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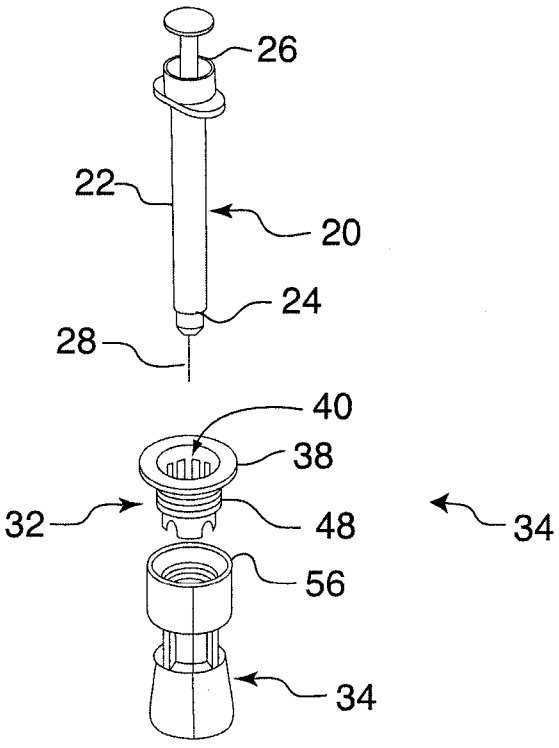
(54) Title: SYRINGE NEEDLE PROTECTOR



(57) Abstract: A lockable syringe needle protector is provided. The syringe protector includes a clamping member and a guard member. The clamping member includes at least one deformable flange portion and a toothed or ribbed surface. Insertion of the clamping member into the guard member creates a locking interaction between the toothed surface of the clamping member and a complementary toothed or ribbed surface of the guard member. A used syringe inserted into the protector is held by urging the clamping member into the guard member, thereby deforming the flange portion of the clamping member and compressibly holding the syringe in the protector.

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SYRINGE NEEDLE PROTECTOR

FIELD OF THE INVENTION

The present invention relates generally to syringes, and more particularly to devices for protecting the needle end of conventional medical syringes so as to prevent accidental needle pricks.

BACKGROUND

As commonly known in the art, syringes are medical devices used to inject fluids into a body and/or withdraw fluids from within a body or its cavities. Conventional medical syringes typically include a barrel portion with one end configured to mate with a conventional piercing element, such as a pointed hollow needle or cannula. A plunger rod is inserted through the opposing end of the barrel portion. By engaging the plunger rod with an elastomeric stopper element fitted in a fluid-tight manner within the interior of the barrel, a user can apply manual force to the plunger to either withdraw or deliver the syringe contents.

During use, it is not uncommon for the needle portions to be involved in accidental needle sticks or punctures. Such puncture incidents can pose a great health risk to medical personnel via the accidental transmission of pathogens and/or pharmacological substances. Thus, it is of utmost importance to provide protection for medical personnel from pathogen-contaminated blood, body fluids, and/or pharmacological substances still present in or on the syringe needle.

Immediately following use of a syringe, a syringe protector can be positioned over the needle cannula, thus preventing an accidental needle prick. A syringe protector should remain permanently affixed to the syringe in order to provide the highest degree of protection in the handling and disposal of the used syringe. Further, as medical syringes are frequently used during times of emergency or high stress, it is highly desirable that a syringe protector be simple to use and be composed of few pieces in order to be most easily employed. Finally, due to the high volume of syringes used daily in hospitals, laboratories, clinics and residential homes, the components of a syringe protector should be easily and inexpensively formed by mass production.

Previous syringe protectors have failed to meet these criteria. Existing syringe protectors are typically composed of numerous small pieces, do not permanently occlude the needle portion of a syringe, and/or are not readily compatible with a conventional medical syringe. There is a need for a syringe protector which is easily and permanently affixed to a conventional medical syringe without special tools, especially during times of high stress and relative inattention such as during emergencies. There also exists a need for a syringe protector that is comprised of a minimal number of parts which are easily formed using mass production techniques. Various aspects of the present invention address these needs.

SUMMARY

The following is not in any way to limit, define or otherwise establish the scope of legal protection. In general terms, the present invention relates to syringe protectors. In one embodiment, an annular clamping member is provided having a toothed exterior portion and at least one flexible flange portion, and a guard member is provided having a toothed interior portion. A medical syringe having a needle at one end is inserted through the clamping member and is compressibly gripped by the at least one flange portion as the clamping member is inserted into the guard member such that the needle of the syringe is at least partially enclosed by the body of the guard member. Pressure applied to the clamping member further drives the clamping member downward into the guard member and increases the compressive grip of the clamping member on the syringe. Interaction between the toothed surfaces of the clamping member and the guard member prevents the two pieces from separating and permanently locks the syringe in the protector.

In another embodiment, a clamping member is provided with a toothed interior and a guard member is provided with a toothed exterior.

In yet another embodiment, a plurality of guard members is fixed to a movable tray body.

It is one object of the present invention is to provide an improved device for protecting the needle portion of a medical syringe.

Further objects, embodiments, forms, benefits, aspects, features and advantages of the present invention may be obtained from the description, drawings, and claims provided herein.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded, perspective view of one example of a syringe protector with a conventional medical syringe.

FIG. 2 is an exploded, plan view of the syringe protector and syringe of FIG. 1.

FIG. 3 is a plan view of a partial cross-section of the syringe protector of FIG. 1.

FIG. 4 is an exploded, plan view of the syringe protector of FIG. 1.

FIG. 5 is an exploded, perspective view of the syringe protector of FIG. 1.

FIG. 6 is an exploded, plan view of a partial cross-section of the syringe protector of FIG. 1.

FIG. 7 is a plan view of a partial cross-section of another example of a syringe protector engaged with a syringe.

FIG. 8 is an exploded, perspective view of another example of a syringe protector with a medical syringe.

FIG. 9 is a side plan view of a partial cross-section of yet another example of a syringe protector.

FIG. 10 is a perspective view of still another example of a syringe protector.

FIG. 11 is a perspective view of a further example of a syringe protector.

FIG. 12 is a partial cross-sectional view of an alternative example of a clamping member.

FIG. 13 is a partial cross-sectional view of an alternative example of a guard member.

DESCRIPTION OF SELECTED EMBODIMENTS

For the purposes of promoting an understanding of the principles of the invention and presenting its currently understood best mode of operation, reference will now be made to the embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, with such alterations and further modifications in the illustrated device and such further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates.

Medical syringes are manufactured in a variety of styles and sizes and utilize various needle lengths. A conventional syringe 20 such as those used subcutaneously for the delivery of pharmacological preparations or the withdrawal of blood or other fluids, includes an integrally formed cylindrical housing 22, a gripping collar, a nozzle end 24 and an open end 26. The housing is typically formed for a type of polypropylene plastic. The syringe further includes a movable plunger having a gripping collar, a stem, and an elastomeric stopper. The plunger is inserted through the open end of the cylindrical housing such that the stopper forms a movable seal within the housing. By moving the plunger into the housing, fluid in the syringe is expelled through the nozzle end. Alternatively, by drawing an inserted plunger partially out from the housing a negative pressure is generated within the body of the syringe so as to draw fluid into the cylindrical housing through the nozzle end. A cannular needle 28 is fixably or removably mounted to the syringe such that fluid passing through the nozzle end also passes through the cannula of the needle.

The length and diameter of syringes and their needles vary according to the intended application. Syringes for applications such as subcutaneous insulin injection are typically less than 0.25 inches in diameter and have small needles such as a 0.5 inch long, 28 gauge diameter needle. Syringes for intramuscular injections are typically 0.25-0.5 inches in diameter and have larger needles such as a 1.5 inch long, 21 gauge diameter needle. Even larger syringes are designed for specialized applications and procedures. Still other syringe designs include Luer or Luer-Lok type syringes which have needles that are threaded onto the syringe body.

The following discussion refers to the structure and operation of a variety of syringe protectors with respect to a conventional medical syringe 20. It is understood that syringe protectors sized and adapted to accommodate non-standard syringes are also contemplated. Although the following discussion refers only to syringes, other examples of syringe protectors described herein may be used to secure other types of sharp medical instruments such as lancets,

glucometer sticks, and the like until disposal. The syringe protectors are typically constructed out of polypropylene, although other plastics, composites and suitable materials may also be used.

Turning now to the drawings, Figs. 1-7 show one example of a syringe protector 30. Syringe protector 30 comprises a clamping member 32 and a needle guard member 34. Clamping member 32 is ferrule-shaped in this particular example and includes a toothed exterior surface 36, a shoulder flange 38 defining an axial opening 40, and at least one flexible flange portion or member 42 extending from shoulder 38 and defining a flexible locking means. In this particular example, clamping member 32 is shown with four (4) flexible flanges. This is for illustrative purposes only and other examples have a greater or lesser number of flexible flanges. Optionally, the wall 44 of axial opening 40 includes one or more ribs or ridges 46 configured and arranged so as to be substantially parallel to the direction of axial opening 40. In other examples, one or more ribs or ridges are configured in orientations other than substantially parallel to the direction of the axial opening. Flange members 42 further include a toothed exterior surface 48 and a leading surface edge 50. In other examples, the clamping member is configured in other suitable shapes such as square, octagonal, and the like.

Needle guard member 34 is generally tubular-shaped defining a cavity 35 and includes a flared base 52 having a generally flat bottom surface 54, a toothed interior surface 56, and a generally annular shoulder 58 adjacent to an upper edge 60. In this particular example, all chamfers of toothed surface 48 of clamping member 32 and of toothed surface 56 of guard member 34 are disposed at approximately a 45° angle relative to the sides of clamping member 32 and guard member 34, respectively. Toothed interior 48 and toothed exterior 56 are configured and arranged such that when clamping member 32 is inserted into guard member 34, interaction between the toothed surfaces locks the two members together as shown in Fig. 3. In one example, syringe protectors 30 are provided in a "pre-loaded" configuration where at least the first tooth 48a of clamping member 32 and the first tooth 56a of guard member 34 are engaged.

Continuing with the present example, the interior diameter of the axial passage 40 of clamping member 32 is sized such that it receives the nozzle end 24 of a syringe 20 therethrough. The interior surface 62 of needle guard 34 is provided with a sloped deflecting surface 64 defined by a cross-sectional area of decreasing diameter arranged between base 54 and toothed surface 56. Sloped deflecting surface 64 abuttingly deflects leading surface 50 of flange portions 42 of clamping member 32 to force or deflect the flange portions radially inward as syringe clamping member 32 is urged downward in the direction indicated by arrow "a" into

needle guard member 34 as shown in Fig. 7. Urging clamping member 32 into needle guard member 34 also serves to deflect flange portions 42 radially inward and compressibly engages and locks nozzle end 24 of syringe 20 in syringe guard 30. When syringe 20 is engaged and locked in syringe guard 30, needle 28 is protectively surrounded by needle guard 34, thereby preventing accidental needle sticks until the syringe and guard combination is properly disposed of using mechanical shredding, incineration, and/or other suitable disposal means.

Another example of a syringe protector is shown in Fig. 8. In this particular example, protector 66 includes a clamping or actuating member 68 and a guard member 70. Actuating member 68 is shown as generally cylindrical in shape for illustrative purposes only. In other examples, alternative actuating member configurations such as those with square or octagonal cross-sections are also suitable. Actuating member 68 includes a cover portion 72, an axial opening 74, a toothed or ribbed inner surface (not shown) similar to the toothed surface of guard member 34 previously discussed with respect to Figs. 1-7, and a camming or deflecting surface similar to surface 64 in Figs. 1-7.

Guard member 70 is generally cylindrically shaped in this particular example with a flared base portion 76 to provide stability when protector 66 is placed upon a flat surface. Guard member 70 is further provided with a toothed exterior surface 78 and at least one flexible flange portions 80. In this example, guard member 70 is shown with four (4) flexible flange members. This is for illustrative purposes only and other examples will have a greater or lesser number of flange members. The toothed surfaces of actuator 68 and guard 70 are configured and adapted so as to cooperate in a ratcheting fashion when actuator 68 is urged over guard 70. In another example, a syringe guard is provided in a pre-assembled state prior to actual use, wherein the actuator is provided disposed downward onto the needle guard, initiating a ratchet engagement between at least the first teeth of the toothed surfaces of the actuator member and the guard member.

Continuing with Fig 8, a conventional medical syringe 20 is placed within axial passageway 74 of the actuator 68 by the user such that the needle 28 of syringe 20 extends downwardly into the interior cavity 82 of guard 70. Downward pressure exerted by the user on actuator 68 and syringe 20 urges actuator 68 in the direction indicated by arrow "b", whereby the internal camming surface of actuator 68 abuttingly engages and deflects flanges 80 radially inward. The radial deflection of flanges 80 compressibly clamps and locks the distal end 24 of syringe 20 thereby permanently enclosing needle 28 within cavity 82 so as to prevent accidental needle pricks.

A side plan view of a partial cross-section of yet another example of a syringe protector 84 is shown in Fig. 9. In this particular example, syringe protector 84 comprises a box or tray 86 and a plurality of clamping members 88-91. Tray 86 is shown as a box having a cavity 92 bounded on one side by a substantially flat surface 94 having a plurality of locking site openings 96-99. In this particular example, tray 86 includes four locking sites, but trays having a greater of lesser number of locking sites are also contemplated. Locking site 96 includes a toothed surface 100 having a plurality of teeth or ridges 102 and a sloped camming or deflecting surface 104. In this particular example, locking sites 96-99 are sized and adapted to accept clamping members of similar size and configuration. In other examples, the tray includes locking sites configured and adapted to accept clamping members designed to clamp and hold syringes of different sizes and/or configurations.

Continuing with Fig. 9, clamping members 88-91 are similar in structure and operation to clamping member 32 as previously described with respect to Figs. 1-7. Clamping member 88 includes at least one flexible flange 106 and a toothed or ridged surface 108 having a plurality of teeth 110 configured and arranged such that when clamping member 88 is inserted into locking site 96, interaction between the toothed surfaces locks clamping member 88 to locking site 96 and tray 86. Inserting a syringe through clamping member 88 and urging clamping member 88 down into locking site 96 causes camming surface 104 to abuttingly deflect flange 106 radially inward so as to compressively grip the syringe so that the needle portion of the syringe is safely disposed within cavity 92 of tray 86.

Fig. 10 is a perspective view of still another example of a syringe protector 112 comprising a tray 114 having four locking sites 116-119. In this particular example, a syringe 120 is shown locked in a clamping member 122. Another clamping member 124 is shown in the "pre-loaded" configuration. Fig. 11 shows a perspective view of a further example of a syringe protector 126. In this particular example, a tray 128 includes a plurality of guard members 130-132 similar to guard member 70 as previously described with respect to Fig. 8, and includes an actuating member 134 similar to actuating member 68. Operation of protector 126 is similar to that of protector 66 as previously described. Optionally, once a syringe is locked in actuating member 134 and guard member 130, the syringe and guard/actuating member combination can be removed from tray 128 and disposed of using a traditional method (e.g., shredding or incineration) or placed in a conventional sharps container for later disposal. In one example, the bases of guard members break away from the tray individually. In another example, the tray is perforated such as by score lines 129, 133 so as to allow the removal of one or more guard members from the tray either individually or in groups as desired.

An alterative clamping member 136 is shown in Fig. 12. In this particular example, clamping member 136 includes at least one tooth or barb 138 disposed on the inner surface 140 of the axial passage 142. Barb 138 is configured and arranged such as to prevent a syringe inserted through axial passage 142 from being withdrawn from clamping member 136. In other examples of clamping members, the internal surface of the axial passage may include a greater number of barbs or barbs of different shapes, sizes and configurations.

An alternative guard member 150 is shown in Fig. 13. In this particular example, guard member 150 has an outer wall 152 and an inner wall 160 which defines a cavity 156 having a base 158. Guard member 150 further includes a threaded portion 168, a sloped deflecting surface 162, and a syringe stop member 166 attached to inner wall 160 and disposed in cavity 164 between deflecting surface 162 and base 158. In this particular example, stop member 166 is an annular-shaped body having an opening 164 sized such that when a syringe is inserted in guard 150, a needle will pass through opening 164, but the nozzle an/or cylindrical body of the syringe will abut stop member 166. Further, stop member 166 is positioned such that when the syringe abuts stop member 166, the needle does not contact base 158, thereby preventing needle from accidentally being forced through base 158 by the application of too much force to the syringe. In other examples, the placement of stop member 166 is determined by the type and size of syringe used. In other examples, another configuration of a stop member or abutting surface is used such as a narrowing of the guard cavity.

While some embodiments of the invention have been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character. It is understood that one of ordinary skill in the art could readily make a nigh-infinite number of insubstantial changes and modifications to the above-described embodiments, and that it would be impractical to attempt to describe all such variations in the present specification. Accordingly, it is understood that all changes and modifications that come within the spirit of the invention are desired to be protected.

What is claimed is:

1. A syringe protector for enclosing the needle portion of a syringe, comprising:

a clamping member having a toothed surface, an axial passage adapted to receive a syringe therethrough, and at least one flexible flange portion; and

a guard member having a toothed surface and a deflecting surface;

wherein interaction between the toothed surface of the clamping member and the toothed surface of the guard member lockably engages the clamping member and the guard member; and

wherein the deflecting surface deflects the at least one flange portion so as to compressively grip a syringe inserted through the axial passage.

2. The syringe protector of Claim 1, wherein the clamping member further includes a second toothed surface configured and arranged such that the second toothed surface engages the syringe inserted through the axial passage when the at least one flange is deflected.

3. The syringe protector of Claim 1, wherein the clamping member includes at least two flexible flange portions.

4. The syringe protector of Claim 1, wherein the clamping member includes at least four flexible flange portions.

5. The syringe protector of Claim 1, wherein the at least one flange portion includes a toothed surface.

6. The syringe protector of Claim 1, wherein the toothed surface of the clamping member is an exterior surface and the toothed surface of the guard member is an interior surface.

7. The syringe protector of Claim 1, wherein the toothed surface of the clamping member is an interior surface and the toothed surface of the guard member is an exterior surface.

8. The syringe protector of Claim 1, wherein the axial passage of the clamping member further includes a plurality of ridges that compressively grip a syringe and which are substantially parallel to the axial passage.

9. The syringe protector of Claim 1, wherein the guard member further includes a stop member configured and arranged so as to allow the needle of a syringe to pass therethrough and to abut the body of the syringe.

10. A syringe protector kit, comprising:

a plurality of clamping members having a toothed surface, an axial passage adapted to receive a syringe therethrough, and at least one flexible flange portion; and

a guard tray having a plurality of locking sites, each locking site adapted to receive one of the plurality of clamping members, each locking site having a toothed surface and a deflecting surface;

wherein interaction between the toothed surface of a clamping member and the toothed surface of a locking site lockably engages the clamping member and the guard tray; and

wherein the deflecting surface of a first locking site radially deflects the at least one flange portion of a first clamping member so as to compressibly grip the syringe inserted through the axial passage.

11. The kit of Claim 10, wherein each of the plurality of locking sites is engaged with one of the plurality of clamping members.

12. The kit of Claim 10, wherein each of the plurality of locking sites is individually separable from the guard tray.

13. The kit of Claim 10, wherein each of the plurality of clamping members further include a second toothed surface configured and arranged such that the second toothed surface engages the syringe inserted through the axial passage when the at least one flange is deflected.

14. The kit of Claim 10, wherein the axial passage of the plurality of clamping members further include a plurality of ridges which are substantially parallel to the axial passage.

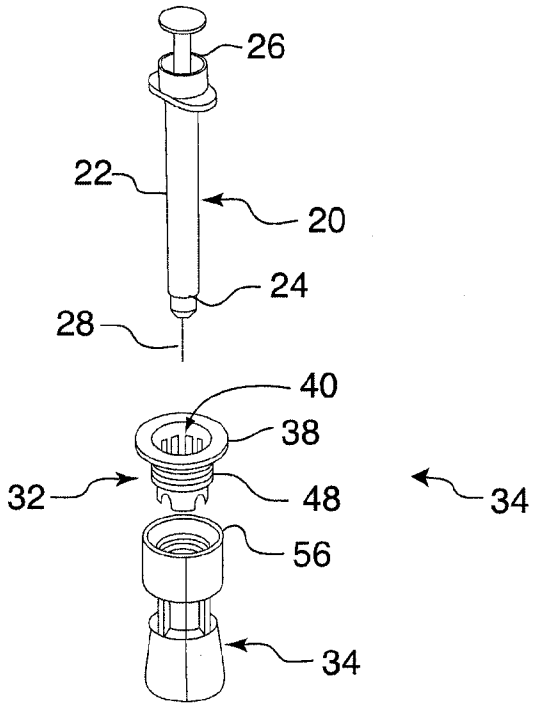

FIG. 1

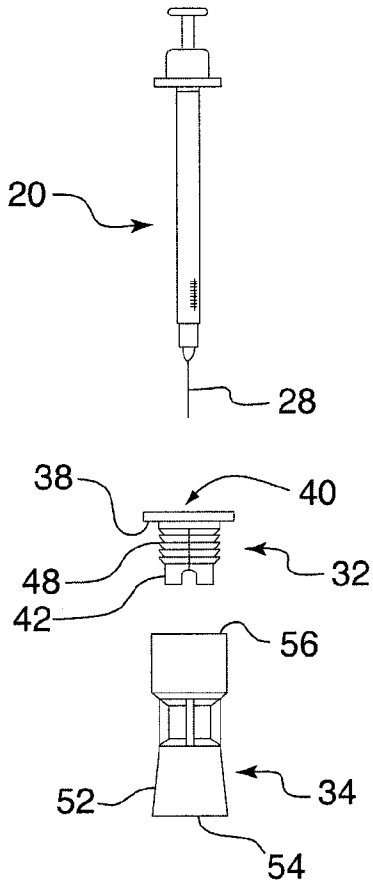

FIG. 2

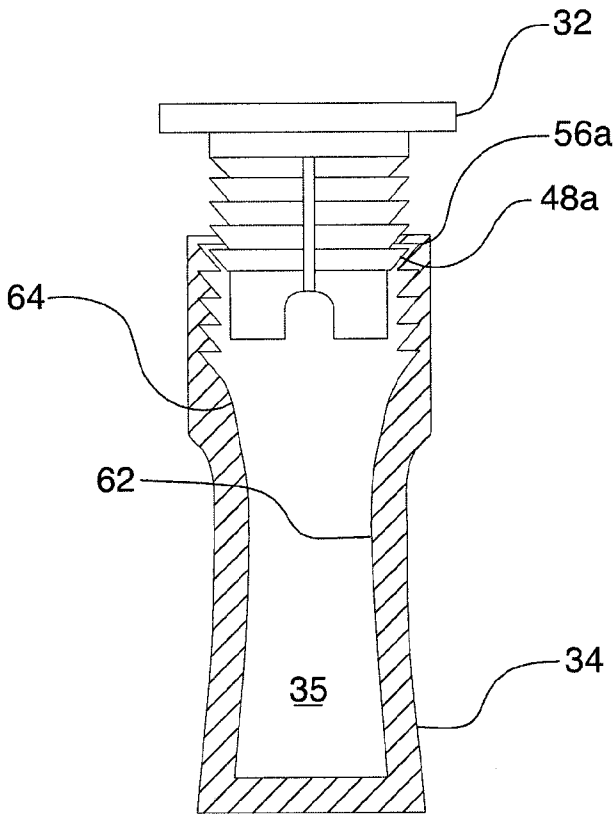

FIG. 3

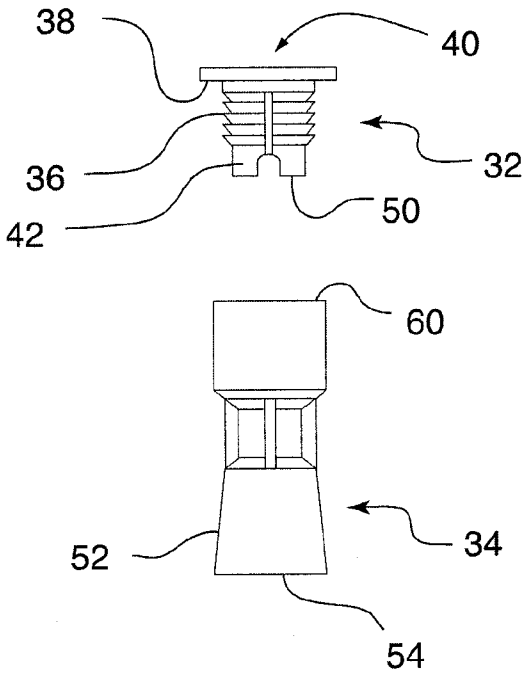

FIG. 4

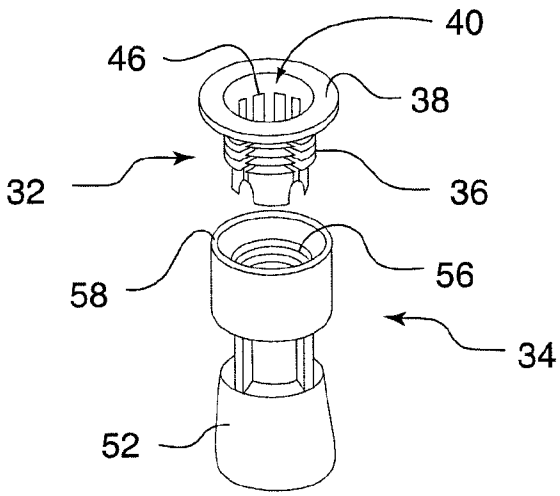

FIG. 5

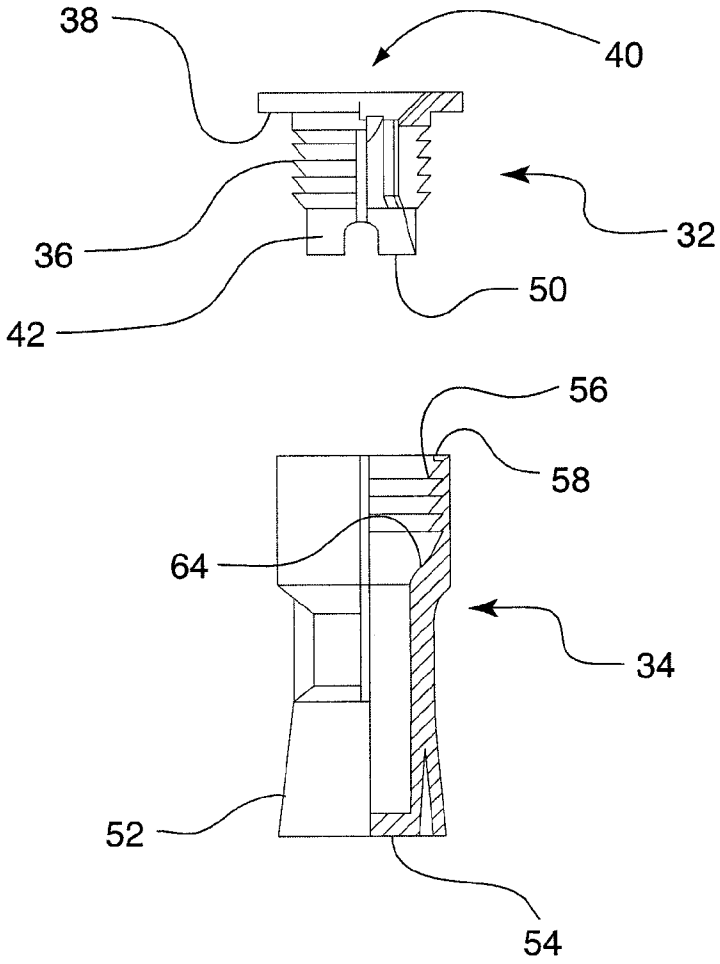

FIG. 6

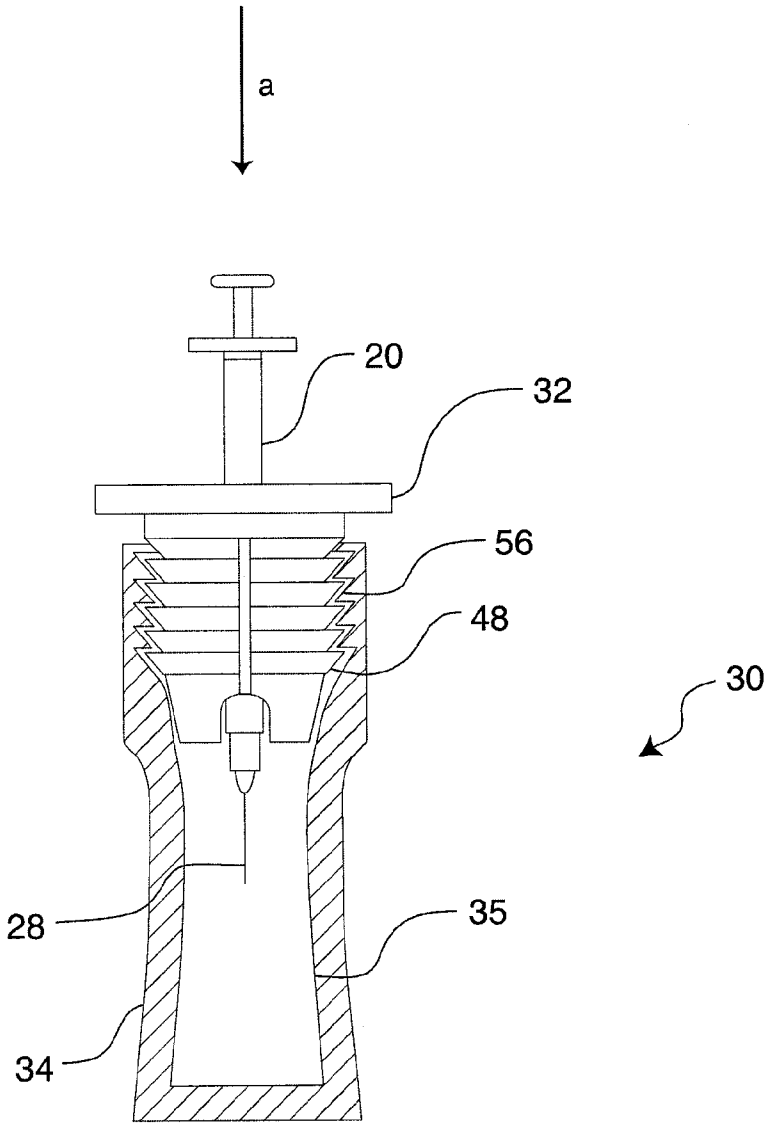

FIG. 7

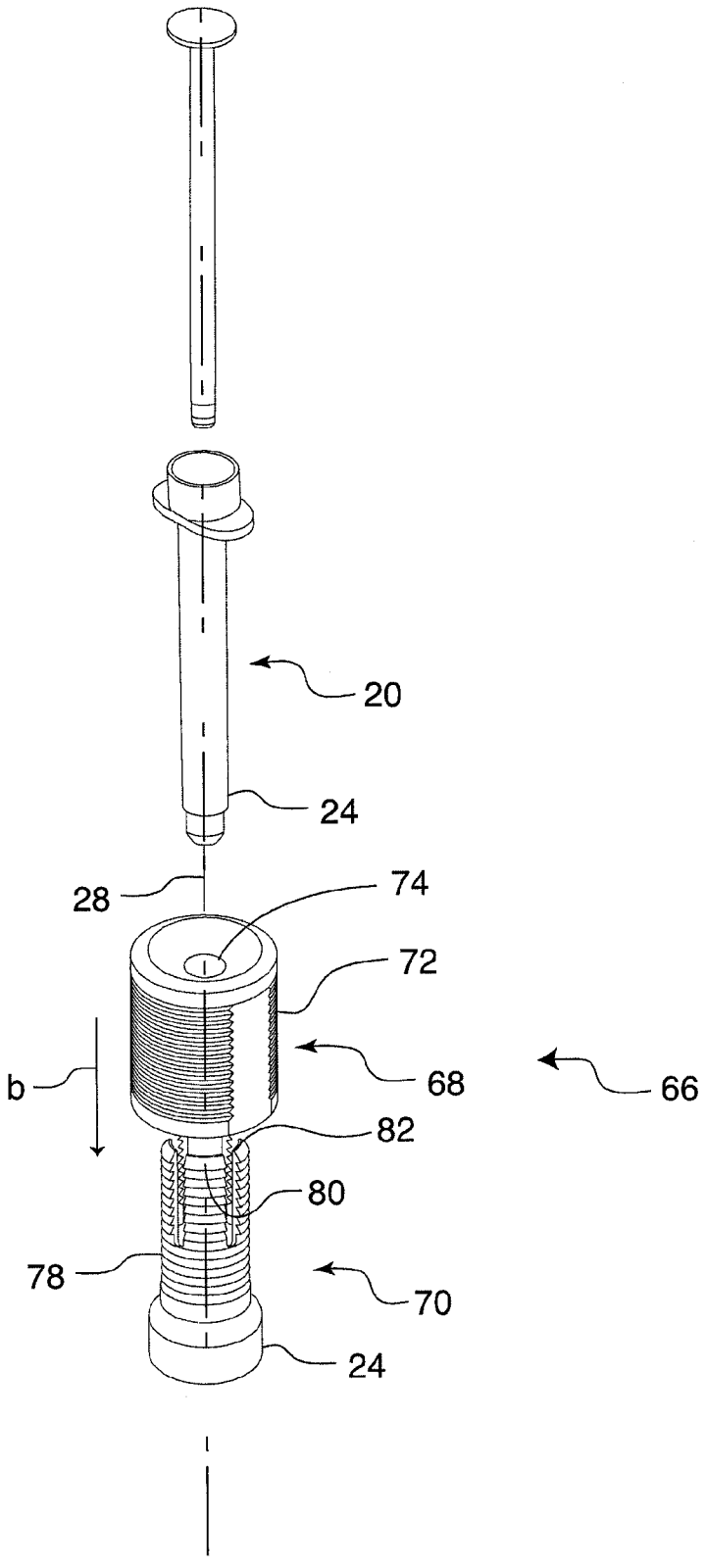

FIG. 8

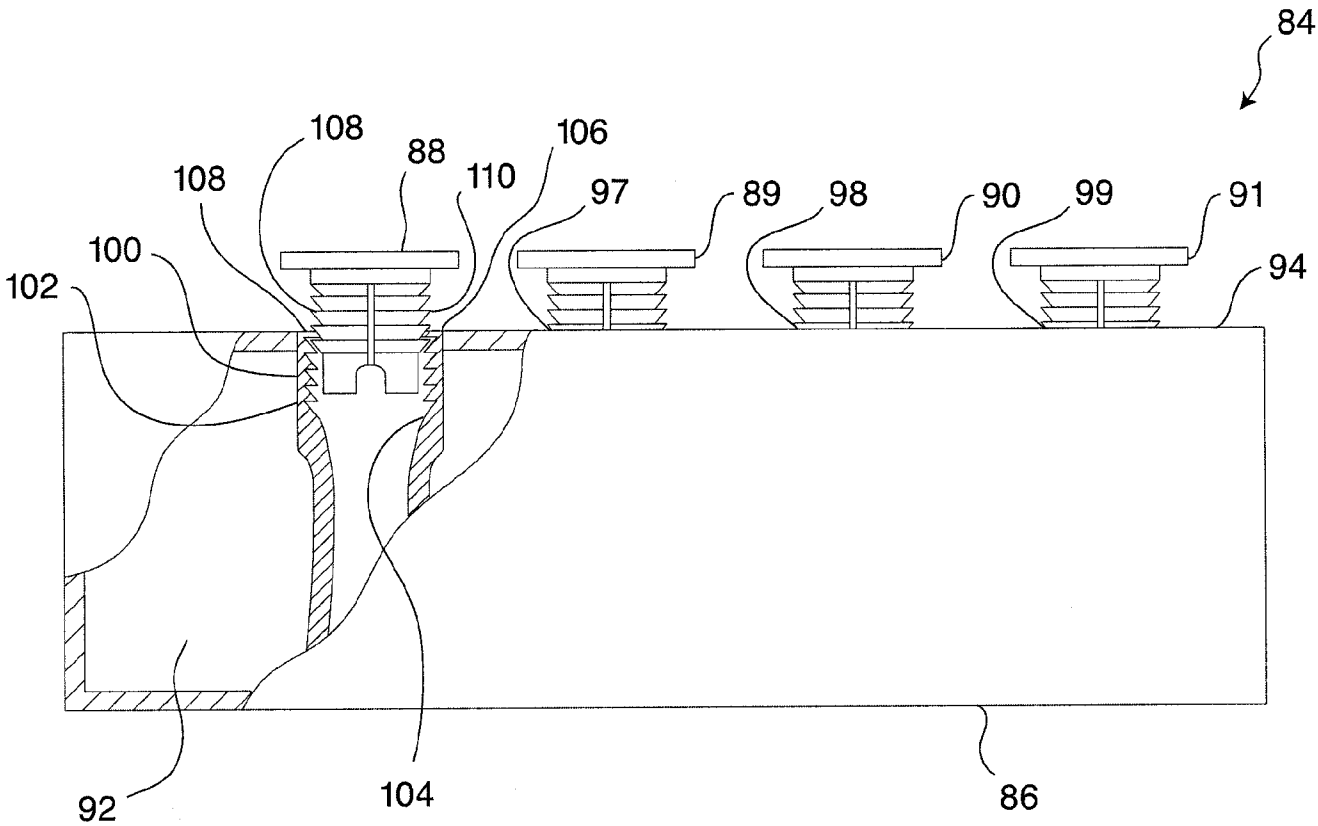

FIG.9

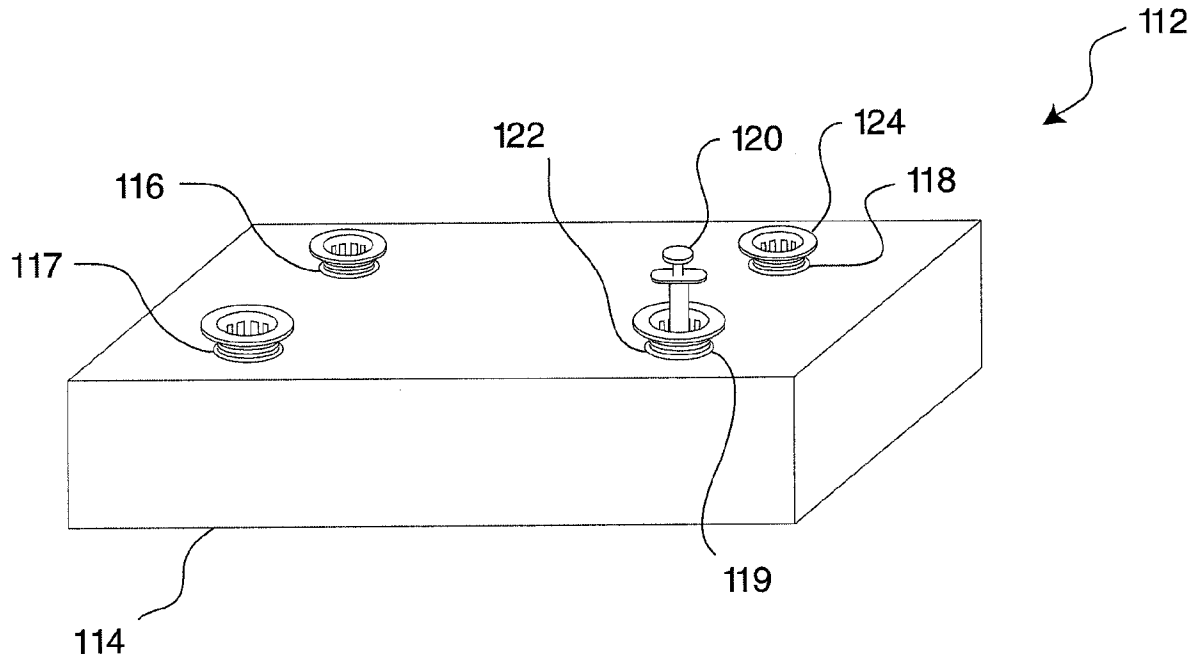
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FIG. 10

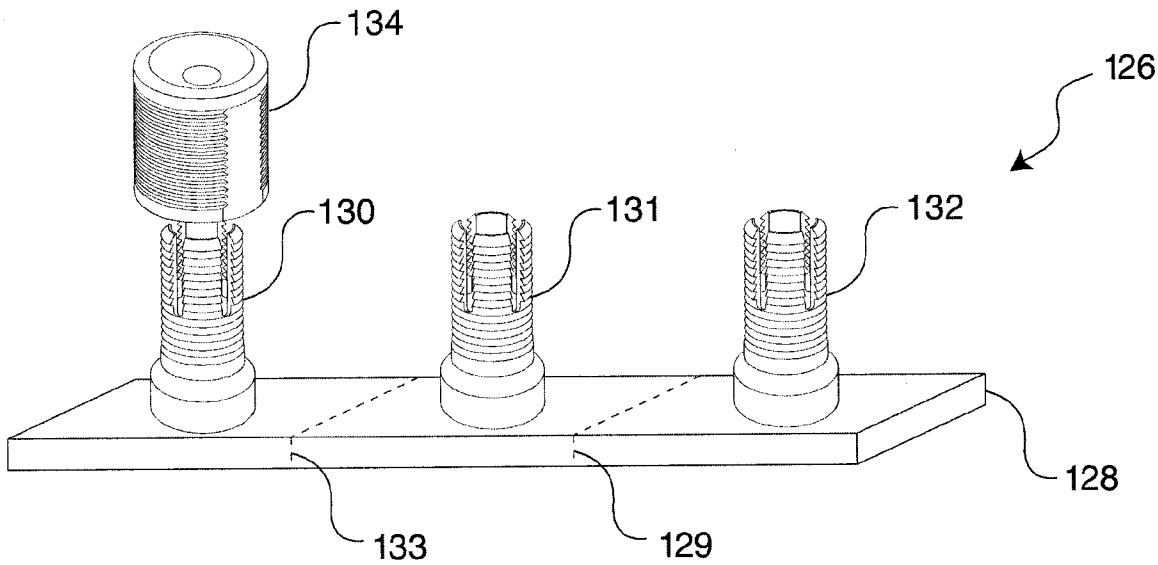
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FIG. 11

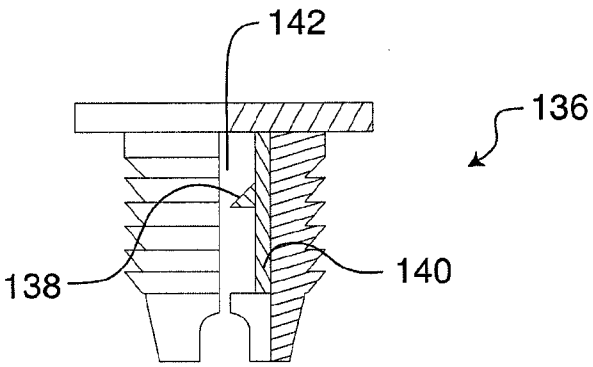

FIG. 12

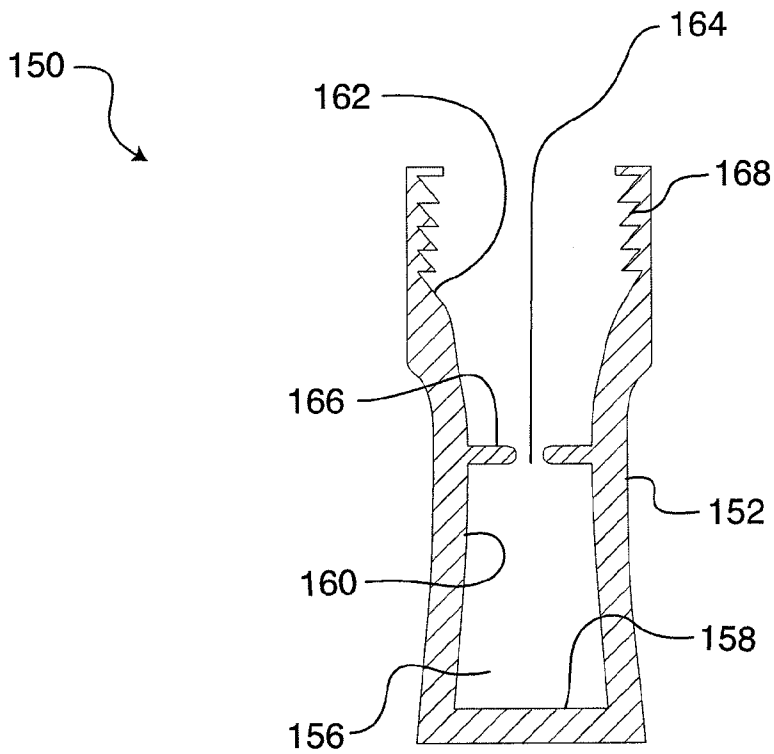

FIG. 13