(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 136 894**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **84306644.0**

(51) Int. Cl.⁴: **A 47 L 9/28**

(22) Date of filing: **28.09.84**

(30) Priority: **30.09.83 US 537645**

(43) Date of publication of application:
10.04.85 Bulletin 85/15

(84) Designated Contracting States:
DE FR GB SE

(71) Applicant: **ELECTROLUX CORPORATION**
3003 Summer Street
Stamford Connecticut 06905(US)

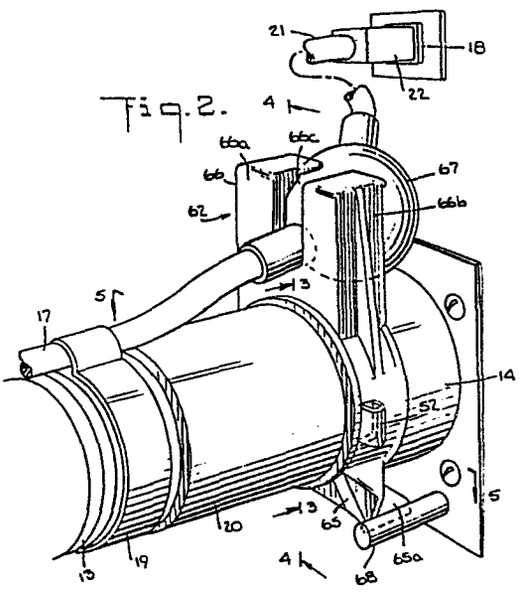
(72) Inventor: **Ferraris, John T.**
75 Noble Street
Stamford Connecticut 06902(US)

(72) Inventor: **Billick, James E.**
10 Tower Drive
Norwalk Connecticut 06850(US)

(74) Representative: **Smith, Philip Antony et al,**
REDDIE & GROSE 16 Theobalds Road
London WC1X 8PL(GB)

(54) Anti-Disengagement device.

(57) A device (62) is disclosed for preventing disengagement of an electrical cord (17), associated with a hose (13), from a receptacle (18) in a body (10) to which the hose (13) is attached. The device (62) comprises, in the preferred embodiment, a ring (63) which cooperates with elements (68, 52) on the hose (13) and on the body (10) to prevent rotation of the hose (13) about the hose axis relative to the body (10) which could otherwise cause the cord (17) to wrap around the hose (13) until the cord (17) disengaged from the body (10). The ring (63) also has a fork (66) which cooperates with a preferably spherical enlargement (67) on the cord (17) to prevent disengagement of the cord (17) because of longitudinal tension on the cord (17) caused by longitudinal expansion of the hose (13).



EP 0 136 894 A2

E-14 (EPO)

ANTI-DISENGAGEMENT DEVICE

Background of Invention

This invention relates to electrical connectors, and more particularly to a strain relief and anti-swivel device for use in attaching a hose and an associated electrical conductor to a vacuum cleaner or other body.

In canister-type vacuum cleaners, the suction motor unit and dust-collecting bag are housed in a body, or canister, which has an orifice that can be connected by a hose to any of various cleaning nozzle attachments. The body is movably supported on the floor and the hose can be used to pull the body along the floor. It is common for the hose to be connected to the orifice in such a way that it can swivel, or rotate, relative to the orifice, so that the hose does not become kinked as the vacuum cleaner is moved in different directions along the floor.

One type of cleaning nozzle attachment frequently provided for use with canister-type vacuum cleaners is the power nozzle. This nozzle, which is designed primarily for use on rugs and carpets, has an on-board motor which drives a rotary brush or beater for agitating the carpet surface to loosen dirt and for separating matted down fibers. The brush is disposed in the air passage through which

the flow of suction air removes the loosened dirt. The motor which drives the rotary brush is typically electrically powered. Therefore, a vacuum cleaner equipped with a power nozzle attachment is usually provided with an electrical receptacle on the body and a power cord to conduct electrical power from the receptacle to the power nozzle. The cord is either molded into the hose or mounted on the exterior surface of the hose, and is removably attached as by plugs to the receptacle at one end and to the power nozzle at the other end.

When such a nozzle is being used, the swiveling feature of the connection between the hose and the orifice can be a disadvantage. As the hose swivels, the free portion of the power cord between the orifice and the receptacle wraps around the hose, causing strain on the connection of the cord to the receptacle and sometimes disengaging the cord from the receptacle. In addition, the hose is typically flexible and longitudinally expandable. When used to move the body along the floor, it will expand longitudinally, applying longitudinal tension to the free portion of the cord, which also tends to disengage the cord from the receptacle.

The need exists for a device which will prevent both disengagement of the cord from the receptacle because of rotation of the hose relative to the body and disengagement of the cord from the receptacle because of longitudinal tension on the cord caused by longitudinal expansion of the hose.

Summary of the Invention

In accordance with the present invention, an anti-disengagement device is provided which will prevent both disengagement of a cord associated with a hose from a receptacle in a body to which one end of the hose is attached because of rotation of the

hose relative to the body, and disengagement of the cord from the receptacle because of longitudinal tension on the cord caused by longitudinal expansion of the hose.

The hose has a tubular section of which at least a portion is flexible and a coupling at one end for securing the hose to the orifice. An electrical conductor is associated with the hose for conducting electrical power along the hose from the receptacle. The conductor has an enlarged portion. The anti-disengagement device, removably associated with the coupling, is adapted to cooperate with the body, the coupling, and the enlarged portion, for preventing disengagement of the cord from the receptacle.

Brief Description of the Drawings

The above and other advantages and features of the present invention will be more completely understood after consideration of the following detailed description of the preferred embodiments, taken together with the accompanying drawings in which like parts are indicated by like reference characters throughout, and in which:

FIG. 1 is a perspective view of the preferred embodiment of the invention in use with a vacuum cleaner to which a power nozzle is attached;

FIG. 2 is an enlarged, partially fragmentary perspective view of the hose connection of the vacuum cleaner shown in FIG. 1 with the preferred embodiment of the invention in place;

FIG. 3 is a cross-sectional view of the connection of FIG. 2, taken from line 3-3 of FIG. 2;

FIG. 4 is a view, partly in section, of the connection of FIG. 2, taken from line 4-4 of FIG. 2;

FIG. 5 is a cross-sectional view of the connection of FIG. 2, taken from line 5-5 of FIG. 2; and

FIG. 6 is an exploded, partially fragmentary perspective view of the connection of FIG. 2.

Detailed Description of the Preferred Embodiment

FIG. 1 shows a vacuum cleaner incorporating the device of the invention. The vacuum cleaner includes a body 10 having an upper section 11 which houses the suction motor unit (not shown), and a wheeled lower section 12 which houses the dust collecting bag (not shown). Suction hose 13 is connected at one end to lower body section 12 at orifice 14. The other end of hose 13 is connected to rigid wand 15, which is connected to power nozzle 16. Hose 13 can also be connected to any one of a number of standard attachments with or without the use of wand 15.

Power nozzle 16 has a power cord 17 which attaches to receptacle 18 on upper body section 11 for supplying power to the motor (not shown) of power nozzle 16. Power nozzle cord 17 travels along hose 13 from power nozzle 16 to vacuum cleaner body 10. As shown, cord 17 is attached to the exterior surface of hose 13 by hose straps 19. It is also possible for cord 17 to be molded into hose 13.

As shown in FIGS. 2, 4, 5 and 6, hose 13 has a coupling 20 for connection of hose 13 to orifice 14. When coupling 20 is inserted into orifice 14, spring clips 50 engage lip 51 formed in the interior of orifice 14 (see FIG. 5), holding hose 13 in place. Hose 13 can be released by exerting inward pressure on coupling-releasing buttons 52, which disengages clips 50 from lip 51. Lip 51 extends 360° around the interior of orifice 14, so that

coupling 20 can be inserted in any rotational orientation, and can be freely rotated while inserted.

Power nozzle cord 17 has a free portion, shown fragmentarily at 21 in FIGS. 2 and 6, which extends beyond coupling 20 and terminates in male plug 22 which attaches to female receptacle 18. Plug 22 has flat "hot" and "common" prongs 60 and a round "ground" prong 61 much like an ordinary three-pronged grounded plug for connection to an ordinary electrical wall outlet. However, as a safety feature, the size and spacing of the prongs of plug 22, and the respective slots (not shown) in receptacle 18, are selected so that plug 22 cannot be inserted in an ordinary wall outlet, nor can an ordinary plug be inserted in receptacle 18.

Power nozzle cord 17 is connected to receptacle 18 only when power nozzle 16 is in use. At other times cord 17 is left free, device 62 is removed and coupling 20 is allowed to rotate freely within orifice 14 when hose 13 is pulled, for example, to move body 10 about the floor. This freedom of rotation prevents kinking of hose 13 which might otherwise occur as hose 13 is pulled in different directions.

When power nozzle 16 is in use, rotation of coupling 20 could cause free cord portion 21 to wrap around coupling 20 and eventually to disengage from receptacle 18, interrupting power to nozzle 16. In addition, because hose 13 is flexible, it expands longitudinally as it is pulled by the user. This expansion applies longitudinal tension to power nozzle cord 17, including free portion 21 and plug 22, which could cause plug 22 to disengage from receptacle 18. To prevent disengagement of plug 22 from receptacle 18 in either manner, device 62 is provided.

Device 62 comprises a ring 63 having apertures 64 in its annular wall and a tongue 65 and a fork 66 projecting radially from the ring 63. The fork 66 includes two closely-spaced radial projections 66a, 66b. The width of slot 66c between projections 66a and 66b is slightly greater than the diameter of cord 17. The number and locations of apertures 64 correspond to the number and locations of coupling-releasing buttons 52. An enlarged portion 67 disposed on cord 17 and posts 68 protruding from lower body section 12 adjacent orifice 14 cooperate with device 62 as described below.

In use, ring 63 of device 62 is slipped onto coupling 20, over clips 50, until coupling-releasing buttons 52 engage indentations or apertures 64. The engagement of buttons 52 with apertures 64 prevents rotation of coupling 20 and hose 13 relative to device 62. Coupling 20 is then inserted into orifice 14 at such an orientation that tongue 65 is disposed between posts 68, which are spaced only slightly farther apart than the width of tongue 65, as shown in FIG. 3. This orientation prevents rotation of device 62 relative to lower body section 12. Because device 62 is already prevented from rotation relative to coupling 20 and hose 13, coupling 20 and hose 13 are prevented from rotation relative to lower body section 12. Disengagement of plug 22 from receptacle 18 because of the wrapping of free portion 21 of cord 17 around coupling 20 is thereby prevented. The possibility of kinking of hose 13 because of the restraint against rotation is considered less important than the prevention of disengagement of cord 17 from receptacle 18. It is to be understood that other means can be provided to engage tongue 65 in place of posts 68. For example, a slot could be provided

in lower body section 12 for the entry of lip 65a of tongue 65.

To prevent the second mode of disengagement, caused by longitudinal tension on the cord 17 because of longitudinal expansion of hose 13, enlarged portion 67 on cord 17, shown here as a sphere, cooperates with fork 66. Sphere 67 is placed between fork 66 and lower body section 12, with cord 17 resting in slot 66c. Because of this arrangement longitudinal tension on cord 17 is borne by fork 66 and sphere 67. To maintain sphere 67 in position between fork 66 and lower body section 12, projections 66a and 66b each have lips 66d, 66e which extend toward body section 12 and prevent vertical and horizontal displacement of sphere 67.

In addition, the portions of cord 17 immediately adjacent either side of sphere 67 define an angle 69 substantially less than 180° with each other. Preferably angle 69 is approximately 90°. This serves to change the direction of the cord so that free portion 21 is in better alignment for engagement with receptacle 18. If angle 69 were exactly or nearly 180°, cord 17 would have to be bent to align it for engagement with receptacle 18, and resulting elastic restoring forces in the bent portions of the cord would tend to straighten the cord. These forces could cause sphere 67 to be displaced from engagement with fork 66. The function of fork 66 in preventing disengagement of plug 22 from receptacle 18 is therefore improved by the provision of angle 69.

Thus, a device is provided which will prevent both disengagement of a hose-mounted cord from a receptacle on a separate body because of rotation of the hose relative to the body, and disengagement of the cord from the receptacle because of longitudinal tension on the cord caused by longitudinal

expansion of the hose. One skilled in the art will recognize that the invention disclosed herein can be practiced in other than the embodiments described, and this invention is not limited by the details of those embodiments, but only by the claims which follow.

CLAIMS:

1. A hose adapted for attachment to a body having an orifice and a pair of spaced-apart projections, said hose characterized by:

a tubular section (13), at least a portion of said tubular section (13) being longitudinally expandable and transversely flexible;

a coupling (20) at one end of said tubular section (13) for coupling said hose to an orifice (14);

an electrical conductor (17) associated with said tubular section (13) for conducting electrical power along said hose from a receptacle (18) on a body (10) to which said one end of said hose is coupled, said conductor (17) having an enlarged portion (67); and

means (62) removably associated with said coupling (20) and adapted for cooperating with said coupling (20), with such a body (10) to which said one end of said hose is coupled, and with said enlarged portion (67), for preventing disengagement of said conductor (17) from such a receptacle (18) because of either longitudinal tension on said conductor (17) caused by longitudinal expansion of said flexible portion of said tubular section (13) or rotation of said coupling (20) in an orifice (14) in which said coupling (20) is received.

2. The hose of claim 1, characterized in that:

said coupling (20) is characterized by means for releasing said coupling (20) from such an orifice (14), said coupling-releasing means characterized by a coupling-releasing button (52) projecting from said coupling (20); and further characterized in that

said disengagement-preventing means (62) is characterized by:

a ring (63) disposed on said coupling (20) adjacent such an orifice (14), said ring (63) having means (64) for engaging said coupling-releasing button (52) for preventing rotation of said ring (63) relative to said hose,

a first projection (65) from said ring (63) for cooperating with such spaced-apart projections (68) of a body (10) to which said hose is coupled, for preventing disengagement of said conductor (17) from such a receptacle (18) caused by rotation of said hose in the orifice (14) of the body (10), and

second and third projections (66a, 66b) from said ring (63), said conductor (17) disposed between said second and third projections (66a, 66b), said enlarged portion (67) disposed between said second and third projections (66a, 66b) and said one end of said hose, for preventing disengagement of said conductor (17) from such a receptacle (18) caused by longitudinal tension on said conductor (17) caused by longitudinal expansion of said flexible portion of said hose.

3. The hose of claim 2, characterized in that said enlarged portion (67) is a sphere.

4. The hose of claim 3, characterized in that the portions of said conductor (17) immediately adjacent said enlarged portion (67) define an angle (69) substantially less than 180° with each other.

5. The hose of claim 4, characterized in that said angle (69) is approximately 90°.

6. The hose of claim 2, characterized in that said second and third projections (66a, 66b) comprise lips (66d, 66e) extending orthogonally therefrom for cooperation with said enlarged portion (67).

7. An anti-disengagement device for preventing disengagement from an electrical receptacle

of an electrical conductor associated with a hose having a tubular section, at least a portion of which is longitudinally expandable and transversely flexible, and having a coupling for connecting the hose to a body on which the receptacle is located, the coupling having a coupling-releasing button projecting therefrom for releasing the coupling from such a body, said anti-disengagement device characterized by:

a ring (63) for fitting over one end of a hose (13);

means (64) for engaging such a coupling-releasing button (52) on such a coupling (20) for preventing rotation of said ring (63) relative to the hose (13);

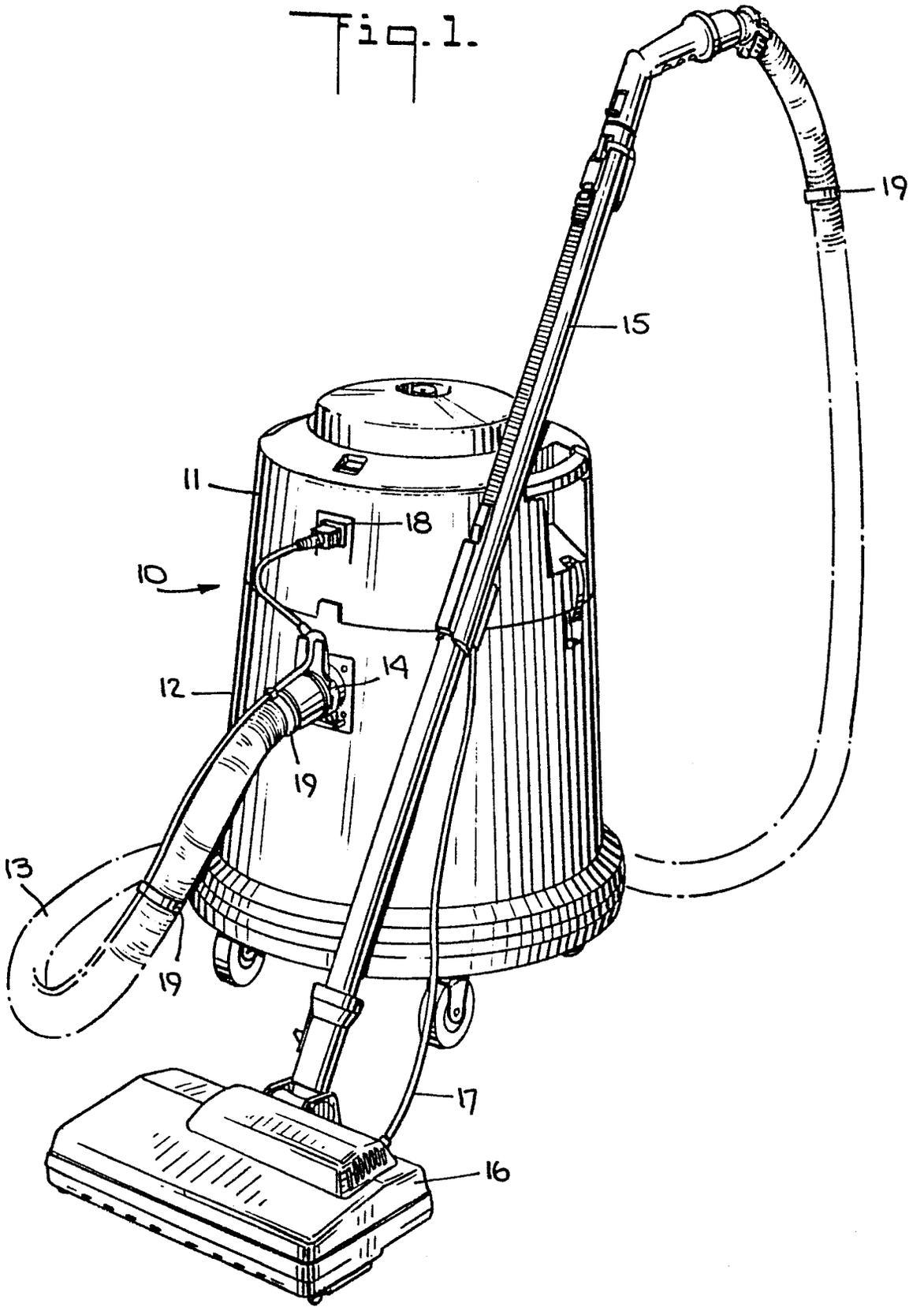
a first projection (65) from said ring (63) adapted for cooperating with two spaced-apart projections (68) from such a body (10) for preventing rotation of the hose (13) in an orifice (14) of the body (10) in which the hose (13) is received, thereby preventing disengagement of such a conductor (17) from such a receptacle (18) caused by rotation of such a hose (13) relative to such a body (10); and

second and third projections (66a, 66b) from said ring (63), for receiving such a conductor (17) between said second and third projections (66a, 66b) and for cooperating with an enlarged portion (62) of such a conductor (17) for preventing the disengagement of such a conductor (17) from the body (10) because of either longitudinal tension on the conductor (17) caused by longitudinal expansion of the hose (13) or rotation of the hose coupling (20) in the orifice (14).

8. The device of claim 7, wherein said second and third projections (66a, 66b) are character-

ized by lips (66d, 66e) extending orthogonally therefrom for cooperation with said enlarged portion (67).

Fig. 1.



0136894

Fig. 2.

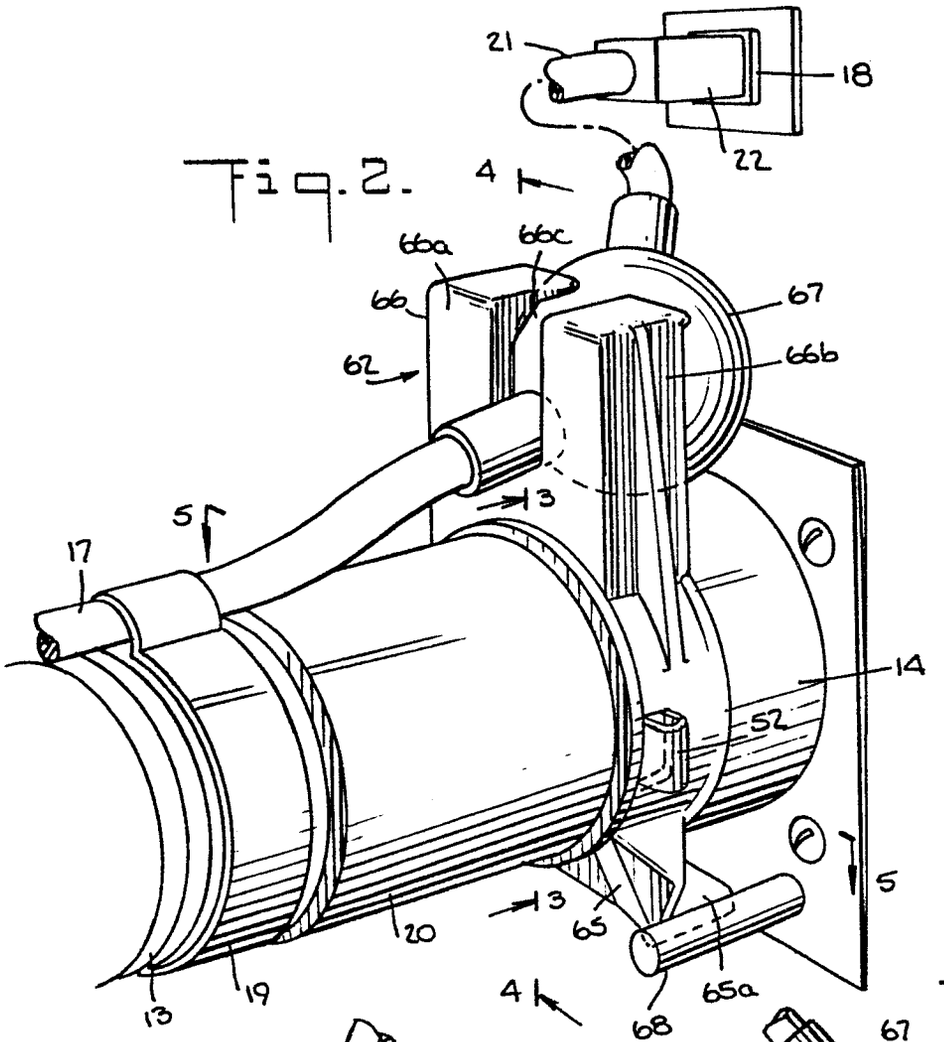


Fig. 3.

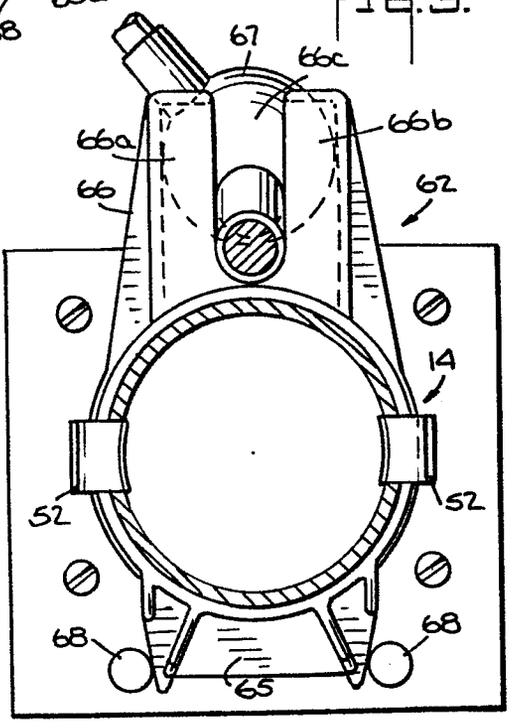
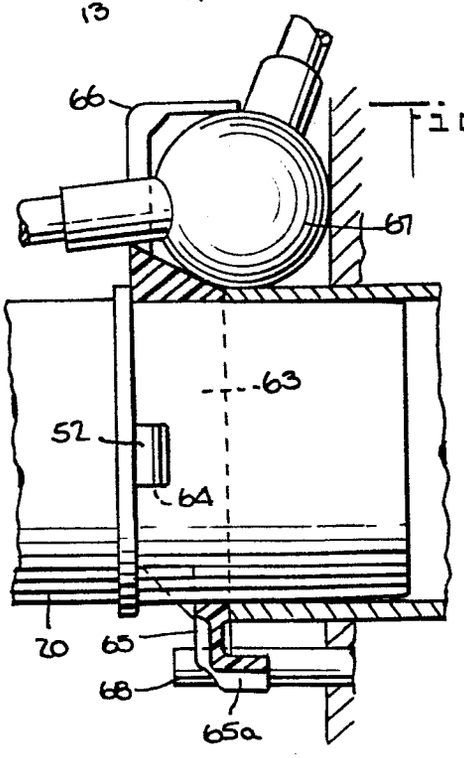


Fig. 4.



0136894

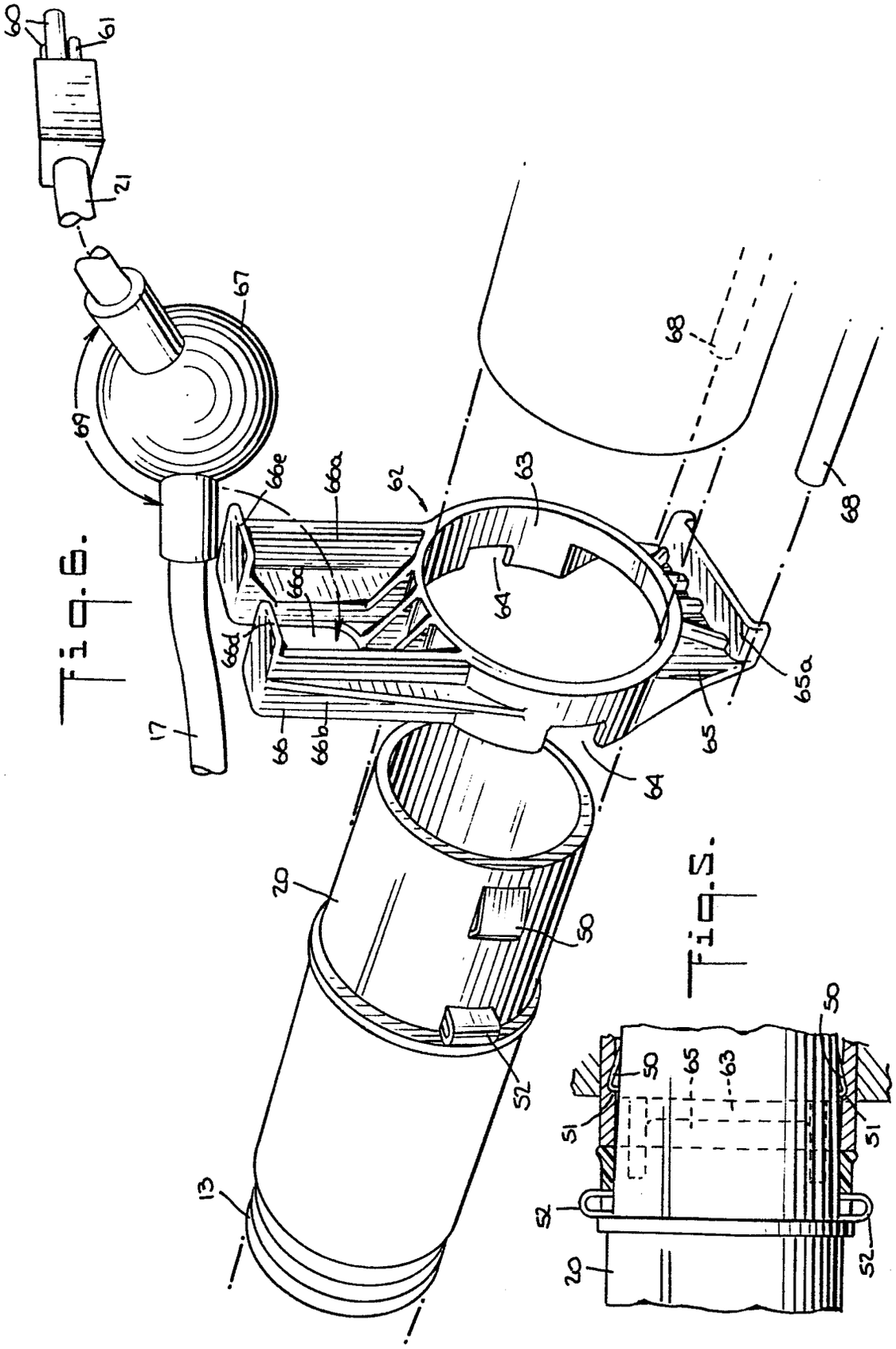


Fig. 6.

Fig. 5.