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(54) **TRAY FOR HANDLING SYRINGE BARRELS**

SCHALE ZUR HANDHABUNG VON SPRITZENKOLBEN

PLATEAU DE MANUTENTION DE CORPS DE SERINGUE

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Description

[0001] This invention relates to the combination of a plurality of syringe barrels and a handling system therefor, suitable for use in the course of the manufacture and preparation of syringes pre-filled with a drug for subsequent injection.

[0002] A known step in the preparation of pre-filled syringes is the manufacture of a syringe barrel and then the loading of a plurality of those syringe barrels into a so-called tub, for storage and transport purposes to a location where the syringe barrels will be charged with a medicament and fitted with a stopper and a plunger, so permitting the subsequent performance of an injection. The tub has a tray having a plurality of apertures arranged in an array and appropriately sized so that one syringe barrel is closely received in each aperture. The tray is supported in the tub above the base and is a close fit therein so that by accurately positioning the tub in a handling machine, the exact centre of each syringe barrel is known, relative to the tub.

[0003] The syringe barrels are prepared under sterile conditions and then are mechanically loaded into a tray supported in a tub, typically with a line of the syringe barrels being picked up and deposited in free apertures in the tray. When the tray is fully loaded, the tub is sealed with a cover and often a plurality of tubs are then packed together, for storage until required for use. When the syringe barrels are to be loaded with a drug, under sterile conditions the syringe barrels are removed from an open tub again by a mechanical handling system which must accurately locate on each syringe barrel, by knowing the precise position of the tub and of the centres of the apertures in the tray supported within the tub.

[0004] In the case of a syringe barrel fitted with a staked-in needle, it is the usual practice to fit either a rigid or flexible needle cover to the needle before loading the syringe with a medicament. Such a needle cover also serves to seal the sharp end of the needle and so prevent loss of medicament therethrough. Conveniently, the needle cover is fitted to the syringe barrel before it is loaded into a tub for storage, in order to confer protection to the needle tip.

[0005] Current health and safety requirements specify the use of a safe needle device on a syringe in order to guard against accidental needle stick injuries. Though such a device may be fitted to a syringe subsequent to the loading of the syringe with a medicament, since the device may include a needle cover, it would be advantageous for the device to be fitted to the syringe barrel before the loading of the barrel into a tub for storage. Unfortunately, often this is not possible because a safe needle device has a shield which slides rearwardly over the syringe barrel in order to expose the needle; as such, the sleeve must have a larger diameter than that of the syringe barrel.

[0006] Such a safe needle device cannot be used with a tray where the syringe barrels closely fit in the apertures in the tray as the safe needle devices will not pass through those apertures. If the apertures are enlarged to allow the safe needle devices to pass therethrough, the syringe barrel will be located only imprecisely in the tray and so there is a high likelihood of mis-handling by a mechanical handling device for lifting the syringe barrels out of the tray. A similar consideration applies in the event that a relatively large shield is to be provided on a syringe barrel to protect a pre-fitted needle, such as may occur with a relatively small diameter syringe body. Further, the same problem may exist with a syringe barrel fitted with a needle having a needle hub secured to the syringe, where the needle hub has a greater diameter than the syringe barrel, and references to the "needle shield" as used hereinafter should be construed broadly to include such a needle hub, a safe needle device or similar component associated with a needle and having a greater diameter than an associated syringe barrel.

[0007] EP 1,449,551 A1, FR 2,498,933 A1, EP 1,138,390 A1, US 5,372,252 A, US 2,523,877 A, US 5,419,775 A and WO 92/18187 A1 disclose tray systems for the handling of syringes. Some of these discuss the use of a syringe with a needle shield but none of these specifications show a needle shield of a greater diameter than the syringe barrel and so do not address the problem of centring a syringe carrying a needle shield of a greater diameter than the syringe barrel at the time the syringe barrel is lowered into an apertured tray.

[0008] It is a principal aim of the present invention to address the above problem and so to allow the fitting of a safe needle device on the forward end of a syringe barrel, before the syringe barrel is carried by a tray of a handling system, while still giving certainty as to the position of the syringe barrel, to allow subsequent reliable mechanical handling.

[0009] According to this invention, there is provided a plurality of tubular syringe barrels each having an enlargement at or adjacent one end and a needle shield mounted at the other end thereof, in combination with a handling system for the plurality syringe barrels, the handling system comprising a tray having an array of apertures therethrough each of a sufficient size for a syringe barrel and associated needle shield to pass therethrough and having a support surface configured for engagement by the enlargement of a syringe barrel received in the aperture when the tray is supported generally horizontally and the syringe barrel is lowered downwardly into an aperture, characterised in that the needle shield mounted at the other end of each syringe barrel is of a greater diameter than the diameter of the associated syringe barrel whereby each aperture is also of a greater diameter than each syringe barrel, and in that at least one of the part of the enlargement adjacent the syringe barrel and said support surface of an aperture has a profile of a reducing cross-section in the downward direction so as to cause substantial concentric alignment of the enlargement with the aperture as the syringe barrel is lowered therein.

[0010] It will be appreciated that a syringe barrel located in an aperture in a tray of a handling system is accurately positioned by virtue of the interengagement of the syringe barrel enlargement with the surface of the tray around the aperture therein receiving the syringe barrel. In this way, the aperture may be sufficiently large to allow a needle shield (i.e. a needle shield fitted to the syringe, a shield of a safe needle device fitted to the syringe or a needle hub) to pass therethrough in a case where the device, hub or shield has a greater diameter than that of the syringe body. Despite this, the interengagement of the enlargement with the support surface of the tray around the aperture causes the syringe barrel to be centred and so coaxial with the aperture such that the exact centre of the syringe barrel is known for handling by a mechanical handling system.

[0011] The enlargement of the syringe barrel may be integrally formed with the syringe barrel and so typically may comprise an outwardly projecting flange formed at the rear end of the syringe barrel, to facilitate the performance of an injection with the syringe. Alternatively, the enlargement may be separately formed and then fitted to the syringe barrel, typically adjacent a flange provided at the rear end of the syringe barrel.

[0012] In either of these cases, the profile of at least one of the enlargement and the support surface, but preferably both of the enlargement and the support surface, have a reducing cross-section in the downward direction so that interengagement of a part of the enlargement with the support surface centres the syringe barrel to be coaxial with the aperture.

[0013] Each aperture in the tray may be provided with a tube surrounding the aperture and projecting from at least one surface (i.e. either the upper surface or the lower surface or possibly both surfaces) of the tray. Most preferably, the tube is in the form of a hollow upstand with said support surface formed at the upper end region of the upstand.

[0014] Various embodiments of this invention are envisaged. The surface of the tray around the aperture or the upper end region of the upstand (if provided) may have a generally conical profile of reducing cross-section in the downward direction, with the flange of the syringe barrel co-operating with that conical profile to give the required centring of the syringe body. In the alternative, or possibly in conjunction with this, the region of the junction between the syringe barrel and the flange thereof may be formed to have a generally conical profile of reducing cross-section in the direction towards the other end of the syringe barrel - i.e. the forward end of the syringe barrel, for carrying a needle.

[0015] As an alternative to suitably forming the region of the junction between the syringe barrel and the flange, a collar may be positioned on the syringe barrel adjacent the flange, the collar being formed to have a reducing cross-section in the direction towards the other end of the syringe barrel. That reducing cross-section may be provided by a generally conical profile or by the collar having a rounded profile.

[0016] As a safe needle device, needle hub or needle shield used in conjunction with a syringe barrel may have a larger diameter than that of the syringe barrel, the underside of at least one of the aperture or the upper end of the upstand (if provided) may be profiled to facilitate removal of the syringe barrel carrying the device, hub or shield from the aperture. For example, where an upstand from the upper surface of the tray is provided, the underside of the junction between the tray and the upstand may be radiused in order to guide into the upstand a needle shield of a greater diameter than the syringe barrel.

[0017] In a further embodiment, the support surface may be defined within the upstand by an inwardly directed rib. In this case, the underside of the rib may be chamfered so as to guide the needle shield through the aperture defined by the rib within the upstand.

[0018] This invention extends to a combination as described above in conjunction with a cover member for a container carrying a tray and syringe barrels, the cover member being sealingly secured to the free edge of the side wall of the container, remote from the face thereof. The invention further extends to a syringe barrel for use in a combination of this invention as described above and also to a tray for use in such a combination, as described above.

[0019] By way of example only, several specific embodiments of this invention will now be described in detail, reference being made to the accompanying drawings in which:-

Figure 1 is an isometric view of a tub carrying a tray of syringe barrels, with one barrel lifted from the tray, for clarity;

Figure 2 shows the tub of Figure 1 with the cover fully removed, the tray of syringe barrels raised from the tub, and one barrel lifted from the tray;

Figure 3 is a detail view on an enlarged scale of the encircled part marked A on Figure 2;

Figure 4 is a part view on the corner region of the tray of Figures 1 to 3 but showing the first embodiment of this invention;

Figure 5 is a detail view on an enlarged scale of the encircled part marked E on Figure 4;

Figure 6 shows the first embodiment of a syringe barrel locating in an upstand of the array of apertures in the tray;

Figure 7 shows the syringe barrel of Figure 6, when fully centred;

Figure 8 is a cross-sectional view through the arrangement of Figure 6;

Figure 9 is a cross-sectional view through the fully centred arrangement of Figure 7;

Figures 10, 11 and 12 are cross-sectional views through second, third and fourth embodiments;

Figure 13 shows the embodiment of Figure 12 when fully centred;

Figures 14 and 15 respectively show a cross-section through a fifth embodiment and an isometric view of the syringe barrel and safety needle device of the fifth embodiment;

Figures 16 and 17 correspond to Figures 14 and 15 but of a sixth embodiment;

Figures 18 and 19 correspond to Figures 14 and 15 but of a seventh embodiment utilising a collar around the syringe barrel adjacent the flange thereof;

Figures 20 and 21, Figures 22 and 23 and Figures 24 and 25 show eighth, ninth and tenth embodiments each similar to Figures 18 and 19 but using different forms of collar; and

Figure 26 shows an eleventh embodiment, similar to the first embodiment of Figures 6 to 9.

[0020] Referring initially to Figures 1 to 3, there is shown a syringe handling arrangement as currently employed in the syringe manufacturing art, for the mechanical handling of syringe barrels on a fully automated basis. The known system comprises a tub 10 of generally rectangular cross-sectional shape and comprising a base 11 with an upstanding side wall 12 having an out-turned lip 13 around the upper periphery of the side wall. Disposed within the tub 10 is a tray 14 having a regular array of apertures therein, each aperture having a tubular upstand 15 surrounding the aperture and projecting upwardly from the main surface of the tray. A shoulder 16 is formed around the side wall 12 to support the tray parallel to the base 11 but spaced therefrom. A cover 17 is sealed to the lip 13 in order that the interior of the tub is hermetically sealed from the environment, from manufacture until such time as access is to be gained to the interior of the tub. The tray includes mechanical handling recesses 18 which form no part of this invention.

[0021] Syringe barrels 19 of a known form are manufactured separately and are then located within the tub, for storage and transportation to a syringe filling site. Each syringe barrel comprises a cylindrical part 20 having an out-turned flange 21 at the open (rear) end of the barrel. At the forward end, the barrel merges into an integral nose having a through-bore communicating with the interior of the barrel. As manufactured, that nose may be profiled as a connector for the hub of a needle, or a needle may be staked-in to the bore, during manufacture of the syringe barrel. In the case of a staked in needle, a needle cover conventionally is fitted over the needle on to the nose of the syringe. That needle cover may be either flexible or rigid but in either case usually is of a lesser diameter than that of the syringe barrel.

[0022] In a conventional arrangement, the syringe barrel is a close fit within an upstand 15, such that the position of each syringe barrel relative to the tray, and hence the tub, is known. Then, by locating the tub carrying the tray on a mechanical handling system, the exact centre of each aperture in the tray and its upstand will be known, both for the insertion of syringe barrels into the tray and subsequently for removal of those syringe barrels. One such mechanical handling system deposits in the tray one complete line of syringe barrels at a time and subsequently when the syringes are to be filled with medicament, another handling system simultaneously lifts a complete line of syringe barrels out of their apertures in the tray.

[0023] Sometimes, it is advantageous to fit to the nose of a syringe barrel a safe needle device 22, in order that protection is conferred on the needle both before an injection is performed and subsequent to an injection. Though the latest designs of safe needle device are much more compact than had been proposed previously, nevertheless a safe needle device typically has a larger diameter than that of the syringe barrel with which the device is to be used. This is necessary in order that a protective shield of the safe needle device 22 may slide rearwardly over the barrel, to expose the needle. Also, it may be that a syringe manufacturer may wish to fit a relatively large diameter needle shield to a syringe barrel having a staked-in needle, especially in the case of a small syringe. The needle shield diameter may then be greater than that of the syringe barrel.

[0024] The apertures in the tray and the upstands surrounding the apertures of a conventional handling system as described above must be sufficiently large to allow the safe needle device 22 or a shield thereof to pass therethrough, but then a smaller diameter syringe barrel will be a relatively loose fit in the upstand and aperture of the tray, such that the exact position of the syringe barrel axis becomes indeterminate, within a defined range. Subsequent mechanical handling of the syringe barrels may be difficult with a likelihood of dropped syringe barrels on account of an inadequately precise relationship between each syringe barrel and a handling device therefor.

[0025] In order to address this problem, the measures shown in Figures 4 to 9 may be employed, these showing a first embodiment of this invention. In this first embodiment, each upstand 24 has its upper end 25 (i.e. the end of the upstand remote from the tray 14) profiled so as to give a centring function to a syringe barrel 19, by cooperating with the flange 21 of the barrel. In this embodiment, there are six ribs 26 equi-spaced around the upstand 24, each rib extending along the length of the upstand from the tray to the upper end 25. At the upper end, the upstand 24 has a generally conical internal profile 27 tapering in the downward direction and the upper end of each rib 26 has a corresponding surface disposed at the same angle as that of the profile 27, as best seen in Figures 5, 8 and 9.

[0026] Internally, the diameter of each upstand 24 tapers in the upward direction, with the largest diameter region in the plane of the tray 14, as can be seen in Figures 8 and 9. The wall thickness of the upstand is substantially constant except for where the ribs 26 are provided, such that between the ribs, the upstand also has a conical form, with a shallow conical angle.

[0027] When a syringe barrel carrying a safe needle

device 22 is lowered into an upstand 24, the axis of the barrel might not be coincident with the axis of the upstand as shown in Figures 6 and 8, once the safe needle device 22 has passed therethrough. Then, on releasing the syringe from a mechanical handling arrangement, the profile 27 in conjunction with the ribs 26 will co-operate with the flange 21 of the syringe barrel, serving to centre the syringe barrel as shown in Figures 7 and 9.

[0028] When the syringe barrels are to be removed from the tray, following transport or storage, light vibration or tapping of the tub containing the tray and syringe barrels will cause each barrel to be centred in the associated upstand and aperture, ready for removal by a mechanical handling system. On removal of a barrel, the conical form of each upstand facilitates entry of the larger diameter safe needle device 22 into the lower end of the upstand and so allows for minor misalignment of a barrel with the upstand.

[0029] It will be appreciated that with this first embodiment, the syringe barrels 19 are entirely of a known form, and require no modification as compared to a conventional syringe barrel. Equally, the tub 10 is as currently employed in a known syringe handling system and it is only the tray 14 which has been modified to give the required centring functionality when the syringe barrels carry either a safe needle device or a relatively large needle shield at the forward end thereof. Moreover, as the length of a safe needle device or shield will be at least slightly greater than the length of a conventional needle cover, the upstand 15 ensures that the syringe barrel is held above the surface of the tray by a sufficient distance to prevent impact between the forward end of the safe needle device or shield and the base 11 of the tub 10.

[0030] In the second embodiment shown in Figure 10, each upstand 30 of the tray 14 has a relatively thick wall and both the upper and lower ends of that wall are given conical profiles 31,32. The conical profile 31 at the upper end of the upstand co-operates with the syringe flange 21 in the same manner as has been described above with reference to Figures 4 to 9. The conical profile at the lower end of the upstand facilitates entry of the safe needle device into the upstand, on removing a syringe barrel therefrom.

[0031] The third embodiment shown in Figure 11 has a parallel-sided cylindrical upstand 34 provided with an in-turned lip 35 at its upper end. That lip defines a conical profile 36 tapering in the downward direction, to co-operate with the syringe flange 21 thereby to give the centring function.

[0032] The embodiments of Figures 12 to 17 differ from those described above, in that the syringe barrel has a modified profile in the region of the junction between the syringe barrel and the flange at the rearward end of the barrel. In the case of these embodiments, the upstands from the tray are cylindrical as with the known handling systems but the upstands are of a sufficient diameter (greater than the diameter of the syringe barrel) to allow a safe needle device or large needle shield to pass therethrough.

[0033] In the embodiment of Figures 12 and 13, a conical profile 38 is formed in the region of the junction between the syringe barrel 39 and the flange 40. As can be seen from Figures 12 and 13 that conical profile serves to correct any axial misalignment between the syringe barrel and the upstand so that the syringe barrel is centred on the upstand. Also shown in Figures 12 and 13 is a conical profile 41 at the lower end of the upstand which serves to facilitate entry of the safe needle device into the upstand on removal of a syringe barrel therefrom.

[0034] The embodiment of Figures 14 and 15 has the same functionality as that described above but the overall profile at the rear end 42 of the syringe barrel is modified such that there is a substantially uniform wall thickness. In all other respects, this embodiment corresponds to that of Figures 12 and 13.

[0035] The embodiment of Figures 16 and 17 also has a substantially uniform wall thickness in the region of the junction between the syringe barrel 43 and a flange 44 at the rear end of the barrel, but the profile defined thereby has a first region 45 of generally conical form and a second region 46 of cylindrical form, of substantially the same diameter as the internal diameter of the upstand. Thus, once the syringe has been centred within the upstand by the co-operation of the first region of the profile with the upstand, the second region of the syringe barrel will enter the upstand and thereafter holds the syringe barrel coaxial with the upstand.

[0036] The embodiments of Figures 18 to 25 have similar functionality to that of the embodiments of Figures 12 to 17 but with a syringe barrel having a conventional form. In the case of these embodiments, a collar is fitted around the syringe barrel 20 to lie closely adjacent the flange 21, the collar having the profiles as shown. The collar 48 of the embodiment of Figures 18 and 19 has a simple conical profile and thus corresponds to the embodiment of Figures 12 and 13. The embodiment of Figures 20 and 21 has a collar 49 of semi-circular cross-section and the part 50 thereof further from the flange 21 serves as a centring profile for the syringe barrel, in the upstand. The collar 51 of the embodiment of Figures 22 and 23 has a first part 52 providing a conical surface, a second part 53 providing a cylindrical surface substantially equal in diameter to that of the internal diameter of the upstand and a third part similar to the first part but disposed adjacent the flange 21.

[0037] The collars of Figures 18 to 23 may be formed of a resilient material such as silicone rubber. This resilience allows precise centring of a syringe barrel and moreover may provide a light frictional grip between a syringe barrel and an upstand. The collars of Figures 20 to 23 are symmetrical about a central transverse plane and so may be fitted to a syringe barrel without regard to orientation, so simplifying the assembly process of a collar on a barrel.

[0038] The collar 55 shown in Figures 24 and 25 is profiled to provide a conical surface 56 giving the centring

functionality in association with an upstand, as has been described above. The collar also has a cylindrical surface 57 which is a close fit in the upstand, so that a syringe barrel is held centred when located as shown in Figure 24. In addition, the collar fits around the flange 21 of the syringe barrel and this provides a radial surface 58 the width of which in the radial direction is comparable to the width of the flange 21. The provision of the collar thus does not lessen the subsequent ease of handling the syringe barrel, for example when performing an injection, as there is still access to a broad flange.

[0039] The arrangement shown in Figure 26 is similar to that of Figures 6 to 9 but differs in that an internal rib 60 extends around the inner surface of the upstand 61, below the upper end 62 of that upstand. The rib is defined by substantially conical upper and lower flank surfaces 63,64, the upper flank surface 63 co-operating with the flange 21 of a syringe barrel 19 in order to give a centring function, as has been described above with reference to the previous embodiments. The lower flank surface 64 serves to guide a safe needle device of shield thereof through the rib 60, on removing the syringe barrel from the tray 65. Further, the annular region 66 of the junction between the upstand 61 and the lower surface of the tray is radiused as shown, to facilitate the entry of the safe needle device or shield thereof into the upstand, on removing the syringe barrel from the tray.

[0040] In this embodiment, the side wall of the upstand is shown extended axially beyond the rib 60, to give a better location for the flange 21 of a syringe barrel, though it will be appreciated that the rib may be provided at the upper end of the upstand, rather than displaced downwardly by a small distance, as shown in Figure 26.

Claims

1. An assembly comprising

- a plurality of tubular syringe barrels (20) each having an enlargement (21, 40, 44) at or adjacent a rear end and a needle shield (22) mounted at a front end thereof, the needle shield having a greater diameter than the diameter of the associated syringe barrel; and
- a handling system (10,11) for the plurality of syringe barrels, the handling system comprising a tray (14) having an array of apertures therethrough each of a sufficient size for a syringe barrel (20) and associated needle shield (22) to pass therethrough and each aperture in the tray being provided with a respective tube (24) surrounding the aperture and projecting from the tray (14), a support surface (27,31,36,63) being formed at an end region of the tube, the support surface (27,31,36,63) being configured for engagement by the enlargement (21,40,44) of a syringe barrel received in the aperture,

wherein either the enlargement (21 ,40,44) of the syringe barrel (20) has a profile of reducing cross-section in a direction towards the front end of the syringe barrel or said support surface (27,31,36,63) has a profile of a reducing cross-section in a direction towards the tray (14), whereby interengagement of the enlargement (21, 40, 44) of the syringe barrel (20) with the support surface (27,31,36,63) suspends the syringe barrel in the aperture and centres the syringe barrel to be co-axial with the aperture.

2. The assembly of claim 1, wherein the enlargement (21) of the syringe barrel is either integrally formed with the syringe barrel (20) or is separately formed and mounted on the syringe barrel.

3. The assembly of claim 1 or claim 2, wherein the enlargement comprises an outwardly projecting flange (21) formed at said one end of the barrel (20).

4. The assembly of any of the preceding claims, wherein said profile of one of the part (45) of the enlargement (21 or 38) adjacent the syringe barrel and also the profile of said support surface (31) of an aperture has a reducing cross-section in the downward direction whereby interengagement of the part of the enlargement with the support surface centres the syringe barrel (20) to be co-axial with the aperture.

5. The assembly of claim 1, wherein each of said tubes is in the form of a hollow upstand with said support surface (27,31,36,63) being formed at the end region of the upstand remote from the tray.

6. The assembly of claim 5, wherein each tube (24) has a reducing internal cross-sectional area in the direction away from the tray (14) towards the support surface.

7. The assembly of claim 6, wherein the support surface (27) is formed at the upper end region of the tube (24) and has a generally conical profile of reducing cross-section in the downward direction.

8. The assembly of claim 7, wherein a plurality of ribs (26) extend along the external surface of the tube (24) to the support surface (27) thereof and the ribs (26) project beyond the end of the tube remote from the tray (14), the support surface in part being defined by the projecting parts of the ribs.

9. The assembly of any of claims 5 to 8, wherein said support surface (36) is defined by an in-turned flange (35) formed at the upper end region of the tube (34).

10. The assembly of any of the preceding claims, wherein the enlargement (40) of the syringe barrel is formed to have a generally conical profile (38) of re-

ducing cross-section in the direction towards the needle shield (22) and is either formed integrally with the syringe barrel (20) or is in the form of a collar (48) fitted to the syringe barrel.

11. The assembly of claim 10, wherein the enlargement of the syringe barrel has a first part (46) nearer the end of the barrel (20) of a substantially constant diameter and a second part (45) further from the end of the barrel of a generally conical profile of reducing cross-section in the direction towards the needle shield (22), said first part having a diameter which is a close fit in the support surface.

12. The assembly of any of the preceding claims, wherein a collar (49) is positioned on the syringe barrel (20) adjacent the enlargement (21) thereof, the collar being formed to have a rounded external profile (50) of reducing diameter in the direction towards the other end of the syringe barrel, for at least a part of the axial length of the collar.

13. The assembly of any of the preceding claims and in which each aperture has a respective tube (61) upstanding from the tray, wherein the region (63) of the tube (61) remote from the tray is profiled to have a reducing cross-section in the downward direction and the part of the enlargement (21) adjacent the syringe barrel or a collar fitted thereto also is profiled to have a reducing cross-section in the downward direction, whereby the two profiles co-operate to centre the syringe barrel in the aperture.

14. The assembly of any of the preceding claims, wherein at least one of the underside of the aperture (66) and the underside of the support surface is profiled to facilitate removal of the syringe barrel (20) and needle shield (22) from the tray.

15. The assembly of any of the preceding claims in conjunction with a container (10) for the tray (14) and syringe barrels (20) carrying respective needle shields (22), the container having a base (11) with an upstanding side wall (12) configured to support the tray above the base with clearance between the base and the lower ends of the needle shields.

Patentansprüche

1. Anordnung, umfassend:

- eine Mehrzahl röhrenförmige Spritzenkolben (20), welche jeweils eine Verbreiterung (21, 40, 44) an oder angrenzend an ein rückwärtiges Ende sowie eine Nadelabschirmung (22) aufweisen, welche an dem entsprechenden vorderen Ende montiert ist, wobei die Nadelabschirmung einen größeren Durchmesser aufweist als der Durchmesser des zugehörigen Spritzenkolbens; und
- ein Handhabungssystem (10,11) für die Mehrzahl Spritzenkolben, wobei das Handhabungssystem eine Schale (14) mit einer Anordnung von durch sie hindurch führenden Öffnungen aufweist, die jeweils eine hinreichende Größe aufweisen, damit ein Spritzenkolben (20) und eine zugehörige Nadelabschirmung (22) hindurch passen, und wobei jede Öffnung der Schale mit einer entsprechenden Röhre (24) versehen ist, die die Öffnung umgibt und aus der Schale (14) hervor steht, wobei eine Unterstützungsfläche (27, 31, 36, 63) an einem Endbereich der Röhre ausgebildet ist, wobei die Unterstützungsfläche (27, 31, 36, 63) für das Zusammengreifen mit der Verbreiterung (21, 40, 44) eines in der Öffnung aufgenommenen Spritzenkolbens konfiguriert ist, wobei entweder die Verbreiterung (21, 40, 44) des Spritzenkolbens (20) ein Profil mit einem sich in einer Richtung zum vorderen Ende des Spritzenkolbens hin verjüngenden Querschnitt aufweist oder die Unterstützungsfläche (27, 31, 36, 63) ein Profil mit einem sich in Richtung der Schale (14) verjüngenden Querschnitt aufweist, wodurch das Zusammengreifen der Verbreiterung (21, 40, 44) des Spritzenkolbens (20) mit der Unterstützungsfläche
(27, 31, 36, 63) dafür sorgt, dass der Spritzenkolben in der Öffnung hängt und der Spritzenkolben zentriert ist, sodass er koaxial zur Öffnung liegt.

2. Anordnung nach Anspruch 1,
bei welcher die Verbreiterung (21) des Spritzenkolbens entweder integral mit dem Spritzenkolben (20) ausgebildet oder separat ausgebildet und am Spritzenkolben montiert ist.

3. Anordnung nach Anspruch 1 oder Anspruch 2,
bei welcher die Verbreiterung einen nach außen vorspringenden Flansch (21) aufweist, der an dem einen Ende des Kolbens (20) ausgebildet ist.

4. Anordnung nach einem der vorigen Ansprüche,
bei welcher das Profil von dem Teil (45) der Verbreiterung (21 oder 38), der an den Spritzenkolben angrenzt, und/oder auch das Profil der Stützfläche (31) einer Öffnung einen sich verjüngenden Querschnitt in Abwärtsrichtung aufweist, wodurch das Zusammengreifen des Teils der Verbreiterung mit der Stützfläche den Spritzenkolben (20) so zentriert, dass er mit der Öffnung koaxial liegt.

5. Anordnung nach Anspruch 1,
bei welcher jede der Röhren in Form eines hohlen

Aufbaus vorliegt, wobei die Stützfläche (27, 31, 36, 63) an dem Endbereich des Aufbaus ausgebildet ist, der von der Schale entfernt liegt.

6. Anordnung nach Anspruch 5, bei welcher jede Röhre (24) eine sich in Richtung von der Schale (14) zur Stützfläche hin verjüngende innere Querschnittsfläche aufweist.

7. Anordnung nach Anspruch 6, bei welcher die Stützfläche (27) am oberen Endbereich der Röhre (24) ausgebildet ist und ein im Wesentlichen konisches Profil mit sich in Abwärtsrichtung verjüngendem Querschnitt aufweist.

8. Anordnung nach Anspruch 7, bei welcher eine Mehrzahl Rippen (26) sich entlang der Außenfläche der Röhre (24) zu ihrer Stützfläche (27) erstrecken und die Rippen (26) über das von der Schale (14) entfernt liegende Ende der Röhre hinaus vorstehen, wobei die Stützfläche teilweise durch die vorstehenden Teile der Rippen definiert ist.

9. Anordnung nach einem der Ansprüche 5 - 8, bei welcher die Stützfläche (36) durch einen nach innen abgekanteten Flansch (35) definiert ist, der an dem oberen Endbereich der Röhre (34) ausgebildet ist.

10. Anordnung nach einem der vorigen Ansprüche, bei welcher die Verbreiterung (40) des Spritzenkolbens so gebildet ist, dass sie ein im Wesentlichen konisches Profil (38) mit sich in Richtung der Nadelabschirmung (22) verjüngendem Querschnitt aufweist und entweder integral mit dem Spritzenkolben (20) ausgebildet ist oder in Form eines Kragens (48) vorliegt, der an dem Spritzenkolben angebracht ist.

11. Anordnung nach Anspruch 10, bei welcher die Verbreiterung des Spritzenkolbens einen näher am Ende des Kolbens (20) liegenden ersten Teil (46) mit im Wesentlichen konstantem Durchmesser und einen weiter vom Ende des Kolben entfernten zweiten Teil (45) mit einem im allgemeinen konischen Profil mit sich in Richtung der Nadelabschirmung (22) verjüngenden Querschnitt aufweist, wobei der erste Teil einen Durchmesser aufweist, der in der Stützfläche eng anliegt.

12. Anordnung nach einem der vorigen Ansprüche, bei welcher ein Kragen (49) auf dem Spritzenkolben (20) angrenzend an dessen Verbreiterung (21) positioniert ist, wobei der Kragen so ausgebildet ist, dass der Kragen für wenigstens einen Teil seiner axialen Länge ein gerundetes Außenprofil (50) mit einem sich in Richtung des anderen Endes des Spritzenkolbens verjüngenden Durchmesser aufweist.

13. Anordnung nach einem der vorigen Ansprüche und bei welcher jede Öffnung eine entsprechende aus der Schale aufragende Röhre (61) aufweist, wobei der Bereich (63) der Röhre (61), der von der Schale entfernt liegt, so profiliert ist, dass er in Abwärtsrichtung einen sich verjüngenden Querschnitt aufweist und der Teil der Verbreiterung (21), der an den Spritzenkolben angrenzt, oder ein daran angebrachter Kragen außerdem so profiliert ist, dass er in Abwärtsrichtung einen sich verjüngenden Querschnitt aufweist, wodurch die beiden Profile zusammenarbeiten, um den Spritzenkolben in der Öffnung zu zentrieren.

14. Anordnung nach einem der vorherigen Ansprüche, wobei die Unterseite der Öffnung (66) oder/und die Unterseite der Stützfläche profiliert ist, um das Entfernen des Spritzenkolbens (20) und der Nadelabschirmung (22) aus der Schale zu erleichtern.

15. Anordnung nach einem der vorigen Ansprüche in Verbindung mit einem Behälter (10) für die Schale (14) und mit Spritzenkolben (20), die entsprechende Nadelabschirmung (22) tragen, wobei der Behälter eine Grundfläche (11) mit einer aufragenden Seitenwand (12) aufweist, die konfiguriert ist, um die Schale über der Grundfläche abzustützen, sodass zwischen der Grundfläche und den unteren Enden der Nadelabschirmungen ein Zwischenraum verbleibt.

Revendications

1. Ensemble comprenant :

- une pluralité de corps de seringue tubulaires (20) ayant chacun un élargissement (21, 40, 44) à ou adjacent à une extrémité arrière et un protecteur d'aiguille (22) monté à une extrémité avant de celui-ci, le protecteur d'aiguille ayant un diamètre supérieur au diamètre du corps de seringue associé ; et
- un système de manutention (10, 11) pour la pluralité de corps de seringue, le système de manutention comprenant un plateau (14) ayant un réseau d'ouvertures à travers celui-ci, chacune d'une taille suffisante pour qu'un corps de seringue (20) et le protecteur d'aiguille associé (22) passent à travers celle-ci et chaque ouverture dans le plateau étant munie d'un tube respectif (24) entourant l'ouverture et se projetant à partir du plateau (14), une surface de support (27, 31, 36, 63) étant formée à une région d'extrémité du tube, la surface de support (27, 31, 36, 63) étant configurée pour un engagement par l'élargissement (21, 40, 44) d'un corps de seringue reçu dans l'ouverture,

dans lequel soit l'élargissement (21, 40, 44) du corps de seringue (20) a un profil de section transversale se réduisant dans une direction vers l'extrémité avant du corps de seringue, soit ladite surface de support (27, 31, 36, 63) a un profil de section transversale se réduisant dans une direction vers le plateau (14), ce par quoi un engagement réciproque de l'élargissement (21, 40, 44) du corps de seringue (20) avec la surface de support (27, 31, 36, 63) suspend le corps de seringue dans l'ouverture et centre le corps de seringue pour qu'il soit coaxial avec l'ouverture.

2. Ensemble selon la revendication 1, dans lequel l'élargissement (21) du corps de seringue soit est formé d'un seul tenant avec le corps de seringue (20), soit est formé de manière séparée et monté sur le corps de seringue.

3. Ensemble selon la revendication 1 ou la revendication 2, dans lequel l'élargissement comprend une collerette se projetant vers l'extérieur (21) formée à ladite extrémité du corps (20).

4. Ensemble selon l'une quelconque des revendications précédentes, dans lequel ledit profil de l'une de la partie (45) de l'élargissement (21 ou 38) adjacent au corps de seringue et également le profil de ladite surface de support (31) d'une ouverture ont une section transversale se réduisant dans la direction vers le bas, ce par quoi un engagement réciproque de la partie de l'élargissement avec la surface de support centre le corps de seringue (20) pour qu'il soit coaxial avec l'ouverture.

5. Ensemble selon la revendication 1, dans lequel chacun desdits tubes se présente sous la forme d'un montant creux avec ladite surface de support (27, 31, 36, 63) qui est formée à la région d'extrémité du montant à distance du plateau.

6. Ensemble selon la revendication 5, dans lequel chaque tube (24) a une aire de section transversale interne se réduisant dans la direction à l'opposé du plateau (14) vers la surface de support.

7. Ensemble selon la revendication 6, dans lequel la surface de support (27) est formée à la région d'extrémité supérieure du tube (24) et a un profil généralement conique de section transversale se réduisant dans la direction vers le bas.

8. Ensemble selon la revendication 7, dans lequel une pluralité de nervures (26) s'étendent le long de la surface externe du tube (24) jusqu'à la surface de support (27) de celui-ci et les nervures (26) se projettent au-delà de l'extrémité du tube à distance du plateau (14), la surface de support étant en partie définie par les parties en saillie des nervures.

9. Ensemble selon l'une quelconque des revendications 5 à 8, dans lequel ladite surface de support (36) est définie par un rebord tourné vers l'intérieur (35) formé à la région d'extrémité supérieure du tube (34).

10. Ensemble selon l'une quelconque des revendications précédentes, dans lequel l'élargissement (40) du corps de seringue est formé pour avoir un profil généralement conique (38) de section transversale se réduisant dans la direction vers le protecteur d'aiguille (22) et soit est formé d'un seul tenant avec le corps de seringue (20), soit se présente sous la forme d'un collet (48) adapté au corps de seringue.

11. Ensemble selon la revendication 10, dans lequel l'élargissement du corps de seringue a une première partie (46) plus proche de l'extrémité du corps (20) d'un diamètre sensiblement constant et une seconde partie (45) plus éloignée de l'extrémité du corps d'un profil généralement conique de section transversale se réduisant dans la direction vers le protecteur d'aiguille (22), ladite première partie ayant un diamètre qui est un ajustement serré dans la surface de support.

12. Ensemble selon l'une quelconque des revendications précédentes, dans lequel un collet (49) est positionné sur le corps de seringue (20) adjacent à l'élargissement (21) de celui-ci, le collet étant formé pour avoir un profil externe arrondi (50) de diamètre se réduisant dans la direction vers l'autre extrémité du corps de seringue, sur au moins une partie de la longueur axiale du collet.

13. Ensemble selon l'une quelconque des revendications précédentes et dans lequel chaque ouverture a un tube respectif (61) se dressant à partir du plateau, la région (63) du tube (61) à distance du plateau étant profilée pour avoir une section transversale se réduisant dans la direction vers le bas et la partie de l'élargissement (21) adjacente au corps de seringue ou un collet adapté à celui-ci est également profilé pour avoir une section transversale se réduisant dans la direction vers le bas, ce par quoi les deux profils coopèrent pour centrer le corps de seringue dans l'ouverture.

14. Ensemble selon l'une quelconque des revendications précédentes, dans lequel au moins une de la face inférieure de l'ouverture (66) et de la face inférieure de la surface de support est profilée pour faciliter un retrait du corps de seringue (20) et du protecteur d'aiguille (22) à partir du plateau.

15. Ensemble selon l'une quelconque des revendications précédentes, conjointement avec un contenant

(10) pour le plateau (14) et des corps de seringue (20) portant respectivement des protecteurs d'aiguille (22), le contenant ayant une base (11) avec une paroi latérale verticale (12) configurée pour supporter le plateau au-dessus de la base avec un jeu entre la base et les extrémités inférieures des protecteurs d'aiguille.

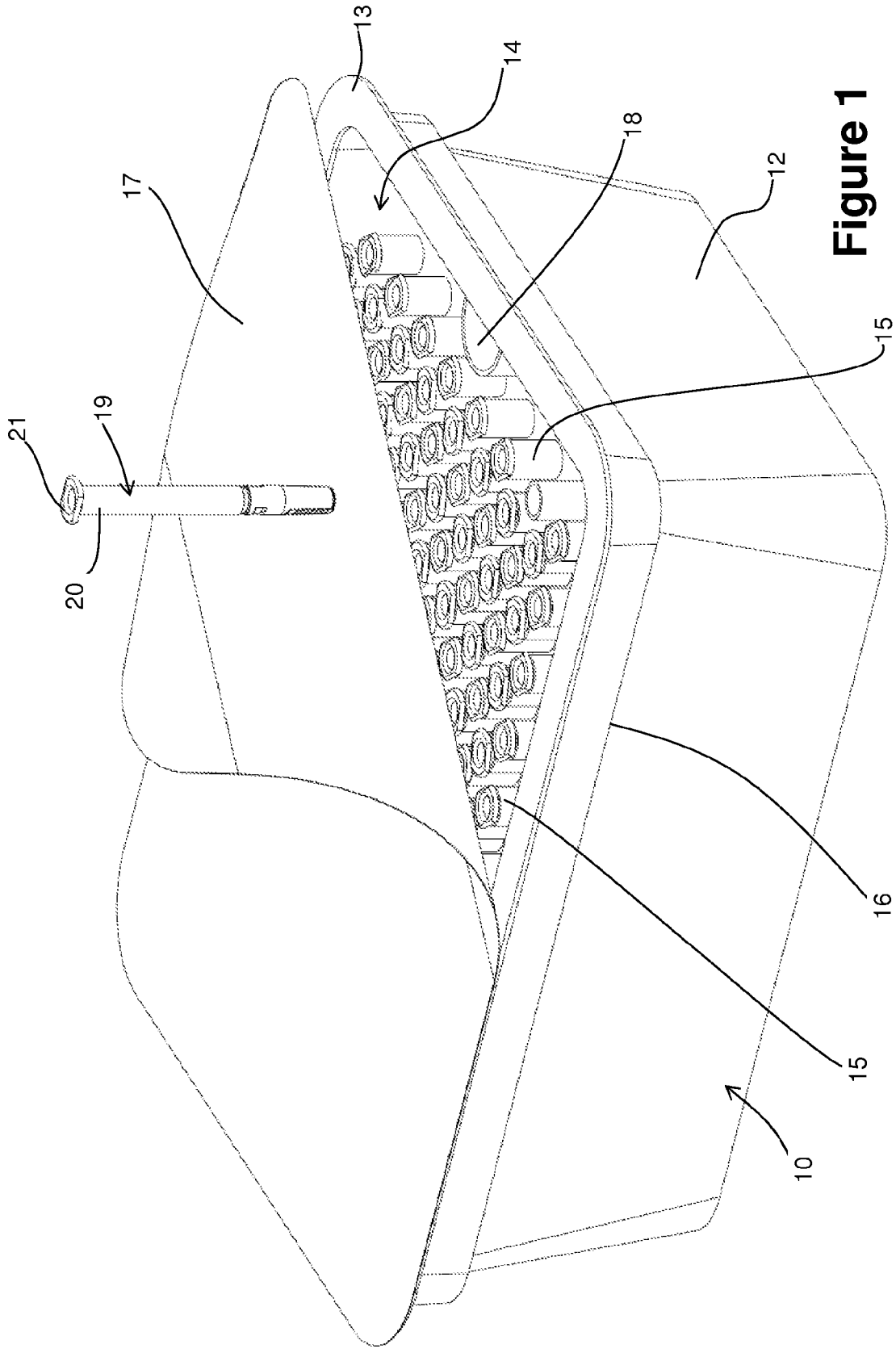

Figure 1

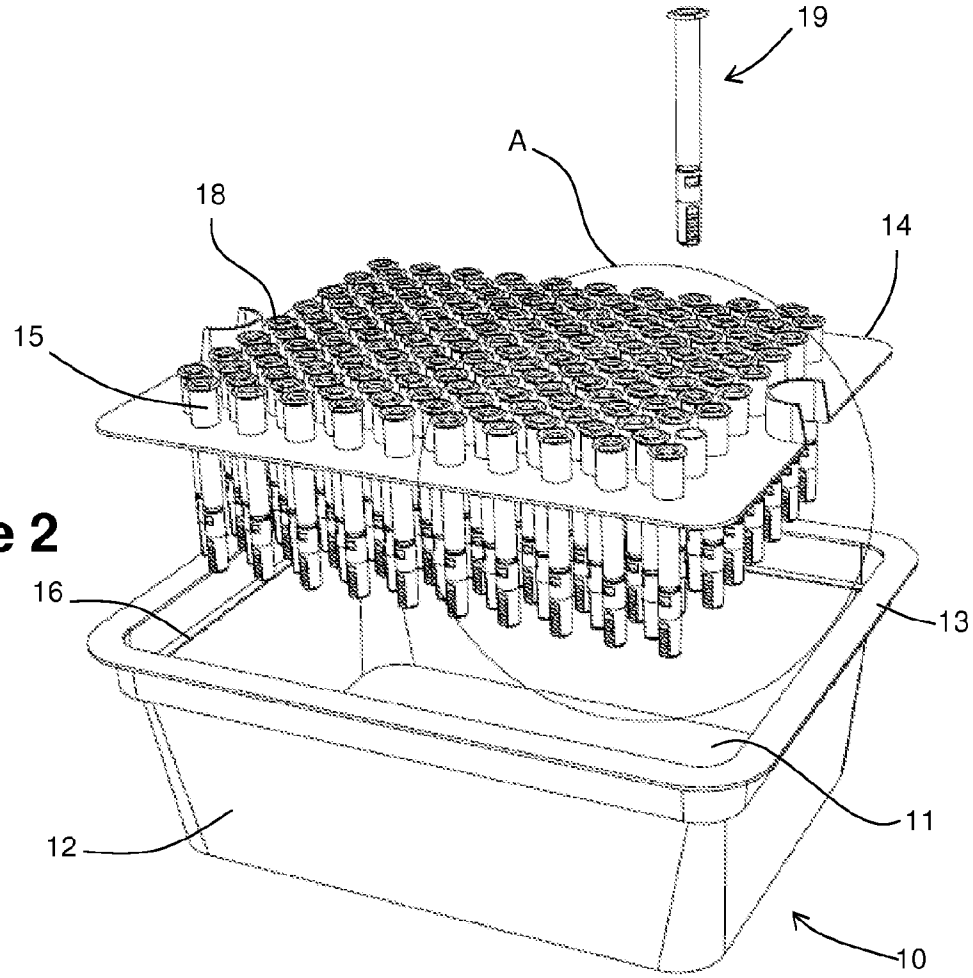

Figure 2

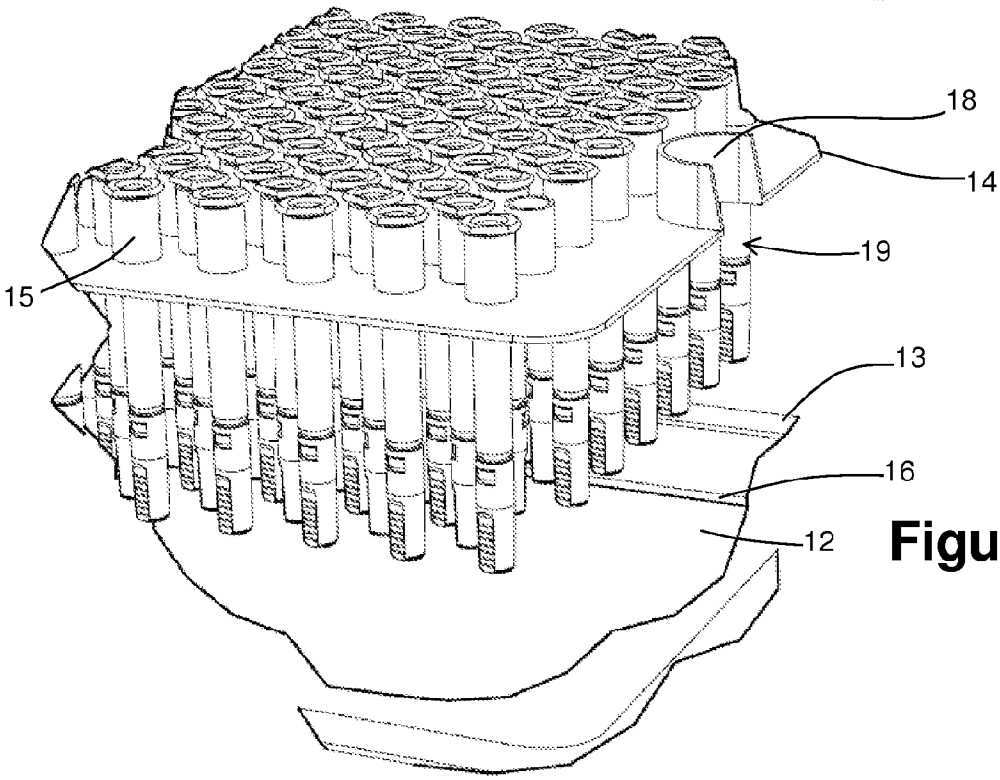

Figure 3

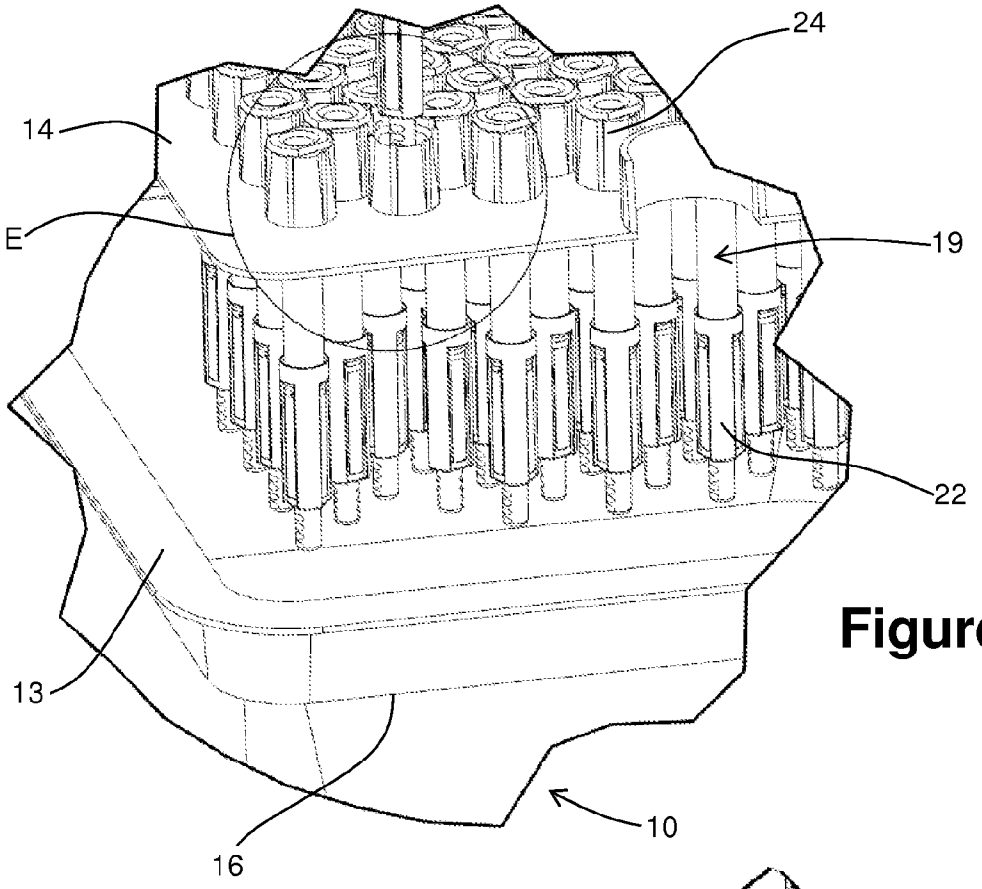

Figure 4

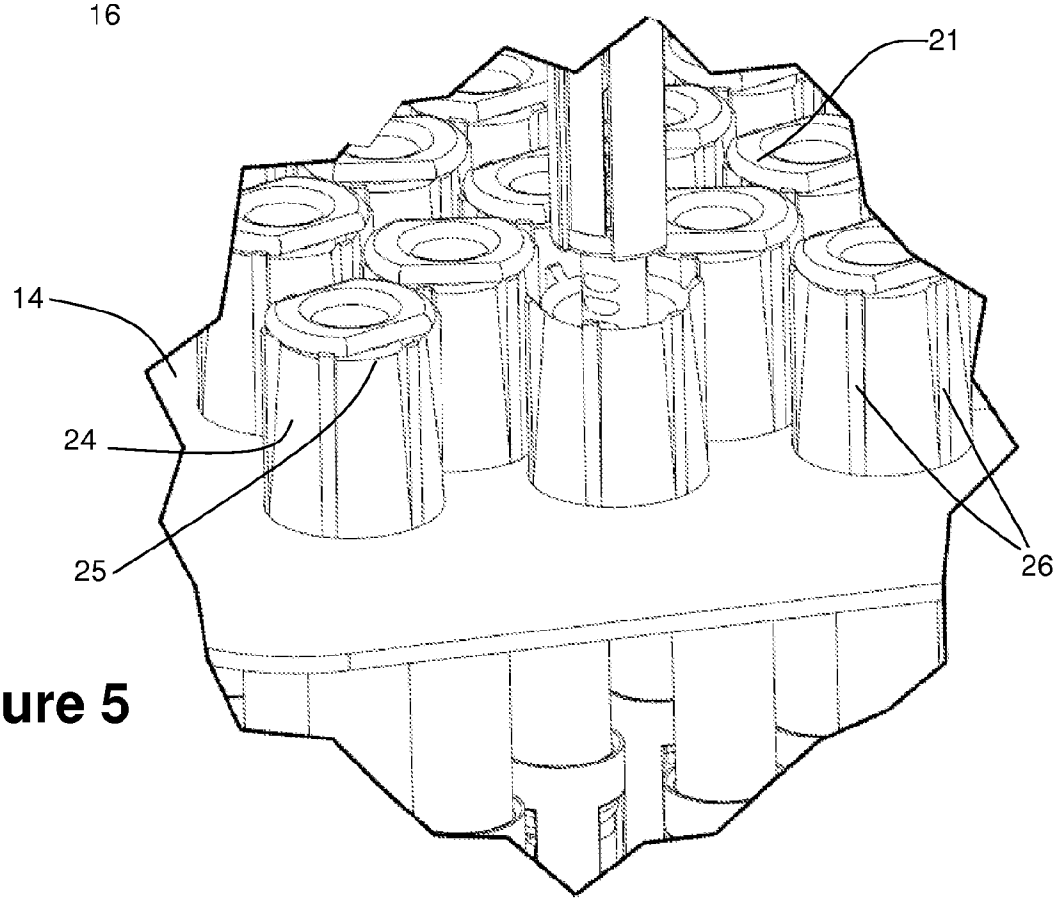

Figure 5

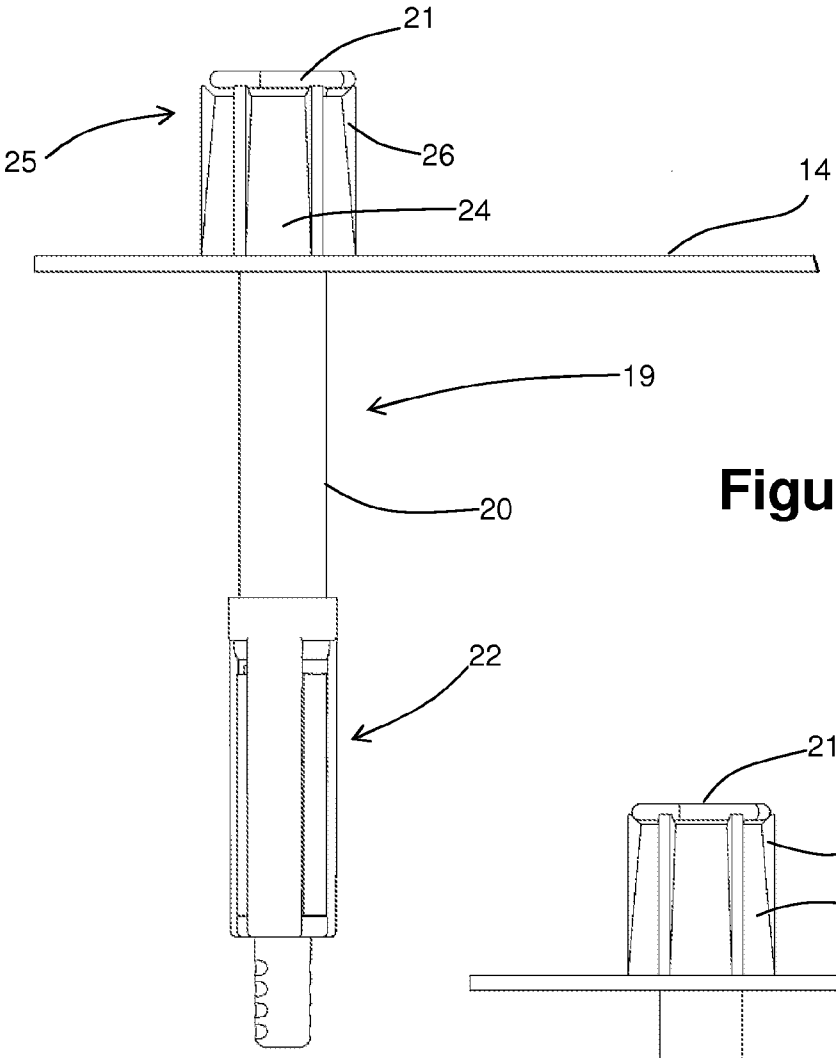

Figure 6

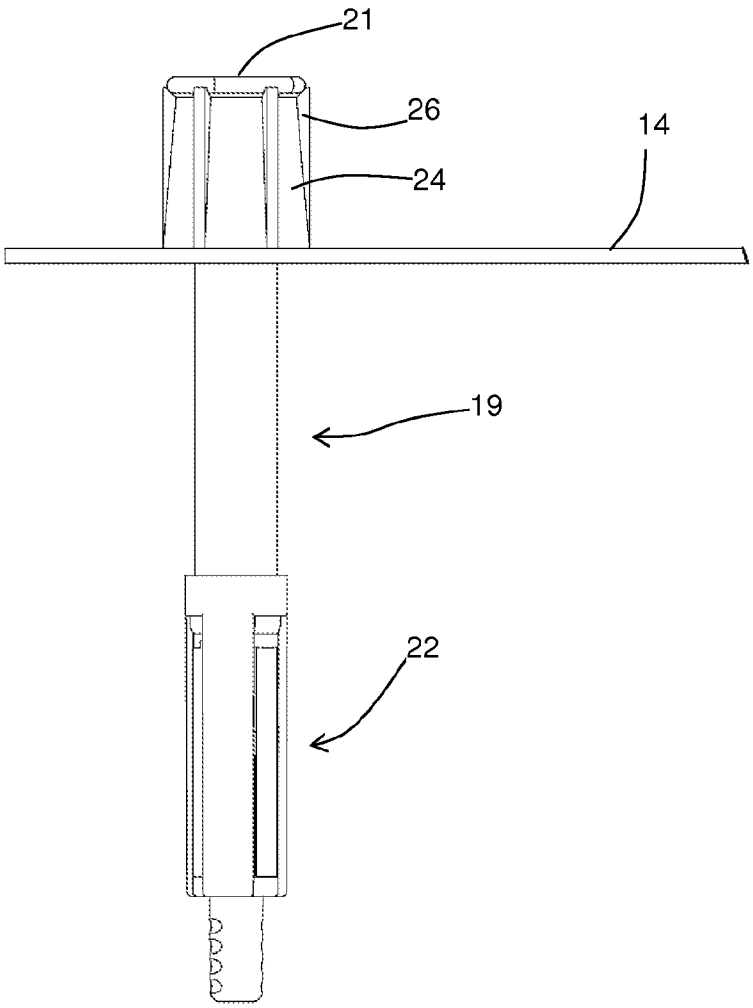

Figure 7

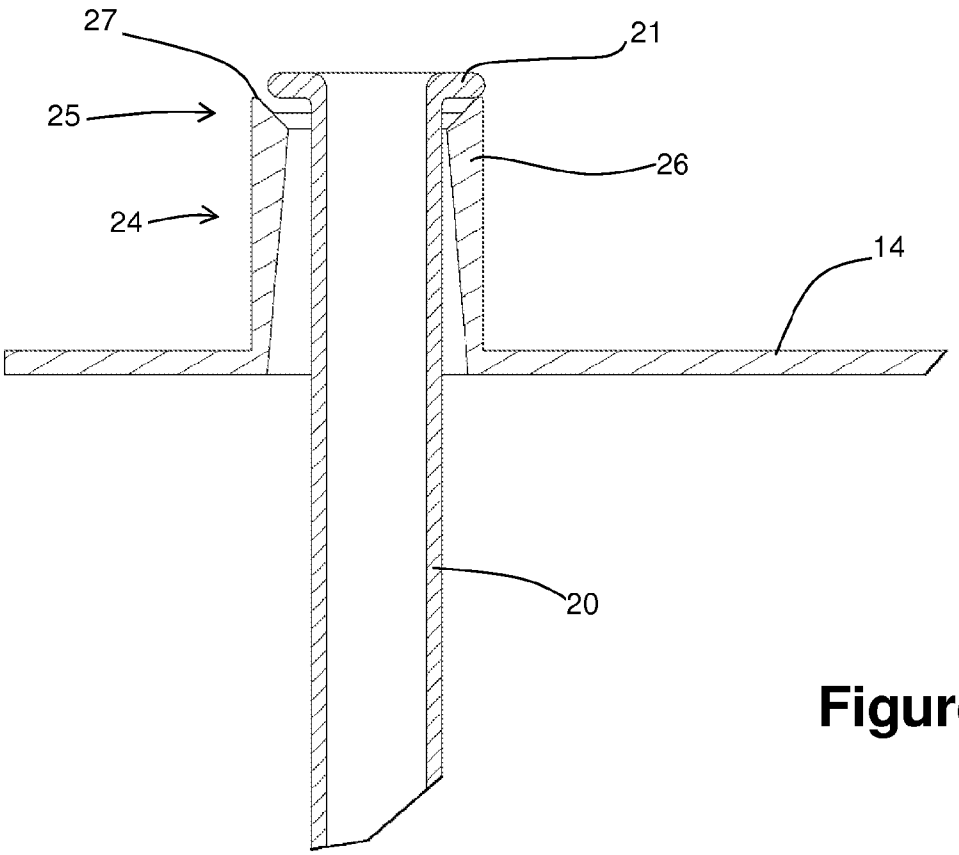

Figure 8

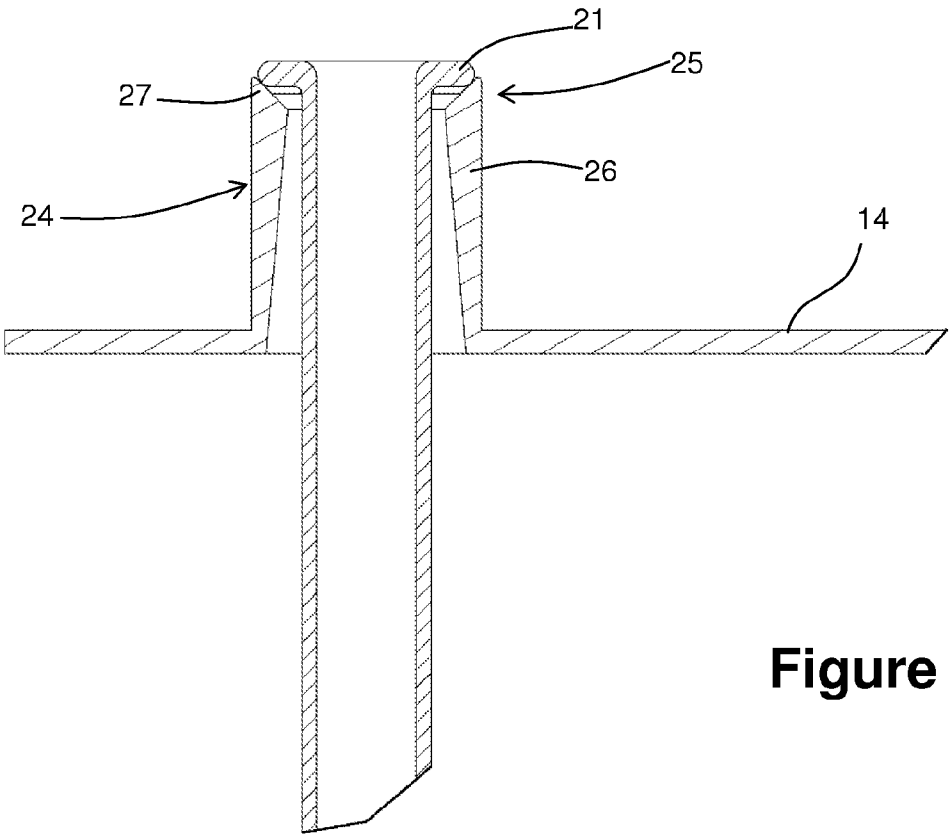

Figure 9

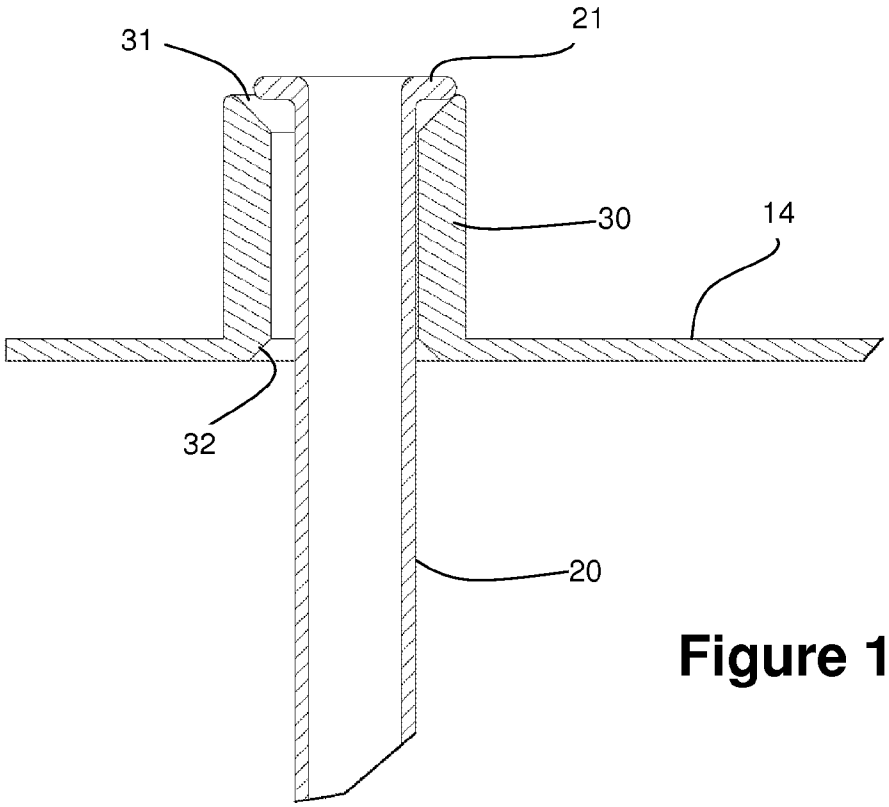

Figure 10

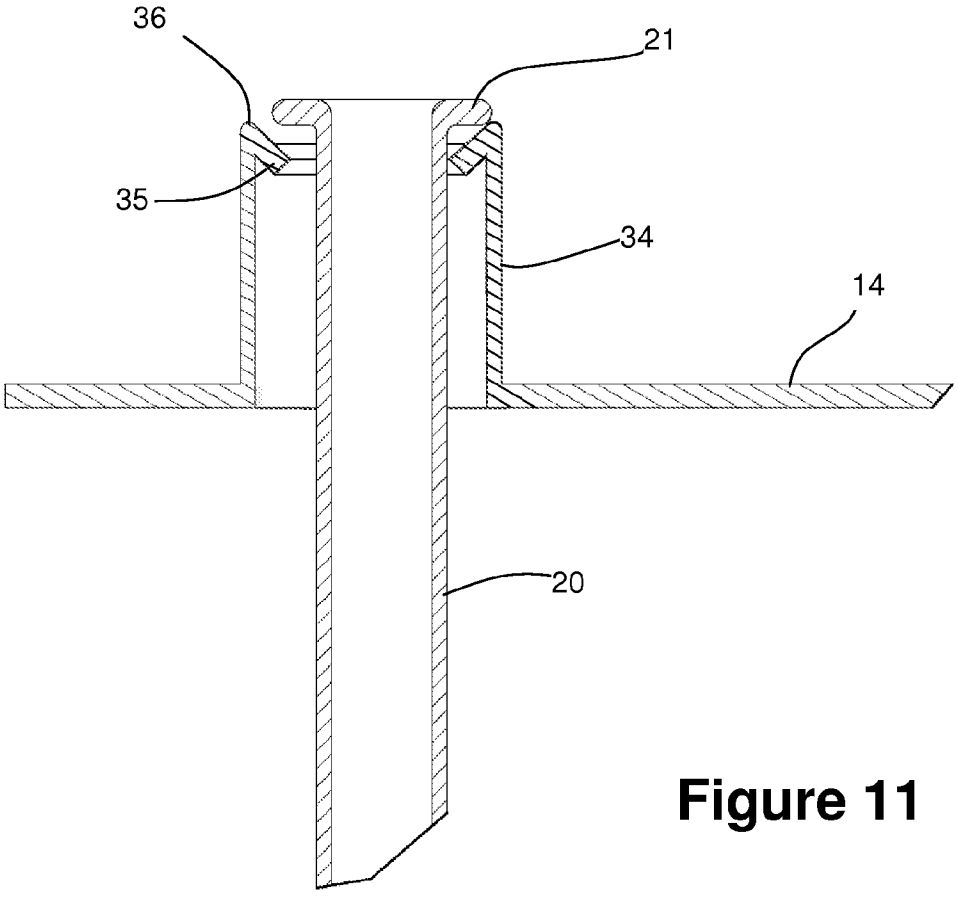

Figure 11

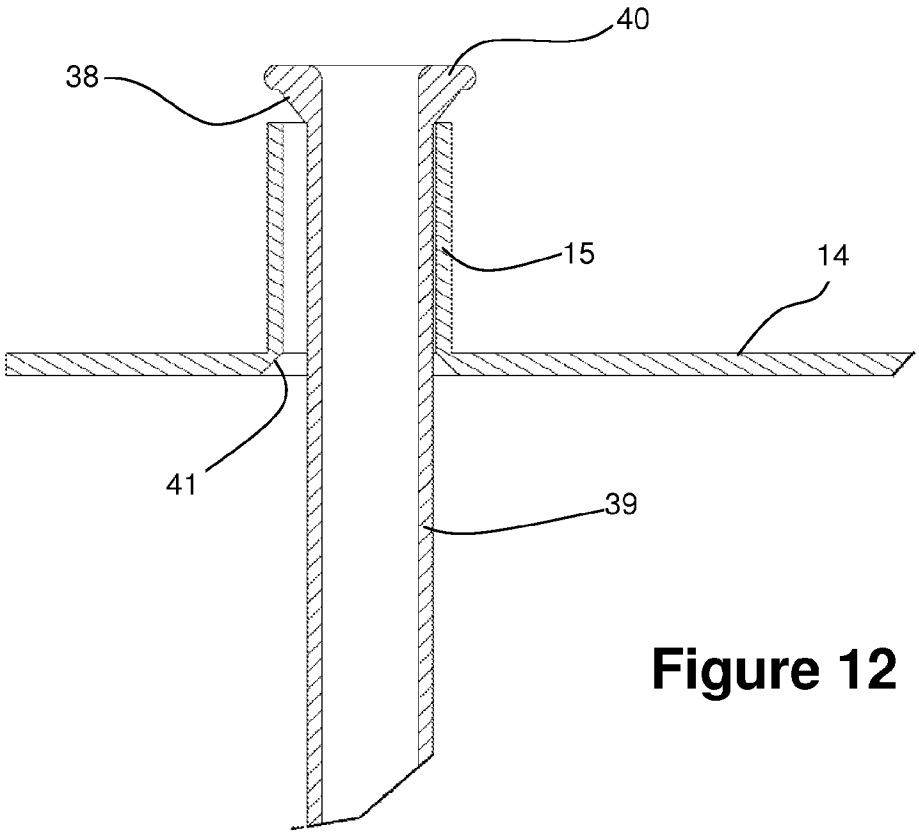

Figure 12

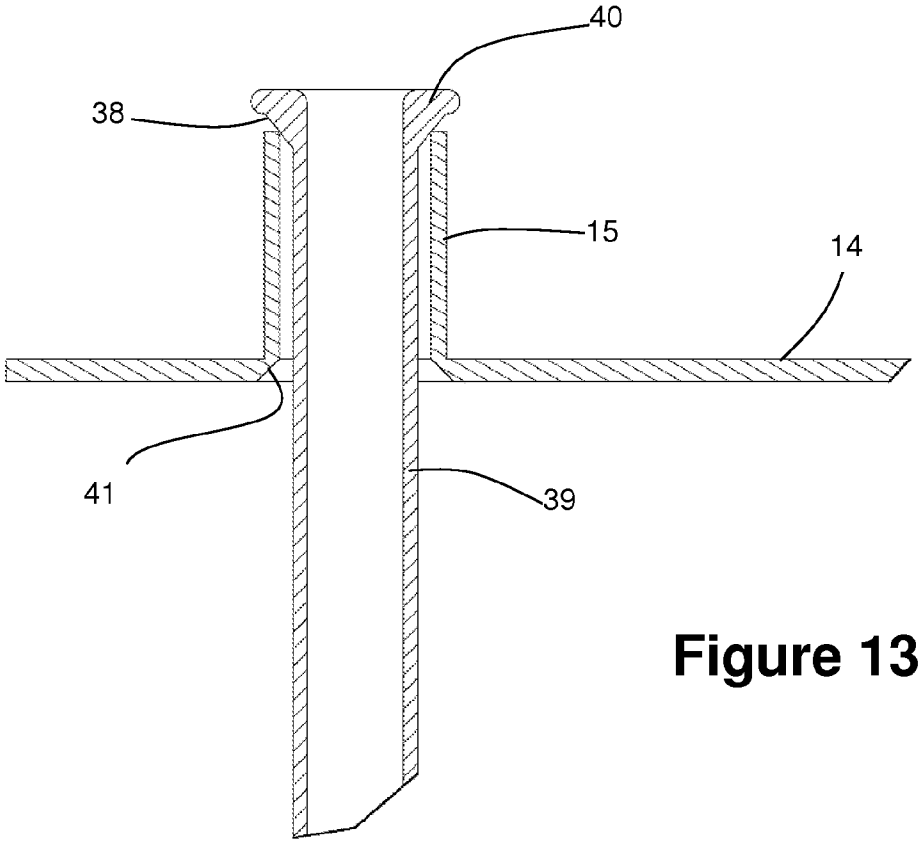

Figure 13

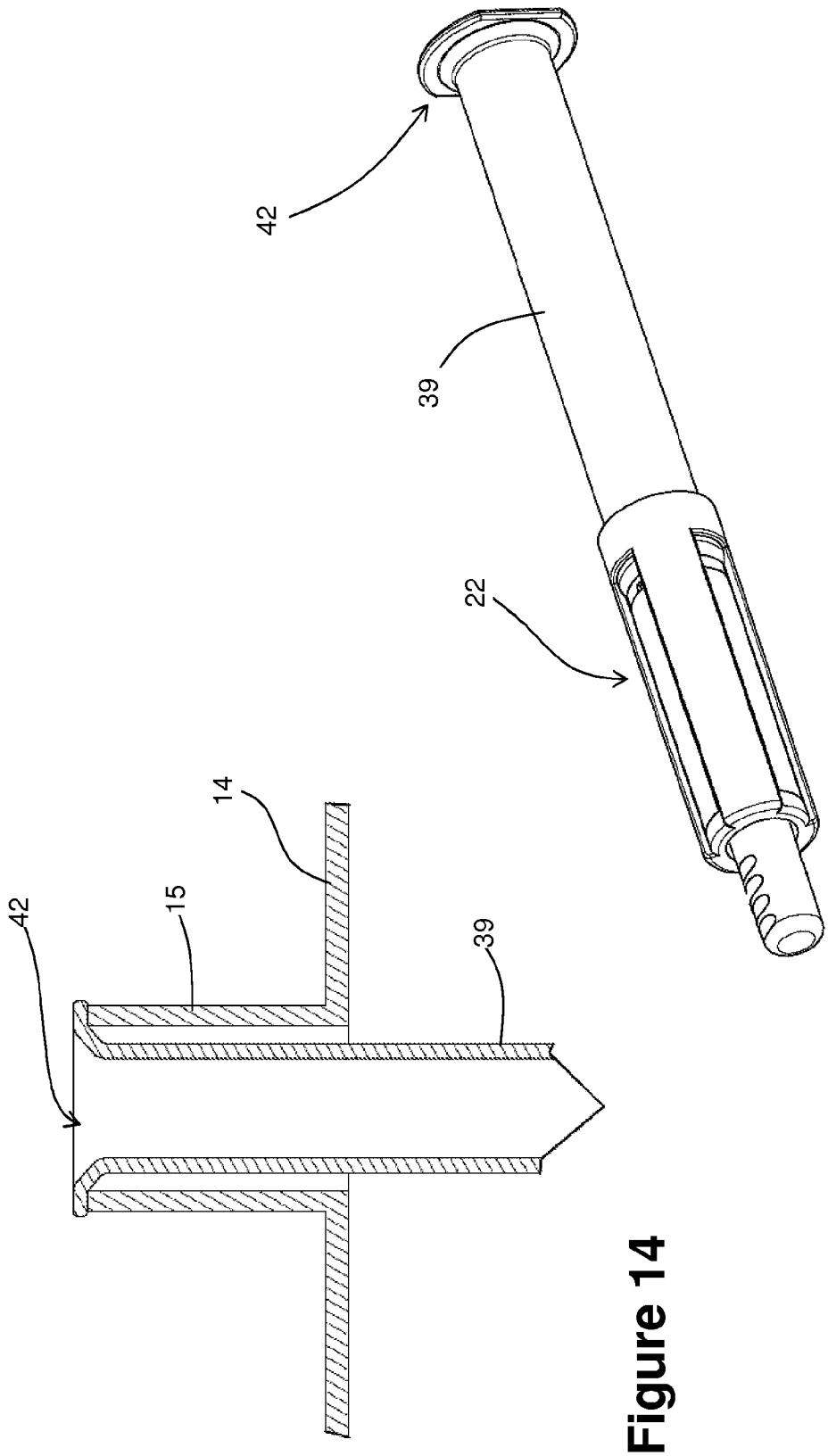

Figure 15

Figure 14

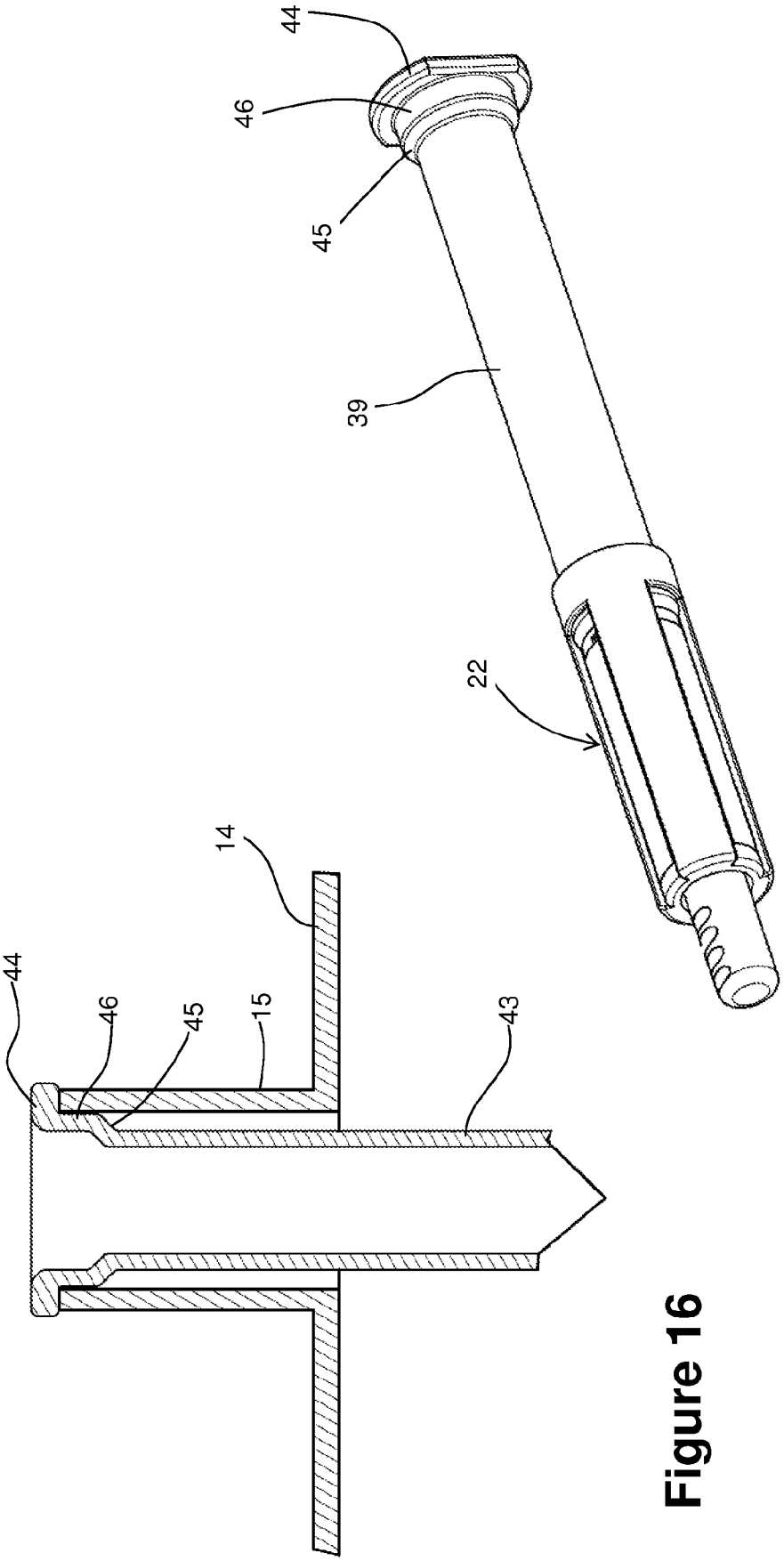

Figure 16

Figure 17

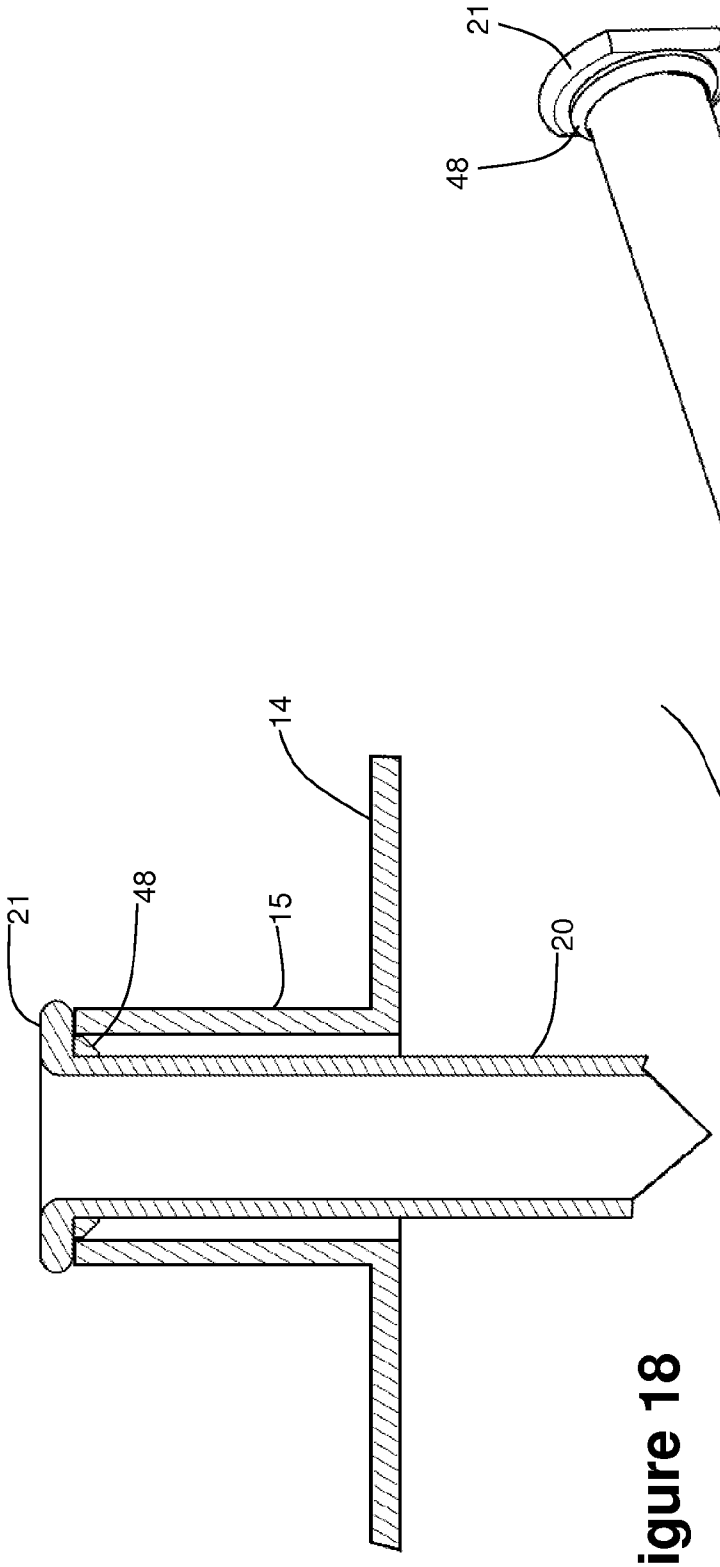

Figure 18

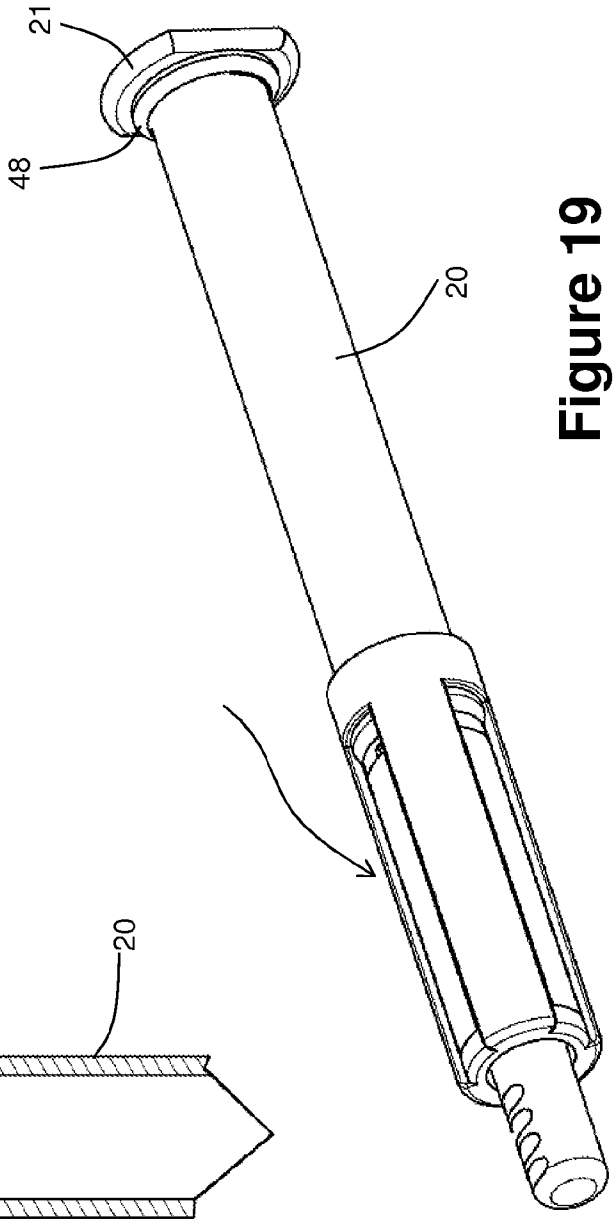

Figure 19

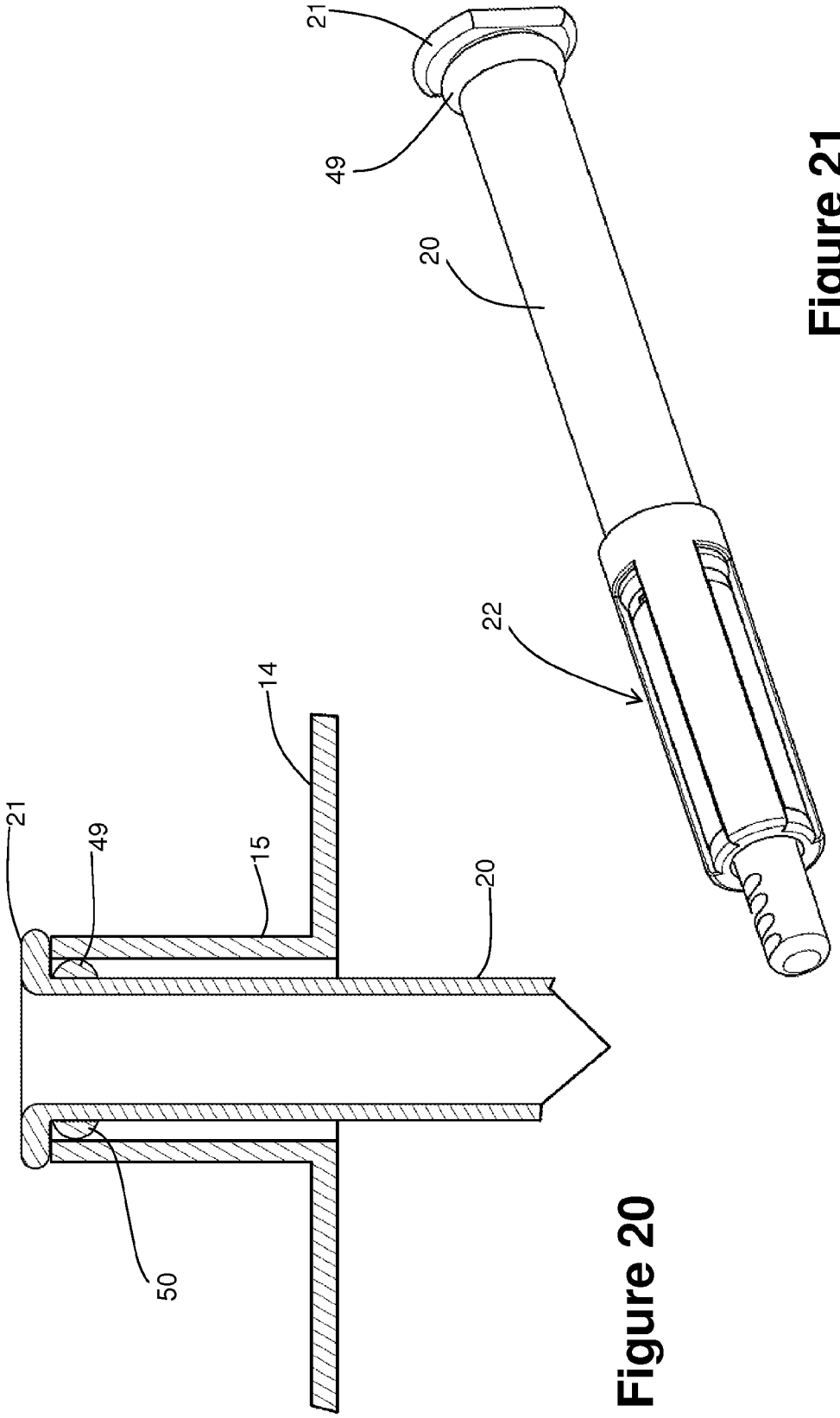

Figure 21

Figure 20

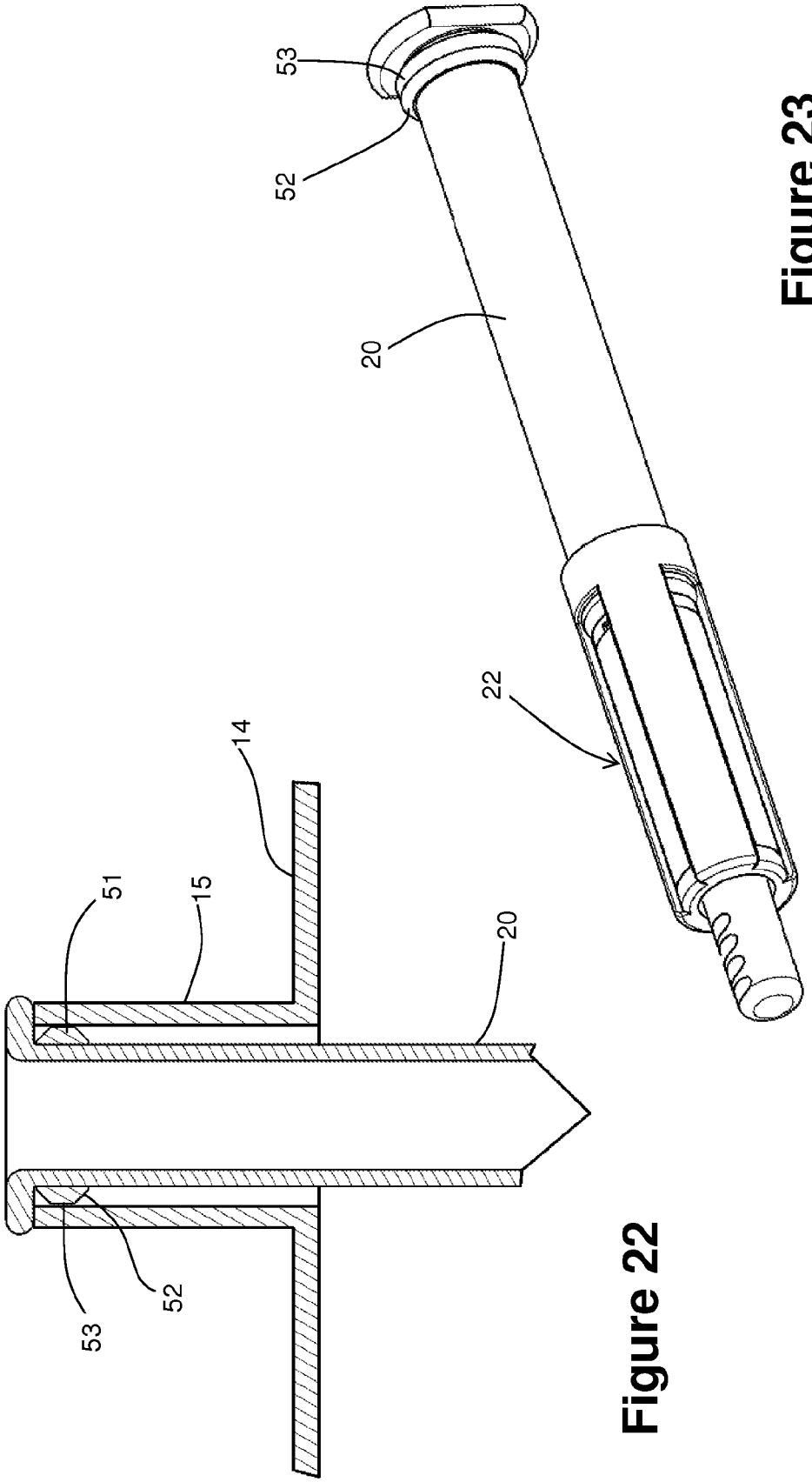

Figure 22

Figure 23

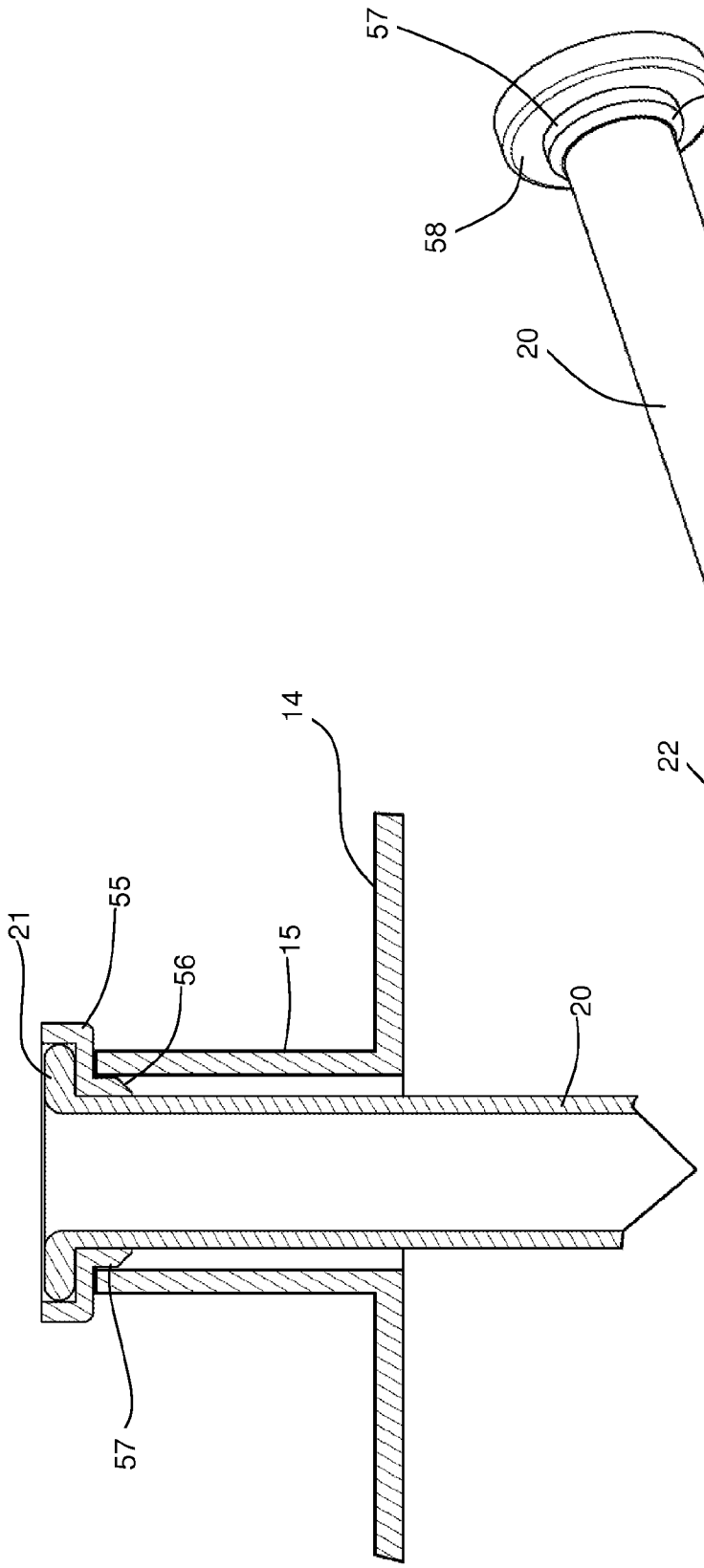

Figure 24

Figure 25

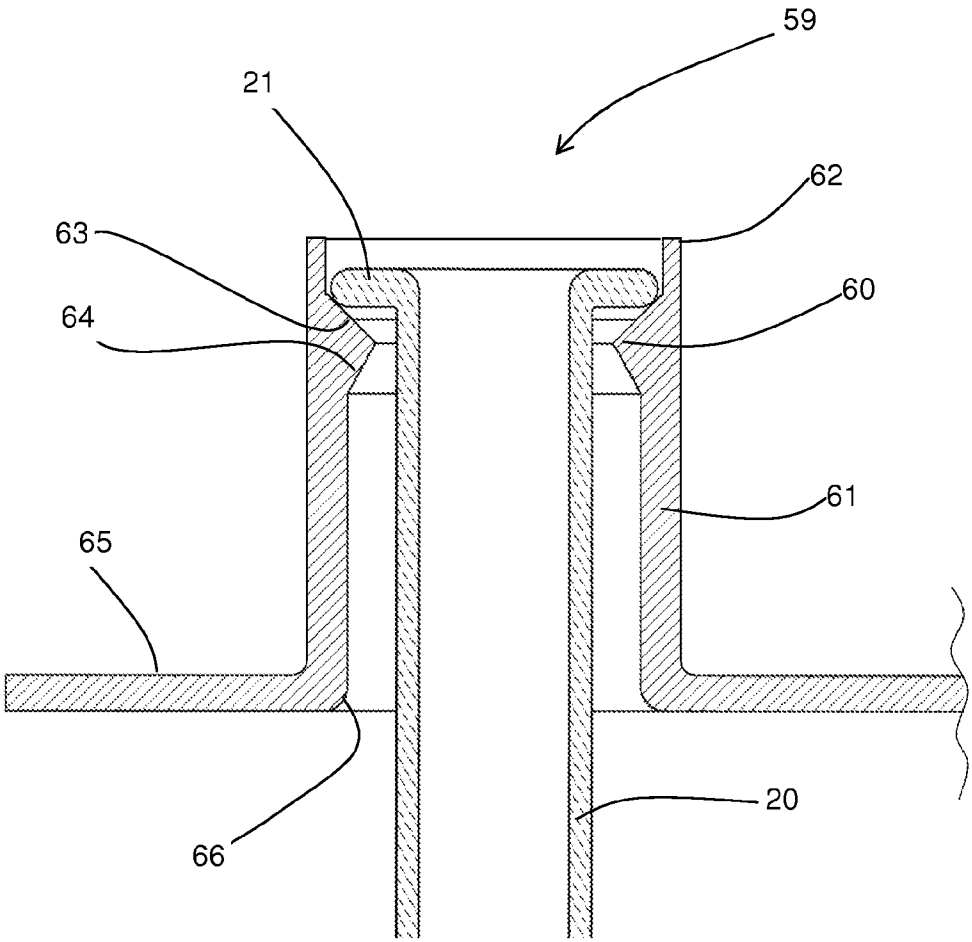

Figure 26

REFERENCES CITED IN THE DESCRIPTION

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TÁLCA FECSKENDŐDUGATTYÚK KEZELÉSÉRE

Szabadalmi igénypontok

1. Elrendezés, amely magában foglalja a következőket:

   - több cső alakú fecskendődugattyút (fecskendőhengert) (20), amelyek közül mindegyik rendelkezik egy bővítéssel (21, 40, 44) egy hátsó végen vagy azzal szomszédosan, valamint egy tűvédő elemmel (22), amely annak egy elülső végére van felszerelve, ahol a tűvédő elem egy nagyobb átmérővel rendelkezik, mint a hozzátartozó fecskendődugattyúnak az átmérője; és
   - egy kezelő rendszert (10, 11) a több fecskendődugattyú számára, ahol a kezelő rendszer magában foglal egy tálcát (14), amely rendelkezik egy azon áthaladó nyílásokból álló elrendezéssel (rendszerrel), amelyek közül mindegyik elégséges méretű ahhoz, hogy egy fecskendődugattyú (20) és a hozzátartozó tűvédő elem (22) áthaladjon azon, és a tálcában található mindegyik nyílás el van látva egy megfelelő csővel (24), amely körülveszi a nyílást és kiáll a tálcából (14), ahol egy támasztó felület (27, 31, 36, 63) van kialakítva a cső egy végterületén, ahol a támasztó felület (27, 31, 36, 63) arra a célra van kialakítva, hogy összekapcsolódjon egy olyan fecskendődugattyúnak a bővítésével (21, 40, 44), amely a nyílásban van fogadva,

   ahol vagy a fecskendődugattyúnak (20) a bővítése (21, 40, 44) egy olyan profillal rendelkezik, amely csökkenő keresztmetszetű egy a fecskendődugattyúnak az elülső vége felé tartó irányban, vagy a nevezett támasztó felület (27, 31, 36, 63) egy olyan profillal rendelkezik, amely csökkenő keresztmetszetű egy a tálca (14) felé tartó irányban, ami által a fecskendődugattyú (20) bővítésének (21, 40, 44) a támasztó felülettel (27, 31, 36, 63) történő kölcsönös összekapcsolódása által a fecskendődugattyú fel van függesztve a nyílásban és a fecskendődugattyú központosítva van, hogy koaxiális (egy tengelyen) legyen a nyílással.

2. Elrendezés az 1. igénypont szerint, ahol a fecskendődugattyúnak a bővítése (21) vagy a fecskendődugattyúval (20) egybeépített módon (egy darabban) van kialakítva vagy külön van kialakítva és fel van szerelve a fecskendődugattyúra.

3. Elrendezés az 1. igénypont vagy a 2. igénypont szerint, ahol a bővítés magában foglal egy kifelé kiálló peremet (21), mely a dugattyúnak (20) a nevezett egyik végén van kialakítva.

4. Elrendezés az előző igénypontok bármelyike szerint, ahol a bővítésnek (21 vagy 38) a fecskendődugattyúval szomszédosan található egyik részének (45) a nevezett profilja és egy nyílás nevezett támasztó felületének (31) a profilja is egy csökkenő keresztmetszettel rendelkezik a lefelé tartó irányban, ami által a bővítés részének a támasztó felülettel történő kölcsönös összekapcsolódása által a fecskendődugattyú (20) központosítva van, hogy koaxiális (egy tengelyen) legyen a nyílással.

5. Elrendezés az 1. igénypont szerint, ahol a nevezett csövek közül mindegyik egy üreges állórész (szerkezet) formájában áll rendelkezésre, ahol a nevezett támasztó felület (27, 31, 36, 63) az állórésznek (szerkezetnek) a végterületén van kialakítva, amely távol található a tálcától.

6. Elrendezés az 5. igénypont szerint, ahol mindegyik cső (24) egy csökkenő belső keresztmetszeti területtel rendelkezik a tálcától (14) távolodó és a támasztó felület felé tartó irányban.

7. Elrendezés a 6. igénypont szerint, ahol a támasztó felület (27) a csőnek (24) a felső végterületén van kialakítva és egy általánosan kúpos profillal rendelkezik, amely csökkenő keresztmetszetű a lefelé tartó irányban.

8. Elrendezés a 7. igénypont szerint, ahol több borda (26) terjed a csőnek (24) a külső felülete mentén annak a támasztó felületéig (27) és a bordák (26) kiállnak a csőnek a végén túl, amely távol található a tálcától (14), ahol a támasztó felület részben a bordáknak a kiálló részei által van meghatározva.

9. Elrendezés az 5.-től 8.-ig igénypontok bármelyike szerint, ahol a nevezett támasztó felület (36) egy befelé fordított perem (35) által van meghatározva, amely a csőnek (34) a felső végterületén van kialakítva.

10. Elrendezés az előző igénypontok bármelyike szerint, ahol a fecskendődugattyúnak a bővítése (40) úgy van kialakítva, hogy egy általánosan kúpos profillal (38) rendelkezzen, amely csökkenő keresztmetszetű a tűvédő elem (22) felé tartó irányban, és vagy a fecskendődugattyúval (20) egybeépített módon (egy darabban) van kialakítva vagy egy gallérnak (48) a formájában áll rendelkezésre, amely a fecskendődugattyúra van illesztve (felszerelve).

11. Elrendezés a 10. igénypont szerint, ahol a fecskendődugattyúnak a bővítése egy a dugattyúnak (20) a végéhez közelebb található olyan első résszel (46) rendelkezik, amely egy lényegében állandó átmérőjű, és egy a dugattyúnak a végétől távolabb található olyan második résszel (45) rendelkezik, amely egy általánosan kúpos profilú, amely csökkenő keresztmetszetű a tűvédő elem (22) felé tartó irányban, ahol a nevezett első rész egy olyan átmérővel rendelkezik, amely szorosan illeszkedik a támasztó felületbe.

12. Elrendezés az előző igénypontok bármelyike szerint, ahol egy gallér (49) van elhelyezve a fecskendődugattyúra (20) annak a bővítésével (21) szomszédosan, ahol a gallér úgy van kialakítva, hogy egy lekerekített külső profillal (50) rendelkezzen, amely csökkenő átmérőjű a fecskendődugattyúnak a másik vége felé tartó irányban, legalább a gallér tengelyirányú hosszának egy részén.

13. Elrendezés az előző igénypontok bármelyike szerint, és ahol mindegyik nyílás rendelkezik egy megfelelő csővel (61), amely felfelé kiáll a tálcából, ahol a csőnek (61) az a része (63), amely távol található a tálcától, úgy van profilozva, hogy egy csökkenő keresztmetszettel rendelkezzen a lefelé tartó irányban, és a bővítésnek (21) az a része, amely szomszédos a fecskendődugattyúval vagy egy arra illesztett (felszerelt) gallérral, szintén úgy van profilozva, hogy egy csökkenő keresztmetszettel rendelkezzen a lefelé tartó irányban, ami által a két profil együttműködik (együtt dolgozik), hogy a fecskendődugattyú központosítva legyen a nyílásban.

14. Elrendezés az előző igénypontok bármelyike szerint, ahol a nyílásnak (66) az alsó oldala és a támasztó felületnek az alsó oldala közül legalább az egyik úgy van profilozva, hogy legyen elősegítve a fecskendődugattyú (20) és a tűvédő elem (22) eltávolítása a tálcából.

15. Elrendezés az előző igénypontok bármelyike szerint együtt egy tartállyal (10), amely a tálca (14) számára szolgál, és fecskendődugattyúkkal (20), amelyek megfelelő (hozzájuk tartozó) tűvédő elemeket (22) hordoznak (tartanak), ahol a tartály rendelkezik egy alaplappal (11), amely egy felfelé álló oldalfallal (12) rendelkezik, amely úgy van kialakítva, hogy a tálca az alaplap felett legyen megtámasztva (megtartva) oly módon, hogy egy térköz álljon rendelkezésre az alaplap és a tűvédő elemeknek az alsó végei között.