



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 621 128 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.02.2006 Bulletin 2006/05

(51) Int Cl.:
A47L 13/36 (2006.01)

(21) Application number: **05016292.4**

(22) Date of filing: **27.07.2005**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**
Designated Extension States:
AL BA HR MK YU

(71) Applicant: **Dassi, Francesco**
28100 Novara NO (IT)

(72) Inventor: **Dassi, Francesco**
28100 Novara NO (IT)

(74) Representative: **Fisauli, Beatrice A. M.**
Con Lor SPA
Via Renato Fucini, 5
20133 Milano (IT)

(30) Priority: **28.07.2004 IT NO20040003**

(54) Orbiting rings beater for textiles

(57) This invention refers to an electromechanical device to beat and clean carpets, sofas, mattresses, etc., and has the peculiarity of performing said function by

means of orbiting rings (21), centrifuged into orbit by the rotation of a plate hub (20), and by a unit that provides suction and collection of the residue removed.

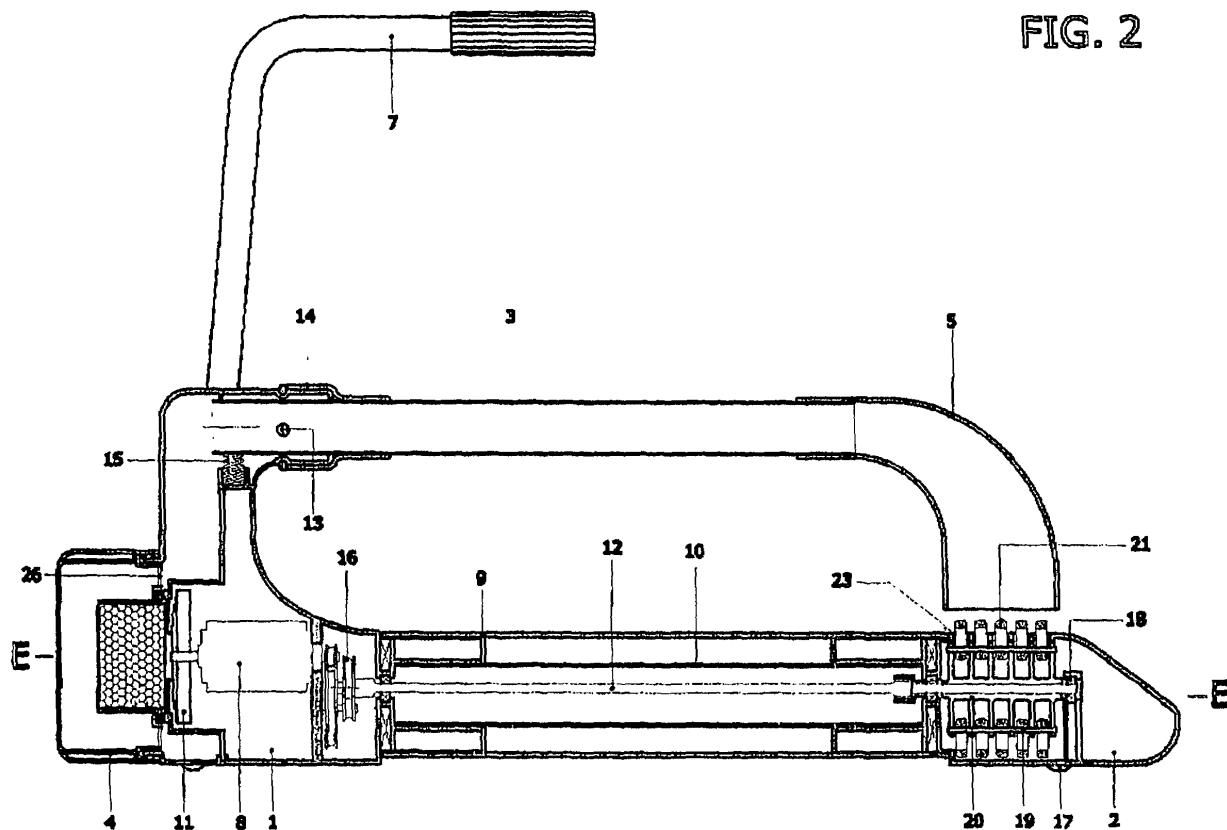


FIG. 2

EP 1 621 128 A2

Description

[0001] As is known, various types of electric carpet beaters are available on the market. Most of these devices perform the beating function by rotating a roller with one or more protrusions along its diameter. These protrusions interrupt the constant profile of the roller, and thus, through rotation, make the device bounce, causing a dropping and lifting action that strikes the carpet below. The roller generally has a series of brushes mounted spirally along its diameter that are designed to remove any residue deposited on the wool of the carpet. Others perform the beating action, using the action of cams to pick up a rigid strip held by a spring which is then released and beats against the wool of the carpet.

[0002] Others clean carpets using almost exclusively a brushing function with a powerful air suction action.

[0003] In any event, all known devices are equipped with a system to suction out and collect the detritus removed.

[0004] Although these carpet beating devices have a wealth of suction action, they are greatly lacking in beating action, as in every case examined, this action is very slow, with very heavy, insufficiently "sharp" blows that do not give the warp and weft of the carpet the vibration necessary to thoroughly remove the dust and particles of dirt hidden in the wool of the carpet. Moreover, both heavy beating action and the mechanical motion of brushes on the wool of the carpet can be rough on the carpet, damaging what is often an extremely valuable object. In effect, it is this very system of beating that has a conceptual defect, in that beating the "right" side of the carpet, that is the "wool," does not help pull up particles of dirt to be suctioned, but rather helps them penetrate deeper, so that the brushing and suction action only have an outward, superficial effect.

[0005] To support this criticism, suffice it to consider that a carpet essentially consists of a normal textile product, woven in warp and weft, to which little tufts of yarn are then densely knotted. These little tufts are the "right" side of the carpet and are the "wool," while the backs of the knots are on the other side (the "back side").

[0006] The textile product, thus structured, is much like a dense forest, where the branches and foliage are the "wool" and the trunks and roots are the knots. Using this rather apt comparison, think what would happen if, with the intention of removing any detritus in the bushes, that is leaves, twigs, etc., we beat and swept from the top of this woods. It's easy to see that the possible result would be damage caused by beating, removal of what is in the foliage through brushing, and collection by means of suction of what was removed. This way, it is unlikely that we would have cleaned the brush, because despite the actions used, the residue that falls to the bottom would not have been able to get past the obstacles that separated it from the surface.

[0007] This picture not only supports a conviction that criticism of the aforementioned devices is justified, it also

spurs us to consider the good work accomplished by classic manual carpet beaters. Apart from the effort, inconvenience and time it requires, this palm-shaped stick that is beaten on the back side of the carpet not only reduces any damage, but effectively removes the dirt hidden deep within the "wool," causing it to rise to the surface and then dispersing it into the air as the carpet continues to be beaten.

[0008] The task that the invention performs is to eliminate the inconveniences noted above and enhance the advantages, by creating an electromechanical device to beat and clean carpets, sofas, armchairs, mattresses, etc., that performs these functions gently and effectively. That is, it is capable of beating the "back" of the carpet very frequently and lightly in order to cause the warp and weft and the knots of the carpet itself to vibrate, releasing dust and detritus hidden in the bottom and bringing them up to the surface, past the "wool," where they can be easily suctioned into a collection bag.

[0009] As part of this task, one purpose and others that will be explained more clearly below, are achieved by the electromechanical carpet beater described in the invention, characterized by a system of beating the "back" of the carpet, a primary suction system that acts from the opposite side in the corresponding direction, in order to directly suction the dust and residue removed by the beating action on the other side, and a secondary suction system that acts from where the beating itself takes place.

[0010] Another purpose of the invention is to produce a device to beat carpets, etc., that has a delicate, effective beating system. This purpose is achieved by sending a series of rings orbiting in circular motion in interference with the "back" of the carpet, thus striking each time they move around their orbit.

[0011] Another purpose is to produce a device according to the invention, that has a reliable system for suctioning the detritus removed. For this purpose, it has a primary suction point located directly over the beating system and a secondary one that acts from the outlets of the beating system.

[0012] An additional purpose of the invention is to provide a device that can beat carpets on the ground and a version that can beat hanging carpets and other textile items.

[0013] Thus, with regard to all the inventive characteristics cited, for this purpose a model will be created to perform this function, equipped with a steering handle and wheels so it can be moved on the floor under the carpet placed on it. Useful in the second case is a model that is lighter and less bulky, so it can be easily picked up and pointed. In this version, of course, there will be no handle or wheels (other small details will be indicated later).

[0014] The purposes above, as well as those mentioned and others, which will become more apparent below, are achieved by an electromechanical device for beating and cleaning rugs, sofas, armchairs, mattresses, etc. characterized by the fact that it includes the follow-

ings.

[0015] A primary casing that contains the electric motor, the reduction gear, the main support for the transmission shaft and the suction chamber. The structure of this first casing is assembled so that it can provide: hooks to detach the waste collector, positioning (of both the upper suction tube and the lower suction pipes), the housing for the first pair of wheels, the attachments for the central tube and the hinge for the handle. The electrical parts such as the cord, etc., will also be housed here.

[0016] A second casing, the head, will hold the second support for the transmission shaft and the plate hub with orbiting rings. The structure of this second casing is designed to be able to provide hookups for the central tube and for the lower suction pipes, as well as housing for the second pair of wheels.

[0017] The two casings are solidly connected by a central tube that contains the transmission shaft.

[0018] Additional features, clarifications and advantages will be further specified in the description of a form of execution, preferred but not exclusive, that includes an electromechanical beater with orbiting rings, whose execution is illustrated for indicative but not limiting purposes, and which uses the aid of the enclosed design where:

- Fig. 1 shows the "trolley" version of the device, in a longitudinal full cross-section, following lines E-E in Fig. 2 and other transverse cross-sections, following lines B-B, C-C and D-D in Fig. 1.
- Fig. 2 shows the device, again in the "trolley" version, with a full longitudinal cross-section, following lines A-A in Fig. 1.
- Fig. 3 shows the "portable" version of the device, in a full longitudinal cross-section following lines E-E in Fig. 4 and other transverse cross-sections, following lines B-B, C-C and D-D in Fig. 3.
- Fig. 4 shows the device, again in its "portable" version, in a full longitudinal cross-section, following lines A-A in Fig. 3, and in a partial longitudinal cross-section, following lines A-A in Fig. 3.
- Fig. 5 shows the "trolley" version of the device, in a cross-section following to lines D-D in Fig. 1 and the "portable" version in three cross-sections following lines D-D in Fig. 3.
- Fig. 6 shows the "trolley" version of the device, in side and top views, while beating and cleaning a carpet on the floor.
- Fig. 7 shows the "portable" version of the device, in top view and partial cross-section, while beating and cleaning a hanging carpet.

[0019] With regard to the cited figures, in the cross-sections shown in figures 1 and 2, we can see the casing (1) whose central portion contains the motor (8), whose shaft moves the fan (11) at one end and the action of the reducing gear (16) and the transmission shaft (12) at the other. The removable filter holder (4) is attached

on the outside of the casing (1).

[0020] The longitudinally opposite side contains the primary support for the transmission shaft (12), as well as means to attach to an end of the central tube (10) and the ends of the secondary suction tubes (6). The lower portion holds the housing for the wheels (17), while the upper portion supports the end of the main suction tube (3), hinged to the pin (13). The main section tube (3) assumes its functional position: driven back by the spring (15), it connects hermetically to the neck of the casing (1) through a rubber hood (14) and terminates at the other end, supporting the stem (15).

[0021] Again in figures 1 and 2, we can see the casing head (2), containing the plate hub (20) which, taking on the motion from the transmission shaft (12), can rotate on bearings (18) and drag the rings into a circular orbit (21), locked into a tangential escape from the pins (19). The outer edge of the casing (2) is soft, so that it can slide under the carpet. The opposite end can attach to the other end of the central tube (10) and those of the secondary suction pipes (6).

[0022] The secondary suction pipes (6) and the central tube (10) not only connect the respective ends to casings (1) and (2), but also account for the structural compactness of the device. They also transport air suctioned from the top (2) to the connection filter (4), while the central tube has the task, through the internal diameter, of running to the transmission shaft (12), with the outer one, with the rotating slip for the free-moving drum (9).

[0023] Figures 3 and 4 show the "portable" version of the device, according to the invention, where, as is immediately apparent, except for the absence of the handle, wheels, secondary suction rods and free-moving drum, all the inventive content and principal solutions remain the same as those described in figures 1 and 2 for the "trolley" version.

[0024] In Fig. 4, in full longitudinal cross section, following lines A-A in Fig. 3, we can see the central tube (10), which in addition to connecting casings (1) and (2), also allows for the passage of air suctioned from the inlets (23), of the casing head (2), to the neck (28), of the casing (1). From here, through the passages (26), the air goes to the collection filter (4). In (25) we can see the catch at the axial rotation of the casing head (2). The partial longitudinal cross section shows the casing head (2), rotated 180 degrees, and the cap (24), which, replacing the lug (5), obstructs the passage of the main suction pipe (3), forcing the entire flow of air pulled in by the fan to go through the tube (10).

[0025] In Fig. 5, in a cross-section following lines D-D of Fig. 1, we see the casing head (2) of the "trolley" version. Inside, this contains the plate hub (20), traversed by pins (19) that can keep the rings in circular orbit (21). In (23) we see the inlets that allow both the external rotating passage of the rings (21), and the entry of suctioned air. We also see one of the wheels (17), mounted in the housing. Also in Fig. 5, in three cut-aways, we see the schematic representation of the rotating sequence of

the plate hub and the centrifuging in orbit of the rings in the "portable" version. Where, in A and B, the rings (21) orbit in maximum diametral extension, moving to the outside through the inlets (23), in C, it is possible to see the deviation from the orbit caused by striking the interfering surface.

[0026] In Fig. 6, in side and top views, the "trolley" version of the device can be seen, according to the invention, as it beats and cleans a carpet placed on the floor.

[0027] In the top view, it seems dear that it is no problem to beat and clean even an infinitely long carpet because, by virtue of the radius between the beating section and the suction section, the device can be slid around, beating below and suctioning above, with no limits in length.

[0028] The side view shows how, as the part of the carpet that has already been cleaned as the machine passes over it is rolled or folded back on itself, above the free-moving drum, strip by strip the entire surface of the carpet is cleaned. Obviously, the last operation described will be useful only for especially wide carpets, as the radius of the device is wide enough to extend beyond the middle of average carpets, which account for most cases. In all these cases, it is sufficient to clean one part and then go on to the next.

[0029] In Fig. 7, in the top view and cross section, we can see the "portable" version of the machine, according to the invention, with a carpet (27) hanging on a frame that can be attached to balconies, windowsills, railings, etc. What was noted earlier regarding the length and width of carpets is totally feasible here as well.

[0030] The invention as set out consists of different elements, some of which may be changed, as long as they follow the basic invention and achieve the desired purposes. In any solution adopted, the following will be examined.

[0031] As noted, the machine is considered a beater and cleaner, according to the invention, in a simplified general explanation, i.e. a structure consisting of two casings connected to each other by a tubular piece.

[0032] The first casing performs the suctioning function, the second, the beating function.

[0033] The first suctioning function has a tube with a special end shape that extends to reach the top of the beating section.

[0034] Placing a carpet on the beating section, the carpet is struck by a series of blows from the orbiting rings. Dust and detritus removed by the action are pushed directly to the suctioning inlet.

[0035] Now, starting from the above situation, using its steering handle, the "trolley" machine can be moved under the carpet to cross the entire length and width permitted by the radius between the suctioning and beating parts.

[0036] Having reached this limit, just fold or roll the cleaned portion over the free-standing drum and continue along other longitudinal portions until completed. In addition, for carpets of medium width, as noted, it is sufficient

to move the machine from one edge to the other to reach the total surface.

[0037] The main sectioning tube is hinged to the casing from which it derives, which permits a certain vertical movement away from the beating section. This compensates for any differences in thickness or folds in the carpets, and facilitates insertion between the two elements, suctioning and beating.

[0038] The movement of the "trolley" version of the machine is aided by its spherical wheels, while its ability to slip and move under the carpet is facilitated by its form and by the mounted drum, which is free to rotate on the back of the central tube. In fact, as this runs along the entire length of the radius, it contributes to reducing friction derived from the weight of the hanging carpet.

[0039] The suctioning action is performed by the fan, mounted on a motor that pulls in the flow of air from both the main suctioning tube, positioned directly above the beating face, and the passage inlets of the rings; the fan carries the dust and detritus removed to the holding and collecting filter.

[0040] The electric motor provides the beating action, with a circular movement that activates both the suctioning fan and, through the reducer gear, the transmission shaft. The shaft, after moving throughout the interior of the central tube, ends in a coupling with the plate hub. Its movement places the rings mounted on it into circular orbit.

[0041] The orbiting action of the rings occurs because they are mounted so that they can slide between the surfaces of the plates, and are kept between them by a pin running longitudinally between the hub plates and the internal diameter of the rings.

[0042] Thus mounted, the rings can freely move between the surfaces of the plates to the extent of the difference between the internal diameter of the ring and the diameter of the pin.

[0043] When the hub begins to rotate, the rings are centrifuged, and, making up the distance between the diameters noted, expand in the circumferential path imposed.

[0044] In this dynamic situation, the rings act as a mass thrown freely into space; thus, any obstacle in their path will cause them to deviate from their trajectory.

[0045] Put briefly, upon each rotation of the hub, the centrifuged ring strikes the carpet, from which it is bounced toward the center, then taken up by the pin, which brings it back into the centrifuging orbit. This operation is repeated cyclically as long as movement continues.

[0046] As indicated in the previous pages of literature and designs for the beating and cleaning machine, there is a "trolley" version that is useful for beating and cleaning carpets placed on the floor, and a "portable" version that is useful for beating and cleaning carpets that are hanging, as well as other textile products.

[0047] In their essential inventive concept, the two versions are exactly the same. The primary difference be-

tween the "trolley" version and the "portable" version is that the latter does not have maneuvering mechanisms that are of no use for a machine that must be easily and manually held up. Therefore, it will not have a handle, wheels, the free-moving drum and the secondary suction rods. Another difference is in the secondary suction system. In fact, in this version, the suctioned air will follow the entry route from the inlets passing through the rings, and from them to the central tube to a chamber in the casing, ending up in the collection filter.

[0048] An additional beneficial difference is that the "portable" machine can beat and clean even very thick items, such as sofas, armchairs, mattresses, etc. To make the machine suitable for this additional function, the beating head should be rotated 180 degrees and the lug replaced with a hermetic cap, the end of the main suction tube. This will make it possible to beat the entire surface exposed and to suction, with full flow potential, through the inlets of the beating head placed in a flat position.

[0049] Obviously, for the functions outlined, it is important to emphasize the need for various factors such as:

- stabilized continuous suction that suitably carries the detritus collected from beating;
- a system for filtering the suctioned air and collecting residues, that can be removed and inspected;
- a beating system that acts on the back of the carpet, and a main suction flow that acts in direct correspondence to the beating point on the other side;
- a diversion of the suctioning flow that enters the inlets of the beating head.

[0050] As conceived, the machine is subject to modifications and variations that fall within the inventive sphere. All details can be substituted with other technically suitable elements. In practice, the materials used, provided they are compatible with the specific use, as well as the dimensions and the contingent forms of the invention, can change according to need.

Claims

1. Device for beating carpets, sofas and upholstery and fabrics in general, of the type that provides a first means designed to exercise a mechanical action on the surfaces to be cleaned, then extraction of dust and detritus that lodges among the fibers that constitute these fabrics, associated with second means designed to aspirate said dust and detritus extracted by said mechanical action, **characterized by** the fact that these first means designed to exercise a mechanical action on the surfaces to be cleaned, for the extraction of dust and detritus, include masses placed in rapid rotation along a trajectory, and these masses strike against said surface to be cleaned and operate a beating action against it.

2. Device according to claim 1, **characterized by** the fact that said masses, placed in rapid rotation along said trajectory, include a number of rings (21), mounted loosely through pins (19) on a plate hub (20), third means designed to place said plate hub (20) in rapid rotation being provided.

3. Device according to claim 2, **characterized by** the fact that said third means designed to place this plate hub (20) in rapid rotation includes a motor (8) connected to said plate hub (20) through a transmission shaft (12).

4. Device according to claim 1, **characterized by** the fact that said second means designed to aspirate said dust and detritus that are extracted by said beating action, includes a tube (3, 5) that connects a suction fan (11) with a part of the carpet or fabric to be cleaned placed in correspondence with said beating means, with said carpet or fabric placed between said first beating mechanism and said tube (3, 5).

5. Device according to claim 1, **characterized by** the fact that said second means designed to aspirate said dust and detritus extracted by said beating action include a head (2), containing said first beating means, connected to said suction fan (11).

6. Device according to claim 5, **characterized by** the fact that said head (2) is connected to said suction fan (11) through a tube (10) that encloses said transmission shaft (12).

7. Device according to claims 4 to 6, **characterized by** the fact that said suction fan (11) is at the same time connected to said tube (3, 5) and said head (2), containing said first beating mechanism.

8. Device according to claim 7, **characterized by** the fact that closing means (24) applied to said tube (3) are provided, suitable to effect the entire suction through said head (2) that encloses said first beating means.

9. Device according to at least one of claims 1 to 8, **characterized by** the fact that said head (2) is revolving in order to guide the action of said first beating means.

10. Device according to at least one of claims 1 to 8, **characterized by** the fact of a casing (1), containing said motor (8), connected with said head (2), through elements with an elongated form (9, 10) designed to create distance between the casing and head (2), as an elongated tube is provided (3), designed to bring the suction action in front of the head (2), in order to be able to effect the beating action on one side of the carpet to be cleaned and contemporane-

ous suction action from the opposite side, in an area corresponding to said first beating means, said elements having an elongated form (9, 10) and said tube (3) being sufficiently long to reach parts of the carpet to be cleaned that are far from the edges.

5

11. Device according to at least one of claims 1 to 9, **characterized by** the fact a free-moving drum (9) is provided, revolving around an axis that substantially coincides with the axis of said transmission shaft (12), designed to accommodate a rolled carpet (27), permitting sliding with low friction of the device as the carpet is being cleaned (27).
12. Device according to at least one of claims 1 to 10, **characterized by** the fact that wheels (17) in the lower portion are provided, suitable to encourage movements below the carpet to be cleaned.
13. Device according to claim 11, **characterized by** the fact that said wheels (17) are ball wheels.

10

15

20

25

30

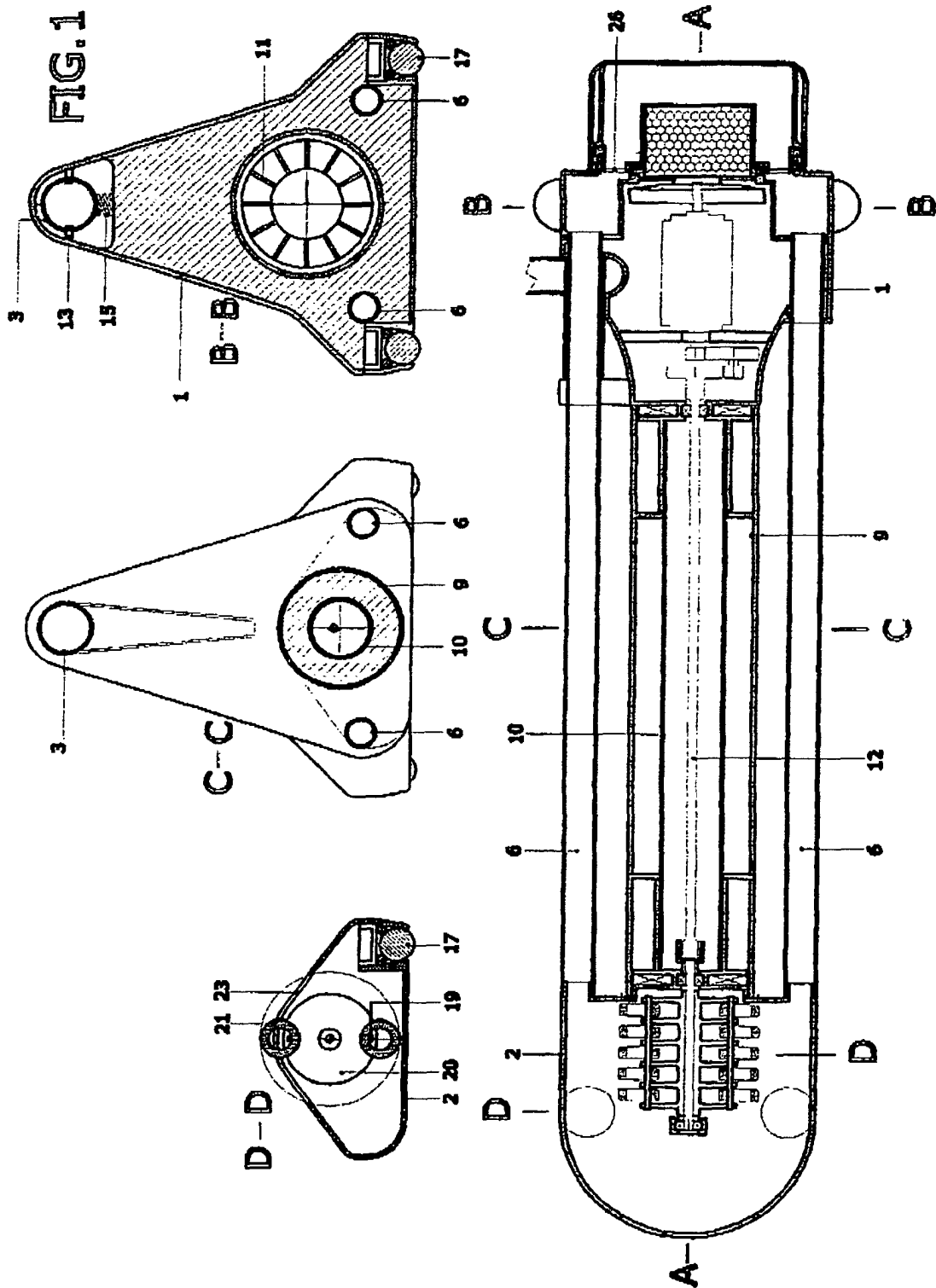
35

40

45

50

55



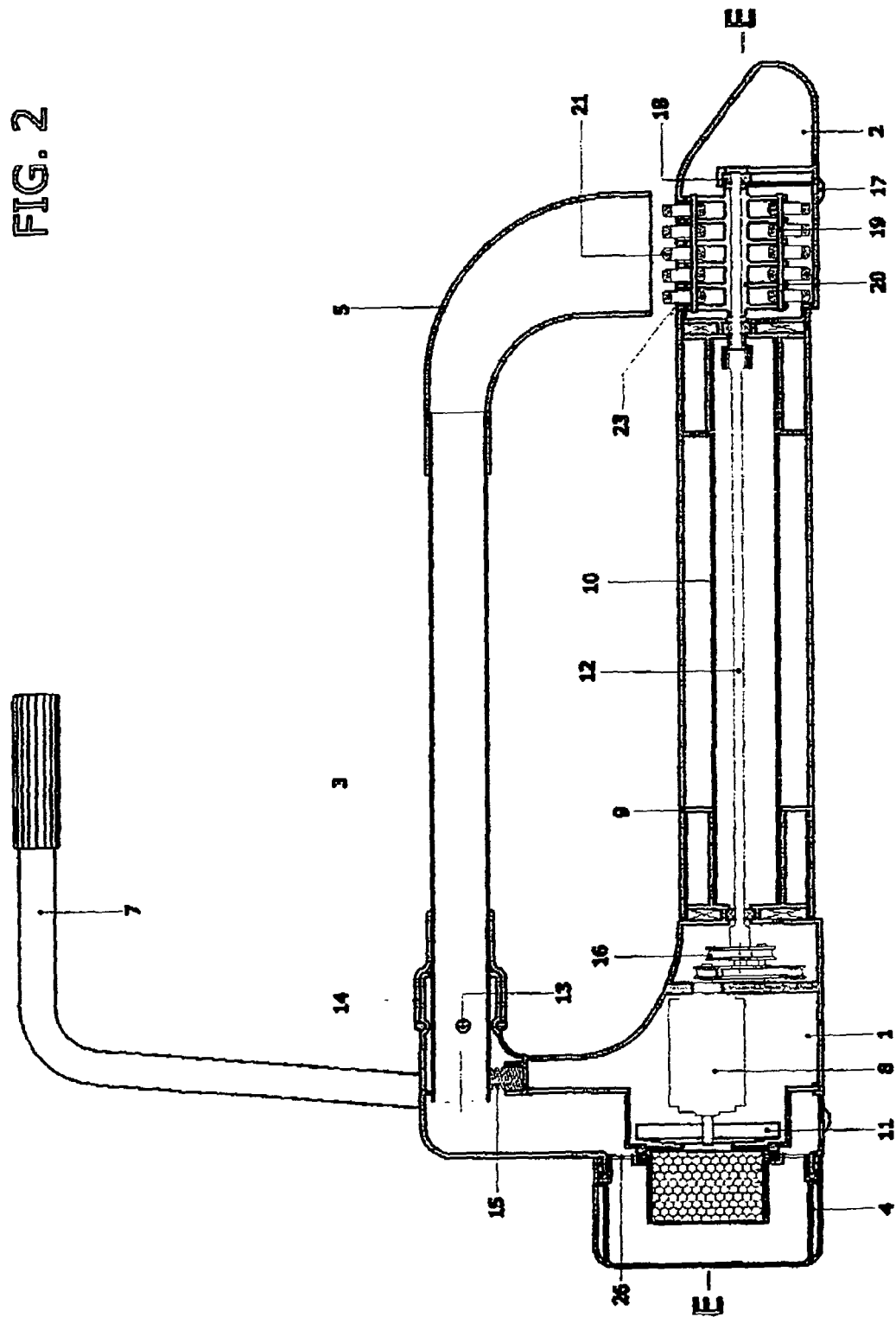
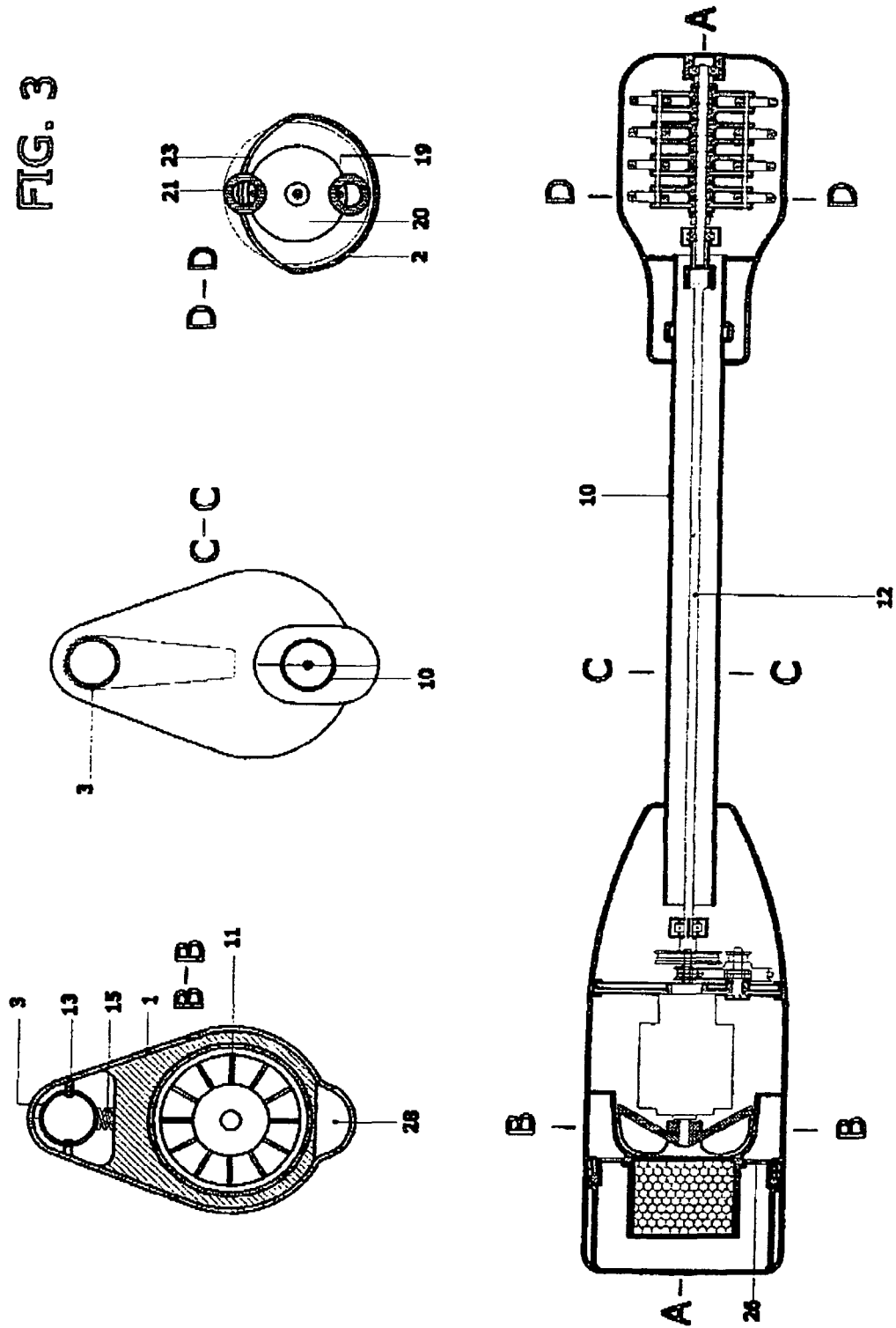
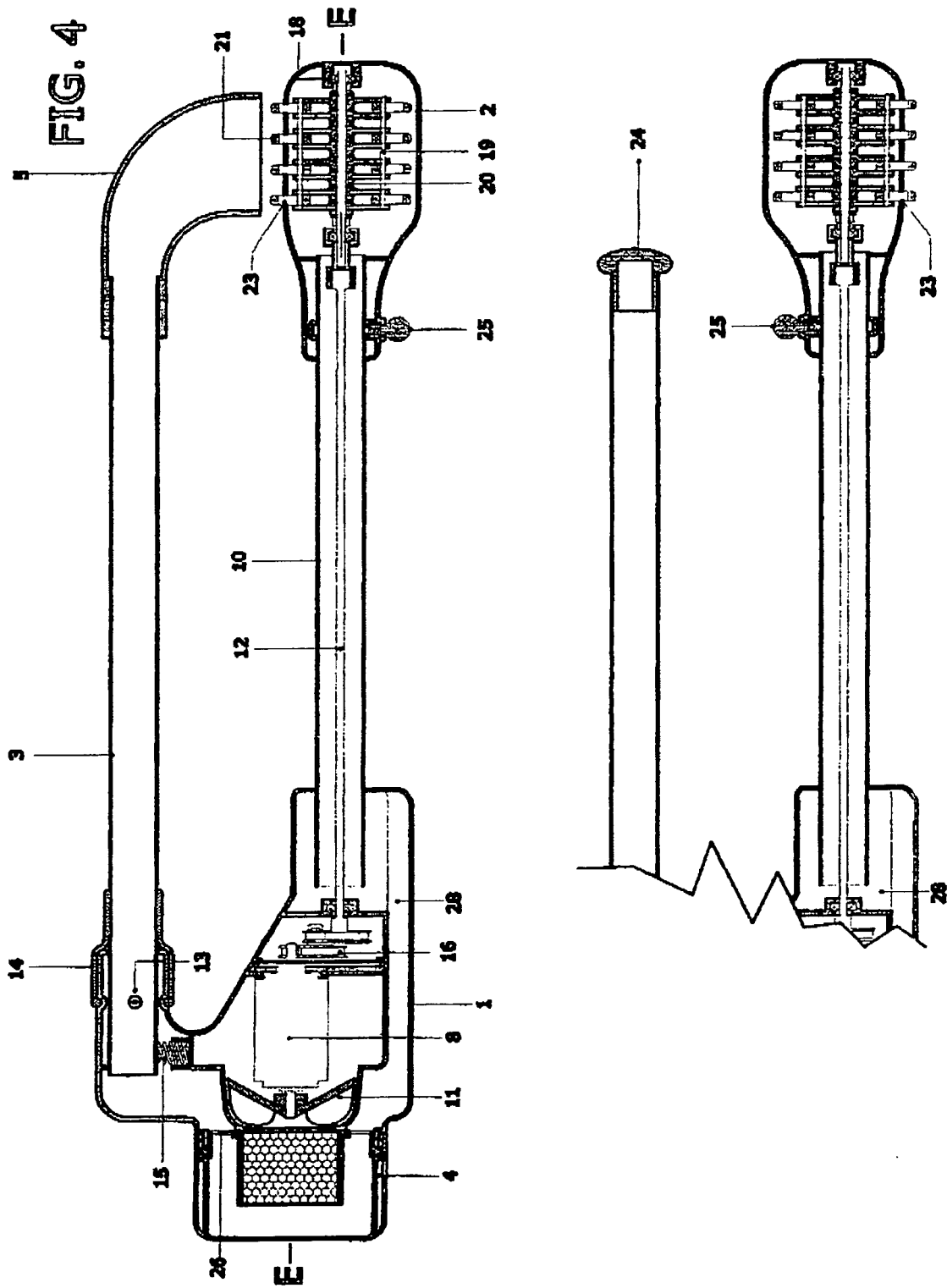


FIG. 3





56

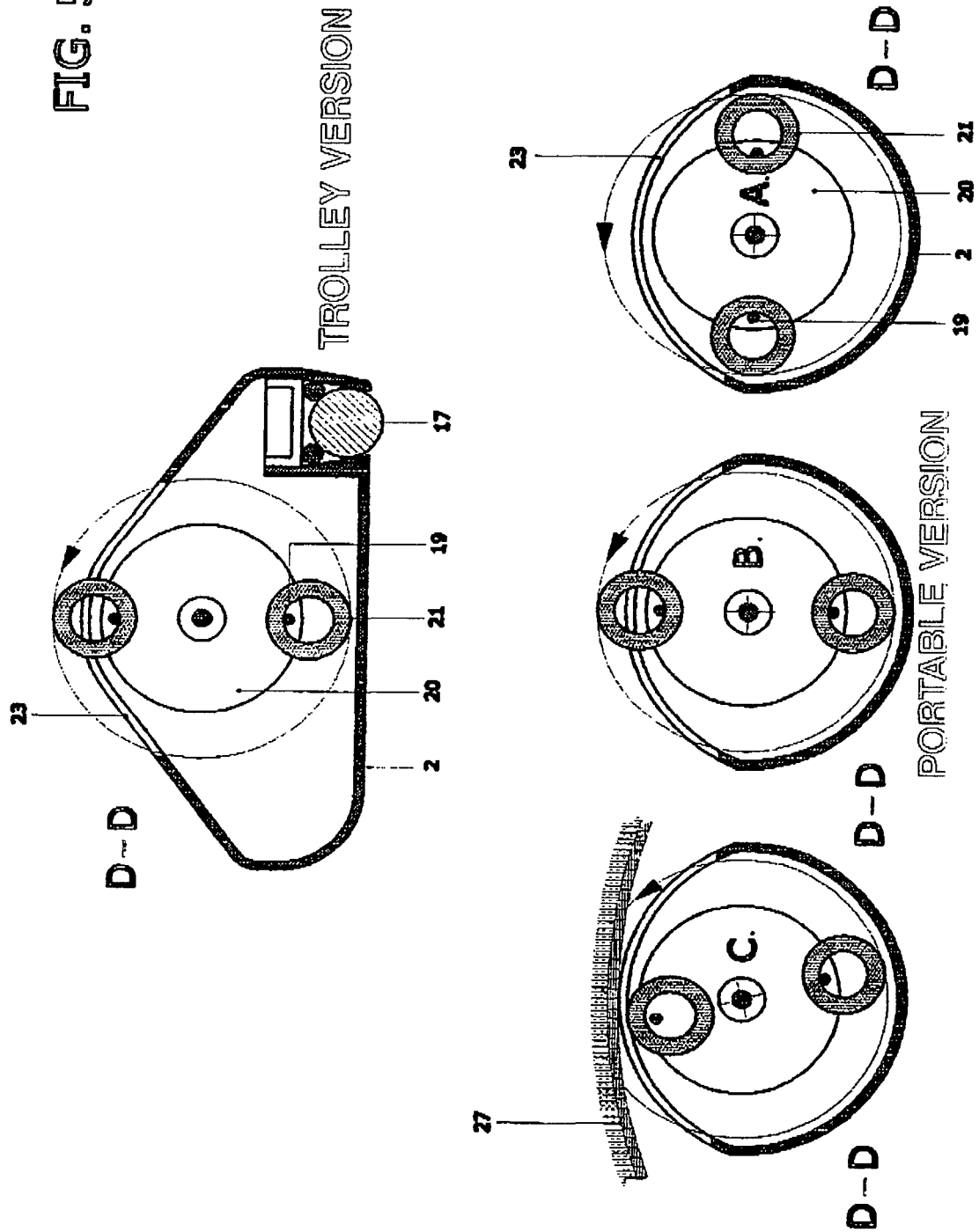


FIG. 6

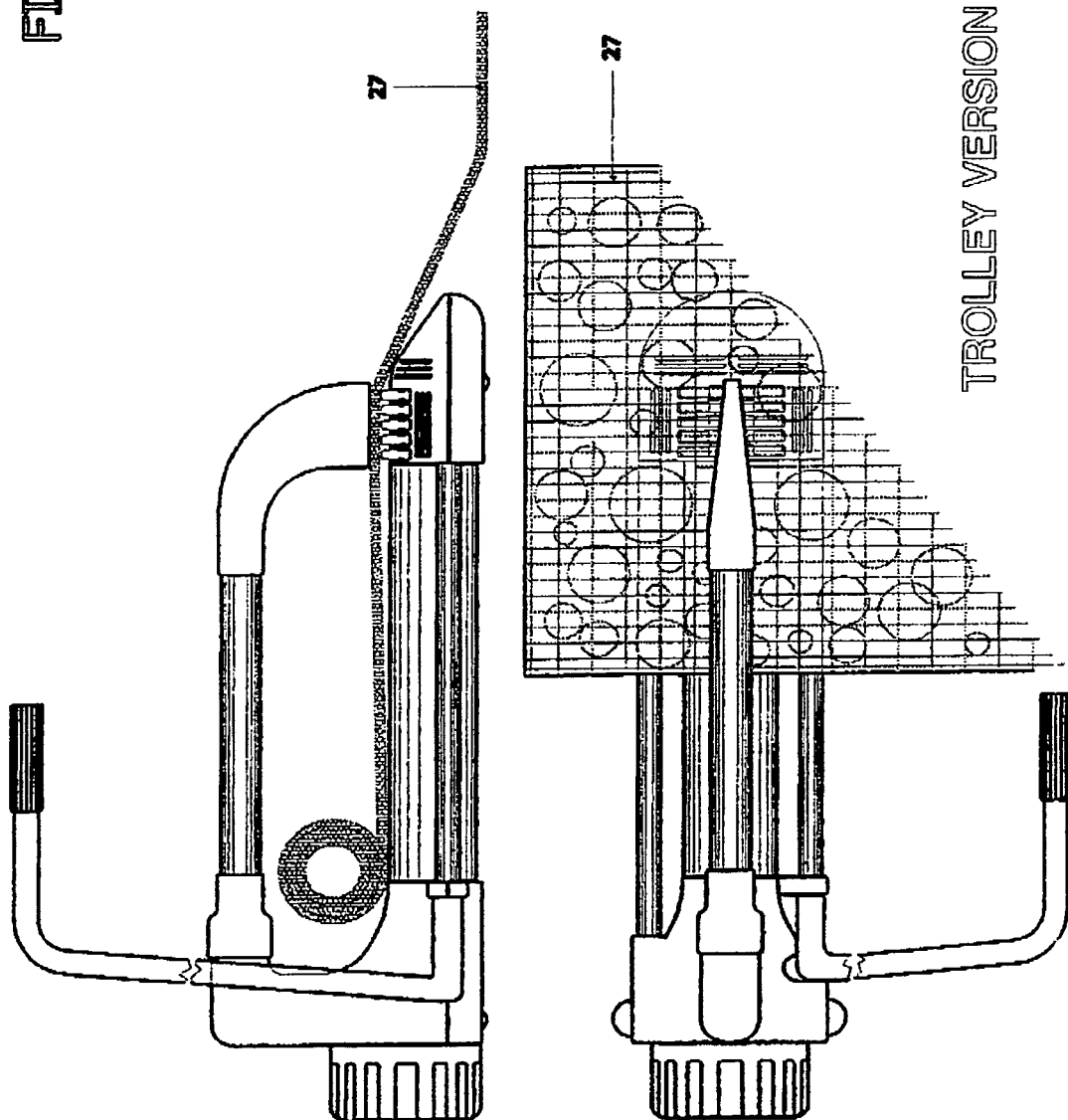
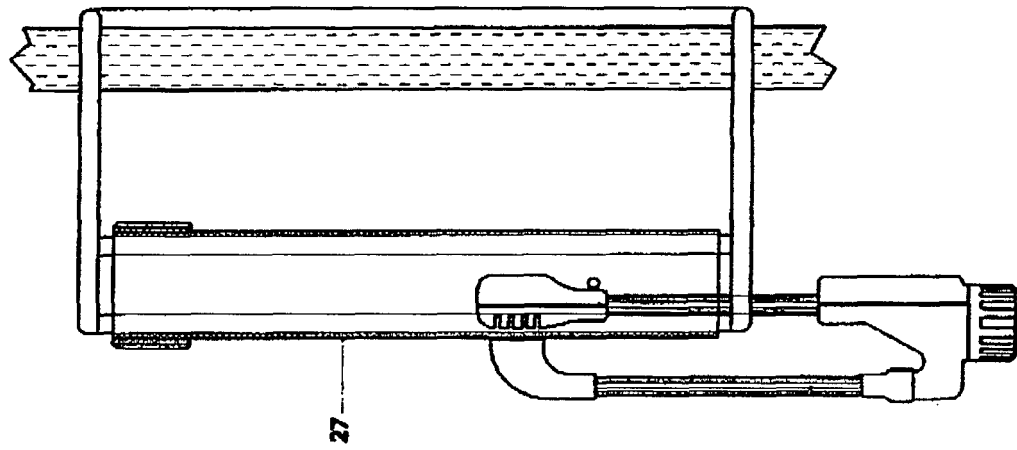


FIG. 7



PORTABLE VERSION

