



(11) **EP 3 041 394 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:

**01.11.2017 Bulletin 2017/44**

(21) Application number: **14790313.2**

(22) Date of filing: **03.09.2014**

(51) Int Cl.:

**A47L 9/06 (2006.01)**

(86) International application number:

**PCT/IB2014/064225**

(87) International publication number:

**WO 2015/033277 (12.03.2015 Gazette 2015/10)**

(54) **BRUSH FOR CLEANING EQUIPMENT**

**BÜRSTE FÜR REINIGUNGS-AUSRÜSTUNG**

**BROSSE POUR ÉQUIPEMENT DE NETTOYAGE**

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(30) Priority: **03.09.2013 IT UD20130115**

(43) Date of publication of application:

**13.07.2016 Bulletin 2016/28**

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**EP 3 041 394 B1**

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**Description**

## FIELD OF THE INVENTION

**[0001]** The present invention concerns a brush usable as an end accessory on cleaning equipment, such as vacuum cleaners, electric brushes, combined apparatuses to vacuum and wash floors, or centralized domestic vacuum plants.

**[0002]** In particular, the present invention is usable both for cleaning smooth surfaces or surfaces covered by tiles, or parquet made of wood or any of its by-products or substitutes, or with laminate or any other polymer coverings, or for cleaning rugs or fitted carpets or other surfaces covered in fabric, for example cushions or furnishing elements.

## BACKGROUND OF THE INVENTION

**[0003]** It is known to use nozzles and/or brushes of different sizes and conformations as end accessories for cleaning equipment, with the purpose of adapting the function and efficiency of such equipment depending on the different cleaning conditions that occur on each occasion.

**[0004]** These accessories are normally studied for specific purposes and therefore are generally configured to be removable and replaceable on the basis of their possibilities and opportunities for use.

**[0005]** Brushes for generic use are known, suitable for sucking up dust and gathering dirt present on common surfaces, smooth and resistant, such as floors with tiles, laminate floors, floors with resin or polymer layers of various types.

**[0006]** In proximity to the suction apertures, this type of brush generally has one or more rows of plastic bristles, which must be both flexible and resistant and normally have an average hardness.

**[0007]** Brushes are also known studied specifically for suction on surfaces in fabric, such as for example fitted carpet, rugs or cushions. These brushes can be provided with hard bristles, shorter than those used on the surfaces described above, or, instead of bristles, strips of velvet or other material, or wheels, which allow sliding on the fabric surfaces and/or the electrostatic capture of the dust or other residues of dirt.

**[0008]** Brushes are also known for exclusive use on delicate surfaces, for example those covered in parquet or the so-called pre-finished wood flooring, or with marble or glass slabs. These brushes have bristles made of natural or synthetic materials characterized by great flexibility and lower rigidity than those brushes used for more resistant surfaces.

**[0009]** Other known brushes are dual-purpose, that is, they act both as generic brush for cleaning common smooth surfaces and also allow to clean surfaces in fabric. These known brushes are generally provided with retractable bristles and a containing body configured to

house them either partly or completely inside it.

**[0010]** It is common usage that the passage from one function to the other of dual-purpose brushes is determined by the retraction of the bristles by means of a retraction mechanism housed inside the containing body. The mechanism is usually driven by means of a pedal lever at least partly outside the containing body and accessible from the outside.

**[0011]** On the basis of the above, it is clear that one disadvantage of the state of the art is that to make cleaning equipment versatile, a plurality of end accessories must be associated to it, among which at least two or three brushes, which are at the most dual-purpose.

**[0012]** Another disadvantage of known brushes, in particular those that are dual-purpose, is that they are generally bulky and heavy, because of the mass of components housed in the containing body.

**[0013]** One purpose of the present invention is to make a brush for cleaning equipment that is able to have a plurality of functions, determining high versatility and efficiency of the cleaning equipment to which it is associated, and that allows to reduce the number of accessories needed for cleaning surfaces of different nature and characteristics.

**[0014]** Another purpose is to make a brush that is at the same time multi-functional, light, simple to make and use, and consisting of a reduced number of components.

**[0015]** The prior art document US 5652997 A, on which the preamble of the main claim is based, describes a tool for a vacuum cleaner in which there are two groups of bristles, which can simultaneously assume a retracted position inside the containing body, a protruding position with respect to the containing body, or a position in which a first group is in a retracted position and the other group is in a protruding position.

**[0016]** 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

**[0017]** The present invention is set forth and characterized in the independent claim, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

**[0018]** In accordance with the above purposes, a brush for cleaning equipment according to the present invention comprises a containing body, a plurality of bristles, bristle command and movement means able to be selectively activated in order to make the brush assume a first functioning condition in which all the bristles protrude from the containing body, and a second functioning condition in which all the bristles are completely retracted inside the containing body.

**[0019]** The bristle command and movement means can be selectively activated to make the brush also assume a third functioning condition in which at least a first

group of bristles protrudes outside the containing body and at least one group of bristles is completely retracted inside it.

**[0020]** The brush according to the present invention therefore has the advantage of being able to assume three distinct functioning conditions. This, together with the division of the bristles into groups, gives a greater versatility and flexibility of use of the brush, which can therefore be advantageously used in several situations where there is dirt, whether it is coarse, normal or fine, and for almost all surfaces to be cleaned, whether they are smooth, have grooves, are resistant, delicate or in fabric.

**[0021]** Another advantage of the present invention is that it allows to reduce the number of accessories for cleaning machines needed by a user, containing a plurality of functions in one brush.

**[0022]** In some forms of embodiment, in the third functioning condition, the amount by which the first group of bristles protrudes from the containing body is greater than the amount by which all the bristles protrude from the containing body in the first functioning condition.

**[0023]** The present invention also concerns forms of embodiment in which the amount by which the first group of bristles protrudes from the containing body in the third functioning condition is less than or equal to the amount by which all the bristles protrude from the containing body in the first functioning condition.

**[0024]** This allows to obtain at least two different heights of the suction mouths of the brush, outside the containing body, with respect to the surface to be cleaned, so that it is thus possible to manage different suction efficiencies, depending on needs.

**[0025]** According to a characteristic aspect of the present invention, the bristle command and movement means comprise at least a first bristle movement mechanism connected to the first group of bristles and a first command lever selectively drivable to make the first bristle movement mechanism assume an activated position, in which the first group of bristles protrudes from the containing body by a desired quantity, and a de-activated position in which the first group of bristles is completely retracted inside the containing body.

**[0026]** Moreover, according to the invention, the bristle command and movement means also comprise a second bristle movement mechanism connected to the second group of bristles, and a second command lever selectively drivable to make the first bristle movement mechanism assume a partly activated position and the second bristle movement mechanism simultaneously assume an activated position, in which both the first and the second group of bristles partly protrude from the containing body of the brush, wherein the second bristle movement mechanism is configured to simultaneously move the first group of bristles and the second group of bristles.

**[0027]** In some implementations of the present invention, the brush can also comprise a third lever which, whatever the bristle movement mechanism is in the ac-

tivated position, determines the passage to the de-activated position.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0028]** These and other characteristics of the present invention will become apparent from the following description of some forms of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a plan view of a brush according to the present invention;
- figs. 2a-2c are schematic views from below of the brush in fig. 1 in three different functioning conditions;
- figs. 3a and 3b are three-dimensional views of a component of the brush in fig. 1 in two respective functioning positions;
- figs. 4a and 4b are three-dimensional views of another component of the brush in fig. 1 in two respective functioning positions;
- figs. 5 to 7 are section views of the brush in fig. 1 from S to S, in three respective functioning conditions;
- fig. 8 is a section view of the brush in fig. 1 from VIII to VIII.

#### DETAILED DESCRIPTION OF SOME FORMS OF EMBODIMENT

**[0029]** With reference to fig. 1, a brush according to the present invention is indicated in its entirety by the reference number 10 and is configured to be associated as an end accessory to cleaning equipment, such as vacuum cleaners, electric brushes, or other equipment to suck up dust or other particles from a surface.

**[0030]** The brush 10 includes a containing body 11 that defines the main structure and the external conformation of the brush 10.

**[0031]** The containing body 11 can be defined by a single shell, continuous and in a single piece, or by a plurality of parts connected to each other to define a closed body, such as, in the solutions described with reference to the attached drawings, an upper part 111, and a lower part or brush bottom 211, or again a front part and a rear part, or combinations of these solutions.

**[0032]** The containing body 11 contains two mechanisms configured to move the bristles 14 exiting from and retracting into the containing body 11.

**[0033]** The reference to the two mechanisms is used in the present description merely as an example of possible movement and command means of the bristles 14, and is not intended to limit the field of protection of the present invention. The two mechanisms include a first bristle movement mechanism 12 and a second bristle movement mechanism 13.

**[0034]** The first bristle movement mechanism 12 is

configured to move a first group of bristles 14a and the second bristle movement mechanism 13 is configured to move a second group of bristles 14b.

**[0035]** In the upper part 111 of the containing body 11a first through aperture 15a is made in which a first command lever 16a of the first bristle movement mechanism 12 is inserted so as to partly protrude from the upper part 111.

**[0036]** In the upper part 111 of the containing body 11a second through aperture 15b is also made, in which a second command lever 16b of the second bristle movement mechanism 13 is inserted so as to partly protrude from the upper part 111.

**[0037]** A third through aperture 15c is made in the upper part 111 of the containing body 11 and houses a third lever 16c to retract the bristles 14, partly protruding from the upper part 111 and cooperating with both the bristle movement mechanisms 12, 13.

**[0038]** The first lever 16a, the second lever 16b and the third lever 16c partly protrude from the upper part 111 of the containing body 11 to be selectively driven from the outside by a user, for example manually, before the installation of the brush 10 in the cleaning equipment, or with a foot after the installation of the brush 10 and/or during use of the equipment.

**[0039]** The reference to the levers 16a, 16b, 16c is simply an example of a possible form of embodiment of movement and command means of the bristles 14, and is not intended to limit the field of protection of the present invention. Indeed, forms of embodiment are possible in which the brush 10 is provided with a single command lever, or other forms of embodiment in which the brush 10 includes movement and command means which can be driven remotely, without command levers and/or movement mechanisms.

**[0040]** In this case, the selective drive of the first lever 16a, the second lever 16b and the third lever 16c determines the command to activate or de-activate one or both bristle movement mechanisms 12, 13.

**[0041]** After this selective drive, the brush 10 can assume three functioning conditions, depending on the surfaces to be cleaned, as will be described in detail hereafter.

**[0042]** Moreover, the containing body 11 conventionally contains a suction pipe 17 that conveys the dust or particles from the surface to be cleaned toward the body of the cleaning equipment.

**[0043]** In figs. 2a to 2c a suction mouth 18 is visible that communicates with the suction pipe 17 and represents its aperture toward the surface to be cleaned.

**[0044]** In the same figs. from 2a to 2c, for convenience and graphic clarity, only the brush bottom 211 is shown, without intending to limit the solutions of the present invention, and with the present description continuing to refer also to the upper part 111 of the containing body 11.

**[0045]** Fig. 2a is used to schematically describe a first functioning condition of the brush 10, in which all the bristles 14, that is, not only those of the first group of bristles

14a but also those of the second group of bristles 14b, protrude from the brush bottom 211. In this condition, a suction chamber is created which is almost completely closed, since the bristles 14 are positioned both to the front and to the rear with respect to the suction mouth 18.

**[0046]** Fig. 2b is used to schematically describe a second functioning condition of the brush 10, in which all the bristles 14 are retracted inside the containing body 11, and therefore neither those of the first group of bristles 14a, nor those of the second group of bristles 14b protrude therefrom. In this case, contact with the surface to be cleaned is established by means of wheels 19, in this case present in correspondence to the rear zone of the brush bottom 211, in proximity to the part of the brush 10 configured to be coupled with the cleaning equipment.

**[0047]** In some forms of embodiment, there can also be possible further wheels 19 in proximity to the suction mouth 18.

**[0048]** Other solutions can provide, instead of the further wheels 19, inserts made of velvet or plastic material.

**[0049]** Fig. 2c is used to schematically describe a third functioning condition of the brush 10, in which only a part of the bristles 14, in this case only those of the first group of bristles 14a, protrudes from the brush bottom 211.

**[0050]** The first functioning condition (fig. 2a) can be adopted for the usual cleaning of smooth floors which are conventionally resistant, for example ceramic tiles; the second functioning condition (fig. 2b) can be adopted to clean surfaces in fabric, for example fitted carpets or rugs, or surfaces with big grooves; while the third functioning condition (fig. 2c) can be adopted for delicate floors, for example parquet, and/or conditions of coarse dirt.

**[0051]** Figs. 3a and 3b are used to describe forms of embodiment of the first bristle movement mechanism 12, which is configured to move the bristles of the first group of bristles 14a vertically.

**[0052]** In fig. 3a, the first bristle movement mechanism 12 is shown in an activated position, that is, with the first group of bristles 14a lowered, while fig. 3b shows a de-activated position, or retraction position of the first group of bristles 14a.

**[0053]** Figs. 4a and 4b are used to describe forms of embodiment of the second bristle movement mechanism 13, which is configured to move the bristles of the second group of bristles 14b vertically.

**[0054]** In fig. 4a, the second bristle movement mechanism 13 is shown in an activated position, or lowered position of the second group of bristles 14b, while fig. 4b shows a de-activated position, or retracted position, of the second group of bristles 14b.

**[0055]** The first bristle movement mechanism 12 can be connected to the first lever 16a and include a support frame 20a, to which the first group of bristles 14a is attached, a rocker arm 21a and a rod 22a which connects the first lever 16a and the rocker arm 21a.

**[0056]** The first lever 16a is pivoted on the containing body 11, for example on its upper part 111, in correspond-

ence with its rotation pin 23a, which defines a first axis of rotation X1 around which the first lever 16a rotates in order to make the first bristle movement mechanism 12 pass from the activated position to the de-activated one, and vice versa.

**[0057]** The rocker arm 21a is provided with a pivoted end 121a, rotatably connected to the containing body 11, for example to its upper part 111, so as to define a second axis of rotation X2.

**[0058]** The rod 22a can have a first end portion 122a, hinged to the first lever 16a in correspondence to a thrust segment 116a of the latter, and a second end portion 222a, opposite the first end portion 122a, hinged to a connection end 221a of the rocker arm 21a, opposite with respect to the pivoting end 121a of the latter.

**[0059]** In some forms of embodiment, such as those shown by way of example in the attached drawings, the rod 22a can be C-shaped and the end portions 122a and 222a can be two transverse branches of this conformation.

**[0060]** In the specific case, the rod 22a is hinged to the first lever 16a by inserting its first end portion 122a in two through holes 24a (only one of which is visible in fig. 3a) aligned along a first hinging axis Y1, parallel to the first axis of rotation X1.

**[0061]** The through holes 24a act as first hinging means and are positioned at a first distance H1 from the rotation pin 23a.

**[0062]** The first distance H1 defines the distance between the first axis of rotation X1 and the first hinging axis Y1.

**[0063]** Moreover, the rod 22a is hinged to the rocker arm 21a by inserting its second end portion 222a in a housing hole 25a made through in the connection end 221b of the rocker arm 21a.

**[0064]** In this way, the housing hole 25a acts as second hinging means of the rod 22a along a second hinging axis Y2, parallel to the second axis of rotation X2 and located distanced from the latter at a second distance H2.

**[0065]** In some forms of embodiment, the first axis of rotation X1 and the second axis of rotation X2 can be parallel to each other.

**[0066]** On the basis of the above, the first lever 16a, the rocker arm 21a and the rod 22a define a kinematism, that can be the articulated quadrilateral type, in which the first lever 16a and the rocker arm 21a are configured to rotate and pivot horizontally respectively around the first axis of rotation X1 and around the second axis of rotation X2, while the rod 22a is configured to translate or perform a roto-translation on a plane orthogonal to the axes of rotation X1, X2 and to the hinging axes Y1 and Y2.

**[0067]** In possible implementations, the first distance H1 can be equal to the second distance H2, and the consequent kinematism can be the articulated parallelogram type.

**[0068]** Other implementations can provide any other type of kinematism suitable to move the bristles 14, of which the present description supplies only one example

solution.

**[0069]** The support frame 20a can include one or more guide blocks 26a, which can be defined by an inclined wall, or inclined plane 126a, and a positioning seating 226a, the latter positioned at one end of the inclined plane 126a.

**[0070]** In the specific case described with reference to figs. 3a and 3b, merely by way of example, the frame 20a comprises four guide blocks 26a, one pair of which is positioned in proximity to the first lever 16a, and one pair positioned in proximity to the rocker arm 21a.

**[0071]** The distance between the two pairs of guide blocks 26a is substantially equal to the length of the rod 22a.

**[0072]** The guide blocks 26a are disposed so that the inclined planes 126a are all parallel to each other and that the positioning seatings 226a are all located at a same first height Q1 with respect to a base surface 120a of the frame 20a.

**[0073]** The positioning seatings 226a can typically have a concave or convex shape, and in any case have a homologous shape with respect to the shape of the thrust segment 116a and of the connection end 221a of the rocker arm 21a.

**[0074]** With reference to figs. 3a and 7, when the first bristle movement mechanism 12 is in the activated position, the thrust segment 116a rests on two corresponding positioning seatings 226a and is housed at least partly inside them.

**[0075]** In the same way, when the first bristle movement mechanism 12 is in the activated position, also the connection end 221a of the rocker arm 21a rests on the positioning seatings 226a of the other pair with respect to those on which the thrust segment 116a rests, and is housed at least partly inside them.

**[0076]** The mating shape of the positioning seatings 226a with respect to the thrust segment 116a and to the connection end 221a allows a firm positioning, even if it is removable, of the first bristle movement mechanism 12 in its activated position.

**[0077]** With reference to figs. 3b, 5 and 6, when the first bristle movement mechanism 12 is in the de-activated position, the thrust segment 116a and the connection end 221a are released from the corresponding positioning seatings 226a.

**[0078]** In this position, the thrust segment 116a and the connection end 221a can be in contact with the corresponding inclined planes 126a (figs. 3b and 6), or can be completely released from the guide blocks 26a (fig. 5).

**[0079]** The passage of the bristle movement mechanism 12 from the activated position to the de-activated one, and vice versa, is determined by a rotation of the first lever 16a around the first axis of rotation X1.

**[0080]** In the case shown here by way of example, to make the first bristle movement mechanism 12 pass from the activated position (fig. 3a) to the de-activated one (fig. 3b), the first lever 16a performs a rotation in a clockwise direction with respect to the first axis of rotation X1,

making the thrust segment 116a and the connection end 221b exit, in the first part of the clockwise rotation, from the respective positioning seatings 226a.

**[0081]** Vice versa, to make the bristle movement mechanism 12 pass from the de-activated position (fig. 3b) to the activated one (fig. 3a), the first lever 16a performs a rotation in an anti-clockwise direction with respect to the first axis of rotation X1.

**[0082]** Alternative forms of embodiment also come within the field of protection of the present invention, in which the rotations of the first lever 16a are inverted.

**[0083]** The first bristle movement mechanism 12 functions as follows, considering a de-activated initial position.

**[0084]** The rotation of the first lever 16a around the first axis of rotation X1 determines an equal rotation of the thrust segment 116a, which thrusts the connection end 221a of the rocker arm 21a by means of the rod 22a.

**[0085]** Since it has its pivoted end 121a attached to the upper part 111 of the containing body 11, the rocker arm 21a will move in a horizontally pivoting motion around the second pivoting axis X2.

**[0086]** In this case, the horizontally pivoting angle of the rocker arm 21a is equal to the angle of rotation of the first lever 16a.

**[0087]** The positioning of the guide blocks 26a is such that the rotation of the first lever 16a determines a corresponding sliding of the thrust segment 116a on the inclined planes 126a of the corresponding pair of guide blocks 26a. Moreover, the thrust of the rod 22a determines the corresponding sliding of the connection end 221a of the rocker arm 21a on the inclined planes 126a of the corresponding pair of guide blocks 26a.

**[0088]** The fact that the end portions 112a, 222a of the rod 22a are rotatable around respective hinging axes Y1, Y2, makes the rod move with a flat motion on a plane orthogonal to both the hinging axes Y1, Y2, and to the axes of rotation X1 and X2.

**[0089]** Since the rotation pin 23a and the pivoting end 121a are attached to the containing body 11 of the brush 10, for example to its upper part 111, the corresponding sliding described above determines an absolute motion with respect to the upper part 111, downward, that is, away from the rotation pin 23a and from the pivoting end 121a, of the support frame 20a.

**[0090]** In this way, the first group of bristles 14a descends, exiting from the brush bottom 211 when the first lever 16a is rotated in an anti-clockwise direction starting from the de-activated position.

**[0091]** The rotation ends when the thrust segment 116a and the connection end 221a cooperate with the positioning seatings 226a.

**[0092]** After a clockwise rotation of the first lever 16a, when the first bristle movement mechanism 12 is in an activated position, as in fig. 3a, an upward movement of the support frame 20a follows, that is, toward the rotation pin 23 a and the pivoting end 121a (fig. 3b), retracting the first group of bristles 14a.

**[0093]** With reference to figs. 4a and 4b, the second bristle movement mechanism 13 is completely analogous to the first bristle movement mechanism 12 and can include the second lever 16b, a support frame 20b, to which the second group of bristles 14b is attached, a rocker arm 21b and a rod 22b that connects the second lever 16b and the rocker arm 21b.

**[0094]** The second lever 16b is pivoted on the containing body 11, for example on the upper part 111 of the latter, in correspondence to its rotation pin 23b, which defines a third axis of rotation X3 around which the second lever 16b rotates to make the bristle movement mechanism 13 pass from the activated position (fig. 4a) to the de-activated one (fig. 4b) and vice versa.

**[0095]** The rod 22b has a first end portion 122b hinged to a thrust segment 116b of the second lever 16b and a second end portion 222b hinged to a connection end 221b of the rocker arm 21b.

**[0096]** The end portions 122b and 222b are rotatable with respect to a third hinging axis Y3 and a fourth hinging axis Y4, respectively.

**[0097]** The rocker arm 21b is pivoted to the containing body 11 of the brush 10, for example to its upper part 111, in correspondence to its pivoting end 121b, and is horizontally pivoting with respect thereto around a fourth axis of rotation X4.

**[0098]** Third axis of rotation X3 and third hinging axis Y3 can be parallel to each other and located at a third distance H3.

**[0099]** Fourth axis of rotation X4 and fourth hinging axis Y4 can be parallel to each other and located at a fourth distance H4.

**[0100]** In some forms of embodiment, the third axis of rotation X3 and the fourth axis of rotation X4 can be parallel to each other.

**[0101]** In possible implementations, the third distance H3 and the fourth distance H4 can be equal.

**[0102]** In other forms of embodiment, combinable with those described above, the axes of rotation X1, X2, X3, X4 can all be parallel to each other.

**[0103]** In still other forms of embodiment, combinable with those described above, the hinging axes Y1, Y2, Y3, Y4 can all be parallel to each other.

**[0104]** It is also possible that the axes of rotation X1, X2, X3, X4 and the hinging axes Y1, Y2, Y3, Y4 are all parallel to each other.

**[0105]** The support frame 20b can include one or more guide blocks 26b, for example four, disposed in two pairs positioned one in proximity to the second lever 16b and one in proximity to the rocker arm 21b.

**[0106]** The guide blocks 26b can each include an inclined plane 126b, on which the thrust segment 116b of the second lever 16b or the connection end 221b of the rocker arm 21b slides.

**[0107]** Each guide block 26b can also include a positioning seating 226b, positioned at one end of the inclined plane 126b and configured to at least partly house the thrust segment 116b or the connection end 221b.

**[0108]** The positioning seatings 226b are located at the same second height Q2 with respect to a base surface 120b of the support frame 20b.

**[0109]** The second height Q2 is less than said first height Q1, which defines the distance of the positioning seatings 226a with respect to the base surface 120a.

**[0110]** The functioning of the second bristle movement mechanism 13, analogous to that described above of the first bristle movement mechanism 12, provides that a rotation of the second lever 16b in a clockwise direction allows the passage of the second bristle movement mechanism 13 from the de-activated position (fig. 4b) to the activated position (fig. 4a) and vice versa.

**[0111]** As the rotation pin 23b and the pivoting end 121b remain stationary, the rotation of the second lever 16b around the third axis of rotation X3 determines a rotation of the thrust segment 116b, which thrusts the rod 22b to make the rocker arm 21b pivot horizontally around the fourth axis of rotation X4.

**[0112]** Simultaneously with the rotation of the second lever 16b, the thrust segment 116b moves along the inclined planes 126b of the corresponding guide blocks 26b to move, at the end of the rotation, into the positioning seatings 226b.

**[0113]** Simultaneously with the horizontal pivoting of the rocker arm 21b, the connection end 221b of the latter slides in contact with the inclined planes 126b of the corresponding guide blocks 26b to position itself, at the end of the horizontal pivoting described above, in the positioning seatings 226b.

**[0114]** Due to the effect of the relative motion of the thrust segment 116b and of the connection end 221b with respect to the inclined planes 126b, the support frame 20b moves downward with respect to the containing body 11, that is, it moves away from the rotation pin 23b and from the pivoting end 121b, when the second bristle movement mechanism 13 passes from the de-activated position to the activated one. In the opposite case, the support frame 20b moves upward with respect to the containing body 11, that is, it moves nearer the rotation pin 23b and to the pivoting end 121b, determining a corresponding vertical translatory motion of the second group of bristles 14b respectively exiting from the brush bottom 211 and retracting into the containing body 11.

**[0115]** With reference to figs. 5, 6 and 7, in which the brush 10 is shown assembled, it shows how the assembly provides that the second bristle movement mechanism 13 is positioned above the first bristle movement mechanism 12.

**[0116]** In particular, the support frame 20b of the second bristle movement mechanism 13 is positioned above the support frame 20a of the first bristle movement mechanism 12.

**[0117]** Fig. 5 is used to describe forms of embodiment of the brush 10 in which it is in its first functioning condition.

**[0118]** In this first functioning condition of the brush 10, all the bristles 14, of both the first group of bristles 14a

and the second group of bristles 14b, protrude from the brush bottom 211.

**[0119]** In the first functioning condition, the first bristle movement mechanism 12 is in the de-activated position, while the second bristle movement mechanism 13 is in the activated position.

**[0120]** The activation of the second bristle movement mechanism 13 makes the support frame 20b of the latter enter into contact with the support frame 20a of the first bristle movement mechanism 12, thrusting it downward.

**[0121]** This downward movement is due to the fact that the second height Q2 at which the positioning seatings 226b are situated is lower than the first height Q1 at which the positioning seatings 226a are situated. Consequently, the downward movement of the support frame 20b, and therefore of the frame 20a, is less than that that the latter could have with the activation of the first bristle movement mechanism 12.

**[0122]** Fig. 6 is used to describe forms of embodiment of the brush 10 in which it is in its second functioning condition.

**[0123]** In the second functioning condition, both the first bristle movement mechanism 12 and the second bristle movement mechanism 13 are in the de-activated position.

**[0124]** In this second functioning condition all the bristles 14 are contained inside the containing body 11 of the brush 10, which can rest on any possible surface to be cleaned with the wheels 19.

**[0125]** Fig. 7 is used to describe forms of embodiment of the brush 10 in which it is in its third functioning condition.

**[0126]** In the third functioning condition, the first bristle movement mechanism 12 is in the activated position, while the second bristle movement mechanism 13 is in the de-activated position.

**[0127]** In this condition, only the bristles of the first group of bristles 14a protrude by a second quantity L2, equal to almost the whole of its height, from the brush bottom 211, while the bristles of the second group of bristles 14b are completely enclosed within the containing body 11 of the brush 10.

**[0128]** In the case described by way of example here, the bristles of the first group of bristles 14a protrude from the brush bottom 211 by about 4 mm.

**[0129]** Since the movement of the support frame 20a in this functioning condition is linked exclusively to the first height Q1, it is higher than the first functioning condition of the brush 10 described above.

**[0130]** Consequently, only the first group of bristles 14a protrudes by a second quantity L2, greater than the first quantity L1 by which the bristles 14 protrude in the first functioning condition of the brush 10.

**[0131]** In the case described by way of example here, the first quantity L1 is equal to about 2.5 mm, that represents about 60% of the value of the second quantity L2, equal to 4 mm.

**[0132]** Forms of embodiment can be provided in which

the first quantity L1 and the second quantity L2 are equal.

**[0133]** In other forms of embodiment, the first quantity L1 is greater than the second quantity L2.

**[0134]** In some forms of embodiment, described with reference to figs. 5 and 7, the second lever 16b can be provided with a prominent part 27, located in correspondence to the thrust segment 116b and protruding toward the central zone of the support frame 20b.

**[0135]** The passage from the first functioning condition (fig. 5) to the third functioning condition (fig. 7) of the brush 10, and vice versa, can occur directly due to the effect of the contact between the prominent part 27 and the connection end 221a of the rocker arm 21a of the first bristle movement mechanism 12.

**[0136]** In this way, the second lever 16b is configured to make the second bristle movement mechanism 13 assume the activated position and at the same time make the first bristle movement mechanism 12 assume the de-activated position.

**[0137]** Similarly, the first lever 16a can be configured to make the first bristle movement mechanism 12 assume the activated position and at the same time make the second bristle movement mechanism 13 assume the de-activated position.

**[0138]** Indeed, rotating the first lever 16a, the prominent part 27 is thrust by the connection end 221a, moved in its turn by the rod 22a, de-activating the second bristle movement mechanism 13, if it is in the activated position.

**[0139]** In the same way, when the first bristle movement mechanism 12 is in the activated position, by rotating the second lever 16b the prominent part 27 thrusts the connection end 221a and, by means of the rod 22a, the thrust segment 116a of the first lever 16a, de-activating the first bristle movement mechanism 12.

**[0140]** With reference to figs. 5, 6 and 7, the second functioning condition (fig. 6) can be obtained starting from any of the preceding first (fig. 5) and third (fig. 7) functioning conditions by activating the third lever 16c.

**[0141]** The latter is pivoted to the containing body 11, for example to the upper part 111 of the latter, and is configured to rotate with respect to its axis of rotation Z, incident, for example substantially orthogonal, with respect to the axes of rotation X1 and X2, respectively of the first lever 16a and of the second lever 16b.

**[0142]** The third lever 16c can be provided with a de-activation protuberance 28, configured to contact a front protrusion 29 of the first lever 16a and a rear projection 30 of the rocker arm 21b.

**[0143]** In the first functioning condition of the brush 10 (fig. 5), the rear projection 30 is located below the de-activation protuberance 28. A rotation of the third lever 16c around its axis of rotation determines the contact between its de-activation protuberance 28 and the rear projection 30. This contact determines a rotation of the second lever 16b around the third axis of rotation X3, and consequently, by means of the rod 22b, a rotation of the rocker arm 21b around the fourth axis of rotation X4.

**[0144]** In this way, both the second lever 16b and the

rocker arm 21b are released from the positioning seatings 226b, allowing to lift the support frame 20a and with it the support frame 20b, with consequent passage of the second bristle movement mechanism 13 to the de-activated position and the brush 10 to the second functioning condition (fig. 6).

**[0145]** In the third functioning condition of the brush 10 (fig. 7), the front protrusion 29 is located below the de-activation protuberance 28. A rotation of the third lever 16c around its axis of rotation determines the contact between its de-activation protuberance 28 and the front protrusion 29. This contact determines a rotation of the first lever 16a around the first axis of rotation X1, and consequently, by means of the first rod 22a, of the rocker arm 21a around the second axis of rotation X2.

**[0146]** In this way, both the first lever 16a and the rocker arm 21a are released from the positioning seatings 226a, with consequent passage of the first bristle movement mechanism 12 to the de-activated position and of the brush 10 to the second functioning condition (fig. 6).

**[0147]** In some forms of embodiment, described with reference by way of example to fig. 8, the brush 10 can include elastic return means, such as for example one or more springs 31, helical, gas, cup or other type, configured to constantly exert an upward thrust against one or both support frames 20a, 20b.

**[0148]** The springs 31 can perform the function of lifting one or both support frames 20a, 20b, even independently from each other, when the respective bristle movement mechanisms 12, 13 are de-activated.

**[0149]** The springs 31 can perform the function of lifting the support frames 20a and 20b, when the third lever 16c is driven.

**[0150]** Another function of the springs 31 is to maintain, by means of the thrust force, the thrust segments 116a, 116b and the connection ends 221a, 221b in the respective positioning seatings 226a, 226b when the first bristle movement mechanism 12 and/or the second bristle movement mechanism 13 are in the activated position.

**[0151]** In forms of embodiment described with the aid of fig. 8, both a first pair of springs 31a acting on the support frame 20a, and a second pair of springs 31b acting on the support frame 20b are provided.

**[0152]** Other forms of embodiment, not shown in the drawings, can provide the presence of a single pair of springs, or the presence of mechanical return means, for example connected to the first lever 16a and/or the second lever 16b, so that no elastic means, such as the springs 31, are present.

**[0153]** It is clear that modifications and/or additions of parts may be made to the brush 10 for cleaning equipment as described heretofore, without departing from the field and scope of the present invention.

**[0154]** 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 brush for cleaning equipment, having the characteristics as set

forth in the claims and hence all coming within the field of protection defined thereby.

### Claims

1. Brush for cleaning equipment, comprising a containing body (11), a plurality of bristles (14), bristle command and movement means (16a, 16b, 16c, 12, 13) able to be selectively activated in order to make said brush (10) assume a first functioning condition in which all the bristles (14) protrude from a lower part (211) of said containing body (11), and a second functioning condition in which all the bristles (14) are completely retracted inside said containing body (11), wherein said bristle command and movement means (16a, 16b, 16c, 12, 13) are able to be selectively activated to make said brush (10) also assume a third functioning condition in which at least a first group of bristles (14a) protrudes from said lower part (211) of said containing body (11) and at least a second group of bristles (14b) is completely retracted inside said containing body (11), wherein said bristle command and control means (16a, 16b, 16c, 12, 13) comprise at least a first bristle movement mechanism (12) connected to said first group of bristles (14a) and a first command lever (16a) selectively drivable to make said first bristle movement mechanism (12) assume at least an activated position, in which at least said first group of bristles (14a) protrudes from said lower part (211) of the containing body (11) by said first quantity (L1), and wherein said bristle command and movement means (16a, 16b, 16c, 12, 13) comprise a second bristle movement mechanism (13) connected to said second group of bristles (14b), and a second command lever (16b) selectively drivable to make said second bristle movement mechanism (13) assume an activated position in which at least said second group of bristles (14b) at least partly protrudes from said lower part (211) of said containing body (11), **characterized in that** said second bristle movement mechanism (13) is configured to simultaneously move said first group of bristles (14a) and said second group of bristles (14b).
2. Brush as in claim 1, **characterized in that**, in said first functioning condition, the bristles (14) protrude from the lower part (211) of the containing body (11) by a first quantity (L1) **and in that** in said third functioning condition the at least one first group of bristles (14a) protrudes from the lower part (211) of the containing body (11) by a second quantity (L2), greater than or equal to said first quantity (L1).
3. Brush as in claim 1, **characterized in that**, in said first functioning condition, the bristles (14) protrude from the lower part (211) of the containing body (11) by a first quantity (L1) **and in that** in said third functioning condition the at least one first group of bristles (14a) protrudes from the lower part (211) of the containing body (11) by a second quantity (L2), less than or equal to said first quantity (L1).
4. Brush as in any of the claims from 1 to 3, **characterized in that** said first lever (16a) is connected to said containing body (11) in correspondence to its own rotation pin (23a) and is provided with a thrust segment (116a), said first bristle movement mechanism (12) comprising a rocker arm (21a) provided with a pivoting end (121a) pivoted to said containing body (11) and with a connection end (221a), said first lever (16a) and said rocker arm (21a) being configured to vertically move a support frame (20a) of said first group of bristles (14a).
5. Brush as in any of the claims from 1 to 4, **characterized in that** said second lever (16b) is connected to said containing body (11) in correspondence to its own rotation pin (23b), and is provided with a thrust segment (116b), said second bristle movement mechanism (13) comprising a rocker arm (21b) provided with a pivoting end (121b) pivoted to said containing body (11) and with a connection end (221b), said second lever (16b) and said rocker arm (21b) being configured to vertically move a support frame (20b) of said second group of bristles (14b).
6. Brush as in any claim hereinbefore, **characterized in that** at least one of either said first bristle movement mechanism (12) or said second bristle movement mechanism (13) comprises a plurality of guide blocks (26a, 26b) each having a positioning seating (226a, 226b) raised with respect to a base surface (120a, 120b) of said support frame (20a, 20b), **and in that** in the activated position of at least one of either the first (12) or the second (13) bristle movement mechanism, the connection end (221a, 221b) of said rocker arm (21a, 21b) and at least one of either the thrust segment (116a, 116b) of the first lever (16a) or that of the second lever (16b) are at least partly housed in corresponding positioning seatings (226a, 226b).
7. Brush as in claim 6, **characterized in that** said second lever (16b) is provided, in correspondence to its own thrust segment (116b), with a prominent part (27) which, in said activated position of the second bristle movement mechanism (13), is in contact with the connection end (221a) of the rocker arm (21a) of the first bristle movement mechanism (12), in order to maintain said connection end (221a) completely outside said one or more positioning seatings (226a).
8. Brush as in any claim hereinbefore, **characterized**

in that it comprises a third lever (16c) associated both to said first bristle movement mechanism (12) and also to said second bristle movement mechanism (13) and selectively drivable to make said first bristle movement mechanism (12) and said second bristle movement mechanism (13) simultaneously assume the de-activated position.

## Patentansprüche

1. Bürste für Reinigungszubehör, umfassend: einen Aufnahmekörper (11), mehrere Borsten (14), Borstensteuer- und -bewegungsmittel (16a, 16b, 16c, 12, 13), die selektiv aktiviert werden können, damit die Bürste (10) einen ersten Betriebszustand, in dem alle Borsten (14) aus einem unteren Teil (211) des Aufnahmekörpers (11) hervorstehen, und einen zweiten Betriebszustand, in dem alle Borsten (14) vollständig in dem Aufnahmekörper (11) eingezogen sind, annimmt, wobei die Borstensteuer- und -bewegungsmittel (16a, 16b, 16c, 12, 13) selektiv aktiviert werden können, um die Bürste (10) dazu zu bringen, außerdem einen dritten Betriebszustand anzunehmen, in dem mindestens eine erste Gruppe von Borsten (14a) aus dem unteren Teil (211) des Aufnahmekörpers (11) hervorsteht und mindestens eine zweite Gruppe von Borsten (14b) vollständig in dem Aufnahmekörper (11) eingezogen ist, wobei die Borstensteuer- und -bewegungsmittel (16a, 16b, 16c, 12, 13) mindestens einen ersten Borstenbewegungsmechanismus (12), der mit der ersten Gruppe von Borsten (14a) verbunden ist, und einen ersten Steuerhebel (16a) umfassen, der selektiv steuerbar ist, um den ersten Borstenbewegungsmechanismus (12) dazu zu bringen, mindestens eine aktivierte Position einzunehmen, in der mindestens die erste Gruppe von Borsten (14a) aus dem unteren Teil (211) des Aufnahmekörpers (11) um den ersten Betrag (L1) hervorsteht, und wobei die Borstensteuer- und -bewegungsmittel (16a, 16b, 16c, 12, 13) einen zweiten Borstenbewegungsmechanismus (13), der mit der zweiten Gruppe von Borsten (14b) verbunden ist, und einen zweiten Steuerhebel (16b) umfassen, der selektiv steuerbar ist, um den zweiten Borstenbewegungsmechanismus (13) dazu zu bringen, eine aktivierte Position einzunehmen, in der mindestens die zweite Gruppe von Borsten (14b) mindestens teilweise aus dem unteren Teil (211) des Aufnahmekörpers (11) hervorsteht, **dadurch gekennzeichnet, dass** der zweite Borstenbewegungsmechanismus (13) konfiguriert ist, die erste Gruppe von Borsten (14a) und die zweite Gruppe von Borsten (14b) gleichzeitig zu bewegen.
2. Bürste nach Anspruch 1, **dadurch gekennzeichnet, dass** die Borsten (14), in dem ersten Betriebszustand, aus dem unteren Teil (211) des Aufnahme-

körpers (11) um einen ersten Betrag (L1) hervorstehen, und dadurch, dass die mindestens eine erste Gruppe von Borsten (14a), in dem dritten Betriebszustand, aus dem unteren Teil (211) des Aufnahmekörpers (11) um einen zweiten Betrag (L2) hervorsteht, der größer als oder gleich dem ersten Betrag (L1) ist.

3. Bürste nach Anspruch 1, **dadurch gekennzeichnet, dass** die Borsten (14), in dem ersten Betriebszustand, aus dem unteren Teil (211) des Aufnahmekörpers (11) um einen ersten Betrag (L1) hervorstehen, und dadurch, dass die mindestens eine erste Gruppe von Borsten (14a), in dem dritten Betriebszustand, aus dem unteren Teil (211) des Aufnahmekörpers (11) um einen zweiten Betrag (L2) hervorsteht, der kleiner als oder gleich dem ersten Betrag (L1) ist.
4. Bürste nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** der erste Hebel (16a) in Übereinstimmung mit seinem eigenen Drehstift (23a) mit dem Aufnahmekörper (11) verbunden ist und mit einem Schubsegment (116a) bereitgestellt ist, wobei der erste Borstenbewegungsmechanismus (12) einen Kipphebel (21a) umfasst, der mit einem Schwenkende (121a), das an dem Aufnahmekörper (11) angelenkt ist, und mit einem Verbindungsende (221a) bereitgestellt ist, wobei der erste Hebel (16a) und der Kipphebel (21a) dafür ausgelegt sind, einen Tragrahmen (20a) der ersten Gruppe von Borsten (14a) vertikal zu bewegen.
5. Bürste nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** der zweite Hebel (16b) in Übereinstimmung mit seinem eigenen Drehstift (23b) mit dem ersten Aufnahmekörper (11) verbunden ist und mit einem Schubsegment (116b) bereitgestellt ist, wobei der zweite Borstenbewegungsmechanismus (13) einen Kipphebel (21b) umfasst, der mit einem Schwenkende (121b), das an dem Aufnahmekörper (11) angelenkt ist, und mit einem Verbindungsende (221b) bereitgestellt ist, wobei der zweite Hebel (16b) und der Kipphebel (21b) dafür ausgelegt sind, einen Tragrahmen (20b) der zweiten Gruppe von Borsten (14b) vertikal zu bewegen.
6. Bürste nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** mindestens einer von entweder dem ersten Borstenbewegungsmechanismus (12) oder dem zweiten Borstenbewegungsmechanismus (13) mehrere Führungsblöcke (26a, 26b) umfasst, die jeweils einen Positioniersitz (226a, 226b) aufweisen, der in Bezug auf eine Grundfläche (120a, 120b) des Tragrahmens (20a, 20b) erhaben ist, und dadurch, dass das Verbindungsende (221a, 221b) des Kipphebels (21a, 21b) und mindestens eins von entweder dem Schubseg-

ment (116a, 116b) des ersten Hebels (16a) oder dem des zweiten Hebels (16b) in der aktivierten Position von mindestens einem von entweder dem ersten (12) oder dem zweiten (13) Borstenbewegungsmechanismus mindestens teilweise in entsprechenden Positioniersitzen (226a, 226b) aufgenommen sind.

7. Bürste nach Anspruch 6, **dadurch gekennzeichnet, dass** der zweite Hebel (16b) in Übereinstimmung mit seinem eigenen Schubsegment (116b) mit einem vorstehenden Teil (27) bereitgestellt ist, das in der aktivierten Position des zweiten Borstenbewegungsmechanismus (13) in Kontakt mit dem Verbindungsende (221a) des Kipphebels (21a) des ersten Borstenbewegungsmechanismus (12) ist, um das Verbindungsende (221a) vollständig außerhalb des einen oder der mehreren Positioniersitze (226a) zu halten.
8. Bürste nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie einen dritten Hebel (16c) umfasst, der sowohl mit dem ersten Borstenbewegungsmechanismus (12) als auch mit dem zweiten Borstenbewegungsmechanismus (13) verbunden ist und antreibbar ist, um dafür zu sorgen, dass der erste Borstenbewegungsmechanismus (12) und der zweite Borstenbewegungsmechanismus (13) gleichzeitig die deaktivierte Position einnehmen.

## Revendications

1. Brosse pour un équipement de nettoyage comprenant un corps contenant (11), une pluralité de soies (14), des moyens de commande et de déplacement de soies (16a, 16b, 16c, 12, 13) pouvant être actionnés sélectivement afin que ladite brosse (10) passe en un premier état fonctionnel dans lequel toutes les soies (14) font saillie d'une partie inférieure (211) dudit corps contenant (11), et un second état fonctionnel dans lequel toutes les soies (14) sont entièrement rétractées dans ledit corps contenant (11), dans laquelle lesdits moyens de commande et de déplacement (16a, 16b, 16c, 12, 13) peuvent être actionnés sélectivement afin que ladite brosse (10) passe également en un troisième état fonctionnel dans lequel au moins un premier groupe de soies (14a) fait saillie de ladite partie inférieure (211) dudit corps contenant (11) et au moins un second groupe de soies (14b) est entièrement rétracté dans ledit corps contenant (11), dans laquelle lesdits moyens de commande et de déplacement (16a, 16b, 16c, 12, 13) comprennent au moins un premier mécanisme de déplacement de soies (12) relié audit premier-groupe de soies (14a) et un premier levier de commande (16a) pouvant être sélectivement entraîné pour faire assumer audit premier mécanisme de déplacement de soies (12) au moins une position activée, dans laquelle au moins ledit premier groupe de soies (14a) fait saillie de ladite partie inférieure (211) dudit corps contenant (11) par ladite première quantité (L1) et dans laquelle lesdits moyens de commande et de déplacement (16a, 16b, 16c, 12, 13) comprennent un second mécanisme de déplacement de soies (13) relié audit second groupe de soies (14b) et un second levier de commande (16b) pouvant être sélectivement entraîné pour faire assumer audit second mécanisme de déplacement de soies (13) une position activée, dans laquelle au moins ledit second groupe de soies (14b) fait saillie au moins en partie de ladite partie inférieure (211) dudit corps contenant (11), **caractérisée en ce que** ledit second mécanisme de déplacement de soies (13) est conçu pour déplacer ledit premier groupe de soies (14a) et ledit second groupe de soies (14b) simultanément.
2. Brosse selon la revendication 1, **caractérisée en ce que** dans ladite première condition fonctionnelle, les soies (14) font saillie de la partie inférieure (211) du corps contenant (11) par une première quantité (L1) et **en ce que** dans ladite troisième condition fonctionnelle l'au moins un premier groupe de soies (14a) fait saillie de la partie inférieure (211) du corps contenant (11) par une seconde quantité (L2), supérieure ou égale à ladite première quantité (L1).
3. Brosse selon la revendication 1, **caractérisée en ce que** dans ladite première condition fonctionnelle, les soies (14) font saillie de la partie inférieure (211) du corps contenant (11) par une première quantité (L1) et **en ce que** dans ladite troisième condition fonctionnelle l'au moins un premier groupe de soies (14a) fait saillie de la partie inférieure (211) du corps contenant (11) par une seconde quantité (L2), inférieure ou égale à ladite première quantité (L1).
4. Brosse selon n'importe laquelle des revendications 1 à 3, **caractérisée en ce que** ledit premier levier (16a) est relié audit corps contenant (11) au niveau de son pivot de rotation (23a) et est muni d'un segment de poussée (116a), ledit premier mécanisme de déplacement de soies (12) comprenant un culbuteur (21a) pourvu d'une extrémité de pivotement (121a) montée pivotante sur ledit corps contenant (11) et d'une extrémité de liaison (221a), ledit premier levier (16a) et ledit culbuteur (21a) étant conçus pour déplacer verticalement un châssis de support (20a) dudit premier groupe de soies (14a).
5. Brosse selon n'importe laquelle des revendications 1 à 4, **caractérisée en ce que** ledit second levier (16b) est relié audit corps contenant (11) au niveau de son pivot de rotation (23b) et est muni d'un segment de poussée (116b), ledit second mécanisme

de déplacement de soies (13) comprenant un culbuteur (21b) pourvu d'une extrémité de pivotement (121b) montée pivotante sur ledit corps contenant (11) et d'une extrémité de liaison (221b), ledit second levier (16b) et ledit culbuteur (21b) étant conçus pour déplacer verticalement un châssis de support (20b) dudit second groupe de soies (14b). 5

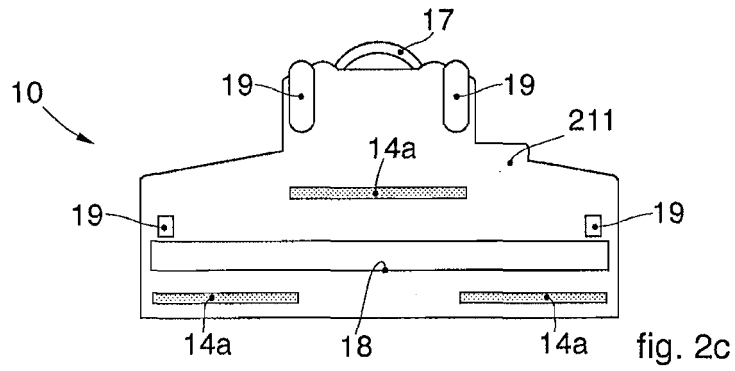
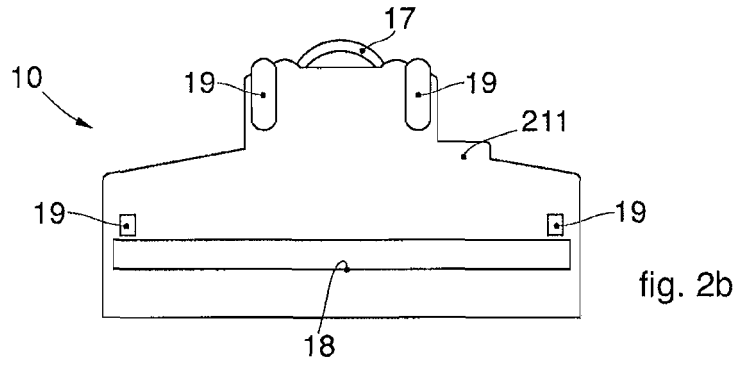
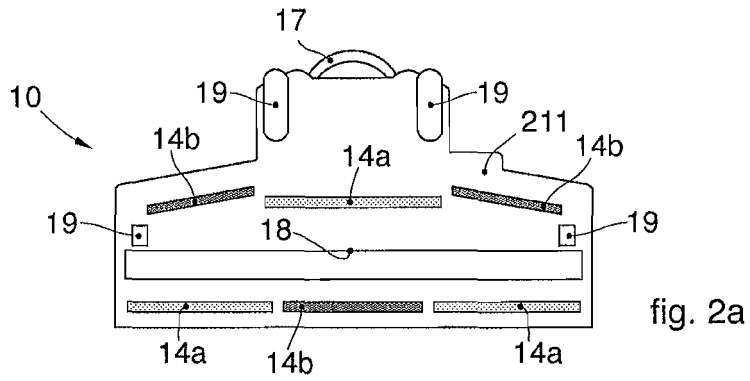
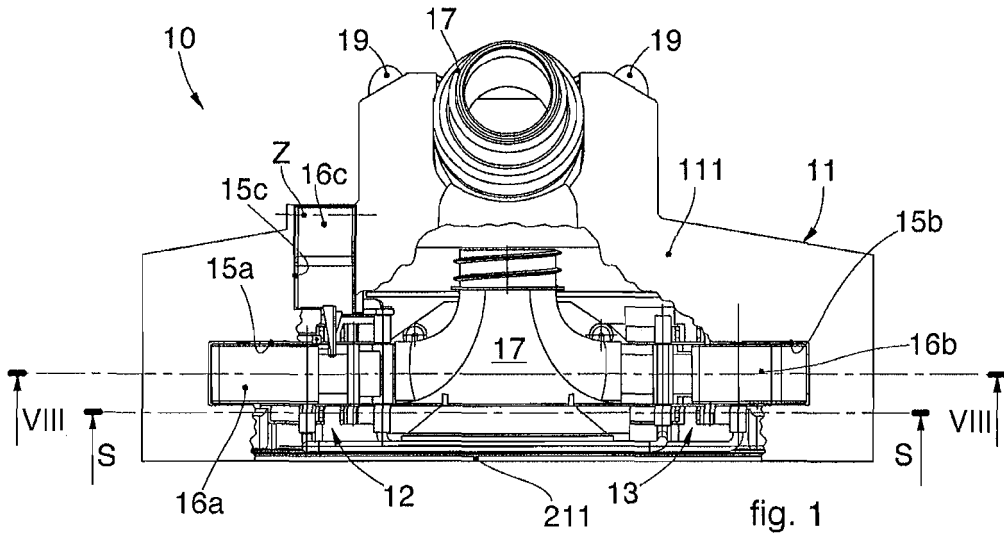
6. Brosse selon n'importe laquelle des revendications précédentes, **caractérisé en ce qu'**au moins entre ledit premier mécanisme de déplacement de soies (12) et ledit second mécanisme de déplacement de soies (13) comprend une pluralité des blocs de guidage (26a, 26b), chacun pourvu d'un siège de positionnement (226a, 226b) surélevé par rapport à une surface de base (120a, 120b) dudit châssis de support (20a, 20b), **et en ce qu'**en position d'activation d'au moins un du premier (12) ou du second (13) mécanisme de déplacement de soies, l'extrémité de liaison (221a, 221b) dudit culbuteur (21a, 21b) et au moins entre le segment de poussée (116a, 116b) du premier levier (16a) et celui du second levier (16b) est logé au moins en partie dans des sièges de positionnement correspondants (226a, 226b). 10  
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7. Brosse selon la revendication 6, **caractérisé en ce que** ledit second levier (16b) est pourvu, au niveau de son segment de poussée (116b), d'une partie en saillie (27) qui, dans ladite position activée du second mouvement de déplacement (13), est en contact avec l'extrémité de liaison (221a) du culbuteur (21a) du premier mécanisme de déplacement de soies (12), en vue de maintenir ladite extrémité de liaison (221a) entièrement à l'extérieur desdits un ou plusieurs sièges de positionnement (226a). 25  
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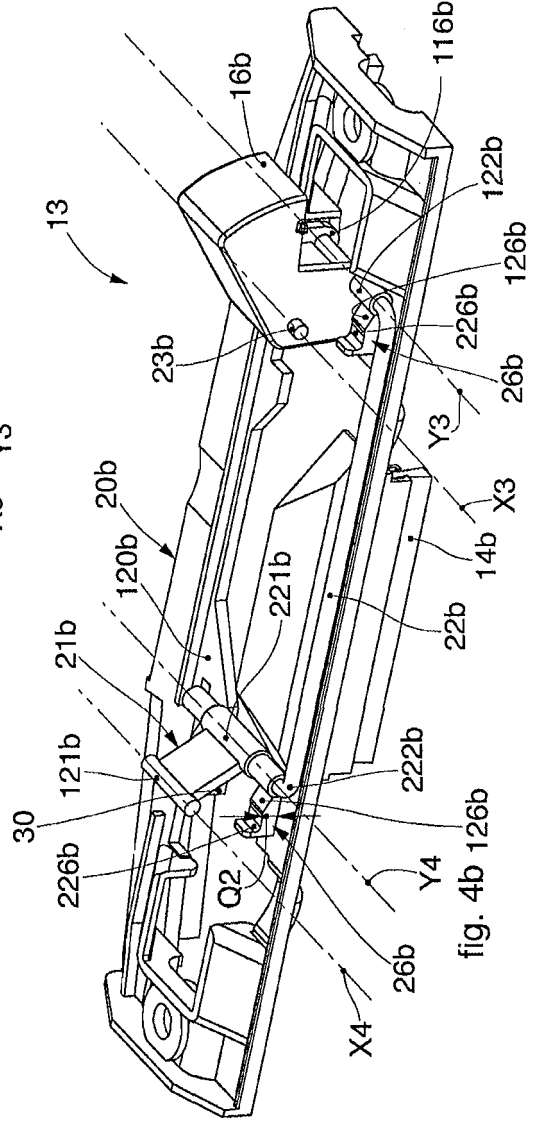
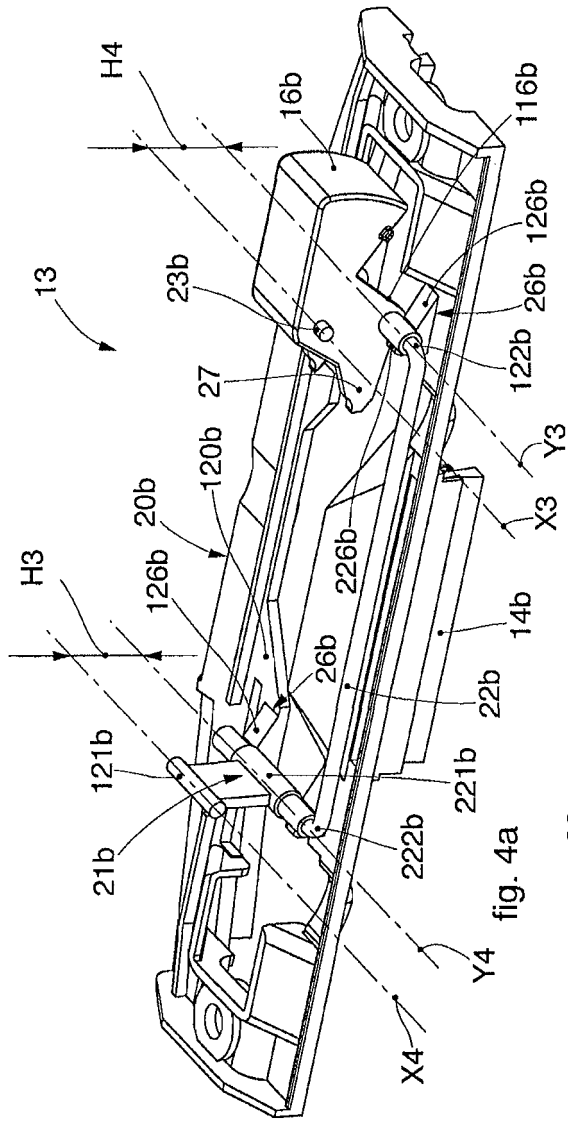
8. Brosse selon n'importe laquelle des revendications précédentes, **caractérisé en ce qu'**il comprend un troisième levier (16c) qui est associé audit premier mécanisme déplacement de soies (12) aussi bien qu'audit second mécanisme de déplacement de soies (13), et peut être sélectivement entraîné pour faire assumer audit premier mécanisme de déplacement de soies (12) et audit second mécanisme de déplacement de soies (13) en même temps la position désactivée. 40  
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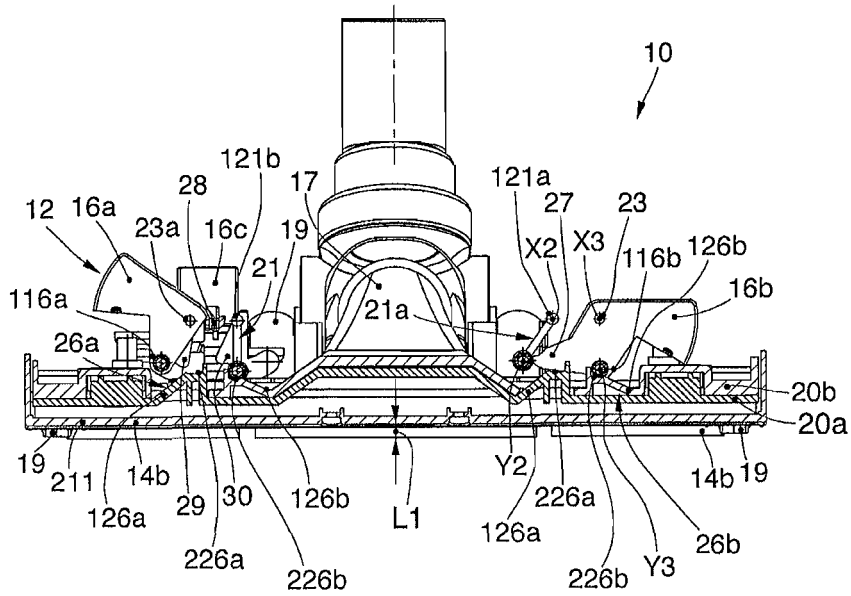


fig. 5

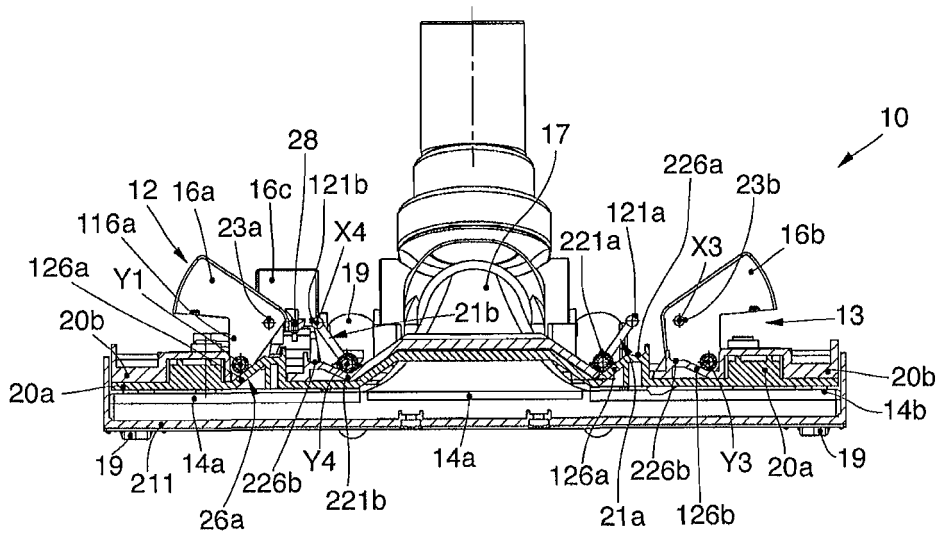


fig. 6

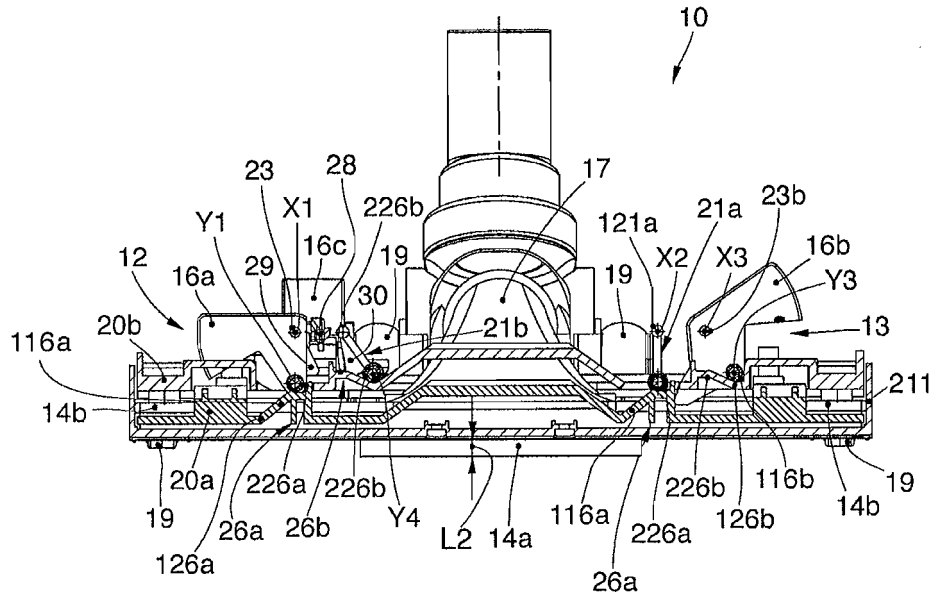


fig. 7

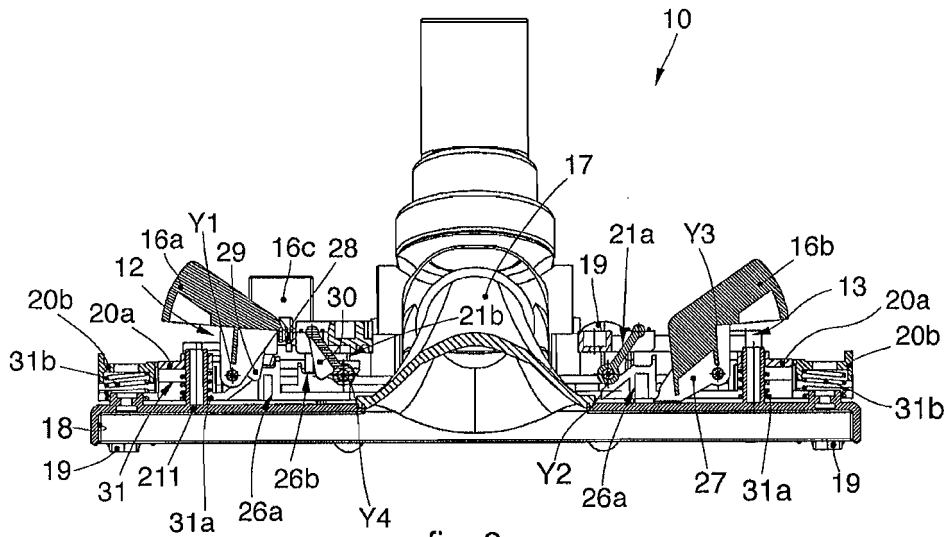


fig. 8

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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