Dec. 22, 1931. F. C. MONTUORI 1,838,039

HYPODERMIC SYRINGE

Filed Nov. 14, 1928

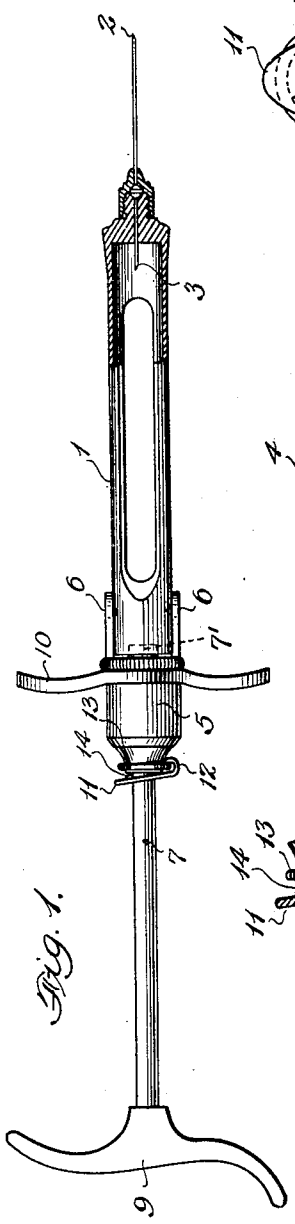


Fig. 1.

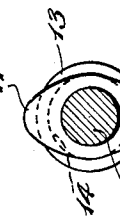


Fig. 5.

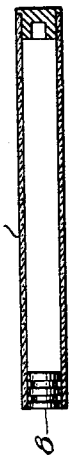


Fig. 2

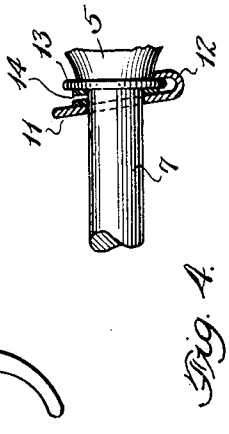


Fig. 4.

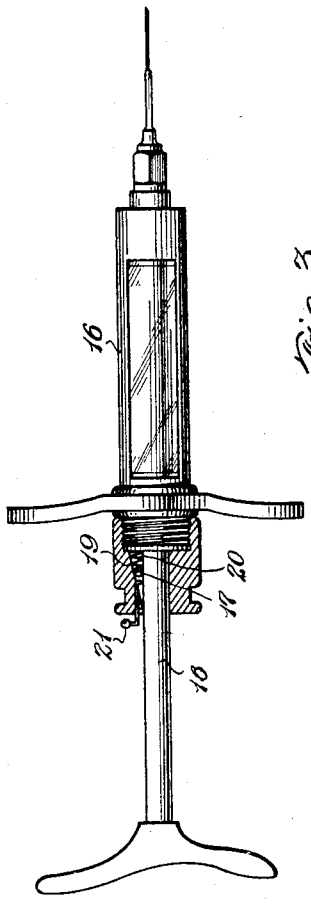


Fig. 3.

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UNITED STATES PATENT OFFICE

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HYPODERMIC SYRINGE

Application filed November 14, 1928. Serial No. 319,382.

The invention relates to an hypodermic syringe or the like, having a stop, lock or drag to prevent any back movement of the piston or device whereby the medicine is expelled through the hollow needle of the instrument.

The principal feature of my invention consists in combining in the syringe means for preventing the sucking, into the medicinal fluid chamber of the syringe, of blood, pus or the like out of the physical area which has been punctured and injected.

This chamber may be a cylinder of the syringe or a cartridge or ampoule of known construction which is inserted into the syringe and punctured at the time of the injection by a rearwardly extending point of the hollow needle.

I have discovered that when an injection is made by the syringe there is an immediately following suctional action of the syringe which charges the needle and sometimes the chamber with more or less blood passing out from the inner part of the wound through the hollow needle. This blood may be infected, and in some cases pus may be drawn into the chamber, unfitting, and even making dangerous, the instrument for another injection.

In the case of the cartridge or ampoule I believe that the suction arises from a slight reenlargement of the carpule chamber when it is no longer subject to pressure, and the pressure is relieved by a little backward or outward movement of the usual piston rod.

In the case of a syringe constructed with a fluid chamber such movement of the piston rod causes an enlargement of said chamber and the objectionable suction effect.

I therefore prefer to carry out my invention by efficiently checking any outward movement of the piston rod while the needle is in the wound. But my invention is not confined to securing the result by holding the piston rod.

It is often necessary to make an injection in an upward direction, the syringe being held by its body and the piston being uncontrolled. Just before this operation the piston is pressed forward to expel all air from the needle and fill the same with the injection fluid. Now when the syringe is held by its body and pointed more or less upward the piston will often move a little downward, with the result of causing a suction and drawing air into the needle, and this air is necessarily injected into the wound which is most objectionable.

My invention, by preventing the suctional action of the syringe, prevents any possible injection of air.

It is very objectionable that even a slight backward movement take place, or that any movement take place which can (even minutely) enlarge the space which the remaining portion of the injected fluid occupies, because thereby blood, pus or the like is sucked or drawn into the hollow needle and even into the body of the remaining medicine fluid, and on a subsequent use of the instrument some or all of such blood, or even pus, may be injected into the next area operated upon, of the same patient or even of the next patient.

New spaces of infection may thus be created with very disastrous results.

According to my invention the action of the syringe is so controlled that its use cannot be accompanied or followed by the drawing in of any air, or fluid from the physical area operated upon. The means for so controlling the action of the springe may be of various kinds or types, and in my following illustration and description I have shown two of such types without thereby excluding other controlling means, which effect the same results.

In order that the invention and its attendant advantages may be more clearly understood, I have shown in the accompanying drawings means for carrying the same into effect, without limiting the improvements, however, to the particular constructions, which, for the purpose of explanation, have been made the subject of illustration.

In said drawings,

Fig. 1 is a side view, partly in section, of a hypodermic syringe for medical or surgical use, and of the type in which a cartridge or ampoule is inserted containing the medicinal fluid to be injected, said syringe com-

prising a stop, lock or drag to prevent any backward movement of the piston after the instant when the injection is completed.

Fig. 2 is a sectional view of a cartridge or ampoule suitable for use with said syringe and containing the medicinal fluid to be injected.

Fig. 3 is a side view of a syringe for medical and surgical use in which the medicinal fluid is drawn into the syringe by an outward movement of the piston, whereby the syringe is ready for use to make an injection.

Fig. 4 is a detail view, partly in elevation, and partly in section, showing the lock for the piston rod.

Fig. 5 is an end view of the same, the piston rod being shown in section.

Referring to the drawings, 1 is the body portion of the syringe having at its forward end means for holding a double ended tubular needle having an outer puncturing end 2 and an inner end 3 which punctures the sealing washer in the advance end of the cartridge or ampoule.

The body of the syringe has a suitable space to receive the cartridge or ampoule 4 shown in Fig. 2. This cartridge or ampoule can be inserted into the side of the body in certain forms of the syringe, but in the form illustrated is inserted endwise. An opening for such longitudinal insertion of the cartridge or ampoule is provided by turning sidewise the piston bearing 5 on the axis 6, this mode of operation being well known. The part 5 forms the bearing holding the piston rod 7 of the instrument and adapted to permit the piston 7′ to be forced against the plug 8 which seals the outer end of the cartridge or ampoule. Such movement of the piston and compression of the ends of the cartridge or ampoule, to cause the injection of the fluid, is conveniently accomplished by an outer handle 9 adapted to rest in the hollow of the hand and an inner handle 10 adapted to be caught by two fingers of the hand, in a known manner.

In the above described form of the instrument the stop to prevent outward or backward movement of the piston and piston rod consists of a slightly movable plate 11 which closely surrounds the piston rod and which has one end 12 hooked under the rim 13 of the bearing 5. Between said plate and the end of the bearing is arranged a spring 14 of any suitable form, it being, as illustrated, a single spiral coil of resilient wire. The action of this spring is to press the plate outward and cause it to fixedly grip the piston rod 7, thereby preventing any outward movement of the piston rod and piston and any suctional action of the cartridge or ampoule to draw fluid into the same through the hollow needle.

While as stated, a spring engageable with the plate and the end of the bearing 5 is used in the preferred form, it will be obvious that this spring 14 is not necessary, under certain conditions, it being merely necessary that the plate bias against the piston rod and prevent retrograde movement of the record.

From whatever cause, such suctional action takes place in the usual or universal hypodermic syringe, but is entirely obviated by my improvement in this instrument.

The plate 11 is released so that the piston rod can be drawn outward by pressing the plate toward the body of the syringe, toward the right in Figs. 1, and 4.

In Fig. 3 is shown in side view a syringe constructed with a fluid chamber or cylinder 16 which is adapted to be charged by drawing the piston outward in said cylinder, the latter taking the place of the cartridge or ampoule in the first described instrument. In the second instrument I have shown a stop or lock consisting of a small steel ball 17 bearing on the piston rod 18 and pressed in its inclined seat 19 in the direction of the outer end of the piston rod by means of a spring 20. This device is in the nature of a clutch which freely permits the inward injecting movement of the piston rod and piston but which grips the piston rod securely at the instant of the completion of the injection and prevents any outward movement of the piston and any suctional action of the syringe.

The ball 17 is released from locking position by pressing inward a small slide 21.

What I claim is:

1. In combination an hypodermic syringe having a needle and a fluid expelling means, and means comprising a single member located adjacent the latter to permit movement toward the needle and to grip and frictionally bind the fluid expelling means against movement away from said needle, thereby to prevent suctional action through the needle, and resilient means to normally maintain said member in engagement with said fluid expelling means.

2. In combination an hypodermic syringe having a needle and a fluid expelling means, and means comprising a member having an opening to receive a plunger of the fluid expelling means, the normal position of the axis of said opening being slightly disaligned with the axis of the plunger, thereby to prevent suctional action through the needle, and resilient means to normally maintain said member in engagement with said fluid expelling means.

3. In combination an hypodermic syringe having a fluid expelling plunger, and means surrounding said plunger, tiltable into and out of contact with the plunger and effective when in contact with the plunger to prevent suctional movement thereof in the syringe,

and resilient means to normally maintain said member in engagement with said fluid expelling means.

4. In combination an hypodermic syringe having a movable member, and means frictionally engageable with said member simultaneously at two different points, said means being tiltable into and out of contact therewith and effective by frictional contact to prevent movement thereof in the syringe, and resilient means to normally maintain said member in engagement with said fluid expelling means.

5. In combination an hypodermic syringe having a fluid expelling plunger, and means comprising a relatively flat plunger locking member having a free side on the plunger and tiltable into and out of contact with a substantial portion of the periphery of the plunger and effective when in contact with the plunger to bind the same and thereby to prevent suctional movement thereof in the syringe, and a spring between the body of the syringe and said locking means, effective to normally maintain said means in locking position.

6. In combination an hypodermic syringe including a fluid expelling plunger and a relatively flat friction member having a central opening to receive the plunger and the axis of which is normally out of alignment with the plunger axis, and resilient means to normally maintain said member in engagement with said fluid expelling means.

7. In combination an hypodermic syringe having a chamber, fluid expelling means movable therein and resilient plate-like means movable into frictional engagement with said fluid expelling means thereby to restrain said expelling means against movement in one direction thereby to prevent suctional action of the same through the needle while the needle is in the wound.

8. In combination an hypodermic syringe having a chamber, fluid expelling means movable therein and resilient plate-like means frictionally restraining said fluid expelling means against movement thereby to prevent any enlargement of the chamber containing the remaining fluid of injection after the completion of the injection.

9. In combination an hypodermic syringe having a chamber, fluid expelling means movable therein, and a plate-like stop tiltable into engagement with said fluid expelling means to frictionally prevent retrograde movement of the same upon completion of its forward injecting movement, and a spring between the body of the syringe and said stop, effective to normally maintain the stop in engagement with said fluid expelling means.

10. In combination an hypodermic syringe having a chamber, fluid expelling means movable therein and plate means tiltable into engagement with said fluid expelling means to frictionally restrain same against movement and prevent suctional action of said fluid expelling means through the needle while the needle is in the wound, and a spring between the body of the syringe and said plate means, effective to normally maintain said plate means in engagement with said fluid expelling means.

11. In combination an hypodermic syringe having a chamber, fluid expelling means movable therein and resilient means including a plate-like stop frictionally acting on said fluid expelling means to prevent any retrograde movement of the same after the completion of its forward injecting movement.

12. In combination an hypodermic syringe having a chamber and fluid expelling means movable therein, a flange exteriorly of said chamber, and means engageable with said flange and with said fluid expelling means effective to permit free movement of said fluid expelling means in one direction and to frictionally bind said means against movement in the other direction, and resilient means to normally maintain said member in engagement with said fluid expelling means.

13. In combination an hypodermic syringe having a chamber and fluid expelling means movable therein, a flange exteriorly of said chamber and suction preventing means comprising a plate-like member engageable at one side with said flange, and with said fluid expelling means and biased at an angle to said latter means whereby to permit free movement of said fluid expelling means in one direction and to frictionally bind said means against movement in the other direction, and resilient means to normally mantain said member in engagement with said fluid expelling means.

14. In combination an hypodermic syringe having a chamber and fluid expelling means movable therein, and resilient means comprising a plate-like member and a spring engageable therewith to bias said plate-like member into frictional engagement with said fluid expelling means, thereby to prevent enlargement of the chamber containing the remaining fluid of injection after the completion of the injection.

15. An attachment for hypodermic syringes comprising a substantially flat member engageable with the body of the syringe, and tiltable into and out of frictional binding engagement with a movable portion of the syringe thereby to permit relative movement of said portion and said body in one direction only, and resilient means to normally maintain said member in engagement with said movable portion.

16. In combination an hypodermic syringe having a fluid expelling plunger, means surrounding said plunger tiltable into con-

tact with the plunger and effective when in contact with the plunger to prevent suctional movement thereof in the syringe, means to urge said first mentioned means into contact with the plunger, and means to move said first mentioned means out of contact with the plunger.

17. In combination an hypodermic syringe having a chamber, fluid expelling means movable therein, and plate means tiltable into engagement with said fluid expelling means effective to frictionally restrain the latter against movement and prevent suctional action of said fluid expelling means through said needle, while the needle is in the wound, means to urge said first mentioned means into contact with the plunger, and means to withdraw said plate means from its restraining position.

18. An attachment for hypodermic syringes comprising a substantially flat member engageable with the body of the syringe and tiltable into frictional binding engagement with a movable portion of the syringe, thereby to prevent relative movement of said portion and body, means to urge said first mentioned means into contact with the plunger, and means to withdraw said member from binding position.

19. In combination an hypodermic syringe having a chamber and fluid expelling means movable therein, a flange exteriorly of said chamber and a lock for said fluid expelling means, comprising a substantially flat member having a hook portion at one end engageable with said flange and having a portion at the other end shaped to grasp said fluid expelling means, and means to bias said grasping portion relative to the fluid expelling means whereby to prevent movement of the fluid expelling means in one direction while permitting free movement thereof in the other direction.

In testimony whereof I affix my signature.

FELIX C. MONTUORI.