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(71) Applicant: **Senur Elektrik Motorlari San. Ve Tic. A.S.**
34310 Istanbul (TR)

(72) Inventors:
- **Ulukan, Yasemin**
  34310 Istanbul (TR)
- **Özer, Sitki**
  34310 Istanbul (TR)

(74) Representative: **Sevinç, Erkan**
Istanbul Patent A.S.
Plaza-33, Büyükdere Cad. No: 33/16
Sisli
34381 Istanbul (TR)

(54) CONVERTIBLE STICK VACUUM CELANER

(57) The present invention discloses a stick vacuum cleaner 1 comprising a hand unit 5 and a tube 22 for supporting said hand unit. The hand unit comprises a vacuum motor 30 for sucking soiled air from a suction slot 15 located on the front end of said hand unit. The hand unit further comprises a handle 25 located at its rear end. The stick vacuum cleaner according to the present invention further comprises a floor nozzle 18 having a connection pipe 20 which is sized and shaped to fit to the inner volume of the suction slot of the hand unit. The tube is telescopically movable in a tube seat 24 formed in the handle and in the body of the hand unit. The length (L) of the valve seat is sufficient to accommodate the tube such that the stick vacuum cleaner converts to a car cleaner once the floor nozzle is removed.

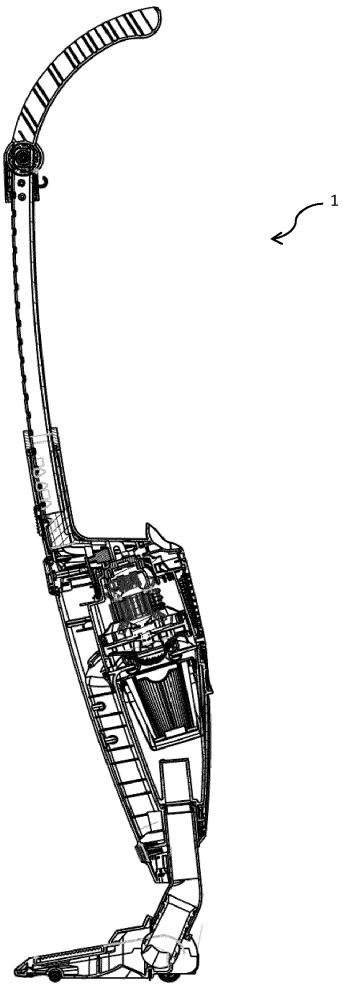

FIG. 1

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Description

Technical Field of the Invention

[0001] The present invention relates to a vacuum cleaner, more particularly, a stick vacuum cleaner which may be converted to a handheld vacuum cleaner without separating and storing parts of said stick vacuum cleaner. The stick vacuum cleaner of the present invention is also known or designated as an upright vacuum cleaner by some of its users. The handheld mode of the invention is known or designated as car vacuum cleaner.

Background of the Invention

[0002] Stick vacuum cleaners are widely known for many years. These vacuum cleaners typically have a body mounted on a rigid tube and standing on top of a floor nozzle. The body typically accommodates a vacuum motor, a filter and other electric parts mounted on the rigid tube on top of which a handle is attached. As the body comprises most essential parts of a vacuum cleaner, the body may be converted to a handheld, or as some say, car type vacuum cleaner firstly by removing the floor nozzle and the rigid tube away from the body. While same handheld units have their own power source, i.e. rechargeable batteries, some have cords and plugs for receiving energy from the mains supply.

[0003] A typical problem with the existing convertible stick type vacuum cleaners is the need for removing parts, particularly the rigid tube and subsequent storage the same. Many users complain that they face difficulty in removing the rigid tube and once cleaning is completed, in re-fixing the rigid tube to the handheld unit. Furthermore, as some parts have to be dismantled, the user would have the burden to properly store dismantled parts. Some users further complain that they lose fixing elements which were used to attach the handheld unit to the rigid tube. Once fixing elements are lost by the user, the vacuum cleaner can no longer be used as a stick or upright vacuum cleaner and the user would be obliged to limit the use of the cleaner only as a car type cleaner.

Objects of the Invention

[0004] An object of the present invention is to provide an a stick vacuum cleaner which may be converted to a handheld vacuum cleaner without separating or removing parts from the stick vacuum cleaner.

[0005] Another object of the present invention is to provide a stick vacuum cleaner which is able to stand upright in the absence of interference of a user.

[0006] Another object of the present invention is to eliminate use of fixing means for attaching the rigid tube to the body of the vacuum cleaner.

Summary of the Invention

[0007] The present invention discloses a stick vacuum cleaner comprising a hand unit and a tube for supporting said hand unit. The hand unit comprises a vacuum motor for sucking soiled air from a suction slot located on the front end of said hand unit. The hand unit further comprises a handle located at its rear end. The stick vacuum cleaner according to the present invention further comprises a floor nozzle having a connection pipe which is sized and shaped to fit to the inner volume of the suction slot of the hand unit. The tube is telescopically movable in a tube seat formed in the handle and in the body of the hand unit. The length (L) of the valve seat is sufficient to accommodate the tube such that the stick vacuum cleaner converts to a car cleaner once the floor nozzle is removed.

[0008] According to other aspects of the invention, the tube and said valve seat formed in the handle and in the body of the hand unit are arc shaped. The valve seat formed in the handle and in the body of the hand unit defines the outer periphery of the arc and the vacuum motor is located on the inner side of the arc. The diameter (Φ) of the arc of the tube is in the range of 5 to 10 times the length (L) of the tube.

[0009] According to further aspects of the invention a collapsible extension piece is attached to said handle via a pivotal joint. The body of the hand unit has a protrusion which corresponds to the rear end of said collapsible extension piece when said extension piece is folded such that the vacancy under the handle becomes a closed geometry for facilitating handling of the hand unit.

[0010] These objects are achieved by the features of Claim 1.

Brief Description of the Figures

[0011] Accompanying drawings are given solely for the purpose of exemplifying a vacuum cleaner whose advantages over prior art were outlined above and will be explained in detail hereinafter:

Fig. 1 demonstrates the cross sectional view of a stick vacuum cleaner according to the present invention.

Fig. 2A demonstrates the side view of a stick vacuum cleaner according to the present invention.

Fig. 2B demonstrates the frontal view of a stick vacuum cleaner according to the present invention.

Fig. 3A demonstrates the cross sectional view of a stick vacuum cleaner in which the arc shaped tube is inserted in the hand unit.

Fig. 3B demonstrates a side view of a stick vacuum cleaner in which the arc shaped tube is inserted in

the hand unit.

Fig. 4 demonstrates the stick vacuum cleaner of Fig. 3A where the collapsible extension piece is in its closed mode.

Fig. 5 demonstrates perspective views of the hand unit and the floor nozzle of a stick vacuum cleaner according to the present invention.

Fig. 6A demonstrates the side view of a stick vacuum cleaner of the present invention in the use mode, i.e. tube is extracted and collapsible extension piece is open.

Fig. 6B demonstrates the side view of a stick vacuum cleaner of the present invention in a transition mode, i.e. tube is inserted and collapsible extension piece is still open.

Fig. 6C demonstrates the side view of a stick vacuum cleaner of the present invention in a later transition mode, i.e. tube is inserted and collapsible extension piece is closed for forming a handle.

Figs. 7A, 7B and 7C demonstrates, respectively, cross sectional, side and frontal views of a hand unit of a stick vacuum cleaner according to the present invention.

Fig. 8 demonstrates perspective view of a hand unit of a stick vacuum cleaner according to the present invention.

Fig. 9 demonstrates perspective view of a floor nozzle of a stick vacuum cleaner according to the present invention.

Fig. 10A,B,C, and D shows, respectively, side, top, side and bottom views of an arc shaped tube of the stick vacuum cleaner according to the present invention.

Detailed Description of the Invention

[0012] Referring now to the figures outlined above, the present invention proposes a stick vacuum cleaner which is referred to in accordance with the following numerals throughout this description.

1 stick vacuum cleaner
5 hand unit
12 collapsible extension piece
14 pivotal joint
15 suction slot
18 floor nozzle
20 connection pipe
22 tube
24 tube seat
25 handle
27 collection pipe
28 accumulation volume
30 vacuum motor
31 filter
32 protrusion
34 tube seat lock button
36 ON-OFF button
37 groove

[0013] Cross sectional view of a stick vacuum cleaner (1) according to the present invention is shown in Fig. 1. The side and frontal views of the same stick vacuum cleaner (1) are depicted, respectively, in Figs 2A and 2B. The stick vacuum cleaner (1) generally comprises a hand unit (5) as the main body of the stick vacuum cleaner (1) and a tube (22) which may be telescopically inserted in the body of said hand unit (5). The vacuum cleaner is further equipped with a floor nozzle (18) which is fixed to the front end of the hand unit (5). The first end of the tube (22) is attached, via a pivotal joint (14), to a collapsible extension piece (12).

[0014] The hand unit (5) forms the main body of the stick vacuum cleaner (1). It comprises a vacuum motor (30) and a filter (31) for protecting the vacuum motor (30) from particles found in the soiled air sucked into the body of the hand unit (5). While the hand unit (5) illustrated in the accompanying drawings is energized via the mains supply it may have its own power source, such as re-chargeable batteries. The hand unit (5) has a suction slot (15) located in the front end of the hand unit. The suction slot (15) is shaped and dimensioned to accommodate the connection pipe (20) of the floor nozzle (18). The connection pipe (20) of the floor nozzle (18) sealingly conveys the soiled air sucked from the floor to the inside of the hand unit (5). Dust and particles found in the soiled air are filtered by the filter (31) and are collected, by gravitational forces, in the accumulation volume (28) formed around the cylindrical collection pipe (27) as depicted in Fig. 7A.

[0015] The hand unit (5) comprises a handle (25) on its rear part for facilitating use of the same. Both of the hand unit (5) and the handle (25) have a tube seat (24) for accommodating the rigid tube (22). The tube may be made of metals or plastics for carrying the stick vacuum cleaner (1). The tube seat (24) formed in the body of the hand unit (5) and in the handle (25) is in the form of a tubular channel which is sized and shaped to accommodate the tube (22). The tube (22) is telescopically movable within the tube seat (24) by the user. While the tube (22) may be hollow, it may be circular, oval or polygonal in cross section. The length (L) of tube seat (24) formed in the body of the hand unit (5) and in the handle (25) is substantially equal to the length of the tube (22). This latter means that the substantial amount of the tube (22) may be inserted via a telescopic movement in the tube seat (24) formed in the body of the hand unit (5) and also

in the handle (25).

[0016] If a user wishes to use the stick vacuum cleaner (1) in the upright mode, the tube (22) shall be in the extracted position as shown in Figs. 2A and 2B. If however the use wishes to use the vacuum cleaner in the handheld mode, the user shall slidably insert the tube (22) in the tube seat (24) formed on the body of the hand unit (5) and the handle (25). In such cases, removal of the floor nozzle (18) is sufficient for putting the cleaner (1) in the car cleaner mode. The car cleaner mode is depicted in Figs. 7A-7B-7C and Fig. 8.

[0017] The tube (22) of the stick vacuum cleaner (1) is not straight and is arc shaped. It has a length (L) and thickness (t) as shown in Figs. 10A to 10D. Based on the fact that the tube (22) is arc shaped, the tube has a peak height (k) which is larger than its thickness (t) as shown in Fig. 10A to 10D. The value of the peak height (k) is normally at least 30% more than the value of the thickness (t) of the tube. The diameter (Φ) of the arc of the tube (22) is in the range of 5 to 10 times the length (L) of the tube (22). Likewise, the tube seat (24) formed on the body of the hand unit (5) and the handle (25) essentially has the same geometry. The diameter (Φ) of the arc of the tube (22) is equal to the diameter (Φ) of the arc of the tube seat (24) formed on the body of the hand unit (5) and the handle (25). This enables that the tube (22) can be smoothly moved telescopically within the tube seat (24).

[0018] The tube (22) of the stick vacuum cleaner (1) is made arc shaped for the purpose that parts which substantially add to the weight of the hand unit (5) are contained on the inner side of the arc, such that the center of gravity of the stick vacuum cleaner (1) substantially coincides with the central point of the floor nozzle (18). This enables that the stick vacuum cleaner (1) can stand upright in the absence of interference from a user. The inner side of the arc means parts which remain in between the arc and the center of the arc. The center of gravity (C.G.) of the hand unit (5) is illustrated with an arrow in broken lines in Figs. 2A and 2B. An example of these parts that add much to the overall weight of the hand unit (5) is the vacuum motor (30). The arc shaped geometry of the tube (22) helps to keep the center of gravity (C.G.) of the stick vacuum cleaner (1) coincide with the central point of the floor nozzle (18). In this case, the stick vacuum cleaner (1) itself stands upright and does not have to lean on a furniture in the cleaning room.

[0019] The stick vacuum cleaner (1) is shown in use mode in Figs. 2A and 2B. In this position, the tube (22) is in its extracted position and remains only partly in the handle (25) of the hand unit (5). The stick vacuum cleaner (1) is shown in a transitional mode in Figs. 3A and 3B. In this mode, the tube (22) is in its retracted position and remains fully in the tube seat (24) formed in the handle (25) and the body of the hand unit (5). Floor nozzle (18) is yet not dismantled.

[0020] Fig. 5 shows the hand unit (5) in a state where the floor nozzle (18) is dismantled. The connection in between the floor nozzle and the hand unit (5) is established with a connection pipe (20) which enters smoothly in the suction slot (15) found in the front end of the hand unit (5). Fig. 6A to 6C show the process of conversion from a stick vacuum cleaner (1) to a hand or car cleaner. Figs. 7A to 7C and Fig. 8 show the hand unit (5) where the collapsible extension piece (12) is folded on top of a corresponding protrusion (32) on the body of the hand unit (5). The collapsible extension piece (12) is pivotably connected to the handle (25) via a pivotal joint (14). Once the collapsible extension piece (12) is folded on top of the corresponding protrusion (32), the vacancy under the handle (25) becomes a closed geometry for facilitating handling of the hand unit (5).

[0021] The body of the hand unit (5) is further equipped with a tube seat lock button (34) for allowing or blocking telescopic movement of the tube (22) within the tube seat (24). The tube seat lock button (34) engages with a plurality of grooves (37) formed on the tube (22). An ON-OFF button is located on the hand unit (5) for facilitating use of the vacuum cleaner in both the stick vacuum cleaner (1) mode and also the hand unit (5) mode.

Claims

1. A stick vacuum cleaner (1) comprising a hand unit (5) and a tube (22) for supporting said hand unit, said hand unit (5) comprising a vacuum motor (30) for sucking soiled air from a suction slot (15) located on the front end of said hand unit, said hand unit further comprising a handle (25) located at its rear end, said stick vacuum cleaner (1) further comprising a floor nozzle (18) having a connection pipe (20) sized and shaped to fit to the inner volume of said suction slot (15) of the hand unit (5) **characterized in that**
said tube (22) is telescopically movable in a tube seat (24) formed in the handle (25) and in the body of the hand unit (5), and
the length (L) of said valve seat (24) is sufficient to accommodate said tube (22) such that the stick vacuum cleaner (1) converts to a car cleaner once the floor nozzle (18) is removed.

2. A stick vacuum cleaner as set forth in Claim 1 wherein said tube (22) and said valve seat (24) formed in the handle (25) and in the body of the hand unit (5) are arc shaped.

3. A stick vacuum cleaner as set forth in Claim 2 wherein said valve seat (24) formed in the handle (25) and in the body of the hand unit (5) defines the outer periphery of the arc and the vacuum motor (30) is located on the inner side of the arc.

4. A stick vacuum cleaner as set forth in Claim 2 wherein the diameter (Φ) of the arc of the tube (22) is in the range of 5 to 10 times the length (L) of the tube

(22).

5. A stick vacuum cleaner as set forth in Claim 1 wherein collapsible extension piece (12) is attached to said handle (25) via a pivotal joint (14).

6. A stick vacuum cleaner as set forth in Claim 5 wherein the body of the hand unit (5) has a protrusion (32) which corresponds to the rear end of said collapsible extension piece (12) when said extension piece (12) is folded such that the vacancy under the handle (25) becomes a closed geometry for facilitating handling of the hand unit (5).

7. A stick vacuum cleaner as set forth in Claim 1 wherein the floor nozzle (18) has a connection pipe (20) for sealingly conveying soiled air into the body of the hand unit (5).

8. A stick vacuum cleaner as set forth in Claim 1 wherein the tube (22) has a plurality of grooves (37) configured to engage with a tube seat lock button (34) for preventing telescopic movement of the tube (22) in the tube seat (24).

9. A stick vacuum cleaner as set forth in Claim 1 wherein the hand unit has a collection pipe (27) located at its front end for forming an accumulation volume (28) around said collection pipe for accumulation of dust and particles under gravitational effect.

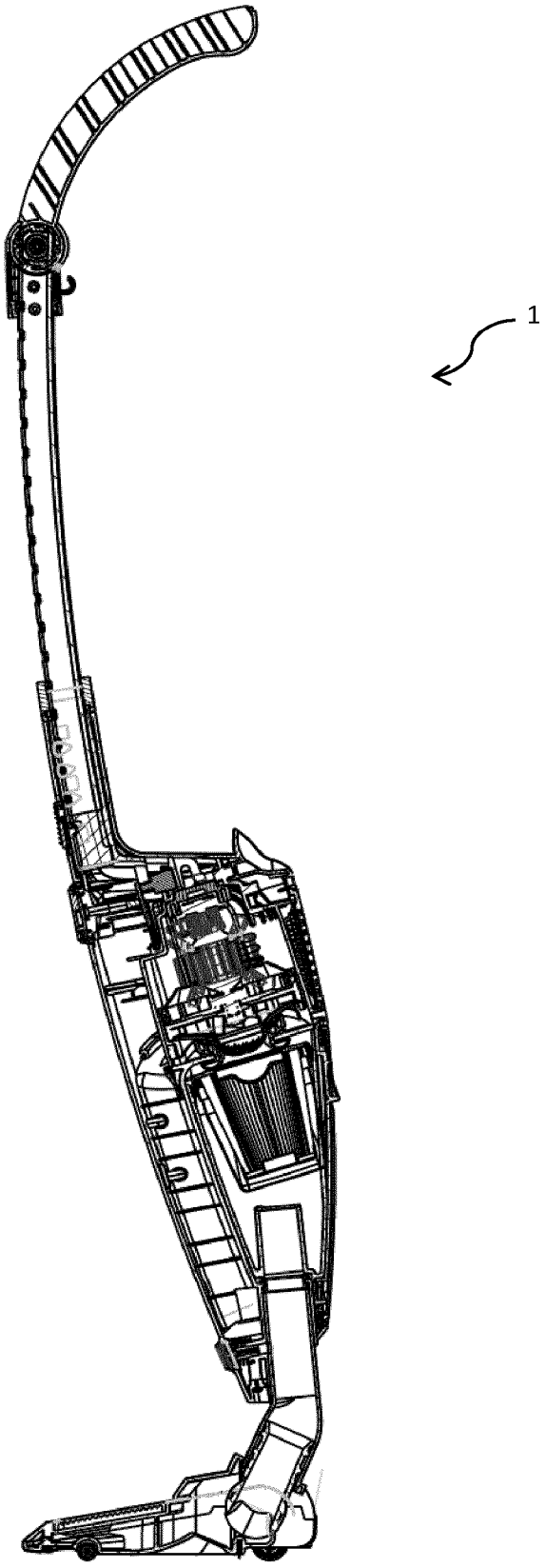


FIG. 1

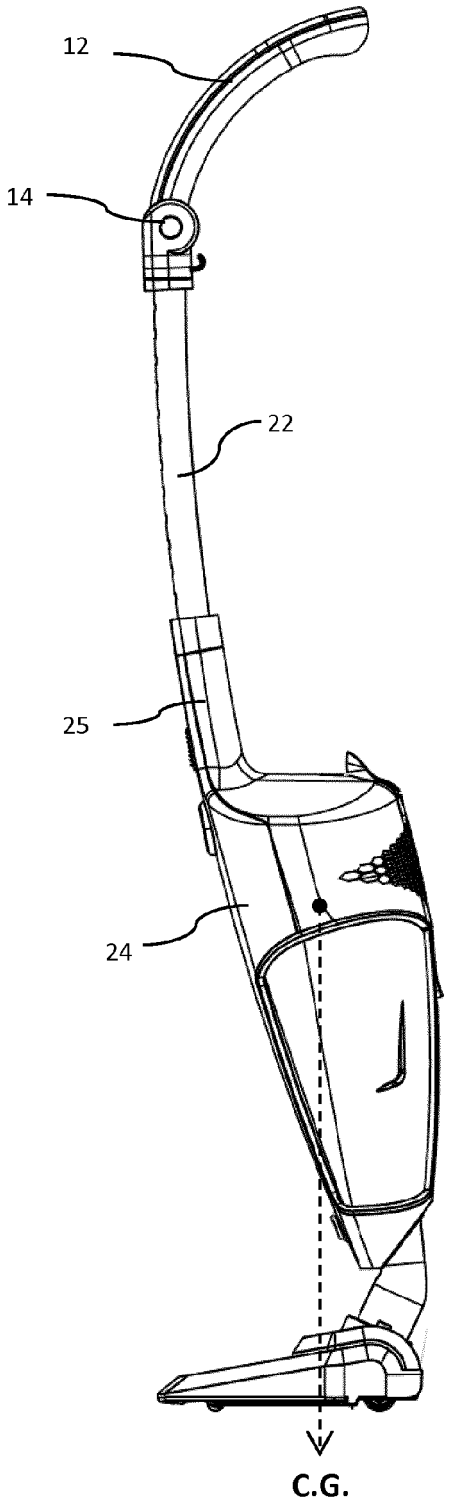


FIG. 2A

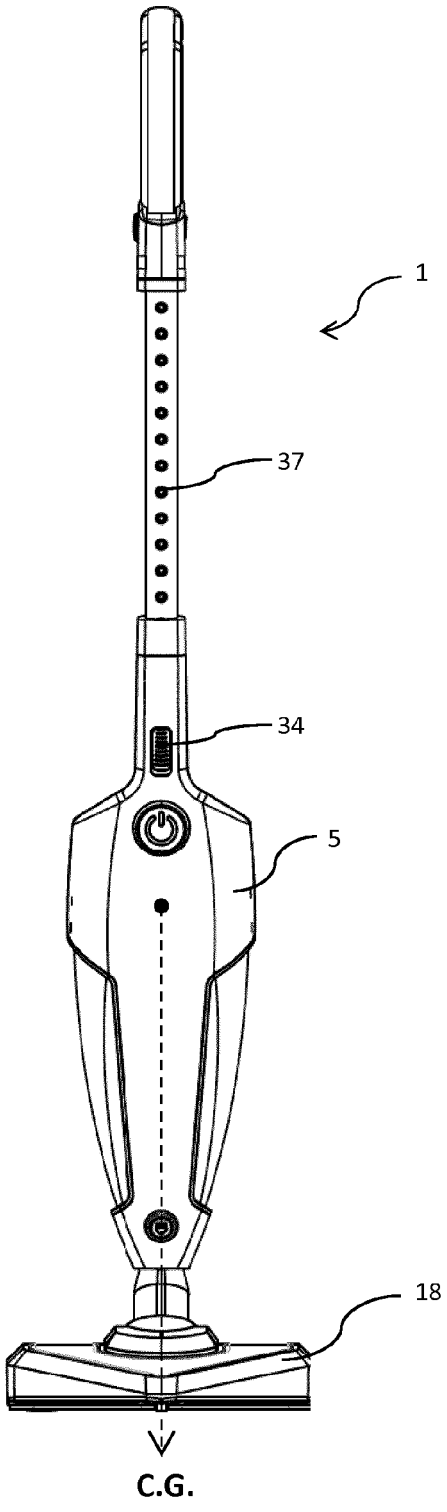


FIG. 2B

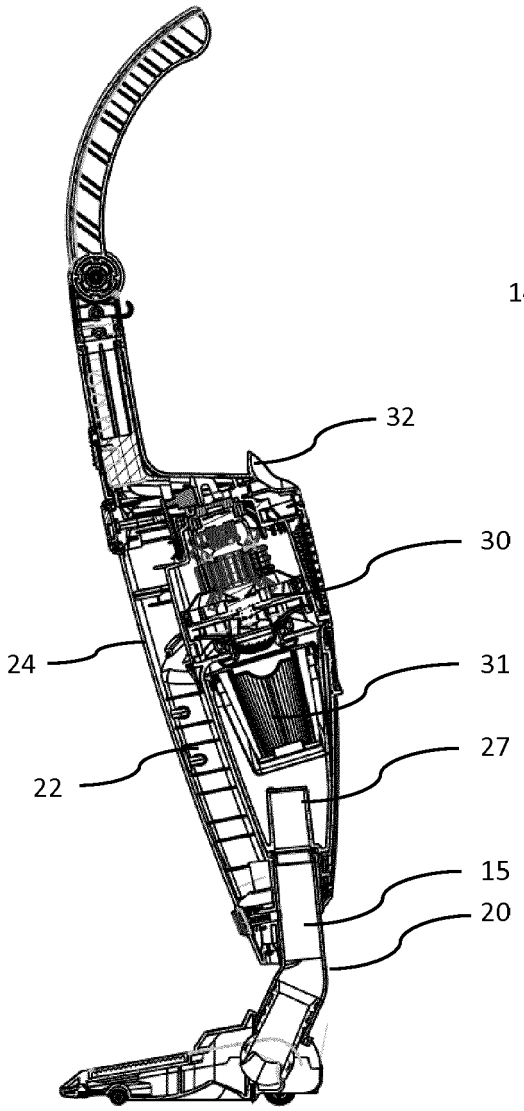


FIG. 3A

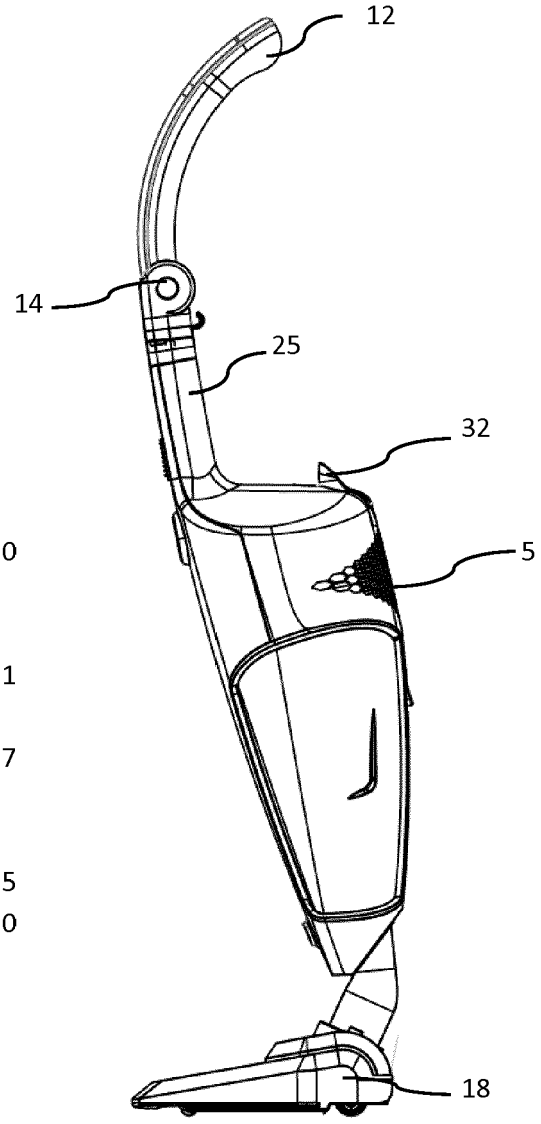


FIG. 3B

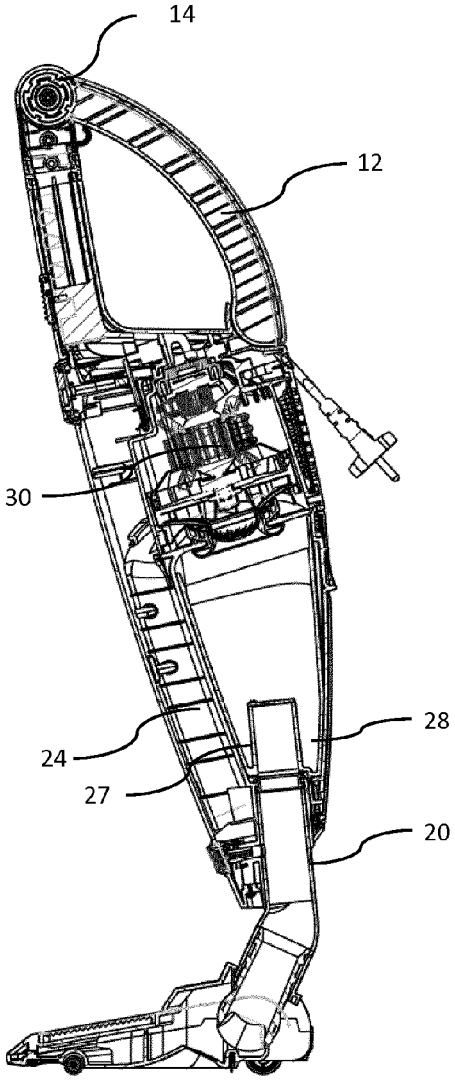


FIG. 4

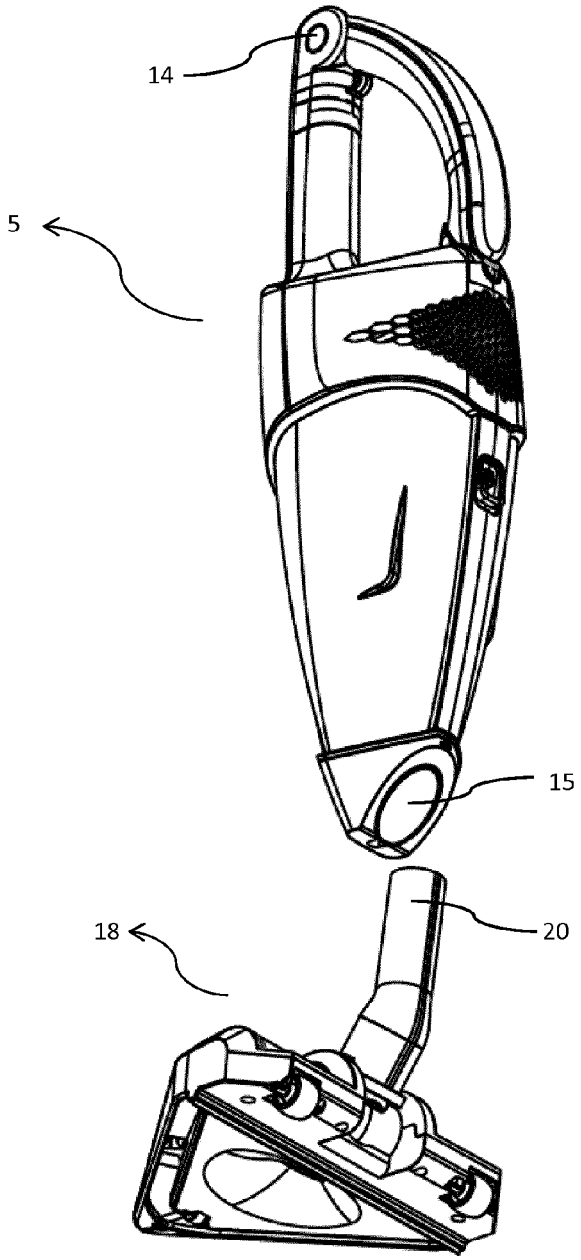


FIG. 5

FIG. 6C

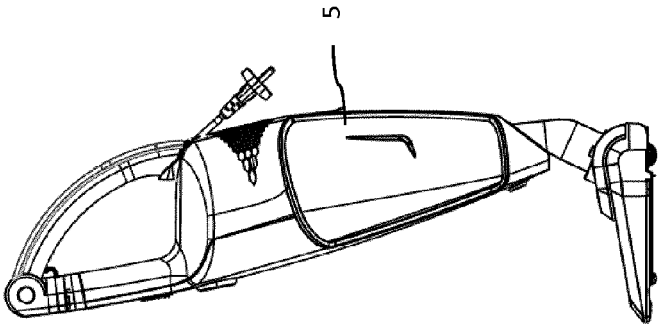


FIG. 6B

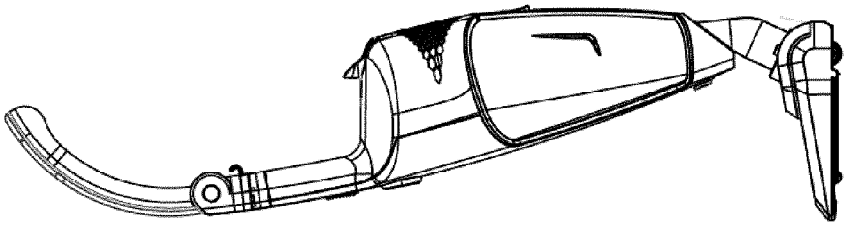


FIG. 6A

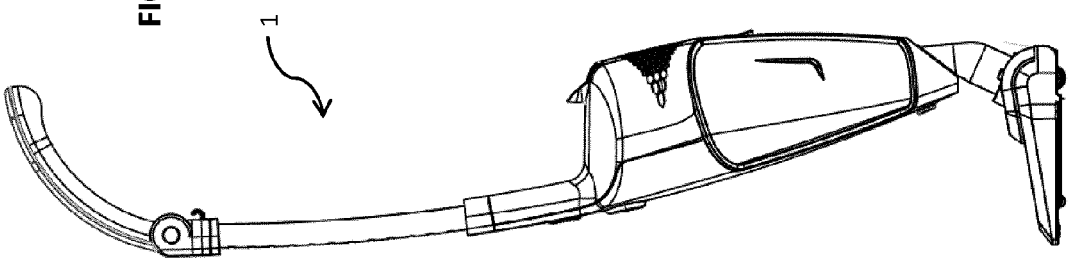


FIG. 7C

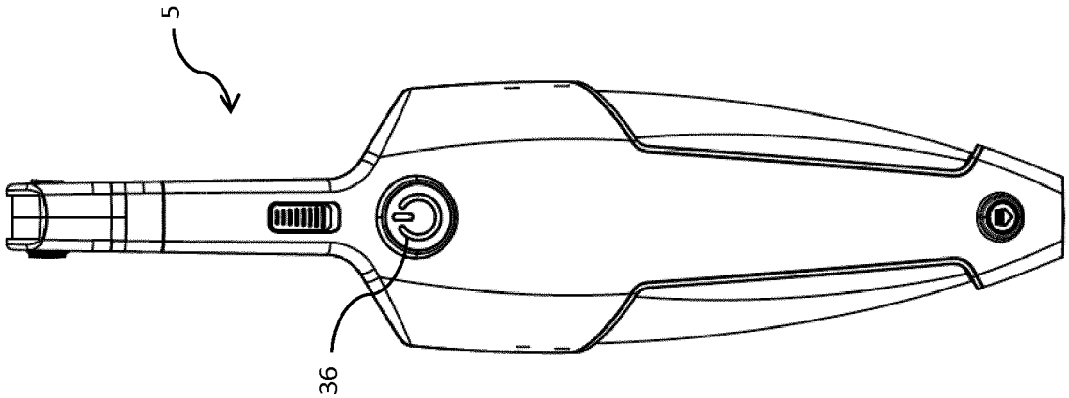


FIG. 7B

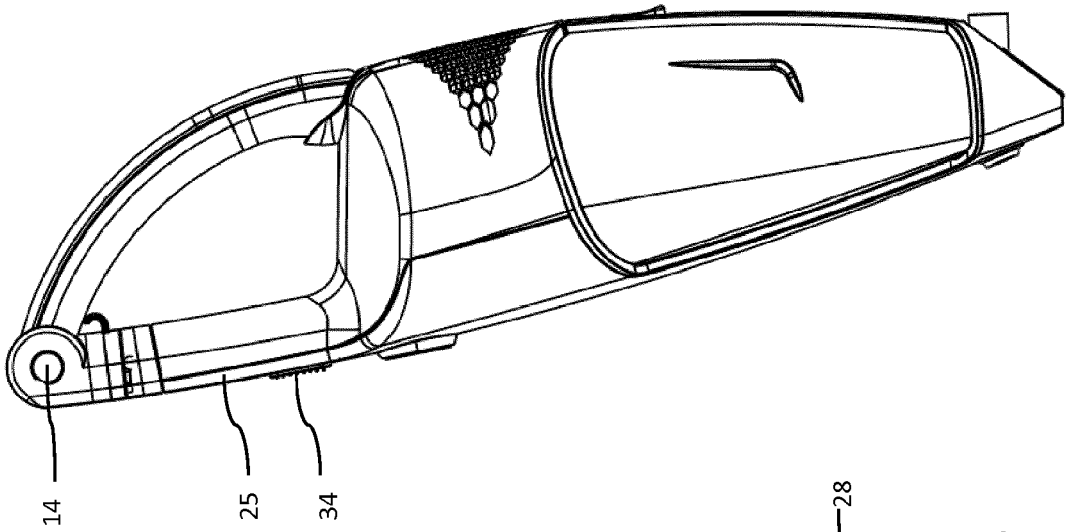


FIG. 7A

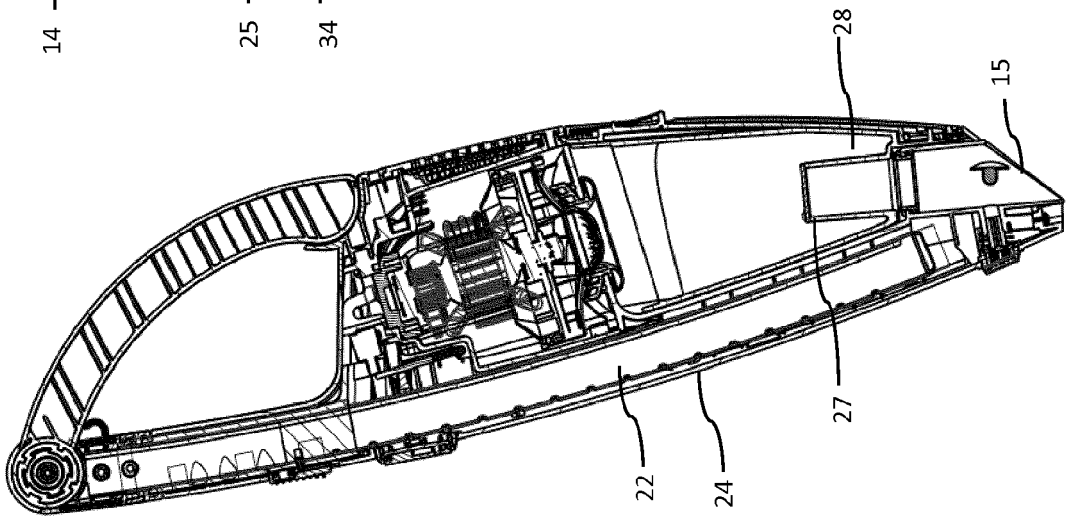


FIG. 9

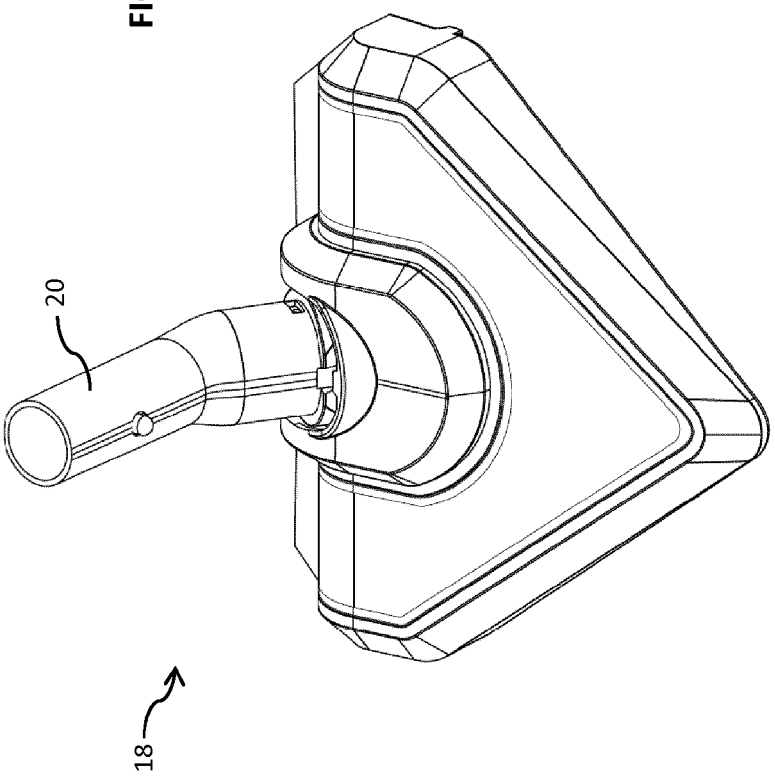
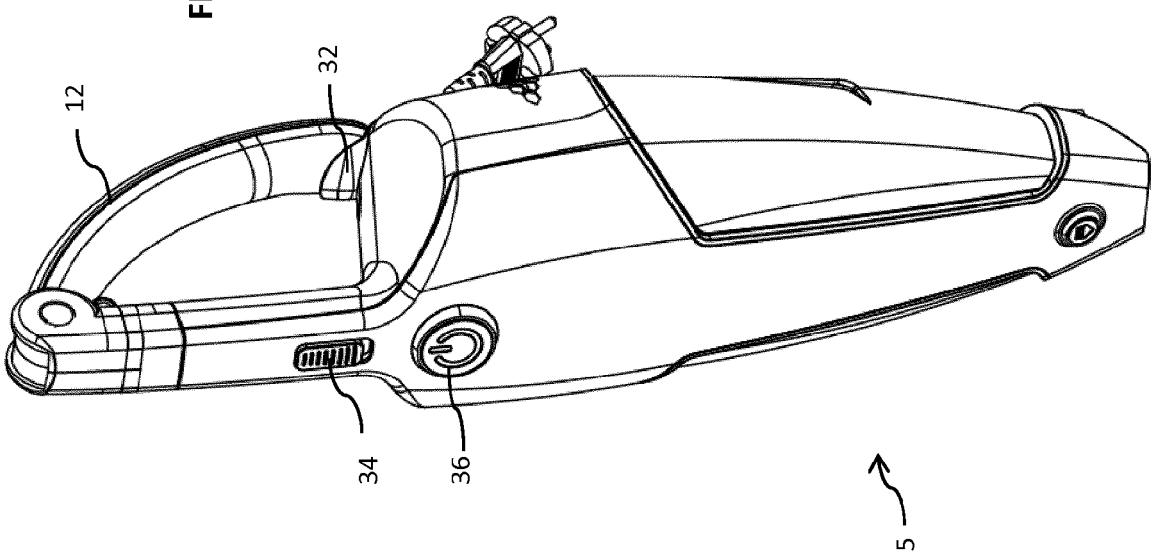


FIG. 8



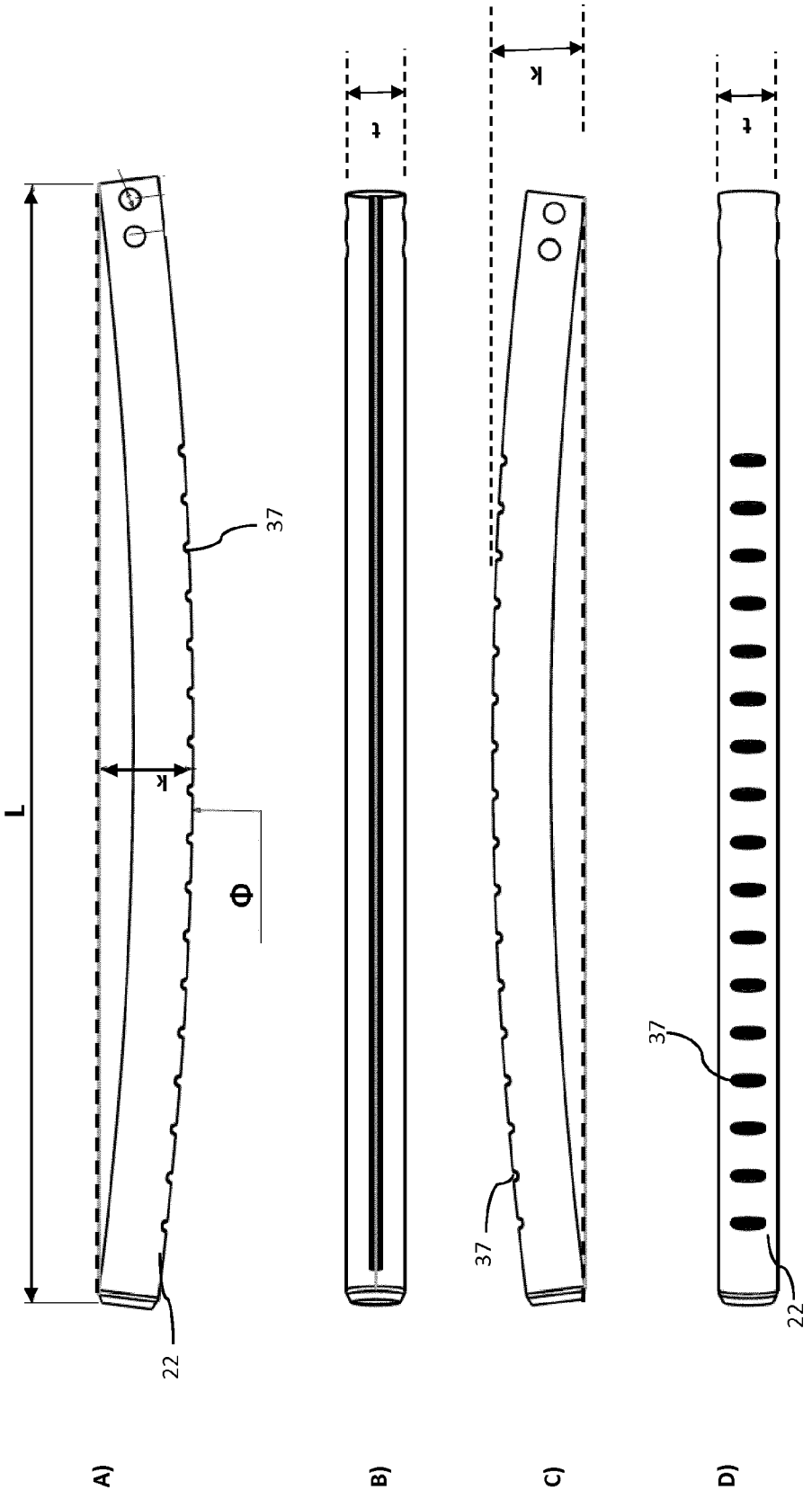


FIG. 10

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EUROPEAN SEARCH REPORT

Application Number
EP 15 15 6574

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	FR 2 025 832 A1 (ELECTROLUX AB) 11 September 1970 (1970-09-11) * page 2, line 10 - page 4, line 21; figures 1-5 * -----	1	INV. A47L5/22 A47L9/32 A47L5/24 A47L5/28
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A	DE 93 18 460 U1 (VORWERK CO INTERHOLDING [DE]) 30 March 1995 (1995-03-30) * page 6 - page 10; figures 1-5 * -----	1	

TECHNICAL FIELDS SEARCHED (IPC)

A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 July 2015	Masset, Markus

CATEGORY OF CITED DOCUMENTS

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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