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[Continued on next page]

(54) **Title**: ADAPTER FOR A SYRINGE

(57) **Abstract**: An adapter for a syringe includes a base portion having an insertion hole configured to surround and engage at least a portion of a barrel of the syringe. The base portion includes a top surface and an opposing bottom surface. A flange portion extends laterally outwardly from the base portion. The flange portion includes a top surface and an opposing bottom surface. The top surface of the base portion extends generally parallel to and spaced between the top and bottom surfaces of the flange portion. A longitudinal axis of the flange portion extends from a first distal end thereof to an opposing second distal end thereof. A first distance measured from a geometric center of the insertion hole to the first end of the flange portion is less than a second distance measured from the geometric center of the insertion hole to the second end of the flange portion.

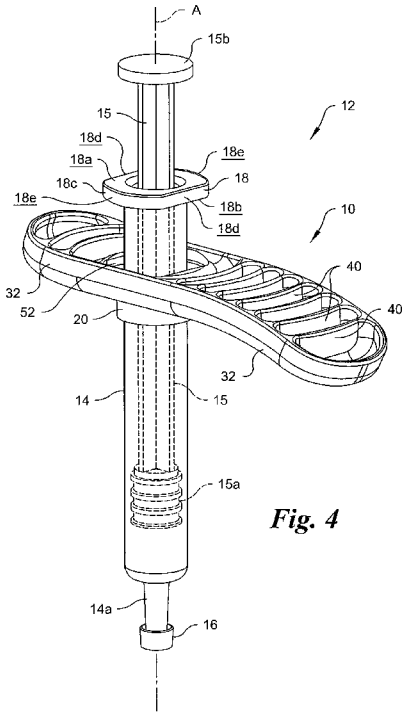

Fig. 4

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TITLE OF THE INVENTION

[0001] Adapter for a Syringe

BACKGROUND OF THE INVENTION

[0002] The present invention relates generally to an accessory for a syringe and, more particularly, to an adapter removably installed onto a syringe, wherein the adapter is rotatable to lock to a portion on the syringe.

[0003] A conventional syringe includes a barrel for holding medicament, a needle or cannula at a distal end thereof for injecting the medicament into a patient, and a small flange at a proximal end thereof. The flange is often referred to as a "finger flange," because the flange provides a surface or structure for which a healthcare professional's or other user's fingers grip or engage. The size, shape and overall configuration of the finger flange can have a direct effect on proper usability, leverage and control over the syringe. The finger flange on an International Organization for Standardization ("ISO") standard 1 milliliter, long syringe can be inadequate in size, shape and ergonomics.

[0004] Therefore, it would be desirable to create a device that eliminates or at least reduces the above-identified deficiencies of conventional finger flanges. For example, it would be desirable to create an accessory or an adapter that can be easily and preferable removably installed onto the finger flange of any syringe. It would also be desirable to create an accessory that may be locked onto the finger flange of a syringe by simply rotating the accessory. The present invention accomplishes the above objectives.

BRIEF SUMMARY OF THE INVENTION

[0005] Briefly stated, one aspect of the present invention is directed to an adapter for a syringe including a base portion having an insertion hole configured to surround and engage at least a portion of a barrel of the syringe. The base portion includes a top surface and an opposing bottom surface. A flange portion extends laterally outwardly from the base portion. The flange portion includes a top surface and an opposing bottom surface. The top surface of the base portion extends generally parallel to and spaced between the top and bottom surfaces of the flange portion. A longitudinal axis of the flange portion extends from a first distal end thereof to an opposing second distal end thereof. A first distance measured from a geometric center of the insertion hole to the first end of the flange portion is less than a second distance measured from the geometric center of the insertion hole to the second end of the flange portion.

[0006] In another aspect, the present invention is directed to a combination of a syringe and an adapter. The syringe includes a barrel and a flange at a proximal end thereof. The adapter includes a base portion having an insertion hole configured to surround and engage at least a portion of the barrel of the syringe. The base portion includes a top surface and an opposing bottom surface. The adapter also includes a flange portion extending laterally outwardly from the base portion. The flange portion includes a top surface and an opposing bottom surface. The top surface of the base portion extends generally parallel to and spaced between the top and bottom surface of the flange portion. A longitudinal axis of the flange portion extends from a first distal end thereof to an opposing second distal end thereof. A first distance measured from a geometric center of the insertion hole to the first end of the flange portion is less than a second distance measured from the geometric center of the insertion hole to the second end of the flange portion.

[0007] In yet another aspect, present invention is directed to an adapter for a syringe including a base portion having an insertion hole configured to surround and engage at least a portion of a barrel of the syringe. The base portion includes a top surface and an opposing bottom surface. At least one projection extends upwardly from the top surface of the base portion. At least one ramped portion is located proximate to the at least one projection. A flange of the syringe is configured to be rotated between and held in place by the at least one projection and the at least one ramp portion. A flange portion extends laterally outwardly from the base portion. The flange portion includes a top surface and an opposing bottom surface. The top surface of the base portion extends generally parallel and spaced between the top and bottom surfaces of the flange portion.

[0008] In yet another aspect, the present invention is directed to a method of attaching an adapter to a syringe including providing an adapter having a base portion with an insertion hole and a flange portion extending laterally outwardly from the base portion. The method also includes inserting a distal end of a barrel of the syringe into the insertion hole of the adapter and sliding the adapter along the barrel toward a flange of the syringe until a top surface of the base portion engages a bottom surface of the flange of the syringe. The method further includes rotating the adapter with respect to the syringe to lock the adapter onto the flange of the syringe.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0009] The foregoing summary, as well as the following detailed description of a preferred embodiment of the invention, will be better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, there are shown in the drawings an

embodiment which is presently preferred. It should be understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown. In the drawings:

[0010] Fig. 1 is a perspective view of an adapter for a syringe according to a preferred embodiment of the present invention;

[0011] Fig. 2 is a perspective view of a portion of the adapter shown in Fig. 1 taken from an alternative perspective;

[0012] Fig. 3 is a cross-sectional elevation view of the adapter shown in Fig 1;

[0013] Fig. 4 is a perspective view of the adapter shown in Fig. 1 mounted to a syringe in a first configuration;

[0014] Fig. 5A is a top plan view of the adapter and syringe shown in Fig. 4 in another configuration;

[0015] Fig. 5B is a top plan view of the adapter and syringe shown in Fig. 4 in yet another configuration;

[0016] Fig. 5C is a top plan view of the adapter and syringe shown in Fig. 4 in yet another configuration; and

[0017] Fig. 6 is a perspective view of the adapter and syringe shown in Fig. 4 in yet another configuration.

DETAILED DESCRIPTION OF THE INVENTION

[0018] Certain terminology is used in the following description for convenience only and is not limiting. The words "proximal," "distal," "upward," "bottom" and "top" designate directions in the drawings to which reference is made. The word "outwardly" refers to a direction away from the geometric center of the adapter or syringe, and designated parts thereof, in accordance with the present invention. Unless specifically set forth herein, the terms "a," "an" and "the" are not limited to one element, but instead should be read as meaning "at least one." The terminology includes the words noted above, derivatives thereof and words of similar import.

[0019] Referring to the drawings in detail, wherein like numerals indicate like elements throughout the several views, Figs. 1-6 show an accessory or adapter, generally designated 10, for a syringe, generally designated 12 (see Figs. 4 and 6), and/or in combination with the syringe 12. The adapter 10 is preferably an accessory or separate component from the syringe 12, such that the adapter 10 can be easily installed onto at least a portion of the syringe 12 and/or is selectively removable therefrom. As described in detail below, the adapter 10 may be selectably locked or fixed onto at least a portion of the syringe 12 by twisting or rotating the adapter 10 with respect to

the syringe 12. The adapter 10 provides a user with an ergonomic advantage, as compared to use of the syringe 12 without the adapter 10, while increasing the overall ease-of-use of the syringe 12. The accessory 10 may be installed onto the syringe 12 by a pharmacist, doctor and/or any other healthcare provider, or the adapter 10 may be installed by the consumer, patient or individual for self-injection.

[0020] Referring to Figs. 4 and 6, the syringe 12 preferably includes a barrel 14 and a plunger 15 having a piston 15a (in phantom) and an opposing base 15b. The piston 15a is preferably slidable and sealing engaged within a hollow cavity of the barrel 14. A needle or cannula (none shown) preferably extends outwardly from a distal end or hub 14a of the barrel 14. The hub 14a of the syringe 12 preferably includes an opening (not shown) that extends generally parallel to a longitudinal axis A of the syringe 12 for receiving and/or capturing a proximal end of the needle. A cap 16 may be removably attached to a distal end of a hub 14a if and/or when the needle is not attached to the hub 14a. The cap 16 is not a necessary component of the syringe 12, as the needle may be fixedly or non-removably mounted to the syringe 12.

[0021] The barrel 14 of the syringe 12 may include two opposing planar surfaces and two opposing curved surfaces, each of which preferably extend generally the entire length of the barrel 14. Alternatively, the barrel 14 may have a generally cylindrical configuration in cross-section. The barrel 14 may be formed of glass, but the present invention is not so limited, as the barrel 14 may be formed of nearly any material, such as plastic or a polymer, capable of safely enclosing medicament. The hollow cavity of the barrel 14 preferably receives and holds medicament (none shown) therein. The medicament is preferably stored between a distal surface of the piston 15a and a proximal end or surface of the needle or cap 16. The syringe 10 is not limited to the inclusion of the barrel 14, the plunger 15, and the needle or cap 16, but maybe comprised of nearly any device that is able to contain medicament therein, be joined with the adapter 10 and expel medicament therefrom, or otherwise inject medicament into the patient.

[0022] Referring again to Figs. 4 and 6, a proximal end of the barrel 14 of the syringe 12 preferably includes a flange 18 that extends generally, if not exactly, perpendicularly to the longitudinal axis A of the syringe 12. The flange 18 also preferably extends generally, if not exactly, parallel to a plane defined by the base 15b of the plunger 15 when the plunger 15 is properly positioned within the barrel 14. The flange 18 preferably includes a first, top or proximal surface 18a and an opposing second, bottom or distal surface 18b. Each surface 18a, 18b of the flange 18 is preferably generally flat or planar and defines a plane that extends generally, if not exactly, perpendicularly to the longitudinal axis A of the syringe 12. The surfaces 18a, 18b of the

flange are preferably spaced-apart a predetermined distance such that the flange 18 has a sidewall 18c therebetween. The shape of the sidewall 18c of the flange 18 preferably matches or mirrors, at least in part, the shape of the exterior of the barrel 14 of the syringe 12. Therefore, the sidewall 18c of the flange 18 may include two opposing planar surfaces 18d and two opposing curved surfaces 18e (see Fig. 4). Of course, the flange 18 extends at least slightly outwardly beyond the radial outer surface of the barrel 14 at least at the curves surfaces 18e.

[0023] Referring now to Figs. 1-4 and 6, the adapter 10 preferably includes a base portion 20 that is sized and shaped to receive at least a portion of the syringe 12, such as the barrel 14, therethrough. More specifically, the base portion 20 preferably includes an insertion hole 22 configured to surround and engage at least a portion of the radial outer surface of the barrel 14 of the syringe 12. The insertion hole 22 preferably extends completely through the adapter 10. As shown in Figs. 1-3, the base portion 20 preferably includes a first or top surface 24 and an opposing second or bottom surface 26. An outer or exterior surface 28 of the base portion 20 is preferably circular in shape and matches a generally circular inner or interior surface 30 of the base portion 20. Alternatively, the outer surface 28 and/or the inner surface 30 of the base portion 20 may generally match or mirror the two opposing planar surfaces 18d and two opposing curved surfaces 18e of the flange 18 and/or the barrel 14. However, the outer and inner surfaces 28, 30 of the base portion 20 are not limited to the above-described configuration, but may be formed in nearly any size and/or shape.

[0024] Referring again to Figs. 1-6, the adapter 10 preferably includes a flange portion 32 that extends laterally outwardly from the base portion 20. When the adapter 10 is attached to the syringe 12, the flange portion 32 preferably extends outwardly from the barrel 14 of the syringe 12 generally perpendicularly to the longitudinal axis A of the syringe 12. The flange portion 32 preferably includes a first or top surface 34 and an opposing second or bottom surface 36. As shown in Fig. 3, the top surface 24 of the base portion 20 preferably extends generally parallel to and spaced between the top and bottom surfaces 34, 36 of the flange portion 32. The top and bottom surfaces 34, 36 of the flange portion 32 are each preferable nonlinear or curved linear in cross-sectional shape (see Fig. 3), such that one side of the flange portion 32 may be at least slightly convex (right side of Fig. 3) and another side of the flange portion 32 may be at least slightly concave (left side of Fig. 3). A peripheral edge 38 of the bottom surface of the 36 of the flange portion 32 is preferably arcuate or concave in shape. The peripheral edge 38 preferably extends around the entire perimeter or periphery of the flange portion 32. The flange portion 32 may be formed of a polymeric or metallic

material, but the flange portion 32 may be formed of any light weight, high strength material that allows for the functionality described herein.

[0025] Referring to Figs. 1, 3, 5A and 5C, a longitudinal axis F of the flange portion 32 preferably extends from a first distal or outer-most end 42 thereof to an opposing second distal or outer-most end 44 thereof. It is preferred that a first distance D_1 measured from a geometric center GC of the insertion hole 22 to the first distal end 42 of the flange portion 32 is less than a second distance D_2 measured from the geometric center GC of the insertion hole 22 to the second distal end 44 of the flange portion 32. However, the adapter 10 is not limited to the above-described configuration as the first and second distances may be of any size ratio. At least one and preferably a plurality of laterally spaced-apart ribs 40 extend downwardly from the top surface 34 of the flange portion 32. As shown in Fig. 5A, each rib 40 preferably extends generally perpendicularly to the longitudinal axis F of the flange portion 32. The ribs 40 may be at least slightly concave in shape with respect to the geometric center GC of the insertion hole 22. The ribs 40 provide structural rigidity to the adapter 10 and provide a gripping surface for the user.

[0026] As described in detail below, the structure of the adapter 10 allows the adapter 10 to be selectively fixed and/or locked onto at least a portion of the barrel 14, such as the flange 18, of the syringe 12. Initially, it is preferred that the adapter 10 is moved or slid along the barrel 14 until at least a portion of the adapter 10 contacts and/or engages the flange 18. Then, it is preferred that the adapter 10 is twisted or rotated in a first rotational direction (i.e., clockwise) with respect to the syringe 12. To accomplish the above result, the adapter 10 preferably includes at least one projection 46 that extends upwardly from the top surface 24 of the base portion 20. The projection 46 shown in Figs. 1-3, 5B and 5C is generally rectangular in shape and extends generally, if not exactly, parallel to the longitudinal axis F of the flange portion 32. In one embodiment, as shown in Fig. 3, a top surface 48 of the projection 46 extends a predetermined distance above the top surface 24 of the base portion 20, and a bottom surface 50 of the projection 46 is positioned at and/or formed unitarily and integrally with the top surface 24 of a base portion 20. However, the projection 46 is not limited to the above-described size, shape and/or configuration, but may be any size-shape or configuration that allows for the functionality described therein.

[0027] As shown in Figs. 1-3, the adapter 10 preferably includes at least one ramp portion 52 located proximate to the at least one projection 46. The ramp portion 52 preferably includes a first or top surface 54 and an opposing second or bottom surface 56. The top surface 54 of the ramp portion 52 is preferably at least generally flat or planar and may extend generally coplanar with the top surface 34 of the flange portion 32 or slightly below the top surface 34 of the flange portion 32

(see Fig. 3). At least a portion of the bottom surface 56 of the ramp portion 52 is also preferably at least generally flat or planar. However, at least a portion of the bottom surface 56 of the ramp portion 52 preferably extends at an angle with respect to the top surface 54 thereof. It is preferred that at least a portion of the bottom surface 56 of the ramp portion 52 extends at an angle of approximately 5 to 45 degrees, and more particularly about 30 degrees, with respect to a plane defined by the top surface 54 of the ramp portion 52.

[0028] In the preferred embodiment, as shown in Figs. 5A-5C, the adapter 10 includes two spaced-apart projections 46 and two spaced-apart ramp portions 52. As shown in Fig. 5C, it is preferred that the two projections 46 are separated by the longitudinal axis F of the flange portion 32, and that each of the ramp portions 52 are bisected by the longitudinal axis F of the flange portion 32. However, the projections 46 and ramp portions 52 are not limited to the above-described positioning and/or configuration. As described in more detail below, the above-described structure and configuration allows for the flange 18 of the syringe 12 to be rotated between and held or locked in place by at least one of the projections 46 and at least one of the ramp portions 52, and more preferably by the two projections 46 and two ramp portions 52.

[0029] A method of attaching the adapter 10 to the syringe 12 of the present invention preferably includes inserting the distal end of the barrel 14 of the syringe 12 into the insertion hole 22 of the adapter 10. It is preferred that the adapter 10 is moved with respect to the syringe 12 or slid along the barrel 14 toward the flange 18 of the syringe 12 until the top surface 24 of the base portion 20 contacts and/or engages the bottom surface 18b of the flange 18 of syringe 12. It is preferred that the adapter 10 is twisted or rotated with respect to the syringe 12 to generally fix or lock the adapter 10 onto the flange 18 of the syringe 12. It is also preferred that the adapter 10 is rotated approximately 90 degrees with respect to the syringe 12 generally lock the adapter 10 onto the syringe 12.

[0030] Figs. 3-6 show the progression of attaching and/or locking the adapter 10 to the syringe 12. After the syringe 12 is inserted into the insertion hole 22 of the adapter 10 or the adapter 10 is slid over the barrel 14 on the syringe 12 (see Fig. 4) until the bottom surface 18b of the flange 18 engages the top surface 24 of the base portion 20, the flange 18 is positioned with respect to the adapter 10 as shown in Fig. 5A. It is preferred that one of the adapter 10 and syringe 12 is held stationery while the other is rotated, such that at least a portion of the flange 18 begins to move beneath the ramp portions 52, the top surfaces 54 of which are shown in Fig. 5B. Continued rotation or twisting of one of the adapter 10 and syringe 12 with respect to the other occurs until the flange 18 is position with respect to the adapter 10 such that the two opposing planar surfaces 18d of the

flange extend generally parallel to the two projections 46, as shown in Fig. 5C. In the configuration shown in Fig. 5C, opposing portions of the flange 18 are positioned between the bottom surface 56 of each ramp portion 52 and a portion of the top surface 24 of the base portion 20. This configuration generally locks the adapter 10 onto the syringe 12.

[0031] The angled configuration of at least a portion of the bottom surface 56 of each ramp portion 52 generally requires a twisting or rotating force of increasing magnitude as the flange 18 is locked within the adapter 10, as shown in Fig. 5C. It is preferred that an audible or tactile sound or click is generated once the flange 18 is positioned with respect to the adapter 10 as shown in Fig. 5C, so as to alert the user that the adapter 10 is in a final locked configuration. Once the adapter 10 is in the final locked configuration, the syringe 12 may be used as is conventional in the art (see Fig. 6).

[0032] It is understood by those skilled in the art that the adapter 10 may be designed to be permanently locked onto the syringe 12 once the adapter 10 is in the final lock configuration. In such an embodiment, the adapter 10 is preferably discarded along with the used syringe 12 after use. In an alternative embodiment, the adapter 10 may be removable from the syringe 12 after the adapter 10 is placed in the final locked configuration. In such an embodiment, the adapter 10 is removed from the syringe 12 by rotating the adapter in an opposing second rotational direction (i.e., counterclockwise) to remove portions of the flange 18 from between the projection(s) 46 and the ramp portion(s) 52, and then sliding or moving the adapter 10 off of the syringe 12. In such an embodiment, the adapter 10 would be reusable and able to be used with a plurality of different syringes 12.

[0033] It will be appreciated by those skilled in the art that changes could be made to the embodiments described above without departing from the broad inventive concept thereof. It is understood, therefore, that this invention is not limited to the particular embodiments disclosed, but it is intended to cover modifications within the spirit and scope of the present invention as defined by the appended claims.

CLAIMS

We claim:

1. An adapter for a syringe comprising:

a base portion having an insertion hole configured to surround and engage at least a portion of a barrel of the syringe, the base portion including a top surface and an opposing bottom surface; and

a flange portion extending laterally outwardly from the base portion, the flange portion including a top surface and an opposing bottom surface, the top surface of the base portion extending generally parallel to and spaced between the top and bottom surfaces of the flange portion, a longitudinal axis of the flange portion extending from a first distal end thereof to an opposing second distal end thereof, a first distance measured from a geometric center of the insertion hole to the first distal end of the flange portion being less than a second distance measured from the geometric center of the insertion hole to the second distal end of the flange portion.

2. The adapter according to claim 1, wherein the top and bottom surfaces of the flange portion are each nonlinear in cross-sectional shape.

3. The adapter according to claim 1, wherein a peripheral edge of the bottom surface of the flange portion is concave.

4. The adapter according to claim 1, wherein the top surface of the flange portion includes at least one rib that extends generally perpendicularly to the longitudinal axis of the flange portion.

5. The adapter according to claim 1, wherein the adapter is locked onto the barrel of the syringe by sliding the adapter along the barrel and then rotating the adapter in a first rotational direction with respect to the syringe.

6. The adapter according to claim 1, further comprising at least one projection extending upwardly from the top surface of the base portion and at least one ramp portion proximate to the at least one projection, wherein a flange of the syringe is configured to be rotated between and held in place by the at least one projection and the at least one ramp portion.

7. The adapter according to claim 6, wherein a top surface of the at least one ramp portion is generally coplanar with the top surface of the flange portion and at least a portion of a bottom surface of the at least one ramp portion extends at an angle of approximately 5-45 degrees with respect to a plane defined by the top surface of the at least one ramp portion.

8. The adapter according to claim 1, further comprising two spaced-apart projections extending upwardly from the top surface of the base portion and two spaced-apart ramp portions, wherein a flange of the syringe is configured to be rotated between and held in place by the two projections and two ramp portions.

9. A combination of a syringe and an adapter, the combination comprising:

the syringe including a barrel and a flange at a proximal end thereof; and

the adapter including:

a base portion having an insertion hole configured to surround and engage at least a portion of the barrel of the syringe, the base portion including a top surface and an opposing bottom surface; and

a flange portion extending laterally outwardly from the base portion, the flange portion including a top surface and an opposing bottom surface, the top surface of the base portion extending generally parallel to and spaced between the top and bottom surfaces of the flange portion, a longitudinal axis of the flange portion extending from a first distal end thereof to an opposing second distal end thereof, a first distance measured from a geometric center of the insertion hole to the first distal end of the flange portion being less than a second distance measured from the geometric center of the insertion hole to the second distal end of the flange portion.

10. The combination according to claim 9, wherein the adapter is locked onto the barrel of the syringe by sliding the adapter along the barrel and then rotating the adapter in a first rotational direction with respect to the syringe.

11. The combination according to claim 9, wherein the adapter further includes at least one projection extending upwardly from the top surface of the base portion and at least one ramp portion proximate to the at least one projection, wherein a flange of the syringe is configured to be rotated between and held in place by the at least one projection and the at least one ramp portion.

12. The combination according to claim 11, wherein a top surface of the at least one ramp portion is generally coplanar with the top surface of the flange portion and at least a portion of

a bottom surface of the at least one ramp portion extends at an angle of approximately 5-45 degrees with respect to a plane defined by the top surface of the at least one ramp portion.

13. An adapter for a syringe comprising:

a base portion having an insertion hole configured to surround and engage at least a portion of a barrel of the syringe, the base portion including a top surface and an opposing bottom surface, at least one projection extending upwardly from the top surface of the base portion, at least one ramp portion being located proximate to the at least one projection, a flange of the syringe being configured to be rotated between and held in place by the at least one projection and the at least one ramp portion; and

a flange portion extending laterally outwardly from the base portion, the flange portion including a top surface and an opposing bottom surface, the top surface of the base portion extending generally parallel to and spaced between the top and bottom surfaces of the flange portion.

14. The adapter according to claim 13, wherein a top surface of the at least one ramp portion is generally coplanar with the top surface of the flange portion and at least a portion of a bottom surface of the at least one ramp portion extends at an angle of approximately 5-45 degrees with respect to a plane defined by the top surface of the at least one ramp portion.

15. A method of attaching an adapter to a syringe, the method comprising:

providing an adapter having a base portion with an insertion hole and a flange portion extending laterally outwardly from the base portion;

inserting a distal end of a barrel of the syringe into the insertion hole of the adapter;

sliding the adapter along the barrel toward a flange of the syringe until a top surface of the base portion engages a bottom surface of the flange of the syringe; and

rotating the adapter with respect to the syringe to lock the adapter onto the flange of the syringe.

16. The method according to claim 15, wherein the barrel of the syringe includes two opposing planar surfaces and two opposing curved surfaces, each planar and curved surface extending generally the entire length of the barrel.

17. The method according to claim 15, wherein the adapter includes at least one projection extending upwardly from a top surface of the base portion and at least one ramp portion

proximate to the at least one projection, wherein the flange of the syringe is configured to be rotated between and held in place by the at least one projection and the at least one ramp portion.

18. The method according to claim 17, wherein a top surface of the at least one ramp portion is generally coplanar with a top surface of the flange portion and at least a portion of a bottom surface of the at least one ramp portion extends at an angle of approximately 5-45 degrees with respect to a plane defined by the top surface of the at least one ramp portion.

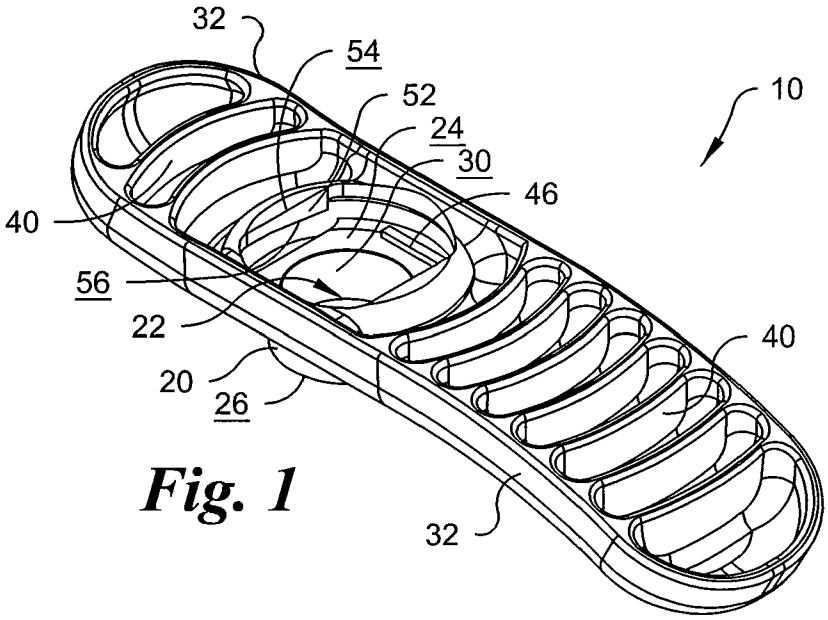

Fig. 1

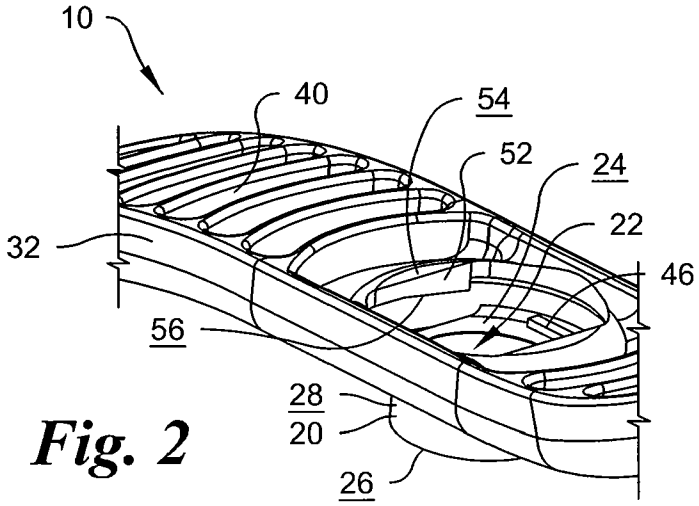

Fig. 2

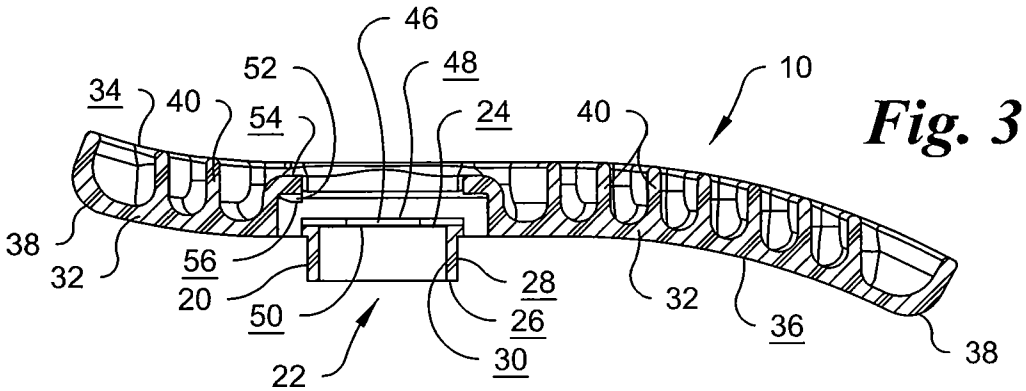

Fig. 3

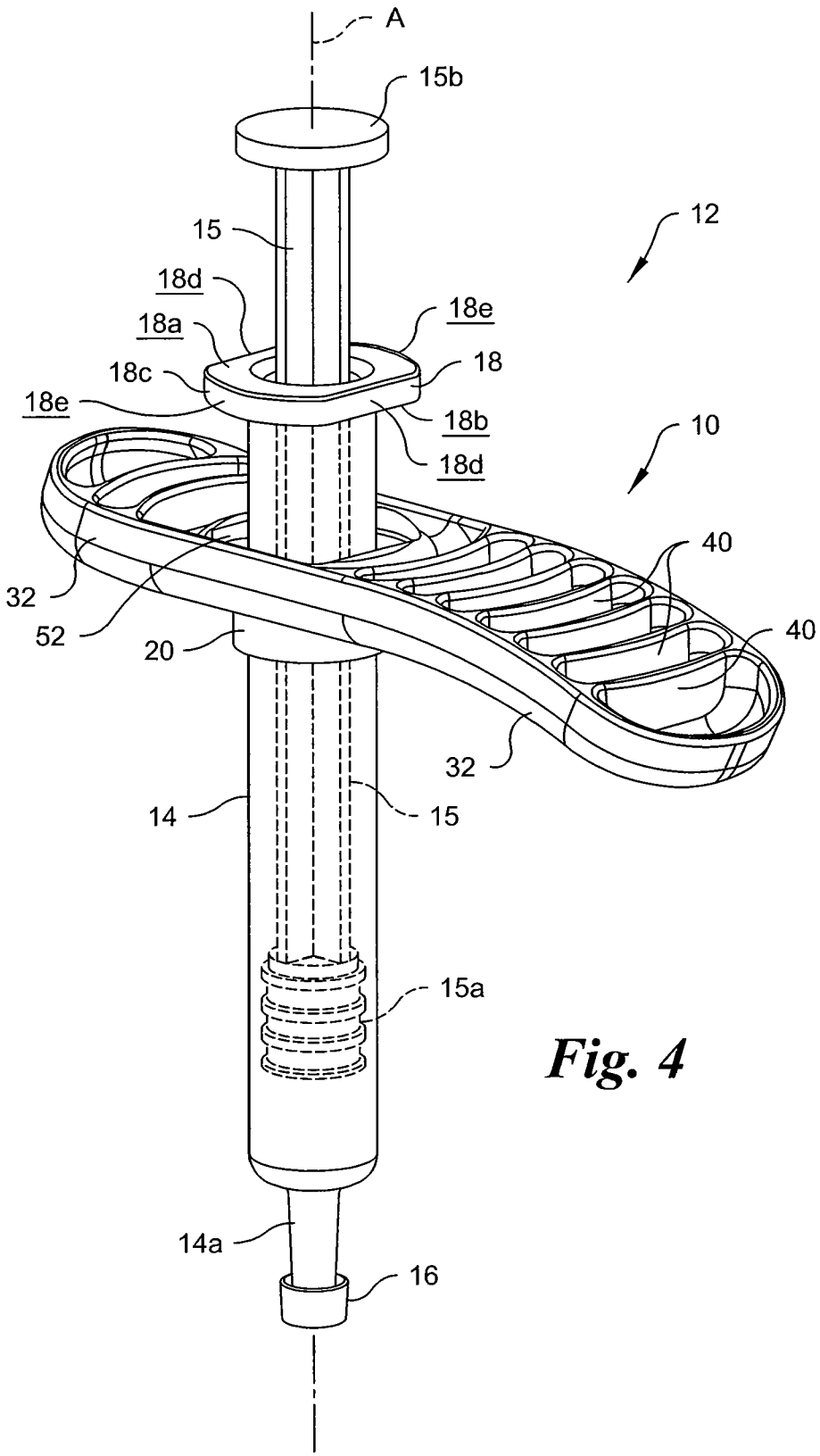
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Fig. 4

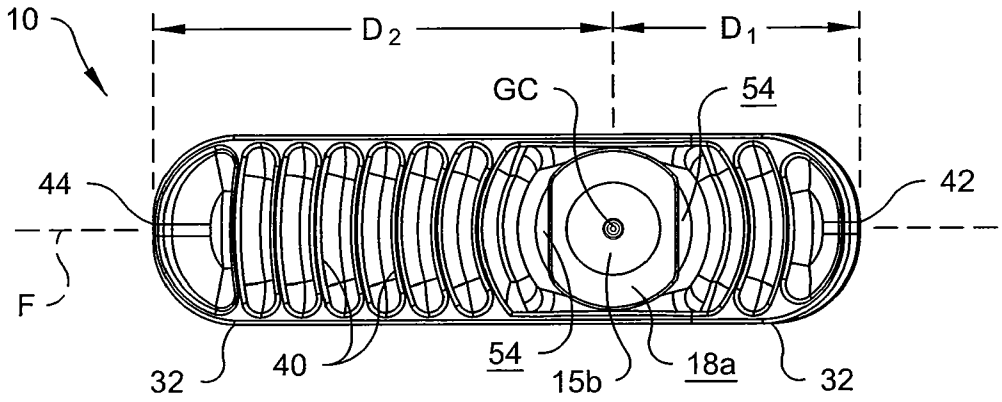

Fig. 5A

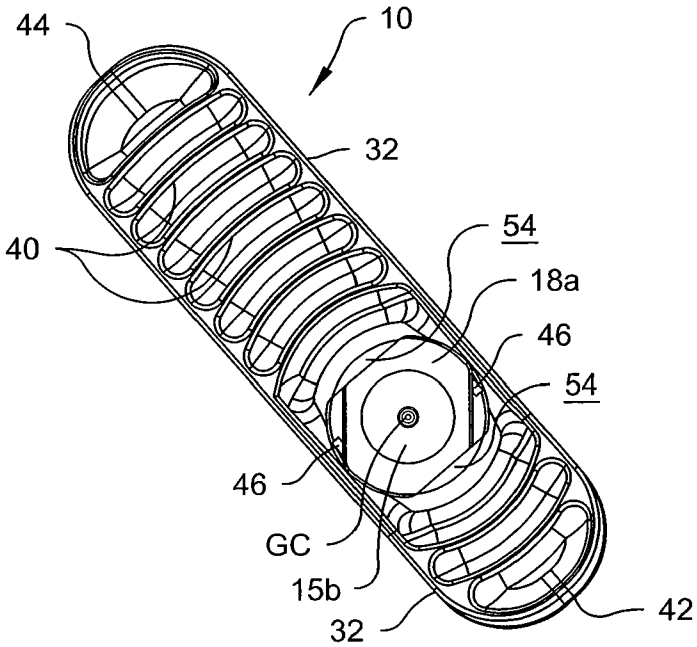

Fig. 5B

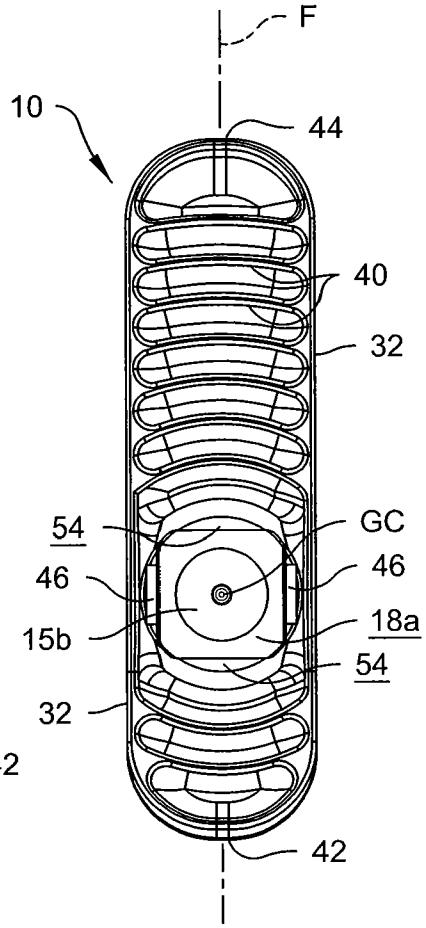

Fig. 5C

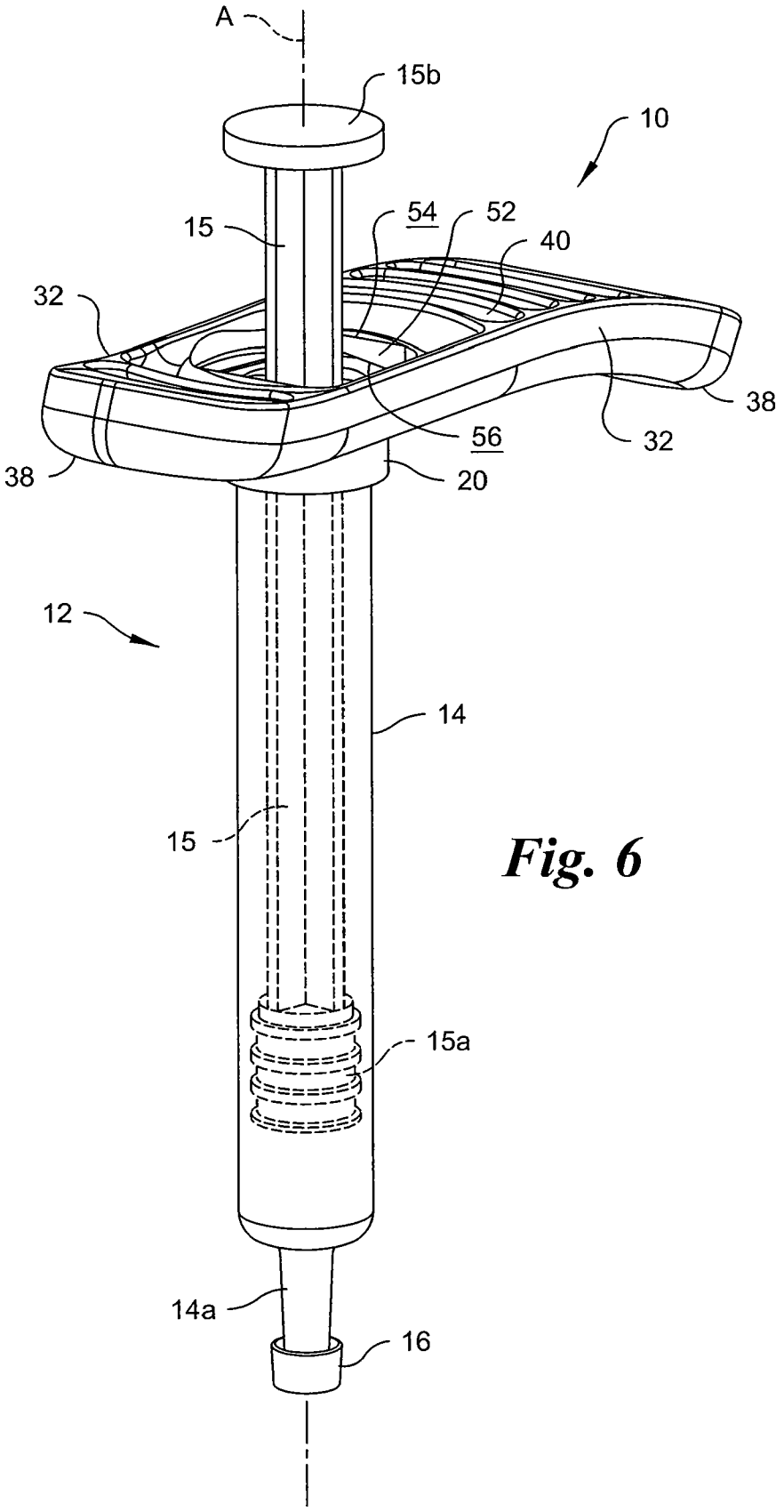

Fig. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/036251

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61M5/31
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2009/182284 A1 (MORGAN DARRELL P [GB]) 16 July 2009 (2009-07-16) paragraphs [0050] - [0054], [0058]; figures 2A-5B	1-3,9 5-8, 10-18

X Y	US 2008/097338 A1 (CHENG WAN CHANG [TW] ET AL) 24 April 2008 (2008-04-24) figures 12-14	1-3,9 5-8, 10-18

A	US 2003/060777 A1 (BENZ PHILIP DAVID [US] ET AL) 27 March 2003 (2003-03-27) figure 1	1,2,9

A	EP 1 285 675 A1 (TAISEI KAKO CO [JP]; SHOFU INC [JP]) 26 February 2003 (2003-02-26) figure 9	3

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 June 2012	29/06/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Krassow, Heiko

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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 265 876 A2 (HABLEY MEDICAL TECHNOLOGY CORP [US]) 4 May 1988 (1988-05-04) figures 1-3	5-8, 10-18
Y	CH 403 164 A (HOECHST AG [DE]) 30 November 1965 (1965-11-30) the whole document	5-8, 10-18
Y	DE 296 12 079 U1 (HURTADO ARTOZON ROBERTO DR MED [DE]) 24 October 1996 (1996-10-24) the whole document	5-8, 10-18
Y	US 2009/182285 A1 (LEE HEEYOUNG [KR] ET AL) 16 July 2009 (2009-07-16) paragraphs [0030], [0040]; figures 1,2	5-8, 10-18

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/036251

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☒ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

1-3, 5-18

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☒ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2011/036251

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009182284 A1	16-07-2009	AR 070098 A1	17-03-2010
		AU 2008347991 A1	23-07-2009
		CA 2711886 A1	23-07-2009
		CN 101945679 A	12-01-2011
		EA 201070840 A1	28-02-2011
		EP 2240222 A2	20-10-2010
		JP 2011509133 A	24-03-2011
		KR 20100120132 A	12-11-2010
		TW 200936197 A	01-09-2009
		US 2009182284 A1	16-07-2009
		WO 2009090499 A2	23-07-2009
US 2008097338 A1	24-04-2008	NONE	
US 2003060777 A1	27-03-2003	US 2003060777 A1	27-03-2003
		US 2004039345 A1	26-02-2004
EP 1285675 A1	26-02-2003	DE 60212527 T2	21-06-2007
		EP 1285675 A1	26-02-2003
		EP 1666081 A2	07-06-2006
		JP 4133071 B2	13-08-2008
		JP 2003135487 A	13-05-2003
		US 2003035744 A1	20-02-2003
EP 0265876 A2	04-05-1988	DE 3783709 D1	04-03-1993
		DE 3783709 T2	05-08-1993
		EP 0265876 A2	04-05-1988
		ES 2036556 T3	01-06-1993
		US 4710179 A	01-12-1987
CH 403164 A	30-11-1965	BE 619288 A1	24-12-1962
		CH 403164 A	30-11-1965
		DE 1836679 U	31-08-1961
		FR 1326151 A	03-05-1963
		LU 41905 A1	18-08-1962
DE 29612079 U1	24-10-1996	NONE	
US 2009182285 A1	16-07-2009	CN 101489605 A	22-07-2009
		EP 2040777 A1	01-04-2009
		US 2009182285 A1	16-07-2009
		WO 2008007892 A1	17-01-2008

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-3, 9

Claims 1-3, and 9 essentially define an adapter for a syringe comprising
1) a base portion having an insertion hole configured to surround and engage at least a portion of a barrel of the syringe, the base portion including a top surface and an opposing bottom surface; and
2) a flange portion extending laterally outwardly from the base portion, a longitudinal axis of the flange portion extending from a first distal end thereof to an opposing second distal end thereof, a first distance measured from a geometric center of the insertion hole to the first distal end of the flange portion being less than a second distance measured from the geometric center of the insertion hole to the second distal end of the flange portion, and
3) wherein the top and bottom surface of the flange portion are each nonlinear in cross-sectional shape (claim 2) such that one side of the flange portion is concave and the other side of the flange portion is convex (cf. description, page 5, lines 26-29).

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2. claim: 4

Claim 4 essentially defines an adapter for a syringe comprising the combination of features 1) and 2) of the above first group, and wherein
4) the top surface of the flange portion includes a rib extending perpendicular to the longitudinal axis of the flange (claim 4).

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3. claims: 5-8, 10-18

Claims 5-8, and 10-18, essentially define an adapter for a syringe or a combination of an adapter and a syringe or a respective method of attaching an adapter to a syringe comprising the combination of features 1) and 2) of the above first group, and wherein
4) the adapter is locked onto the barrel of the syringe by sliding the adapter along the barrel and then rotating the adapter in a first direction with respect to the syringe (claim 5 or claim 10 or claim 15).
