Oct. 14, 1958 E. HENDERSON 2,855,927

HYPODERMIC NEEDLE MOUNT

Filed May 5, 1955 2 Sheets-Sheet 1

Fig. 1

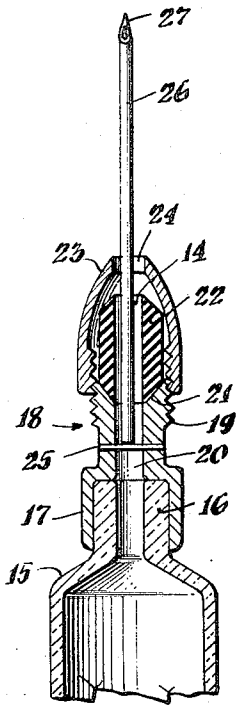


Fig. 2

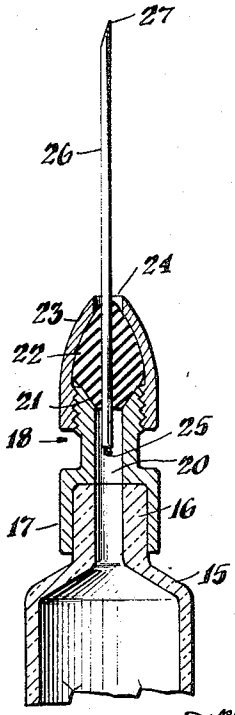


Fig. 3

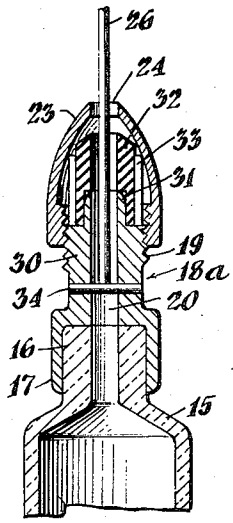


Fig. 4

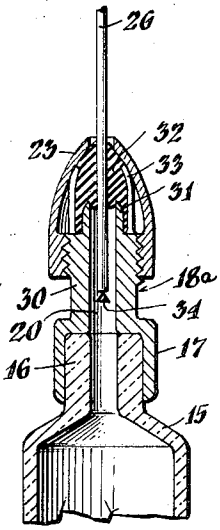


Fig. 5

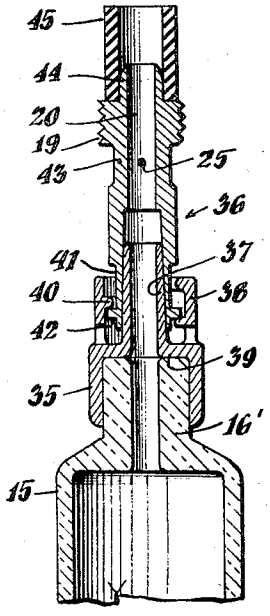


Fig. 6

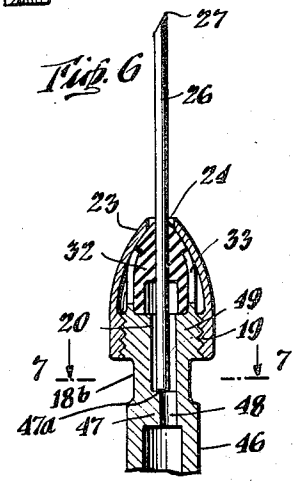


Fig. 7

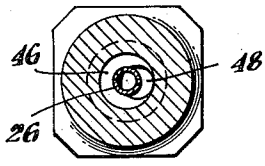
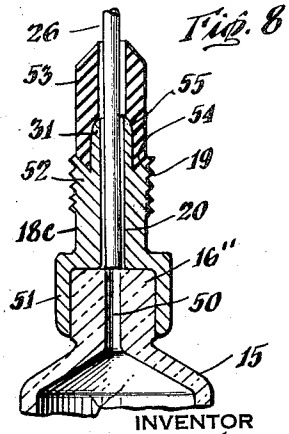


Fig. 8



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Fig. 9

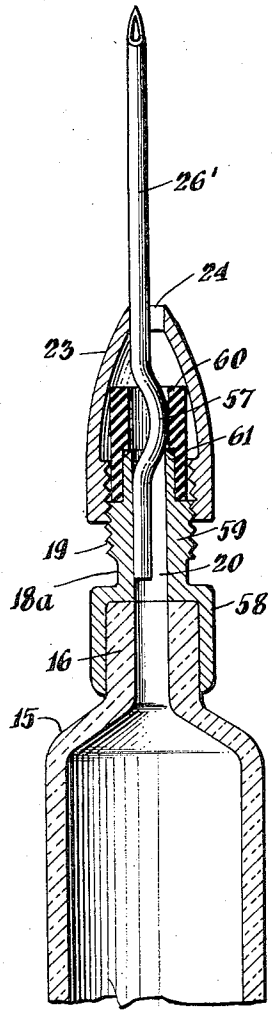
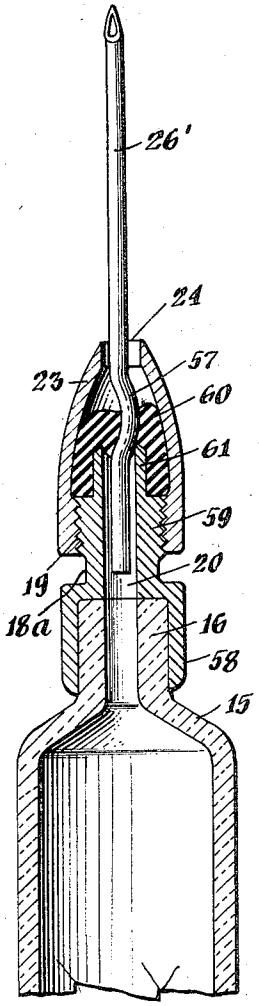


Fig. 10



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HYPODERMIC NEEDLE MOUNT

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9 Claims. (Cl. 128—218)

This invention relates to a hypodermic needle mount for releasably and resiliently holding a hypodermic needle securely in place for use.

Known types of hypodermic needle mounts include those which are adapted for rigidly holding needles of uniform diameter from end to end and others which accommodate only needles of special construction, as with flared ends, intermediate flanges or other peripherally projecting parts. In the first mentioned group, are mounts provided with clutch devices of metal or other rigid material. These have disadvantages which greatly limit their use. For example, a rigid clutch can effectively retain only needles of a given diameter under conditions which avoid leakage; or, as an alternative, must be employed with adequate gaskets. A further disadvantage of the rigid or unyielding clutch mount is that a needle so held is easily broken by lateral impact.

Known clutch type mounts also have the disadvantage that too much time and care are required in replacing needles, particularly under conditions which make the time factor critical. Thus, where there is no inner end stop to quickly and automatically limit inward movement of the needle, valuable time can be wasted in trying to place it accurately in the clutch. Also, without such a stop, undue handling of the needle is involved with consequent increased likelihood of its contamination before use.

Where the mount receives only needles specially formed to limit their inward movement, its use is, to that extent, restricted because such needles are not in abundant supply and are more expensive than conventional types of needles which are commonly of uniform diameter.

It is an object of the present invention to provide an improved needle mount assembly which retains the needle securely but resiliently in place when in use and provides a positive stop to limit inward displacement of the needle even when considerable force is applied thereto, but which nevertheless may be readily opened and closed, when desired, to permit the convenient and rapid insertion, adjustment and removal of the needle.

A further object of the invention is the provision of an improved hypodermic needle mount of the above character which may be readily cleaned and sterilized.

Another object of the invention is the provision of an improved needle mount having means for retaining an inexpensive needle of substantially uniform diameter from end to end so that the needle can be discarded if desired after use. Such needles may advantageously be packed in improved sterile packages which permit shipping, storage, handling and insertion in the mount for use without contamination.

It is also an object of the invention to provide an improved shock absorbing mount for a hypodermic needle which embraces a shank portion thereof in a cushioning element for absorbing and minimizing shocks or impacts to the needle applied in a transverse or lateral direction.

My invention contemplates the provision of an improved hypodermic needle mount or holder having a

collet made of a material having the characteristic of rubber and provided with an opening arranged and adapted to releasably retain securely a hypodermic needle in place for use. When the collet is in normal unstressed or released condition, a needle of uniform diameter from end to end may be readily inserted in or removed from said opening. An adjustable member is provided for stressing the collet so that the material thereof flows into gripping engagement with a shank portion of the needle to securely hold it in place. The collet thus serving as the sole retainer for the needle, not only securely holds it against accidental endwise displacement but also serves as a shock absorber minimizing impacts and shocks imparted to the needle in a lateral or transverse direction.

A positive stop is preferably provided to engage the needle and limit the imward displacement thereof.

Other objects of the invention will be apparent from the following detailed description of the drawings in which—

Fig. 1 is a central longitudinal sectional view of my improved hypodermic needle mount showing a needle with a portion of its shank positioned loosely in the collet thereof which is in normal, unstressed condition;

Fig. 2 is a view similar to Fig. 1 showing the mount in closed position with the collet stressed so as to grip and securely retain the needle in position for use;

Fig. 3 is a central longitudinal sectional view similar to Fig. 1 showing a modified form of mount in which resilient prongs embrace the collet and a slightly different form of needle stop is employed;

Fig. 4 is a similar view showing the collet of Fig. 3 in closed position gripping the needle;

Fig. 5 is a central longitudinal sectional view of a further modified form of the collet in a mount adapted to fit the outer end or tip of a hypodermic syringe having a detachable tip;

Fig. 6 is a central longitudinal view of a further modified form of mount similar to that shown in Fig. 5 and in which a portion of the passageway through the tip is offset to form a shoulder that serves as a positive stop;

Fig. 7 is a cross-sectional view in the direction of the arrows on the line 7—7 of Fig. 6;

Fig. 8 is a central longitudinal sectional view of a further modified form of collet and tip applied to a syringe and showing that the other end or tip of the syringe may, in certain instances, serve as a positive stop for the needle; and

Figs. 9 and 10 are central longitudinal sectional views of a further modified form of needle mount embodying my invention shown in open and closed positions, respectively, and illustrating a needle mounted therein with a laterally offset shank portion engaging the tip which serves in such case as a positive stop.

Referring now to Figs. 1 and 2, the invention is there illustrated as embodied in a mount applied to the barrel 15 of a hypodermic syringe. The barrel may be made in the usual manner of glass, plastic material or the like with a tubular neck 16 at the outer end thereof to which the base flange 17 at one end of the tubular tip 18 is suitably secured, as by being cemented thereto.

The tip 18 may be made of any suitable material, as metal, with its outer end threaded at 19. Its central bore 20 is larger in diameter than any of the needles to be used with the mount and extends through the tip with its lower or inner end communicating with the interior of the syringe barrel, as shown, through a similar bore in said neck 16 and with its outer end positioned to receive an inner end shank portion of a needle.

The outer end of tip 18 is countersunk or recessed as shown at 21 around bore 20 to provide a seat for one end of a collet 22 in the form of a tubular sleeve

or bushing made of a flexible resilient material having the characteristics of rubber, such as natural rubber, synthetic rubber, or a natural or synthetic silicone rubber and having a longitudinal bore **14**. Both ends of said collet may be tapered, as shown, so that either will conform with the correspondingly tapered contour of said counterbore **21**. Thus, the collet may be mounted in the end of tip **18** with either end engaging said counterbore **21**.

The bore **14** through collet **22** is larger in diameter than the outside diameter of the largest size hypodermic needle appropriate for use with the mount so that when said collet is in normal unstressed condition, as shown in Fig. 1, the needle may be readily inserted in and removed therefrom. Although rubber of the consistency useful for this purpose is substantially non-compressible, it will flow or shift its position under compression. Accordingly, when stress is applied to the collet with a needle positioned therein, the material thereof will flow into gripping engagement with the needle in the manner shown in Fig. 2 and so securely retain the needle in place for use.

To accomplish this result, I provide suitable collet stressing means one form of which includes a compression cap **23** internally tapered from a wide bottom opening to a narrower top opening **24** and which is provided with threads on a portion of the inner surface engaging with the threads **19** on tip **18**. In this manner, cap **23** is adjustably mounted on tip **18** so that it can readily be manipulated from open or needle receiving and releasing position, as shown in Fig. 1 with the collet unstressed, to closed position with the cap **23** stressing collet **22** so as to cause it to tightly grip a shank portion of the needle **26**.

The outer end opening **24** of compression cap **23** is substantially larger in diameter than any of the needles to be used with the assembly. Inasmuch as the passage **20** in tip **18** and the opening **24** in cap **23** are larger than the needle, the latter is engaged and securely retained in the mount when cap **23** is tightened, solely by means of said collet **22**. In addition, it will be seen that the collet of rubber or equivalent substance provides a resilient cushion which permits rocking of the needle out of its axial position and thus functions as a shock absorber for absorbing and minimizing laterally directed impacts and serves as a watertight seal to prevent passage of fluid either around the needle or around the collet. It is contemplated that a relatively small degree of angular displacement of the needle will be useful and will be permitted where the bore **20** and the opening **24** are sufficiently larger in diameter than needle **26**.

In addition to collet **22** and other parts cooperating to retain needle **26**, I also provide a suitable positive stop in the path of a portion of the needle. This may take any desired form as, for instance, a pin **25** of smaller dimension than the passage **20** and mounted transversely therein so as to be engaged by the inner end of the needle when it is inserted therein. The stop should not block the flow of fluid through the needle; and for this purpose, may be positioned off center with respect to the passage **20**, or it may be of suitable cross-sectional shape, as indicated in Figs. 1 through 5, so as not to block the lower end opening in the needle.

The hypodermic needle **26**, as shown, is of conventional type, but without hub or bead, is of uniform diameter and has a central bore and a pointed outer end **27**. It is contemplated that a mount according to my invention will securely hold these needles which are free from any needle hub, attaching bead or like enlargement. That portion of the shank of needle **26** which engages the collet may be roughened or knurled at **63**, as shown in Fig. 14, so as to provide additional frictional grip, if required, between the collet and needle. The mount is thus adapted to employ needles of relatively simple and inexpensive construction which may be freely discarded after use.

In using a hypodermic device embodying my invention as above described, the cap **23** is rotated to open or non-compressing position to bring collet **22** into normal unstressed condition. The shank end of hypodermic needle **26** may then be easily and rapidly inserted in the mount until it engages the fixed stop **25**. The compression cap **23** is then tightened sufficiently to stress collet **22** by compression into secure gripping engagement with the needle **26** to securely retain it in place for employment in the usual manner.

It will thus be seen that my improved three-part hypodermic needle mount is simple to use; and that although the needles may be readily inserted and removed, they are securely retained in the mount while in use. In addition, needle breakage is minimized due to the fact that the needle is free to rock slightly against lateral cushioning means so that lateral shocks or impacts imparted thereto are absorbed or minimized by the collet **22** which forms the sole retaining means for the needle.

In the modified form of my invention shown in Figs. 3 and 4, the outer end of tip **18*a*** is not recessed or counterbored as in Figs. 1 and 2. Instead, it is provided with a projecting collar or flange **31** of reduced outside diameter which fits into a coaxial recess in the lower end of collet **32** which is made of resilient material similar to that of the collet shown in Figs. 1 and 2 and has a similar central bore and tapered outer end. Thus, the inner end of the collet **32** can be telescoped over flange **31** of tip **18*a*** and thus, to that extent, be more securely and accurately held in needle receiving position when cap **23** is loosened or removed.

The collet stressing means in Figs. 3 and 4 includes, besides cap **23**, a plurality of resilient prongs **33** which embrace the collet and are preferably secured to the outer end of the tip. When the cap **23** is in the open position shown in Fig. 3, the prongs project outwardly in parallel relationship and do not apply stress to the collet. When the cap **23** is tightened to the position shown in Fig. 4 it deflects end portions of the prongs **33** inwardly causing them to stress the collet, with the result that the material thereof flows into gripping engagement with the needle. When cap **23** is adjusted to open position, the prongs **33** will again spring outwardly, as shown in Fig. 3, relieving the stress on the collet and releasing its grip on needle **26**.

The cross pin **34** serving as the positive stop for needle **26** may be of different cross-sectional configuration from that shown in the first described form of my invention, as, for instance, triangular; and the assembly shown in Figs. 3 and 4 may be used in the same manner and to the same advantage as the form of mount shown in Figs. 1 and 2.

Referring now to Fig. 5, I have shown a modified form of collet **45** applied to a well-known type of removable tip **36** which can readily be attached to and removed from a standard syringe by actuating a coupling member **38**. The barrel **15** of a hypodermic syringe is shown as formed with an integral tip **16'** of slightly modified form to which is permanently secured the base flange **35** of a coupling member which receives the removable tip assembly shown generally at **36**.

The coupling member includes the externally tapered neck portion **37** and the larger concentric flange **38** disposed therearound and both of which are secured to the base portion **39** which in turn is integral with the base flange **35**. The flange **38** is internally threaded as shown at **40**. The removable tip assembly is provided with a tubular connecting portion **41** at its lower end which is internally flared so as to fit over the tapered neck **37** and is provided with external threads **42** which mesh with the threads **40**.

The tip assembly may be coupled with the syringe by applying the lower end thereof to the neck **37** and turning the tip assembly in a clockwise direction so that the

threads cause the flared coupling portion 41 to tightly grip and tightly engage and seal against the outer surface of the tapered neck 37. The parts may be uncoupled by turning the tip assembly in an anti-clockwise direction.

The tip 36 is in general similar to tip 18*a*, Figs. 3 and 4, being provided with a similar internal bore or passage 20 larger in diameter than any of the needles to be received therein. Tip 36 is also threaded at 19 to receive a stress applying member, such as cap 23, as shown in Figs. 1 and 2. A suitable positive stop for the needle is also provided as, for instance, cross pin 25 extending across the passage 20. A retaining flange 44 similar to flange 31, Figs. 3 and 4, projects beyond the outer end of tip 36 as shown so as to receive and hold in place the collet 45 made of suitably resilient materials, as above described in connection with collets 22 and 32. Said collet shown in Fig. 5 is, however, of cylindrical shape and of uniform inside and outside diameter from end to end. The inside diameter of collet 45 is considerably larger than the diameter of the needle to be inserted therein but of such dimension that, when the cap is tightened, the collet is stressed sufficiently to cause it to flow into gripping engagement with the needle.

In Figs. 6 and 7, I have shown a tip 18*b* having a central needle receiving bore or passageway 20 partially blocked at its inner end by a projection 47 which presents a shoulder 47*a* and defines an eccentrically disposed passageway 48, so that when needle 26 is inserted in the bore 20, its inner end will engage and rest on the shoulder 47*a* which thus serves as a positive stop. However, as shown in Fig. 7, at least a portion of the opening through the needle communicates with the eccentric passage 48 so that the fluid contents of the hypodermic syringe can be expelled through the needle. In other respects, the needle mount shown in Figs. 6 and 7 is similar to that shown in Figs. 3 and 4.

In Fig. 8 I have shown a modified form of needle mount wherein the parts are so arranged that the discharge end of the syringe may serve as the positive stop for the needle. Thus, flange 51 of tip 18*c* is permanently secured to the neck 16'' of the syringe 15 with bore 20 communicating with bore 50 of said syringe. The bore or passage 20 is somewhat larger in diameter than the largest needle to be used therewith and is also larger than the passage 50. Accordingly, needles of greater outside diameter than the passage 50 may be received therein, as shown, and with their inner ends resting on the end of neck 16'' at the end of the syringe barrel which thus serves as a positive stop while at the same time fluid may be expelled through the passage 50 into the bore of the needle.

The tubular collet 53 of rubber or the like, as in previously described collets, is tapered at both ends as shown and assembled with its inner end nested into a tapered recess 54 provided in the outer end of tip 18*c*. The inner end of collet 53 is recessed as shown at 55 to receive an attaching flange 31 provided at the outer end of tip 18*c*. The opening through collet 53 is at least as large as the passage 20 through 18*c* so that the needle 26 may be freely inserted in said passage and said opening when the collet is in unstressed condition.

The needle mount above described and as shown in Fig. 8 is used in similar fashion to those previously described and is particularly suitable for use with larger diameter needles and should generally not be used with small needles.

As shown in Figs. 9 and 10, a mount such as that shown in Figs. 3 and 4, may also be employed to receive a modified form of needle, as 26' which is provided with a laterally offset portion such as the small bend 57 positioned to engage an upper edge portion of the tip 18*a*. Said needles 26' are of uniform diameter from end to end and are free of any attaching hub or bead. The lateral offset or bend 57 does not involve any sharp angles and, accordingly, does not materially affect the cross-sectional area of the bore or the passage of fluid through the needle.

In the embodiment shown in Figs. 9 and 10, a tip 18*a* is provided with an internal passage 20 and exterior threads 19 which engage with the threaded cap 23 serving to stress collet 60 which, as in other forms of my invention, is made of a material having the characteristics of rubber. The opening through collet 60 is at least as large as the passage 20 when the collet is in unstressed position, and passage 20 and end opening 24 are large enough to permit some rocking or inclining displacement of needle 26 when it encounters a laterally applied force. Said collet 60 has a cylindrical external diameter but is recessed as shown at its lower end to accommodate the attaching flange 61. The opening 24 through cap 23 as well as the opening through collet 60, when the collet is in unstressed condition, are large enough to permit passage of the offset 57 to operative position. However, the passage 20 while receiving the lower end of needle 26' is not large enough to accommodate the offset 57 with the result that the later rests upon an upper edge portion of the flange 61 which thus serves as a positive stop. In use, needle 26' is inserted in the mount until the offset 57 comes to the position just described. Thereupon cap 23 is tighened, stressing the rubber collet 60 and causing it to grip needle 26' and retain it securely in place for use.

From the foregoing, it will be seen that I have provided an improved hypodermic needle mount which serves to retain the needle firmly in place when in use; which includes a positive stop that limits the inward displacement of the needle even when considerable force is applied thereto; and which may be readily opened and closed when desired to permit the convenient insertion and removal of the needle. The mount also provides means for cusioning hypodermic needles against shocks or impacts imparted to the needle in a transverse or lateral direction. Furthermore, a mount according to my invention permits the use in one embodiment of relatively simple and inexpensive needles of various sizes which can be discarded if desired after use and which can be packaged in a sterile package which facilitates shipping, storage and use of the needles without contamination. It also appears that a needle mount having the structural features above described lends itself particularly to effective use in situations, as the battlefield or public calamities, where many patients must be treated in minimum time with optimum effect.

Modifications may be made in the illustrated and described embodiments of the invention without departing from the invention as set forth in the accompanying claims.

1. An improved hypodermic needle mount for releasably retaining in place a hypodermic needle of substantially uniform diameter from end to end and cooperable to be applied to a hypodermic syringe barrel comprising: a tip having a passage therein cooperable to be applied to a hypodermic syringe barrel with the passage in communication with the barrel; a collet made of a flexible resilient material having the characteristics of rubber positioned coaxially with said passage, said collet being in tubular form with a central opening large enough when the collet is in normal unstressed condition to freely receive the shank of a hypodermic needle to be retained in the mount; a collet stressing cap operatively engaging the collet and adjustable on said tip to apply stress to the collet and thereby cause portions thereof to flow into gripping engagement with a hypodermic needle inserted therein to provide the sole means for retaining the needle in the mount; and means providing a positive stop associated with said tip adjacent the passage therein for engaging the needle to limit the inward displacement thereof.

2. An improved hypodermic needle mount of the type set forth in claim 1 in which the tip is threaded and the collet stressing cap is in threaded engagement with the threads of the tip.

3. An improved hypodermic needle mount as set forth in claim 1 in which the positive stop comprises a pin of smaller transverse dimension than the passage mounted in said tip and extending across the passage.

4. An improved hypodermic needle mount as set forth in claim 1 which includes resilient prongs embracing the collet, and the collet stressing cap has threaded engagement with the tip and is engageable with said prongs to deflect end portions thereof inwardly upon the collet.

5. An improved hypodermic needle mount for releasably retaining in place a hypodermic needle of substantially uniform diameter from end to end and cooperable to be applied to a hypodermic syringe barrel comprising: a tubular tip having an externally threaded portion and a passage extending therethrough and larger in diameter than the hypodermic needle to be inserted therein, said tip being cooperable to be applied to a hypodermic syringe barrel with the passage in communication with the barrel; a tubular collet made of a flexible resilient material having the characteristics of rubber and having a central opening large enough when the collet is in normal unstressed condition to freely receive the shank of a hypodermic needle to be retained in the mount, said tip and collet having cooperating means for retaining them in assembled relationship with the collet extending beyond and engaging the end of the tip and with the opening therein forming a continuation of the passage in the tip; collet stressing means including an internally threaded cap applied to the threaded portion of the tip and operatively engaging the collet whereby the cap may be adjusted on the tip to apply stress to the collet and cause portions thereof to flow into gripping engagement with a hypodermic needle inserted to thereby provide the sole retaining means to retain the needle in the mount, said cap having an opening through its outer end larger than the needle to be inserted therein for accommodating the needle; and means providing a positive stop associated with said tip adjacent the passage therein for engaging the needle to limit the inward displacement thereof.

6. An improved hypodermic needle mount as set forth in claim 5 in which the cooperating retaining means on the tip and collet includes a recess in the end of the tip and a complementary projecting portion formed on the end of the collet.

7. An improved hypodermic needle mount as set forth in claim 5 in which the cooperating retaining means on the tip and collet includes a flange of reduced diameter compared to the tip projecting from the end of the said tip and frictionally engaging the inner surface of the collet.

8. An improved hypodermic needle mount as set forth in claim 5 in which the cooperating retaining means on the tip and collet includes a plurality of spring prongs projecting from the end of the tip and embracing the collet, said prongs being in operative engagement with the cap so that when the latter is tightened it engages the prongs to cause them to apply stress to the collet.

9. In a hypodermic needle mount, the combination of a tip having a longitudinal bore arranged and adapted to receive a portion of a needle shank, needle retaining means carried at one end of said tip and adjustably movable for gripping and releasing a needle shank whereby the needle is prevented from being pulled out of the mount when said retaining means is in gripping engagement with said shank, and stop means carried by said tip in the form of a rod extending transversely across the bore in position to be engaged by the inner end of the needle and effectively limit the extent of endwise inward movement of said needle therein.

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