Nov. 14, 1939. L. H. SURBECK 2,179,834

NEEDLE-THREADING DEVICE

Filed Nov. 19, 1938

Fig. 1.

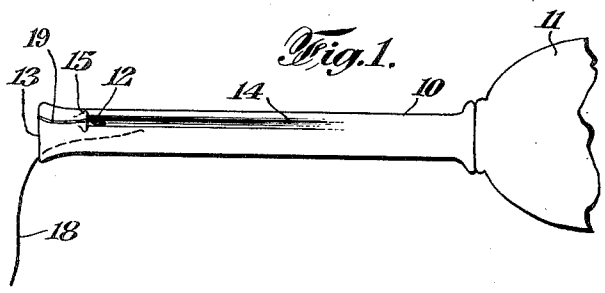


Fig. 8.

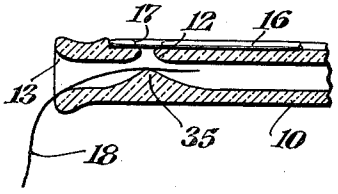


Fig. 2.

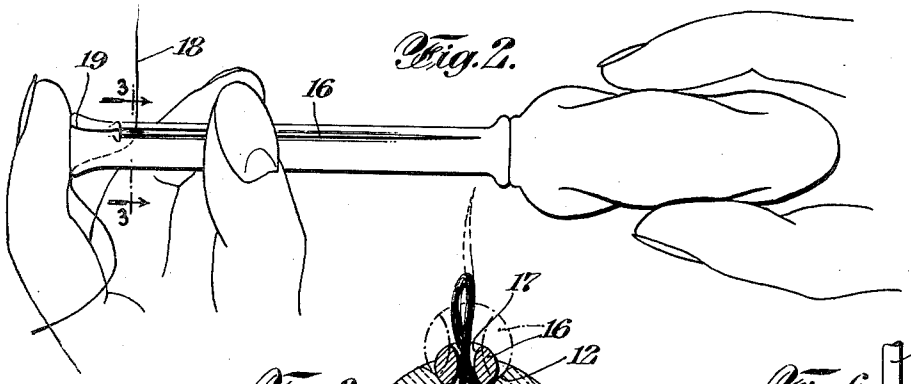


Fig. 3.

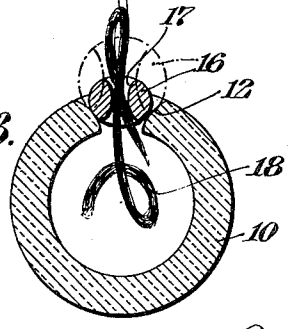


Fig. 6.

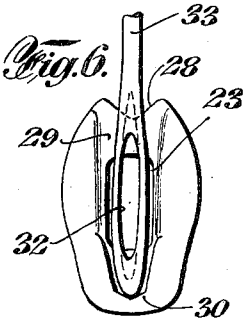


Fig. 4.

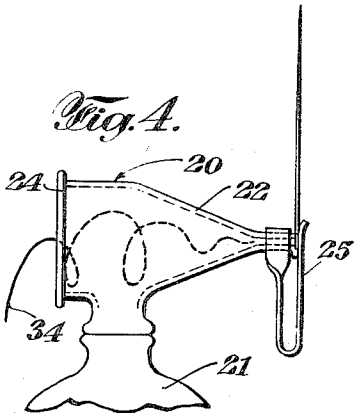


Fig. 5.

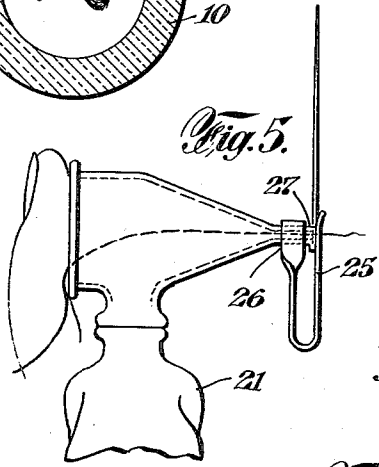


Fig. 7.

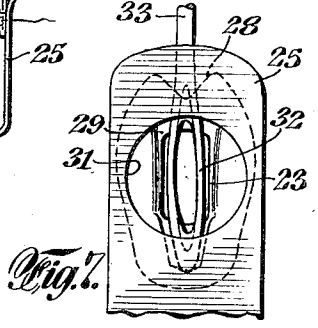


Fig. 9.

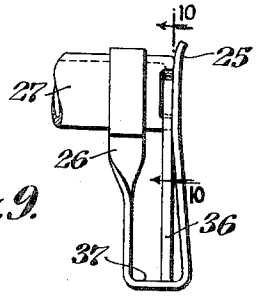
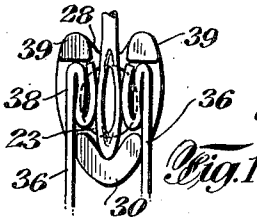


Fig. 10.



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Patented Nov. 14, 1939

2,179,834

UNITED STATES PATENT OFFICE

2,179,834

NEEDLE-THREADING DEVICE

Leighton Homer Surbeck, New York, N. Y.

Application November 19, 1938, Serial No. 241,349

11 Claims. (Cl. 223—99)

This invention relates to needle-threading devices. It is the purpose of this invention to afford a needle-threading device which is simple and easy to operate and which is positive in operation.

It is a further purpose of this invention to afford a needle-threading device which has a minimum number of elements and which does not contain any intricate or delicate mechanism which can get out of adjustment.

It is a feature of this invention that means are afforded whereby a thread can be inserted through one opening which is of such ample size that no difficulty whatever can be encountered and that the thread is thereafter caused to be carried by a current of air through a second opening in the device which is in registration with a needle's eye so that the thread becomes threaded in the eye of the needle. It is a feature of a preferred embodiment of this invention that the device sets up air currents of such a nature as to draw the tip end of a thread endwise through the second opening in the device and thence through the eye of a needle that is in registration therewith.

The features of this invention which have been briefly referred to above and further features, advantages and purposes of this invention will be apparent in connection with the following description of the illustrative embodiments of this invention which are shown in the accompanying drawing wherein

Figure 1 is a side view of a needle-threading device embodying this invention;

Figure 2 is similar to Figure 1, except that the parts are shown in the position for directing a thread through a needle's eye;

Figure 3 is a cross-section of the device shown in Figure 2 taken on the line 3—3 and illustrating the discharge of a thread through the needle's eye;

Figure 4 is a side view of another and preferred embodiment of this invention;

Figure 5 is similar to Figure 4, with the parts shown in position for directing the thread through the needle's eye;

Figure 6 is a detail end view of the device shown in Figs. 4 and 5, with the spring clip removed;

Figure 7 is a detail end view of the device shown in Figs. 4 and 5, with the spring clip in place;

Figure 8 is a detail side view of a modified form of the device shown in Figs. 1 to 3;

Figure 9 is a detail side view of a modified form of the device shown in Figs. 4 to 7; and

Figure 10 is a detail view of the device shown in Fig. 9 partly in section on the line 10—10 of Fig. 9.

Referring to the drawing, the device comprises a hollow body part 10 which, in the embodiment shown in Figs. 1 and 2, is elongated and in the form of a tube. Connected to one end of the tube is a bulb 11 made of some resilient material such as rubber. The interior of the bulb 11 communicates with the interior of the body part 10 so that air can be discharged under pressure from the bulb into the body part 10. In the side wall of the hollow body part 10 is an opening 12 which is of a size that is appropriate for at least approximate registration with the eye of a needle. The end of the body part 10 which is opposite to the end that is attached to the bulb 11 has an opening 13 therein which is substantially larger than the opening 12. Preferably the opening 13 is at least as large as the interior diameter of the body part 10, and, as shown, this opening may be flared outwardly somewhat so as to facilitate the entry of the end of the thread into the body part 10.

Preferably the body part 10 has needle-positioning means affixed thereto as by being made integral therewith. In the embodiment shown this positioning means is in the form of a groove 14 with a stop 15 at the end thereof adjacent the opening 12. As shown in Fig. 2, a needle 16, when placed in the groove 14, can be easily maintained in proper position so that the eye 17 of the needle is in at least approximate registration with the opening 12 in the body part 10.

In operating the device, a thread 18 is inserted through the opening 13 so that the end thereof comes within the body 10 as shown in Figure 1. Since the opening 13 is many times larger than the thread, it is apparent that it is an extremely simple matter to insert a sufficient length of thread through the opening 13 and into the body part 10 so that a portion of the thread can be expelled through the opening 12. The insertion of the thread can be facilitated by first compressing the bulb and upon re-expansion of the bulb causing the thread to be sucked into the body part 10 with the current of air being drawn into the bulb. The body part 10 is preferably made of transparent material such as glass or transparent resinous composition so that the position of the thread can be readily observed. By placing the finger or other stop over the opening 13 and compressing the bulb, the thread is caught in the air current passing out through the opening 12 and is carried through this open-

ing and thence through the eye of the needle that is held, as shown in Fig. 2, with the eye thereof in registration with the opening through which the thread is discharged. In this embodiment of my invention, the thread usually, although not necessarily, comes through the eye of the needle when it is bent as shown by way of illustration in Fig. 3. In this figure the thread is shown passing through the opening 12 and the eye 17 of a needle. Upon further discharge of air, the thread is straightened out to a position shown in dotted lines in Fig. 3. The opening 13 can then be uncovered and the bulb 11 released, leaving the thread in position to be grasped and pulled through the needle's eye to any extent that may be desired.

For ordinary household use the device above described is satisfactory, inasmuch as the length of thread desired can be cut from the balance of thread on a spool, for example, and pulled through the opening 12 in the body part 10. If, however, the thread is not to be cut away from the thread supply, the device can be modified by providing a normally closed continuous passage in the body part 10 between the opening 12 and the opening 13 so that the thread can be removed sidewise rather than endwise from the device. In the embodiment shown in Figs. 1 and 2, the body part, between the openings 12 and 13, comprises a slit 19, the faces of which are normally maintained in abutment. If the body part 10 is made of some resilient material, the slit can be opened sufficiently as by pulling the thread sidewise against the slit to permit the pasage of the thread between the opposed surfaces thereof. Other passage means adapted to be opened sufficiently to permit sidewise movement of the thread between the openings in the body part may, of course, be used according to this invention.

In the modification of this device shown in Figs. 1, 2 and 3, satisfactory results can be obtained when the thread that is used is of a relatively pliable type which can be bent in expelling it with a current of air through the needle's eye. In Figs. 4 to 7, a modified form of this invention is shown which is regarded as preferable to the device shown in Figs. 1, 2 and 3, inasmuch as this modification of my invention is especially adapted to discharge a thread endwise through a needle's eye. This is of advantage, especially when threads of a somewhat stiff character are used or when threads are used which are of nearly the same size as the needle's eye.

Referring more in detail to the embodiment of this invention shown in Figs. 4 to 7, the device includes a body part which is indicated generally by the reference character 20, to which an air compression means such as resilient bulb 21 is attached, the interior of the bulb 21 being in communication with the interior of the body part 20 so that air can be discharged under pressure from the bulb 21 into the interior of the body 20.

The body part 20 is characterized by the fact that it includes a tapered or funnel-shaped portion 22. For preferred operation in the manner herein described the tapered portion 22 should be such that the axial length thereof is at least as long as its maximum diameter. An opening 23 is disposed substantially at the end of the tapered portion 22. The opening 23 is of a size which is appropriate for at least approximate registration with the eye of a needle. The body part 20, as in the previous modification of this invention, includes a relatively large opening 24 through which a thread can be very readily inserted so that the end thereof comes within the interior of the body part 20.

At the end of the tapered portion 22 and adjacent the opening 23 there is suitable means for maintaining a needle in position with the eye thereof in approximate registration with the opening 23. In the device shown, this means takes the form of a spring clip 25 which is secured as by means of clamping ears 26 to the end portion 27 of the body part of the device. The spring clip 25 is adapted to be resiliently urged against the end portion 27. In order to facilitate the positioning of the needle, the end portion 27 has a groove 28 in the side wall thereof which terminates in a recess 29 having a stop 30 at the bottom thereof against which the end of the needle can rest. The needle can be placed in position by first inserting the eye end of the needle in the groove 28 and then sliding it toward the spring clip 25 until the end of the needle can be pushed downwardly into the recess 29 until it strikes the stop 30, leaving the eye of the needle in approximate registration with the opening 23. The spring clip thereafter maintains the needle in position. The spring clip has an opening 31 therein so that a thread can be discharged through the opening 23 and then through the eye 32 of the needle 33.

In the operation of this embodiment of my invention, the end of a thread 34 is first inserted through the opening 24 and into the interior of the body part 20, while the bulb 21 is fully expanded. For preferred operation the thread is inserted until the end comes within the tapered portion of the device and until the thread 34 has considerable slack as shown in Fig. 4. One's finger or other suitable stop is then placed over the opening 24 and the bulb 21 compressed. Upon compressing the bulb the air currents are such that the end of the thread is caused to pass through the opening 23 and through the eye 32 of the needle. At least, the tapered part of the device is preferably made of transparent material so that the position of the thread therein can be readily observed.

The device operates in the manner described due to certain principles involving the behavior of gases in motion, e. g., a current of air through a passage. As above-mentioned, the body part of the device includes the tapered portion 22. As the cross-section of the tapered portion 22 becomes smaller, the rate of flow of gases toward the opening 23 progressively increases and reaches a maximum at the opening 23. This is because the speed of the air varies inversely with the cross-section of the tapered portion and the pressure decreases as the speed increases. The effect of the pressure and motion of the air upon the thread within the body portion of the device is to pull the end of the thread out through the opening 23. It is, therefore, preferable to initially position the thread in the device so that the end of the thread is adjacent the discharge orifice where the pressure is lowest during expulsion of air so that the pull on the thread will be greatest at the tip and tend to carry the thread endwise through the discharge orifice. The thread is not pushed from behind in being carried through the opening 23, inasmuch as the pull is the greatest at the point of the thread which is furthest in the tube, namely, at the tip end of the thread. It is, therefore, the tip end of the thread which is first carried through the needle's eye. The thread is urged to pass through the eye of the needle for the further reason that the needle's

eye is usually as small or smaller than the discharge orifice and, therefore, tends to create the greatest rate of flow and the greatest pulling effect on the thread both toward and through it.

A device made according to this invention is also advantageous, inasmuch as the thread tends to be discharged at the center of the opening 23. This is due to the fact that the rate of flow of discharged air is greatest at the center of the opening, and, therefore, tends to position the thread being carried through the discharge orifice at the approximate center thereof. This facilitates the directing of the tip end of the thread through the eye of a needle. As shown in Figs. 6 and 7, a thread can be discharged through a needle's eye, even though the eye of the needle is considerably narrower than the orifice or opening in the device, inasmuch as the thread always tends to be discharged at the center of the orifice, and therefore, will pass through the eye of a needle which is positioned over the center of the orifice. Due to this fact, a single device made according to this invention can be used with needles of many different sizes and in connection with threads of many different sizes. The opening in the device can be made of a size appropriate for handling threads of relatively large diameter. When, however, such a device is used with a thread of small diameter and with a needle having a small size, the device nevertheless operates according to the principles described more in detail above to direct a thread through the center of the discharge orifice and through the eye of a needle in registration therewith.

The fact that the thread is drawn through a needle's eye by the tipmost portion rather than being pushed from behind makes a device made according to this invention appropriate for readily passing threads with frayed ends through a needle's eye. Frequently threads are broken with the result that the end thereof is considerably frayed. The frayed ends ordinarily make the threading of a needle difficult. With a device embodying the present invention, the frayed ends actually assist the threading of the needle, inasmuch as the air currents exert an even greater pulling effect tending to pass the thread through a needle's eye than would be the case with a thread having an unfrayed end. In the case of a thread somewhat larger than a needle's eye, the frayed ends can be carried through the needle's eye sufficiently so that the ends can be grasped in order to pull the thread through the needle's eye by hand.

It is apparent that a normally closed passage means permitting the sidewise passage of a thread between the openings in the device can be incorporated in the device shown in Figs. 4 to 7 for the purposes mentioned above in connection with the description of the illustrative embodiment of such a passage means in the device of Figs. 1 to 3.

In Fig. 8 a modified form of device is shown which is generally similar to that shown in Figs. 1 to 3 and the parts are indicated by the same reference characters. In this modification the body part 19 comprises the projection 35 extending from the inner wall thereof so as to be approximately opposite the opening 12 in the body part. The projection 35 is of advantage in that it causes a thread, e. g., thread 18, that is inserted in the body part to be positioned adjacent the opening 12 and to lie, when inserted, so that it is more readily caught in a current of air passing through the opening than would be the case if the thread were to lie at the bottom of the cylindrical embodiment shown in Figs. 1 to 3. The projection 35 is also of advantage in that the constriction which it produces in the body portion makes the body portion tapered adjacent the opening 12 and tends to accelerate the movement of the air in the region adjacent the opening in the same way that tapered portion 22 of the embodiment shown in Figs. 4 to 7 tends to accelerate the air passing toward the opening 23. For this reason, the projection 35 has gradually inclined sides as shown. Further in this regard, the structure shown in Fig. 8 illustrates the fact that the tapered part 22 of the device shown in Figs. 4 to 7 need not be symmetrical about a central axis. The tapered portion may be non-symmetrical as illustrated in Fig. 8.

The device shown in Figs. 9 and 10 is similar to the device shown in Figs. 4 to 7 (the parts being indicated by the same reference characters) except that in addition to the spring clip 25, means are included for preventing displacement of the needle laterally with respect to the opening 23 and for covering, at least partially, any part of the opening 23 which is not covered by the head of the needle overlying the opening. For this purpose, a pair of spring arms 36 is used. In the device illustrated these spring arms are conveniently affixed to the base part 37 of the spring clip 25 as by means of a rivet, or by welding, or by being made integral with the spring clip. At the upper ends of the arms 36 are heads 38 each of which in the form shown consist of a portion of the spring arms that is folded on itself prior to tempering the spring arms. Preferably the heads lie between the stop 30 and a pair of small projections on each side of the groove 28.

In placing the needle in position, the end of the head of the needle can be moved down the trough 26 until it strikes the upper end of the clip 25. The needle can then be pushed downwardly thereby separating the heads 38 against the tension exerted by the spring arms 36 until the end of the head of the needle strikes the stop 30. In this position the needle head is prevented from being moved outwardly away from the opening 23 by clip 25 and is prevented from being laterally displaced from the approximate center of the opening 23 by the resiliently mounted heads 38. The heads 38 also serve to cover up any part of the opening 38 which is not covered by the head of the needle thereby directing substantially all of the air being expelled from the device through the eye of the needle. This promotes the tendency of the thread to pass through the eye of the needle and prevents the setting up of any stray air currents which might cause the thread to be misdirected. With this construction a single device is capable of employment with needles having wide size variations. Even when a very small needle is used substantially all of the air is directed through the needle's eye.

It is an advantage of devices embodying this invention that a plurality of threads can be simultaneously threaded through the eye of a needle as readily as a single thread.

While reference has been made herein to the use of air currents, it is, of course, apparent that any other gas or liquid than air may be used in threading a needle, although in ordinary practice air would, of course, be utilized. The term "thread" is intended to cover any type of yarn or filament.

While this invention has been described in

connection with certain specific embodiments thereof, it is apparent that this invention can take many different forms. Any means other than a bulb may be used for causing a current of air to pass outwardly through an orifice in the device, although for ordinary household use a resilient rubber bulb is preferable. The body part of the device may be made of a variety of different shapes and various types of means may be used for positioning a needle so that the eye thereof is in approximate registration with the opening in the body part through which the thread is carried. Variations in the construction of the device may be made within the scope of the language of the following claims.

I claim:

1. A needle-threading device which comprises a hollow body and air compression means arranged to discharge air under pressure into said hollow body, said hollow body having a first opening appropriate for approximate registration with a needle's eye and a second and substantially larger opening through which the end of a thread can be inserted into said hollow body, said device being arranged so that the end of a thread inserted through said second opening can be carried from within said hollow body outwardly through said first opening by a current of air forced outwardly through said first opening by discharging air into said hollow body from said air compression means when said second opening is closed.

2. A needle-threading device which comprises a hollow body, said hollow body having an internally tapered portion, a first opening substantially at the smaller end of said tapered portion appropriate for approximate registration with a needle's eye and a second and substantially larger opening through which the end of a thread can be inserted into said tapered portion of said hollow body; and means for causing a current of air to pass outwardly through said tapered portion from the larger to the smaller end thereof and thence outwardly through the opening substantially at the end thereof.

3. A needle-threading device which comprises a hollow body and air compression means connected thereto and arranged to discharge air under pressure into said hollow body, said hollow body having an internally tapered portion, the axial length of which is at least as long as its maximum diameter, a first opening substantially at the smaller end of said tapered portion appropriate for approximate registration with a needle's eye and a second and substantially larger opening through which the end of a thread can be inserted into said tapered portion of said hollow body, said device being arranged so that upon discharging air under pressure into said hollow body from said air compression means when said second opening is closed air can be directed outwardly through said tapered portion from the larger to the smaller end thereof and thence outwardly through said first opening.

4. A needle-threading device which comprises a hollow body and a resilient bulb attached thereto adapted to discharge air under pressure into said hollow body, said hollow body having a relatively large opening therein and having a tapered portion opposite to said opening and said tapered portion terminating at its smaller end with a relatively small opening appropriate for approximate registration with the eye of a needle.

5. A needle-threading device which comprises an elongated hollow body and air compression means connected thereto and arranged to discharge air under pressure into said hollow body, said hollow body having a first opening in the side thereof which is appropriate for approximate registration with a needle's eye and a second and substantially larger opening at one end of said hollow body through which the end of a thread can be inserted into said hollow body, said device being arranged so that the end of a thread inserted through said second opening can be carried from within said hollow body outwardly through said first opening by a current of air forced outwardly through said first opening by discharging air into said hollow body from said air compression means when said second opening is closed.

6. A needle-threading device which comprises a hollow body, said hollow body having a first opening appropriate for approximate registration with a needle's eye and a second and substantially larger opening through which the end of a thread can be inserted into said hollow body, and means for discharging air outwardly from said hollow body through said first opening when said second opening is closed, there being affixed to the exterior of said hollow body positioning means adapted to cooperate with a needle for positioning the needle's eye in approximate registration with said first opening.

7. A needle-threading device which comprises a hollow body and said hollow body having a first opening appropriate for approximate registration with a needle's eye and a second and substantially larger opening through which the end of a thread can be inserted into said hollow body, means for discharging air outwardly from said hollow body through said first opening when said larger opening is closed, and means for maintaining a needle on the outside of said hollow body with the eye thereof in approximate registration with said first opening.

8. A needle-threading device which comprises a hollow body and air compression means arranged to discharge air under pressure into said hollow body, said hollow body having a first opening appropriate for approximate registration with a needle's eye and a second and substantially larger opening through which the end of a thread can be inserted into said hollow body, and there being a groove in the exterior of said body portion adapted to guide the eye end of a needle, a recess at the end of said groove having a portion thereof in registration with said first opening and into which the eye end of said needle can be inserted and resilient means adapted to maintain said needle in said recess with the eye thereof in approximate registration with said first opening.

9. A needle-threading device which comprises a hollow body and air compression means arranged to discharge air under pressure into said hollow body, said hollow body having a first opening appropriate for approximate registration with a needle's eye, a second and substantially larger opening through which a thread can be inserted into said hollow body, and means arranged to afford a continuous normally closed passage between said openings.

10. A needle threading device which comprises a hollow body, said hollow body having a first opening appropriate for approximate registration with a needle's eye and a second and substantially larger opening through which a thread can be inserted into said hollow body, means for drawing air into said hollow body through said

larger opening and means for discharging air under pressure into said hollow body and outwardly through said first opening when said second opening is closed.

11. A needle threading device which comprises a hollow body and air compression means arranged to discharge air under pressure into said hollow body, said hollow body having a first opening appropriate for approximate registration with a needle's eye and a second and substantially larger opening through which a thread can be inserted into said hollow body, resilient means for urging the head of a needle overlying said opening against said opening and yieldable members adapted to prevent lateral displacement of the head of the needle from said opening.

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