MEDICAMENT INJECTING DEVICE

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References Cited
UNITED STATES PATENTS
2,717,597 9/1955 Hein .................................. 128/173 H
2,603,782 7/1952 Spencer .................................. 227/132
3,625,208 12/1971 Frost .................................. 128/173 H

ABSTRACT

A device for pressure administration of a fluent medicament in which a cartridge, containing the medicament, includes a small discharge orifice in communication with an enlarged chamber containing the medicament, encapsulated therein by a dispensing piston. The capsule is removably mounted in one end of a barrel of the device containing a force transmitting means, operable by a handle lever, to discharge the medicament from the orifice at a skin-penetrating pressure. Means are provided for automatically resetting the device for subsequent use with another cartridge when hand applied pressure is released from the handle.

10 Claims, 4 Drawing Figures
Choice of the dosages, as prescribed, would be available, for example, in prefilled cartridges of from one-tenth CC to and including one-half CC in one-tenth increments. The prescribed dosage may be administered by placing the required dosage, within a predetermined range, in one size of cartridge, carried in a correspondingly sized magazine.

The device of the present invention utilizes a simple trigger and trigger lock means which is self-cocking after each injection, that is, the actuating handle lever returns automatically and cocks the trigger, readying the instrument for the next injection, thereby eliminating the usual cocking operation required in some triggering mechanisms.

A further advantage of the device of the present invention is that the mechanism will operate only if the handle lever is purposefully squeezed approximately 80 percent of its full arc, thereby preventing accidental discharge thereof by careless handling.

Because of the particular angular relation of the handle lever to the barrel of the device, it is quite compact, less bulky to utilize, store or carry on one's person. As a result, it is particularly desirable for diabetic persons who are required to inject Insulin at various times during the day. Because of its reduced overall size, it can be carried on one's person in a small case along with a supply of cartridges containing the precise dosage of Insulin.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a longitudinal, vertical sectional view of the injecting device of the present invention in a preinjecting attitude;

FIG. 2 is a view similar to FIG. 1 showing the positions of the parts immediately after the medication from a cartridge has been administered;

FIG. 3 is a vertical cross sectional view taken along the line 3—3 of FIG. 1; and

FIG. 4 is a perspective view of the cartridge magazine utilized in the device.

**DETAILED DESCRIPTION OF THE DRAWINGS**

With reference to the drawings in which like reference characters designate like or corresponding parts throughout the various views and with particular reference to FIG. 1, the medicament injecting device of the present invention 10 comprises generally a barrel housing 12, provided with a removable cartridge magazine 14 containing a dosage cartridge 16, a plunger assembly 18, actuated by a compression spring 20, an actuating handle lever 22 and a trigger and trigger lock assembly 24.

More particularly, the barrel 12 is appropriately slotted at 26 and 28 to receive a pair of diametrically opposite, outwardly projecting lugs 30 and 32 on the cartridge magazine in a typical twist-lock connection. The dosage cartridge 16 is adapted to nest securely in the chamber 34 provided in the magazine 14. In a preferred form, the cartridge 16 is preferably constructed of glass with a rubber piston 36 in the same manner as a conventional medically tested and approved glass and rubber syringe. The medicament M is confined in the chamber 38 of the cartridge by the piston 36. Instead of a needle, a small orifice 40, which may be capped for storage purposes, is formed in the forwardly extending, reduced diameter nozzle 42, projecting outwardly through a forward aperture 44 in the magazine 14.
With further reference to FIG. 1, the plunger assembly 18 includes a plunger rod 46 having a piston member 48 rigidly fixed therethrough. The forward end of the piston rod 46 is slidingly journeled in a reduced diameter aperture 50 in the barrel housing and the piston 48 is similarly journeled in the enlarged barrel chamber 52.

Compression spring 20 is circumposed about the plunger rod 46 between the piston member 48 and a washer 54 slidably engaged along the rear portion of rod 46. A cover housing 56, fixed in any conventional manner in a closing relation to the rear end of the barrel housing 12, carries a first pivot pin 58, fixed transversely therethrough, for the handle lever 22. Said handle lever is generally angular in form, providing a bifurcated, generally transverse short leg 60 as seen in FIG. 1 and an elongated, forwardly and outwardly extending hand grip portion 62. The plunger rod 46 extends between the opposed side plates 64 and 66, formed by the bifurcated short leg 60. As best illustrated in FIGS. 1 and 2, the grip portion 62 of the handle lever 22 is fulcrummed about the pivot pin 58 and a pair of confronting, inwardly projecting ears 68 and 70, from the respective plates 64 and 66, are adapted to engage the rear surface of the slidable washer 54 on rod 46. Therefore, when the handle grip 62 is pivoted inwardly about pin 58 to the broken line illustration thereof at 62', the ears 68 and 70 by means of washer 54 compress the spring 20 against the piston 48 to preload the force transmitting plunger rod 46.

Fixed in any conventional manner to the rear distal end of the plunger rod is an enlarged annular head 72 which is normally engaged in a V notch 74 in a trigger member 76, transversely pivoted on a pin 78, fixed in the housing 56. Forwardly of the trigger pivot 76, a trigger lock 80 is similarly pivoted at 82 to the housing 56. The trigger lock 80 is notched at 84 to normally seat a corner 86 of the trigger 76.

When the handle grip 62 is moved to the position 62' to compress the spring 20, the relationship between the pivot pins 78 and 82 causes the trigger lock 80 to bind tightly with the trigger 76 to lock the plunger rod 46 against forward movement.

A transverse rod 90, spanning the side plates 64 and 66, having its opposed end portions slidably engaged in slots 92 and 94 (FIG. 4), includes a rearward projection 96 hooked to the trigger lock 80 at 98. A light tension spring 100 urges the trigger lock 80 to swing rearwardly or counterclockwise.

When the handle grip is positioned at 62', the transverse rod 90 will have reached the end of its travel relative to the slots 92 and 94. Further movement of the handle grip 62 to the position illustrated in FIG. 2 causes the transverse rod 90 by means of the rearward projection 96, hooked to the trigger lock 80, to pivot the trigger lock 80 clockwise to unseat the corner 86 of the trigger 76, permitting the stored-up energy in the compressed spring 20 to drive the plunger rod forwardly to, in turn, drive the cartridge piston 36 to the bottom of the chamber 38, resulting in the complete discharge therefrom of the medicament through the orifice 40.

Because the cross sectional area of the orifice 40 is very substantially smaller than that of the chamber 38, the pressure, 20 pounds per square inch, for example, generated by the piston 36 is multiplied in direct proportion to the differential in the above-mentioned cross sectional areas.

One size of cartridge can be used to inject varying dosages, for example, from 1/10th cc to 1/2 cc in 1/10th increments, by positioning the piston relative to the dosage in the chamber 38 at the time of prefilling.

The glass and rubber cartridge as above described is preferable to the use of various synthetic materials because these materials have been medically tested and approved. No chemical reaction occurs between the medicaments contained therein and the glass and rubber. As a result, it is desirable to provide a cartridge magazine 14 which firmly embraces the outer surface of the cartridge to absorb the forces imparted to the cartridge by the plunger. FIG. 4 illustrates a two part, hinged cartridge magazine. The two halves thereof 102 and 104 are hinged at 106 to permit said halves to be swung open for loading and unloading purposes when removed from the barrel 12. However, when a cartridge is installed in the magazine 14 and twist-locked in the barrel, it is firmly supported against the forces applied thereto.

A handle lever return spring 108 is carried by the fulcrum pin 58. After the trigger is tripped and the plunger assembly is driven outwardly, the light spring 100 connecting to the trigger lock causes said trigger lock 80 to hold the trigger 76 in a tilted position to receive the annular head 72 of the plunger assembly 18 when said assembly is recocked. When the handle lever 22 is released, the return spring 108 opens the handle to the normal position of FIG. 1, pulling the plunger assembly rearwardly and recocking the trigger 76 with the annular head 72 locked in the V notch 74 to ready for the next injection operation.

FIG. 2 illustrates the positioning of the thumb T and the four fingers of the hand during operation of the device of the present invention. It is to be noted particularly that the thumb T, index finger I and second finger S, the strongest fingers, are positioned where the greatest pressure is required during operation of the device; the little finger L, the weakest, is positioned where the least pressure is required.

What is claimed is:

1. A device for pressure administering fluid medicaments comprising:
   A. an elongated barrel providing,
      1. a main cylindrical chamber, and
      2. a reduced diameter aperture through the portion thereof, just inwardly of the front end, in axial alignment with said cylindrical chamber;
   B. a plunger assembly comprised of
      1. a plunger rod having a forward portion, slidably journeled through said aperture,
      2. a piston, fixed to said plunger rod, slidably engaged in said main chamber, and
      3. an enlarged head at its rear end;
   C. a housing, fixed relative to the open rear end of said cylindrical chamber;
   D. trigger means pivotally carried in said housing;
   E. lock means pivotally carried in said housing, normally locking said trigger means relative to said enlarged head to hold said plunger assembly against longitudinal movement in said barrel;
   F. a compression spring, circumposed about said plunger rod between said piston and a washer means slidably engaged along the rear portion of said plunger rod;
G. an angular handle lever, pivotally attached relative to said housing and including,
1. an elongated handle grip portion, and
2. a short arm including abutment means, normally in contact with said washer means, whereby the initial, major pivotal movement of said handle grip causes said compression spring to be compressed to store energy therein;

H. means connecting between said short arm and lock whereby the final, minor pivotal movement of said handle grip unlocks said trigger to release said stored energy to drive said plunger assembly forwardly;

I. means to detachably mount a medicament cartridge assembly relative to the front end of said barrel whereby the medicament is discharged therefrom when said plunger assembly is driven forwardly.

2. The device as defined in claim 1 wherein said handle grip portion is normally angled forwardly and outwardly relative to the rear end of said barrel.

3. The device as defined in claim 1 wherein said means to detachably mount includes a cartridge magazine, detachably mounted relative to the front end of said barrel as by a twist-lock structure and providing an interior chamber for the reception of a cartridge containing a medicament.

4. The device as defined in claim 3 wherein said cartridge magazine is formed in two halves, hinged together.

5. The device as defined in claim 4 wherein said cartridge provides an interior chamber filled with a medicament, a piston in closing relation to the normally open rear end thereof and a small discharge orifice opening through the front end thereof.

6. The device as defined in claim 5 wherein said cartridge is formed of glass and said piston is formed of rubber.

7. The device as defined in claim 1 wherein said trigger provides a V notch, normally in engagement with an edge portion of said enlarged head, and a corner normally in engagement with a notch in said lock means, said trigger and lock pivots being staggered relative to each other.

8. The device as defined in claim 7 wherein said means connecting between said short arm and lock comprises a transverse rod slidably engaged in slot means in said short arm and a rearwardly extending projection connecting between said transverse rod and lock.

9. The device as defined in claim 8 including tension spring means connecting between said lock and said housing.

10. The device as defined in claim 1 including spring means to return said handle lever to its normal position after each injection operation and to simultaneously recock said plunger assembly relative to said trigger and lock means.

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