecessary discomfort.

There are also other problems which it is the object of this invention to overcome and these include the desirability of completing an injection as quickly as possible and yet not forcing the injected liquid into the body at a harmful rate.

Various proposals have been made to reduce or overcome some of the above mentioned faults with the injection system as at the present practised and it is known that certain proposals have been made whereby a hypodermic syringe may pierce the flesh under the action of a spring. However, there are certain problems which are known to still exist, and among these is the problem that occasionally a needle may be thrown from the end of the body of the syringe, and further that the previously proposed units are not always convenient to use.

A still further problem with the hypodermic syringes of the type in which the force to effect injection is transmitted to the syringe body through the liquid contents, is that certain drugs should be injected at a depth beneath the skin which exceeds a predetermined minimum in order to prevent irritation to the skin, and if a hypodermic syringe enters the skin whilst its contents are being discharged, it is probable that irritation will occur. It is a further object of this invention to provide a means whereby discharge of a hypodermic syringe will not commence until the needle is positioned beneath the flesh.

In brief the invention may be said to consist of a device comprising a housing, a syringe carrier arranged to slide in relation to the housing, means on the carrier to confine a syringe within it against relative axial displacement, so that the needle of the syringe may project forwardly from the carrier and the plunger may project rearwardly, spring means arranged to load the carrier so that it tends to move in a forward direction, a releasable trigger arranged to hold the carrier back against the spring loading, release means to release a pressure member on forward movement of the carrier and means on the pressure member to move the syringe plunger forward within the syringe during continued movement of the pressure member.

While it will be understood that constructional varia-

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tions could be introduced which would still lie within the scope of the invention, an embodiment of the invention will be described with reference to the accompanying drawings in which:

FIG. 1 is a perspective view of a device,

FIG. 2 is a longitudinal section to a slightly reduced scale, showing a syringe loaded in the device, and the device in its cocked position,

FIG. 3 is a view with the lid open, but without the syringe, and with the device in a normal position, and FIG. 4 is a section on lines 4-4 of FIG. 1.

The injecting device 1 is made with a pistol grip 2, a release trigger 3, and a housing 4 of sheet metal. A syringe carrier 5 is constructed so that the syringe 6 is supported at its front in a slot 7 which supports the nose or boss of the needle 8, and it is supported at its rear end in a second slot 9 which fits over the plunger 10. The slot 9 is in a slotted bracket 11 which is adjustably secured to the carrier 5 by the screw threaded members 12, which at the same time serve to slidably retain the carrier 5 to the housing 4.

A pressure rod 14, which may be of any suitable material, say three sixteenth inch diameter brass, extends for the full length of the housing 4, terminating just behind the front face at its front end 15 and projecting through the rear end of the housing 4 by a short distance and terminating in a bridge member 16 which enables it to be cocked by hand. The bridge member 16 also carries an actuating rod 17, the actuating rod 17 being made co-axial with the injection syringe 6.

The top surface of the syringe carrier 5 has an upwardly formed member 18 with a hole 19 therein through which the pressure rod 14 projects. This member 18 is situated a predetermined distance back from the front of the syringe carrier 5 so that the distance between the front of the syringe carrier 5 and the front end 15 of the member 14 is approximately the length of stroke of the syringe plunger 10 when the device 1 is cocked.

The pressure rod 14 has a slot 21 cut in the top of its front end to engage a downwardly formed part of the latch member 22 which is urged into the slot 21 by the leaf spring 23, when pressure rod 14 and the syringe carrier 5 are drawn rearwardly. A projection 24, preferably in the form of a screw as shown in FIG. 3 engages the upwardly formed member 18 so that the unit may be cocked by moving the bridge member 16 rearwardly.

A slot 25 in the lower wall of the syringe carrier 5 co-operates with a sear 26 which is urged upwardly by means of a sear spring (not shown) when the carrier 5 is withdrawn the desired amount. The trigger 3 is held outwardly by spring 27, but when actuated releases the sear 26 from the syringe carrier 5 so that a spring 29 around the pressure rod 14 urges pressure rod 14 forwardly at a high speed, this in turn urging the carrier 5 forwardly, thus moving the needle 8 through the aperture 30 in the housing 4 so that it may penetrate into the flesh, and when the carrier 5 terminates its forward motion the pressure rod 14 is released from the hole 19 in the member 18 on the syringe carrier 5 by the latch member 22 against a release ramp 32 on the inside of the housing 4, and then the actuating rod 17, which is on the pressure rod 14 because of the bridge member 16, will push the syringe plunger 10 downwardly to inject the contents. A screw threaded adjusting member 33 is provided with a flange 34 arranged to contact the outside of the housing 4 to adjust the foremost point of travel of the carrier 5 and thereby adjust the depth of penetration of the needle 8.

A lid 35 is fitted to the side of the housing 4 to obscure the syringe 6, this feature having a strong psychological effect particularly on children who might

otherwise be afraid of injections. The spring member 36 retains the syringe 6 in the carrier 5 when the lid 35 is closed.

It will be seen from this description that the carrier 5 is loaded in a forward direction by the spring 29 acting through the pressure rod 14. It will further be seen that the device 1 may be cocked by a single movement, and that the contents of the syringe 6 will not commence to be expelled until the needle 8 has finished or almost finished its forward movement.

What I claim is:

1. A device for automatically effecting injections, comprising a housing including a pistol grip, a syringe carrier in the housing, syringe retaining means on said carrier arranged to axially confine a syringe in said carrier with the needle of said syringe projecting forwardly and the plunger of said syringe projecting rearwardly, an aperture in the forward end of the housing in the path of travel of the needle, retaining means engaging the carrier but being confined in a slot in the housing whereby said retaining means slidably retains the carrier to the housing, an adjusting member screwed into the carrier and extending rearwardly through an aperture in the housing, a flange on said adjusting member arranged to strike the housing upon forward movement of the carrier and to thereby limit said forward movement, a pressure rod slidable in the housing, a spring disposed around said slidable pressure rod bearing against the rear end of the housing to urge the pressure rod forwardly, a transverse slot in the pressure rod near its front end, a latch member on the carrier releasably engaging said transverse slot on said pressure rod whereby said spring loads said carrier forwardly, a bridge member on the rear end of said pressure rod, an actuating rod on said bridge member spaced from said pressure rod but parallel thereto, a releasable trigger in the pistol grip to hold said carrier back, and a ramp on the housing in the path of the latch member adapted to release said latch member from said pressure rod after the first part of the forward movement of the pressure rod, said actuating rod being arranged to strike the syringe plunger and move the plunger forward upon continued forward movement of the pressure rod under the influence of the spring.

2. A device for automatically effecting injections, comprising a housing including a pistol grip, a syringe carrier in the housing, syringe retaining means on said carrier arranged to axially confine a syringe in said carrier with the needle of said syringe projecting forwardly and the plunger of said syringe projecting rearwardly, an aperture in the forward end of the housing in the path of travel of the needle, a screw and nut engaging the carrier but being confined in a slot in the housing whereby the nut slidably retains the carrier to the housing, an adjusting member screwed into the carrier and extending rearwardly through an aperture in the housing, a flange on said adjusting member arranged to strike the housing upon forward movement of the carrier and to thereby limit said forward movement, a pressure rod slidable in the housing, a spring disposed around said slidable pressure rod bearing against the rear end of the housing to urge the pressure rod forwardly, a transverse slot in the pressure rod near its front end of said pressure rod, a latch member on the carrier releasably engaging said transverse slot on said pressure rod whereby said spring loads said carrier forwardly, a bridge member on the rear end of said pressure rod, an actuating rod on said bridge member spaced from said pressure rod but parallel thereto, said actuating rod passing through an aperture in the rear of said housing, a releasable trigger in the pistol grip to hold said carrier back, a ramp on the housing in the path of the latch member adapted to release said latch member from said pressure rod after the first part of the forward movement of the pressure rod, said actuating rod being arranged to strike the syringe plunger and move the plunger forward upon continued forward movement of the pressure rod under the influence of the spring.

pressure rod whereby said spring loads said carrier forwardly, a bridge member on the rear end of said pressure rod, an actuating rod on said bridge member spaced from said pressure rod but parallel thereto, said actuating rod passing through an aperture in the rear of said housing, a releasable trigger in the pistol grip to hold said carrier back, a ramp on the housing in the path of the latch member adapted to release said latch member from said pressure rod after the first part of the forward movement of the pressure rod, said actuating rod being arranged to strike the syringe plunger and move the plunger forward upon continued forward movement of the pressure rod under the influence of the spring.

3. A device for automatically effecting injections, comprising a sheet metal housing including a hinged lid and pistol grip, a syringe carrier in the housing, a syringe retaining slot in the front end of said carrier, and a slotted syringe retaining bracket towards the rear end of said carrier arranged to axially confine a syringe in said carrier with the needle of said syringe projecting forwardly and the plunger of said syringe projecting rearwardly, an aperture in the forward end of the housing in the path of travel of the needle, an elongated aperture in said bracket, a screw securing the bracket to the carrier, said screw passing through the elongated aperture in the bracket whereby the bracket is adjustably positioned on the carrier, a nut on the screw, the nut being disposed outside the housing, the nut engaging the carrier but being confined in a slot in the housing whereby the nut slidably retains the carrier to the housing, an adjusting member screwed into the carrier and extending rearwardly through an aperture in the housing, a flange on said adjusting member arranged to strike the housing upon forward movement of the carrier and to thereby limit said forward movement, a pressure rod slidable in the housing, a spring disposed around said slidable pressure rod bearing against the rear end of the housing to urge the pressure rod forwardly, a transverse slot in the pressure rod near its front end of said pressure rod, a latch member on the carrier releasably engaging said transverse slot on said pressure rod whereby said spring loads said carrier forwardly, a bridge member on the rear end of said pressure rod, an actuating rod on said bridge member spaced from said pressure rod but parallel thereto, said actuating rod passing through an aperture in the rear of said housing, a releasable trigger in the pistol grip to hold said carrier back, a ramp on the housing in the path of the latch member adapted to release said latch member from said pressure rod after the first part of the forward movement of the pressure rod, said actuating rod being arranged to strike the syringe plunger and move the plunger forward upon continued forward movement of the pressure rod under the influence of the spring.

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