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(54) **VACUUM CLEANER ADAPTER SET**

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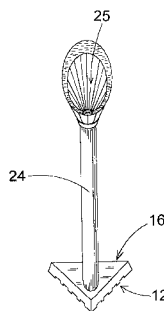
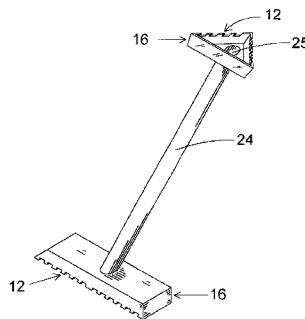
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(52) **U.S. Cl. 15/415.1; 15/414; 15/420; 15/417**

(57) **ABSTRACT**

This invention relates to a set of related new and useful vacuum cleaner adapters and accessories, designed for vacuum cleaning areas that are high clearance, low clearance, narrow clearance, or surfaces with special cleaning needs. The various embodiments disclosed may be fit onto the terminal end of a standard hose fitting of a vacuum cleaner, and used to clean heretofore inaccessible areas. There is also an associated flashlight assembly disclosed herein that may be affixed to the other adapters disclosed, or may be affixed to a vacuum cleaner hose or a portion of the hose fitting. The flashlight assembly may be used to provide illumination to the otherwise non-illuminated area being cleaned with an adapter, and may also be useful for vacuum cleaners that do not have lights incorporated therein such as the canister variety of vacuum cleaners. There are a number of embodiments, shapes, and configurations for these related adapters disclosed, including an article retrieval screen, and with a variety of specialized new and useful cleaning applications disclosed.



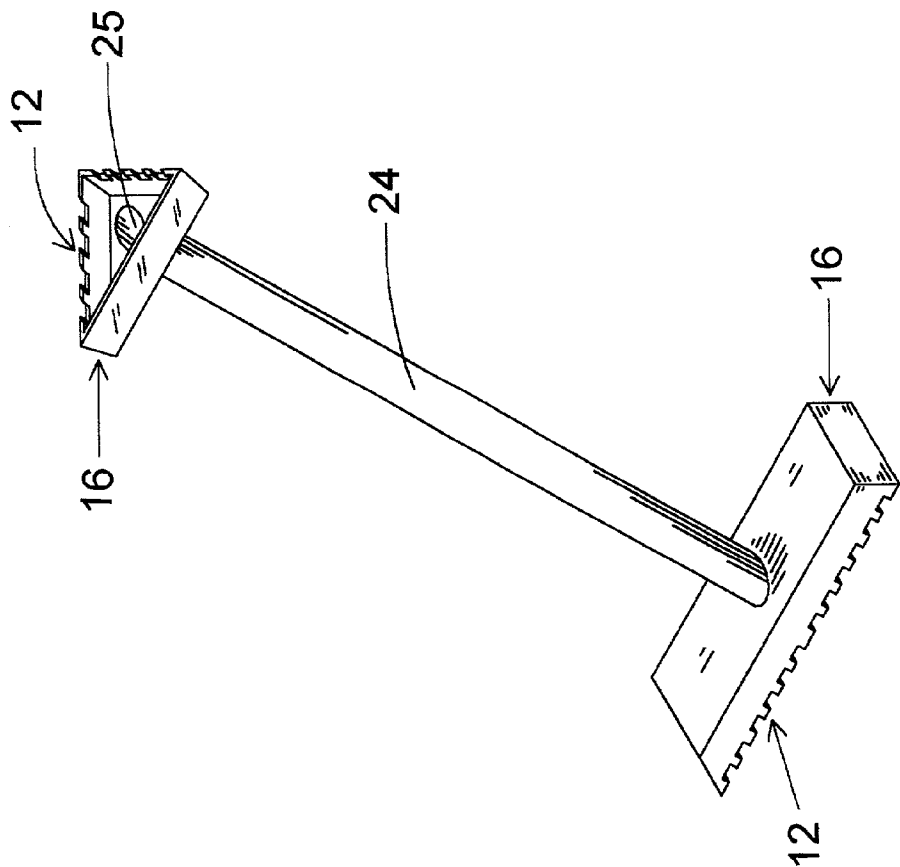


FIG. 1

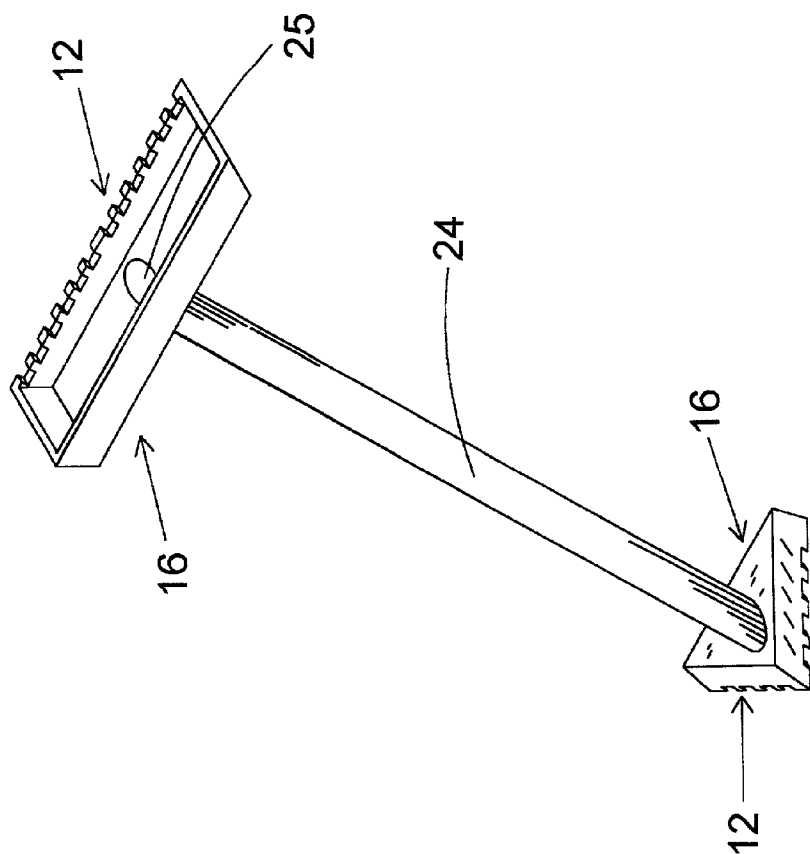
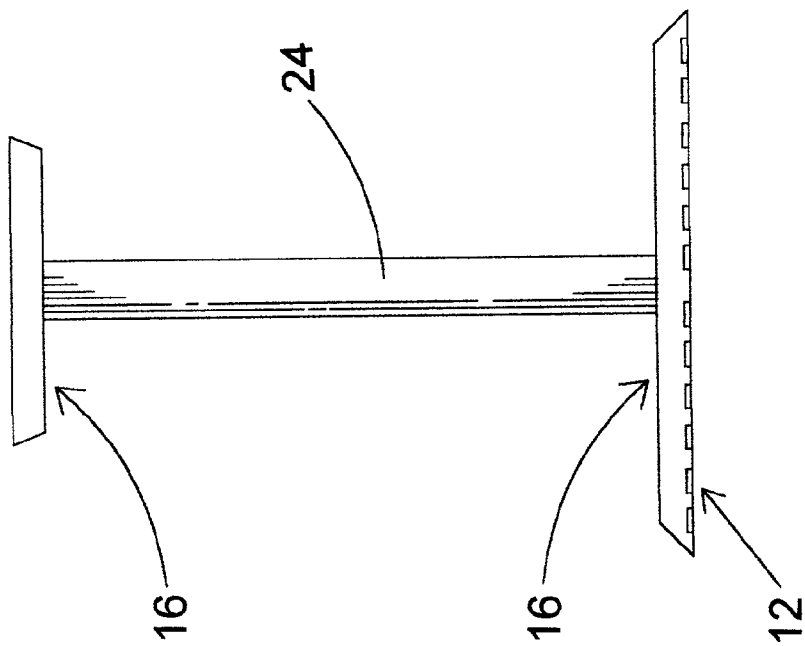


FIG. 2



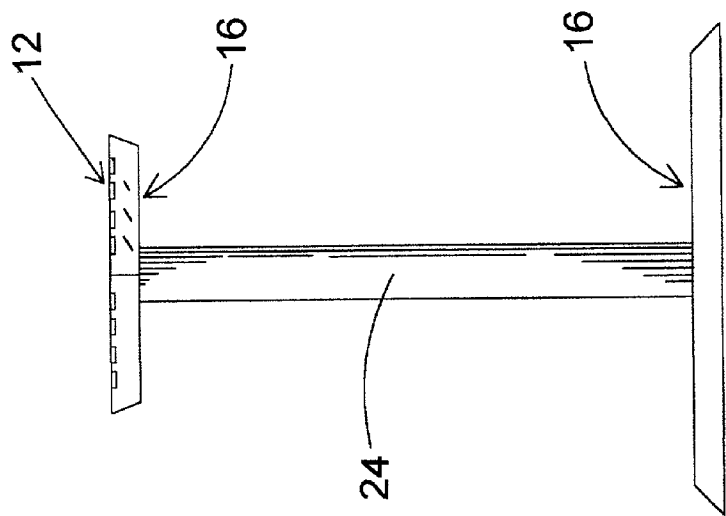


FIG. 4

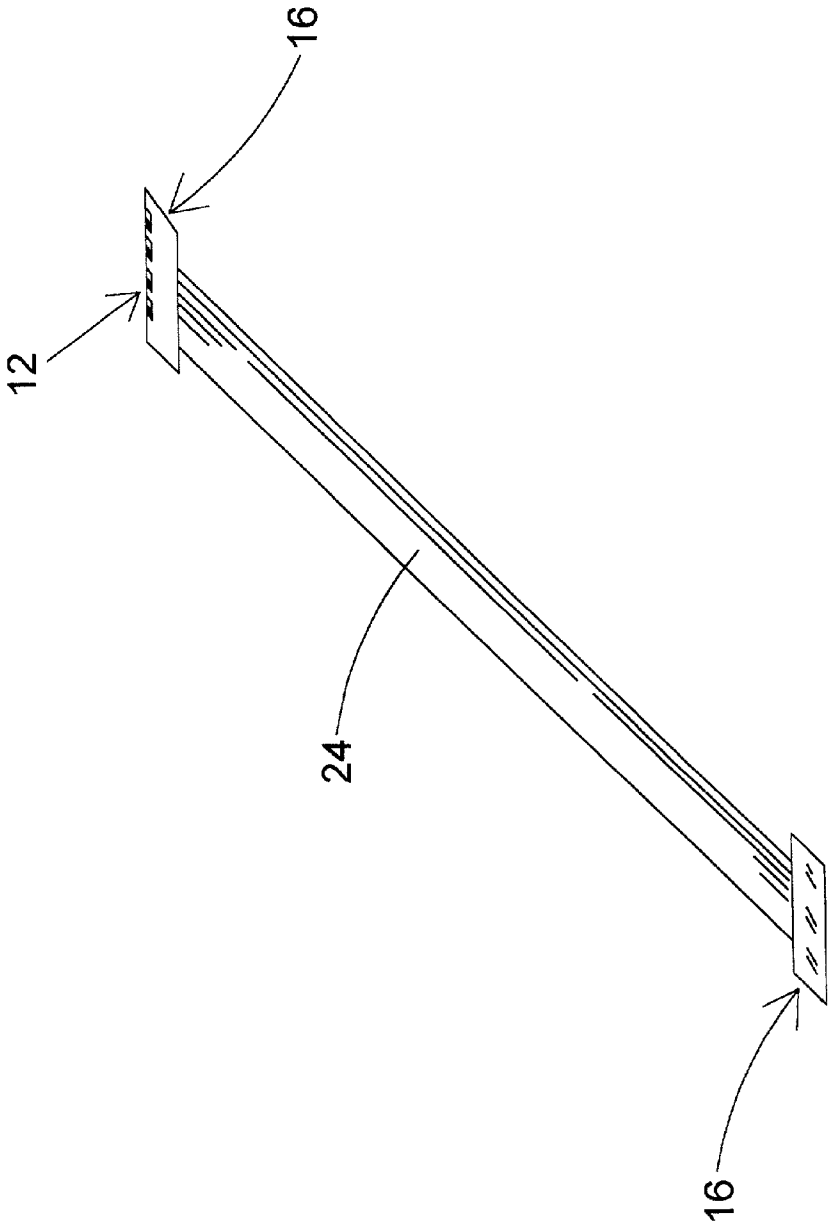


FIG. 5

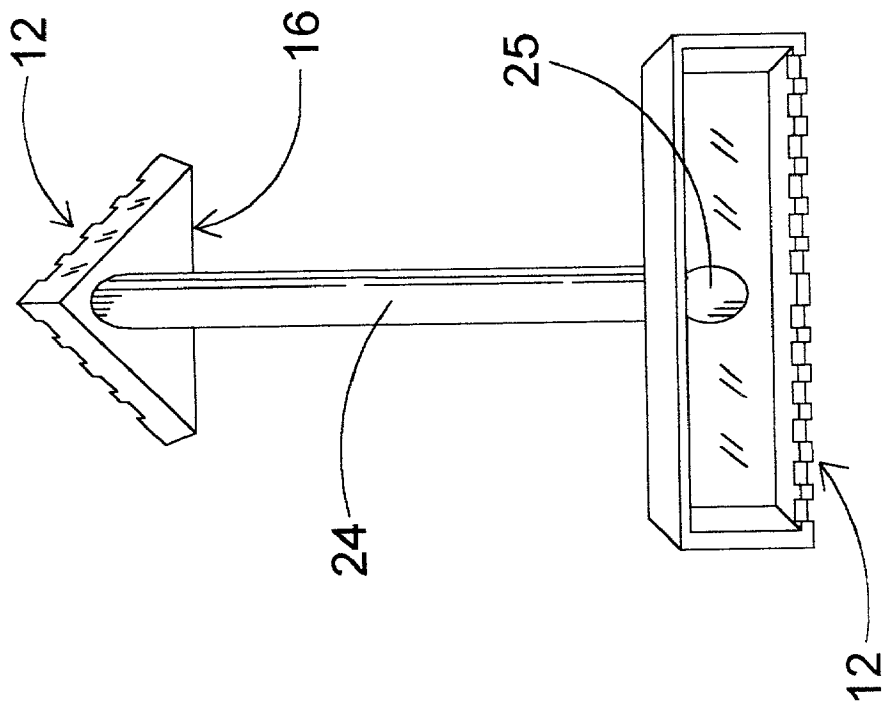
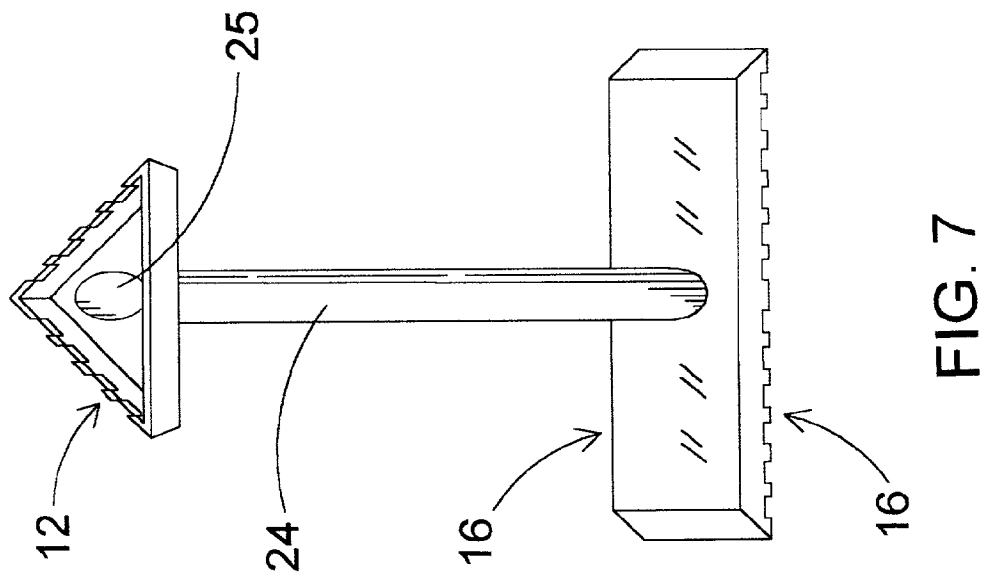


FIG. 6



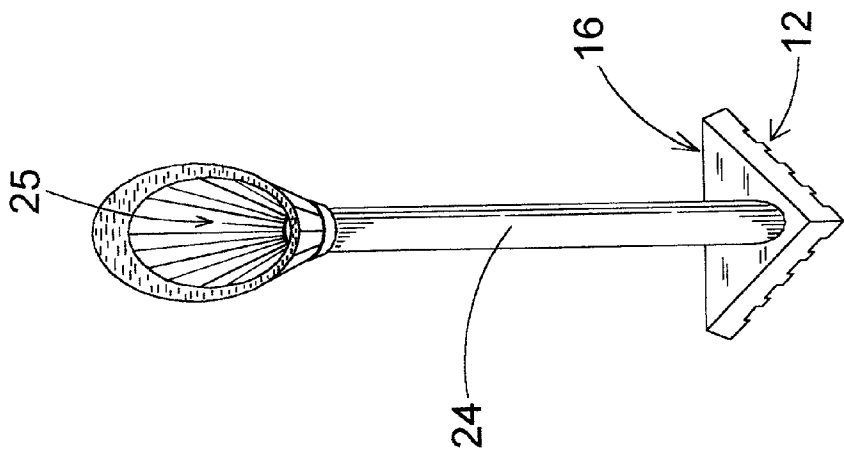


FIG. 8

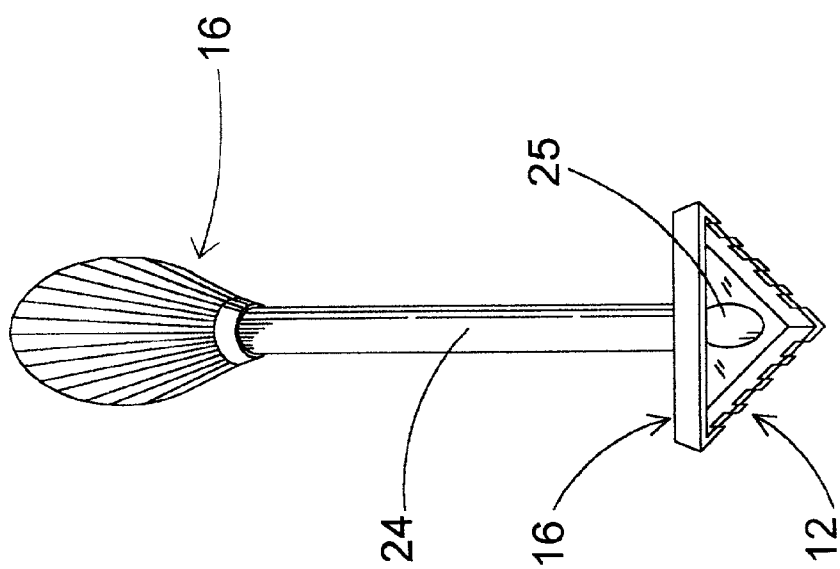


FIG. 9

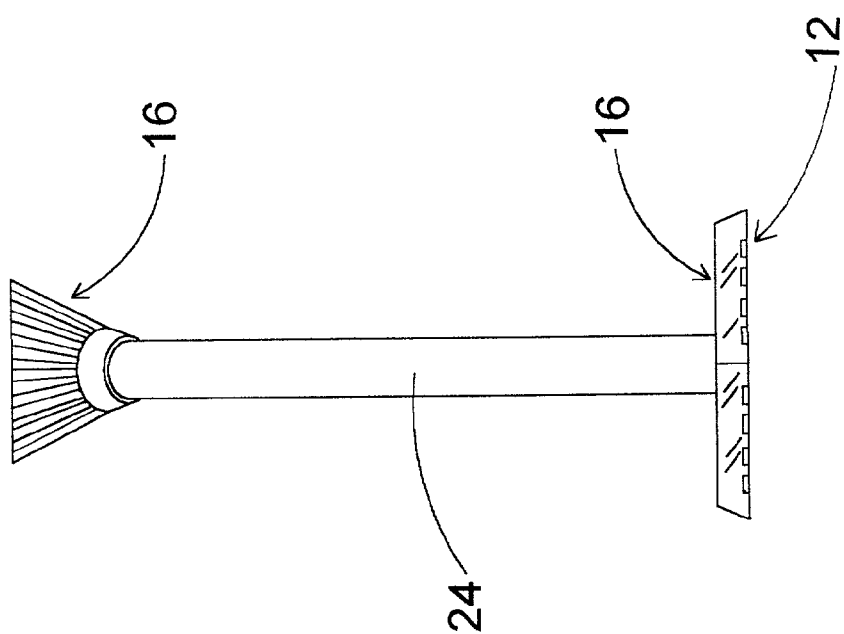


FIG. 10

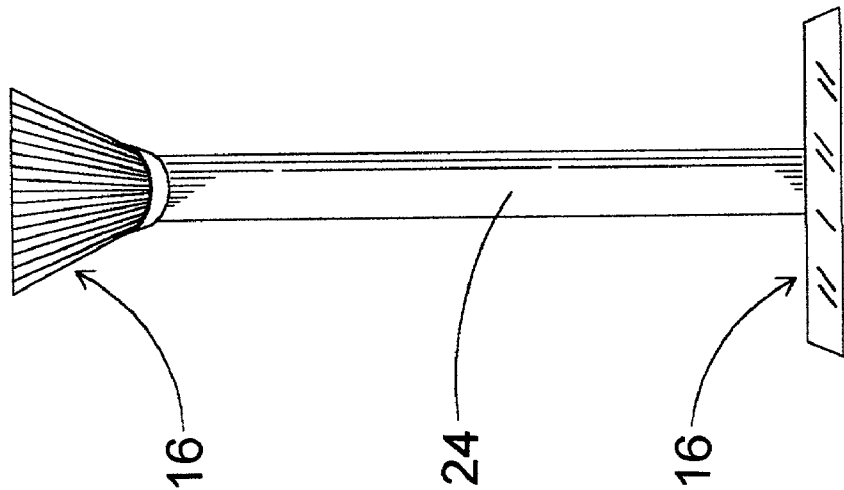
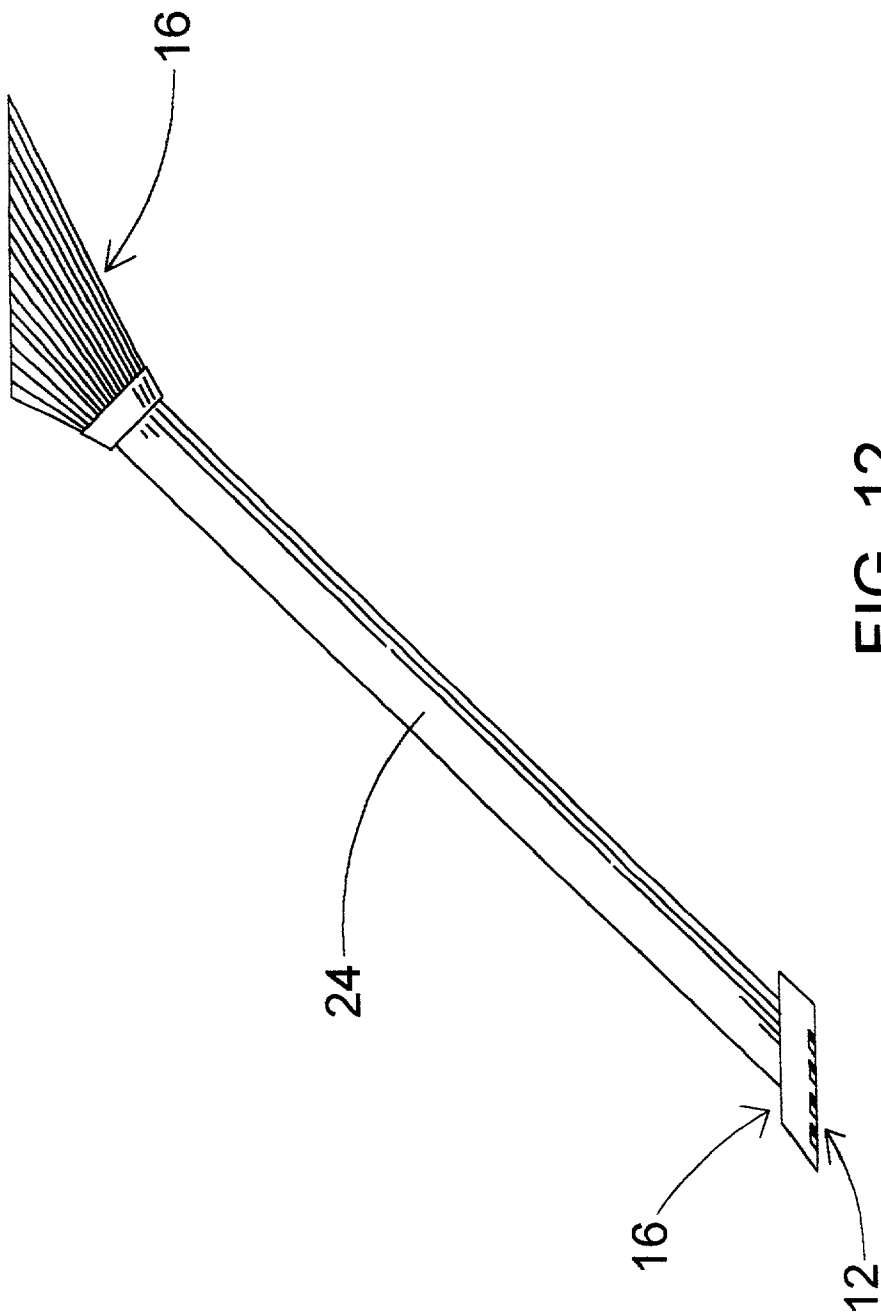


FIG. 11



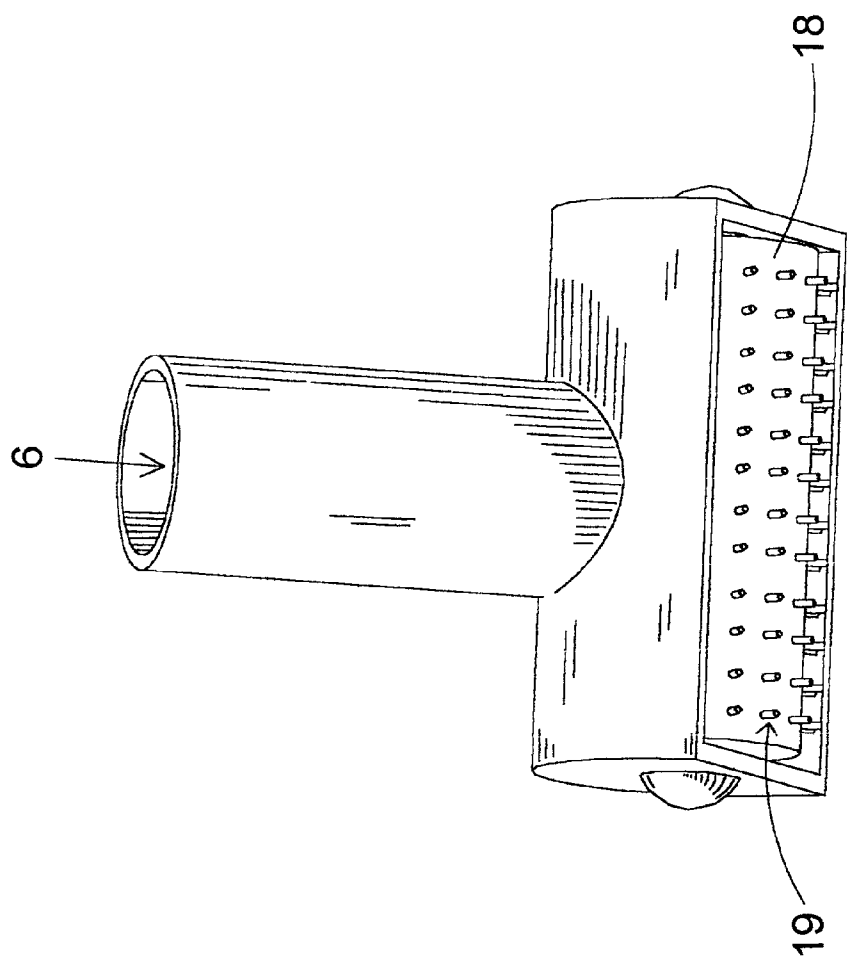


FIG. 13

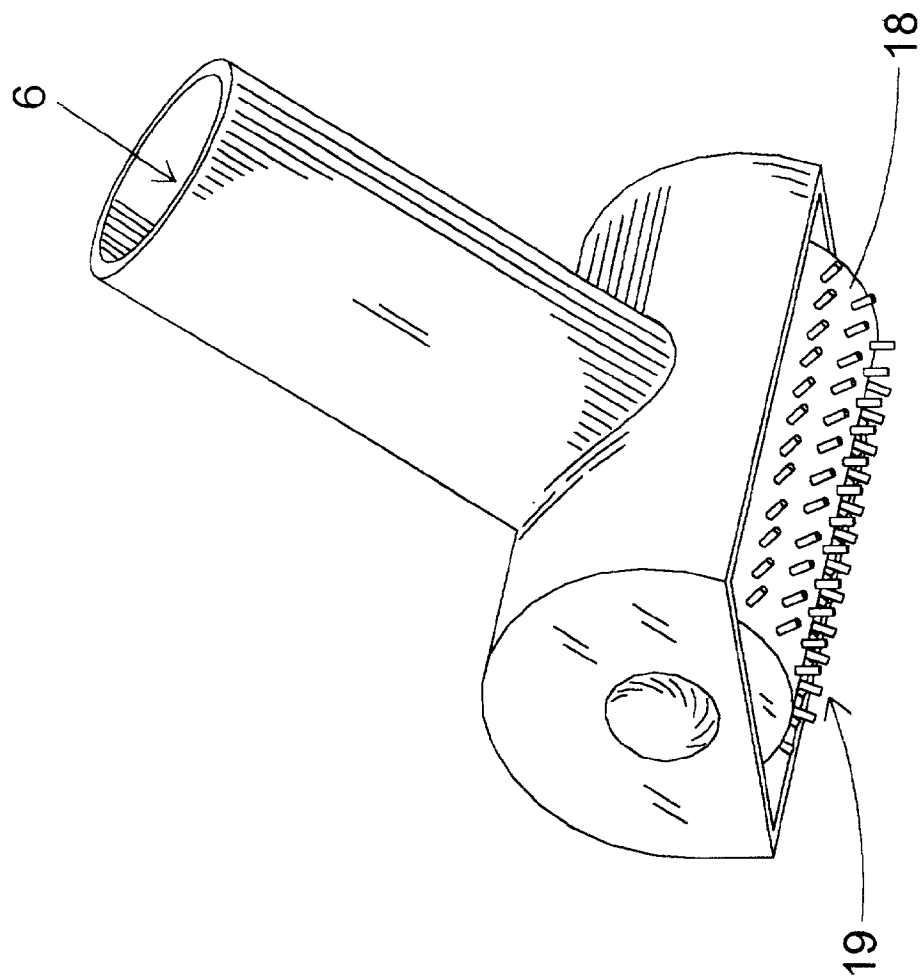


FIG. 14

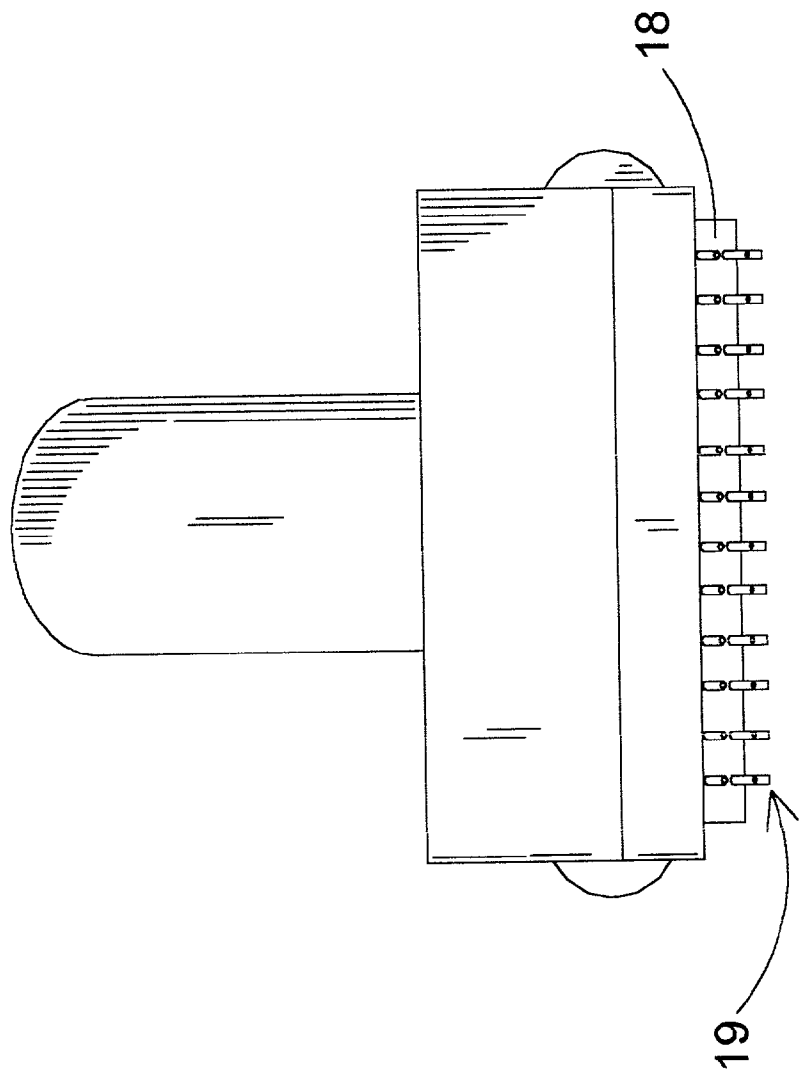


FIG. 15

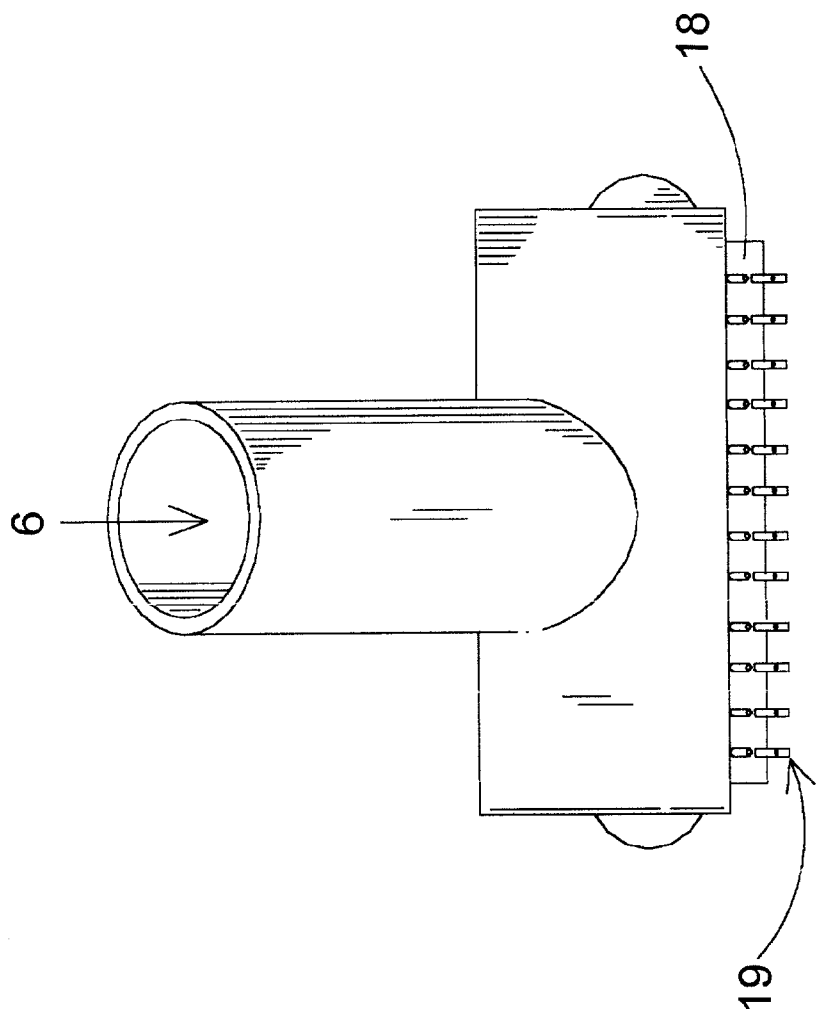


FIG. 16

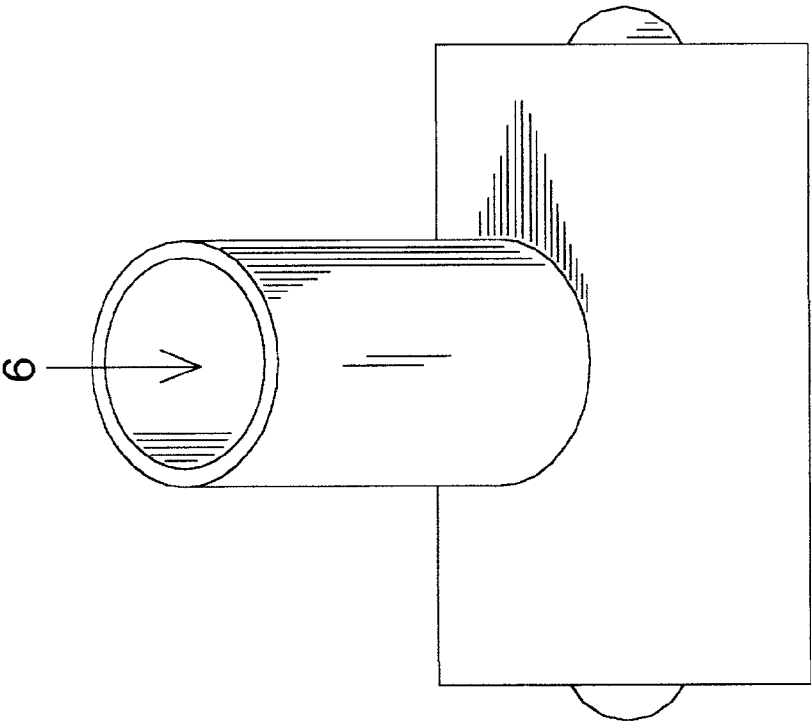


FIG. 17

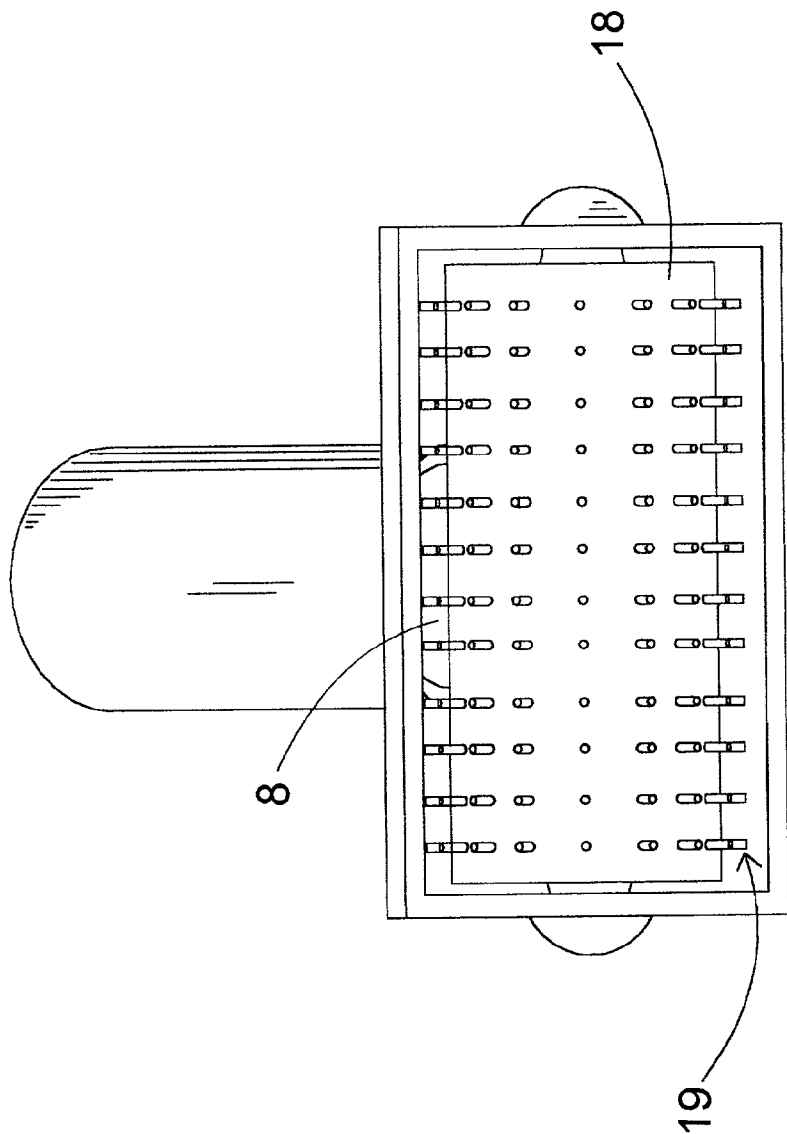


FIG. 18

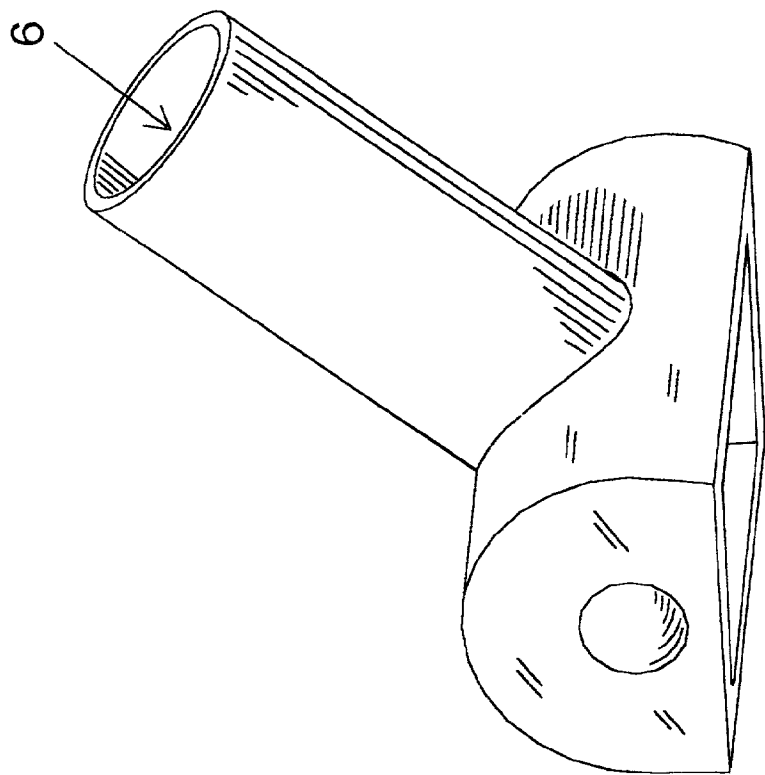


FIG. 19

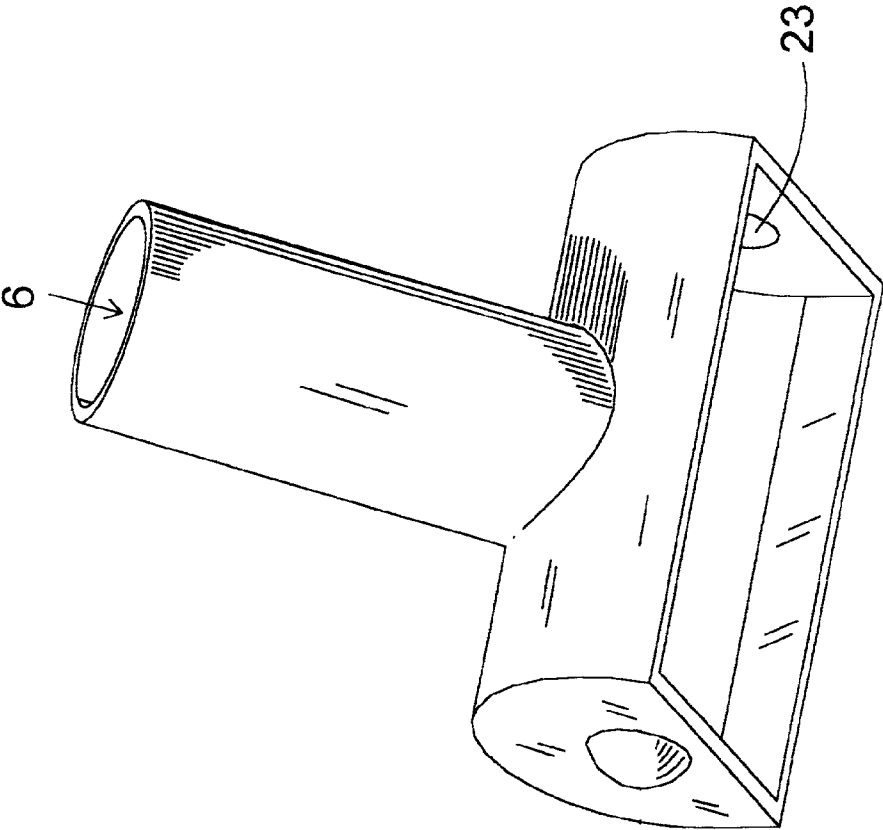


FIG. 20

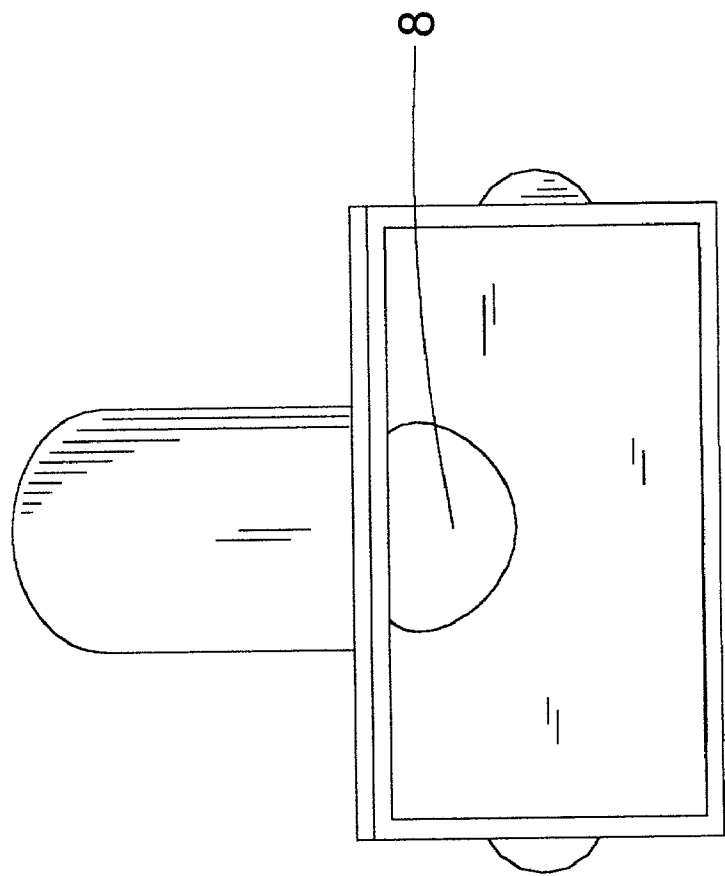


FIG. 21

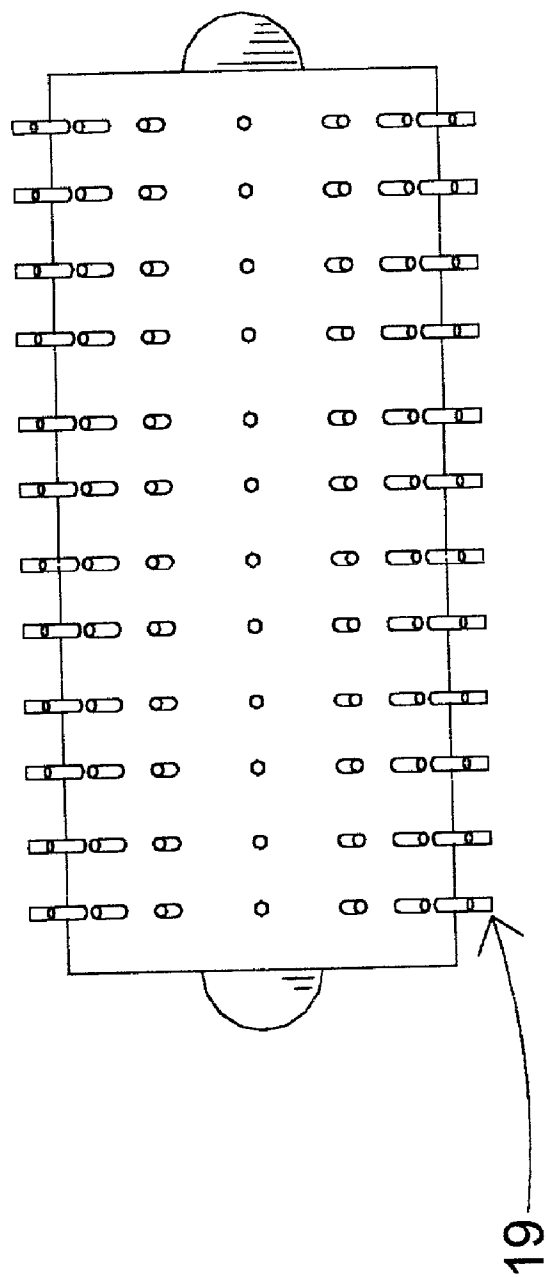


FIG. 22

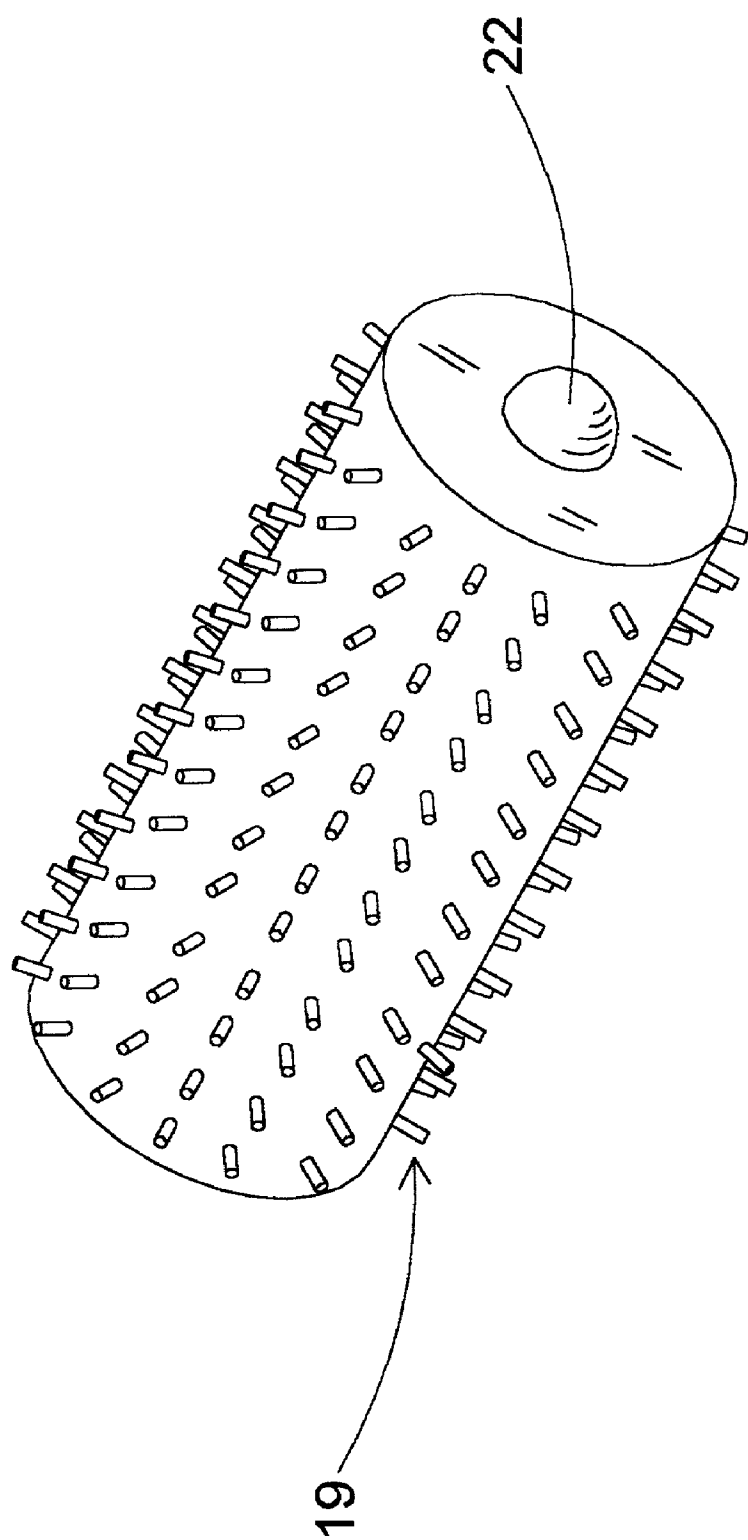


FIG. 23

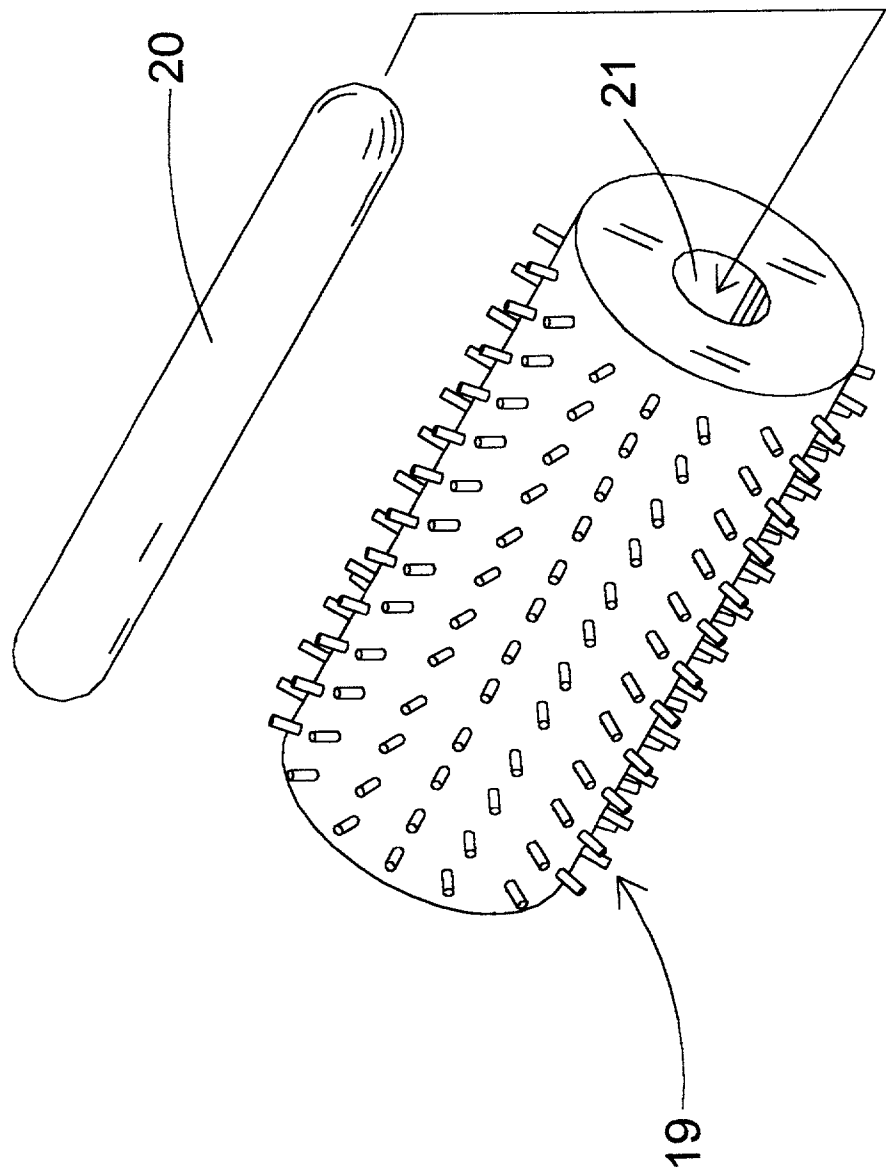


FIG. 24

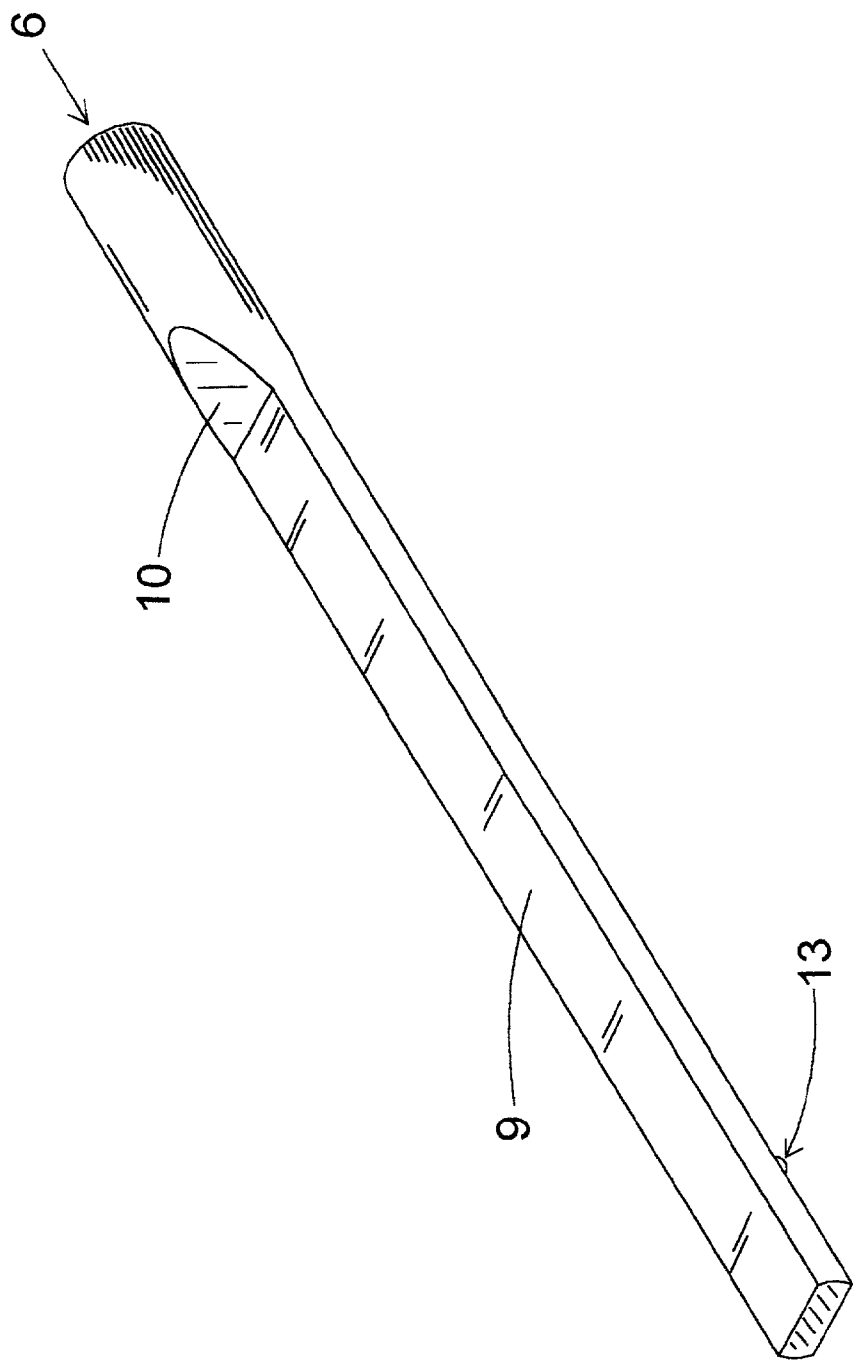


FIG. 25

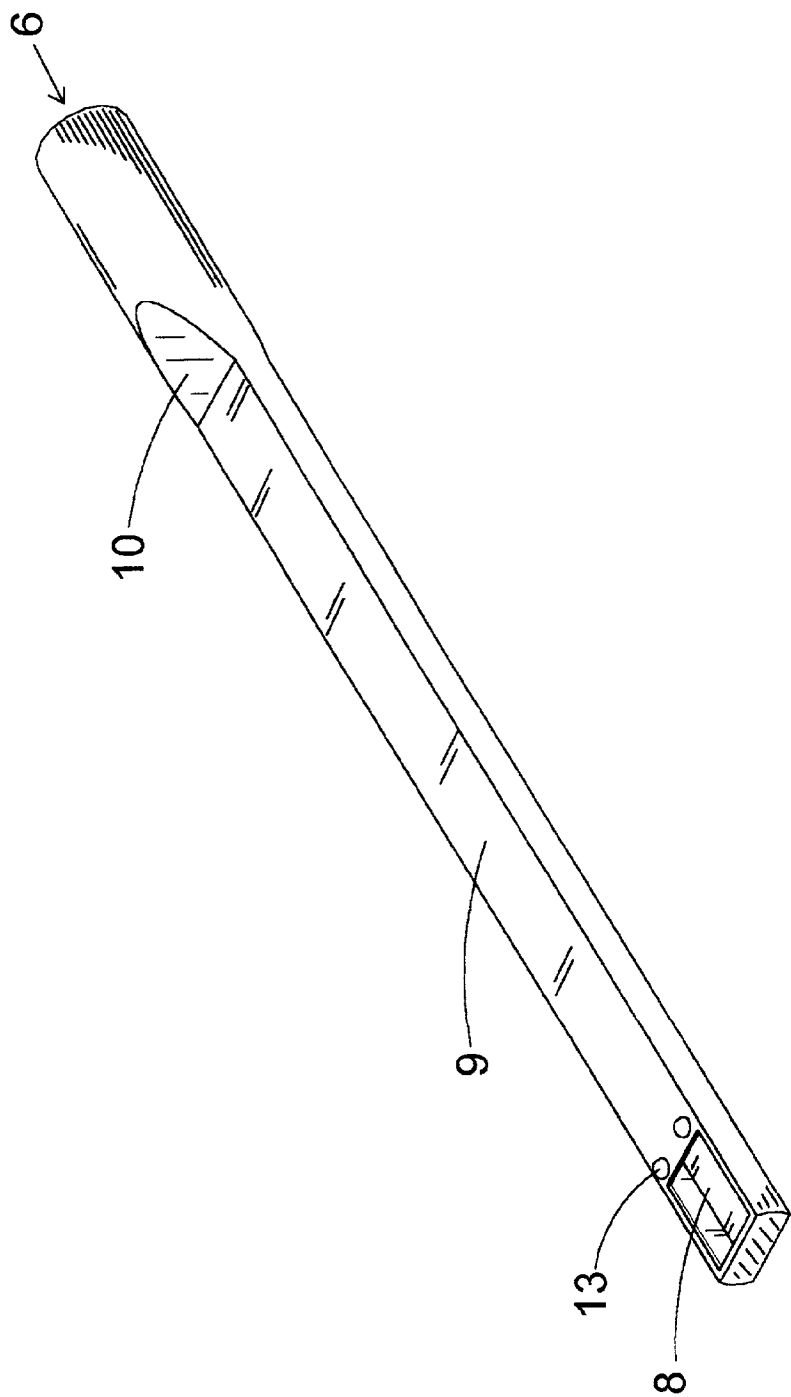


FIG. 26

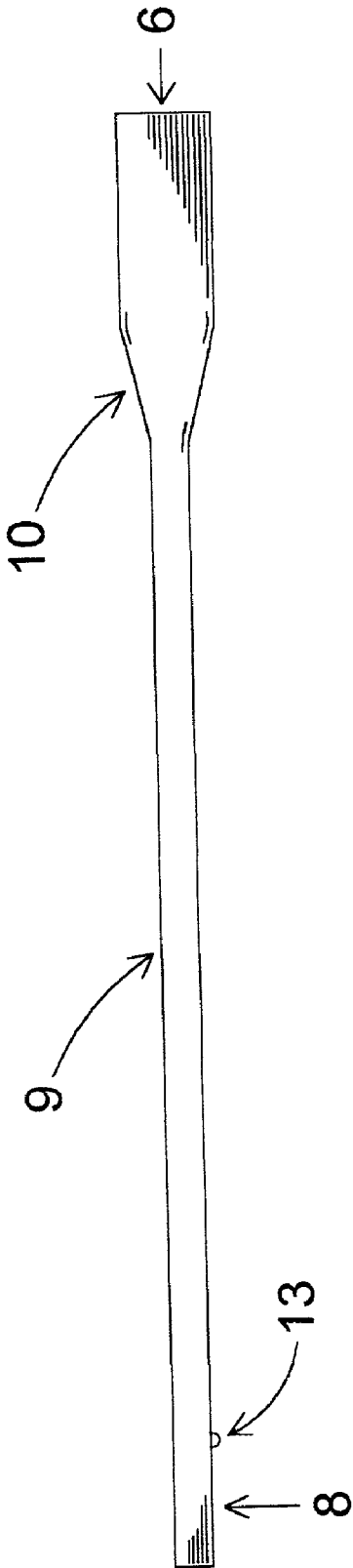


FIG. 27

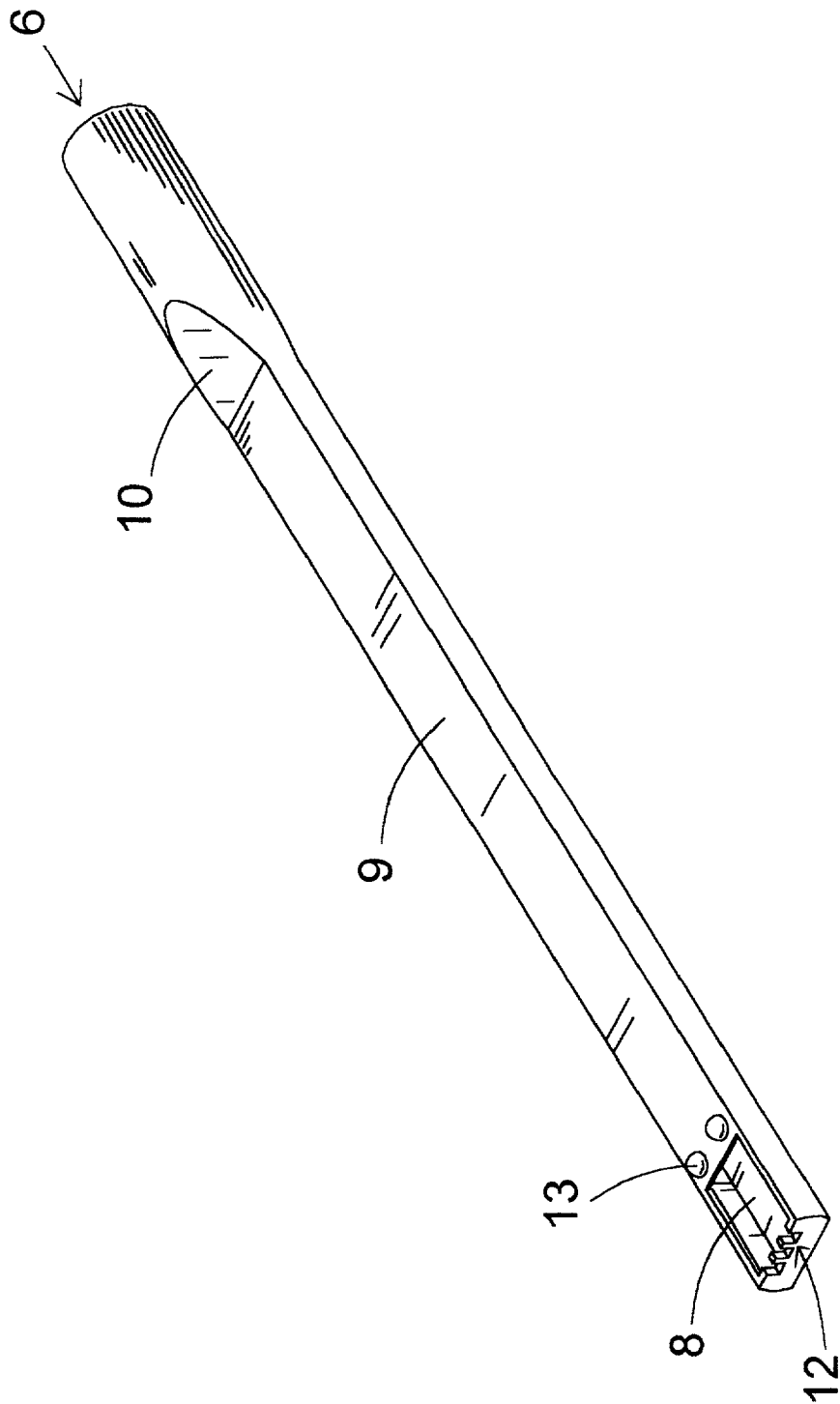


FIG. 28

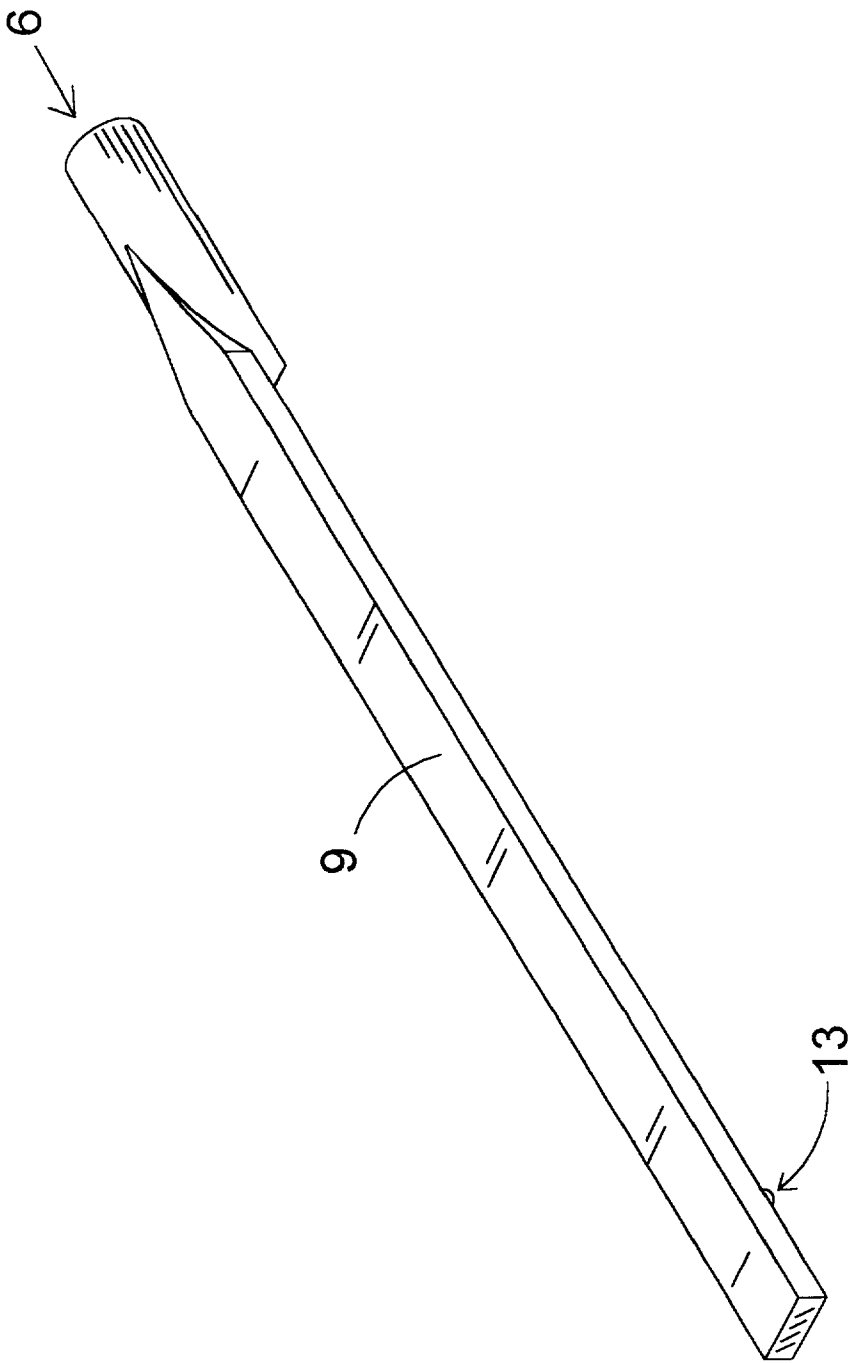


FIG. 29

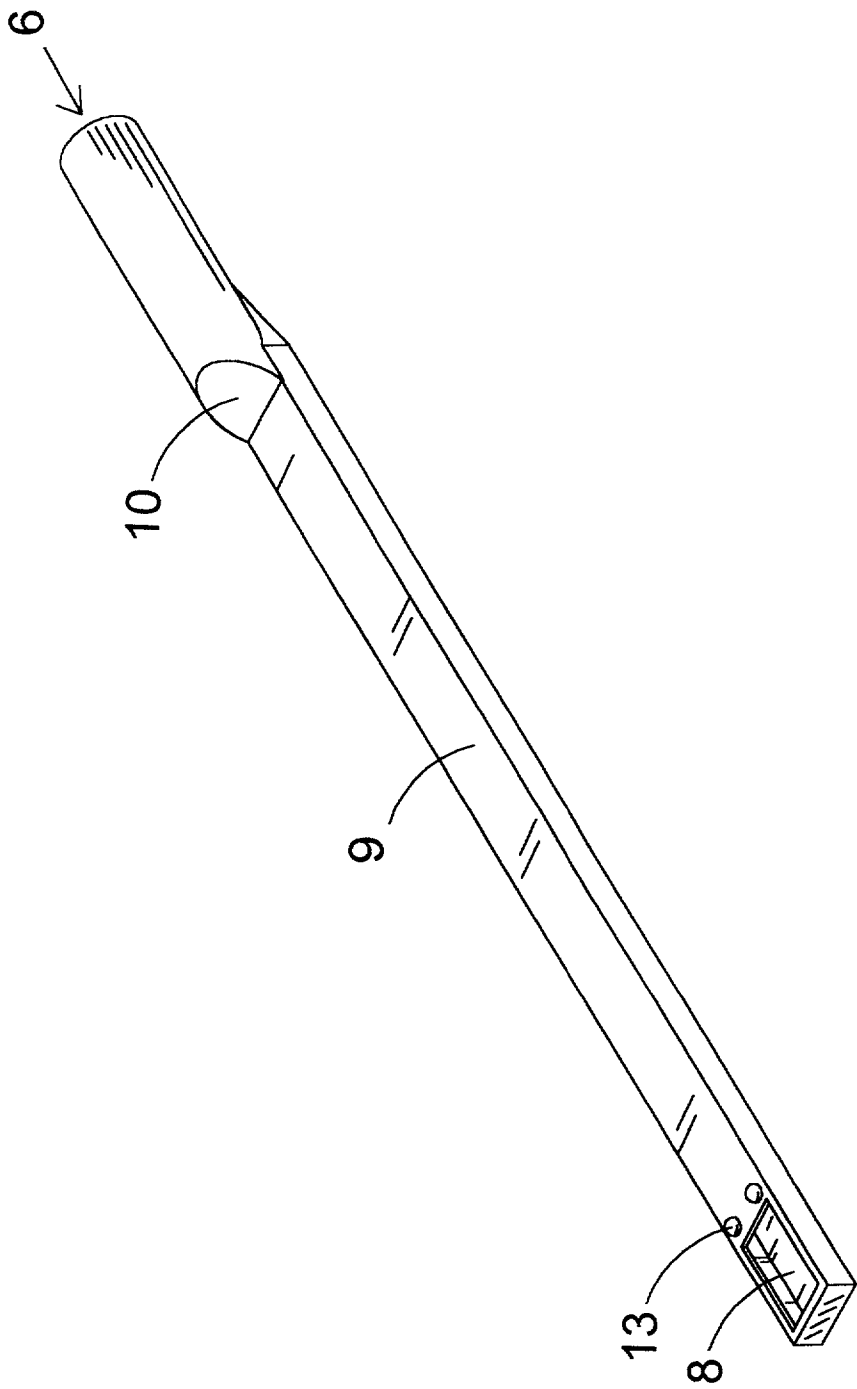


FIG. 30

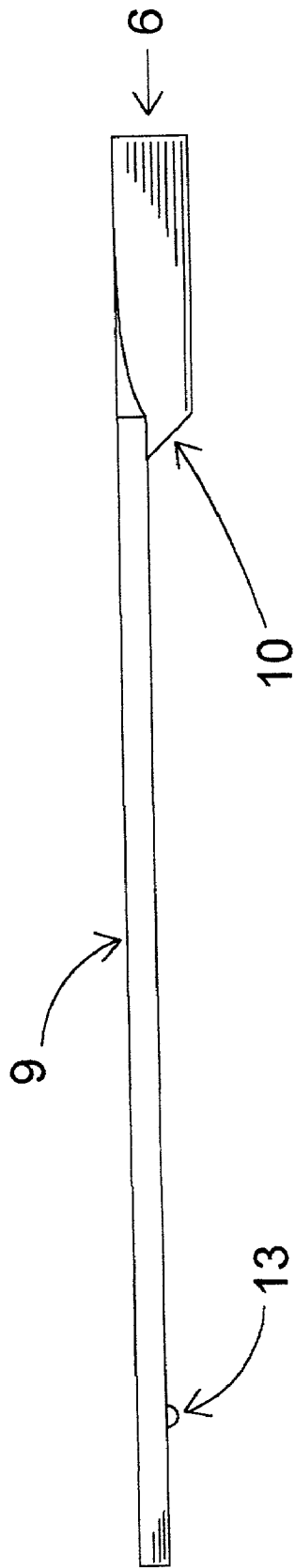


FIG. 31

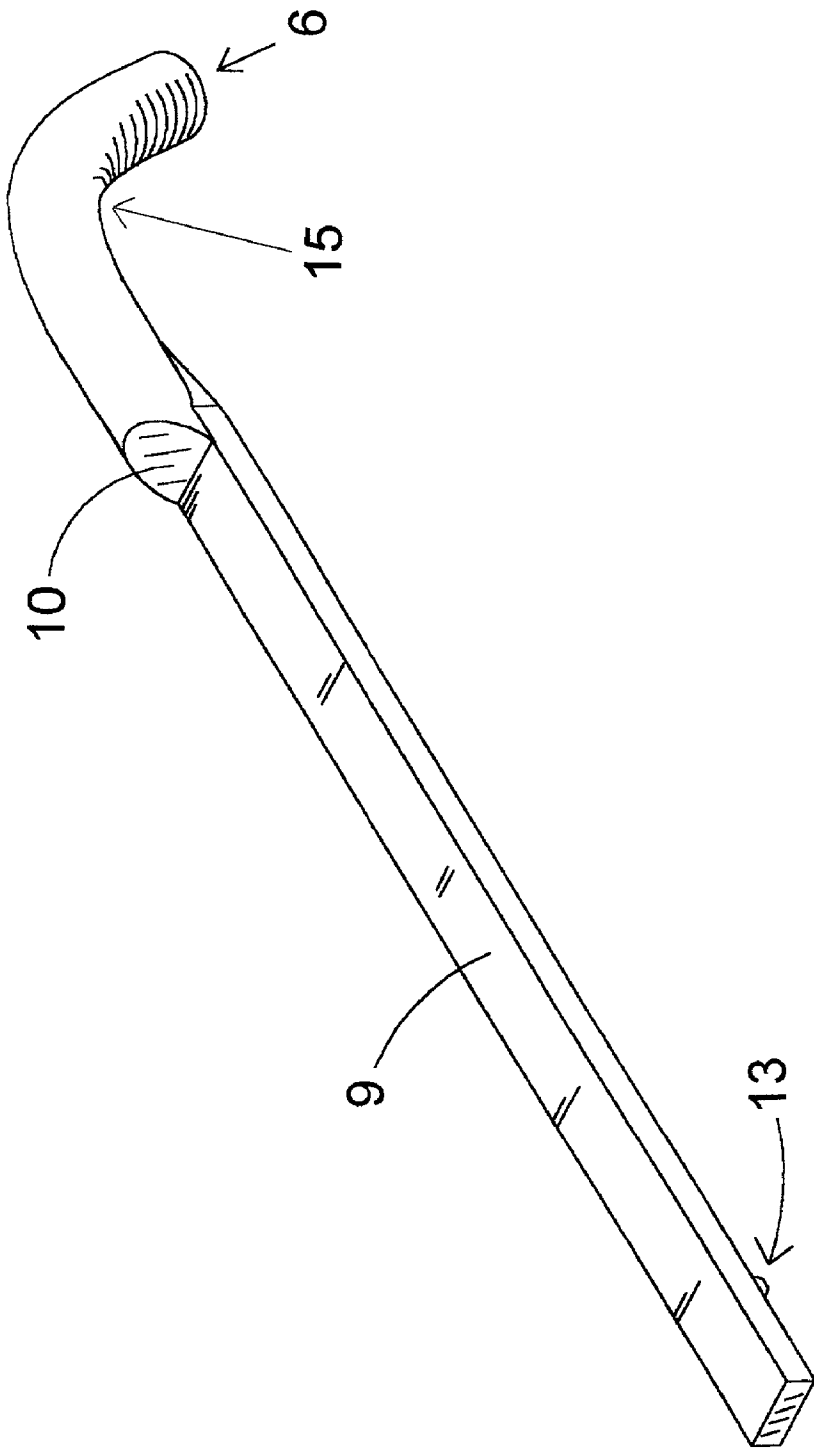


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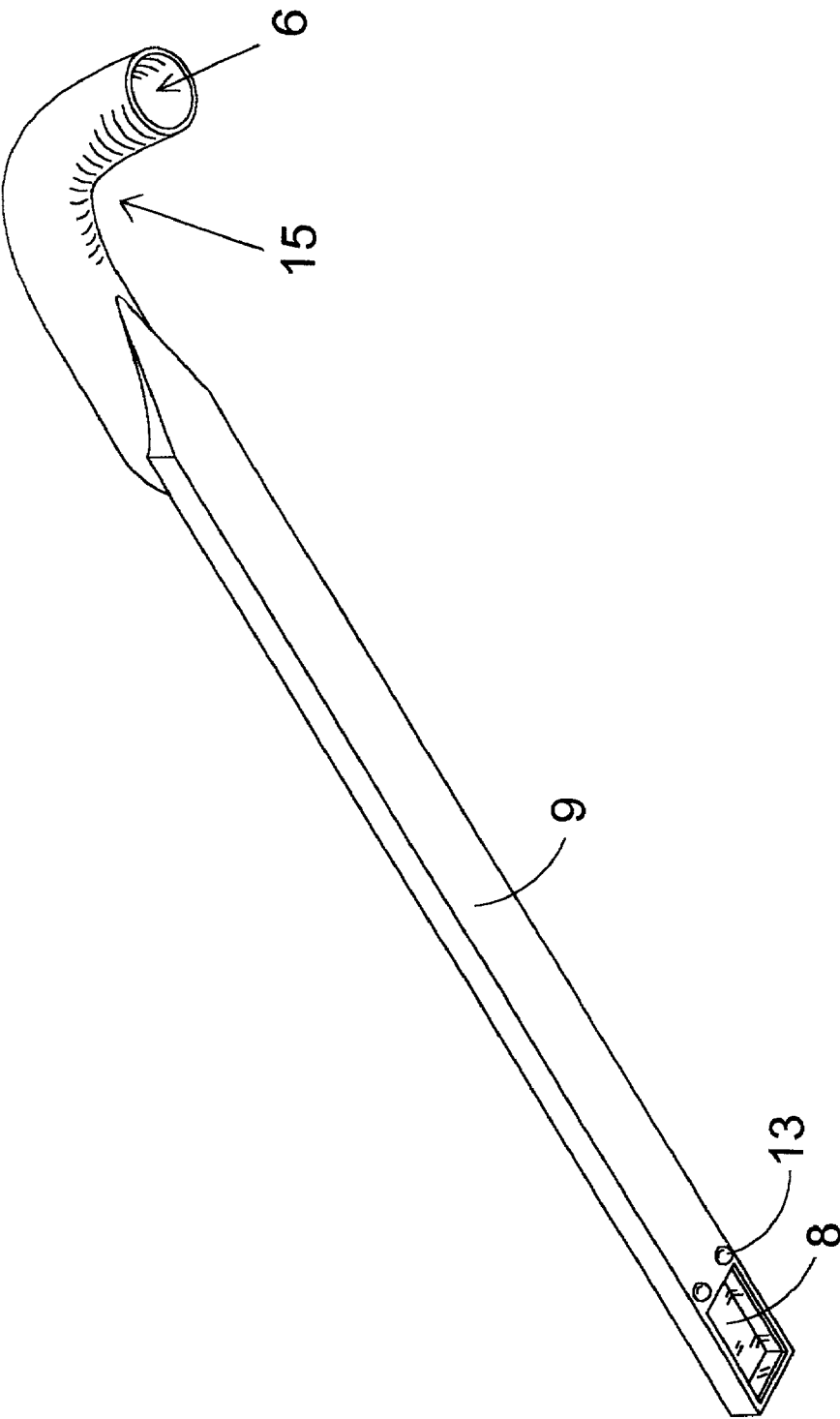


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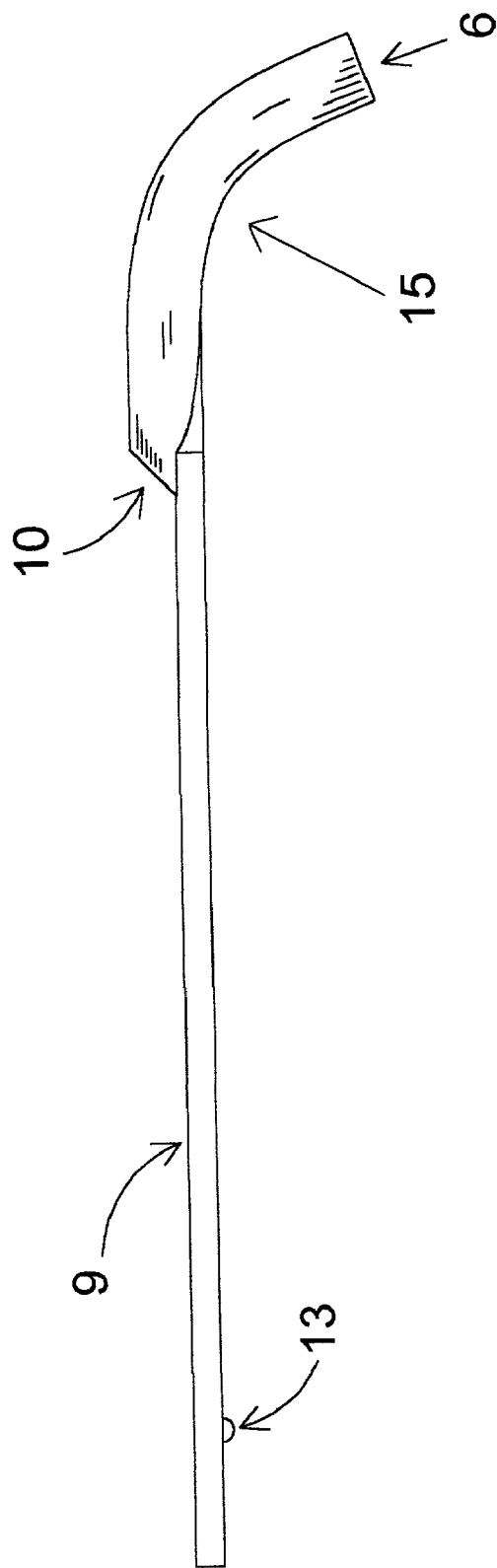


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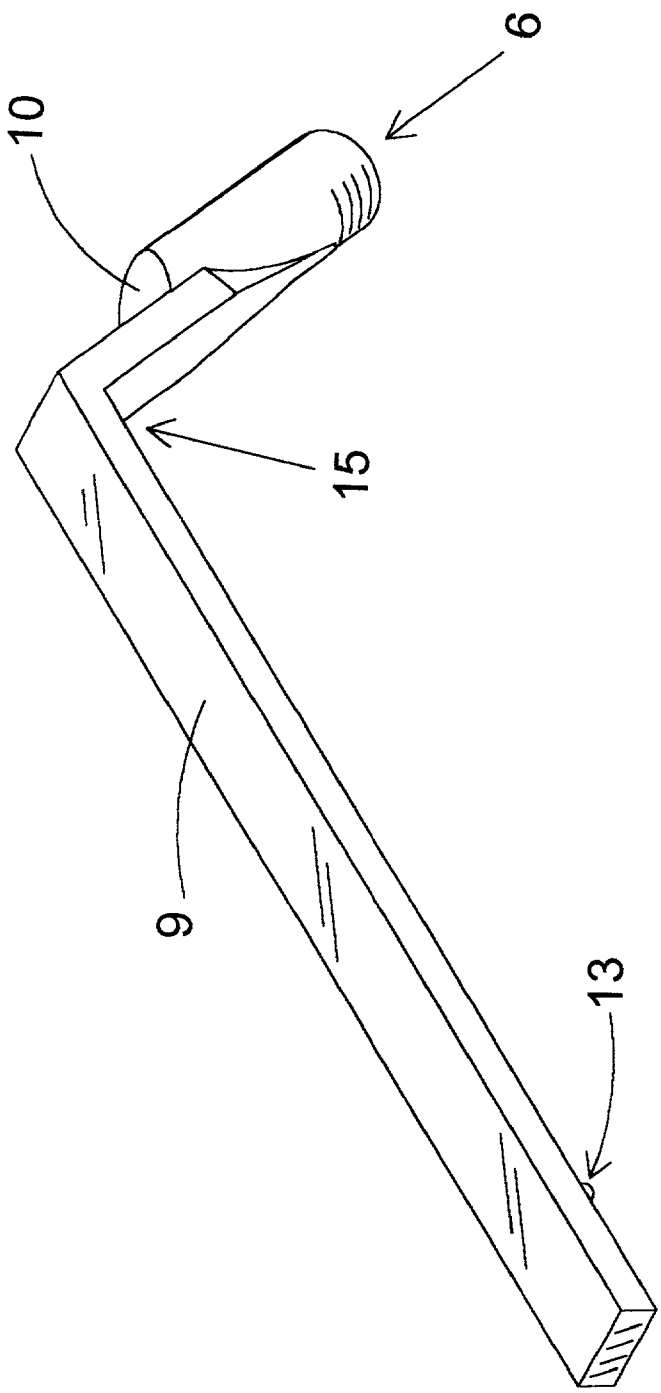
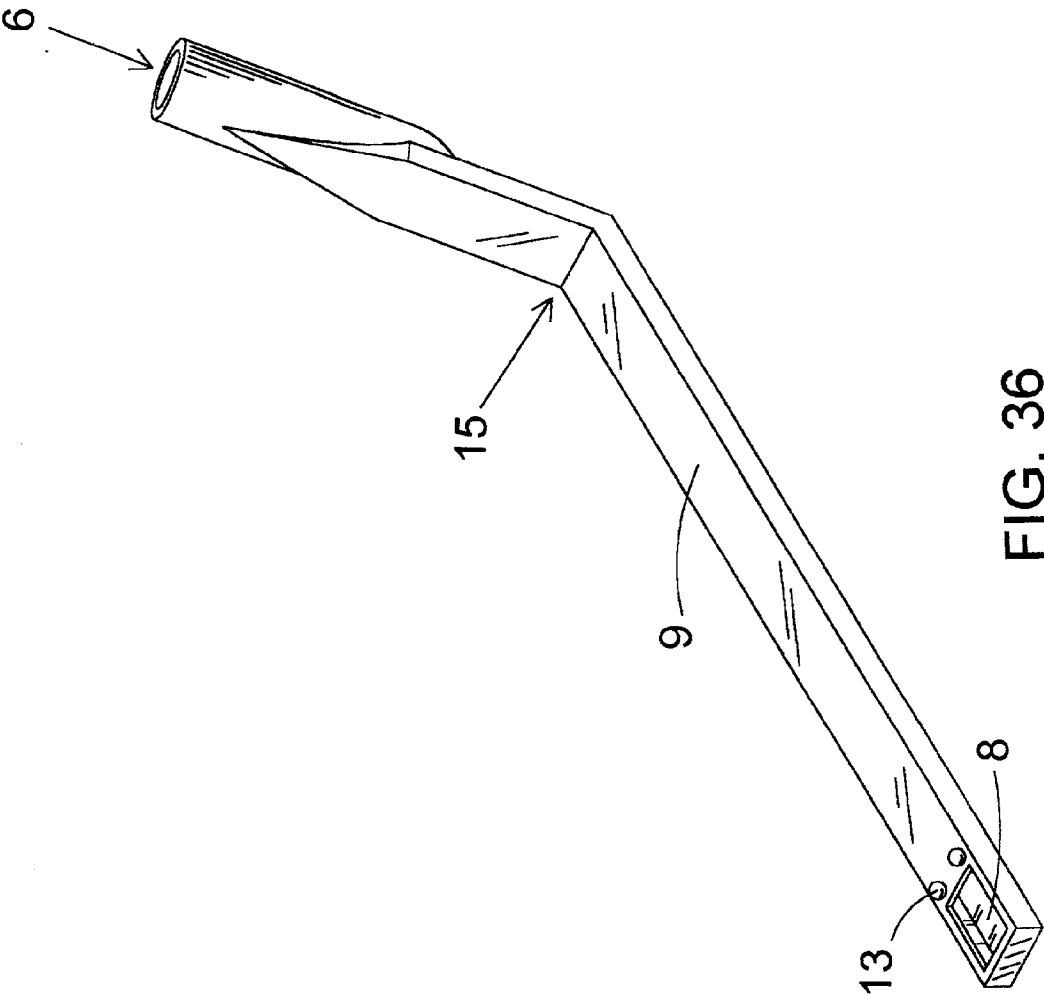


FIG. 35



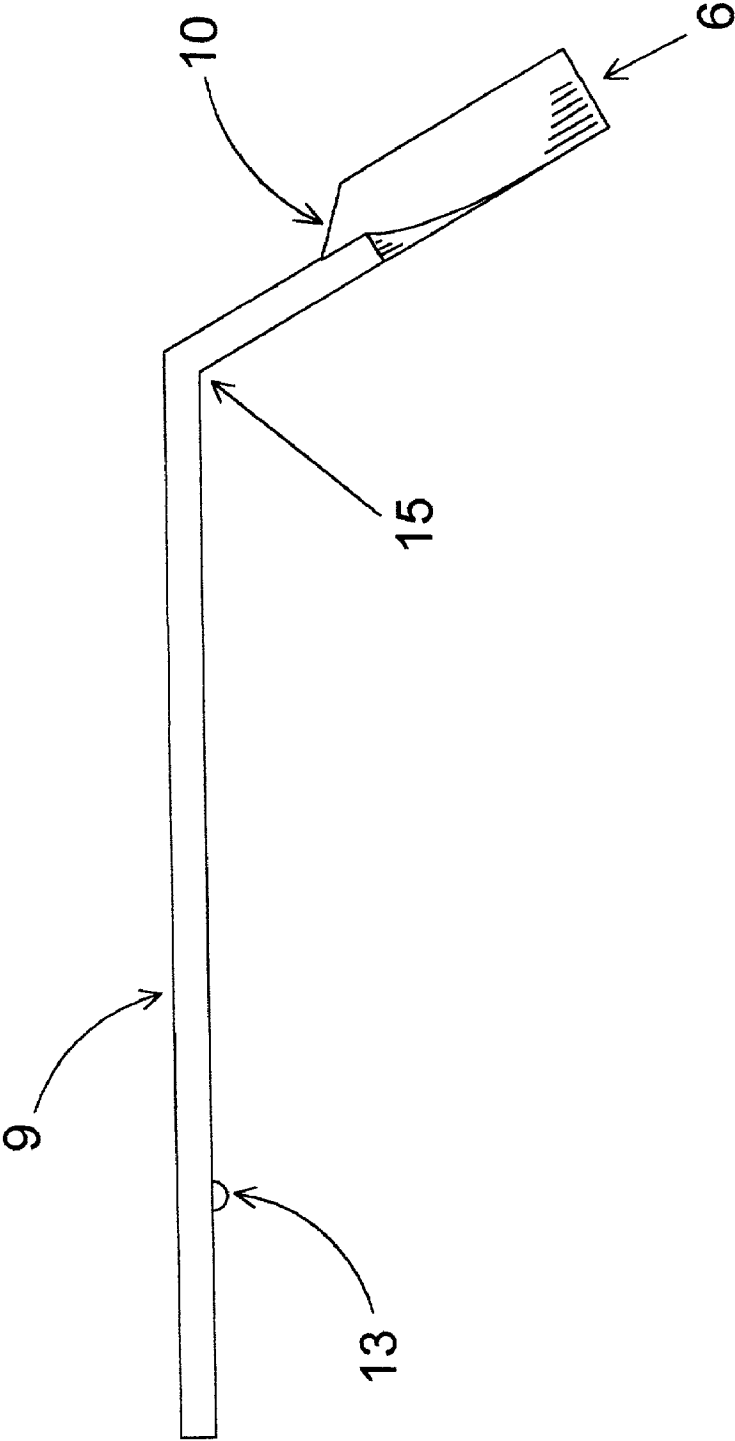


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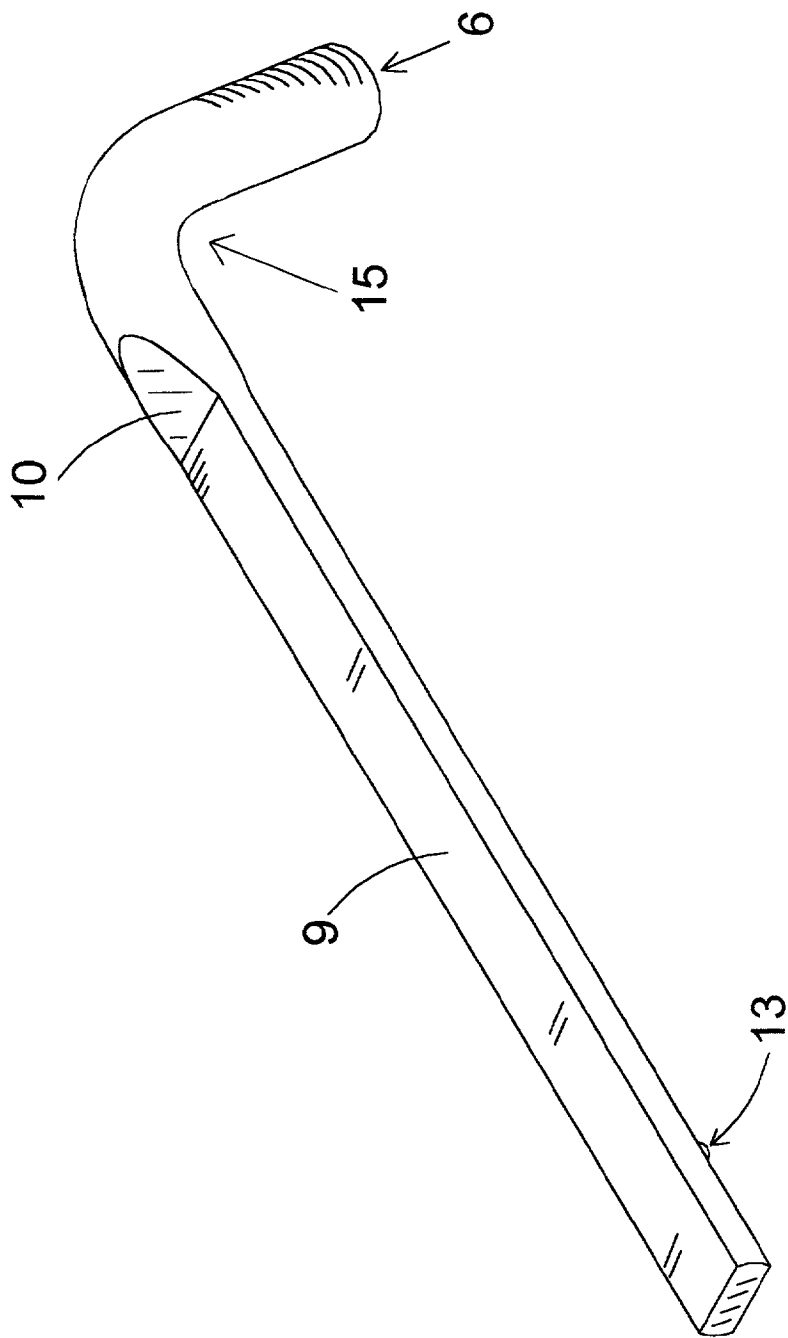


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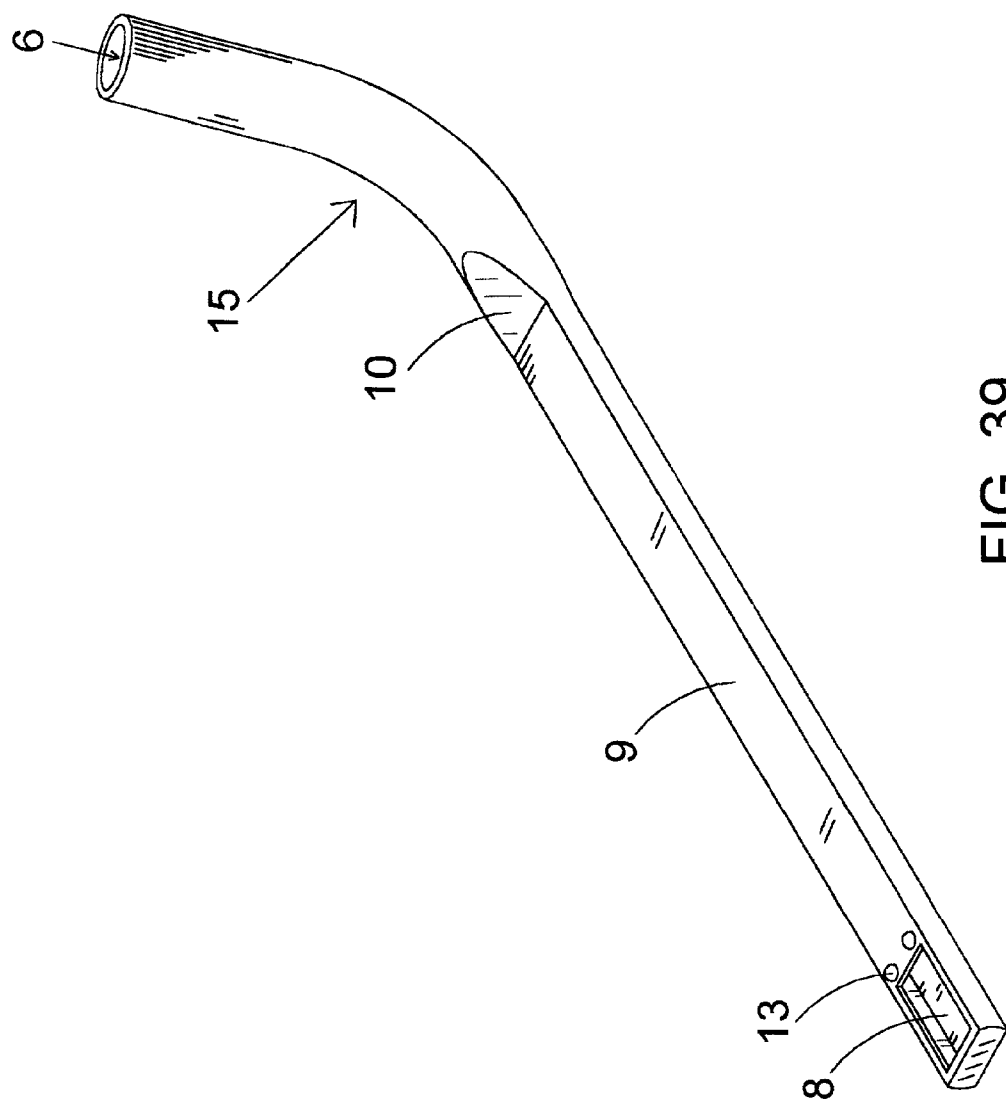


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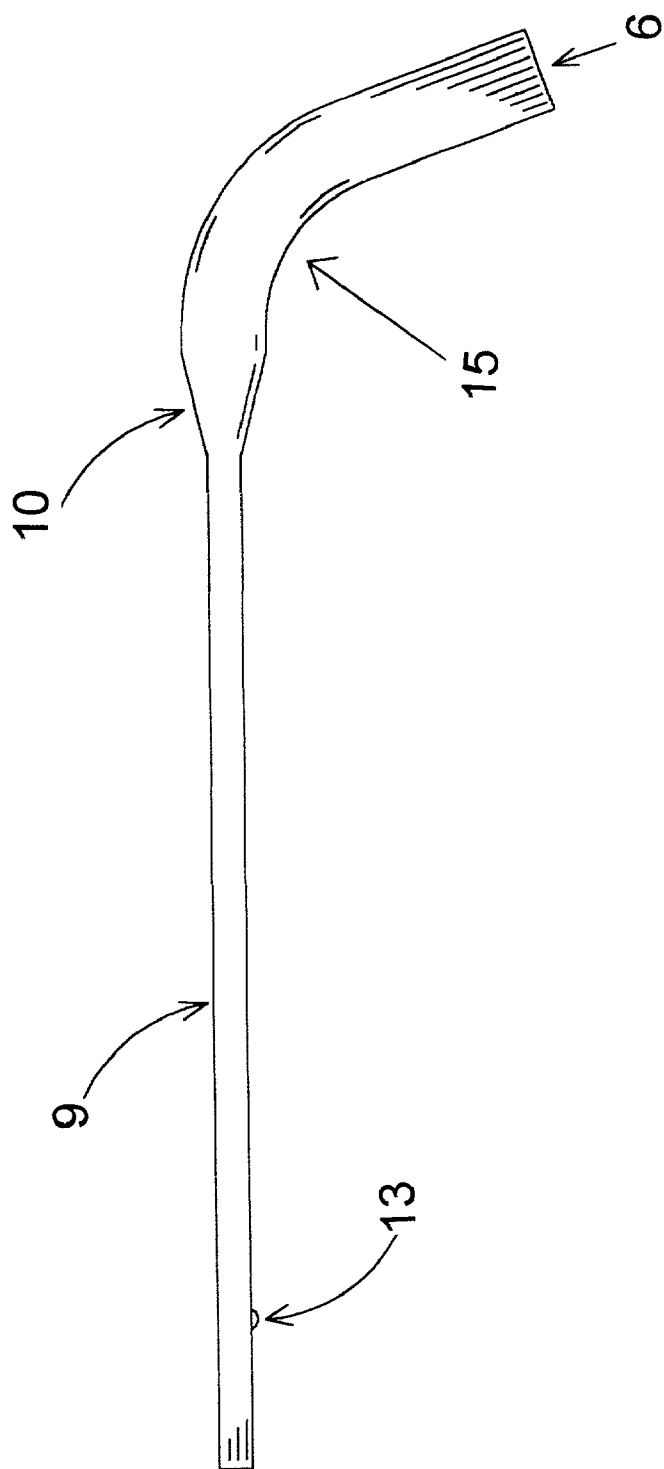


FIG. 40

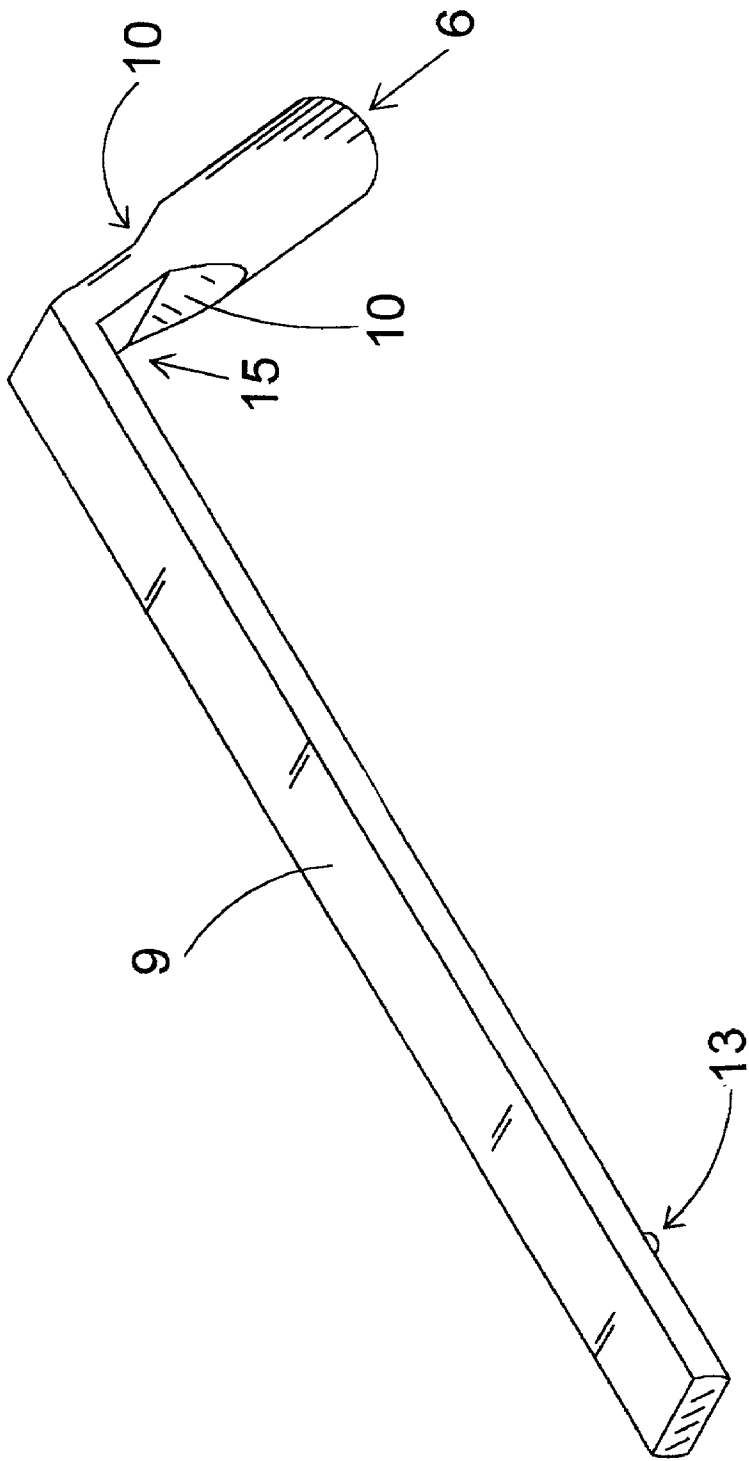


FIG. 41

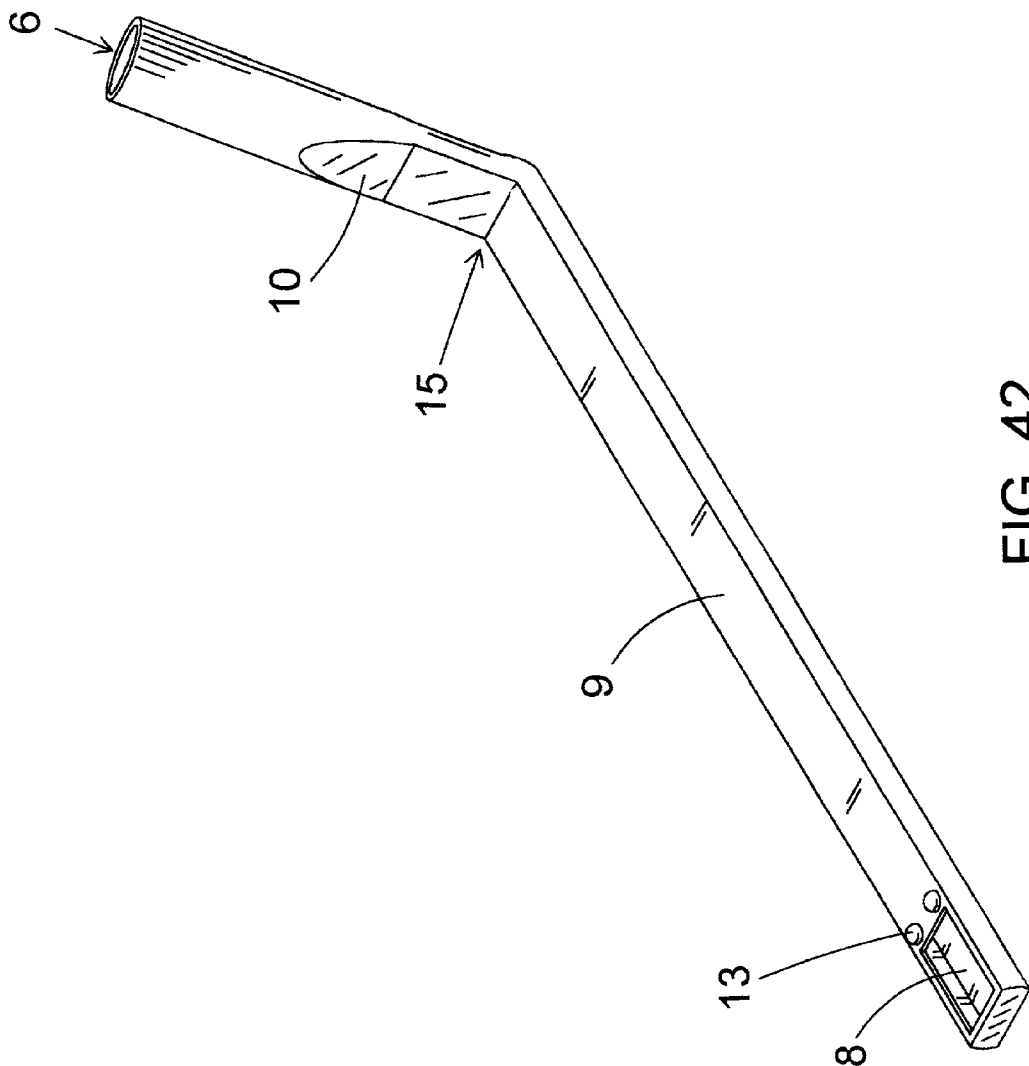


FIG. 42

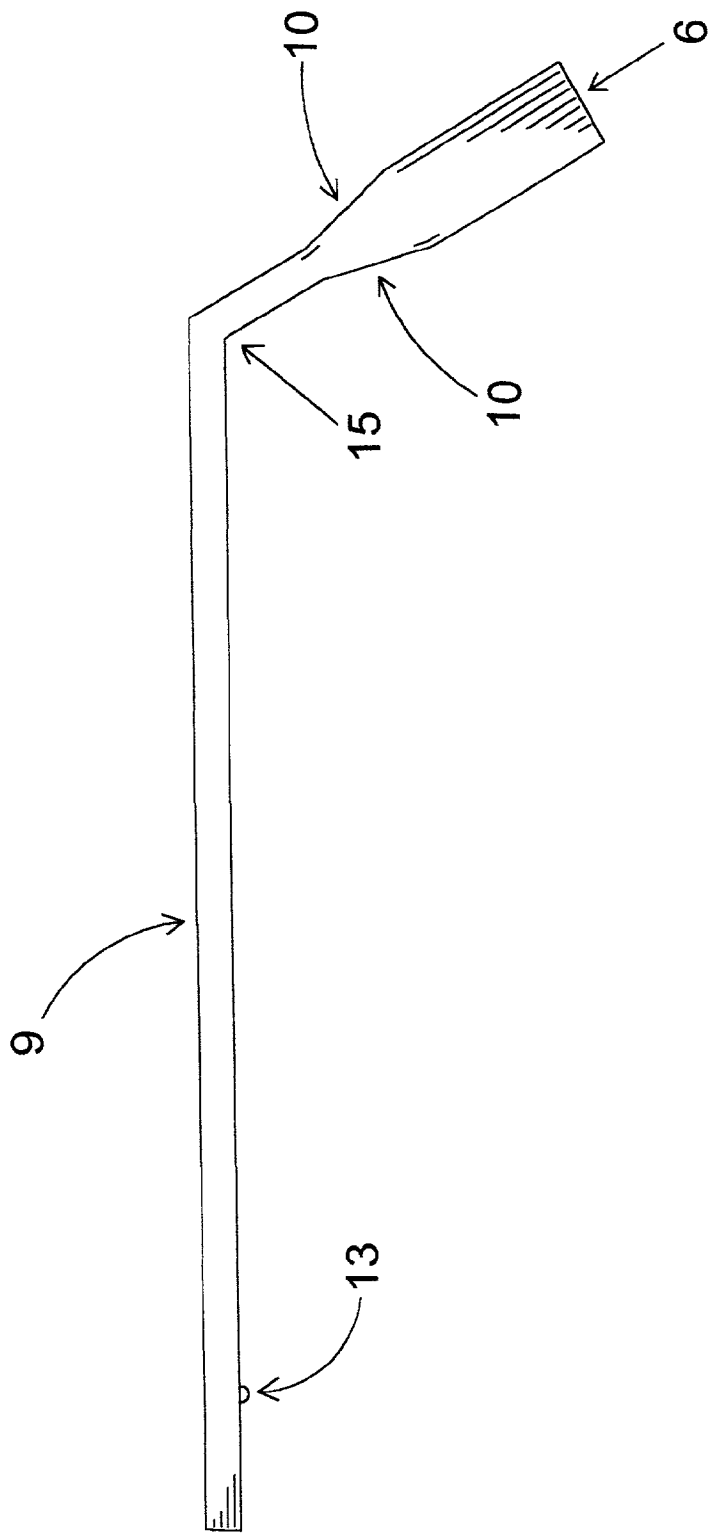


FIG. 43

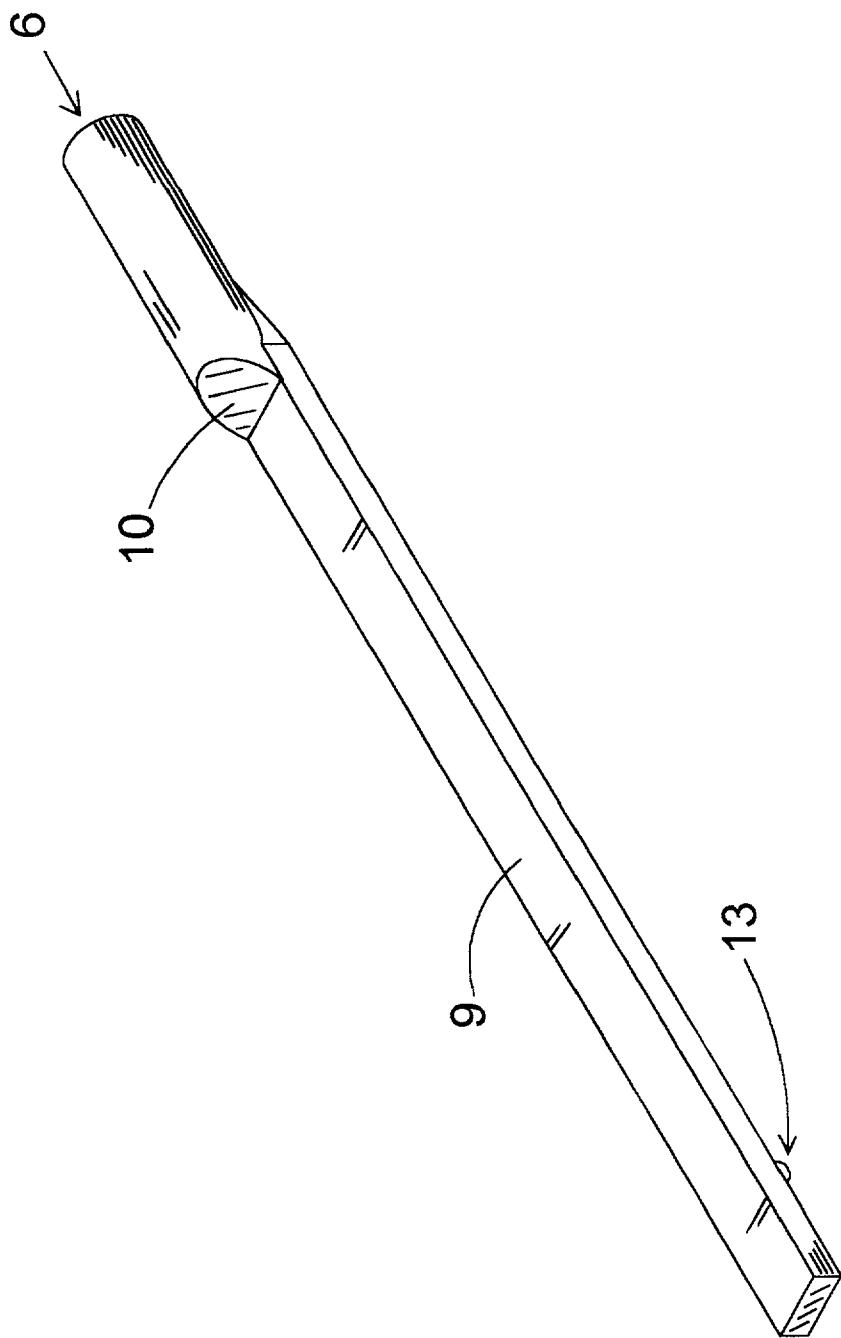


FIG. 44

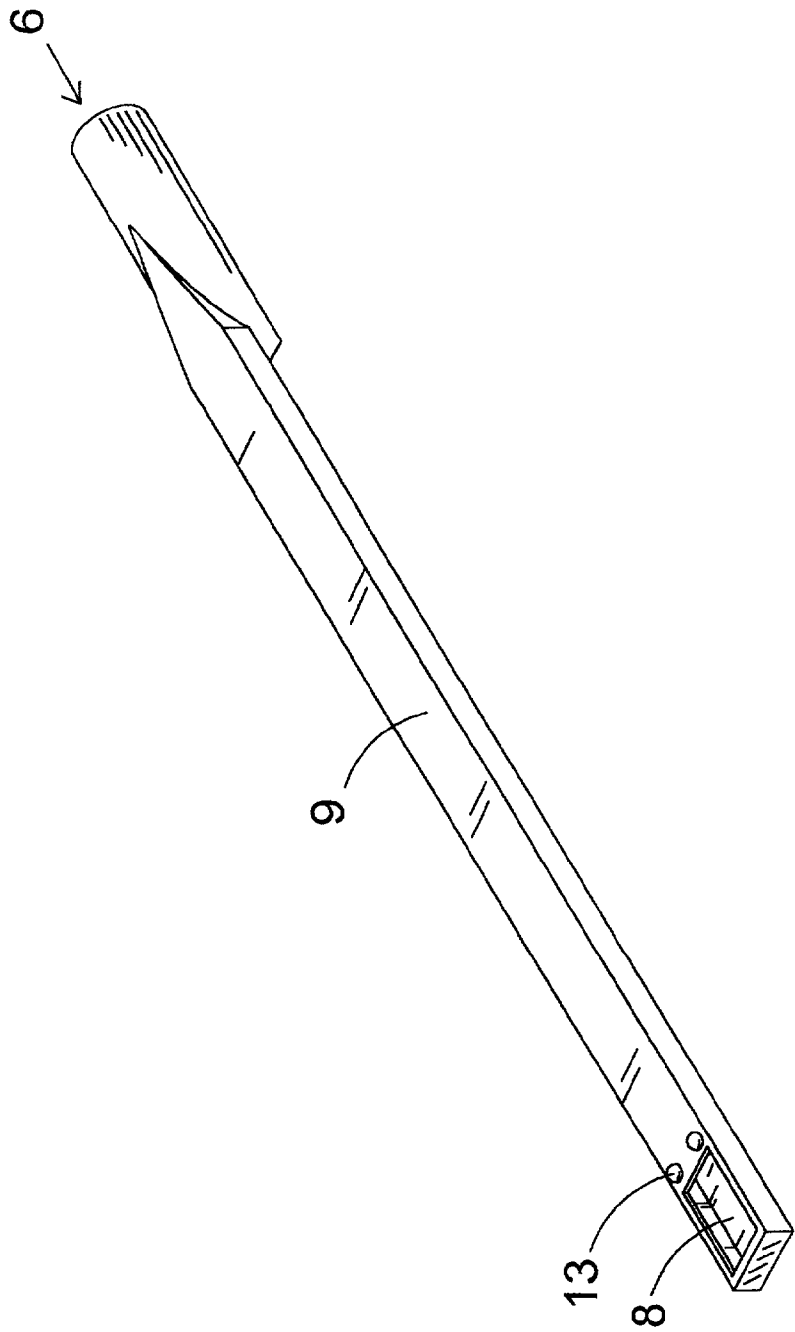


FIG. 45

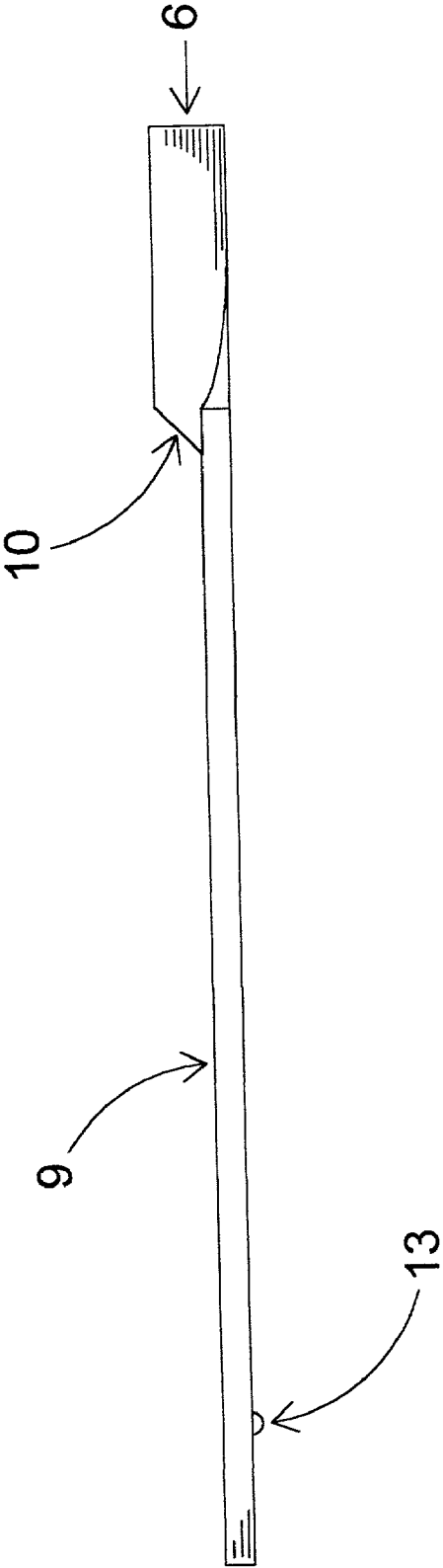
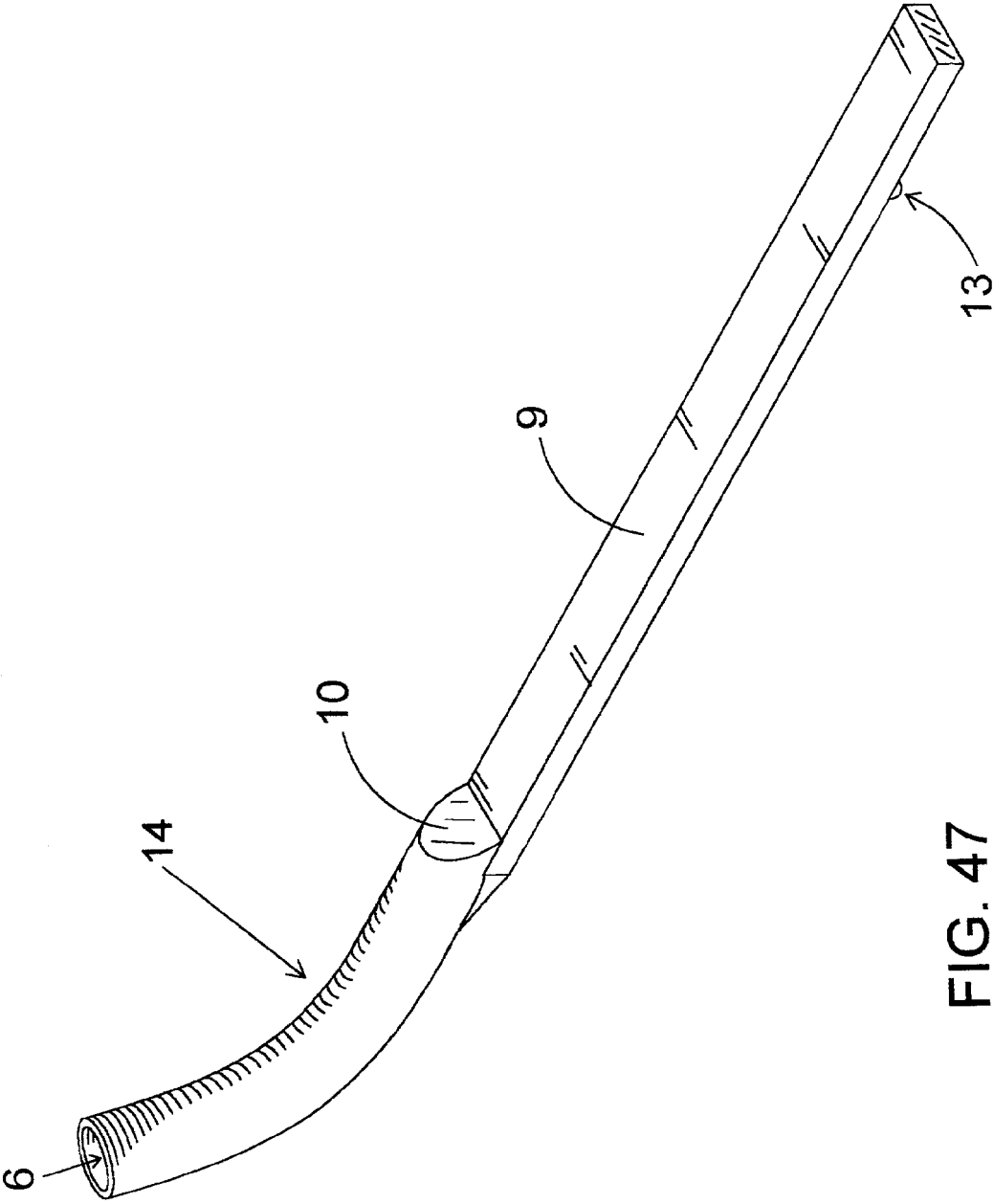


FIG. 46



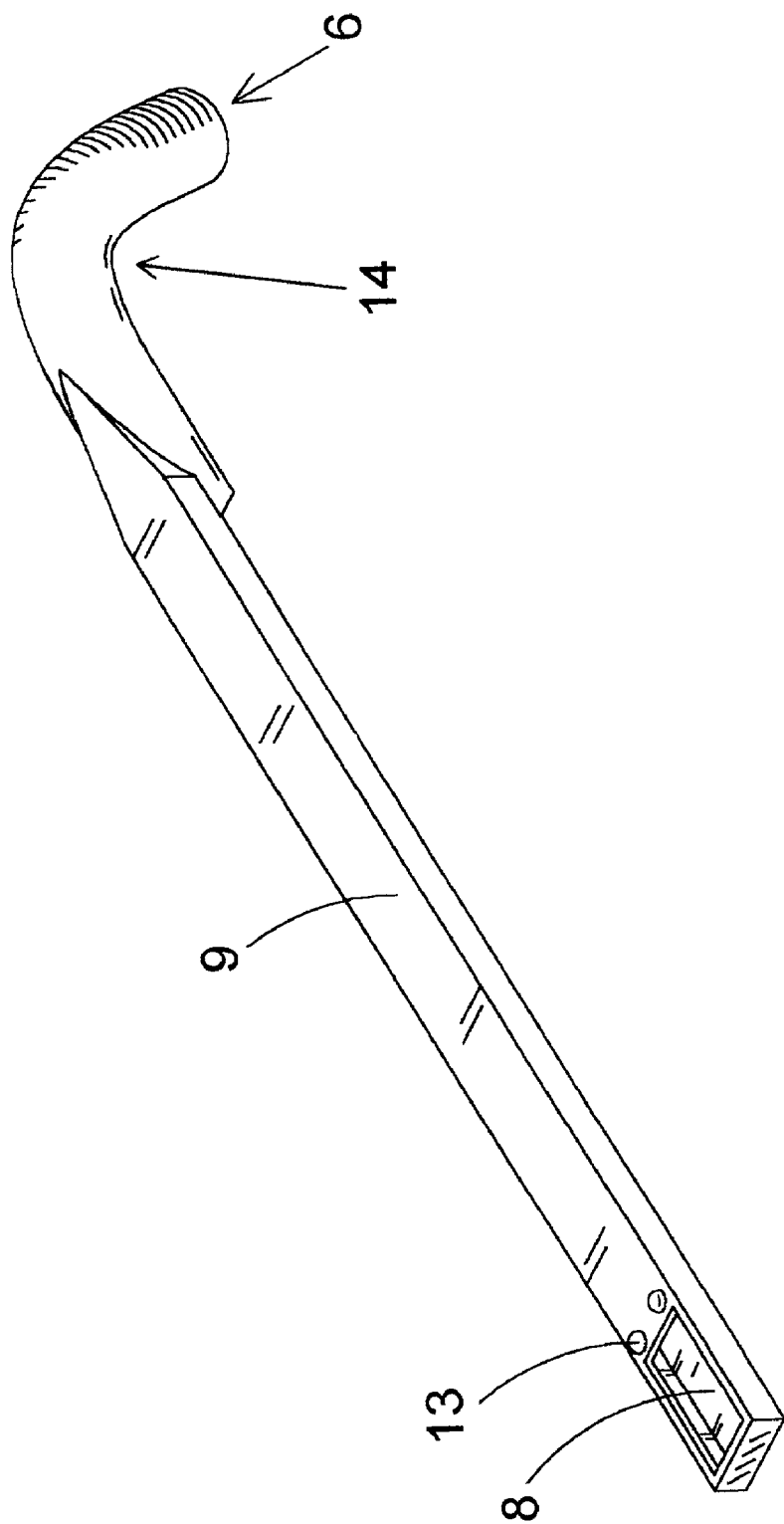


FIG. 48

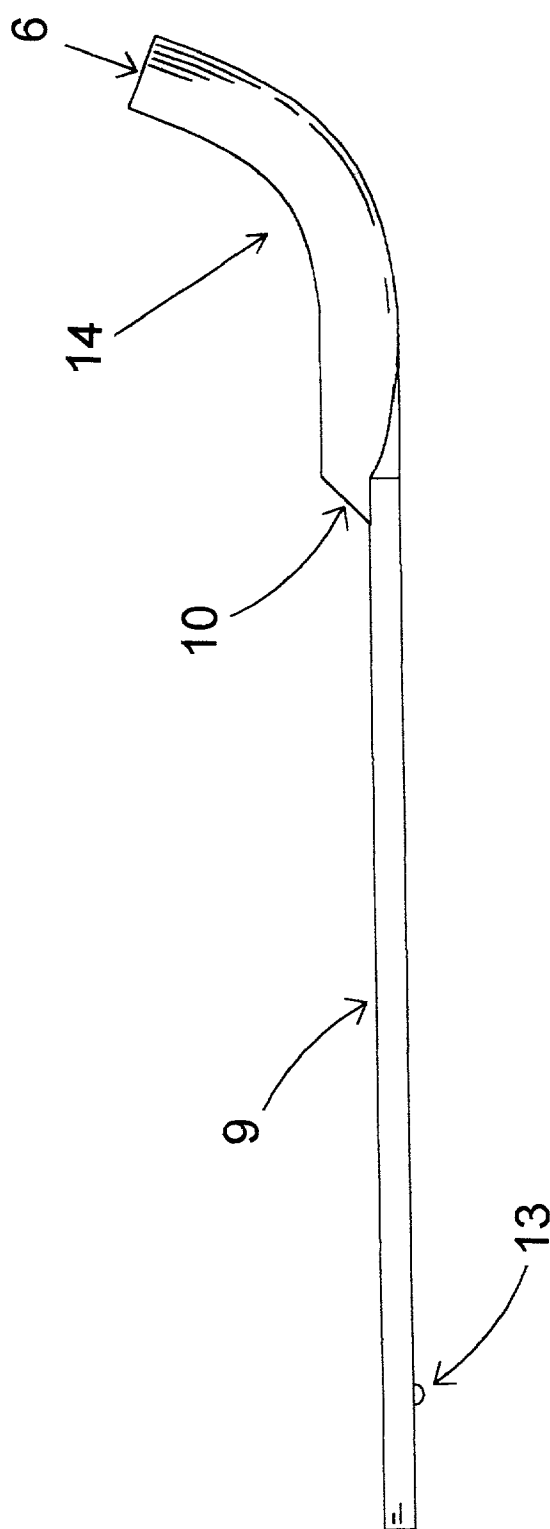
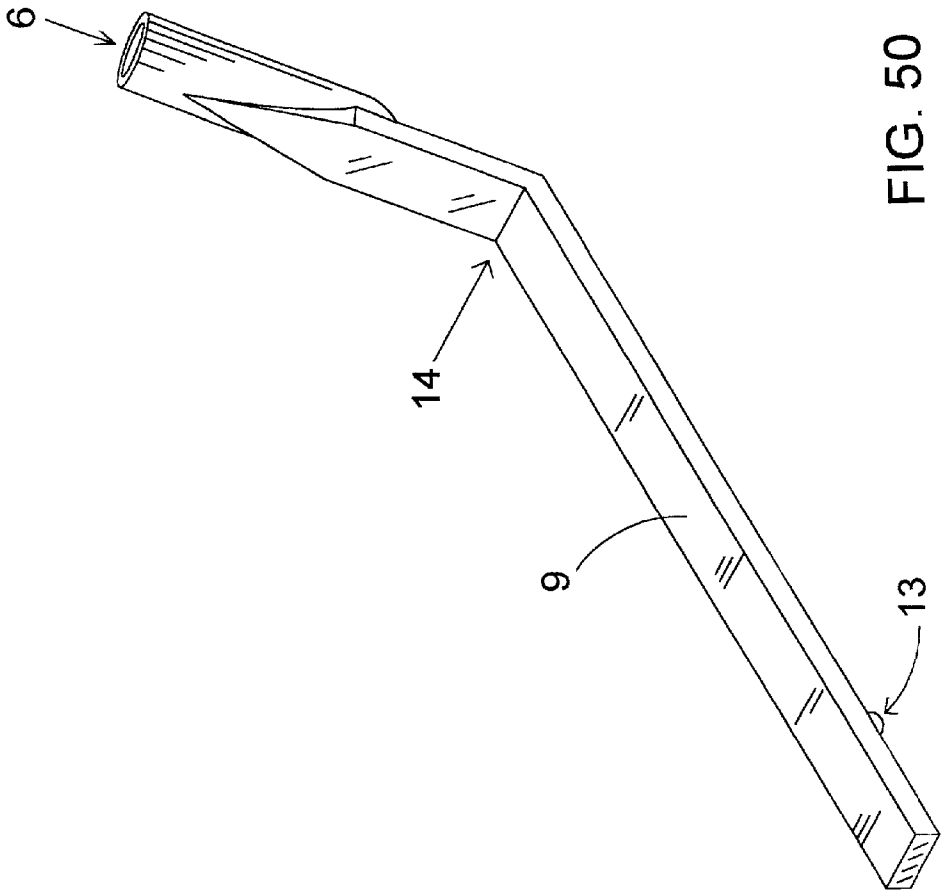


FIG. 49



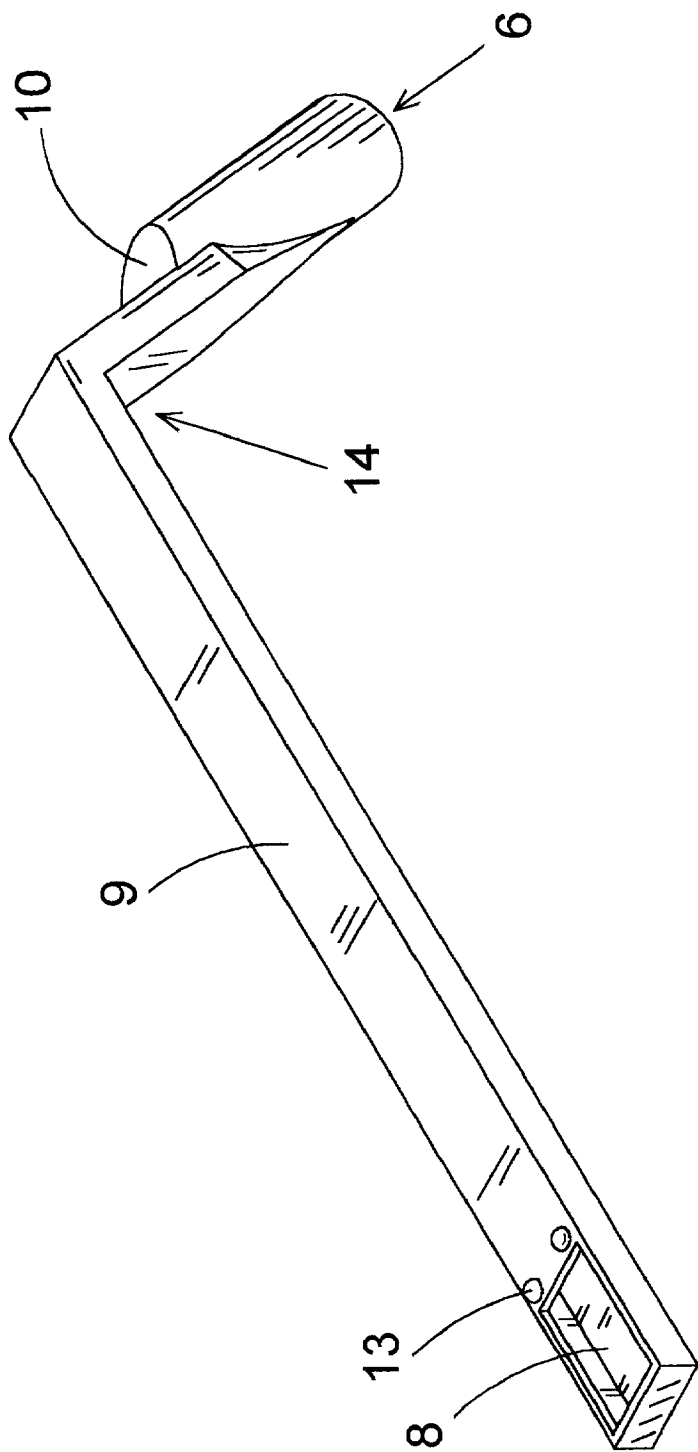


FIG. 51

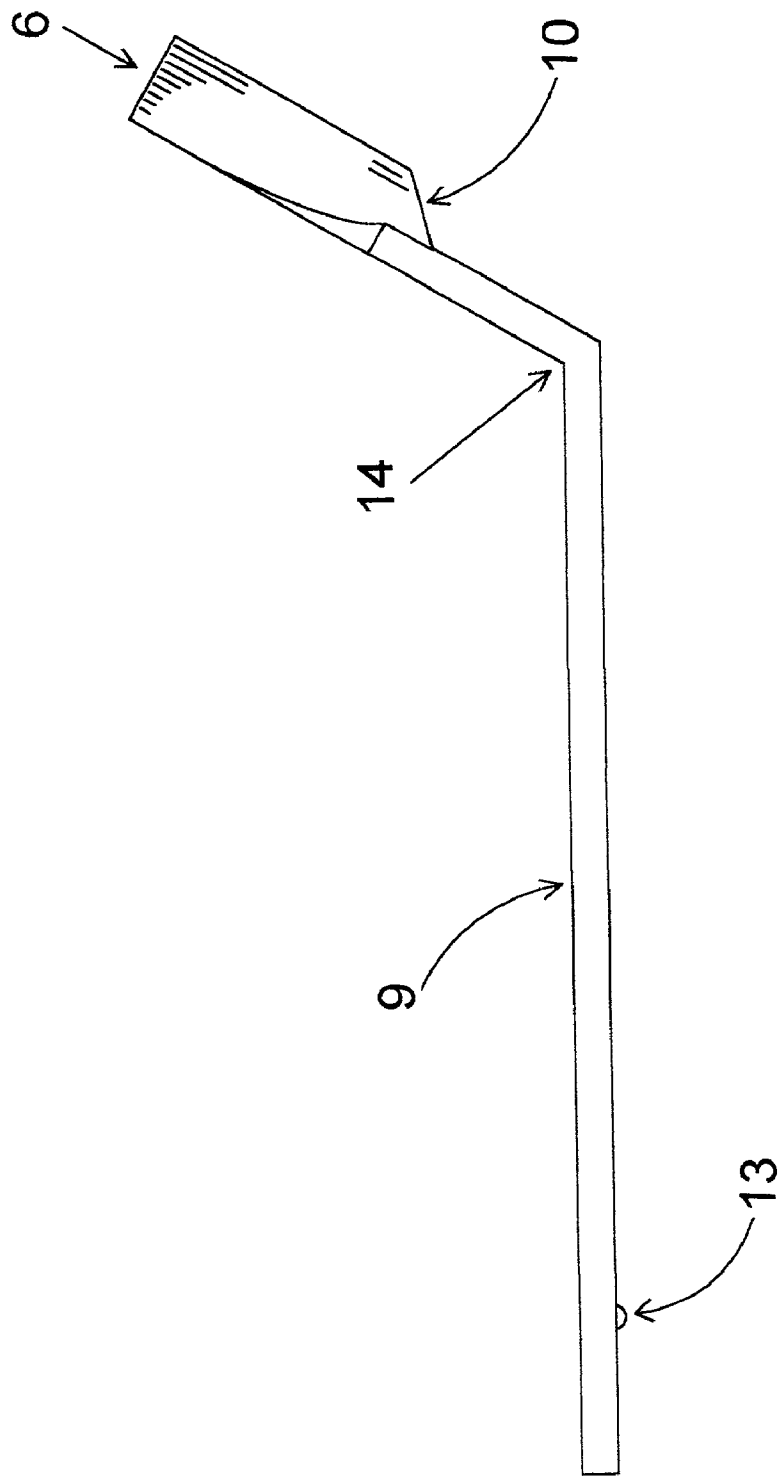


FIG. 52

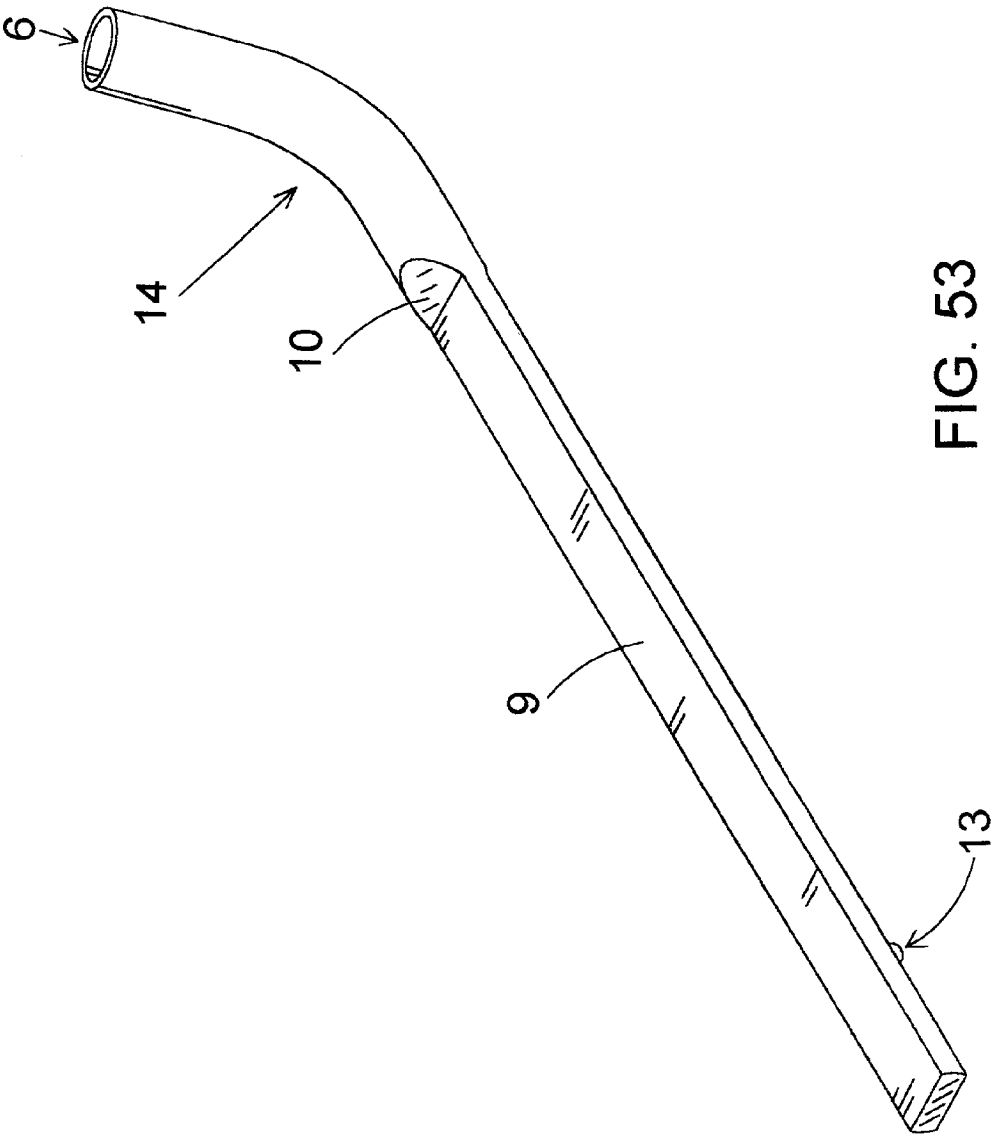


FIG. 53

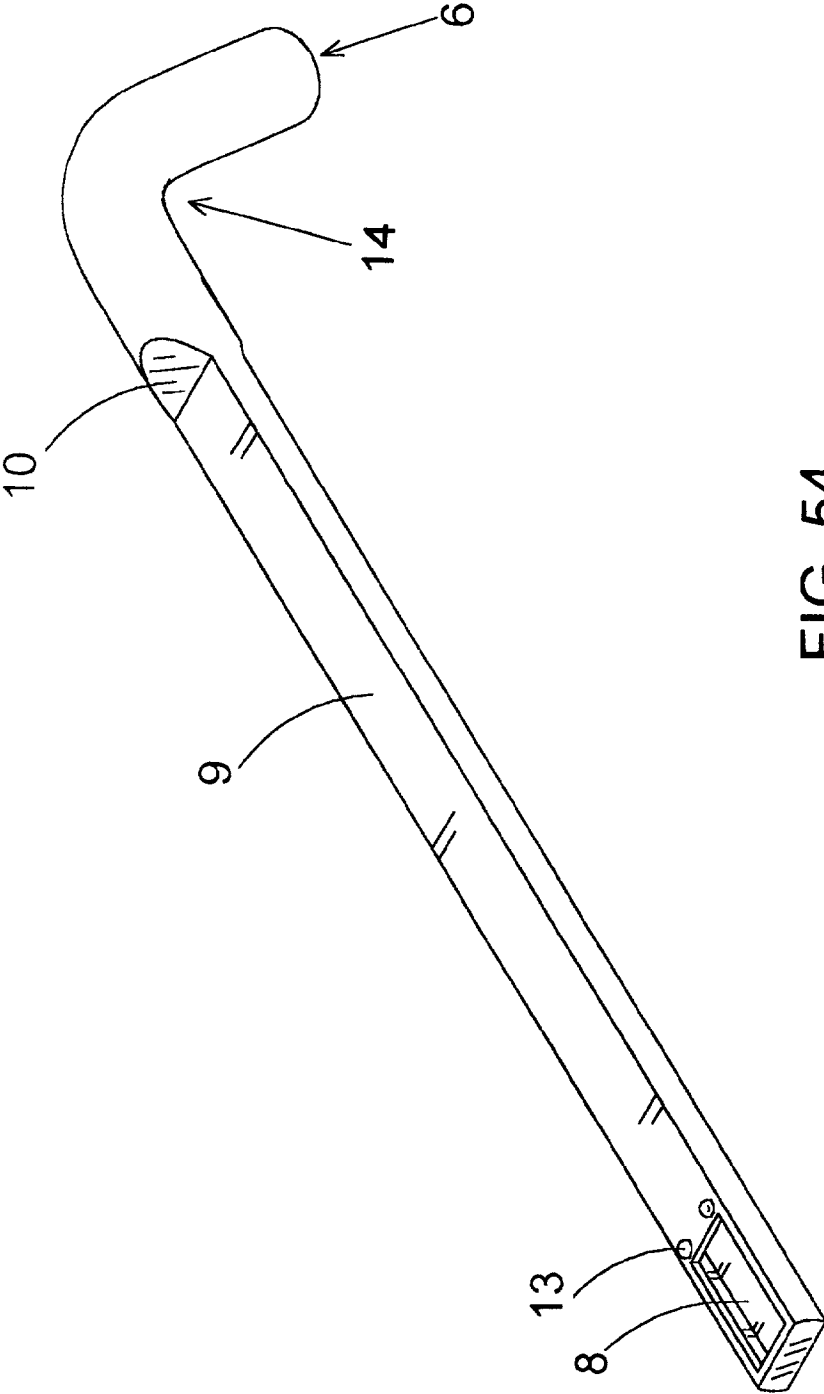


FIG. 54

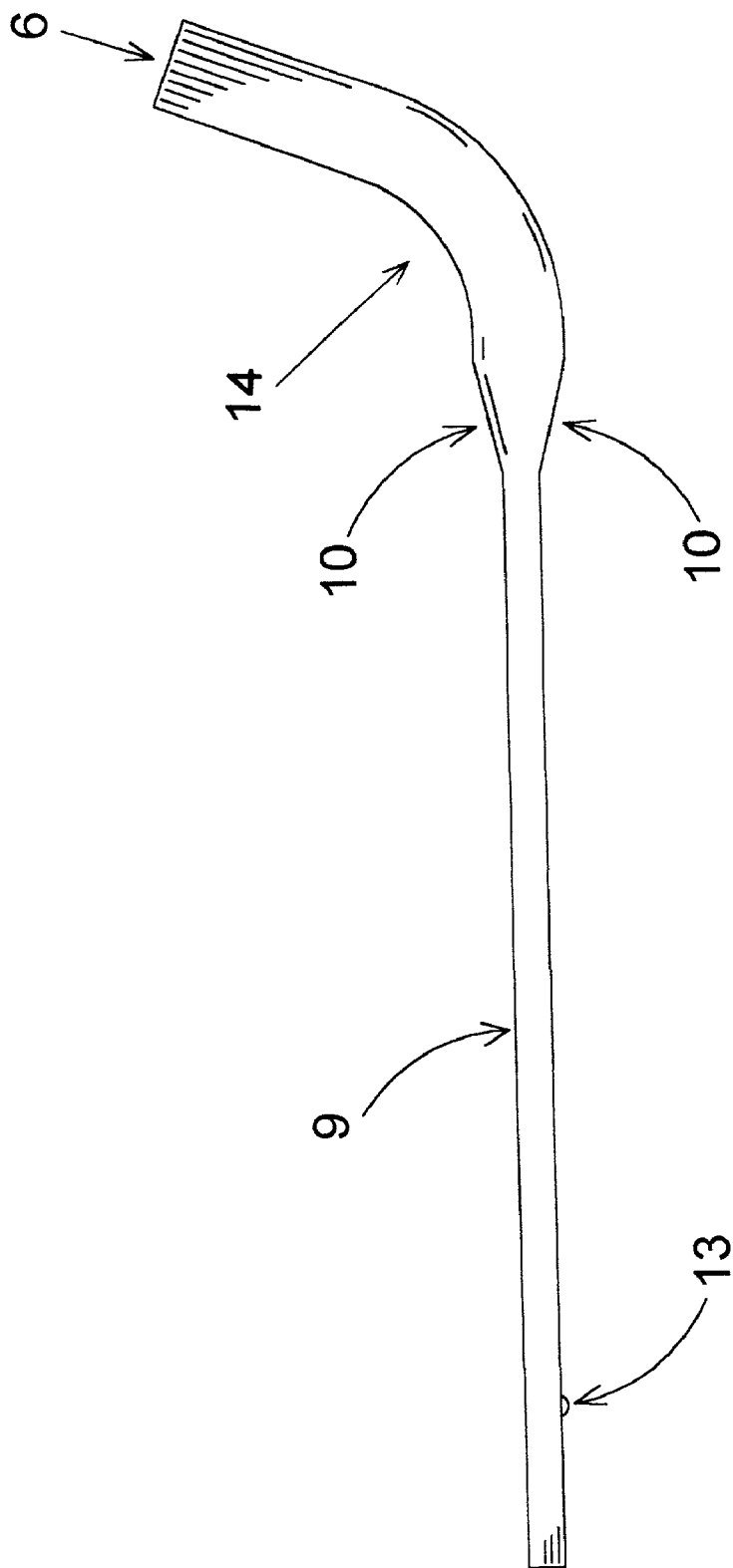


FIG. 55

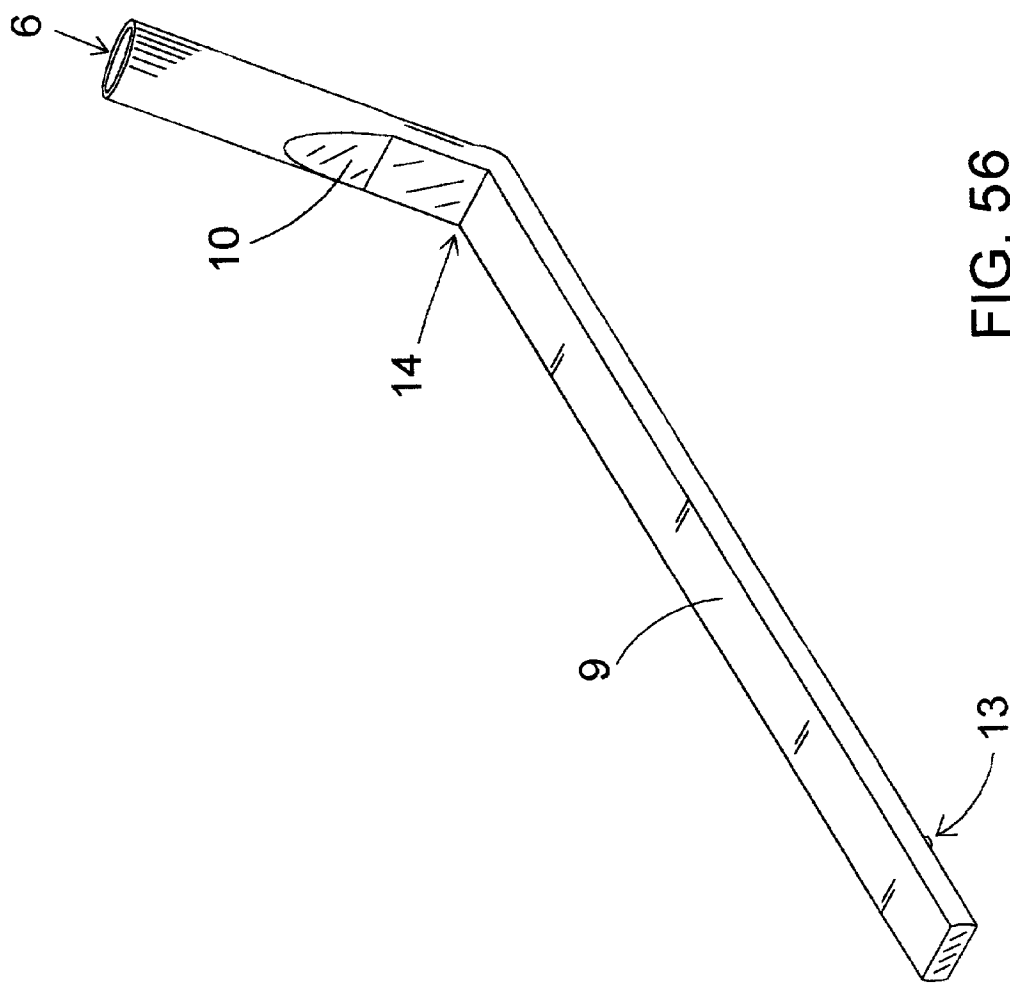


FIG. 56

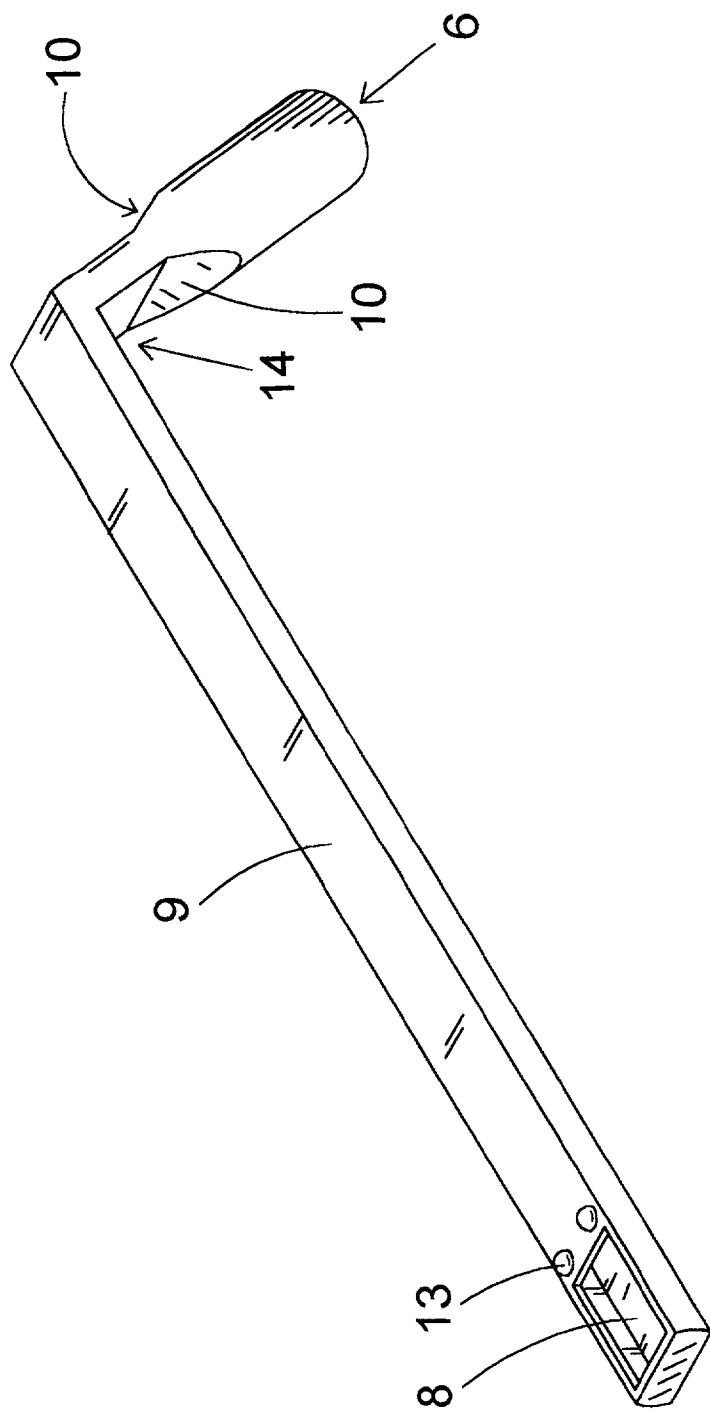


FIG. 57

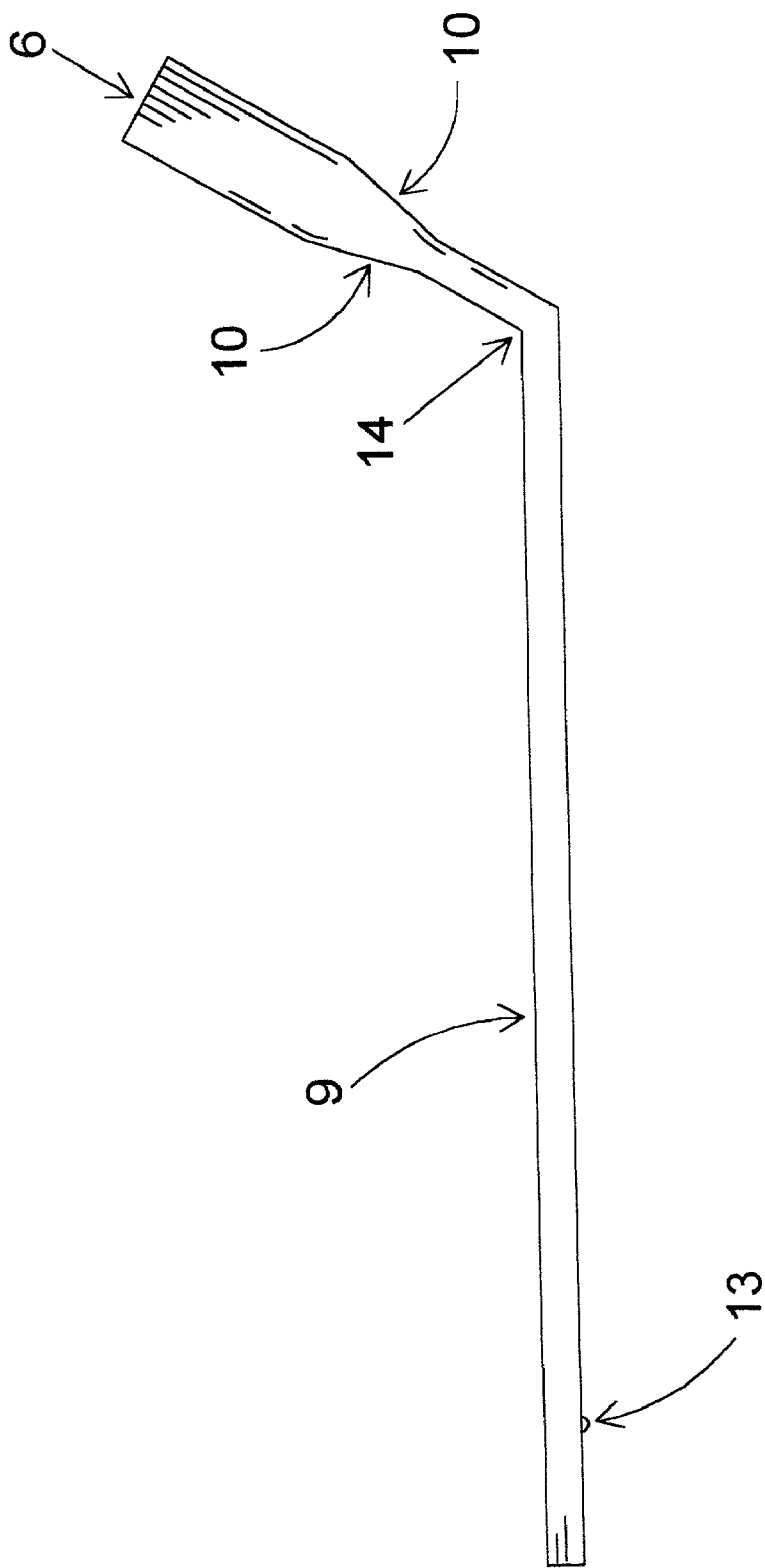


FIG. 58

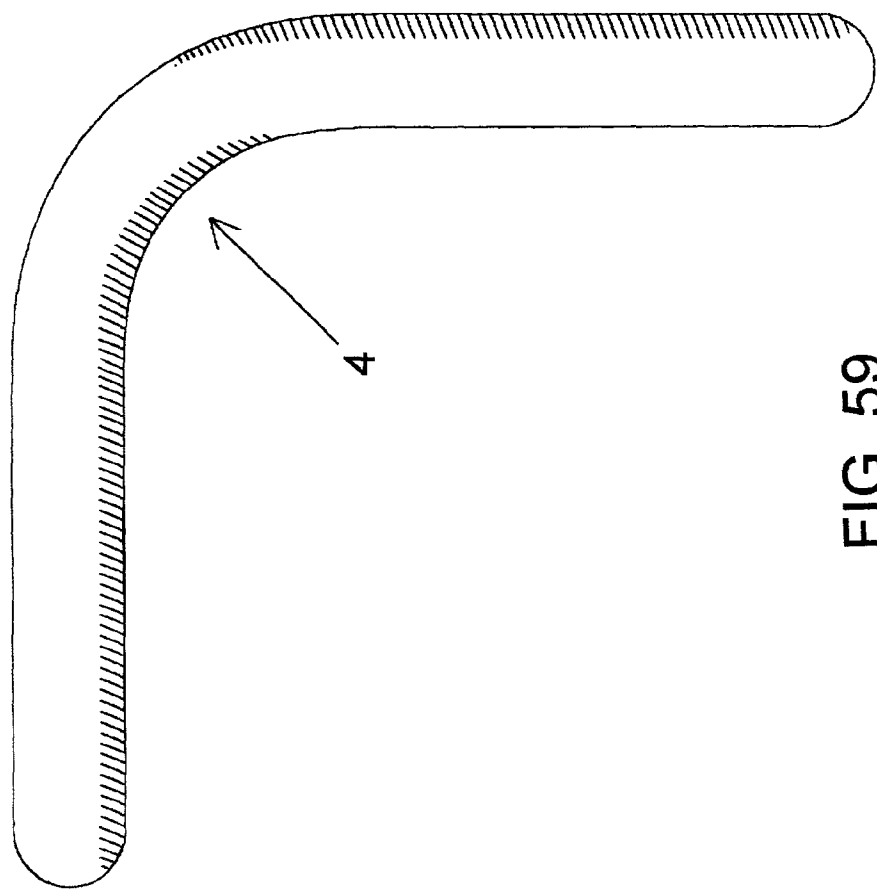


FIG. 59

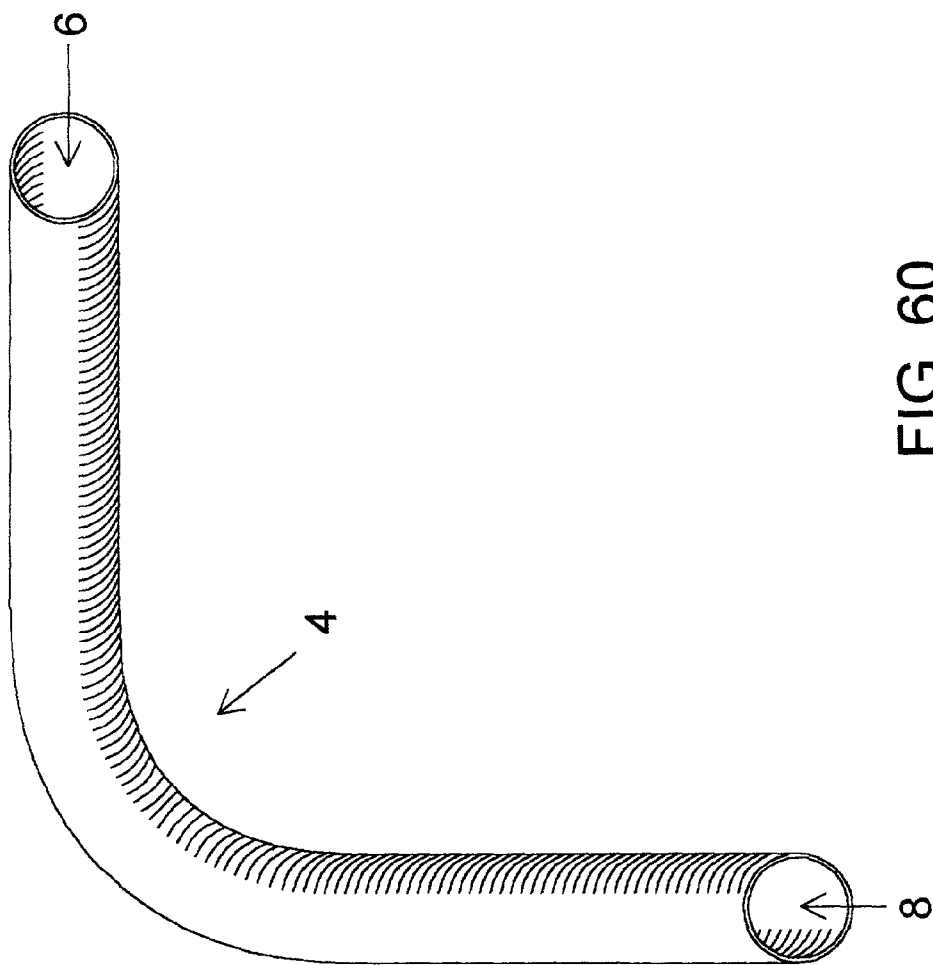


FIG. 60

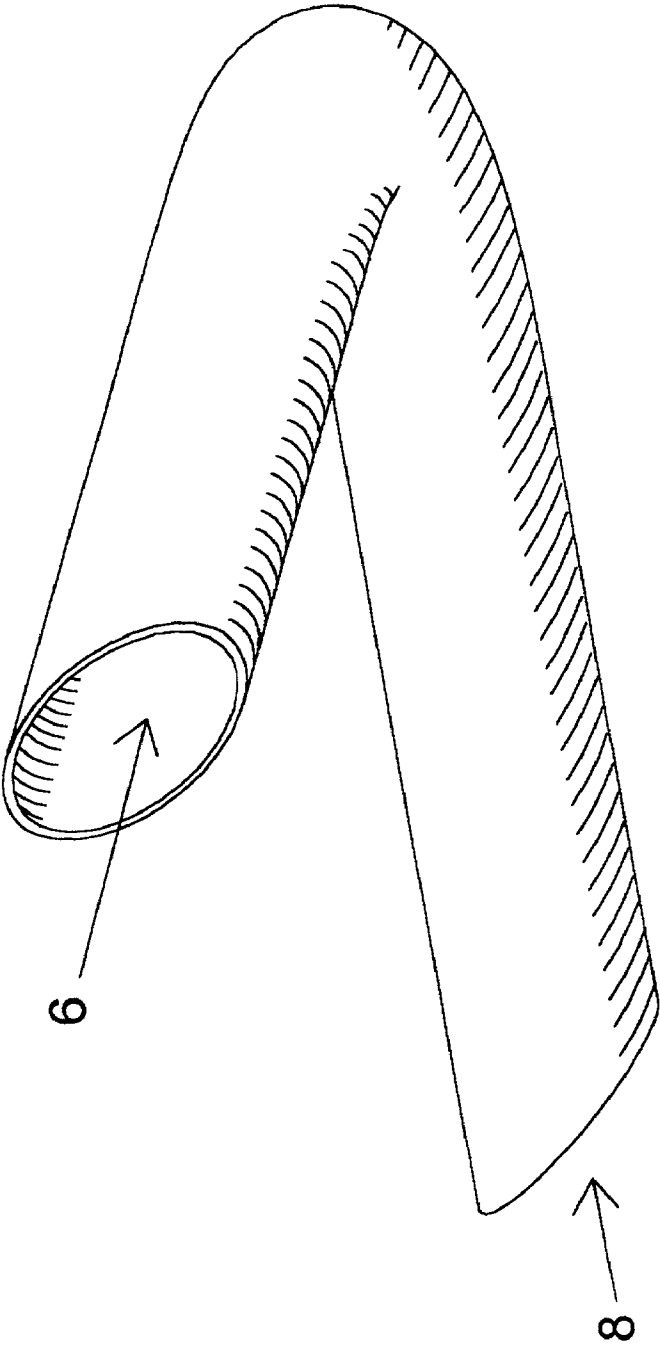


FIG. 61

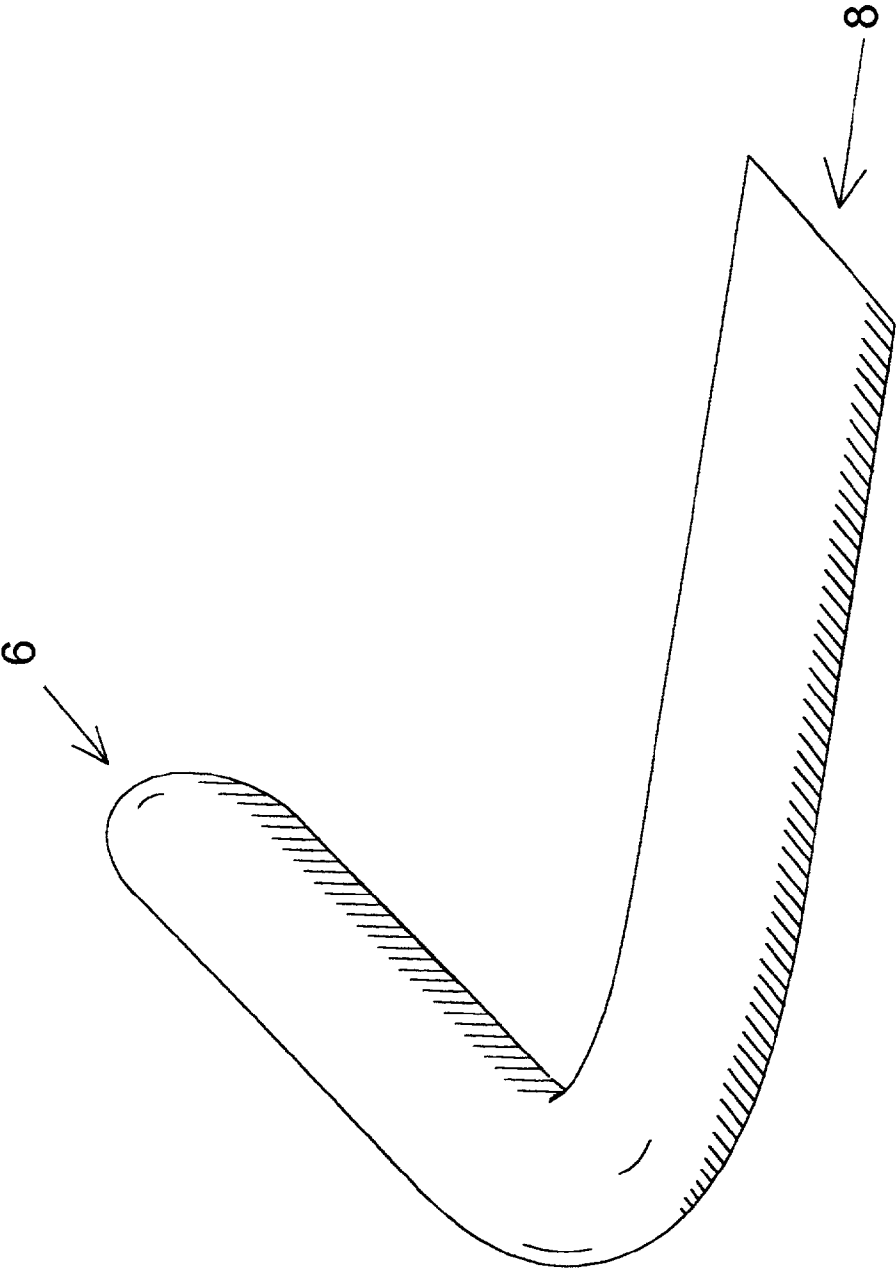


FIG. 62

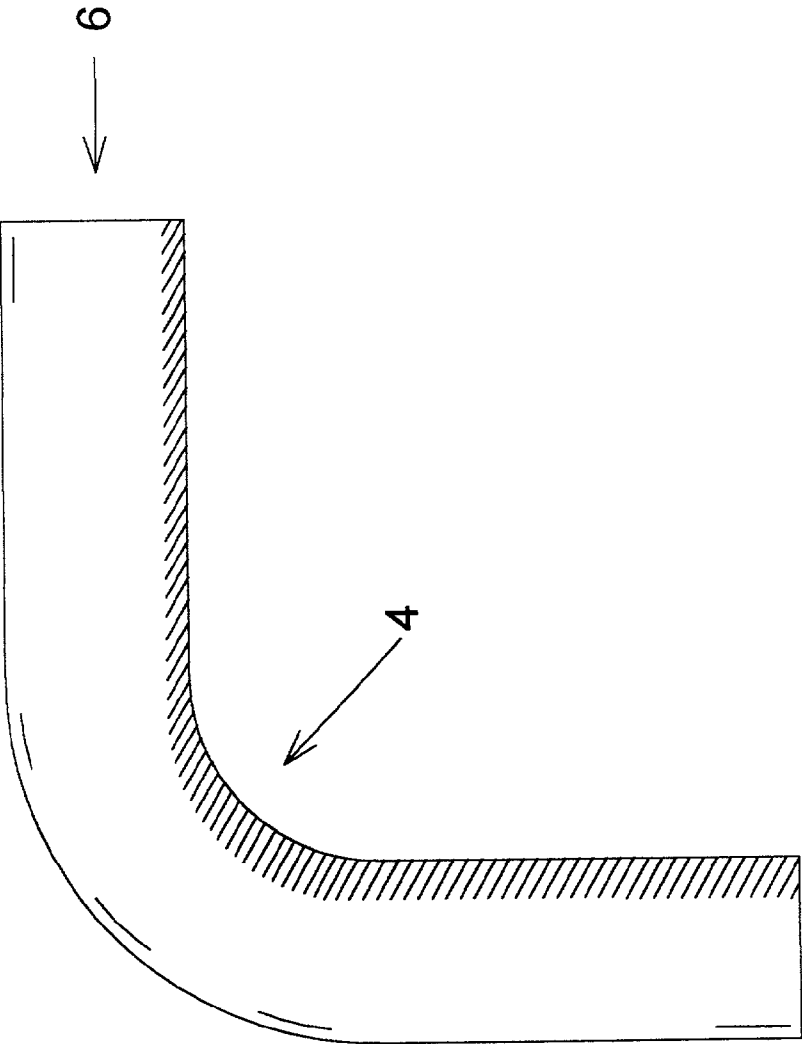


FIG. 63

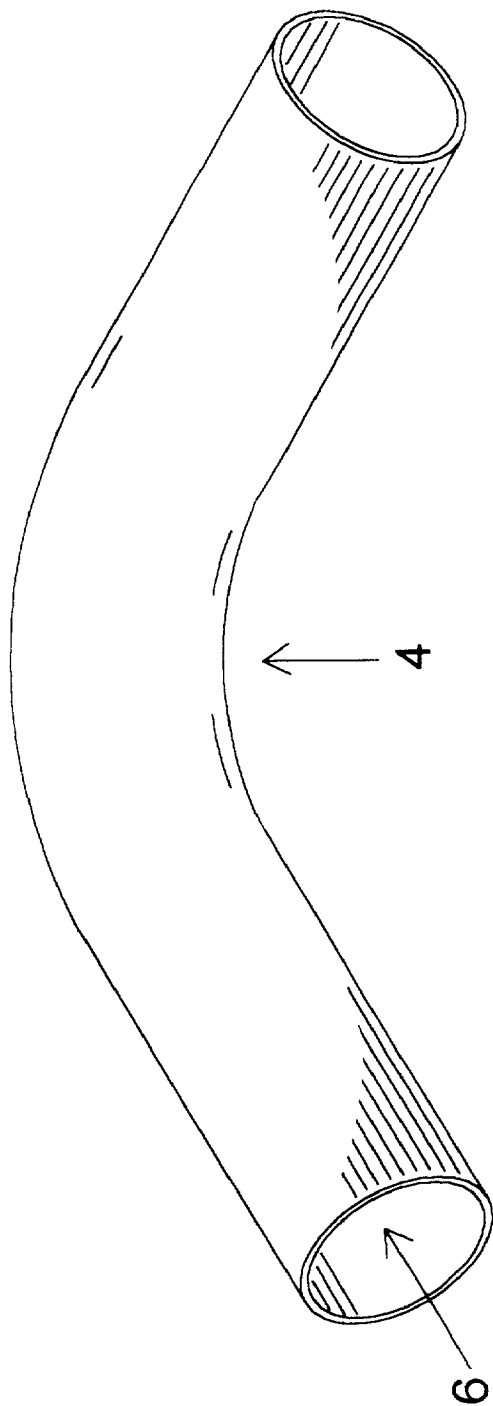


FIG. 64

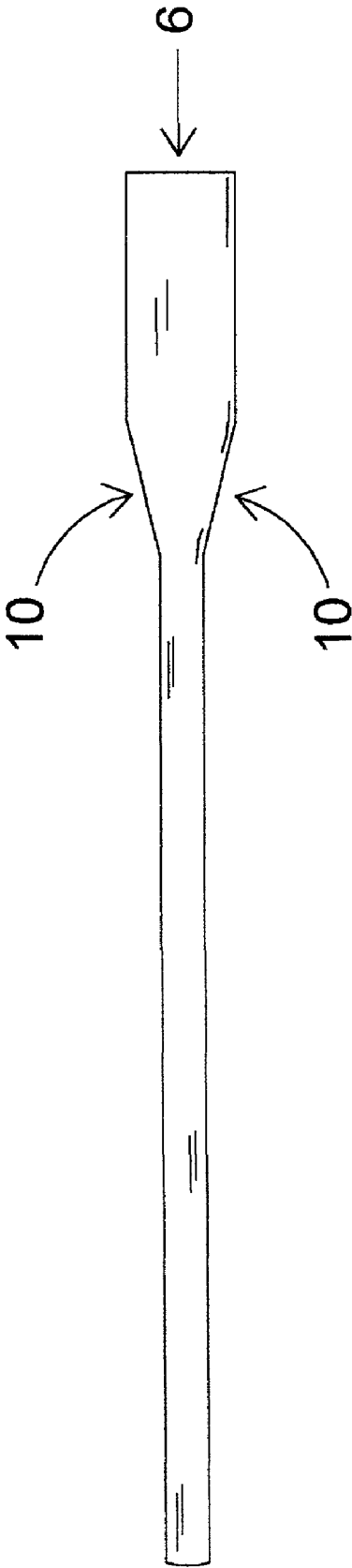


FIG. 65

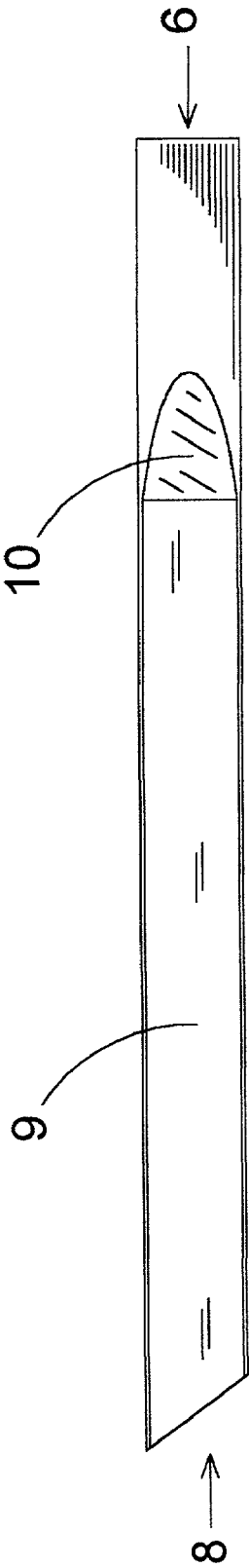


FIG. 66

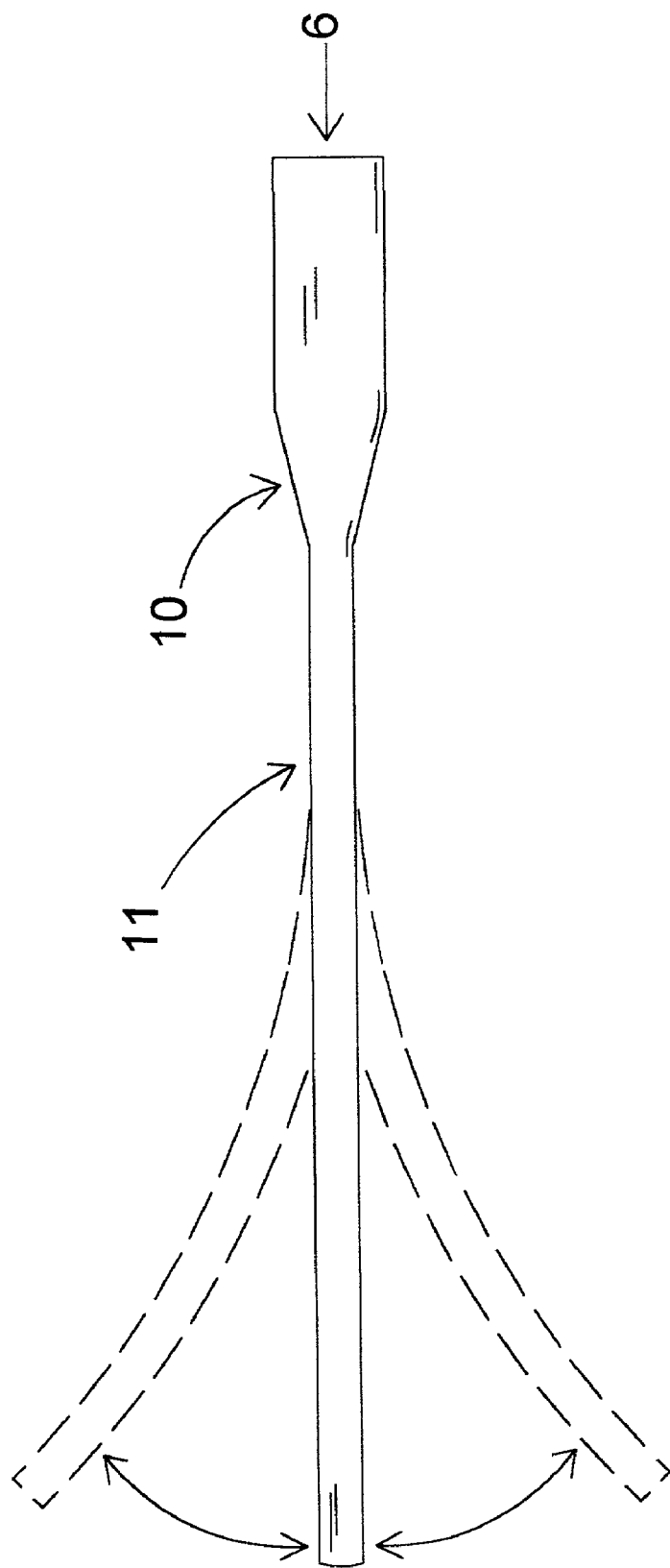


FIG. 67

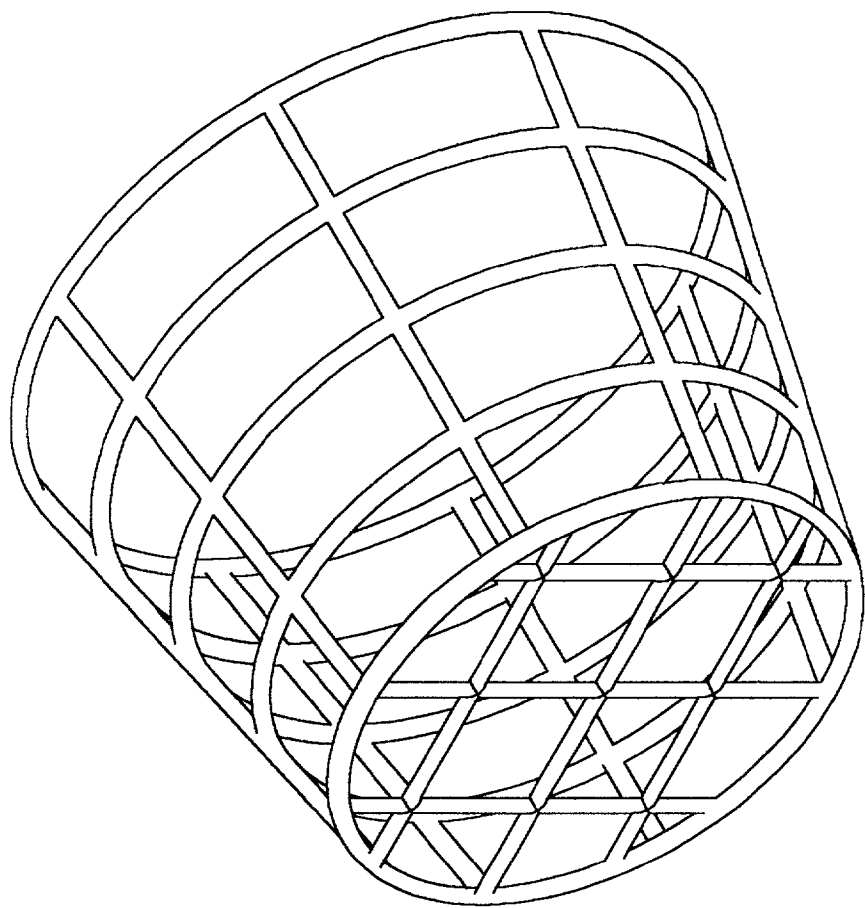


FIG. 68

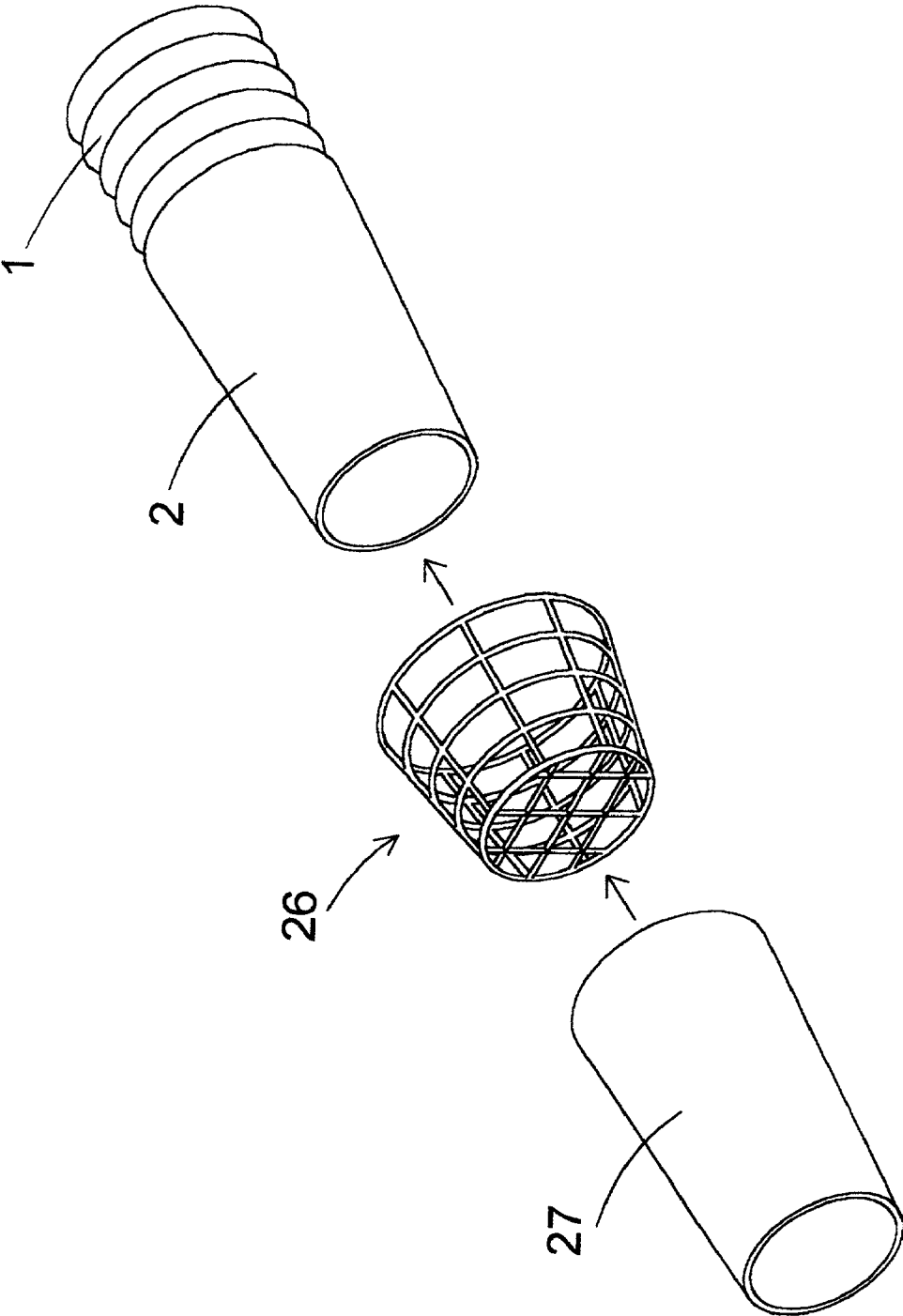


FIG. 69

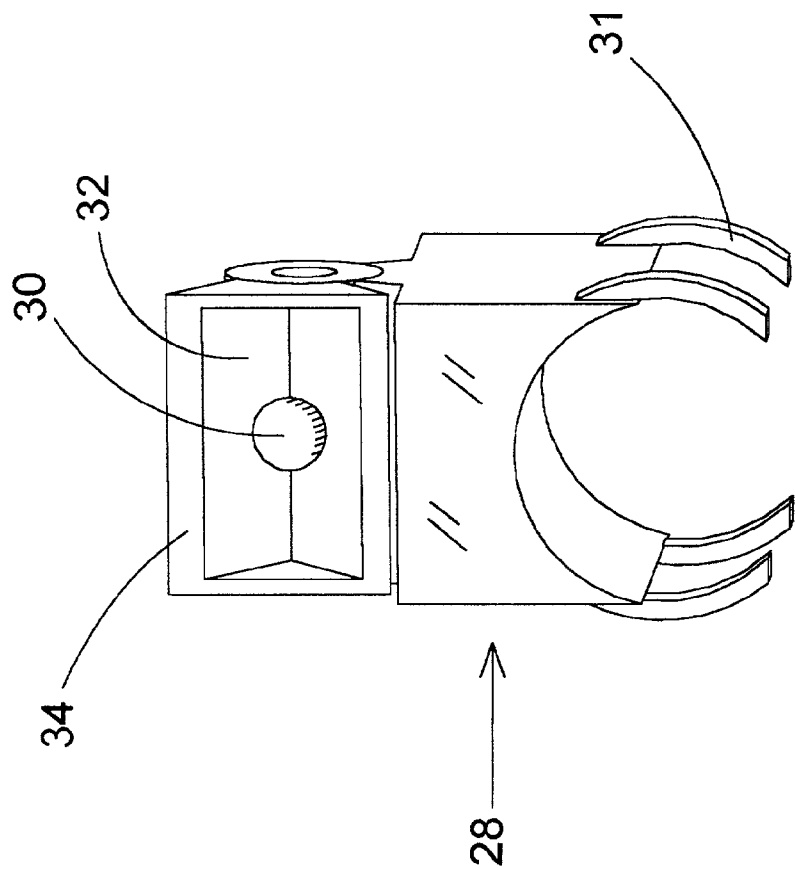


FIG. 70

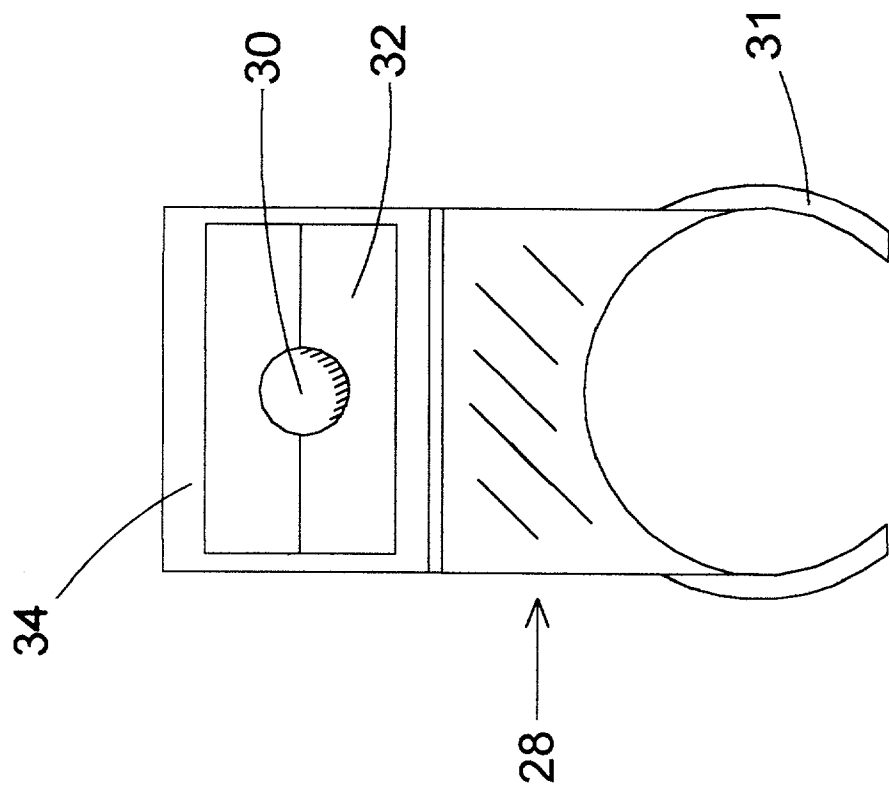


FIG. 71

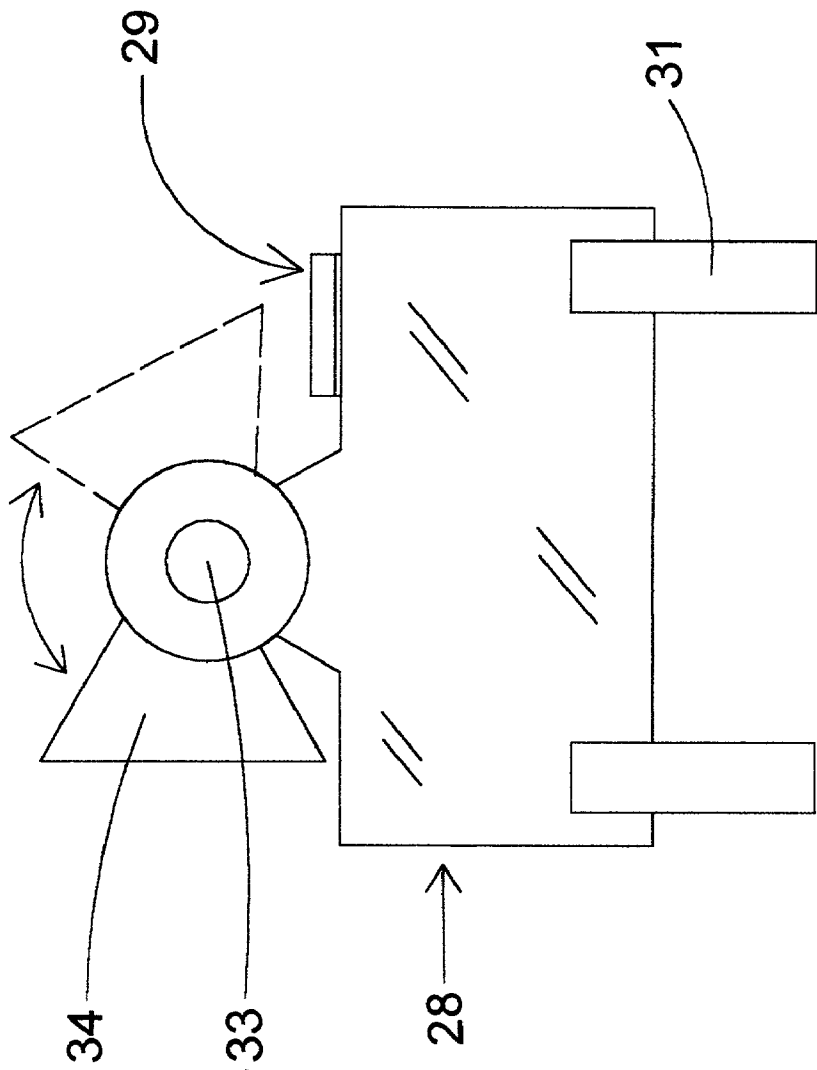


FIG. 72

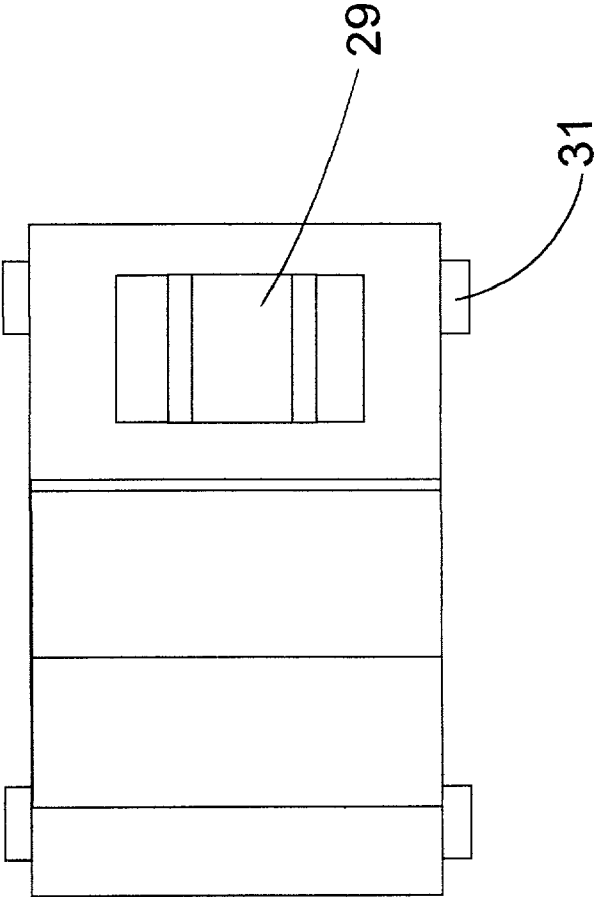


FIG. 73

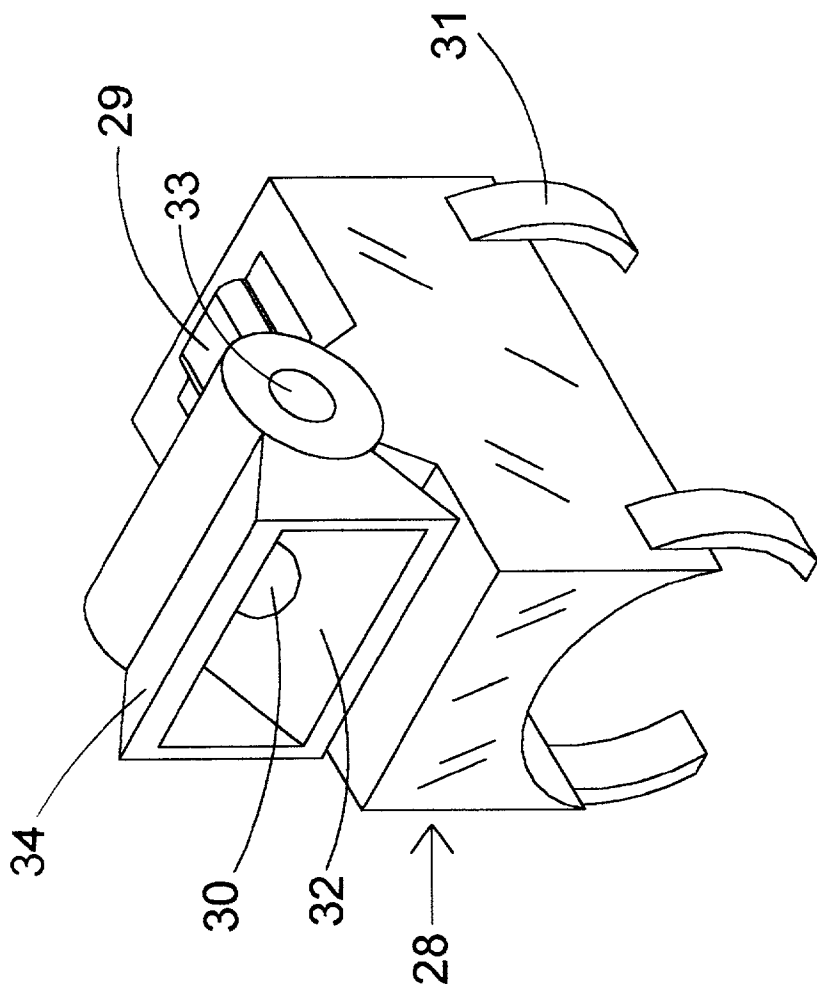


FIG. 74

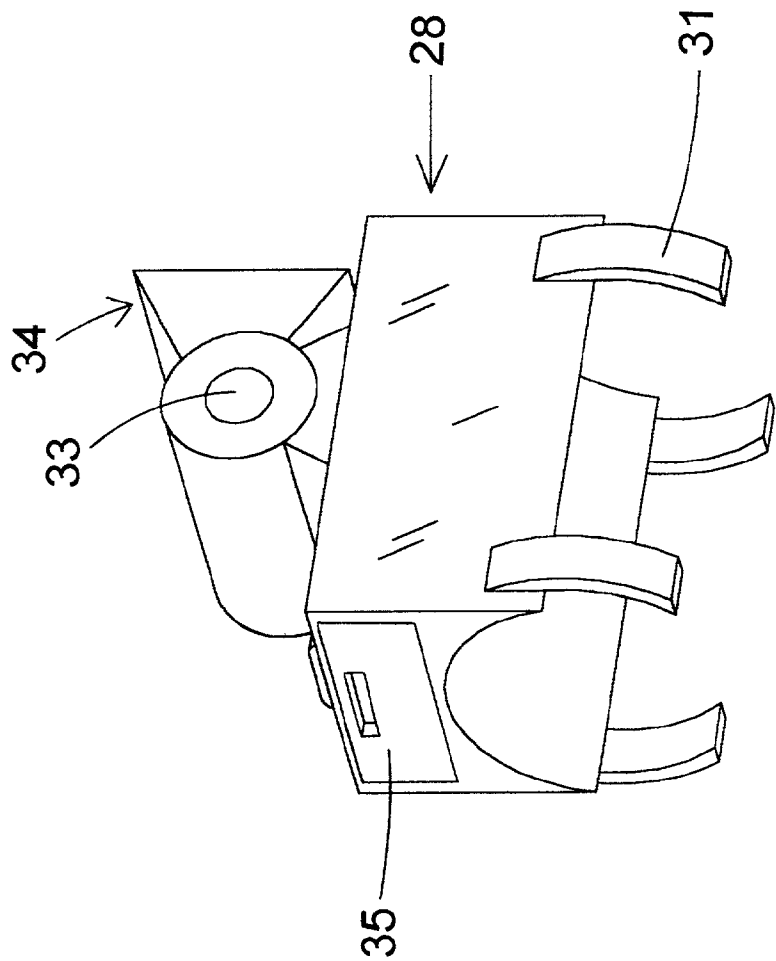


FIG. 75

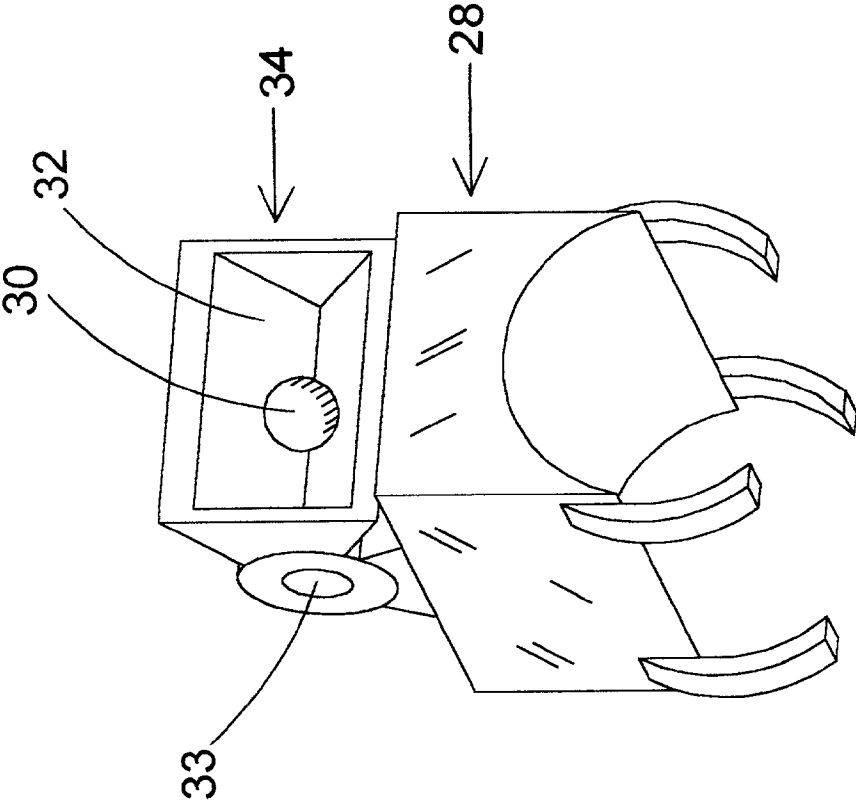


FIG. 76

VACUUM CLEANER ADAPTER SET

BACKGROUND OF THE INVENTION

[0001] This invention, entitled "Vacuum Cleaner Adapter Set", was devised and invented by Jamie Diaz and Robert N. Schlesinger, and relates to a set of new and useful set of adapters, accessories and attachments for use with a vacuum cleaner, such as those used in homes and by commercial cleaning companies, including car washes and used by those responsible for cleaning and maintaining various types of cleanrooms.

[0002] The term "vacuum cleaner adapter" will be used throughout this specification and its appended claims, and is intended to refer to one or more of the invention embodiments in the Vacuum Cleaner Adapter Set, disclosed herein. The term "vacuum cleaner attachment" as used throughout this specification and its appended claims is intended to refer to vacuum cleaner attachments that are not specifically included in the Vacuum Cleaner Adapter Set.

[0003] The term "vacuum cleaner" will be used throughout this specification and its appended claims, and is intended to also refer to suction cleaning devices, hand held and portable vacuum and suction cleaning devices, dust buster devices, wet-dry vacuum cleaner devices, shop vacuum cleaning devices, and vacuum cleaning devices used in industrial settings, such as car wash vacuums, specialized vacuum cleaning devices for cleanrooms, and the like.

[0004] The "vacuum circuit" as used throughout this specification and its appended claims is intended to refer to the negative air pressure circuit or suction circuit, generated by a motor, fan, or the like, contained in the vacuum cleaner, and said vacuum circuit may be extended with the vacuum cleaner hose (1), and attached extension fittings (3), adapters, and attachments, through which negative air pressure may flow from said vacuum circuit.

[0005] The terms "flexible" and "bendable" as used throughout this specification and its appended claims are intended to also refer to a part that is flexible, bendable, elastic, corrugated, rubber, and may be bent to a desired angle and will generally remain in that set position and at that desired angle, until said part is bent to another desired angle or until said part spontaneously returns to its original angle.

FIELD OF THE INVENTION

[0006] The field of this invention relates to the vacuum cleaner industry and to vacuum cleaning technology, and most specifically to a set of new and useful adapters, accessories and attachments for use with a vacuum cleaner, such as those used in homes and by commercial cleaning companies, and in industrial settings. The set of adapters, accessories, and attachments described herein may also have utility in specialized applications, such as in car washes, for vacuuming under and around car seats, and in other applications, such as in cleaning special rooms, such as pharmaceutical cleanrooms and satellite assembly cleanrooms, or the areas adjacent to semiconductor chip cleanrooms.

DESCRIPTION OF RELATED ART INCLUDING INFORMATION DISCLOSED UNDER 37 CFR 1.97 AND 1.98

[0007] Heretofore, vacuum cleaners have had a generally rectangular or box-shaped housing that may be

moved along a floor surface, with wheels attached onto the bottom of said housing. The suction region for such vacuum cleaners has been limited to a rectangular region on the bottom side of the vacuum cleaner, with a cylindrically rotating brush contained therein, and to a generally circular region on the terminal end of an associated vacuum cleaner hose (1), for attachments that may optionally be attached thereto and are thereby also connected to the vacuum circuit of the vacuum cleaner.

[0008] There are a number of problems associated with the commercially available vacuum cleaning devices, including their associated attachments. These problems include their inability to easily fit into narrow or curving pathways, their inability to fit under low clearance furnishings and over high clearance finishings, their inability to clean behind furnishings and the like, their inability to effectively pick up hair and animal fur from furniture, rugs and carpeting, their inconvenience when changing terminal adapter nozzles, their inability to easily retrieve objects inadvertently sucked into the vacuum cleaner system during the vacuuming process, and their sometimes inadequate or inability to illuminate areas to be cleaned.

[0009] The inventors, Jamie Diaz and Robert N. Schlesinger, have devised, designed, and invented a set of vacuum cleaner adapters or devices to solve the problems described herein and associated with the vacuum cleaner industry. This Vacuum Cleaner Adapter Set includes the following: bristled wheel adapters, low clearance adapters, high clearance adapters, right angle adapters, right angle fittings, flexible tip adapters, reversible double ended adapters, article retrieval screens, and flashlight adapters.

[0010] A primary application for the present invention is to provide a set of vacuum cleaner adapters that may be used with the commercially available vacuum cleaners and with industrial vacuum cleaning hose fittings, and will improve the efficiency of the vacuum cleaner and its associated technologies, and make it easier to effectively use the vacuum cleaner and its associated technologies.

BRIEF SUMMARY OF THE INVENTION AND FURTHER ADVANTAGES AND OBJECTIVES OF THE INVENTION

[0011] In trying to solve the vacuum cleaner industry problems and disadvantages that are described above and elaborated throughout this specification, and within the scope of this objective, it was surprising to find that a solution to the above described problems and disadvantages need not be expensive or involve complex technology.

[0012] The objectives and advantages of the various embodiments of the present Vacuum Cleaner Adapter Set include:

[0013] 1. The Vacuum Cleaner Adapter Set invention includes a Bristled Wheel Adapter that may be fit onto the tapered hose fitting (2). The Bristled Wheel Adapter is useful in that it may be used to more effectively pick-up hair and animal fur, and similar debris from furniture, rugs and carpets. Preferred embodiments of the bristles (19) may be straight or frusto-conical with the narrower conic at the terminal outer end of the bristle (19), and the bristles (19) would not have flattened or hooked terminal ends, as

such flattened or hooked terminal ends would cause hair or fur to become affixed to the bristles (19), thereby requiring significantly greater vacuum cleaner suction to remove them from the bristles (19) during the vacuum cleaning process. The bristles (19) of the Bristled Wheel Adapter effectively picks up the hairs and fur from the furniture, rug or carpet surface, and as the Adapter's cylindrical wheel (18) rolls or turns, the exposure of the soiled bristles to the vacuum circuit removes the hair and fur from the bristles (19). The Bristled Wheel Adapter may be used to clean, e.g., a carpet, rug, or certain upholstered furnishings. A preferred embodiment of the bristled wheel adapter is shown in FIGS. 13-18.

[0014] 2. The Vacuum Cleaner Adapter Set invention includes a limited clearance adapter that may fit onto the tapered hose fitting (2). The Limited Clearance Adapter is useful in that it may be used to effectively clean under furnishings, slightly elevated bookshelves, and the like, which have a low clearance, such as one inch clearance, and that would not otherwise be easily cleaned. In some modified embodiments, the Limited Clearance Adapter may also have a plurality of adapter body nipples (13) or one or more runners, located on each side of the suction intake orifice (8) on the bottom surface of the flattened adapter body (9). These nipples (13) or runners make it significantly easier to slide the Limited Clearance Adapter along the surface to be cleaned. The adapter body nipples (13) or runners also function to slightly elevate the suction intake orifice (8), and prevent attachment from the vacuum circuit's negative pressure, of said Adapter to the surface to be cleaned. The Limited Clearance Adapter may be used for low clearance, as well as high clearance applications, such as cleaning under low clearance furniture and beds, and the top of high clearance bookshelves and refrigerators, which are very close to the ceiling, and not easily accessible. Various embodiments of the Limited Clearance Adapters are shown in FIGS. 25-58. The set of embodiments of the limited clearance adapters may be divided into two subsets, comprised of the set of low clearance adapters and the set of high clearance adapters. Some embodiments of the set of limited clearance adapters may be effectively used as a low clearance adapter, as well as a high clearance adapter, thereby being elements or embodiments in both of said subsets.

[0015] 3. The Vacuum Cleaner Adapter Set invention includes an Angled Low Clearance Adapter that may fit onto the tapered hose fitting (2). The Angled Low Clearance Adapter is useful for easily and effectively cleaning under slightly elevated furniture, desks, bookshelves, and the like, which have a low clearance, such as one inch from the floor, and may be used while the user is in the standing position holding an extension fitting (3) with said Adapter attached to its terminal end. A preferred embodiment for the Angled Low Clearance Adapter has a cylindrical hose fitting port (6) on the cylindrical portion of a generally flattened adapter body (9) with a low clearance adapter angle (14) or internal angle of approximately 120 degrees, and a suction intake

orifice (8) located near the terminal end of the adapter, as shown in FIGS. 47-58. This low clearance adapter angle (14) may vary, depending upon the needs and ergonomics of the application. This low clearance adapter angle (14) allows the user to most easily clean low clearance areas while in the standing position, and without bending or leaning over. The low clearance adapter angle (14) on the flattened adapter body (9) is typically located near the hose fitting port (6), and the bend on the low clearance adapter angle (14) may be a cylindrical bend, a flattened bend, or an elliptical bend, as shown in FIGS. 47-58. A preferred embodiment of the Angled Low Clearance Adapter would have a flattened bend, to optimize the low clearance penetration of the Adapter, thereby allowing deeper cleaning of the desired surface, as shown in FIGS. 50-52. In some modified embodiments, the Angled Low Clearance Adapter may further have a plurality of adapter body nipples (13) or a set of runners, located on each of the two sides of the suction intake orifice (8), and which function to slightly elevate the suction intake orifice (8), and also to make the cleaning movements of the Adapter easier, particularly when used for very low clearance objects.

[0016] 4. The Vacuum Cleaner Adapter Set invention includes an Angled High Clearance Adapter that may fit onto the terminal end of a tapered vacuum cleaner hose fitting (2). The Angled High Clearance Adapter is useful for easily and effectively cleaning the top of furnishings, bookshelves, refrigerators, and the like, which have a high clearance, such as one inch from the ceiling, and while the user is in the standing position holding an extension fitting (3) with said Adapter attached to its terminal end. A preferred embodiment for the Angled High Clearance Adapter has a cylindrical hose fitting port (6), on the cylindrical portion of a generally flattened adapter body (9) with a high clearance adapter angle (15) or internal angle of approximately 100-degrees, and a suction intake orifice (8) located near the terminal end of the Adapter, as shown in FIGS. 32-43. This high clearance adapter angle (15) may vary, according to the needs and ergonomics of the application. The high clearance adapter angle (15) allows the user to most easily clean high clearance areas while the user is in the standing position holding an extension fitting (3), and without stretching or using chairs, stools, and the like. This bend on the high clearance adapter angle (15) may be a cylindrical bend, a flattened bend, or an elliptical bend, as shown in FIGS. 32-43. A preferred embodiment would have a flattened bend, to optimize the high clearance penetration of the adapter, thereby allowing deeper cleaning of the desired surface, as shown in FIGS. 35-37. In some modified embodiments, the Angled High Clearance Adapter may further have a plurality of adapter body nipples (13) or a set of runners, located on the bottom surface of the flattened adapter body (9). The preferred location for said nipples (13) is with one on each of the two sides of the suction intake orifice (8), and which function to slightly elevate the suction intake orifice (8), and also to make the cleaning movements of the adapter easier,

particularly when used for very high clearance objects. This Angled High Clearance Adapter is particularly useful because the user may use it in the standing position, and without the use of a chair or ladder, when one or more extension fittings (3) are attached between the tapered hose fitting (2) and the Angled High Clearance Adapter.

[0017] 5. The Vacuum Cleaner Adapter Set invention includes a group of Right Angle Adapters that may fit onto the tapered hose fitting (2) or an extension fitting (3). The Right Angle Adapters are useful in that they may be used to effectively clean the behind furnishings, bookshelves, refrigerators, and the like, which have a close wall clearance, such as two inches from the wall. These Right Angle Adapters may be easily and effectively used while the user is in the standing position holding an extension fitting (3) with said Adapter attached to its terminal end. A preferred embodiment for the Right Angle Adapter has a generally cylindrical adapter body (9) bent at a bend angle (4) of approximately 90-degrees, and either end of said cylindrical adapter body (9) may be utilized as a hose fitting port (6), and with the opposite end not utilized as a hose fitting port (6), but functioning as a suction intake orifice (8). Each of these two ends may be angularly cut to be a mirror image of each other, as shown in FIGS. 59-62. Said angular cuts are optimally at approximately 45-degrees with respect to the centerline of the adapter body (9). This angular cut allows the Right Angle Adapter to be used to optimally clean behind furnishings, from a left approach or a right approach, and toward the floor or the ceiling, depending upon which end of the Adapter is utilized as the terminal end and as a suction appliance, as shown in FIGS. 59-62. There is a modified embodiment of the Right Angle Adapter where the adapter body (9) length is expandable or telescoping near each of the two ends, and typically the end containing the suction intake orifice (8) is expanded or telescoped to its full length, with an optional locking means to keep the expanded adapter body (9) firm, and to allow for easier use; said modified embodiment would optimally telescope small, into smaller segments. There are two other modified Right Angle Adapters that have a generally flattened adapter body (9), with a cylindrical hose fitting port (6), which tapers to become a centrally protruding tapered adapter body (9), and with the flattened terminal end of each of these two modified Right Angle Adapters being angularly cut, as with the above-disclosed embodiments. One of these modified Right Angle Adapter embodiments has a terminal end cut designed for a right approach, and the other embodiment has a terminal end cut designed for a left approach; these two modified Right Angle Adapters being mirror images of each other. The angled cut at the terminal end of the flattened adapter body (9) functions as the suction intake orifice (8). The flattened adapter body (9) has a bend angle (4) or internal angle of approximately 90-degrees, but said angle (4) may vary, depending upon the needs and ergonomics of the application, similar to that shown in as shown in FIGS. 59-62. These Right Angle Adapters are useful in cleaning

behind otherwise inaccessible areas such as refrigerators, stoves, bookshelves, and the like, and may, function in conjunction with the article retrieval screen, disclosed below, to retrieve into said screen, objects that have fallen into said inaccessible areas.

[0018] 6. The Vacuum Cleaner Adapter Set invention includes a Right Angle Fitting with a tapered hose fitting (2) end and a non-tapered hose fitting port (6) on the opposite end, that may be fit onto the tapered hose fitting (2) or an extension fitting (3), and thereby emulates some properties of the Right Angle Adapter. This Right Angle Fitting may have an angular cut on its tapered output end (6), somewhat similar to the Right Angle Adapter described above, and with similar utility. This Right Angle Fitting may be used to simplify and broaden the applications of the embodiments of the Vacuum Cleaner Adapter Set disclosed herein. Another advantage of the Right Angle Fitting is to simplify the tooling and molding of the pieces, thereby making the parts less expensive to manufacture. The Right Angle Fitting is shaped like a bent cylinder, and one end may be utilized as a hose fitting port (6), and the other end may be used as the suction intake orifice (8) or as a tapered hose fitting (2) for attaching another adapter or vacuum cleaner attachment. The Right Angle Fitting is typically bent at a bend angle (4) of approximately 90-degrees, as shown in FIGS. 63-64, but said angle may vary by 15-degrees. A preferred embodiment of the Right Angle Fitting is shown in FIGS. 63-64.

[0019] 7. The Vacuum Cleaner Adapter Set invention includes a corrugated or Flexible Angle Fitting that may be fit onto the tapered hose fitting (2). The Flexible Angle Fitting is useful in that it may be used to bend and thereby set said fitting at a desired angle, with each use. This Flexible Angle Fitting simplifies and broadens the applications of the adapters in the Vacuum Cleaner Adapter Set disclosed herein, and will broaden the utility of available vacuum cleaner attachments. Another advantage of the Flexible Angle Fitting is to simplify the tooling and molding of the pieces, by making the angled adapters or angled elements thereof, available as the present Flexible Angle Fitting, which may be affixed to other adapters and attachments with a generally linear design. This reduces the cost of tooling and manufacturing the vacuum cleaner adapters and attachments. The Flexible Angle Fitting is typically shaped like a cylinder, but the terminal region of said adapter may optionally have a slightly flattened cylindrical shape in some embodiments. The Flexible Angle Fitting may be used in a straight, 180-degree configuration, or may be bent and used at another desired angle, such as 90-degrees or 45-degrees, thereby affording optimal applications of this new and usefull vacuum cleaner fitting.

[0020] 8. The Vacuum Cleaner Adapter Set includes a Flexible Tip Adapter that may be fit onto the tapered hose fitting (2). The Flexible Tip Adapter is useful in cleaning difficult-to-access cracks and crevices, and other areas where rigid and fixed adapters or attachments cannot readily access, such as those

areas found in car interiors, and the interfaces between computer and stereo system components, and between closely arranged furnishings. The Flexible Tip Adapter has a cylindrical hose fitting port (6) that fits onto a tapered hose fitting (2). The Flexible Tip Adapter has a generally flattened adapter body (9) with the suction intake orifice (8) located at or near the terminal end, as shown in FIGS. 65-67. The flattened portion of the adapter body (9) is generally comprised essentially of a flexible, corrugated, or elastomeric material that may be used to temporarily bend the tip and its suction intake orifice (8) into the desired position, with each use.

[0021] 9. The Vacuum Cleaner Adapter Set invention includes a Reversible Double Ended Adapter that may be fit onto the tapered hose fitting (2). The Reversible Double Ended Adapter is useful because it may be used to simplify and broaden the applications of the above-disclosed embodiments of the Vacuum Cleaner Adapter Set. Another advantage of the Reversible Double Ended Adapter is to simplify the tooling and molding of the desired terminal end pieces, by having on one reversible piece, two different terminal end pieces or attachments that may be attached to a vacuum cleaner hose fitting (2) or extension fitting (3). This makes the Reversible Double Ended Adapter more convenient to store and easier to use, when switching applications from one terminal end application to the other terminal end application. A preferred embodiment of the Reversible Double Ended Adapter has a cylindrical body (24), with one vacuum cleaner adapter located on each end of the reversible cylindrical body (24), and either end may be utilized as a hose fitting port (6), with the end not utilized as said port (6) then being a suction intake orifice (8). The vacuum cleaner adapters located on each end of said cylindrical body (24) have a hose fitting port (6) located thereon, and when in use, there is fluidic communication through an adapter suction channel (7), between the hose fitting port (6) located on one end of the Reversible Double Ended Adapter, and with the suction intake orifice (8) effectively located on the opposite end of the Reversible Double Ended Adapter. These two hose fitting ports (6) are designed to receive a hose fitting (2) therein. A preferred embodiment of the Reversible Double Ended Adapter would have a modified rectangular terminal adapter located or affixed on one end, and would have an angled corner adapter located or affixed at the opposite end of the Reversible Double Ended Adapter, as shown in FIGS. 1-7. The modified rectangular terminal adapter is novel because it is part of a Reversible Double Ended Adapter, with an adapter suction channel (7), and has an accessible hose fitting port (6) located at its terminal end. This angled corner adapter is novel because it is part of a Reversible Double Ended Adapter, with an adapter suction channel (7), and has an accessible hose fitting port (6) located at its terminal end, and it may be designed and tooled to have an adapter angle of 30 degrees to approximately 90 degrees, as shown in FIGS. 1-12. A preferred embodiment of this Reversible Double Ended Adapter with an adapter body rake (12)

located on the front of each of the two Adapter ends, is shown in FIGS. 1-7. Another embodiment of the Reversible Double Ended Adapter has a corner adapter located or affixed at one end of the Reversible Double Ended Adapter, and would have modified brush terminal adapter located or affixed at the opposite end of the Reversible Double Ended Adapter, as shown in FIGS. 8-12. The modified Brush Terminal Adapter is novel because it is part of a Reversible Double Ended Adapter, with an adapter suction channel (7), and has an accessible hose fitting port (6) located at its terminal end. The use of the Reversible Double Ended Adapter makes the transport and changing of adapter heads significantly easier, because the user may simply reverse the orientation of the reversible cylindrical body (24), to utilize a different and desired terminal adapter.

[0022] 10. The Vacuum Cleaner Adapter Set invention includes an Article Retrieval Screen that may be fit between the tapered hose fitting (2) and a vacuum cleaner adapter, attachment, or extension fitting (3). A simple embodiment of the Article Retrieval Screen is shown in FIGS. 68-69, and is essentially a screen (26) that may be fit into the vacuum cleaner circuit, between circuit junctions, i.e., places where vacuum cleaner components interface. The Article Retrieval Screen is useful in retrieving objects that are accidentally sucked into the vacuum circuit, and prevents said objects from being sucked into the dust bag or debris collection chamber of a vacuum cleaner device. When vacuuming a carpet or floor, it is not uncommon for the user to hear an object being sucked into the vacuum circuit, and wonder about the identity of said object. With the Article Retrieval Screen, the user may easily turn off the vacuum cleaner and the object that was sucked into the vacuum circuit and was being retained by the Article Retrieval Screen, will then simply drop out, or may be retrieved by opening the vacuum cleaner circuit between the Article Retrieval Screen, and terminal adapter or attachment. If it does not drop out or if debris accumulates in said screen, the user may turn off the vacuum cleaner, and remove the Article Retrieval Screen fitting, and remove the objects or debris that were sucked into the vacuum circuit, and trapped in the Article Retrieval Screens. Such objects that may be retrieved by the Article Retrieval Screen include: coins, jewelry, keys, and the like. A preferred embodiment of the Article Retrieval Screen is shown in FIG. 69, showing an exploded isometric side view of the screen (26) between said screen's associated short screen fittings (27) or an associated extension fitting (3) and a hose fitting (2). A modified preferred embodiment of the Article Retrieval Screen would have a screen (26) fit or affixed into a clear or smoked-clear screen fitting (27), with one end of said screen fitting (27) acting as a hose fitting port (6), and the opposite end acting as a hose fitting (2). The screen (26) for modified preferred embodiments of the Article Retrieval Screen may be located or affixed on either end of a screen fitting (27) or extension fitting (3), or said screen (26) may, in some modified embodiments, be permanently affixed within a screen fitting (27) or extension fitting (3).

[0023] 11. The Vacuum Cleaner Adapter Set invention includes a Flashlight Assembly Adapter. A simple embodiment of the Flashlight Assembly Adapter has clips affixed to its housing (28), thereby allowing the user to clip the flashlight Assembly Adapter to a cylindrical tube, such as a hose fitting (2) or an extension fitting (3) of a vacuum cleaner, or to another part of the vacuum cleaner, such as the hose (1), a hose fitting (2), attachment or adapter, or the cylindrical body (24) of an adapter, to effect improved lighting when vacuuming, or for use with vacuum cleaners, such as the canister variety of vacuum cleaners, that generally do not have a light or illumination means for the area to be cleaned. A preferred embodiment of the Flashlight Assembly Adapter with a pivot point (33), hinge, or bearing for directing the light, would allow the user to focus or direct the light emanating from the light bulb (30). A preferred embodiment of the Flashlight Assembly Adapter is shown in FIGS. 70-76.

[0024] Further objects, features, and advantages of the present invention will become more apparent from the following descriptions, when taken with the accompanying drawing figures that show, for purposes of illustration only, embodiment constructions in accordance with the present invention.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

[0025] The drawing figures reflect selected embodiments for the Vacuum Cleaner Adapter Set, and as is intended for use with a standard vacuum cleaner machine, but said invention is not limited to said use or application, and may further have applications in other types of vacuum or suction cleaning equipment, as well as in other industries where solid, liquid or fine fluidic power material must be removed from surfaces.

[0026] FIG. 1 shows an isometric view of an embodiment of the Reversible Double Ended Adapter, with an angled corner adapter shown on the top end, and a rectangular adapter on the opposite end.

[0027] FIG. 2 shows an isometric bottom view of the Reversible Double Ended Adapter embodiment shown in FIG. 1.

[0028] FIG. 3 shows a front view of the Reversible Double Ended Adapter embodiment shown in FIG. 1.

[0029] FIG. 4 shows a rear view of the Reversible Double Ended Adapter embodiment shown in FIG. 1.

[0030] FIG. 5 shows a side view of the Reversible Double Ended Adapter embodiment shown in FIG. 1.

[0031] FIG. 6 shows a isometric bottom view of the Reversible Double Ended Adapter embodiment shown in FIG. 1.

[0032] FIG. 7 shows a isometric top view of the Reversible Double Ended Adapter embodiment shown in FIG. 1.

[0033] FIG. 8 shows an isometric top view of an embodiment of the Reversible Double Ended Adapter, with a 90-degree angle corner adapter shown on the bottom end, and a brush adapter on the opposite end.

[0034] FIG. 9 shows an isometric bottom view of the Reversible Double Ended Adapter embodiment shown in FIG. 8.

[0035] FIG. 10 shows a front view of the Reversible Double Ended Adapter embodiment shown in FIG. 8.

[0036] FIG. 11 shows a rear view of the Reversible Double Ended Adapter embodiment shown in FIG. 8.

[0037] FIG. 12 shows a side view of the Reversible Double Ended Adapter embodiment shown in FIG. 8.

[0038] FIG. 13 shows an isometric bottom rear view of a preferred embodiment of the Bristled Wheel Adapter with dimples (22), and their associated dimple ports (23), which are hidden in this view, and also showing the cylindrical wheel (18), with its convex dimples (22) which are hidden in this and some of the following views.

[0039] FIG. 14 shows an isometric side view of the preferred embodiment of the Bristled Wheel Adapter shown in FIG. 13.

[0040] FIG. 15 shows a front view of the preferred embodiment of the Bristled Wheel Adapter shown in FIG. 13.

[0041] FIG. 16 shows a rear view of the preferred embodiment of the Bristled Wheel Adapter shown in FIG. 13.

[0042] FIG. 17 shows a top view of the preferred embodiment of the Bristled Wheel Adapter shown in FIG. 13.

[0043] FIG. 18 shows a bottom view of the preferred embodiment of the Bristled Wheel Adapter shown in FIG. 13.

[0044] FIG. 19 shows an isometric rear view of the preferred embodiment of the Bristled Wheel Adapter shown in FIG. 13, but with the cylindrical wheel (18) removed from said Adapter.

[0045] FIG. 20 shows an isometric bottom view of the embodiment of the Bristled Wheel Adapter shown in FIG. 19.

[0046] FIG. 21 shows a bottom view of the embodiment of the Bristled Wheel Adapter shown in FIG. 19.

[0047] FIG. 22 shows a front view of the cylindrical wheel (18) utilized in the embodiments of the Bristled Wheel Adapter shown in FIGS. 13-16 and FIG. 18, the opposite view being symmetrical and the rear view, and being a mirror image of the front view.

[0048] FIG. 23 shows an isometric side view of the cylindrical wheel (18) utilized in the embodiments of the Bristled Wheel Adapter shown in FIGS. 13-16 and FIG. 18.

[0049] FIG. 24 shows an exploded isometric side view of an embodiment of the Bristled Wheel Adapter utilizing a wheel axle (20) in the axle port (21) on the cylindrical wheel (18), and each end of said wheel axle (20) fitting into a dimple port (23).

[0050] FIG. 25 shows an isometric top view of a General Limited Clearance Adapter with a Central Taper.

[0051] FIG. 26 shows an isometric bottom view of said General Limited Clearance Adapter with a Central Taper.

- [0052] FIG. 27 shows a side view of the General Clearance Adapter with a Central Taper.
- [0053] FIG. 28 shows a bottom isometric view of a modified embodiment of the General Clearance Adapter with a Central Taper and with a rake (12) near the suction intake orifice (8), as shown.
- [0054] FIG. 29 shows an isometric top view of a Non-Angled High Clearance Adapter.
- [0055] FIG. 30 shows an isometric bottom view of a Non-Angled High Clearance Adapter.
- [0056] FIG. 31 shows a side view of a Non-Angled High Clearance Adapter.
- [0057] FIG. 32 shows an isometric top view of an Angled High Clearance Adapter without a Central Taper.
- [0058] FIG. 33 shows an isometric bottom view of an Angled High Clearance Adapter without a Central Taper.
- [0059] FIG. 34 shows a side view of an Angled High Clearance Adapter without a Central Taper.
- [0060] FIG. 35 shows an isometric top view of a Flat Bend High Clearance Adapter without a Central Taper.
- [0061] FIG. 36 shows an isometric bottom view of a Flat Bend High Clearance Adapter without a Central Taper.
- [0062] FIG. 37 shows a side view of a Flat Bend High Clearance Adapter without a Central Taper.
- [0063] FIG. 38 shows an isometric top view of an Angled High Clearance Adapter with a Central Taper.
- [0064] FIG. 39 shows an isometric bottom view of an Angled High Clearance Adapter with a Central Taper.
- [0065] FIG. 40 shows a side view of an Angled High Clearance Adapter with a Central Taper.
- [0066] FIG. 41 shows a top isometric view of a Flat Bend High Clearance Adapter with Central Taper.
- [0067] FIG. 42 shows a bottom isometric view of a Flat Bend High Clearance Adapter with Central Taper.
- [0068] FIG. 43 shows a side view of a Flat Bend High Clearance Adapter with Central Taper.
- [0069] FIG. 44 shows an isometric top view of a Non-Angled Low Clearance Adapter.
- [0070] FIG. 45 shows an isometric bottom view of a Non-Angled Low Clearance Adapter.
- [0071] FIG. 46 shows a side view of a Non-Angled Low Clearance Adapter.
- [0072] FIG. 47 shows an isometric top view of an Angled Low Clearance Adapter without a Central Taper.
- [0073] FIG. 48 shows an isometric bottom view of an Angled Low Clearance Adapter without a Central Taper.
- [0074] FIG. 49 shows a side view of an Angled Low Clearance Adapter without a Central Taper.
- [0075] FIG. 50 shows an isometric top view of a Flat Bend Low Clearance Adapter without a Central Taper.
- [0076] FIG. 51 shows an isometric bottom view of a Flat Bend Low Clearance Adapter without a Central Taper.
- [0077] FIG. 52 shows a side view of a Flat Bend Low Clearance Adapter without a Central Taper.
- [0078] FIG. 53 shows an isometric top view of an Angled Low Clearance Adapter with a Central Taper.
- [0079] FIG. 54 shows an isometric bottom view of an Angled Low Clearance Adapter with a Central Taper.
- [0080] FIG. 55 shows a side view of an Angled Low Clearance Adapter with a Central Taper.
- [0081] FIG. 56 shows a top isometric view of a Flat Bend Low Clearance Adapter with Central Taper.
- [0082] FIG. 57 shows a bottom isometric view of a Flat Bend Low Clearance Adapter with Central Taper.
- [0083] FIG. 58 shows a side view of a Flat Bend Low Clearance Adapter with Central Taper.
- [0084] FIG. 59 shows a top view of the Right Angle Adapter.
- [0085] FIG. 60 shows a bottom view of the Right Angle Adapter.
- [0086] FIG. 61 shows a perspective bottom view of the Right Angle Adapter.
- [0087] FIG. 62 shows a perspective top view of the Right Angle Adapter.
- [0088] FIG. 63 shows a top view of the Right Angle Fitting, a bottom view being a mirror image thereof.
- [0089] FIG. 64 shows a perspective side view of the Right Angle Fitting, and showing the hose fitting port (6), the opposite end being the extension fitting (3) port.
- [0090] FIG. 65 shows a top view of the Flexible Tip Adapter.
- [0091] FIG. 66 shows a side view of the Flexible Tip Adapter.
- [0092] FIG. 67 shows a top view of the Flexible Tip Adapter, demonstrating two symmetrical angles that the Flexible Tip Adapter may be bent from side to side, and shown in hatched lines.
- [0093] FIG. 68 shows an isometric front view of a simple embodiment of the Article Retrieval Screen.
- [0094] FIG. 69 shows an exploded isometric side view of an embodiment of the Article Retrieval Screen with the screen (26) shown between a vacuum cleaner hose (1) and a screen fitting (27). The screen fitting (27) closest to the terminal adapter is optimally composed of a clear material, to allow the user to identify the contents of the Article Retrieval Screen. Alternatively the screen (26) may be located, e.g., between an extension fitting (3) and the hose fitting port (6) for an adapter body (16).
- [0095] FIG. 70 shows a front isometric view of a preferred embodiment of the Flashlight Adapter.
- [0096] FIG. 71 shows a front view of said preferred embodiment of the Flashlight Adapter.
- [0097] FIG. 72 shows a side view of the preferred embodiment of the Flashlight Adapter.
- [0098] FIG. 73 shows a top view of said preferred embodiment of the Flashlight Adapter.

[0099] FIG. 74 shows an isometric top front view of the preferred embodiment of the Flashlight Adapter.

[0100] FIG. 75 shows an isometric bottom rear view of said preferred embodiment of the Flashlight Adapter.

[0101] FIG. 76 shows an isometric bottom front view of the preferred embodiment of the Flashlight Adapter.

BRIEF DESCRIPTION OF THE REFERENCE NUMERALS

[0102] Referring now to the drawing figures and to the specification and the appended claims, like reference numerals are used to refer to like specific parts of the various Drawing Figures and the specification and claims. The reference numerals used to describe the various parts of the Drawing Figures and the specification and its appended claims follows.

[0103] The vacuum cleaner hose (1) is the hose, tube, or the like, that is connected on one end to a chamber or the like, housing the vacuum cleaner fan or motor, and said hose (1) generally has a hose fitting (2) on its other end, where the suction pressure from said fan may be introduced to a vacuum cleaner adapter or attachment that may be attached onto said hose fitting (2). Vacuum cleaner hoses (1) typically are manufactured in standardized diameter and taper sizes, such that a tapered terminal end of a hose (1) will fit into the hose fitting port (6) of a vacuum cleaner attachment or adapter.

[0104] The hose fitting (2) is the fitting located at the terminal region of a vacuum cleaner hose (1) or extension fitting (3), that is generally tapered, and typically tapered at approximately a 6-degree taper, so that a tapered hose fitting (2) may be fit snugly into the hose fitting port (6) of an adapter body (9), vacuum cleaner attachment, or the like.

[0105] The extension fitting (3) is the extension tube, tubing, substantially tubular wand, or the like, that may be fit onto a hose fitting (2) at one end, and may accept an adapter body (9) or the like, at its other end, which may also be tapered. One or more extension fittings (3) may be fit together and used for extending the reach of the user, and may be particularly useful in cleaning inaccessible and high areas, such as ceilings. The Applicants have disclosed herein a new and useful type of angled extension fitting (5) that is a Right Angle Fitting, with a bend angle (4) or curve of approximately 90-degrees, rather than the straight 180-degree tubular shape that has been available heretofore on extension fittings (3). This new and useful type of angled extension fitting (5) is optimally bent to an approximately 90-degree bend angle (4), as shown in FIGS. 59-62, as a Right Angle Fitting. A modified embodiment of this invention has a flex region (11), generally located between the hose fitting port (6) and the middle of said extension fitting (3) or adapter, where the bend angle (4) in said flex region (11) is adjustable, and will generally remain fixed until manually bent to another desired bend angle (4). The bend angle (4) is the angle of the bend or curvature on the adapter body (9) or angled extension fitting (5).

[0106] The angled extension fitting (5) is the Applicants' new and useful extension fitting that is bent or curved, rather than the straight tubular shape that has been available heretofore. This angled extension fitting (5) is optimally bent to approximately 90-degree angle to form a Right Angle

Fitting, as shown in FIGS. 59-64. A modified embodiment of this invention has a flex region (11), optimally located in the middle of said angled extension fitting (5), where the bend angle (4) is adjustable, as described above.

[0107] The hose fitting port (6) is the port, receptacle, or the like, which is sized to matedly receive a hose fitting (2). The hose fitting port (6) is located on one end of an extension fitting (3), or is located on the end of the adapter body (9) connecting said adapter body (9) to the vacuum cleaner's vacuum circuit.

[0108] The adapter suction channel (7) is the channel, conduit, duct, or the like, found in all extension fittings (3), and vacuum cleaner adapters and attachments. The adapter suction channel (7) provides a channel for the negative pressure, i.e., suction from the vacuum cleaner to travel through the adapter body (9), to the suction intake orifice (8).

[0109] The suction intake orifice (8) is an orifice, cavity, hole, or region, located at the terminal end of the adapter suction channel (7), and is the orifice (8) where the terminal end of the suction pressure is located, thereby allowing the suction action to clean the surface over which it is applied.

[0110] The adapter body (9) is the body, housing, or the like, which is intended to refer generally to the vacuum cleaner adapter or attachment piece or part, that may be attached to the hose fitting (2) or extension fitting (3).

[0111] The flattened body taper (10) is the taper, narrowing region, or the like, that is found on the flattened embodiments of the vacuum cleaner adapters disclosed herein, and shown in FIGS. 25-58 and FIGS. 65-67, and transforms a generally cylindrical region of an adapter body (9) to a generally flattened terminal region of said adapter body (9).

[0112] The adapter body flex region (11) is the flexible or elastomeric region or portion of an adapter body (9) that allows the user to bend that portion of the adapter body (9) to a desired angle, as shown in FIG. 67. This region (11) may in some embodiments remain fixed at the desired angle, until it is manually bent to another desired bend angle (4), or until it spontaneously returns to its original position. Some embodiments of the flex region (11) may be comprised of a corrugated elastomeric flex region (11).

[0113] The terminal adapter body rake (12) is the rake or set of prongs or the like, that is located near the terminal end of some embodiments of the adapter bodies (9) disclosed herein, and is intended to assist in loosening debris from the cleaning surface and be sucked into the intake suction orifice (8), when negative pressure is applied through the vacuum circuit. The terminal adapter body rake (12) prevents a complete closure of the vacuum circuit and thereby preventing a pressurized attachment of a vacuum cleaner adapter to said cleaning surface.

[0114] The adapter body nipple (13) is the nipple, disk, semi-sphere, or the like, that is located near the suction intake orifice (8) on some embodiments of the adapter bodies (9), and is intended to assist in sliding or moving said adapter body (9) over a surface, and is also intended to allow suction or vacuum to pass from the adapter body (9) to the cleaning surface, without causing a complete closure of the vacuum circuit, thereby preventing attachment of the adapter body (9) to said cleaning surface.

[0115] The low clearance adapter angle (14) is the angle on an embodiment of the low clearance adapter that is angled and not straight, thereby allowing the user to clean a low clearance area, such as under a desk, bed, or furniture, while in the standing position, when one or more extension fittings (3) are attached between the tapered hose fitting (2) and the adapter. The preferred low clearance adapter angle (14) for this adapter is approximately 120-degrees, as shown in FIGS. 47-58.

[0116] The high clearance adapter angle (15) is the angle on an embodiment of the high clearance adapter that is angled and not straight, thereby allowing the user to clean a high clearance area, such as a bookshelf, while in the standing position, and without the use of a chair or ladder, when one or more extension fittings (3) are attached between the tapered hose fitting (2) and the adapter. The preferred high clearance adapter angle (15) for this adapter is approximately 110-degrees, as shown in FIGS. 32-43.

[0117] The cylindrical wheel (18) is the cylinder, roller, wheel, or the like, that is set or affixed to the inside of the adapter body (9) of the Bristled Wheel Adapter, and near the suction intake orifice (8), to allow rotation about one axis. The cylindrical wheel (18) may be solid, or may in some embodiments be hollow, as a result of injection-molded manufacturing. The cylindrical wheel (18) may in some embodiments have a centrally located axle (20) along the length of the cylindrical wheel (18), and each of the two ends of said axle (20) may fit into an axle port (21), as shown in FIG. 24. A preferred embodiment would have a centrally located convex dimple (22) located on each flat surface of the cylindrical wheel (18), and said convex dimples would each matedly fit into a dimple port (23) located on opposite sides of the portion of the adapter body (9) that is housing said cylindrical wheel (18). This preferred embodiment allows for the easy manual removal of the cylindrical wheel (18) for cleaning or replacement, and the easy snapping of the cylindrical wheel (18) into position. A modified embodiment may have a concave dimple, rather than the convex dimple (22), which would thereby matedly fit onto a convex dimple port, rather than a concave dimple port (23), located on opposite sides of the portion of the adapter body (9) housing the cylindrical wheel (18).

[0118] The bristles (19) are the bristles, wires, prongs, or the like, that are located on the curved surface of the cylindrical wheel (18), such that said bristles (19) are protruding from the curved surface area of said cylindrical wheel (18) at approximately right angles to said surface, as shown in FIGS. 13-16, 18, and 22-24. The bristles (19) may be elongated cylindrical in shape, or may be frusto-conical in shape, with the narrowest portion of said frusto-conical shape located at the terminal end, farthest from the curved surface of said cylindrical wheel (18), to allow for the easy suction removal of hair, fur and debris from said bristles (19). This disclosed shape for the bristles (19) is to optimally allow for the picking up of hair and animal fur, and to further allow for the removal of said hair and fur from the bristles (19), with the suction action emanating from the nearby suction intake orifice (8). This disclosed shape for the bristles (19) also optimally loosens debris from the cleaning surface, without damaging said surface. The arrangement of the bristles (19) may be in a set of parallel lines or in a set of spiraling lines, or in another desired arrangement, which may vary according to intended application of the Bristled

Brush Adapter. Typically, a spiral or helical arrangement of bristles (19) on the cylindrical wheel (18) is optimal for loosening and cleaning debris from a surface. The bristles (19) may be composed essentially of a metal, alloy, composite, natural organic, polymeric or elastomeric material. The preferred length of the bristles (19) is between 0.5 and 2.5 millimeters, and the preferred thickness is between 0.2 and 0.9 millimeters. For delicate furnishings and rugs, the shorter lengths and smaller thickness are preferred, to afford optimal protection to the textile or fabric.

[0119] The wheel axle (20) is the axle, pin, or the like, used in embodiments of the Bristled Wheel Adapter that utilizes a wheel axle (20) for the rotation of the cylindrical wheel (18), as shown in FIG. 24.

[0120] The axle port (21) is the port or the like, that is located on the cylindrical wheel (18), as shown in FIG. 24, and is intended to receive and enable each of the two ends of the wheel axle (20) to fit into the two concave dimple ports (23), located on the adapter body (9), thereby allowing the cylindrical wheel (18) to rotate about its central axis.

[0121] The convex dimple (22) is the dimple, protrusion, or the like, centrally located on each end and typically flat surface of the cylindrical wheel (18), and said convex dimples (22) would each matedly fit into a concave dimple port (23) located on opposite sides of the portion of the adapter body (9) housing said cylindrical wheel (18). Some modified embodiments may alternatively utilize concave dimples and convex dimple ports.

[0122] The concave dimple port (23) is the concave port, pit, hole, or the like, that is located on opposite sides of the portion of the adapter body (9) housing said cylindrical wheel (18), and as shown in FIG. 20. Some modified embodiments of the Bristled Wheel Adapter may alternatively utilize concave dimples that matedly fit onto convex dimple ports.

[0123] The reversible cylindrical body (24) is the substantially tubular, and cylindrical central region of the Reversible Double Ended Adapter, and this reversible cylindrical body (24) is hollow or has a channel therein, to allow the negative pressure or vacuum circuit to communicate with the suction intake orifice (8). The reversible cylindrical body (24) may also function as a convenient grip or handle for the adapter. There is a different vacuum cleaner attachment or adapter located or affixed at each end of the reversible cylindrical body (24), as shown, e.g., in FIGS. 1-12.

[0124] The dual use port orifice (25) is the portion of each of the two adapter bodies (9) located on each end of the Reversible Double Ended Adapter, that may function as either a suction intake orifice (8) or as a hose fitting port (6), depending upon its orientation on the vacuum circuit. If the dual use port orifice (25) is at the terminal end of the vacuum circuit, it (25) functions as a suction intake orifice (8), and alternatively, if the dual use port orifice (25) is directly connected to a hose fitting (2), it (25) functions as a hose fitting port (6).

[0125] The screen (26) is the screen, net, filter, mesh, or the like that mates with or fits onto or into a screen fitting (27), extension fitting (3), or hose fitting (1), as shown in FIG. 69. The screen (26) optimally is a mesh of intertwined or interlaced wires or the like, with one array of equidistant and parallel wires or the like being approximately perpen-

dicular to a second array of parallel wires or the like, as shown in FIGS. 68-69. Some embodiments of the screen (26) mesh may utilize another lattice network design in the arrangement of said mesh. The gauge of said wires, threads, or the like are optimally similar to that gauge used in home window screens, and but the space between any two parallel wires is optimally greater than is found on home window screens, and is approximately 0.8 to 2.6 millimeters, thereby preventing the screen (26) from being frequently choked-off with lint, but still having the ability to retrieve coins, keys, jewelry, and the like.

[0126] The screen fitting (27) is the fitting, connector, extension fitting (3), or the like, which mates with a screen (26), an example of such mating being shown in FIG. 69. The screen (26) is optimally fit into the back end of said screen fitting (27) to allow a tight fit and to allow easy removal of trapped items, such as jewelry, coins, and keys. Some embodiments of the Article Retrieval Screen may utilize a multiple piece screen fitting (27), such that, e.g., the screen (26) fits into the interface between the two pieces (2 and 27), and over the tapered end of the tapered hose fitting (2), as shown in FIG. 69.

[0127] The flashlight housing (28) is the housing, case, or the like, that houses essentially the flashlight battery, circuitry, flashlight activation switch (29), and light bulb (30), and may have a plurality of flashlight attachment clips (31) or the like, attached or affixed thereon, so that the Flashlight Assembly may be temporarily attached to a vacuum cleaner handle, extension fitting (3), hose (1), or another convenient part of the vacuum cleaner or its attachments and adapters. A preferred embodiment of the flashlight housing (28), as shown in FIGS. 70-76, would have a concave bottom surface so that said housing (28) may matedly fit onto the outside curved surface of said vacuum cleaner handle, extension fitting (3), or hose (1).

[0128] The flashlight activation switch (29) is the switch, button, key, toggle, or the like, that is generally a two way switch, for "on" and for "off" mode, and such that "on" completes the electrical circuit in the flashlight, thereby causing electricity from the battery or battery pack to activate the light bulb (30).

[0129] The light bulb (30) is the light source for the Flashlight Assembly, and said light source may be one or more bulbs (30) that are incandescent, fluorescent, halogen, or a combination of such bulbs. In some specialized embodiments, the light source may be the terminal ends of a plurality of end-light fiber optic cables, thereby reducing the size of the Flashlight Assembly by eliminating the need for a battery or the electrical circuitry associated with the battery on the Flashlight Assembly. In this specialized fiber optic embodiment, the cables' light source is the primary light source, and not the light source, per se.

[0130] The flashlight attachment clips (31) are the clips, clamps, or the like, that are attached or affixed to the flashlight housing (28), and are utilized to temporarily attach or affix the Flashlight Assembly to a vacuum cleaner handle, extension fitting (3), hose (1), or vacuum cleaner attachment or adapter. A simple embodiment of the Flashlight Assembly would utilize two clips (31) with mirror image curvature. A preferred embodiment of the Flashlight Assembly would utilize four clips, as shown in FIGS. 70-76. The use of four clips (31) would minimize shifting of the Flashlight Assembly when in active use.

[0131] The reflector backing (32) is the optional reflector or mirrored backing surface for the light bulb (30) in the Flashlight Assembly, to affect a brighter illumination effect from said bulb (30) and focusing and reflection of the light from the bulb (30). The location for an optional reflector backing (32) is shown in FIGS. 70-71, 74, and 76.

[0132] The light pivot point (33) is the optional hinge, axle, pivot point, bearing or the like, that allows the light bulb (30) or the light bulb housing (34) on the Flashlight Assembly, to rotate about an axis and thereby direct light in a desired direction, as shown in FIG. 72.

[0133] The light bulb housing (34) is the optional case, housing, fitting, or the like, holding the one or more light bulbs (30) onto the flashlight housing (28), as shown in FIG. 72.

[0134] The battery access cover (35) is the cover, door, or the like, generally located on the rear side of the Flashlight Assembly, and covers the internal portion of the flashlight housing (28) holding the one or more batteries in position therein, and also functions to prevent said batteries from falling out of the Flashlight Assembly, when in active use.

DETAILED DESCRIPTION OF THE VARIOUS EMBODIMENTS OF THE INVENTION

[0135] The Vacuum Cleaner Adapter Set includes several related vacuum cleaner adapters, and the simple and preferred embodiments are disclosed for each of these related vacuum cleaner adapters, along with some modified and hybrid embodiments. The inventors, Jamie Diaz and Robert N. Schlesinger, intend this disclosure and its appended claims to be liberally construed and to embrace these various embodiments, as well as modifications, and embodiments with various additions, eliminations, replacements, or hybridizations, as one skilled in the art may construct.

[0136] Description of the Bristled Wheel Adapter

[0137] The Vacuum Cleaner Adapter Set invention includes a Bristled Wheel Adapter that may be fit onto a tapered hose fitting (2), an extension fitting (3), or the like. The Bristled Wheel Adapter is useful in that it may be used to more effectively pick-up hair and animal fur from rugs and carpets, and to loosen debris from a cleaning surface, thereby making the debris accessible for suction from the Bristled Wheel Adapter to the vacuum circuit of the vacuum cleaner.

[0138] A modified embodiment of the Bristled Wheel Adapter fits onto a tapered hose fitting (2), and is effectively an extension of the hose (1) and its vacuum circuit, with a cylindrical wheel (18) attached or affixed to the bottom surface of the adapter body (9). Said cylindrical wheel (18) has a centrally located wheel axle port (21) with a wheel axle (20) located therein. The two ends of wheel axle (20) are attached or affixed to the interior cavity of the bristled wheel adapter body (9) near the suction intake orifice (8), such that the cylindrical wheel (18) protrudes slightly from the bottom of the adapter body (9), as shown in FIG. 14. The cylindrical wheel (18) has a plurality of bristles (19) affixed to the wheel's (18) curved surface, and is attached to the adapter body (9). The bristles (19) may be composed essentially of a metal or alloy, such as aluminum or steel, or of a natural or synthetic organic, polymeric, elastomeric, or composite material, such as nylon, rubber, or the like. The bristles (19)

would optimally be of a gage or thickness or diameter similar to a thin wire, and between approximately 0.2 and 0.9 millimeters, and would optimally have a length between approximately 0.5 and 2.5 millimeters, depending upon the cleaning application. Generally, a shorter bristle length is preferred for the cleaning of furnishings and a longer bristle length is preferred for the cleaning of rugs or carpets. A preferred embodiment of the bristles (19) would have straight terminal ends, and would not have mushroomed or hooked terminal ends, as such ends would cause hair or fur to become affixed to the bristles (19), and such ends might also damage the upholstery or rug being cleaned. The Bristled Wheel Adapter is optimally composed essentially of a polymeric material such as plastic. The cylindrical wheel (18) may be comprised of a solid body or of a hollow body, thereby saving material and manufacturing cost, a generally hollow body is preferred.

[0139] A preferred embodiment of the bristled wheel adapter would have a centrally located convex dimple (22) located on each of the two flat surfaces of the cylindrical wheel (18), and said convex dimples (22) would each matedly fit into a dimple port (23) located on the opposite sides of the portion of the adapter body (9) that would mount and house said cylindrical wheel (18), as shown in FIGS. 13-23. This preferred embodiment is sized such that the cylindrical wheel (18) is located at terminal end of the vacuum circuit, and such that the fit does not completely seal the vacuum circuit, and the vacuum pressure acts on the on the surface of the unexposed portion of the cylindrical wheel (18) surface on the interior of the Bristled Wheel Adapter as it is rolled during use. The bristles (19) of this Adapter effectively picks-up the hairs and fur from a rug, carpet, or upholstery surface, and as the cylindrical wheel (18) rolls or turns, the exposure to the vacuum circuit removes the hair and fur from the bristles (19) by suction action.

[0140] A modified preferred embodiment may utilize concave dimples, rather than the convex dimples (22), which would matedly fit onto convex dimple ports, rather than a concave dimple ports (23), located on opposite sides of the portion of the adapter body (9) housing the cylindrical wheel (18).

[0141] In short, the Bristled Wheel Adapter may be comprised essentially of an adapter body (9) with a hose fitting port (6) located at one end of the adapter body (9), and a suction intake orifice (8) located near the opposite end of the adapter body (9). A cylindrical wheel (18), which has a plurality of bristles (19) attached to the curved outer surface of the cylindrical wheel (18), is attached into said adapter body (9), with said cylindrical wheel (18) located in front of the suction intake orifice (8) and at the terminal end of the adapter body (9). Some embodiments of the Bristled Wheel Adapter may also have a convex dimple or the like, located on each approximately circular side of the cylindrical wheel (18), and the adapter body (9) of these embodiments would have two dimple ports (23) positioned such that each of said two dimple ports (23) would matedly receive one of said two convex dimples, thereby attaching said cylindrical wheel to the adapter body. Some other embodiments of the Bristled Wheel Adapter may use an alternative cylindrical wheel (18) means or design, to that described in the previous sentence, and wherein the cylindrical wheel (18) has a centrally located channel running through its length, and an axle or the like, of a suitable dimension to fit through said centrally

located channel, and said axle will protrude from each of the two ends of the cylindrical wheel (18) a sufficient length to each matedly fit into one of two dimple ports (23) positioned on the adapter body (9), such that each of said two ends of the axle are matedly fit into said one of two dimple ports (23), thereby attaching the cylindrical wheel (18) to said adapter body (9).

[0142] Description of Narrow Clearance Adapters

[0143] The Vacuum Cleaner Adapter Set includes a group of narrow clearance adapters, which may be attached to a tapered hose fitting (2), extension fitting (3), or the like. The Narrow Clearance Adapters disclosed herein include the general limited clearance adapters, low clearance adapters, and high clearance adapters. Each of these narrow clearance adapter embodiments includes linear, angled, and flexible variations of the general limited clearance adapters, the low clearance adapters, and the high clearance adapters. Further variations of the narrow clearance adapters include a multi-purpose flexible limited clearance adapter, a right angle adapter, and a flexible tip adapter.

[0144] The Vacuum Cleaner Adapter Set's general limited clearance adapter may fit onto the tapered hose fitting (2) or the tapered end of an extension fitting (3). The general limited clearance adapter is useful in that it may be used to effectively clean low clearance areas, as well as high clearance areas, and with as little clearance as approximately one inch. An advantage to using this adapter over the more specialized low clearance and high clearance adapters described below, include the convenience of not having to change adapters, when the user alternates between cleaning a low clearance area and a high clearance area. A preferred embodiment of the general limited clearance adapter has a hose fitting port (6) located on the cylindrical portion of the adapter body (9), and has a suction intake orifice (8) located near the opposite terminal end, which is generally the flattened end of the adapter body (9). The flattened body taper (10) of the flattened adapter body (9) is generally located a few inches from the hose fitting port (6), and the centrally located taper (10) generally tapers toward a center or diameter line in a section of the cylindrical portion of the adapter body (9). The suction intake orifice (8) is located on one of the two flat sides, hereinafter referred to as the bottom side, and said suction intake orifice (8) is located near the terminal end of the adapter body (9), as shown in FIGS. 25-28. The suction intake orifice (8) is preferred to be rectangular in shape, and with a surface area smaller or approximately equal to the surface area of the hose fitting port (6). Some modified embodiments of the general limited clearance adapter may have a runner or set of adapter body nipples (13) located near two opposite sides of the suction intake orifice's (8) rear vertices, as shown in FIGS. 25-28. These adapter body nipples (13) function to slightly elevate the terminal end of the adapter body (9), such that the suction intake orifice (8) is slightly elevated, and to make the cleaning movements easier for the user.

[0145] The set of specialized narrow clearance adapters may be bent or angled, or they may be non-angled. The non-angled narrow clearance adapters that have dual application as a low clearance, as well as a high clearance adapter, and are entitled the general limited clearance adapters, are disclosed above. The non-angled narrow clearance adapters that have a specialized primary application include a non-

angled low clearance adapter, wherein the adapter body taper (10) is located on the top side of the adapter body (9), as shown in FIGS. 44-46. The non-angled narrow clearance adapters that have a specialized primary application include a non-angled high clearance adapter, wherein the adapter body taper (10) is located on the bottom side of the adapter body (9), as shown in FIGS. 29-31.

[0146] The set of specialized narrow clearance adapters may be bent or angled near the hose fitting port (6), with a bend angle (4) or the like (14, 15), to form limited clearance adapters, which may be sub-classified as low clearance adapters and high clearance adapters. This optional bend angle (4) or the like (14, 15) may be located on the cylindrical region of the adapter body (9), on the flattened region, or on a tapered region. The preferred bend angle (4) for these angled limited clearance adapters is approximately 110-degrees to approximately 120-degrees, but the bend angle (4) may vary depending upon the needs and ergonomics of the application. The bend angles (4) may be more specifically identified as the low clearance adapter angle (14) and the high clearance adapter angle (15), for the low clearance adapters and the high clearance adapters respectively. The low clearance adapters have a suction intake orifice (8) on their bottom side and the high clearance adapters also have their suction intake orifice (8) on their bottom side, as shown in FIGS. 44-58, and FIGS. 29-43, respectively. The suction intake orifice (8) is preferred to be rectangular, although other orifice (8) geometries are viable, depending upon application. These angled low and high clearance adapters are useful because they may be used to effectively clean low clearance and high clearance areas, respectively, while the user is in the standing position, when used with one or more extension fittings (3). The various embodiments of the angled limited clearance adapters may have a runner or a plurality of adapter body nipples (13) located on the bottom surface of the flattened adapter body (9), with one or more nipples (13) located near each of two opposite sides of the suction intake orifice's (8) rear vertices, as shown in FIGS. 32-58.

[0147] A modified embodiment of the general limited clearance adapter has an adapter body flex region (11) along its adapter body (9), so that the user may bend the adapter body (9) to a desired angle for special cleaning applications, and may then bend the flex region (11) to another desired angle for storage or another cleaning application. The flex region (11) may be elastic with or without memory, and may or may not be corrugated. This flex region (11) is optimally located in the flattened region of the adapter body (9), and close to the end with the tapered hose fitting port (6). This modified embodiment of the limited clearance adapter may emulate an angled low clearance adapter or an angled high clearance adapter, depending upon how one bends the adapter's bend angle (4).

[0148] The Vacuum Cleaner Adapter Set's low clearance adapter may fit onto the tapered hose fitting (2) of a vacuum cleaner hose (1) or the tapered end of an extension fitting (3). The low clearance adapter is useful because it may be used to effectively clean under furnishings, slightly elevated bookshelves, and the like, which have a low clearance, such as a one inch clearance from the floor. The low clearance adapter embodiments have a hose fitting port (6) located on the cylindrical portion of adapter body (9), and a suction intake orifice (8) located near the opposite and generally

flattened end of the adapter body (9). The body taper (10) is generally located a few inches from the hose fitting port (6), and may be located on the top side or the bottom side of the adapter body (9), depending upon the embodiment. The suction intake orifice (8) is preferred to be a rectangular shape, and with a surface area smaller or approximately equal to the surface area of the hose fitting port (6). Some embodiments, including the preferred embodiments, of the low clearance adapter may further have a runner or a plurality of adapter body nipples (13), located near the suction intake orifice's (8) rear vertices. The function of the adapter body nipples (13) is to slightly elevate the adapter body (9), such that the suction intake orifice (8) will avoid a suction coupling of the adapter to the cleaning surface, and to make the user's cleaning movements of the low clearance adapter easier. The low clearance adapters also have a specialized application in cleaning high clearance areas, such as cleaning the ceiling near the top of high clearance bookshelves, refrigerators, and furnishings, which are very close to the ceiling. The high clearance adapter, further disclosed below, is designed especially for cleaning the top of these high clearance areas, whereas the low clearance adapters, and particularly the angled low clearance adapters, may be used for cleaning the bottom of high clearance objects, such as a ceiling.

[0149] The Vacuum Cleaner Adapter Set's high clearance adapter may fit onto the tapered hose fitting (2) of a vacuum cleaner hose (1) or the tapered end of an extension fitting (3). The high clearance adapter is useful because it may be used to effectively clean the top of bookshelves, refrigerators, cabinets, and the like, which have a high clearance, such as a one inch clearance from the ceiling or niche. The high clearance adapter embodiments have a hose fitting port (6) located on the cylindrical portion of adapter body (9), and a suction intake orifice (8) located near the opposite and generally flattened end of the adapter body (9). The body taper (10) is generally located a few inches from the hose fitting port (6), and may be located on the top side or the bottom side of the adapter body (9), depending upon the embodiment. The suction intake orifice (8) is preferred to be a rectangular shape, and with a surface area smaller or approximately equal to the surface area of the hose fitting port (6). Some embodiments, including the preferred embodiments, of the high clearance adapter may further have a runner or a plurality of adapter body nipples (13), located near the suction intake orifice's (8) rear vertices. The function of the adapter body nipples (13) is to slightly elevate the adapter body (9), such that the suction intake orifice (8) will avoid a suction coupling of the adapter to the cleaning surface, and to make the user's cleaning movements of the high clearance adapter easier. The angled high clearance adapters are useful in that they may be used to effectively clean the top of furnishings, bookshelves, refrigerators, and the like, which have a high clearance, such as approximately one inch from the ceiling, and while the user is in the standing position, and the user need not use a chair or ladder to use the adapter, particularly when one or more extension fittings (3) are attached between the tapered hose fitting (2) and the angled high clearance adapter. The high clearance adapters also have a specialized application in cleaning the bottom of equipment and furnishings and in cleaning low clearance areas, such as cleaning the bottom of certain low clearance furnishings, such as the bottom of a sofa or chairs, bookshelves elevated in part an inch off the

floor, refrigerators and equipment that may be slightly elevated in part off the floor, and the like, which are very close to the floor. This limited clearance adapter is effective for cleaning a great variety of limited clearance areas, and may have additional application in cleanrooms, and other areas where even the bottom of low clearance furnishings and equipment must be cleaned and no appropriate cleaning equipment exists heretofore.

[0150] There are two viable variations for each of the three embodiments of the body tapers (10), for these two specialized limited clearance adapters, the high clearance adapter and the low clearance adapter. One of these embodiments has the body taper (10) located on the top side of the adapter body (9), as shown in FIGS. 32-34 and FIGS. 35-37, respectively showing the two variations of the embodiment for the high clearance adapter, and as shown in FIGS. 47-49 showing the variation of the embodiment for the low clearance adapter. The second of these embodiments has the body taper (10) tapering toward the center line of the adapter body (9), as shown in FIGS. 38-40 and FIGS. 41-43, respectively showing the two variations of the embodiment for the high clearance adapter, and as shown in FIGS. 53-55 and FIGS. 56-58, respectively showing the two variations of the embodiment for the low clearance adapter. A third embodiment of the body taper (10) is possible, and has the body taper (10) located on the top surface of the adapter body (9), as shown in FIGS. 47-49, showing the variation of the low clearance adapter, but this embodiment does not have the depth range at high clearance that are possible with the two variations shown in FIGS. 50-52 and 56-58. In short, the Narrow Clearance Adapters may be comprised essentially of a channeled adapter body (9) that has a hose fitting port (9) located on one end of said adapter body (9), and has a suction intake orifice located near the opposite end of the adapter body (9), with said channeled adapter body being cylindrical or substantially tubular on one end, and has a taper into a substantially flattened region for the remainder of the length of the channeled adapter body (9), and with said suction intake orifice located on one side of said substantially flattened region, and near the terminal end of the channeled adapter body (9). Some embodiments may have a plurality of nipples, ribs, or the like, located on a plurality of the sides of the suction intake orifice (8). Some embodiments may also have a rake or the like located between the terminal end of the channeled adapter body (9) and the suction intake orifice (8). The taper 0 located along the adapter body (9) may be located along one side of the adapter body (9), or may be located along two opposite sides of the adapter body (9). The substantially tubular channeled adapter body (9) may be substantially straight in some embodiments, and may be bent at an angle in other embodiments of the Narrow Clearance Adapter. The channeled adapter body (9) of any of the above disclosed Narrow Clearance Adapters may be bent at an angle such that the suction intake orifice (8) is located on the opposite side of the substantially flattened region that is farthest from the hose fitting port (6), or may alternatively be bent at an angle such that the suction intake orifice (8) is located on the opposite side of the substantially flattened region that is closest to the hose fitting port (6).

[0151] The Vacuum Cleaner Adapter Set's right angle adapter may fit onto the tapered hose fitting (2) of a vacuum cleaner hose (1) or onto an extension fitting (3). The right angle adapter is useful in effectively cleaning behind fur-

nishings, bookshelves, refrigerators, and the like, which have a close wall clearance, such as two inches from the wall, and allows the user to access the narrow clearance area, from the right side or the left side, using the same adapter device. This right angle adapter may be used while the user is in the standing position, when used with one or more extension fittings (3). A simple embodiment of the right angle adapter has a hose fitting port (6), on each end of the angled cylindrical adapter body (9). Either end of said angled cylindrical adapter body (9) may receive a tapered hose fitting (2) end of a vacuum cleaner hose (1) or an extension fitting (3), the other end of said adapter body (9) then functions as the suction intake orifice (8). A preferred embodiment of the right angle adapter has each of the two ends of this right angle adapter terminating with an angled section, as shown in FIGS. 59-62. These angled sections are optimally approximately 45-degrees, and the section on each end is a mirror image of each other, such that one end has a 45-degree angle or slope in one direction, and the other end has a 45-degree angle or slope in the opposite direction, as shown in said FIGS. The 90-degree angle or bend on the adapter body is optimally located at or near the center of the length of the adapter body (9), as shown in FIGS. 59-62, and the length of the adapter body (9) may vary according to the ergonomics, applications, and needs, so as to allow the user deeper access behind narrow clearance furnishings and equipment. A typical total length for the adapter body (9) may be four feet long, with the bend angle (4) located near the middle of said length. The advantages of having terminal ends of the adapter body (9) with mirror imaged 45-degree angles or slopes, as shown in FIGS. 59-62, is that the right angle adapter may be used to clean behind a furnishing, such as a bookshelf, on the user's left side, using the terminal end with an angle or slope that will most closely be parallel to the floor, as the suction intake orifice (8). When the user is cleaning behind a furnishing, such as a bookshelf, on their right side, the opposite end of the adapter body (9) would optimally be used as the suction intake orifice (8).

[0152] The Vacuum Cleaner Adapter Set's right angle fitting may be fit onto the tapered hose fitting (2) of a vacuum cleaner hose (1) or an extension fitting (3). The right angle fitting is useful because it may be used to simplify and broaden the applications of some of the above-disclosed embodiments of the Vacuum Cleaner Attachment Set. Another advantage of the right angle fitting is to simplify the tooling and molding of the vacuum cleaner pieces, attachments, and adapters, thereby making the parts less expensive to manufacture. The right angle fitting is shaped like a bent cylinder, with one selected end functioning as a tapered hose fitting (2) and the other end functioning as a non-tapered hose fitting port (6). Typically a vacuum cleaner attachment or adapter is attached to the hose fitting port (6). The right angle fitting is permanently bent at an angle of approximately 90-degrees, but said angle may vary by 15-degrees, and this bend angle (4) is optimally located at or near the middle of the adapter body (9), as shown in FIGS. 63 and 64. This embodiment may be distinguished from the simple embodiment of the right angle adapter by the length of the device, the right angle adapter being longer in length than the right angle fitting.

[0153] In short, the Right Angle Adapter may be comprised essentially of a channeled adapter body (9) with a bend along the longitudinal length of said adapter body (9), and with the bend being at approximately 90-degrees. Some

embodiments of the Right Angle Adapter may further have one or both terminal ends with an angled section, and in the embodiments with two angled terminal ends, said terminal ends' angled sections may be mirror images of each other, and may be positioned such that the two angles face at approximately 90-degrees rotated about the channeled adapter body's central axis, from said approximately 90-degree bend.

[0154] The Vacuum Cleaner Adapter's flexible angle fitting may be fit onto the tapered hose fitting (2) of a vacuum cleaner hose (1) or an extension fitting (3). The flexible angle fitting is useful in that it may be used to simplify and broaden the applications of the above-disclosed embodiments of the Vacuum Cleaner Attachment Set. Another advantage of the flexible angle fitting is to simplify the tooling and molding of the pieces, thereby making the parts less expensive to manufacture. The flexible angle fitting is typically shaped like a cylinder with an adapter body flex region (11) located midway along the length of the adapter body (9). One selected end of the flexible angle fitting functions as a hose fitting (2) and the other end functions as a hose fitting port (6). Typically a vacuum cleaner attachment or adapter is attached to the hose fitting port (6) of the flexible angle fitting. The flexible angle fitting has a flex region (11) that is corrugated, ribbed, or made of a flexible elastomeric or flexible composite material that may retain its bend angle (4), until bent into another bend angle (4). The user will typically bend or flex the adapter body (9) such that the angle from the center point flex region (11) is approximately 110-degrees, but said bend angle (4) may vary and be adjusted to any angle desired by the user.

[0155] Description of a Flexible Tip Adapter

[0156] The Vacuum Cleaner Adapter Set includes a Flexible Tip Adapter that may be fit onto a tapered hose fitting (2) or the like. The Flexible Tip Adapter is useful in cleaning difficult to access cracks and crevices, and other areas where rigid and fixed adapters or attachments cannot readily access, such as those found in car interiors, and the interfaces between components of a system, such as a stereo system or a computer system, and between closely arranged furnishings or appliances. The Flexible Tip Adapter has a cylindrical hose fitting port (6) that fits onto a tapered hose fitting (2) or the like, and has a generally flattened terminal end, with an adapter flex region (11), as shown in FIG. 67. The flattened body taper (10) between the hose fitting port (6) and the flattened adapter body (9) is optimally located near the hose fitting port (6). The Flexible Tip Adapter has a generally flattened adapter body (9) with the suction intake orifice (8) located at or near the terminal end, an example shown in FIGS. 65-67. The flattened part of the adapter body (9) or alternatively, a portion of said flattened part and the tip region, generally containing the suction intake orifice (8), is comprised essentially of a flexible or elastomeric material such as rubber, so that the user may temporarily bend, insert, or work the suction intake orifice (8) into the desired position in a crack, crevice, or other difficult-to-access area. The flexibility or elasticity of the flex region (11) should be greater than the flexibility utilized in the above-disclosed flexible adapters, and after each use, the Flexible Tip Adapter would therefore revert to its original shape, as shown in FIGS. 65-67.

[0157] In short, the flexible tip adapter may be comprised essentially of a channeled adapter body (9) that has a hose

fitting port (6) on one end of said adapter body (9), and has a suction intake orifice (8) located on the opposite end of the adapter body (9), and said channeled adapter body (9) is substantially tubular and is substantially cylindrical or circularly tubular on one end and tapers into a substantially flattened tip along its length to the opposite end, where said suction intake orifice (8) is located. A flexible portion of said substantially flattened tip, which may be composed essentially of a elastomeric material, such as a flexible polymeric or composite material, allows the user to insert said tip into narrow and irregular passages.

[0158] Description of the Reversible Double Ended Adapters

[0159] The Vacuum Cleaner Adapter Set includes a set of Reversible Double Ended Adapters, which may be attached to the tapered hose fitting (2) of a vacuum cleaner hose (1) or an extension fitting (3), or the like. These Reversible Double Ended Adapter embodiments are comprised of a generally reversible, hollow or channeled cylindrical body (24), with a vacuum cleaner attachment or adapter attached, affixed, or located on each of the two ends of said reversible cylindrical body (24). Each of the two ends of the adapter body would have a different vacuum cleaner attachment or adapter attached or affixed thereto, and the opening at each end of the reversible cylindrical body (24) may optionally be utilized as either a hose fitting port (6) or a suction intake orifice (8), depending upon the end selected for use as a suction intake orifice (8), the opposite opening end being used as the hose fitting port (6). One of said two openings would function as a hose fitting port (6) if it is attached to a vacuum cleaner hose (1) or extension fitting (3), while the opening located on the other end of the reversible cylindrical body (24) would thereby function as the suction intake orifice (8) for the vacuum cleaner attachment or adapter body type attached or affixed to the terminal end with the suction intake orifice (8). Either opening end of the Reversible Double Ended Adapter may be fit onto the tapered hose fitting (2) of a vacuum cleaner hose (1) or an extension fitting (3). The Reversible Double Ended Adapter is useful because it may be used to simplify and broaden the applications of the above-disclosed embodiments of the Vacuum Cleaner Adapter Set. Another advantage of the Reversible Double Ended Adapter is to have two different terminal end adapters or attachments on one reversible piece, thereby making the Reversible Double Ended Adapter more convenient to store and easier to use, when switching cleaning applications from one terminal end adapter to the other terminal end adapter. A preferred embodiment of the Reversible Double Ended Adapter has a reversible cylindrical body (24), with one vacuum cleaner attachment or adapter located on each end of the reversible cylindrical body (24). There are different vacuum cleaner attachments or adapters located on each end of said reversible cylindrical body (24), and the adapter at each said end has an opening located thereon, which when in use causes a fluidic communication, i.e., a partial vacuum suction, from the hose fitting port (6) located on one end of the Reversible Double Ended Adapter, through the suction channel (7), and to the suction intake orifice (8) located on the opposite end of said Adapter. The adapter suction channel (7) allows the fluidic communication between the hose fitting port (6) located on one end of the cylindrical body (24) and the suction intake orifice (8) located on the opposite end of this reversible and hollow cylindrical body (24). A preferred embodiment of the

Reversible Double Ended Adapter would have a modified rectangular terminal adapter located or affixed on one end, and would have a modified corner terminal adapter located or affixed at the opposite end of the Reversible Double Ended Adapter, as shown in FIGS. 1-7. The modified rectangular terminal adapter is novel because it is part of a Reversible Double Ended Adapter, with an adapter suction channel (7) connecting a hose fitting port (6) and a suction intake orifice (8), and because there is another vacuum cleaner attachment or adapter located, attached, or affixed to the Reversible Double Ended Adapter's opposite end. The modified corner terminal adapter is novel because it is part of a Reversible Double Ended Adapter, with an adapter suction channel (7) connecting a hose fitting port (6) and a suction intake orifice (8), and because it is a new and useful means of vacuum cleaning a corner area, with an adapter, attachment, or fitting, that was designed by the present inventors to easily and conveniently fit into a corner area and effectively use the suction pressure to clean the corner area.

[0160] Another example embodiment of the Reversible Double Ended Adapter has a modified corner terminal adapter located, attached or affixed at one end of the reversible cylindrical body (24), and would have modified brush terminal adapter located, attached or affixed at the opposite end of the reversible cylindrical body (24), as shown in FIGS. 8-12. The modified brush terminal adapter is novel because it is part of a Reversible Double Ended Adapter, with an adapter suction channel (7) connecting a hose fitting port (6) and a suction intake orifice (8), and because there is another vacuum cleaner attachment or adapter located, attached or affixed to the Reversible Double Ended Adapter's opposite end.

[0161] In short, a Reversible Double Ended Adapter may be comprised essentially of a substantially tubular or reversible cylindrical body (24) with two open ends, a first open end and a second open end, and a channel or the like connecting said first channel with said second open end. A first vacuum cleaner adapter is an integral part of and is affixed to the first open end of the cylindrical body (24), and a second vacuum cleaner adapter is an integral part of and is affixed to the second open end of the cylindrical body (24). The first vacuum cleaner adapter has the first open end of the cylindrical body (24), located near the vacuum cleaner's terminal end, and said first open end has dual utility, either as a hose fitting port (6) or as a suction intake orifice (8). The second vacuum cleaner adapter has the second open end of the cylindrical body (24), located near the second vacuum cleaner adapter's terminal end, and said second open end has dual utility, either as a hose fitting port (6) or as a suction intake orifice (8).

[0162] Description of the Article Retrieval Screen

[0163] The Vacuum Cleaner Adapter Set includes a set of embodiments for an Article Retrieval Screen, which may be attached to the interface between any two of the following: either end of an extension fitting (3); either end of a second extension fitting (3); a hose fitting port (6) located on a vacuum cleaner attachment or adapter body (9); or a tapered hose fitting (2) which is the terminal end of the vacuum cleaner hose (1). The Article Retrieval Screen may, e.g., be fit between a tapered hose fitting (2) and the hose fitting port (6) of an adapter body (9) or may, e.g., be fit between a tapered hose fitting (2) and an extension fitting (3). The

simple embodiment of the Article Retrieval Screen would be comprised essentially of a shaped or molded screen (26) fit, affixed, or attached over the tapered hose fitting (2) or the tapered end of an extension fitting (3), screen fitting (27), or the like, thereby allowing the fitting (2, 3, or 27) with the screen (26) attached thereon, to fit snugly into the hose fitting port (6) of a terminal adapter, attachment, extension fitting (3), or the like (6), and thereby be secured therein. Modified embodiments of the Article Retrieval Screen may utilize a ring or the like to aid in the alignment of the screen (26) and to affect additional support for the screen (26), when it is fit over a tapered hose fitting (2). The second simple embodiment is comprised essentially of a screen (26) attached or affixed over a tapered hose fitting (2), and with said tapered hose fitting (2) with the screen affixed thereon, fit snugly into the hose fitting port (6) of an extension fitting (3), screen fitting (27), or a vacuum cleaner adapter or attachment, as shown in FIGS. 68 and 69. The utility of the screen fitting (27) shown in FIGS. 68 and 69 is that when the vacuum cleaner is shut off, large articles, such as keys, coins, and jewelry, that are retrieved by the screen (26), may simply fall out of the vacuum circuit and through its terminal end, due to the loss of vacuum pressure along the suction channel (7), or alternatively, once the narrower hose fitting end (2) of the screen fitting (27) is removed from its mated connection, said large articles that are retrieved by the screen (26) are trapped and stored in the screen fitting (27), and are easily removed from the screen fitting (27) area. The removal of trapped items from the screen fitting (27) may often be made by simply inverting the screen fitting (27) so that the open end is in the down position, thereby allowing the items to fall out of the screen fitting (27) trap. The screen (26) may be glued or affixed to one end, and preferably the port end, of the screen fitting (27). The gauge of the screen's (26) treads or wire may vary according to the vacuum cleaning applications, but the preferred one half of the gauge used in the window screens typically used in the window screens and the screens used in the doors of homes. The porosity of the screen (26) may vary, according to the cleaning applications, but a preferred porosity may, e.g., only retain objects greater than or equal to approximately 0.6 square or cubic centimeter. The surface of the screen (26) exposed to the suction intake orifice (8) may be flat, concave, convex, or a combination thereof, with a generally flat embodiment being preferred. The screen (26) utilized in these embodiments may be composed essentially of a metal or alloy, or may be composed essentially of a polymeric material, a composite material, or a fabric material. A metallic screen (26) composed essentially of steel is a preferred composition for dry vacuum cleaners, and a polymeric plastic screen (26) is the preferred composition for wet/dry vacuum cleaners and some dry vacuum cleaners.

[0164] In short, an Article Retrieval Screen may, for example, be comprised essentially of a screen (26) manufactured to cover the terminal end of a tapered hose fitting of a vacuum cleaning device, and in some embodiments of said Article Retrieval Screen, the screen (26) may be matedly attached to one end of a screen fitting (27), said screen fitting (27) manufactured to matedly fit its terminal end into a hose fitting port (6) of a vacuum cleaning device.

[0165] Description of the Flashlight Assembly Adapter

[0166] The Vacuum Cleaner Adapter Set includes a Flashlight Assembly, which may be attached to the vacuum

cleaner, the hose (1), and extension fitting (3), or a vacuum cleaner attachment or adapter. The Flashlight Assembly is comprised essentially of a flashlight housing (28) containing one or more batteries or a battery pack, electrically connected with electrical circuitry to one or more light bulbs (30), and a flashlight activation switch (29), which opens and closes said electrical circuitry. The flashlight housing (28) for this Flashlight Assembly has the light bulb (30) located on the front side of said flashlight housing (28), with said light bulb (30) preferred to be housed in a light bulb housing (34), attached to the flashlight housing (28). The light bulb housing (34) would optimally have a pivot point (33), hinge, bearing, or the like at the interface between the portion of said flashlight housing (28) containing the battery and the portion of the light bulb housing (34) containing the light bulb (30). The light bulb housing (34) containing the light bulb (30) may be rotated about the pivot point (33), hinge, bearing, or the like, thereby controlling the direction of the light emanating from the light bulb (30), as shown in FIGS. 70-76. There may additionally be an optional reflector backing (32) behind the light bulb (30) and on the inside wall or a portion thereof, of the light bulb housing (34), to enhance and increase the lumens reflected in the desired direction by the illuminated light bulb (30). This embodiment would allow the user to focus or direct the light emanating from the light bulb (30), as shown in FIG. 72. Throughout this specification and its appended claims, the term light bulb (30) is intended to also mean light source or a plurality of light bulbs (30) or end-light fiber optic cable ends. The flashlight housing (28) may have a plurality of flashlight attachment clips (31), clamps, or the like, located on the rear side, as shown in FIGS. 70-76. These clips (31) are intended for temporarily attaching the battery-operated Flashlight Assembly to the handle bar of a vacuum cleaner, or to another part of the vacuum cleaner, such as the hose (1), a hose fitting, an extension fitting (3), a vacuum cleaner attachment or adapter, or the cylindrical body of an adapter, to affect better lighting, or for use with vacuum cleaners that do not have a light or illumination means for the area to be cleaned. A preferred embodiment of this Flashlight Assembly would have a concave bottom side, as shown in FIGS. 70-76, and preferred embodiments of the clips (31) would be composed essentially of a durable plastic or a metal or alloy. A preferred embodiment of the Flashlight Assembly would utilize two pairs of clips (31) to provide better security and stability for the Flashlight Assembly. A specialized embodiment of the Flashlight Assembly would utilize fiber optic means to illuminate the area to be cleaned, and such a specialized embodiment may have a terminal and illuminated end with a greatly reduced size, for applications in small and delicate areas.

[0167] In short, a Flashlight Assembly Adapter may, for example, be comprised essentially of a flashlight housing (28), containing a battery port (35) that is electrically connected, using electrical circuitry, to a light bulb receptacle with a light bulb (30) affixed therein. The electrical circuitry has a flashlight activation switch (29), which when manually activated, would close a portion of the electrical circuitry at said flashlight activation switch (29). The flashlight housing (28) has a plurality of clips (31) or the like protruding therefrom, to allow the user to attach the Flashlight Assembly to a desired part of a vacuum cleaning device, such as an extension fitting or vacuum cleaner hose, or another part where the Flashlight Assembly may matedly

onto it. Preferred embodiments of the Flashlight Assembly may further be comprised essentially of a light bulb housing (34) containing the one or more light bulb receptacles and their respective light bulbs (30), and such that said light bulb housing has a pivot point or pivot axis of rotation, located at the interface between the light bulb housing (34) and the flashlight housing (28), with said pivot point or pivot axis of rotation, enabling the light bulb housing (34) to rotate about the pivot point or pivot axis of rotation.

[0168] While we have shown and described in this disclosure and its appended drawing figures, and which are a part of and incorporated in said disclosure, only selected embodiments in accordance with the present invention, it is understood that the same is not limited thereto, but is susceptible to numerous changes and modifications as known to one having ordinary skill in the art, and we therefore do not wish to be limited to the details shown and described herein, but intend to cover all such modifications, changes, eliminations, and hybrids, as are encompassed by the scope of the appended claims.

We claim:

1. A Reversible Double Ended Vacuum Cleaner Adapter, comprised essentially of:

- a. a channeled reversible cylindrical body with two open ends, a first open end and a second open end, and a channel connecting said first open end with said second open end;
- b. a first vacuum cleaner adapter is an integral part of and is affixed on the first open end of said cylindrical body;
- c. a second vacuum cleaner adapter is an integral part of and is affixed on the second open end of the cylindrical body;
- d. said first vacuum cleaner adapter has said first open end of said cylindrical body, located near the first vacuum cleaner adapter's terminal end, and the first open end has dual utility, as either a hose fitting port or as a suction intake orifice; and
- e. said second vacuum cleaner adapter has said second open end of the cylindrical body, located near the second vacuum cleaner adapter's terminal end, and the second open end has dual utility, as either a hose fitting port or as a suction intake orifice;

2. A Reversible Double Ended Vacuum Cleaner Adapter, as recited in claim 1, and further comprised essentially of:

- a. said first vacuum cleaner adapter is a modified rectangular terminal adapter; and
- b. said second vacuum cleaner adapter is a modified corner terminal adapter.

3. A Bristled Wheel Adapter, comprised essentially of:

- a. an adapter body with a hose fitting port located on one end of said adapter body, and a suction intake orifice located near the opposite end of the adapter body;
- b. a cylindrical wheel attached into said adapter body, with said cylindrical wheel located in front of said suction intake orifice and at the terminal end of said adapter body; and
- c. a plurality of bristles affixed to the curved surface of the cylindrical wheel.

4. A Bristled Wheel Adapter, as recited in claim 3, and further comprised essentially of:

- a. said cylindrical wheel has a convex dimple located on each approximately circular side of the cylindrical wheel; and
- b. the adapter body has two dimple ports positioned such that each of said two dimple ports would matedly receive one of said two convex dimples, thereby attaching said cylindrical wheel to said adapter body.

5. A Bristled Wheel Adapter, as recited in claim 3, and further comprised essentially of:

- a. said cylindrical wheel has a centrally located channel running through its length; and
- b. an axle of suitable dimension to fit through said centrally located channel, and said axle will protrude from each of two ends of the cylindrical wheel a sufficient length to each matedly fit into one of two dimple ports positioned on the adapter body, such that each of said two ends of the axle are matedly fit into said one of two dimple ports, thereby attaching the cylindrical wheel to said adapter body.

6. A Flashlight Assembly comprised essentially of:

- a. a flashlight housing containing a battery port that is electrically connected, using electrical circuitry, to a light bulb receptacle with a light bulb affixed therein;
- b. said electrical circuitry has a flashlight activation switch, which when manually activated, would close a portion of the electrical circuitry at said flashlight activation switch; and
- c. said flashlight housing has a plurality of clips protruding therefrom, to allow a user to attach said Flashlight Assembly to a desired part of a vacuum cleaning device.

7. A Flashlight Assembly, as recited in claim 6, and further comprised essentially of:

- a. a light bulb housing containing said light bulb receptacle and said light bulb, and such that said light bulb housing has a pivot point located at the interface between the light bulb housing and said flashlight housing, said pivot point enabling the light bulb housing to rotate about the pivot point.

8. An Article Retrieval Screen, comprised essentially of:

- a. a screen manufactured to cover the terminal end of a tapered hose fitting of a vacuum cleaning device.

9. An Article Retrieval Screen, as recited in claim 8, and further comprised essentially of:

- a. said screen matedly attached to one end of a screen fitting, said screen fitting manufactured to matedly fit its terminal end into a hose fitting port of a vacuum cleaning device.

10. A Flexible Tip Adapter, comprised essentially of:

- a. a channeled adapter body that has a hose fitting port on one end of said adapter body, and has a suction intake orifice located on the opposite end of the adapter body;
- b. said channeled adapter body is substantially tubular on one end, and tapers into a substantially flattened tip along its length to the opposite end, where said suction intake orifice is located;

- c. a flexible portion of said flattened tip allows the user to insert said tip into narrow and irregular passages; and

- d. said flexible portion of the flattened tip is composed essentially of an elastomeric material.

11. A Narrow Clearance Adapter, comprised essentially of:

- a. a channeled adapter body that has a hose fitting port on one end of said adapter body, and has a suction intake orifice near the opposite end of the adapter body; and
- b. said channeled adapter body is substantially tubular on one end, and has a taper into a substantially flattened region for the remainder of the length of the channeled adapter body;

- c. said suction intake orifice is located on one side of said substantially flattened region, and near the terminal end of said channeled adapter body.

12. A Narrow Clearance Adapter, as recited in claim 11, and further comprised essentially of:

- a. a plurality of adapter body nipples located along a plurality of the sides of the suction intake orifice.

13. A Narrow Clearance Adapter, as recited in claim 12, and further comprised essentially

- a. a rake located between said terminal end of the channeled adapter body, and said suction intake orifice.

14. A Narrow Clearance Adapter, as recited in claim 12, and further comprised essentially of:

- a. said taper is located along one side of the channeled adapter body.

15. A Narrow Clearance Adapter, as recited in claim 12, and further comprised essentially of:

- a. said taper is located along two opposite sides of the channeled adapter body.

16. A Narrow Clearance Adapter, as recited in claim 12, and further comprised essentially of:

- a. the channeled adapter body is bent at an angle such that the suction intake orifice is located on the side of the substantially flattened region that is farthest from said hose fitting port.

17. A Narrow Clearance Adapter, as recited in claim 12, and further comprised essentially of:

- a. the channeled adapter body is bent at an angle such that the suction intake orifice is located on the side of the substantially flattened region that is closest to said hose fitting port.

18. A Narrow Clearance Adapter, as recited in claim 12, and further comprised essentially of:

- a. the channeled adapter body is bent at an angle such that the suction intake orifice is located on the opposite side of the substantially flattened region that is farthest from said hose fitting port.

19. A Narrow Clearance Adapter, as recited in claim 12, and further comprised essentially of:

- a. the channeled adapter body is bent at an angle such that the suction intake orifice is located on the opposite side of the substantially flattened region that is closest to said hose fitting port.

20. A Narrow Clearance Adapter, as recited in claim 14, and further comprised essentially of:

- a. said channeled adapter body is bent at an angle such that the suction intake orifice is located on the side of the substantially flattened region that is farthest from said hose fitting port.

21. A Narrow Clearance Adapter, as recited in claim 15, and further comprised essentially of:

- a. said channeled adapter body is bent at an angle such that the suction intake orifice is located on the side of the substantially flattened region that is closest to said hose fitting port.

22. A Right Angle Adapter, comprised essentially of:

- a. a channeled adapter body that has a circular openings located at each of said channeled adapter body's two ends; and

- b. said channeled adapter body has an approximately 90-degree bend along its length.

23. A Right Angle Adapter, as recited in claim 22, and further comprised essentially of:

- a. each of said two ends terminates with an angled section.

24. A Right Angle Adapter, as recited in claim 23, and further comprised essentially of:

- a. each of said two angled sections are mirror images of each other, and are positioned such that the two angled sections face at approximately 90-degrees rotated about the channeled adapter body's central axis, from said approximately 90-degree bend.

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