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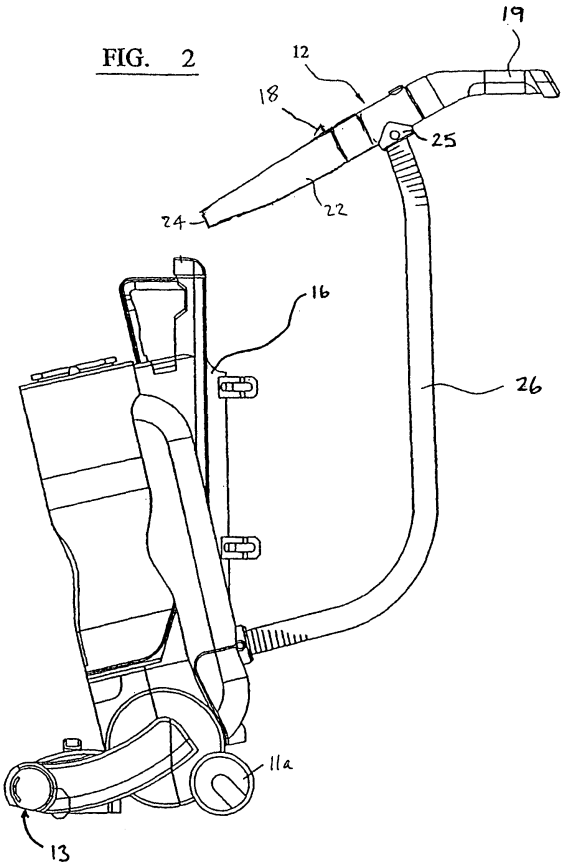
(54) Vacuum cleaner

(57) A vacuum cleaner comprising a floor-engaging unit having a suction inlet, an upright body mounted to said floor-engaging unit and including means for creating a suction and means for separating and collecting dirt from an airstream drawn in by said suction, a unit having a handle and a tubular portion extending from said handle, said tubular portion forming a suction inlet and being coupled to said body via a flexible hose, and said tubular portion being attachable to said body with said handle projecting for the user to grasp for manoeuvring the cleaner over the floor, wherein said tubular portion comprises first and second tubes which are telescopically coupled together to enable said tubular portion to be extended when detached from said body.

FIG. 2



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Description

[0001] The present invention relates to a vacuum cleaner and more particularly to a vacuum cleaner having a telescopic suction nozzle.

[0002] Our European patent application No. 1,464,267 discloses a vacuum cleaner of the upright type, which comprises an upright body pivotally mounted at its lower end to a floor-engaging unit enabling limited rotation of the body forwardly and rearwardly, relative to the floor-engaging unit, about an axis extending transverse of the cleaner. The body houses a motor-driven fan unit which serves to develop suction to draw air in through an inlet in the floor-engaging unit and into a dust-separation unit, mounted to the body of the cleaner. A motor-driven, rotary agitator brush is mounted across the floor-engaging unit, in the air inlet thereof, to beat and sweep the floor in the region of the airflow into the cleaner. The cleaner also comprises a combined handle and suction nozzle unit of elongate form, having an end portion formed as a handle or handgrip and a tubular portion extending from the handle to form a suction nozzle: the free end of the tubular portion forms a second suction inlet of the cleaner and an air outlet is formed in the side of the tubular portion, adjacent its junction with the handgrip, a flexible hose being coupled between this air outlet and the upright body of the cleaner.

[0003] For use of the cleaner for floor cleaning, the tubular portion of the combined handle and suction nozzle unit is inserted into a socket with which the upright body of the cleaner is formed, the handle portion of the unit projecting to form a handgrip for use in manoeuvring the cleaner over the floor: the free end of the tubular portion of the handle and suction nozzle unit abuts a spring-biassed actuating member of a changeover valve to depress this actuating member and hold the valve in a position to communicate suction, developed by the fan unit of the cleaner, to the suction inlet in the floor-engaging unit. When the combined handle and suction nozzle unit is withdrawn from its socket, the actuating member of the valve is free to move under its spring bias and so move the valve into a position to communicate suction to the suction nozzle, via the flexible hose, instead of to the air inlet in the floor-engaging unit of the cleaner: the user is now able to use the suction nozzle for above-floor cleaning. The tubular portion which forms the suction nozzle is shaped to form a so-called crevice tool, its cross-section changing from a circular shape to a generally rectangular shape as the nozzle tapers to its free end.

[0004] Although the combined handle and suction nozzle unit is instantly ready for many above-floor cleaning tasks upon being withdrawn from the cleaner body, the fitting of accessories, for example an extension tube, is necessary for other tasks. It is known to store such accessories on the cleaner body, typically in retaining sockets or by means of retaining clips.

[0005] For cleaning some relatively inaccessible locations, for example, the user must remove an extension tube from its receptacle on the body of the cleaner, and fit this extension tube to the suction nozzle before cleaning can commence. After the cleaning operation, the extension tube must be detached from the suction nozzle and returned to its storage location on the cleaner body.

[0006] We have now devised arrangements which enable further simplification in use of vacuum cleaners of the above-described type. The terms tube and tubular are used throughout to define an elongate hollow member. The elongate hollow member may have a generally constant cross-section e.g generally circular, elliptical, square or alternatively may be of varying cross-section.

[0007] In accordance with the present invention, there is provided a vacuum cleaner which comprises a floor-engaging unit having a suction inlet, an upright body mounted to said floor-engaging unit and including means for creating a suction and means for separating and collecting dirt from an airstream drawn in by said suction, a unit having a handle and a tubular portion extending from said handle, said tubular portion forming a suction inlet and being coupled to said body via a flexible hose, and said tubular portion being attachable to said body with said handle projecting for the user to grasp for manoeuvring the cleaner over the floor, wherein said tubular portion comprises first and second tubes which are telescopically coupled together to enable said tubular portion to be extended when detached from said body.

[0008] Preferably the first tube is joined to or extends from the handle.

[0009] Preferably, the second tube is formed as a suction nozzle or tool, for example as a so-called crevice tool.

[0010] Preferably the second tube forms an outer tube disposed over the first or inner tube.

[0011] Preferably the combined handle and suction inlet or suction nozzle unit includes means serving to lock or latch the first and second tubes against relative longitudinal displacement, when the tubes are in one or more predetermined positions relative to one another: in a preferred embodiment, the tubes latch together only when in the fully extended condition or in the fully contracted condition, but not when in any intermediate positions.

[0012] In a preferred embodiment, a latching mechanism is provided, which comprises a sleeve mounted on the second or outer tube and arranged for limited displacement longitudinally of that tube: the latching mechanism is arranged so that upon displacement of the sleeve forwardly, when the tubes are in a contracted condition, the latch between the two tubes becomes disengaged to permit the tubes to be extended by a continuing displacement of the sleeve in the forward direction.

[0013] Preferably the latching mechanism includes a resiliently biased part provided at one end thereof with a projection which engages with a recess formed in the outer surface of the first or inner tube when the tubes are in their contracted condition, and an element coupled to the sleeve and arranged to act on the resiliently biased part, to displace its projection out of its recess in the first

tube, upon displacement of the sleeve in the forward direction.

[0014] Preferably the resiliently biased part comprises a leaf spring. Alternatively the resiliently biased part is biased by a spring, most preferably a compression spring.

[0015] Preferably the latching mechanism is also arranged so that upon displacement of the sleeve rearwardly, when the tubes are in an extended condition, the latch between the two tubes becomes disengaged to permit the tubes to be contracted by a continuing displacement of the sleeve in the rearward direction.

[0016] Preferably the latching mechanism includes a second resiliently biased part, provided at one end thereof with a projection which engages with a recess formed in the outer surface of the inner tube when the tubes are in their extended condition, the element coupled to the sleeve being arranged to act on the second resiliently biased part, to displace its projection out of its recess in the first tube, upon displacement of the sleeve in the rearward direction.

[0017] Preferably the second resiliently biased part comprises a leaf spring. Alternatively the second resiliently biased part is biased by a spring, most preferably a compression spring.

[0018] Preferably the element coupled to the sleeve comprises a roller. Preferably the roller is coupled to the sleeve by a member which fits into a window formed in the sleeve, and includes at least one projection which is formed with a notch which receives an axle portion of the roller.

[0019] It will be appreciated that the above-described latching mechanism may be used with advantage in other tubular arrangements of telescopic construction, particularly but not solely for vacuum cleaner suction inlets. Also in accordance with the present invention, therefore, there is provided a tubular arrangement which comprises inner and outer tubes which are longitudinally slidable relative to one another, and means for latching said tubes at least in one relative longitudinal position, said latching means comprising a sleeve disposed around said outer sleeve and arranged for limited longitudinal displacement along said outer tube and so that displacement of said sleeve in a predetermined longitudinal direction serves to disengage the latch between the two tubes to permit said outer tube to be displaced in said direction relative to said inner tube by a continuing displacement of said sleeve in said direction.

[0020] In an alternative embodiment of the above-defined vacuum cleaner, the second or outer tube is provided, at its rear end, with an external screw-thread, and an internally screw-threaded sleeve is engaged over this: rotation of the sleeve serves to compress a compression ring disposed between the outer tube and the inner tube, in order to clamp these together.

[0021] Embodiments of the present invention will now be described by way of example only and with reference to the accompanying drawings, in which:

FIGURE 1 is a side view of a vacuum cleaner in accordance with the present invention, shown with its combined handle and suction nozzle unit retained within a socket of the upright body of the cleaner so that the cleaner is configured for floor cleaning;

FIGURE 2 is a similar view of the vacuum cleaner of Figure 1, shown with its combined handle and suction nozzle unit withdrawn from its socket for the cleaner to be used for above-floor cleaning;

FIGURE 3 is an enlarged view of the combined handle and suction nozzle unit of the cleaner, shown in its contracted condition;

FIGURE 4 is a similar view of the combined handle and suction nozzle unit, shown in its extended condition;

FIGURE 5 is a view of the underside of the handle and suction nozzle unit;

FIGURE 6 is an enlarged view of a carrier member and a sleeve cover of the latching mechanism of the handle and suction nozzle unit;

FIGURES 7a and 7b show an enlarged cross-sectional view of part of the latching mechanism of FIGURE 6;

FIGURE 8 is an enlarged view of a carrier member of an alternative embodiment of the latching mechanism;

FIGURE 9 is a view of the underside of the carrier member of FIGURE 8; and

FIGURE 10 is an enlarged, cut-away view of a handle and suction nozzle unit provided with a modified mechanism for locking it telescopic tubes in desired positions.

[0022] Referring to Figures 1 and 2 of the drawings, there is shown an upright vacuum cleaner which comprises an upright body 10 pivotally mounted, at its lower end, to a floor-engaging unit 11 having a pair of wheels 11a at its rear: the pivotal mounting of the body 10 enables partial rotation of the body 10 forwardly and rearwardly relative to the floor-engaging unit 11, about a pivotal axis which extends transversely of the cleaner. A motor-driven fan unit(not shown) is housed within the body 10 and serves, in use, to develop suction. A first suction inlet 13 is provided in the underside of the floor-engaging unit 11 adjacent it front and a motor-driven, rotating agitator brush (not shown) is mounted transversely of the cleaner in the suction inlet 13. The vacuum cleaner also comprises a cyclone separation unit 14 of cylindrical form, mounted to the front of the body 10, and arranged to separate out dirt and dust from the air which is drawn by suction into the cleaner, and to collect the separated-out dirt and dust.

[0023] The vacuum cleaner further comprises a combined handle and suction nozzle unit 12, which is of elongate form and shown, in Figure 1, received in a vertical socket 16 provided in the rear of the upright body 10 of the cleaner, such that an end portion 19 of the unit 12 projects to form a handle for the cleaner. The unit 12,

when received within the socket 16, is retained in place by a catch 17, provided on the body 10 of the cleaner adjacent to top of the socket 16, engaging a barb 18 on the side of the unit 12. The handle 19 is shaped to provide a handgrip for a user to grasp for manoeuvring the cleaner during floor cleaning. The unit 12 further comprises a tubular portion 22 projecting from the handle 19 and forming an airflow duct between a second suction inlet 24 of the cleaner, at the free end of the tubular portion 22, and an air outlet 25 formed in the side of the tubular portion 22, adjacent its junction with the handle 19. An elongate, flexible hose 26 is coupled at one end thereof to the air outlet 25 of the unit 12, and at the opposite end thereof to the body 10 of the cleaner. As will be described below, the tubular portion 22 of unit 12 is telescopic.

[0024] When the cleaner is used for conventional floor cleaning, the unit 12, in its contracted condition, is fitted into the socket 16 of the body 10, as shown in Figure 1. The free end of the tubular portion 22 abuts a spring-biassed actuator member of a valve (not shown) to depress the actuator member and hold the valve in a position to communicate suction from the fan unit to the first suction inlet 13 in the underside of the floor-engaging unit 11 of the cleaner. In order to use the cleaner for above-floor cleaning, the catch 17 is released manually to enable the user to withdraw the unit 12 from its socket 16: this allows the actuator member of the valve to move under its spring bias, and so move the valve to a position to communicate suction from the fan unit to the second suction inlet 24 via the flexible hose and the air duct within the tubular portion 22 of the unit 12. The tubular portion 22 of the unit 12 forms a suction nozzle for above-floor cleaning, and in particular (in the example shown) is shaped to provide a so-called crevice tool, although it may instead be formed as any alternative type of suction tool.

[0025] As mentioned above, the tubular portion 22 of the unit 12 is telescopic in form. Referring to Figures 3 and 4 of the drawings, the tubular portion 22 of the unit 12 comprises a first or inner tube 30 joined at one end to the handle 19, and a second or outer tube 32 slidably received over the first or inner tube. The inner and outer tubes are of uniform, generally circular cross-section, but the forward end of the outer tube 32 tapers and changes to a generally rectangular cross-section, thus forming a so-called crevice tool. The outer tube 32 may be slid along the inner tube 30, to change the suction nozzle between the contracted condition shown in Figure 3 and the extended condition shown in Figure 4: the outer tube 32 is prevented from rotating relative to the inner tube, for example by a longitudinal groove being formed in the outer surface of the inner tube 30 and a projection formed on the inner surface of the outer tube and engaged into this longitudinal groove.

[0026] Figures 5 and 6 show a mechanism provided for latching the outer tube 32 at each end of its travel relative to the inner tube 30. The mechanism comprises a carrier member 34, in the form of a generally rectangular frame, mounted in a recess adjacent the rear end of the outer tube 32 and extending longitudinally of the tube 32. A roller member 35 extends across the carrier member 34 and its enlarged ends are arranged to run on rails along opposite sides of the carrier member 34. Two leaf springs 36, 38 extend lengthwise of the carrier member 34, the first spring 36 having one of its ends fixed to one end of the carrier member 34 and the second spring 38 having one of its ends fixed to the opposite end of the carrier member 34. Each spring 36, 38 has an inwardly-inclined portion 36a, 38a intermediate its ends and terminates in an end portion 36b, 38b which carries an inwardly-directed pin 37, 39. The two springs 36, 38 extend over the reduced-diameter or axle portion of the roller member 35. A sleeve 40 is disposed around the outer tube 32 of the suction nozzle, over the latching mechanism: the sleeve 40 is formed with a rectangular window 41, registered with the position of the latching mechanism, and a cover member 42 is snap-engaged into the window. The cover member 42 is formed, along its opposite edges, with flanges 43 which are formed with notches 44, which receive the axle portion of the roller member 35. The sleeve 40 is slidable along the outer tube 32 of the nozzle and it will be appreciated that movement of the sleeve 40, in either axial direction, will drive the roller member 35 along the carrier member 34.

[0027] When the suction nozzle is in its contracted condition, the pin 37 of the first spring 36 engages into a socket or recess formed in the outer surface of the inner tube 30 as shown in Figure 7a, to latch the tubes 30, 32 against relative longitudinal movement. In order to disengage the latch and extend the nozzle, the user grips the sleeve 40 and displaces it forwardly in the direction of the suction nozzle: this drives the roller member 35 forwardly along the carrier member 34 and the roller member 35 accordingly engages the inclined portion 36a of the first spring 36 to lift this spring so that its pin 37 is lifted out of the socket of the inner member, into which it was engaged. A stop (not shown) is provided to limit the movement of the sleeve 40 relative to the outer tube 32 of the nozzle. When the sleeve 40 reaches this stop, continued forward movement of the sleeve will move the outer tube 32 forwards into its extended position, at which the pin 39 on the second spring 38 will engage into a socket or recess in the outer surface of the inner tube 30, adjacent its forward end, to latch the nozzle in its extended condition as shown in Figure 7b. In order to disengage the latch and contract the nozzle, the user grips the sleeve 40 and displaces it rearwardly away from the suction nozzle: this drives the roller member 35 rearwardly along the carrier member 34, the roller member 35 accordingly engaging the inclined portion 38a of the second spring 38 to lift this spring and lift its pin 39 out of the socket or recess of the inner tube 30, into which it was engaged. When the sleeve 40 reaches the stop which limits its movement relative to the outer tube 32, continued rearward movement of the sleeve 40 will move the outer tube 32 rearwards into its contracted position,

at which the pin 37 on the first spring 36 will engage into the socket or recess in the inner tube 30, adjacent its rear end.

[0028] Figures 8 and 9 show an alternative mechanism to that of figure 6 for latching the outer tube at each end of its travel relative to the inner tube. Leaf springs 36, 38 are replaced with two rigid lever elements 61,63. The first rigid lever element 61 is pivotally attached at one of its ends to the carrier member 34 while the second rigid lever element is pivotally attached at one of its ends to the opposite end of the carrier member 34. The rigid lever elements 61,63 are resiliently biased inwardly by compression springs 65 and 67. Each rigid lever element 61,63 has an inwardly directed pin 69,71. As will be clear to the person skilled in the art the latching mechanism of figures 7 and 8 operates in a similar manner to that illustrated and described with reference to figure 6. Movement of the sleeve 40 drives the roller member 35 along the carrier member 34 and the roller member 35 engages the inclined portion of either the first or second rigid lever element depending on whether the suction nozzle is initially in its contracted or expanded position. The continued movement of the roller member 35 causes the rigid lever element 61 or 63 to pivot, compressing the spring 65 or 67 against upper portion 73 or 75 of the carrier member and lifting the pin 69 or 71 out of the socket or recess of the inner tube 30, into which it was engaged.

[0029] Figure 10 shows a modified arrangement for locking the two tubes 30, 32 of the suction nozzle and serving to lock these tubes in any desired position longitudinally of each other. In this arrangement, a cylindrical member 50, having an external screw-thread 51, is fixed to or forms part of the rear end of the outer tube 32 and a compression ring 52 is disposed in an annular space between the cylindrical member 50 and the inner tube 30, at the rear end of the cylindrical member 50. A sleeve 54, having an internal screw-thread 55, is engaged over the cylindrical member 50: sleeve 54 is formed at its rear end with an inwardly-directed annular flange 57. The inner tube 30 is formed with a longitudinal groove 56 into which a projection on the inner surface of the outer tube 32 engages, to prevent rotation of the outer tube 32 around the inner tube, as it is slid along the latter. In order to lock the outer tube 32 at any desired position along the inner tube 30, the sleeve 54 is rotated by hand to advance it along the cylindrical member 50, for its flange 57 to clamp against the compression ring 52, causing the compression ring 52 to be compressed axially and expand radially, thus clamping between the cylindrical member 50 and the inner tube 30.

[0030] It will be appreciated that the arrangements which have been described provide for a suction nozzle of improved versatility, which is simple to extend or contract as desired and is of simple construction.

[0031] The invention covers not only individual embodiments as discussed but combinations of embodiments as well. It is to be understood that modifications and variations of the present invention will become apparent to those skilled in the art and it is intended that all such modifications will be included within the scope of the present invention.

Claims

1. A vacuum cleaner comprising a floor-engaging unit having a suction inlet, an upright body mounted to said floor-engaging unit and including means for creating a suction and means for separating and collecting dirt from an airstream drawn in by said suction, a unit having a handle and a tubular portion extending from said handle, said tubular portion forming a suction inlet and being coupled to said body via a flexible hose, and said tubular portion being attachable to said body with said handle projecting for the user to grasp for manoeuvring the cleaner over the floor, wherein said tubular portion comprises first and second tubes which are telescopically coupled together to enable said tubular portion to be extended when detached from said body.

2. A vacuum cleaner according to claim 1, wherein the first tube is joined to or extends from the handle.

3. A vacuum cleaner according to claim 1 or claim 2, wherein the second tube is formed as a suction nozzle or tool and preferably the second tube forms an outer tube disposed over the first or inner tube.

4. A vacuum cleaner according to any preceding claim, wherein the tubular portion includes means serving to lock or latch the first and second tubes against relative longitudinal displacement, when the tubes are in one or more predetermined positions relative to one another and preferably the tubes latch together only when in a fully extended condition or in a fully contracted condition, but not when in any intermediate positions.

5. A vacuum cleaner according to any of claims 3 or 4, including a latching mechanism which comprises a sleeve mounted on the second tube and arranged for limited displacement longitudinally of that tube and preferably wherein the latching mechanism is arranged so that upon displacement of the sleeve forwardly, when the tubes are in a contracted condition, the latch between the two tubes becomes disengaged to permit the tubes to be extended by a continuing displacement of the sleeve in the forward direction.

6. A vacuum cleaner according to claim 5, wherein the latching mechanism includes a resiliently biased part provided at one end thereof with a projection which engages with a recess formed in the outer surface of the first or inner tube when the tubes are in their

contracted condition, and an element coupled to the sleeve and arranged to act on the resiliently biased part, to displace its projection out of its recess in the first tube, upon displacement of the sleeve in the forward direction.

7. A vacuum cleaner according to claim 6, wherein the latching mechanism is also arranged so that upon displacement of the sleeve rearwardly, when the tubes are in an extended condition, the latch between the two tubes becomes disengaged to permit the tubes to be contracted by a continuing displacement of the sleeve in the rearward direction.

8. A vacuum cleaner according to claim 7, wherein the latching mechanism includes a second resiliently biased part, provided at one end thereof with a projection which engages with a recess formed in the outer surface of the inner tube when the tubes are in their extended condition, the element coupled to the sleeve being arranged to act on the second resiliently biased part, to displace its projection out of its recess in the first tube, upon displacement of the sleeve in the rearward direction.

9. A vacuum cleaner according to any of claims 6 to 8, wherein the resiliently biased part comprises a leaf spring and/or wherein the element coupled to the sleeve comprises a roller.

10. A vacuum cleaner according to claim 9, wherein the roller is coupled to the sleeve by a member which fits into a window formed in the sleeve, and includes at least one projection which is formed with a notch which receives an axle portion of the roller.

11. A vacuum cleaner according any of claims 1 to 4, wherein the second tube is provided, at its rear end, with an external screw-thread, and an internally screw-threaded sleeve is engaged over this and preferably wherein rotation of the sleeve serves to compress a compression ring disposed between the second tube and the first tube, in order to clamp these together.

12. A tubular arrangement which comprises inner and outer tubes which are longitudinally slidable relative to one another, and means for latching said tubes at least in one relative longitudinal position, said latching means comprising a sleeve disposed around said outer tube and arranged for limited longitudinal displacement along said outer tube and arranged so that displacement of said sleeve in a predetermined longitudinal direction serves to disengage the latch between the two tubes to permit said outer tube to be displaced in said direction relative to said inner tube by a continuing displacement of said sleeve in said direction.

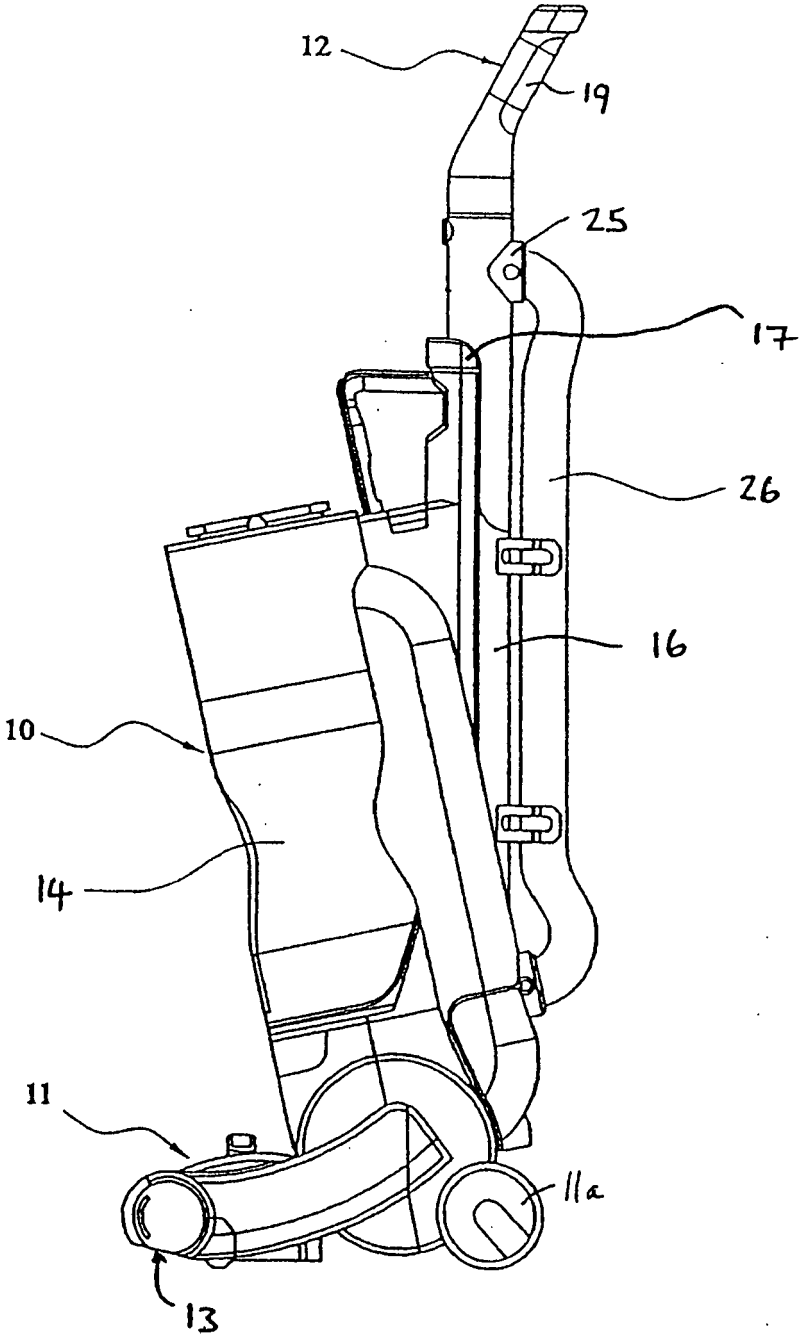
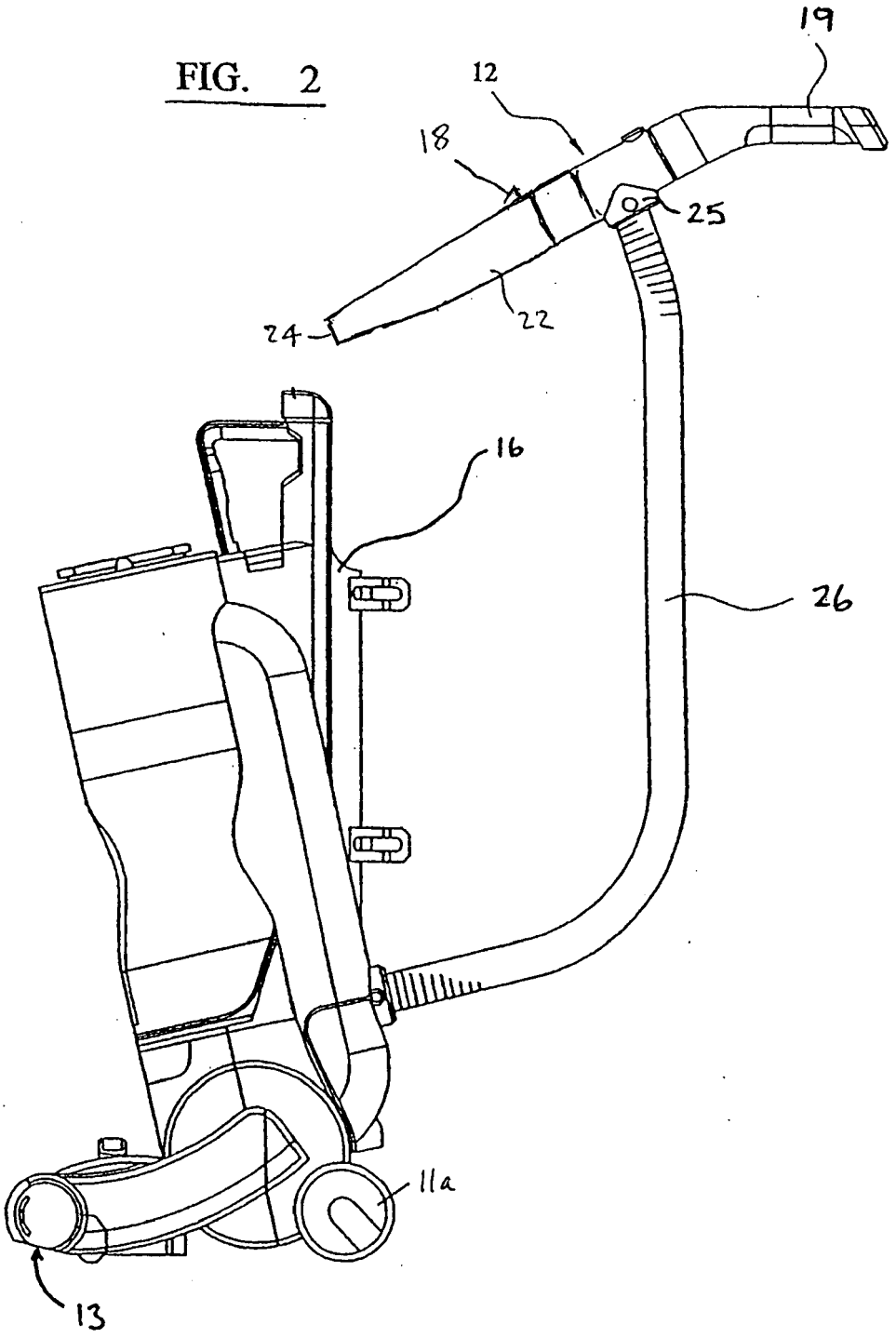


FIG. 1

FIG. 2



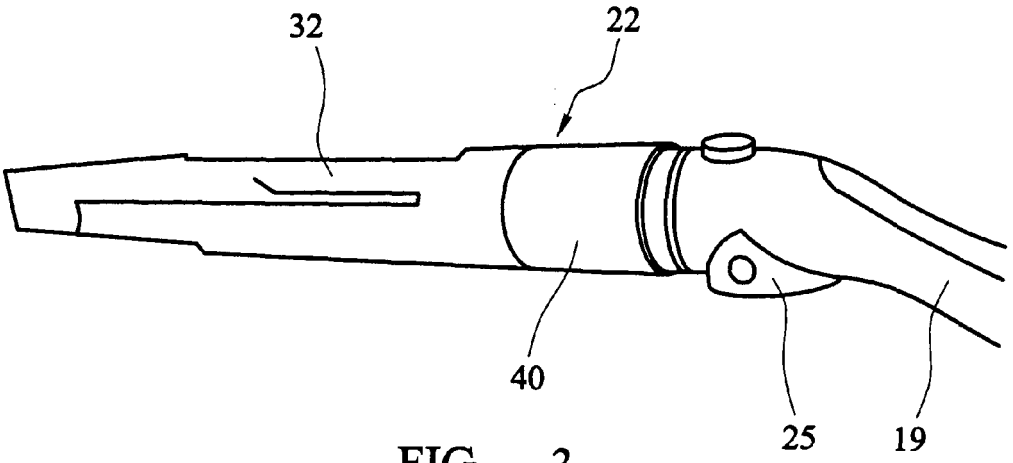


FIG. 3

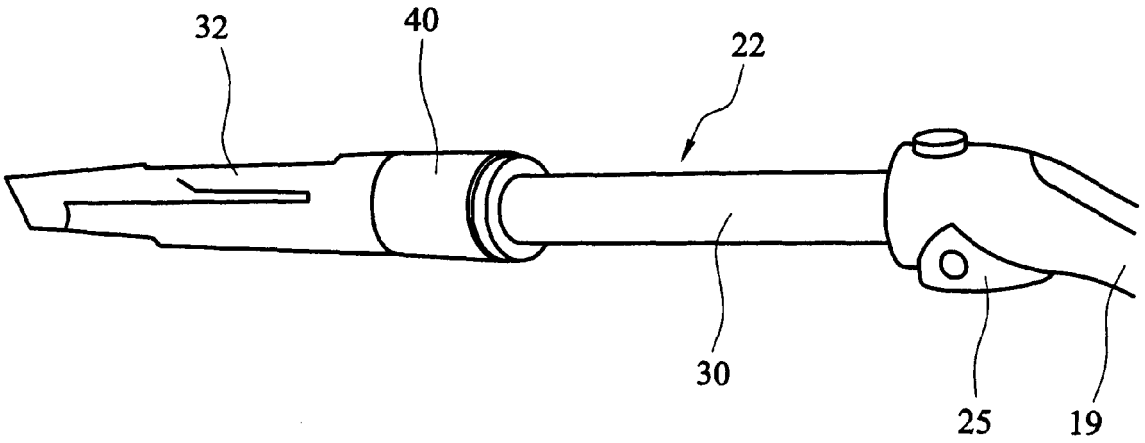


FIG. 4

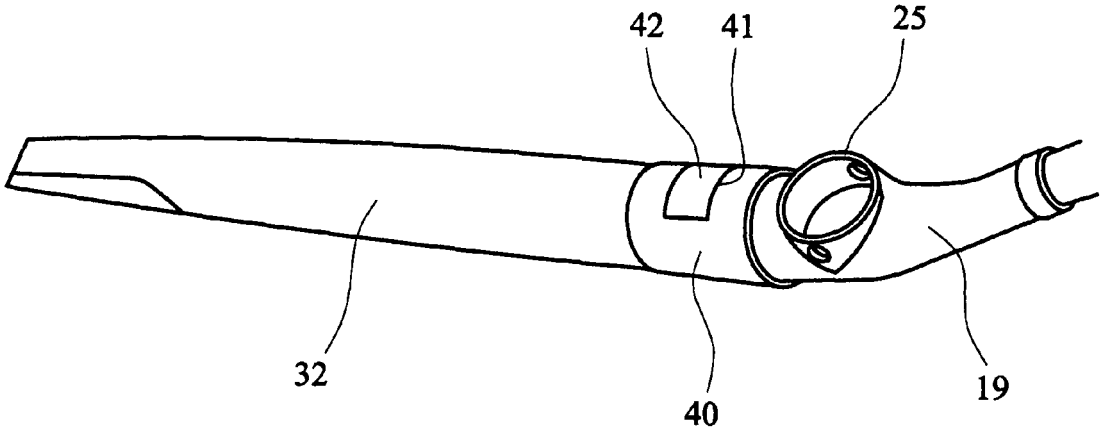


FIG. 5

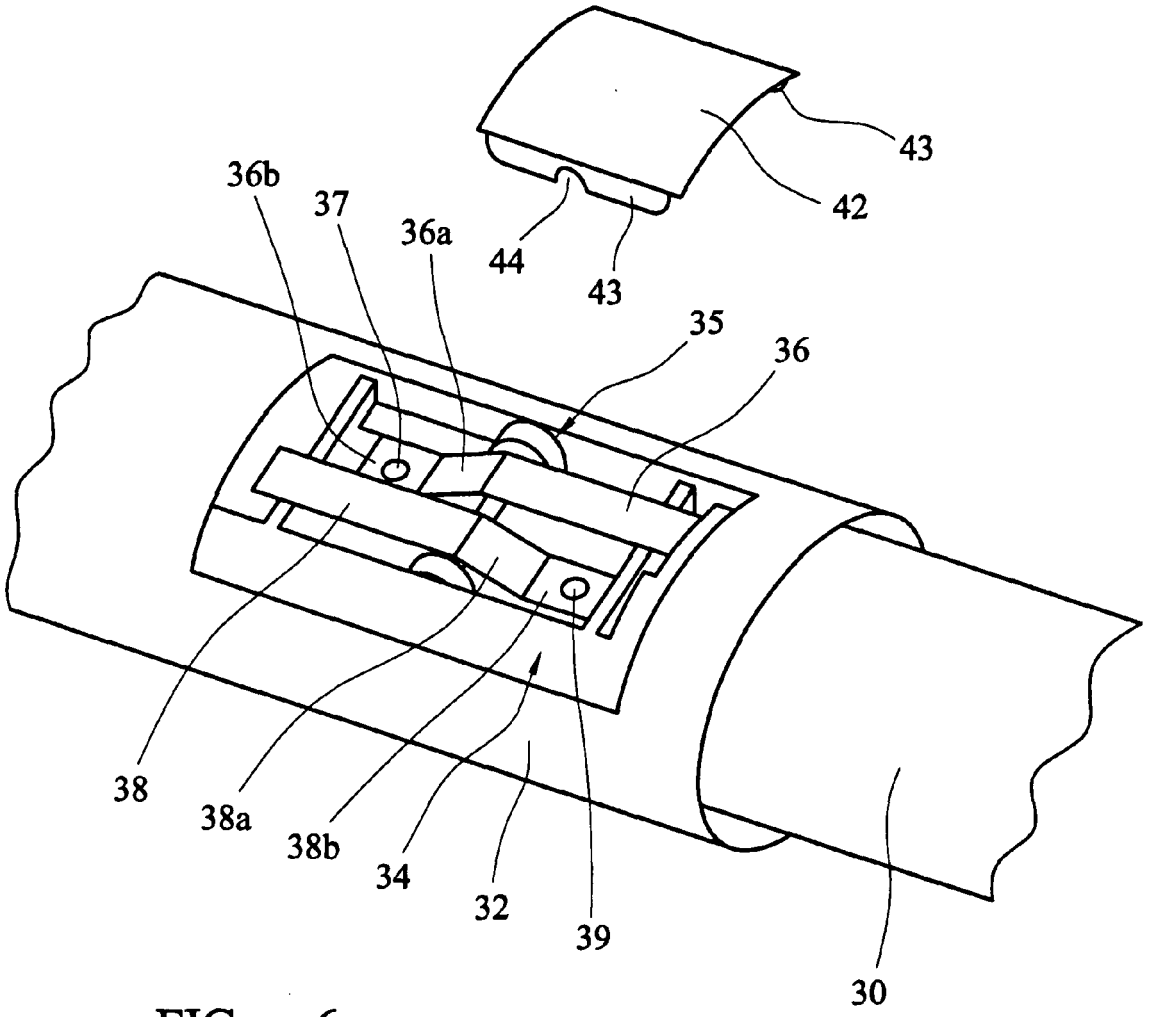


FIG. 6

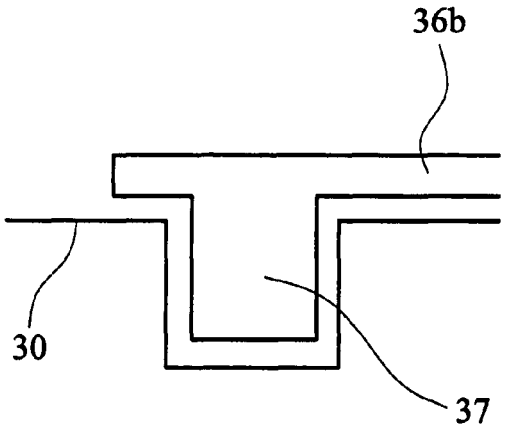


FIG. 7a

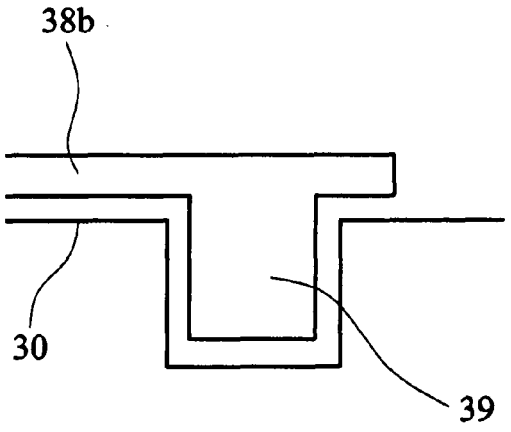


FIG. 7b

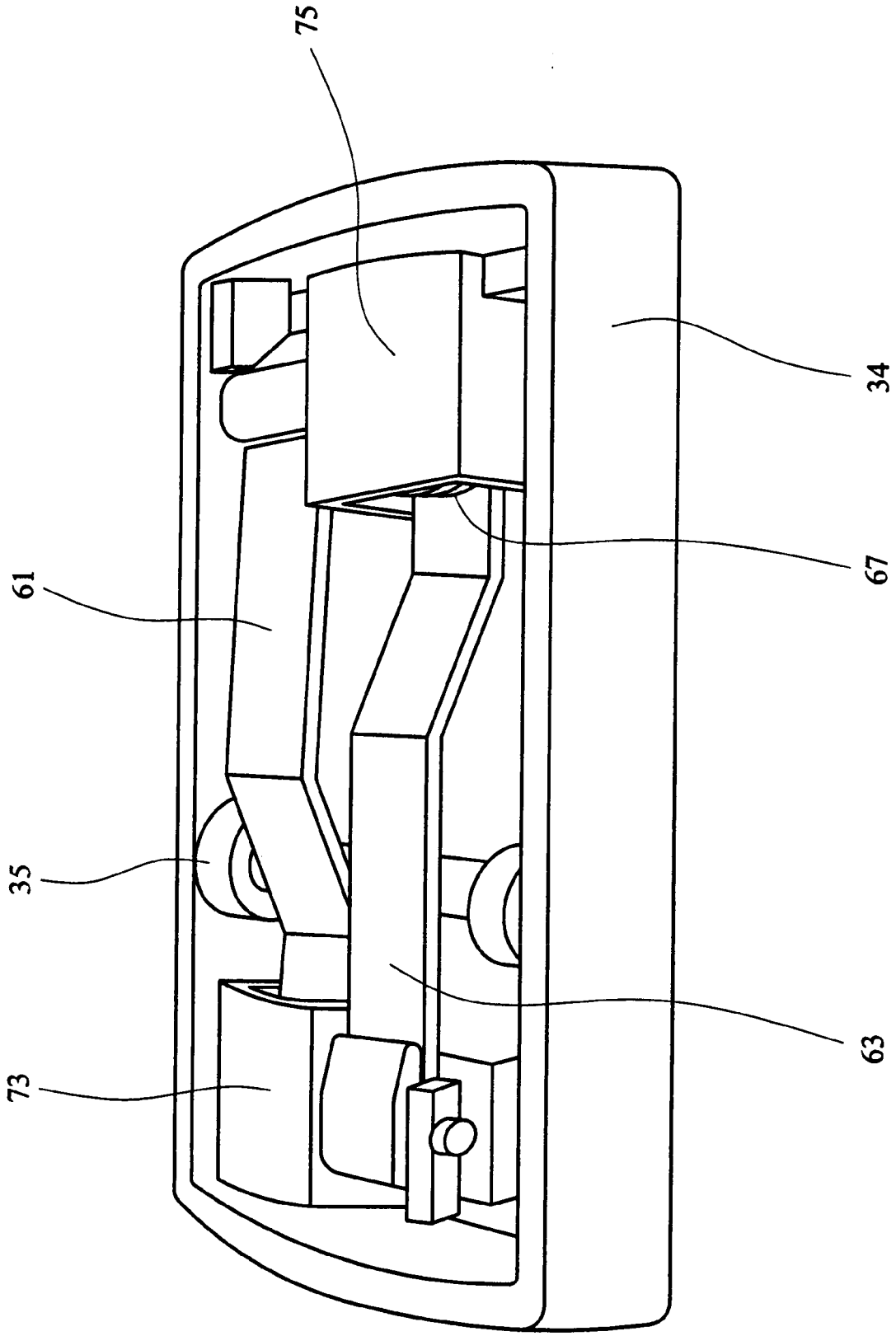


FIG. 8

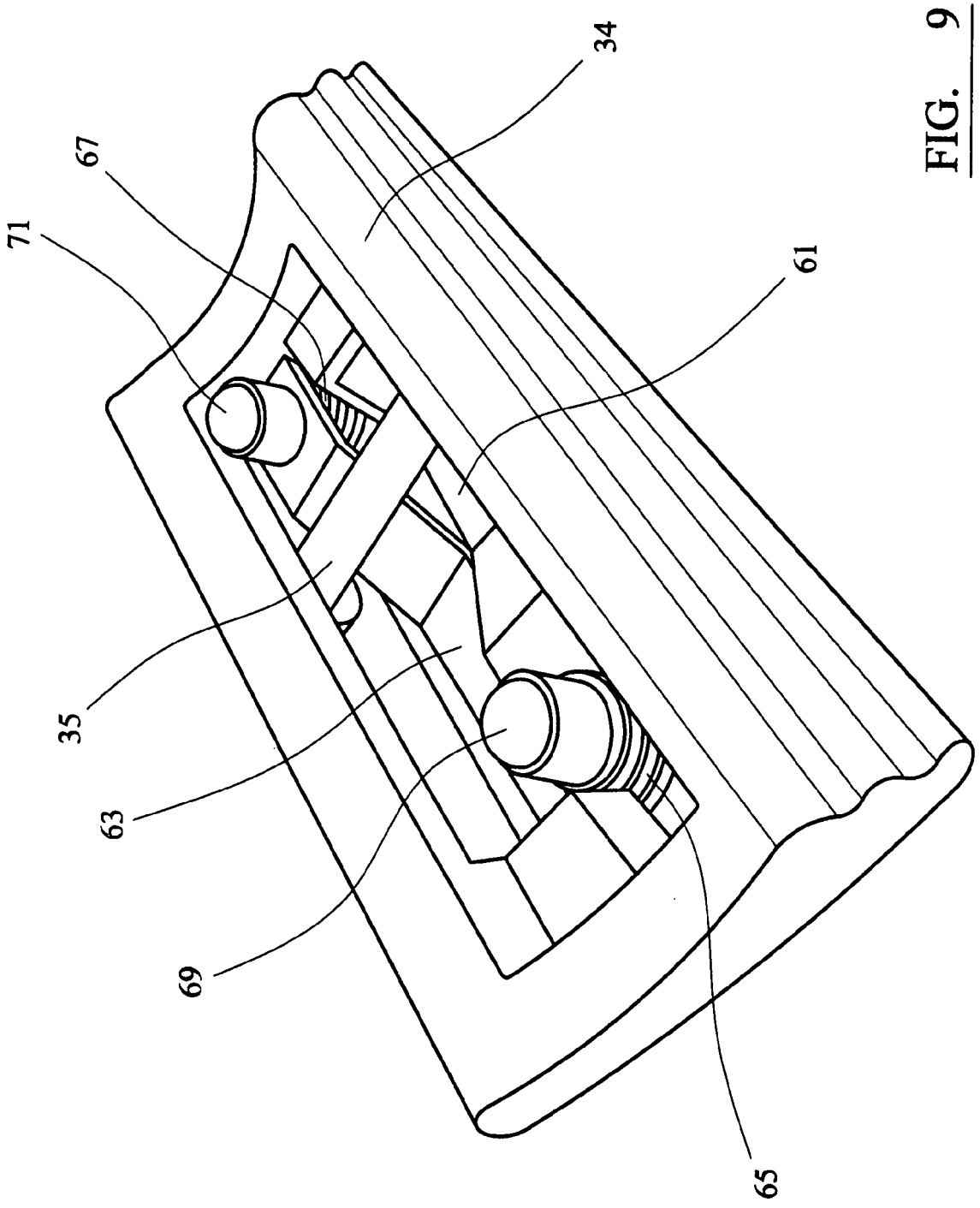


FIG. 9

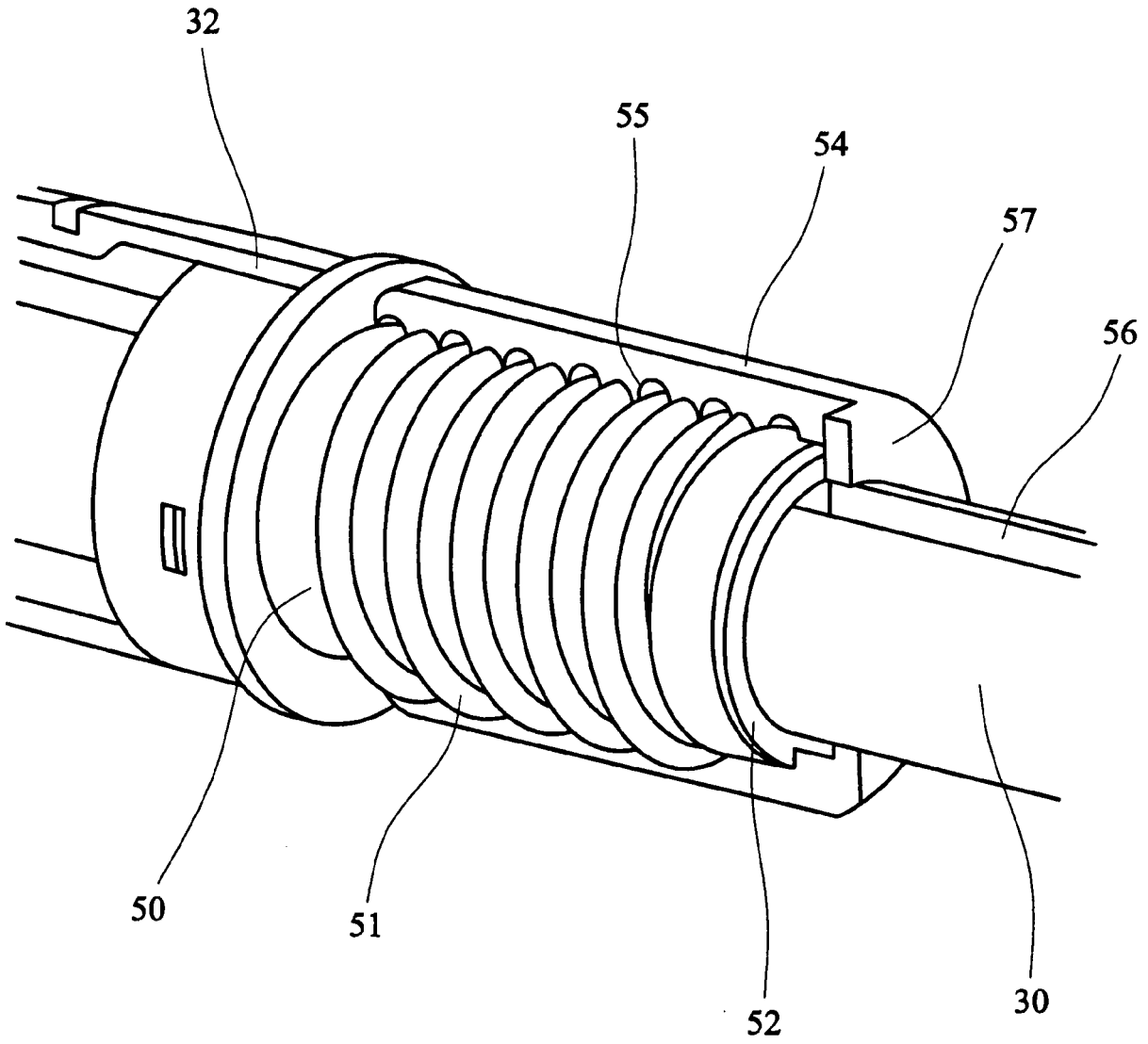


FIG. 10

REFERENCES CITED IN THE DESCRIPTION

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