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(54) MULTI-FUNCTIONAL ELECTRIC BRUSH

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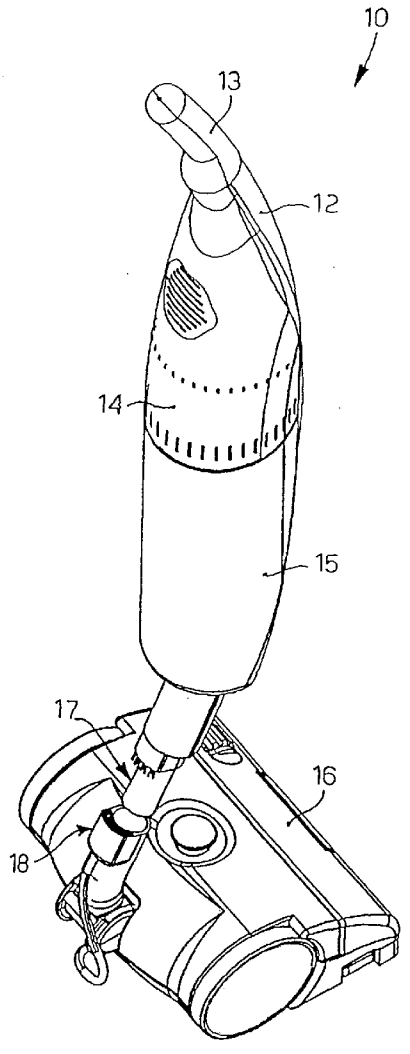
(57) **ABSTRACT**

Multi-functional electric brush comprising a supporting structure, a suction unit, a container to contain the material sucked in, and a cleaning end-piece having at least a suction aperture. The cleaning end-piece has at least an electric device, which is able to generate steam and/or deliver cleaning liquids, including hot or cold water. The supporting structure has a lower end provided with a first connector able to be coupled mechanically and removably with a second connector disposed on the cleaning end-piece in order to put the suction aperture in communication with the suction unit. The first connector and the second connector have respectively a first and a second electric connector able to feed the electric device electrically.



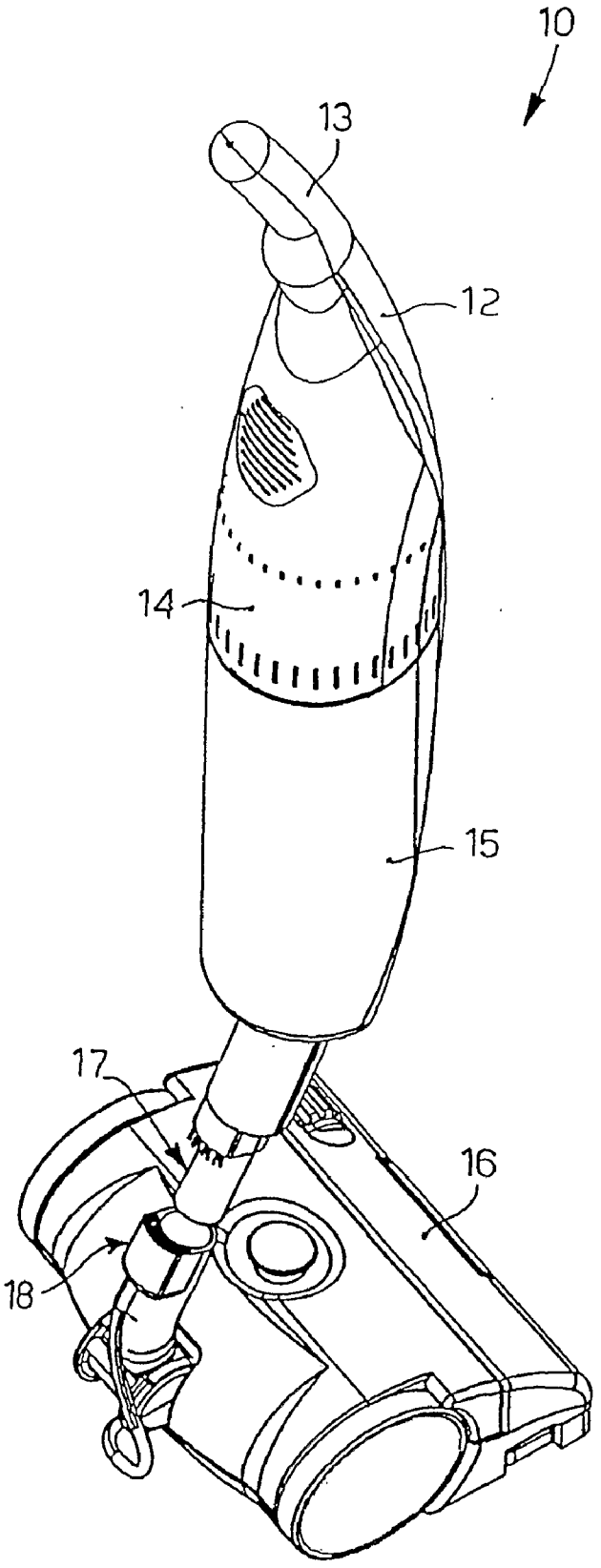


fig. 1

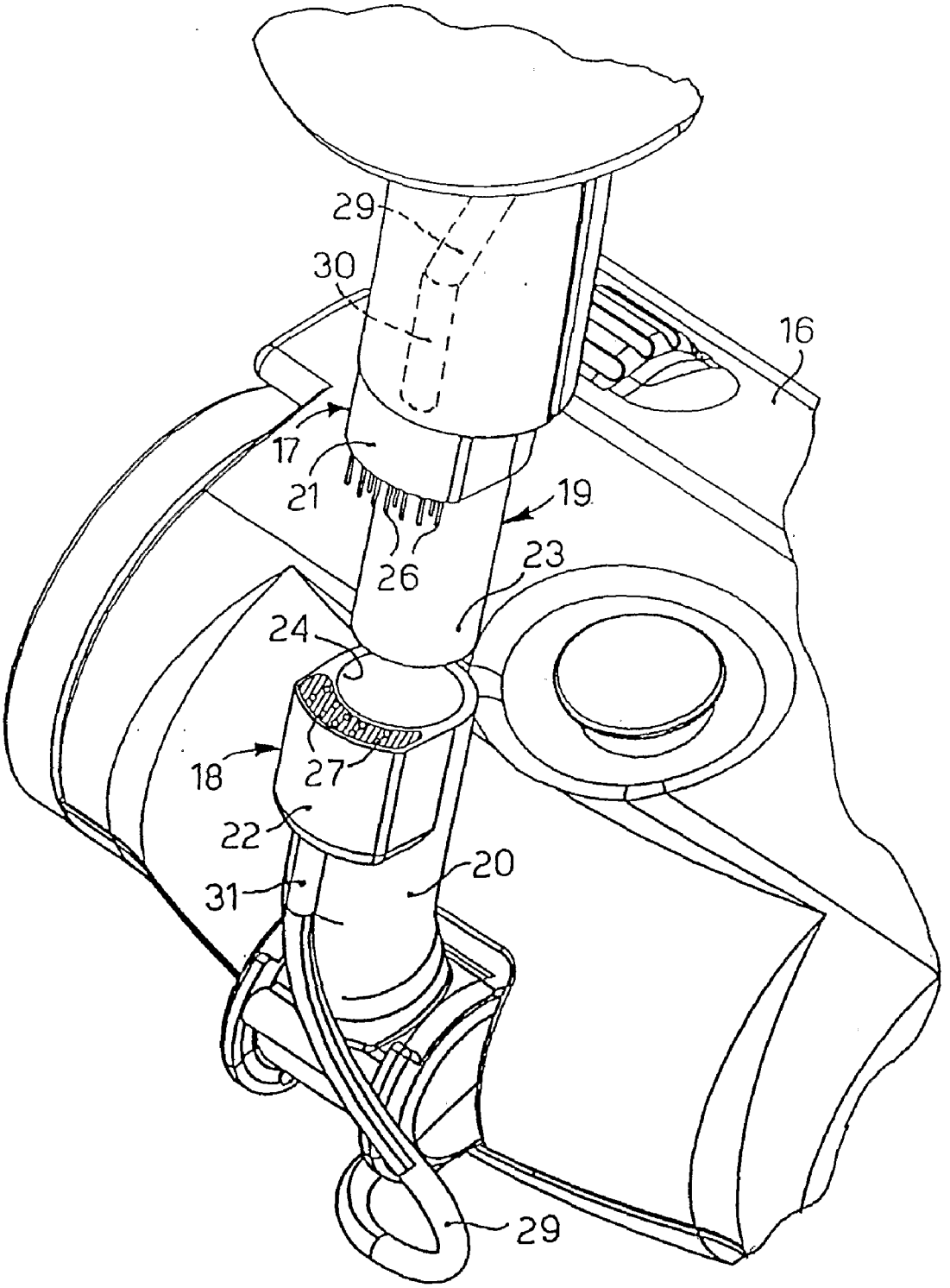


fig. 2

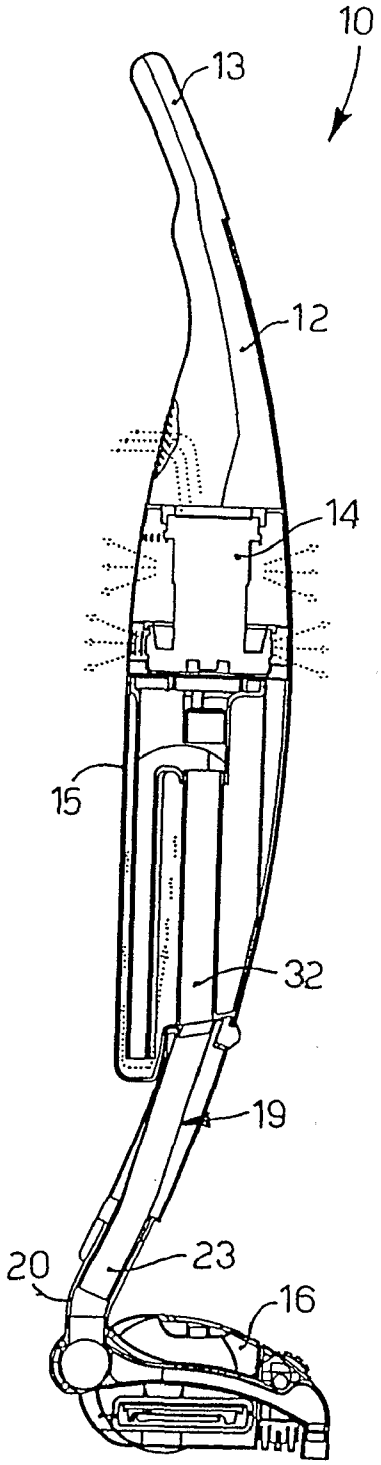


fig. 3

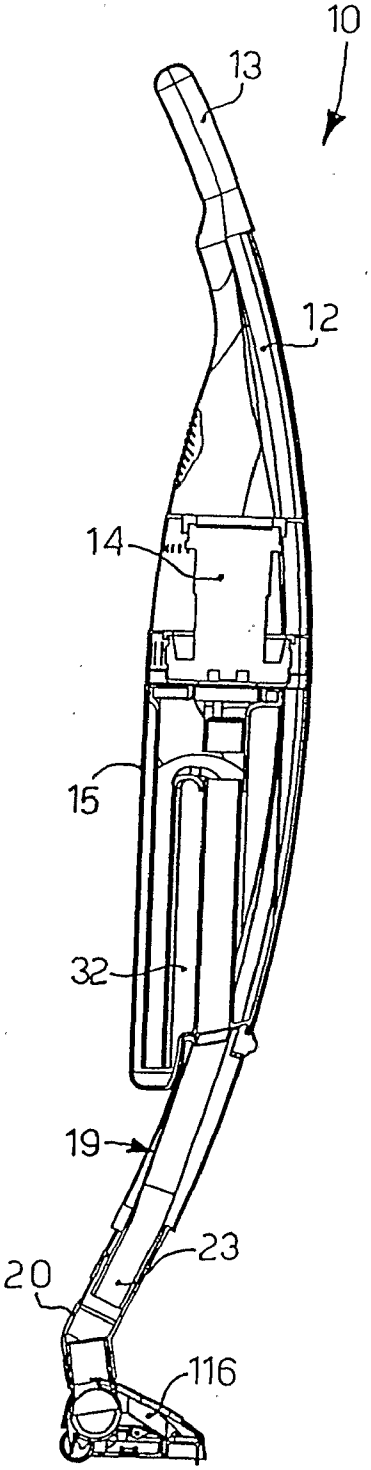


fig. 9

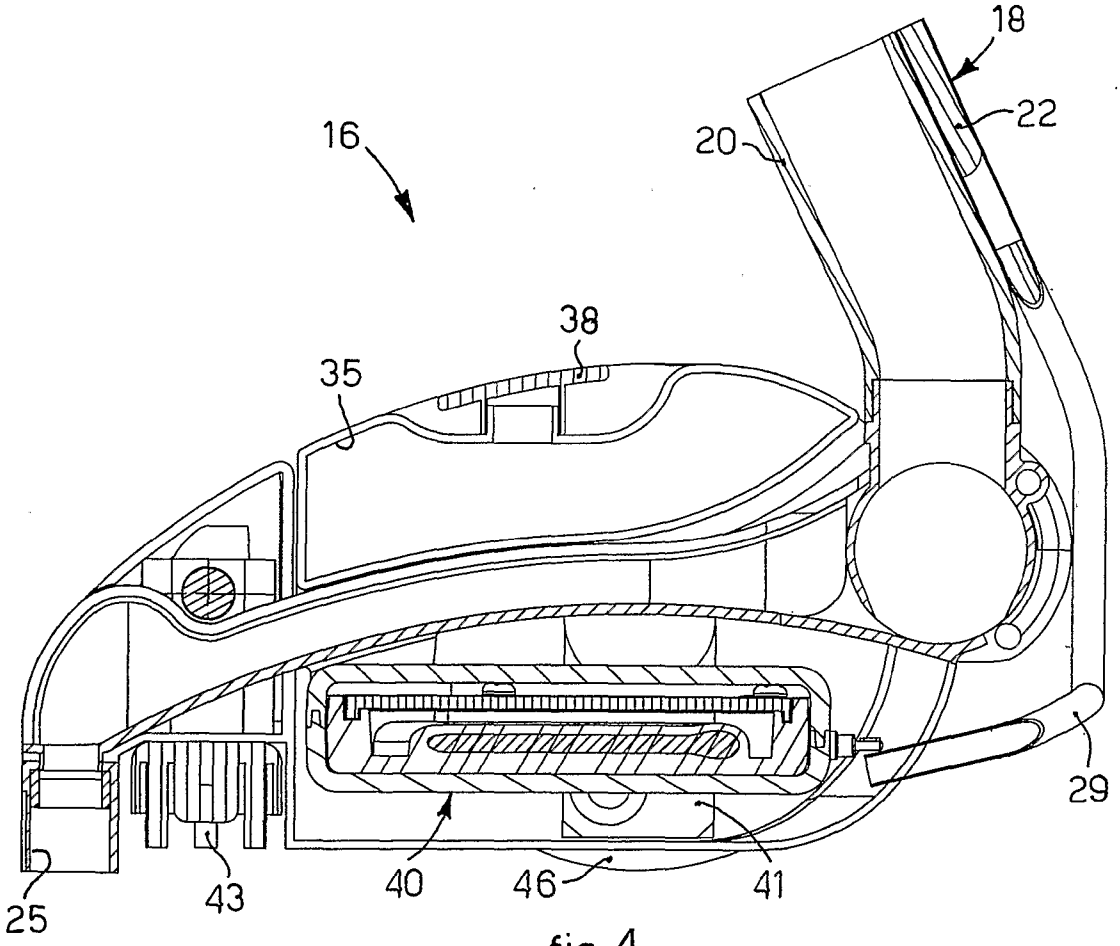


fig. 4

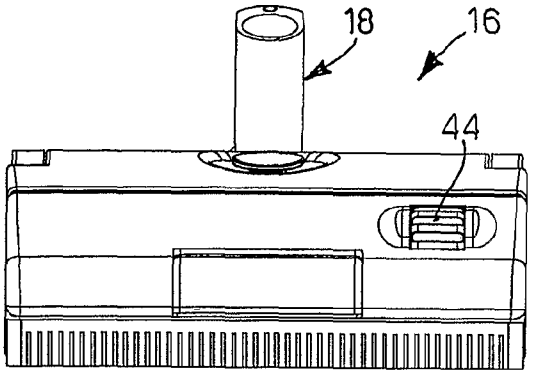


fig. 5

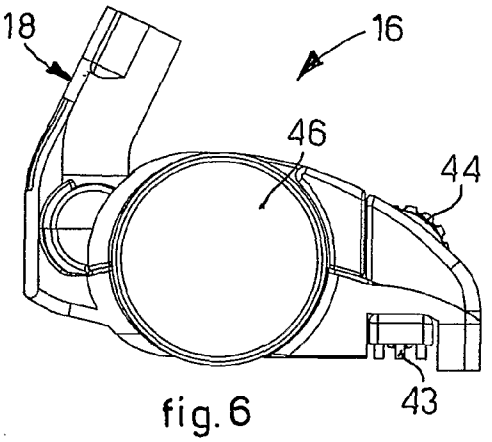


fig. 6

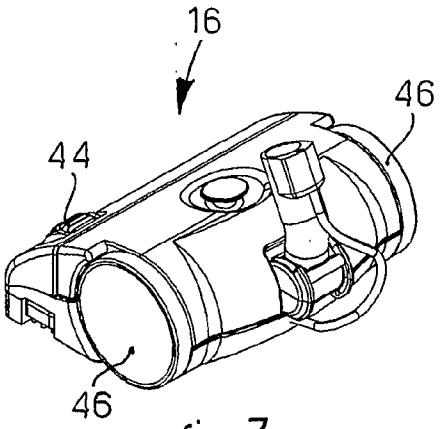


fig. 7

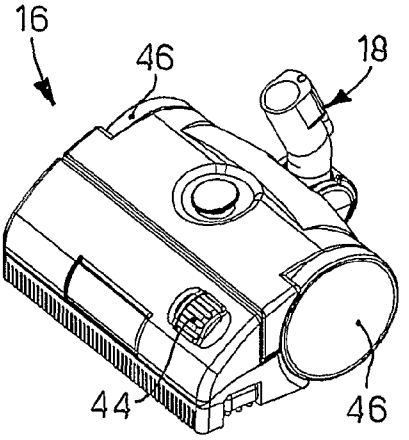


fig. 8

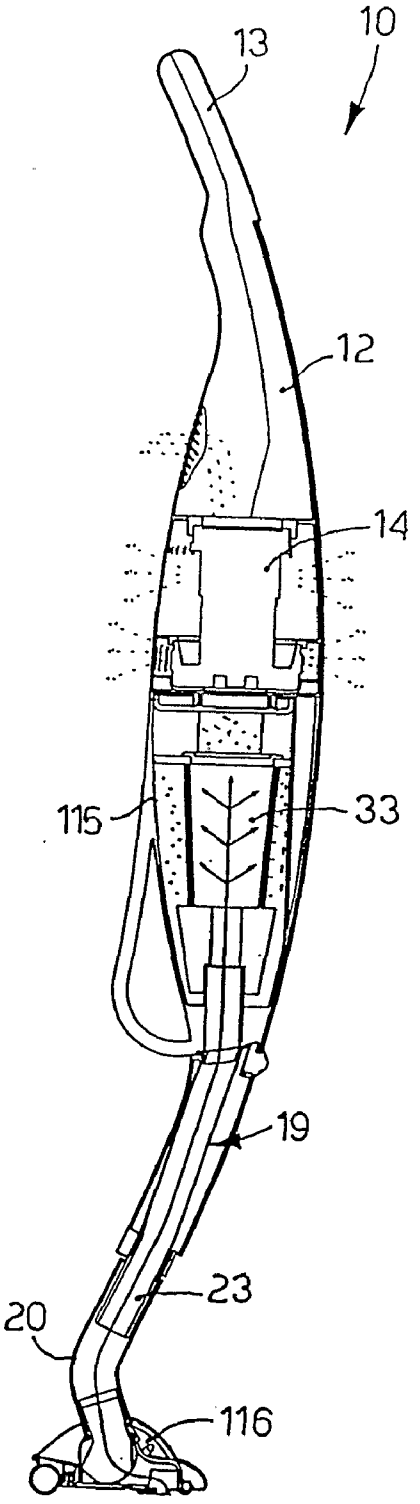


fig. 10

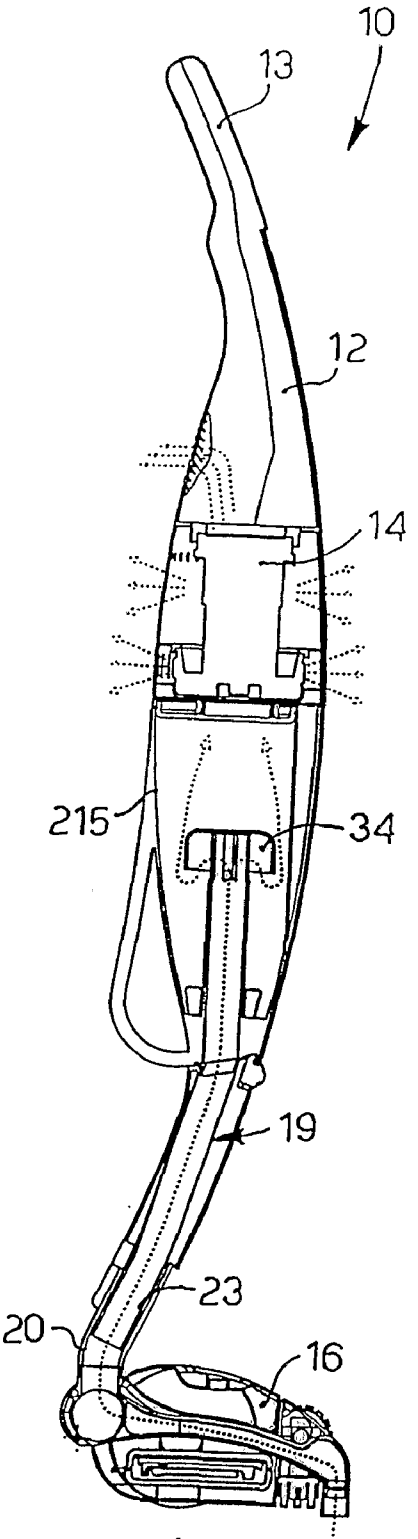


fig. 11

MULTI-FUNCTIONAL ELECTRIC BRUSH

FIELD OF THE INVENTION

[0001] The present invention concerns a multi-functional electric brush, able to be used to suck in solid dry particles of dust and dirt, and also liquid substances and damp materials.

BACKGROUND OF THE INVENTION

[0002] An electric brush for cleaning is known, comprising a supporting structure on which a suction unit is assembled provided with an electric motor and able to create a suction flow.

[0003] A cleaning end-piece is able to be connected to the supporting structure by means of a tubular connector, and is provided with a suction aperture disposed in correspondence with the surface to be cleaned, or is able to be extended as far as the latter.

[0004] The cleaning end-piece comprises, for example, a device with rotary brushes and driven by an electric motor, or a device to deliver a cleaning liquid.

[0005] These cleaning end-pieces all need electric feed, which is normally supplied by means of an electric cable autonomous with respect to the cable that electrically feeds the suction unit.

[0006] The known electric brush has the disadvantage that, to allow said end-piece to be removed from or inserted into the supporting structure, the user must perform two distinct operations: he must connect the tubular connector and connect the autonomous electric cable to an external electric power point.

[0007] WO-A-97/29675 describes an electric brush provided with a cleaning end-piece having an aperture for delivering a liquid and an aperture for sucking in said liquid. A tank for the liquid is mounted on the supporting structure and is connected to the delivery aperture by means of a tube. This known electric brush, however, has the disadvantage that it is difficult to move and maneuver, because its baricenter is very high with respect to the floor, due to the raised position of the tank. Moreover, it does not comprise means to generate steam for cleaning and/or making the surface hygienic.

[0008] EP-A-0621003 describes an electric brush having a cleaning end-piece able to be associated with the supporting structure and provided with an electric motor in order to make the brushes rotate. However, this known document does not provide that the cleaning end-piece can generate steam and/or deliver cleaning liquids.

[0009] The electric brush of a known type also comprises a container associated with the suction unit and in which the material sucked in is collected. This container is provided with a filter which can be of the dry type, or the water type, to contain possible liquids sucked in.

[0010] In the state of the art, dry filters and water filters are not interchangeable, due to their different sizes, so that it is not possible to assemble them selectively and alternately in the same electric brush. This is therefore another disadvantage of known electric brushes.

[0011] One purpose of the present invention is to achieve a multi-functional electric brush in which the cleaning end-piece is connectable, simply and quickly, by means of a single operation, to the end of the supporting structure, guaranteeing both the mechanical assembly for conveying the material sucked in, and also the electric connection.

[0012] Another purpose of the present invention is to achieve a multi-functional electric brush which allows to deliver steam and/or cleaning liquids and which can be used, moved and maneuvered easily.

[0013] Another purpose of the present invention is to achieve a multi-functional electric brush in which the container for the material sucked in, either dry or containing water, can easily be replaced and is interchangeable with another that may not be of the same type.

[0014] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0015] The present invention is set forth and characterized in the main claim, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0016] In accordance with the above purposes, a multi-functional electric brush according to the present invention comprises a supporting structure, a suction unit fed electrically and able to create a suction flow, means to contain the material sucked in from the surface to be cleaned and at least a cleaning end-piece having at least a suction aperture.

[0017] The supporting structure is provided, at a lower end, with first connection means able to be coupled mechanically and removably with second connection means disposed on the cleaning end-piece in order to put the suction aperture in communication with the suction unit.

[0018] According to a characteristic of the present invention, the cleaning end-piece comprises at least an electric device which is able to generate steam and/or deliver cleaning liquids, including hot or cold water.

[0019] According to another characteristic, the first and the second connection means comprise respectively first and second electric feed means able to feed the electric device electrically.

[0020] In this way, the cleaning end-piece can be connected to or removed from the end of the supporting structure, simply and quickly by means of a single operation, guaranteeing both the mechanical assembly for conveying the material sucked in by the suction aperture to the suction unit, and also the electric connection.

[0021] Thanks to the invention, the electric device is integrated into the cleaning end-piece, allowing to displace the baricenter of the electric brush downwards, thus making it more easily usable, movable and maneuverable with respect to known solutions.

[0022] According to a variant of the invention, the cleaning end-piece comprises at least an electric cleaning device having one or more brushes driven by an electric motor.

[0023] The first connection means comprise a first tubular suction pipe, not necessarily cylindrical, communicating at one end with said containing means, and terminating at another end with a first coupling element.

[0024] The second connection means comprise a second tubular suction pipe, also not necessarily cylindrical, communicating at one end with the suction aperture and terminating at another end with a second coupling element.

[0025] Said two tubular pipes are able to be coupled in correspondence with the respective coupling elements, so as to achieve the mechanical connection between the supporting structure and the cleaning end-piece, and at the same time to guarantee continuity to the suction flow.

[0026] Advantageously the first electric feed means are disposed adjacent to the first tubular suction pipe, while the second electric feed means are disposed adjacent to the second tubular suction pipe.

[0027] The first electric feed means are connected to an electric cable, for example arriving from the supporting structure, while the second electric feed means are connected to a feed cable that terminates in the cleaning end-piece in order to feed at least the electric device electrically.

[0028] According to another characteristic of the present invention, the containing means comprise a liquid bath filter, towards which the dirt sucked in is conveyed and remains trapped, or alternatively a dry filter consisting for example of a bag made of paper or similar material, and able to block and contain the particles of dirt sucked in.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] These and other characteristics of the present invention will become apparent from the following description of a preferential form of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

[0030] FIG. **1** is a view of an electric brush according to the present invention;

[0031] FIG. **2** is a detail of a cleaning end-piece of the electric brush in FIG. **1**;

[0032] FIG. **3** is a lateral section of the electric brush in FIG. **1**;

[0033] FIG. **4** is a lateral section of the cleaning end-piece in FIG. **2**;

[0034] FIG. **5** is a front view of the cleaning end-piece in FIG. **2**;

[0035] FIG. **6** is a lateral view of the cleaning end-piece in FIG. **2**;

[0036] FIG. **7** is a rear perspective view of the cleaning end-piece in FIG. **2**;

[0037] FIG. **8** is a front perspective view of the cleaning end-piece in FIG. **2**;

[0038] FIG. **9** is a lateral section of a variant of the electric brush in FIG. **1**;

[0039] FIG. **10** is a lateral section of another variant of the electric brush in FIG. **1**;

[0040] FIG. **11** is a lateral section of another variant of the electric brush in FIG. **1**.

DETAILED DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT

[0041] With reference to FIG. **1**, an electric brush **10** according to the present invention comprises a supporting structure **12**, substantially tubular, a suction unit **14**, a container **15**, assembled on the supporting structure **12**.

[0042] The suction unit **14** is of a known type and comprises an electric motor and a fan, partly shown in the FIG. **3**.

[0043] The container **15** comprises a liquid bath filter **32** (FIGS. **3** and **9**), for example with water, of a known type, able to retain the dirt and dust sucked in.

[0044] The electric brush **10** also comprises a cleaning end-piece **16** (FIGS. **1**~**8** and **11**) able to be associated with a lower end of the supporting structure **12**, and a handle **13** disposed at an upper end of the supporting structure **12**.

[0045] The cleaning end-piece **16** is equipped with a suction aperture **25** (FIG. **4**), disposed in correspondence with the surface to be cleaned.

[0046] The suction unit **14** is able to create a suction flow from the suction aperture **25** to the container **15**, able to contain the material thus sucked in.

[0047] The supporting structure **12** is provided at its lower end with a first connector **17** (FIGS. **1** and **2**) mating with a second connector **18** with which the cleaning end-piece **16** is equipped.

[0048] The first connector **17** comprises a first tubular pipe **19** (FIG. **2**), disposed partly also inside the supporting structure **12**, and a first electric connector **21** attached to the first tubular pipe **19**.

[0049] The second connector **18** comprises a second tubular pipe **20** (FIGS. **2** and **4**), and a second electric connector **22** attached to the second tubular pipe **20**.

[0050] The first and the second tubular pipe **19**, **20** are cylindrical in shape, or any other hollow shape.

[0051] The first tubular pipe **19** is connected at one end to the container **15**, and at the other end has a first coupling element **23**, while the second tubular pipe **20** is connected at one end to the suction aperture **25** and at the other end has a second coupling element **24**.

[0052] The first tubular pipe **19** is able to be inserted inside the second tubular pipe **20** in order to constrain the cleaning end-piece **16** removably to the supporting structure **12** and to guarantee the continuity of the suction flow.

[0053] The first and the second electric connector **21**, **22** cooperate to guarantee the supply of the electric feed to the cleaning end-piece **16**, arriving from an electric cable **29**.

[0054] The electric cable **29** has a first segment **30** associated with the supporting structure **12** and terminating in the first electric connector **21**, and a second segment **31** which exits from the second electric connector **22** in order to enter the cleaning end-piece **16**.

[0055] The first electric connector **21** comprises a plurality of metal terminals **26**, for example ten, and the second electric connector **22** comprises a corresponding plurality of seatings **27**, each one able to accommodate the corresponding metal terminal **26**.

[0056] In this way the cleaning end-piece **16** can be associated with the supporting structure **12**, obtaining in a single operation the mechanical attachment, the continuity of the suction flow and also the electric connection.

[0057] The number of metal terminals **26**, and relative seatings **27**, generally depends on the number of different types of feed tensions (alternate current, direct current and amplitude) required by the cleaning end-piece **16**.

[0058] It is also provided to transmit to the cleaning end-piece **16**, by means of the electric cable **29** and the electric connectors **21**, **22**, command signals which can be sent for example by switches or regulators, of a known type and not shown here, disposed near the handle **13**, or on the handle **13** itself.

[0059] The cleaning end-piece **16** (FIG. **4**) comprises a tank **35** able to contain water or a cleaning liquid and is provided with a stopper **38**, selectively removable in order to allow to insert or remove the water or cleaning liquid.

[0060] The cleaning end-piece **16** also comprises a steam generator **40** and a pump **41** to deliver the steam and/or water, or cleaning liquid, contained in the tank **35**.

[0061] The cleaning end-piece **16** also comprises a cleaning brush **43** provided with a plurality of bristles and able to be adjusted in height, with respect to the floor, by means of an adjuster **44** (FIGS. **5**-**8**).

[0062] The electric brush **10**, by means of the cleaning end-piece **16**, is able to deliver water or the cleaning liquid and/or steam onto the surface to be cleaned and, at the same time, to suck in, together with the fluid and/or the steam condensation, the dirt removed.

[0063] The cleaning end-piece **16** is provided with two wheels **46**, disposed laterally and having a diameter of a length substantially equal to the overall height of the cleaning end-piece **16** itself, so as to confer on the electric brush **10** in its entirety great maneuverability and stability.

[0064] According to a variant not shown here, the cleaning brushes are of the rotary type and driven by an electric motor disposed inside the cleaning end-piece **16** and fed by means of the electric connectors **21**, **22**.

[0065] According to a variant, the cleaning end-piece **16** can be replaced by a brush **116** (FIG. **9**), of a known type, comprising a plurality of fixed bristles disposed in correspondence with the surface to be cleaned and able to be used also in the case of liquids present on the surface to be cleaned.

[0066] In this case the electric brush **10** is able to suck in the dirt removed and possible liquids present on the surface to be cleaned.

[0067] According to another variant, the container **15** can be removed from the electric brush **10** and replaced by another container **115** (FIG. **10**), of a known type, having a dry filter **33**, made for example with a paper bag, and able to retain the particles of dirt removed.

[0068] The substitution operation can be performed, since the second container **115** has the same characteristics of size as the container **15**.

[0069] In this variant, the electric brush **10** is able to suck in only dry particles of dirt, not damp or liquid. Moreover, the brush **116** can be of the simplified type and suitable only to dry particles of dirt.

[0070] According to another variant, in the electric brush **10** the container **15** or the second container **115**, can be replaced by a third container **215** (FIG. **11**), of a known type and having the same characteristics of size as the container **15** and the dry container **115**.

[0071] The third container **215** comprises a filter **34** able to filter and contain both the dirt removed and also possible drops of steam delivered on the surface to be cleaned.

[0072] In this other variant, the electric brush **10**, by means of the cleaning end-piece **16**, is able to deliver steam onto the surface to be cleaned and at the same time to suck in the dirt removed, together with the steam.

[0073] The electric brush **10** therefore has a basic structure comprising the supporting structure **12** and the suction unit **14**.

[0074] The user can combine with the basic structure the desired container, for example the container **15**, the second container **115** or the third container **215**, and the cleaning end-piece **16**, **116** desired.

[0075] The electric brush **10** according to the present invention is therefore easy to personalize according to the requirements of the user, the type of cleaning to be done and according to cost.

[0076] It is clear that modifications and/or additions of parts may be made to the electric brush **10** as described heretofore, without departing from the field and scope of the present invention.

[0077] It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of multi-functional electric brush, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

1. A multi-functional electric brush comprising a substantially tubular supporting structure having an upper end provided with a handle, a suction unit having an electric motor fed electrically and a fan disposed inside said substantially tubular supporting structure, and able to create a suction flow, containing means disposed inside said substantially tubular supporting structure to contain the material sucked in from the surface to be cleaned, and at least a cleaning end-piece having at least a suction aperture, wherein said substantially tubular supporting structure has a lower end provided with first connection means able to be coupled mechanically and removably with second connection means disposed on said cleaning end-piece in order to put said suction aperture in communication with said suction unit, wherein said cleaning end-piece further comprises at least an electric device, which is able to generate steam and/or deliver cleaning liquids, including hot or cold water, and wherein said first and said second connection means comprise respectively first and second electric feed means able to feed said electric device electrically.

2. A multi-functional electric brush as in claim **1**, wherein said cleaning end-piece comprises at least an electric cleaning device having one or more brushes driven by an electric motor.

3. A multi-functional electric brush as in claim **1**, wherein said first connection means comprise a first tubular suction pipe communicating at one end with said containing means and terminating at another end with a first coupling element, and wherein said second connection means comprise a second tubular suction pipe communicating at one end with said suction aperture and terminating at another end with a second coupling element.

4. A multi-functional electric brush as in claim **3**, wherein said first and said second tubular suction pipes are able to be coupled in correspondence with said respective first and second coupling elements, so as to achieve the removable mechanical connection between said substantially tubular supporting structure and said cleaning end-piece and to guarantee continuity to the suction flow.

5. A multi-functional electric brush as in claim **3**, wherein said first tubular suction pipe is disposed, at least partly, inside said substantially tubular supporting structure.

6. A multi-functional electric brush as in claim **3**, wherein said first electric feed means are disposed adjacent to said first tubular suction pipe, and in that wherein said second electric feed means are disposed adjacent to said second tubular suction pipe.

7. A multi-functional electric brush as in claim **1**, wherein said containing means comprise a container having at least a liquid bath filter, towards which the dirt sucked in is conveyed, and remains retained therein.

8. A multi-functional electric brush as in claim **1**, wherein said containing means comprise a container having at least a dry filter able to retain and contain the dry particles of dirt sucked in.

* * * * *