

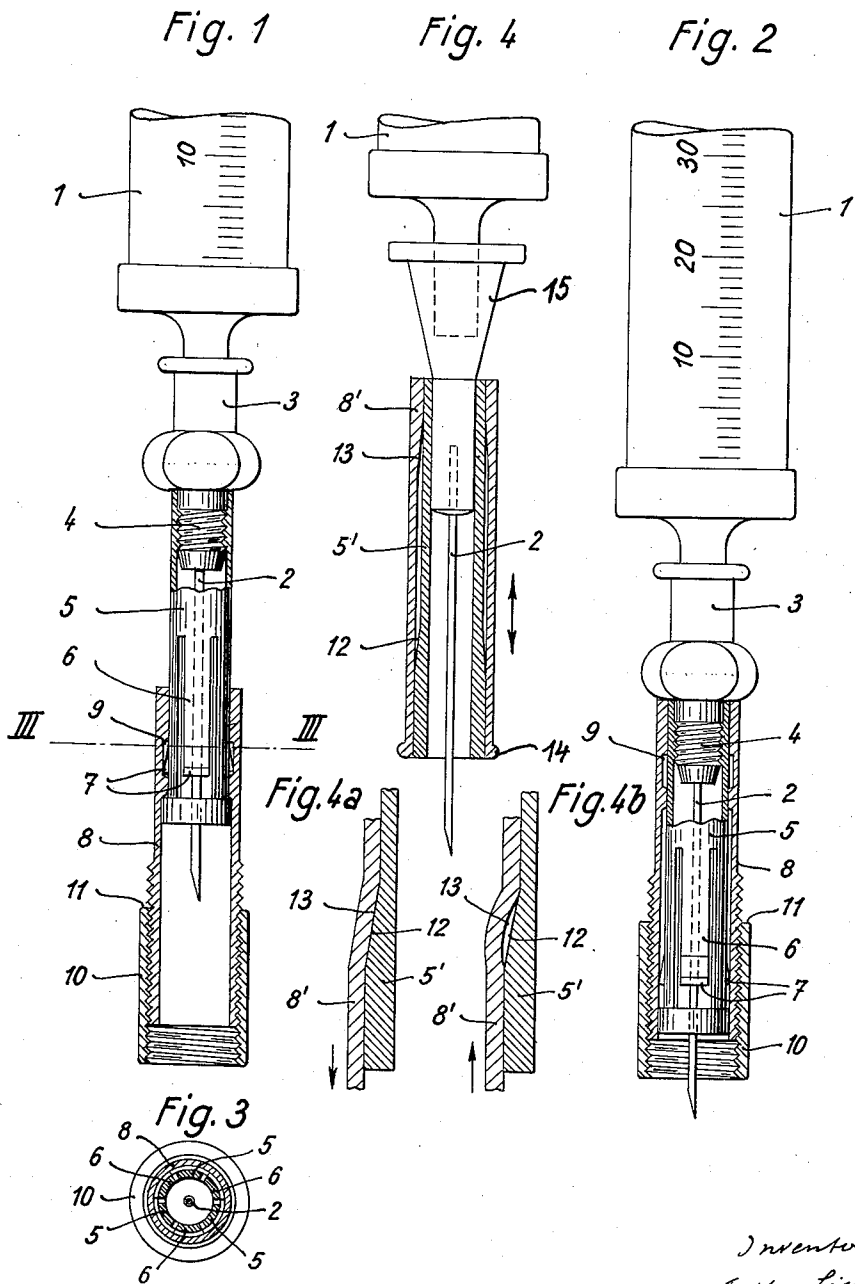
Jan. 15, 1963

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3,073,306

HYPODERMIC SYRINGE

Filed April 15, 1959



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United States Patent Office

3,073,306

Patented Jan. 15, 1963

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3,073,306

HYPODERMIC SYRINGE

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Filed Apr. 15, 1959, Ser. No. 806,665

Claims priority, application Germany Sept. 3, 1958
17 Claims. (Cl. 128-215)

The present invention relates to improvements in hypodermic syringes, and more particularly to a device for supporting a hypodermic syringe and facilitating its use in giving an injection.

It is one of the objects of the present invention to provide a simple telescopic device which is adapted to be connected to the front end of a hypodermic syringe around the hypodermic needle and, when in the extended position, to hold the syringe and the needle thereon arrested at a certain distance from the point on the body where the injection is to be made, and which is further adapted to be suddenly released from such extended position and to telescope suddenly when the syringe with the new device thereon is pressed with sufficient force upon the body so that the hypodermic needle will then be plunged abruptly into the skin.

In accordance with the invention, the new device comprises a pair of tubular members, one of which is to be connected at one end to the front end of a hypodermic syringe which carries the hypodermic needle, and is telescopically slidable within the other tubular member, and wherein the two tubular members are provided with interengageable, pressure-responsive locking means which are adapted to maintain the two members in an extended position until they are pressed with a certain force toward each other, whereupon the locking means will suddenly disengage from each other with the result that the pressure which was previously arrested by the locking means will be suddenly released and the two tubular members will be pushed together very abruptly so as to assume a withdrawn or collapsed position. Since the inner tubular member carries the hypodermic needle and the outer tubular member is placed upon the skin at the point where the injection is to be made and then pressed by the inner member or the hypodermic syringe thereon upon the skin, the hypodermic needle will be suddenly propelled forwardly to plunge into the skin. Such a device is especially of advantage to a slightly timid person giving an injection and particularly to a person giving himself an injection since, after pressing the syringe with the new device thereon upon the point where the injection is to be made, a reflex movement of the hand holding the syringe will no longer retard or delay the plunging of the needle into the skin. Such plunging movement will then occur so suddenly that the person receiving the injection will feel very little, if any, pain. Furthermore, since the device must be pressed with a certain force upon the body before the device will suddenly release the hypodermic needle for plunging into the skin, the area around the point of impact of the needle will be numbed by such pressure so that the person receiving the injection will hardly feel the insertion of the needle.

It is another object of the invention to design a device of the type described in a manner so as to be applicable to almost any kind of hypodermic syringe available on the market and to be easily mountable thereon or removable therefrom. Furthermore, the device should be made of the smallest possible diameter so as to permit the hypodermic needle also to be inserted at an oblique angle into the body of a patient, while the annular contact surface of the device still rests fully on the skin. This will in many cases not be possible if the device is made of a greater diameter.

A further important object of the invention consists in providing the outer tubular member with an extension

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tube which is adjustable thereon so as to permit the length of the device to be adjusted to the desired distance or depth which the hypodermic needle may enter into the body. This extension tube may serve for the additional purpose of forming a projection on the outer tubular member which may be easily and firmly gripped to pull the outer tube to the extended position.

Further objects, features, and advantages of the present invention will become apparent from the following detailed description thereof, particularly when read with reference to the accompanying drawings, in which—

FIGURE 1 shows, partly in section, the head portion of a hypodermic syringe which is provided with a supporting and propelling device according to the invention which is illustrated in the extended position;

FIGURE 2 shows a similar view of a hypodermic syringe with the device according to the invention in the contracted position;

FIGURE 3 shows a cross section taken along line III—III of FIGURE 1;

FIGURE 4 shows a view, partly in section, of a modification of the device according to the invention consisting of plastic material;

FIGURE 4a shows a partial but enlarged view of the telescopic plastic tubes according to FIGURE 4 arrested in the extended locked position; while

FIGURE 4b shows a similar view to FIGURE 4a of the telescopic plastic tubes in the position at the instant of their release from each other.

Referring to the drawings, FIGURE 1 shows a part of the cylinder 1 of a conventional hypodermic syringe, the front end of which is provided with a head portion 3 holding the hypodermic needle 2. This head portion 3 may be mounted on cylinder 1 either by being screwed or tightly fitted upon the front end thereof, although any other suitable connecting means may be used. The front end of the head portion 3 is provided with outer screw threads 4 upon which a tubular member 5 may be screwed which is slotted so as to form, for example, four longitudinal spring fingers 6, each of which has a small cam-shaped nose 7 at its end.

Tube 5 carries an outer tube 8 so as to be telescopically slidable therein in the longitudinal direction. At its rear portion, the inner wall surface of tube 8 is provided with recesses 9 which are adapted to receive the cam portions 7 so that, when tube 8 is pulled forwardly on the other tube 5, these cam portions 7 will snap into recesses 9 and arrest the tubes in the extended position.

The front end of the outer tube 8 has outer screw threads upon which a tubular extension sleeve 10 may be screwed to different extents so as to permit the entire tube 8, 10 to be adjusted to different lengths. The rear edge 11 of sleeve 10 may also serve as an abutment on which tube 8 may be gripped to pull it outwardly from tube 5 to its extended position. It should be noted that in such extended position the free end surface of the tubular member 8, 10 is located at a substantial distance beyond the tip of the needle 2 as shown in FIG. 1. The spring fingers 6 are made of such a strength that the cam portions 7 thereon will not disengage from recesses 9 until the pressure exerted upon the front edge of the outer tube 8 or its extension sleeve 10 has reached a certain strength. The corresponding inclined surfaces on cam portions 7 and the front edges of recesses 9 will then slide along each other and thereby press the spring fingers radially inwardly to such an extent that the cam portions 7 will suddenly disengage from recesses 9, permitting the inner tube with the hypodermic needle therein to be suddenly propelled forwardly and the needle to be plunged into the skin with such a sudden impact that the penetration of the needle will cause no pain. Such sudden and painless insertion of the needle is there-

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fore entirely due to the fact that the person giving the injection and gripping the syringe by its cylinder 1, presses the extended supporting device consisting of tubes 5 and 8 and the extension 10 with such a pressure upon the particular part of the body where the injection is to be made that the locking engagement between tubes 5 and 8 will be suddenly released and tube 5 with the hypodermic needle 2 therein will be quickly propelled within tube 8 from the position shown in FIGURE 1 to the position shown in FIGURE 2. The pressure exerted by the front end of tube 8 or extension 10 upon the body will also numb the feeling of the patient around the point of the injection to such an extent that he will hardly feel the sudden impact of the needle.

Since the supporting device which is removably secured by the screw threads 4 to the head portion 3 of the syringe has a relatively small diameter, the syringe with the supporting device may also be applied upon the body at an incline so as to permit the hypodermic needle to be inserted in an oblique direction.

The modification of the invention as illustrated in FIGURE 4 differs from the embodiment previously described primarily by the fact that the telescopic tubular members 5' and 8' consist of a plastic material. In the extended position of these members, they will be locked to each other by means of a conical portion 12 near the front end of the inner tubular member 5' and by a conical portion 13 near the rear end of the outer tubular member 8'. These conical portions 12 and 13 are made of such an angle that, when in engagement with each other, they will press firmly against each other. Since the plastic material of tubular members 5' and 8' is slightly resilient the conical portion 13 will become slightly distorted, as indicated in FIGURE 4a, when the two tubes are pulled outwardly to the fully extended position. This results in a sufficient locking action between the two tubes so that the same effect will be attained as by the spring fingers 6 and their cam noses 7 and the locking recesses 9, as shown in FIGURES 1 and 2.

When the tubular members 5' and 8' are pushed together from their extended position, the outer tube 8' will be slightly deformed at its weakest point near the base of the conical portion 13 and this point will bulge slightly outwardly, as indicated diagrammatically and slightly overemphasized in FIGURE 4b. This will suddenly release the tight fit between the conical portions 12 and 13 so that the outer tube 8' can suddenly slide backwardly along tube 5' and the hypodermic needle 1 can impinge abruptly into the skin. Such sudden release of the conical portions 12 and 13 and the ensuing abrupt forward movement of the hypodermic needle can, however, not occur until a sufficient pressure has been exerted upon the supporting device.

The front end of the outer tube 8' may also be provided with a small flange 14 which reinforces the tube and increases the size of the contact surface which engages with the skin. This flange 14 also serves as an abutment on which the outer sleeve 8' may be gripped to pull it to the extended position.

Although the supporting device according to FIGURE 4 may also be secured to a syringe head as illustrated in FIGURES 1 and 2, it may instead be provided with a special needle head 15 which may also consist of a plastic material. This needle head 15 may serve as an adapter which may be fitted over the slightly conical front end of a hypodermic cylinder 1.

There also are special hypodermic needles which, when being turned, automatically fit tightly upon a conical member. In such a case, the front part of the glass syringe is preferably enclosed by a metallic ring which carries the conical member. This conical member may also be provided with a coarse thread for easily securing the hypodermic needle thereon. The supporting device according to the invention may then be secured to the

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metal ring on the glass spring. Instead of securing the supporting device to the syringe by screw threads, as shown in FIGURES 1 and 2, it may of course also be secured thereto by means of a conical seat or a snap joint.

Although my invention has been illustrated and described with reference to the preferred embodiments thereof, I wish to have it understood that it is in no way limited to the details of such embodiments, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. A device for attachment to a hypodermic syringe having a needle, comprising, in combination, a first tubular member and a second tubular member telescopically slidable relative to each other between a collapsed position and an extended position; means for securing said first tubular member to the syringe so that said first tubular member encompasses the rear portion of the needle; said second tubular member having an annular end surface for engaging a body portion to be treated, said end surface being located at a substantial distance beyond the tip of the needle when said second member is in said extended position thereof; said syringe and said tubular members when mounted thereon having a common axis, and said end surface being disposed transversely of said common axis in symmetrical relationship thereto; and disengageable, pressure-responsive locking means symmetrically disposed on said tubular members with respect to said axis for locking said tubular members in said extended position on the syringe against relative sliding movement when initial manual pressure is applied to the syringe in axial direction to press said annular end surface against said body portion, and for quickly releasing said tubular members when said pressure acting upon said annular end surface and said body portion exceeds a predetermined value, whereby upon release of said tubular members said needle will be rapidly accelerated and plunged into said body portion at a relatively high speed.

2. A device as defined in claim 1, in which said first tubular member secured to the syringe extends into said second tubular member so that the latter member is slidable upon the outside of said first tubular member.

3. A device as defined in claim 1, further comprising means for limiting the depth of insertion of the hypodermic needle into said body portion.

4. A device as defined in claim 1, further comprising an extension tube adjustably secured to the front end of said first of said tubular members for adjusting the effective length of said first member.

5. A device as defined in claim 4, and means on said extension tube for facilitating pulling of said first of said tubular members to the extended position.

6. A device as defined in claim 1, wherein said locking means comprise at least one radially resilient portion on one of said tubular members, and a portion on the other tubular member adapted to interengage with said resilient portion in the extended position of said tubular members.

7. A device as defined in claim 1, wherein at least one of said tubular members consists of a plastic material and has a portion thereon adapted by its inherent resiliency to serve as one part of said locking means.

8. A device as defined in claim 1, wherein at least one of said tubular members consists of a plastic material of a selected resiliency, said locking means comprising a portion on said member adapted to interengage with a portion on the other tubular member in the extended position of said members, one of said portions being radially resilient for releasing the other portion only when said two extended tubular members are pushed toward each other at said pressure exceeding said predetermined value.

9. A device as defined in claim 1, further comprising an adapter having means at one side thereof for secur-

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ing the same to the hypodermic syringe, said needle being secured to the other side thereof, and means on said other side for securing said adapter to said first tubular member so as to form a unit therewith.

10. A device for attachment to a hypodermic syringe having a needle, comprising, in combination, a first tubular member and a second tubular member telescopically slidable relative to each other between a contracted position and an extended position; and means for securing said first tubular member to the syringe so that said first member encompasses the rear portion of the needle; said second tubular member having an annular end surface for engaging a body portion to be treated; said syringe and the telescoping tubular members when mounted thereon having a common axis, said end surface being disposed transversely of said common axis in symmetrical relationship thereto; at least one of said telescoping tubular members consisting of a plastic material of a selected resiliency, and both of said telescoping tubular members having conical portions adapted to engage with each other when said members are in the extended position and to adhere to each other until said two members are pressed toward each other with a force of a predetermined value; whereby said telescoping tubular members are locked in said extended position on the syringe against relative sliding movement when an initial manual force below said predetermined value is applied to the syringe in axial direction to press said end surface against said body portion but are quickly released when the manual force exceeds said predetermined value so that said needle will then be rapidly accelerated and plunged into said body portion at a relatively high speed.

11. A device as defined in claim 10, wherein the conical portion of the outer one of said telescoping tubular members is designed so as to be slightly deformed and to bulge outwardly from the conical portion on the inner one of said telescoping tubular members when said force of a predetermined value is applied in pushing said extended members toward each other, whereby said bulging outer portion will suddenly release said conical portion on said inner member.

12. A device as defined in claim 10, wherein the outer one of said telescoping tubular members consists of said plastic material and has a reinforcing portion at its front end, said reinforcing portion projecting outwardly as an abutment to permit said outer member to be gripped and pulled from the contracted position to the extended position.

13. A device for attachment to a hypodermic syringe having a needle, comprising, in combination, a first elongated member; means for securing said first elongated member to the syringe so that said first member extends along the rear portion of the needle; a second elongated member slidable relative to said first member between a withdrawn position and an extended position and having an end surface for engaging a body portion to be treated, said end surface being located at a substantial distance beyond the tip of the needle when said second member is in said extended position thereof; said syringe and said first and second members when mounted thereon having a common axis, and said end surface being symmetrically arranged with respect to said common axis; and disengageable, pressure-responsive locking means on said elongated members for locking said elongated members in said extended position on the syringe against relative sliding movement when initial manual pressure is applied to the syringe in axial direction to press said end surface against said body portion, and for quickly releasing said elongated members when said pressure acting upon said end surface and said body portion exceeds a predetermined value, whereby upon release of said elongated members said needle will be rapidly accelerated and plunged into said body portion at a relatively high speed.

14. A device for attachment to a hypodermic syringe having a needle, comprising, in combination, a first elongated member; means for securing said first elongated member to the syringe so that said first member extends along the rear portion of the needle; a second elongated member slidable relative to said first member between a withdrawn position and an extended position and having an end surface for engaging a body portion to be treated, said end surface being located at a substantial distance beyond the tip of the needle when said second member is in said extended position thereof; said syringe and said first and second members having a common axis, and said end surface being symmetrically arranged with respect to said common axis; and disengageable, pressure-responsive locking means on said elongated members for locking said elongated members in said extended position against relative sliding movement when initial manual pressure is applied to the syringe in axial direction to press said end surface against said body portion, and for quickly releasing said elongated members when said pres-

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gated member; means for securing said first elongated member to the syringe so that said first member extends along the rear portion of the needle; a second elongated member slidable relative to said first member between a withdrawn position and an extended position and having an annular end surface for engaging a body portion to be treated, said end surface being located at a substantial distance beyond the tip of the needle when said second member is in said extended position thereof; said syringe and said first and second members when mounted thereon having a common axis, and said end surface extending transversely of said axis in symmetrical relationship thereto; and disengageable, pressure-responsive locking means symmetrically disposed on said elongated members with respect to the axis thereof for locking said elongated members in said extended position on the syringe against relative sliding movement when initial manual pressure is applied to the syringe in axial direction to press said annular end surface against said body portion, and for quickly releasing said elongated members when said pressure acting upon said annular end surface and said body portion exceeds a predetermined value, whereby upon release of said elongated members said needle will be rapidly accelerated and plunged into said body portion at a relatively high speed.

15. A device for attachment to a hypodermic syringe having a needle, comprising, in combination, a first tubular member and a second tubular member telescopically slidable relative to each other between a collapsed position and an extended position; means for securing said first tubular member to the syringe so that said first tubular member encompasses the rear portion of the needle; said second tubular member having an annular end surface for engaging a body portion to be treated; said syringe and said tubular members when mounted thereon having a common axis, and said end surface being disposed transversely of said common axis in symmetrical relationship thereto; and disengageable, pressure-responsive locking means on said tubular members for locking said tubular members in said extended position on the syringe against relative sliding movement when initial manual pressure is applied to the syringe in axial direction to press said annular end surface against said body portion, and for quickly releasing said tubular members when said pressure acting upon said annular end surface and said body portion exceeds a predetermined value, whereby upon release of said tubular members said needle will be rapidly accelerated and plunged into said body portion at a relatively high speed; said locking means including at least one spring finger on one of said tubular members, and a cam-like projection at the free end of said spring finger, the other tubular member having at least one recess therein adapted to receive and interengage with said cam-like projection in the extended position of said tubular members.

16. An injection device comprising, in combination, a hypodermic syringe having a needle; a first elongated member; means for securing said first elongated member to the syringe so that said first member extends along the rear portion of the needle; a second elongated member slidable relative to said first member between a withdrawn position and an extended position and having an end surface for engaging a body portion to be treated, said end surface being located at a substantial distance beyond the tip of the needle when said second member is in said extended position thereof; said syringe and said first and second members having a common axis, and said end surface being symmetrically arranged with respect to said common axis; and disengageable, pressure-responsive locking means on said elongated members for locking said elongated members in said extended position against relative sliding movement when initial manual pressure is applied to the syringe in axial direction to press said end surface against said body portion, and for quickly releasing said elongated members when said pres-

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sure acting upon said end surface and said body portion exceeds a predetermined value, whereby upon release of said elongated members said needle will be rapidly accelerated and plunged into said body portion at a relatively high speed.

17. An injection device comprising, in combination, a hypodermic syringe having a head portion; an adapter secured at one end thereof to said head portion and carrying at its other end a hypodermic needle; a first elongated member secured to said adapter so that said first member extends along the rear portion of the needle; a second elongated member slidable relative to said first member between a withdrawn position and an extended position and having an end surface for engaging a body portion to be treated, said end surface being located at a substantial distance beyond the tip of the needle when said second member is in said extended position thereof; said syringe, said adapter, said needle, and said first and second members having a common axis, and said end surface being symmetrically arranged with respect to said common axis; and disengageable, pressure-responsive

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locking means on said elongated members for locking said elongated members in said extended position against relative sliding movement when initial manual pressure is applied to the syringe in axial direction to press said end surface against said body portion, and for quickly releasing said elongated members when said pressure acting upon said end surface and said body portion exceeds a predetermined value, whereby upon release of said elongated members said needle will be rapidly accelerated and plunged into said body portion at a relatively high speed.

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