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(54) SURFACE CLEANING TOOL

(57) A surface cleaning tool (10) comprises at least one handle (12), an attachment element (11) for the handle (12), a support element (14) for bristles or the

like and at least one base (13) for supporting said support element (14), and to which said attachment element (11) is rotatably fixed.

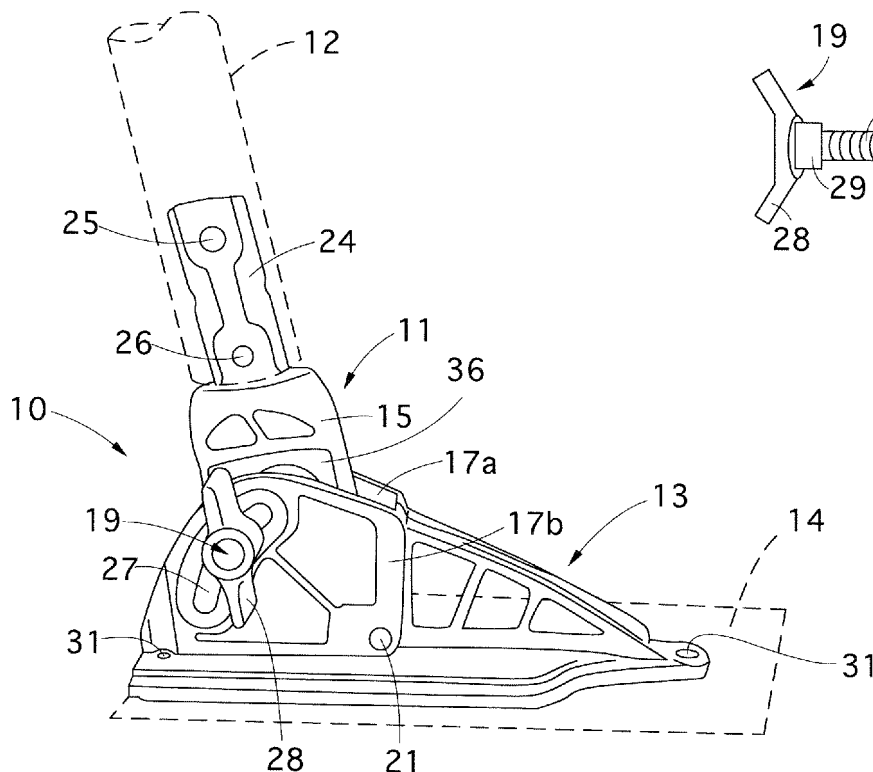


Fig. 1a

Fig. 1

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Description

Field of the invention

[0001] The present invention concerns a surface cleaning tool, such as for example brooms, brushes, in particular professional brooms or the like.

Background of the invention

[0002] As is known, there are tools for cleaning surfaces, such as brooms, brushes or the like, which are used for cleaning interior or exterior floors and comprise a handle at one end of which a support element for bristles or the like is fixed, by means of a suitable attachment element.

[0003] There are also bristle support elements that are interchangeable with respect to an intermediate coupling element on which said handle attachment element is fixed.

[0004] There are also cleaning tools provided with fixing systems for fixing said attachment element to said coupling element that allow to vary the inclination of the handle with respect to the support element carrying the bristles and therefore, ultimately, with respect to the surface to be cleaned.

[0005] The variability of the inclination of the handle with respect to the support element carrying the bristles is useful to allow the user to choose a comfortable and effective operating position based, for example, on the position of the area to be cleaned.

[0006] The fixing systems that allow to carry out a variation of the inclination of the handle with respect to said bristle support element can comprise for example arcuate slots obtained on opposed walls of said support element and associated by means of a screw and a corresponding nut to a single hole obtained in said handle attachment element.

[0007] This state of the art presents some problems, as such systems are not very stable and precise. In fact, if these systems are incorrectly subjected to excessive force, the clutch system causes the angular position to change and the operator finds the tool in an unwanted position.

[0008] In other solutions known in the art, holes are also provided on the opposed walls of the support element instead of the slots.

[0009] In this case there is the disadvantage of having a reduced possibility of choosing the desired angle of inclination of the handle and also the screw could be inadvertently lost during the operations of varying the inclination of the handle with respect to the bristle support element.

[0010] There is therefore a need to perfect a surface cleaning tool that can overcome at least one of the disadvantages of the state of the art.

Summary of the invention

[0011] One purpose of the invention is to improve the state of the art.

[0012] In particular, one purpose of the present invention is to make a convenient and versatile surface cleaning tool to be used.

[0013] Another purpose of the present invention is to make a surface cleaning tool in which the inclination of the handle can be varied in a simple and stable manner.

[0014] Another purpose of the present invention is to make a robust and reliable surface cleaning tool.

[0015] According to one aspect of the invention there is provided a surface cleaning tool according to the features of claim 1.

[0016] Further features of the invention are present in the dependent claims.

[0017] The surface cleaning tool therefore allows the following advantageous technical effects to be obtained:

- to stably and precisely vary the inclination of the handle with respect to the base, according to well-defined positions, each of which is represented by a respective pair of mutually aligned holes, configured to receive a fixing element, in which the number of well-defined positions is greater than those available in solutions known in the art;
- to simply vary the inclination of the handle with respect to the base, without risking that said fixing element can be dispersed nearby;
- to provide a secure clamping system that allows the fixing element to be kept permanently associated with the base, avoiding accidental falls of the fixing element, which are unwanted because it can be difficult for the operator to retrieve it, for example due to the presence of leaves, grates or manholes on the road surface to be cleaned.

Brief description of the drawings

[0018] Further characteristics and advantages of the invention will become more evident in the light of the detailed description of a preferred but not exclusive embodiment, of a surface cleaning tool, illustrated as a non-limiting example with the help of the accompanying drawings, wherein:

- fig. 1 is a first side view, illustrated from a first side, of a first embodiment of a surface cleaning tool;
- fig. 1a is a side view, on an enlarged scale, in perspective and exploded, of a threaded fixing element and of a clamping element which in use are cooperating with each other;
- fig. 2 is a second side view of the cleaning tool of fig. 1, wherein the view is taken from a second side, opposite to the first side of fig. 1;
- fig. 3 is a side view of an attachment element of the cleaning tool;

- fig. 4 is a side view of a base of the cleaning tool;
- fig. 5 is a side view of a variant of the attachment element, in which a portion of a handle is also depicted;
- fig. 6 is an enlarged view of a part of the cleaning tool during the extraction or insertion of a fixing element, according to another mode of use, different from that of figures 1 and 2;
- figures 7, 8 and 9 are side views of the cleaning tool like the one of fig. 2, in which the handle is illustrated according to three of the various possible inclinations;
- fig. 10 is an axonometric view of a variant of the attachment element of the cleaning tool, intended to couple with the base of fig. 11;
- fig. 11 is an axonometric view of a variant of the base of the cleaning tool, intended to couple with the attachment element of fig. 10.

Detailed description of an example of a preferred embodiment

[0019] With reference to the cited figures, see for example figures 1, 2, 3, 4 and 5, a surface cleaning tool 10 comprises at least one attachment element 11 of a handle 12 of said tool and at least one support base 13 connectable to, or obtained as a single piece with, a support element 14 for bristles or the like, schematized with a dashed rectangle in fig. 1.

[0020] Said attachment element 11 can be an element separated from said handle 12 and connectable to the latter by means of a mechanical connection, as illustrated for example in fig. 1, or it can be obtained as a single piece with said handle 12, providing appropriate machining, for example pressing and drilling, of its engagement end with the base 13.

[0021] Said base 13, if separated from said support element 14 as in the example of figures 1-5, may comprise a coupling element 30 (fig. 4) configured to be inserted interlockingly in said support element 14 and a series of through holes 31 (figures 1 and 2) suitable for receiving fixing elements, such as screws, bolts or the like, for fixing with said support element 14. By way of example, the coupling element 30 can be configured as a guide projection adapted to be inserted into guide grooves made on the support element 14, having a shape conjugated to that of the guide projection. Said attachment element 11 comprises a body 15 and is rotatably fixed to said base 13.

[0022] The attachment element 11 is provided with a series of first through holes 16a, 16b, 16c, in particular threaded, obtained in a wall 36 of said body 15.

[0023] Said base 13 comprises a series of second through holes 18a, 18b, 18c, 18d, 18e.

[0024] In particular, in the example illustrated in figures 1, 2, 4 and 7-9, said base 13 comprises at least one first side wall 17a, or sideboard, substantially adjacent to said body 15 when the attachment element 11 is joined to the

base 13. Said second through holes 18a, 18b, 18c, 18d, 18e are made in the first side wall 17a. The relative arrangement between the latter wall and the wall 36 of the attachment element 11 is such that said through holes 18a, 18b, 18c, 18d, 18e are substantially adjacent to said through holes 16a, 16b, 16c.

[0025] By way of non-limiting example, three through holes 16a, 16b, 16c and five through holes 18a, 18b, 18c, 18d, 18e are provided, but of course the number of said through holes 16a, 16b, 16c and/or 18a, 18b, 18c, 18d, 18e could be different.

[0026] Said first through holes 16a, 16b, 16c are substantially aligned along an arc A of circumference (fig. 5) and are preferably mutually equi-spaced.

[0027] Said second through holes 18a, 18b, 18c, 18d, 18e are substantially aligned along an arc B of circumference (fig. 4) and are preferably mutually equi-spaced.

[0028] Said first through holes 16a, 16b, 16c of said attachment element 11 are configured to align with said second through holes 18a, 18b, 18c, 18d, 18e of said base 13 so as to define, as a function of the desired inclination of said attachment element 11 with respect to said base 13, at least one pair of respective aligned through holes in which to insert a fixing element 19. In the example of fig. 1 and fig. 2, said fixing element 19 is engaged in the pair of through holes 16a and 18d, mutually aligned. As a function of the pair of aligned through holes 16a, 16b, 16c and 18a, 18b, 18c, 18d, 18e, it is therefore possible to define a series of extremely precise and stable inclinations of said attachment element 11 with respect to said base 13, hence of said handle 12 with respect to said base 13. Each of said inclinations is therefore defined by a specific position of the handle 12 with respect to the base 13.

[0029] As a function of the number of first through holes and second through holes, it is possible to define a predefined number of alignment combinations, corresponding to the number of inclinations that the handle 12 can assume with respect to the base 13. In the example illustrated here, in which three first through holes 16a, 16b, 16c and five second through holes 18a, 18b, 18c, 18d, 18e are provided, the handle 12 can assume twelve different possible different inclinations.

[0030] Said fixing element 19, see also fig. 1a, can be a screw, a bolt or the like, provided with a threaded stem 35, possibly associable with anti-slip means, in particular a clamping element 22, such as a nut, for example hexagonal, butterfly nut or the like. Said fixing element 19 is provided with a head 28, for example shaped like a handwheel. Said fixing element 19 is configured to be screwed and unscrewed in one of said through holes 16a, 16b, 16c.

[0031] Said attachment element 11 is connected to said base 13, in particular at an end 20 thereof (figures 3 and 5) and by means of a fixing element 21 (figures 1 and 2), such as a pin, a screw, a bolt or the like, which allows a rotation thereof with respect to said base 13.

[0032] Said attachment element 11 is also provided with a shank 24, preferably of smaller thickness or diameter than said body 15, into which the handle 12 is inserted. Said shank 24 is provided with through holes 25 and 26 adapted to receive fixing elements of said handle 12.

[0033] Preferably, said base 13 provides a second side wall 17b or sideboard, located substantially parallel and spaced from said first side wall 17a. Between said side walls 17a and 17b there is inserted, at least in part, said wall 36 of the attachment element 11.

[0034] Said base 13 comprises a slot 27, in particular of arcuate shape, wherein the radius of curvature of the arcuate shape followed by the slot 27 is approximately equal to the radius of curvature of said arc B of circumference.

[0035] In particular, the slot 27 is formed on said second side wall 17b, so as to be positioned opposed to said series of second through holes 18a, 18b, 18c, 18d, 18e obtained on said first side wall 17a.

[0036] As can be seen from the comparison of fig. 1 and fig. 2, said fixing element 19 is inserted from said slot 27, engages, for example by screwing, in one of the through holes 16a, 16b, 16c of the wall 36 of the attachment element 11, for example the through hole 16a, then protrudes from one of the second through holes 18a, 18b, 18c, 18d, 18e of the first side wall 17a, for example the through hole 18d.

[0037] The end of said fixing element 19 that protrudes from said through hole 18d can possibly engage with said clamping element 22. Said fixing element 19 is also provided with said head 28 which abuts against the side wall 17b.

[0038] Said second through holes 18a, 18b, 18c, 18d, 18e may have a circular shape, as in fig. 4, or in accordance with other embodiments, not shown, polygonal shape, for example square, rectangular, hexagonal or other.

[0039] In the embodiment variant in which the through holes 18a, 18b, 18c, 18d, 18e have a polygonal shape, it is possible to provide in said fixing element 19 a part 29 of polygonal shape conjugated to the shape of the second through holes below said head 28 (fig. 1a). This allows the clamping element 22 to be screwed and tightened onto the fixing element 19 without the need to hold the latter in place with a tool, a wrench or otherwise. In this embodiment variant, the fixing element remains in use anchored to the tool thanks to the engagement with the clamping element 22.

[0040] The present cleaning tool 10 allows to vary the inclination of the handle 12 with respect to the base 13 in a plurality of discrete, precise and stable positions.

[0041] Suppose that the handle 12 is in the position of fig. 1 and fig. 2 with the through holes 16a and 18d aligned and engaged by the fixing element 19 with relative clamping element 22.

[0042] To vary said inclination, it is sufficient to remove the clamping element 22, if provided, unscrew the fixing

element 19 to make it retract until it disengages from the second through holes 18a, 18b, 18c, 18d, 18e and then rotate the attachment element 11 with respect to said base 13 so that said fixing element 19 can be inserted into another hole chosen among the second through holes 18a, 18b, 18c and 18e. In this inclination variation mode, therefore, the position of the fixing element 19 is kept fixed since it is not completely removed from the slot 27, while its position is varied thanks to the possibility for the fixing element 19 to be inserted into one of the through holes 18a, 18b, 18c or 18e, adjacent to the hole 18d. Once the new position in one of said through holes 18a, 18b, 18c or 18e is chosen, the fixing element 19 is inserted into one of them protruding on the opposite side so as to be able to be engaged again with the clamping element 22.

[0043] Fig. 3 illustrates a variant of the attachment element 11, usable in particular with the assembly of the cleaning tool 10 illustrated in fig. 1 and fig. 2. Said attachment element 11 internally provides a block 32 of suitable thickness where a series of polygonal seats 33 are obtained at each of the first through holes 16a, 16b, 16c. In each of said seats 33 a suitable anti-slip means can be housed, for example a nut 34 that engages with the threading of the fixing element 19. The fixing element 19 is inserted in particular from the portion of the slot 27 on the second side wall 17b and protrudes from the first side wall 17a, where it is engaged by the clamping element 22. If the clamping element 22 is inadvertently unscrewed during the cleaning operations, the cleaning tool can continue to work, as the fixing element 19 remains fixed to the attachment element 11 and to the side wall 17b thanks to the engagement in one of the nuts 34 ultimately associated with one of the first through holes 16a, 16b, 16c. Said fixing element 19 also passes through one of the second through holes 18a, 18b, 18c, 18d, 18e, whereby the inclination of the handle 12 is stably maintained.

[0044] Thanks to the presence of the nuts 34 that engage with the threaded stem 35 to ensure the firm engagement of the fixing element 19 to the cleaning tool 10, the first through holes 16a, 16b, 16c and the second through holes 18a, 18b, 18c, 18d, 18e can be smooth. In the case where the nuts 34 are present, the fixing element 19 is devoid of the polygonal-shaped portion 29.

[0045] In the embodiment of figures 1 and 2, if the through holes 16a, 16b, 16c are threaded, the seats 33 and the nuts 34 are optional.

[0046] With reference in particular to fig. 4 and fig. 5, said second through holes 18a, 18b, 18c, 18d, 18e can be internally threaded, so as to engage with the threading of the fixing element 19. Preferably, in this embodiment of fig. 4 and fig. 5, the through holes 16a, 16b, 16c are internally smooth, thus not threaded.

[0047] Fig. 6 illustrates a further variant of use of the tool in which the fixing element 19 is inserted from the part where the through holes 18a, 18b, 18c, 18d, 18e are obtained and protrudes from the part of the slot 27. In this

example, when it is wished to vary the inclination of the handle 12, the fixing element 19 is moved backwards with respect to the first side wall 17a by an amount sufficient to disengage the holes 16, remaining in any case associated with the same hole 18c. Subsequently, after varying the inclination of the handle 12 until a different hole 16a, 16b, 16c is brought into alignment with the hole 18c, it is possible to completely reinsert the fixing element 19 and lock it in position in any of the ways described above, for example by means of the clamping element 22.

[0048] In this case, it is possible to provide that such through holes 18a, 18b, 18c, 18d, 18e are circular and threaded. Alternatively, it is possible to provide that such through holes 18a, 18b, 18c, 18d, 18e are internally smooth and that the through holes 16a, 16b and 16c are threaded. Or again, it is possible to provide that the through holes 18a, 18b, 18c, 18d, 18e, and 16a, 16b, and 16c are all internally smooth. In this case, the clamping element 22 is provided for said fixing element and the anti-slip means 34 are provided as illustrated in fig. 3.

[0049] It is therefore possible to provide a plurality of stable positions of inclination of the handle 12 with respect to the base 13, as a function of the various combinations of said second through holes 18a, 18b, 18c, 18d, 18e with said first through holes 16a, 16b, 16c.

[0050] Figures 7, 8 and 9 illustrate three examples of inclination, in which the handle 12 is respectively in a substantially vertical position, with an angle α of about 90° with respect to the ground, an intermediate inclination position with an angle β of about 65° , and a maximum inclination position with an angle γ of about 40° .

[0051] The inclination of fig. 7 is obtainable by engaging the fixing element 19 in the through holes 16a and 18e.

[0052] The inclination of fig. 8 is obtainable by engaging the fixing element 19 in the through holes 16b and 18d.

[0053] The inclination of fig. 9 is obtainable by engaging the fixing element 19 in the through holes 16c and 18c. In said position of maximum inclination, a side 23 (fig. 5) of the body 15 of said attachment element 11 lies substantially horizontal and can rest stably internally on the base 13.

[0054] In fig. 10 and fig. 11 a variant of the attachment element 11 and a variant of the base 13, intended to be mutually coupled, are respectively illustrated.

[0055] In this case, the side walls 17a and 17b provided respectively with the through holes 18a, 18b, 18c, 18d and the slot 27 are obtained in the attachment element 11 and are configured to overlap at least partially the wall 36, in which the through holes 16a, 16b, 16c, 16d, 16e are obtained. In this case, said wall 36 is provided in the base 13 and the two walls 17a and 17b are approached to it, whereby a kind of fork connection is configured. With respect to what has been illustrated above, by way of example only, a different number of through holes 18a, 18b, 18c, 18d and through holes 16a, 16b, 16c, 16d, 16e have been provided. Said wall 36, whether it is obtained

in said attachment element 11, as in figures 1 to 9, or whether it is obtained in the base 13, as in figure 11, is substantially parallel to said side walls 17a and 17b. When the attachment element 11 is connected to said base 13, moreover, said wall 36 is substantially adjacent to said side walls 17a and 17b.

[0056] In the embodiment shown in Figures 10 and 11, said support element 14 carrying the bristles and said base 13 are made as a single piece, on which the wall 36 is made.

[0057] Ultimately, the present cleaning tool 10 allows to easily and quickly incline the handle 12 with respect to the base 13, according to a plurality of stable and defined positions.

[0058] It has in practice been established that the invention achieves the intended task and objects.

[0059] The invention thus conceived is susceptible to many modifications and variants, all falling within the same inventive concept. Moreover, all details can be replaced by other technically equivalent elements.

[0060] In practice, the materials used, as well as the contingent shapes and sizes, can be whatever according to the requirements without for this reason departing from the scope of protection of the following claims.

Claims

1. Surface cleaning tool (10), comprising at least one handle (12), an attachment element (11) for said handle (12), a support element (14) for bristles or the like, a base (13) for supporting said support element (14), and to which said attachment element (11) is rotatably fixed, by means of a first side wall (17a) and a second side wall (17b) obtained in said base (13), or in said attachment element (11), and substantially adjacent to a further wall (36) provided with first through holes (16a, 16b, 16c) and obtained in said attachment element (11), or in said base (13), wherein one of said first and second side wall (17a and 17b) is provided with a series of second through holes (18a, 18b, 18c, 18d, 18e) and the other of said first and second side walls (17a and 17b) is provided with a slot (27), wherein, as a function of the desired inclination of said attachment element (11) with respect to said base (13), at least one through hole of said first through holes (16a, 16b, 16c) is aligned with at least one through hole of said second through holes (18a, 18b, 18c, 18d, 18e) so as to form a pair of mutually aligned through holes, wherein the alignment axis of said pair of through holes crosses said slot (27), and wherein a fixing element (19) is positioned along said axis.
2. Surface cleaning tool (10) according to claim 1, characterized in that said fixing element (19) is provided with threading and configured to cross, and remain anchored to, said pair of through holes

mutually aligned with said slot (27).

a single piece with said base (13) .

3. Surface cleaning tool (10) according to claim 1 or 2, **characterized in that** said second side wall (17b) is parallel and spaced from said first side wall (17a) by a distance such as to allow the insertion of said wall (36) between said first and second side walls (17a and 17b). 5

4. Surface cleaning tool (10) according to any one of the preceding claims, **characterized in that** said first through holes (16a, 16b, 16c) are substantially aligned along an arc (A) of circumference and **in that** said second through holes (18a, 18b, 18c, 18d, 18e) are substantially aligned along a respective arc (B) of circumference, having mutually correlated curvatures. 10
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5. Surface cleaning tool (10) according to claim 4, **characterized in that** said slot (27) is arcuate shape and has a radius of curvature approximately equal to the radius of curvature of said respective arc (B) of circumference. 20

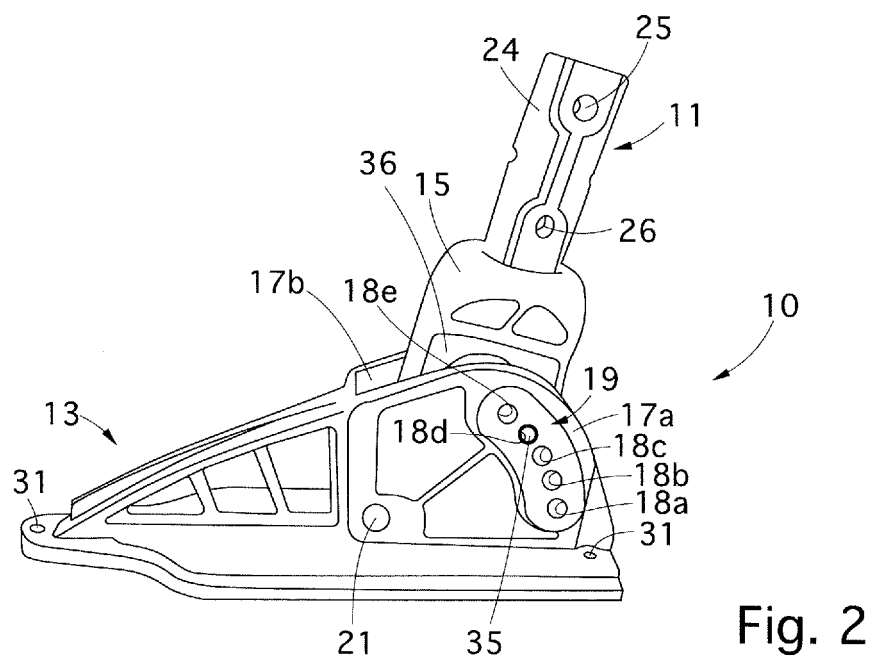
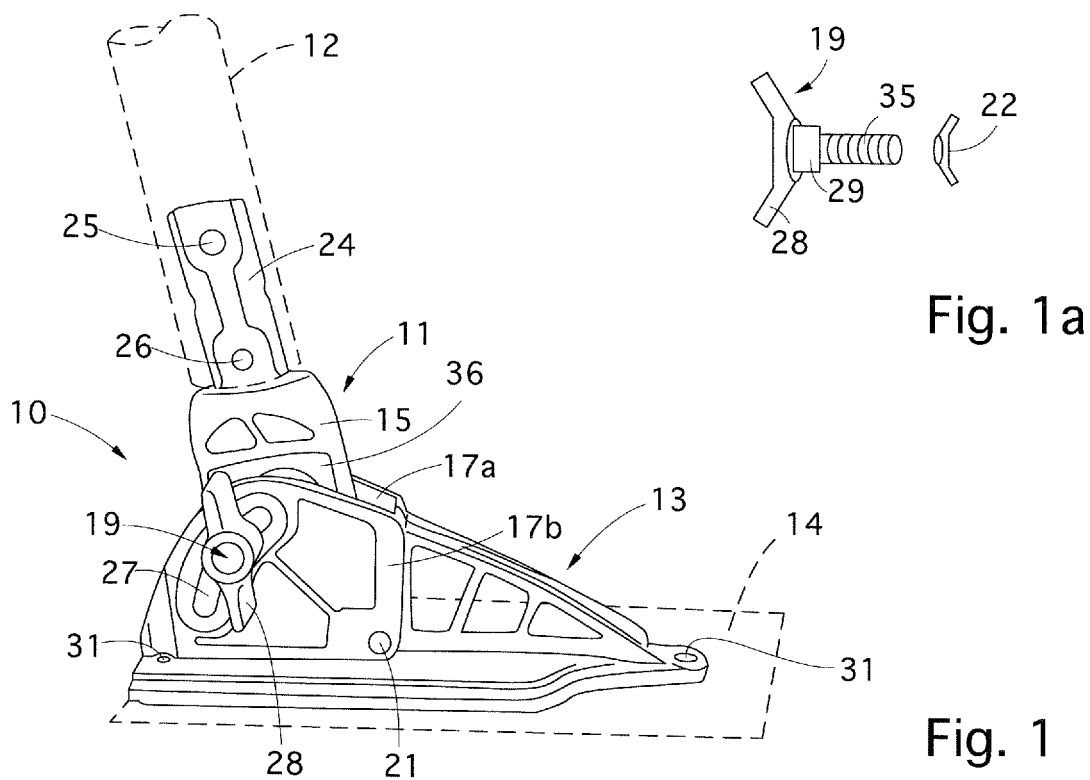
6. Surface cleaning tool (10) according to any one of the preceding claims, **characterized in that** said first through holes (16a, 16b, 16c) or said second through holes (18a, 18b, 18c, 18d, 18e) are of threaded type, or said first through holes (16a, 16b, 16c) and/or said second through holes (18a, 18b, 18c, 18d, 18e) are smooth, threadless circular holes. 25
30

7. Surface cleaning tool (10) according to any one of the preceding claims from 2 to 5, **characterized in that** said second through holes (18a, 18b, 18c, 18d, 18e) are polygonal in shape and said fixing element (19) comprises a portion (29) of shape conjugated to that of said second through holes (18a, 18b, 18c, 18d, 18e). 35
40

8. Surface cleaning tool (10) according to any one of the preceding claims, **characterized in that** it comprises anti-slip means (22; 34), such as a hexagonal nut or a butterfly nut, and configured to be associated with said fixing element (19). 45

9. Surface cleaning tool (10) according to any one of the preceding claims, **characterized in that** said attachment element (11) is an independent element with respect to said handle (12) or is integrated in said handle (12), in this case being configured as an end thereof adapted to engage with said base (13). 50

10. Surface cleaning tool (10) according to any one of the preceding claims, **characterized in that** said support element (14) is independent of said base (13) and connected to the latter by means of a non-permanent mechanical connection, or is made as 55



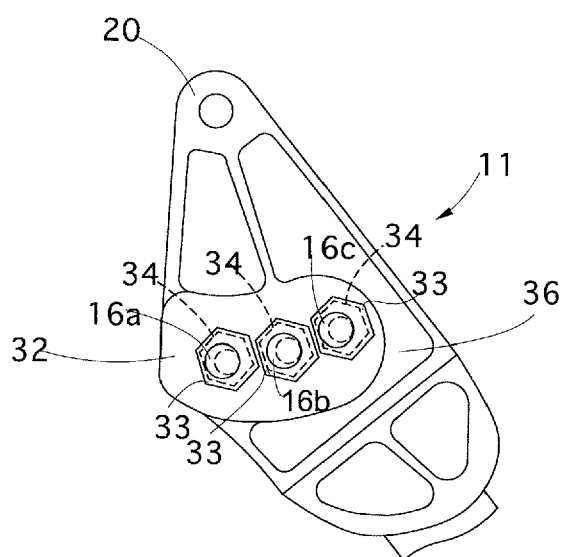


Fig. 3

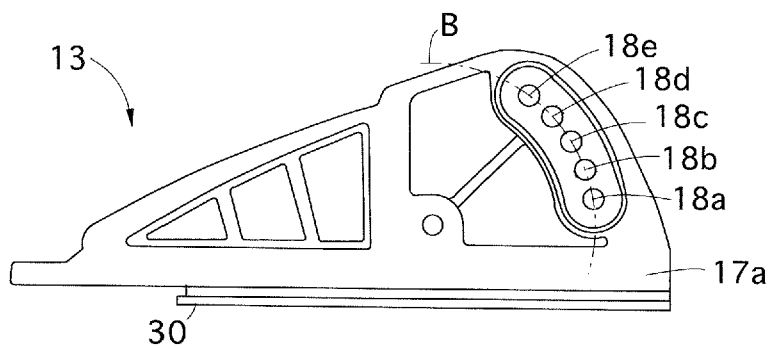


Fig. 4

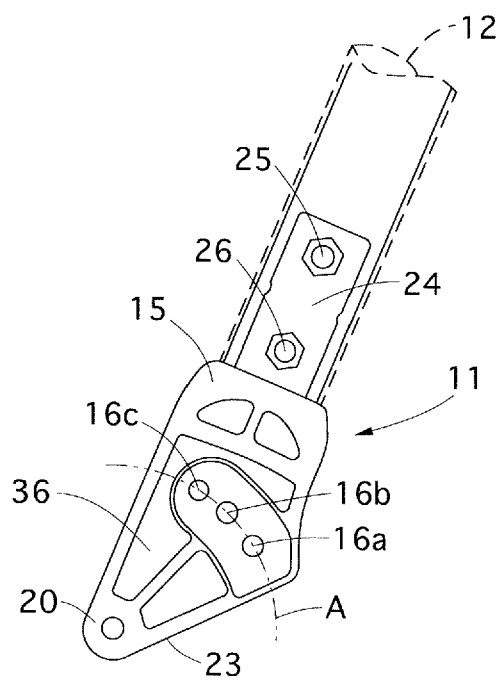


Fig. 5

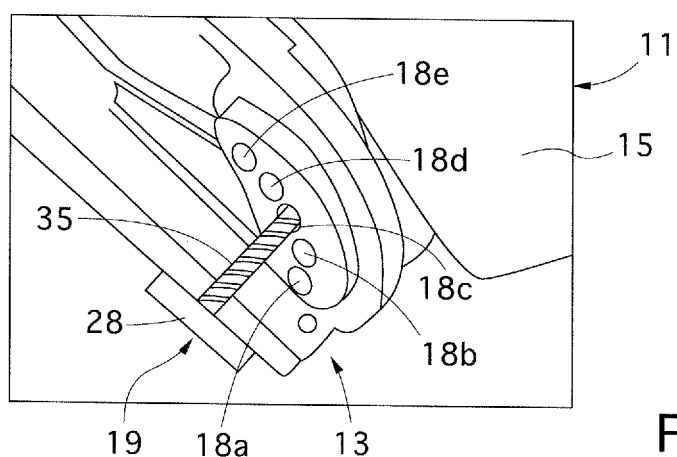


Fig. 6

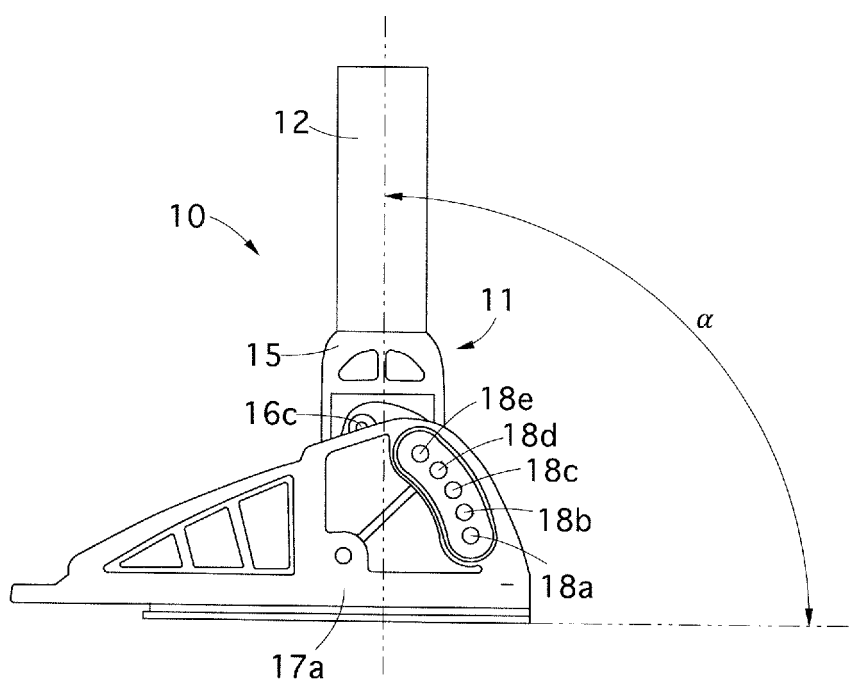


Fig. 7

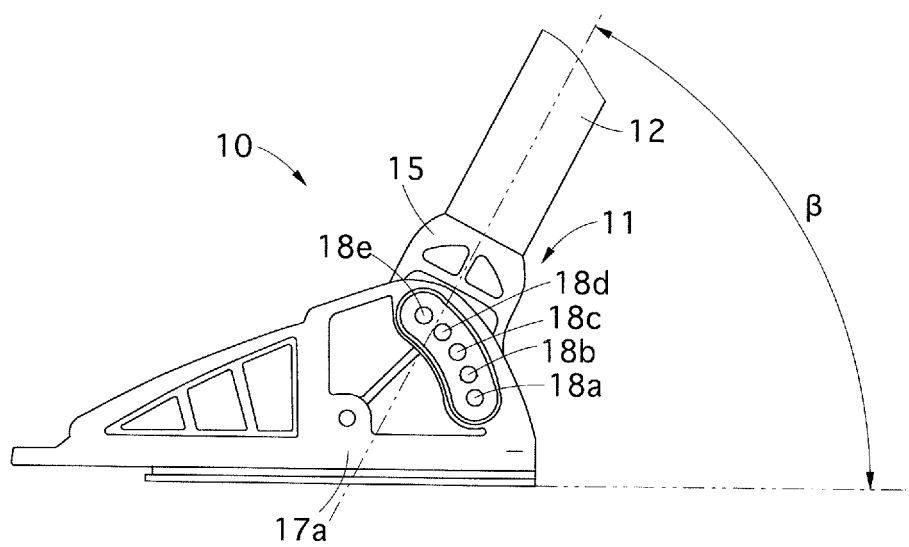


Fig. 8

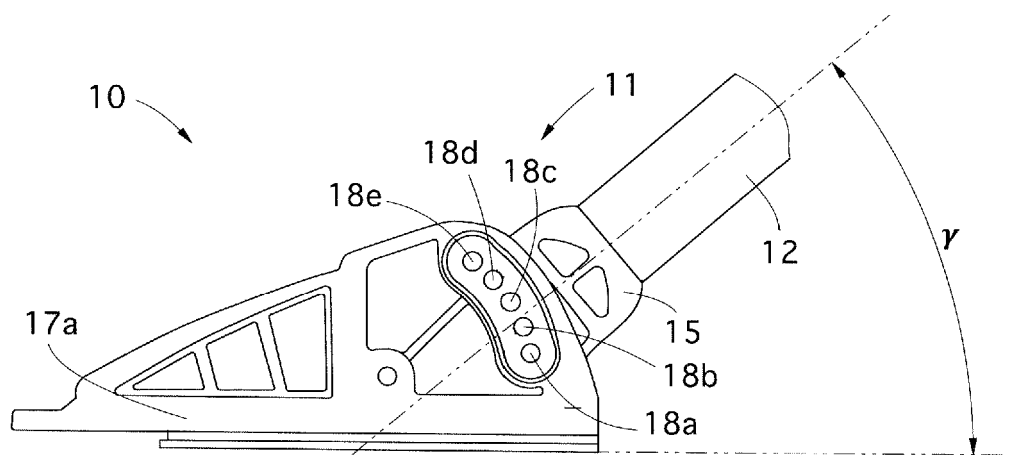


Fig. 9

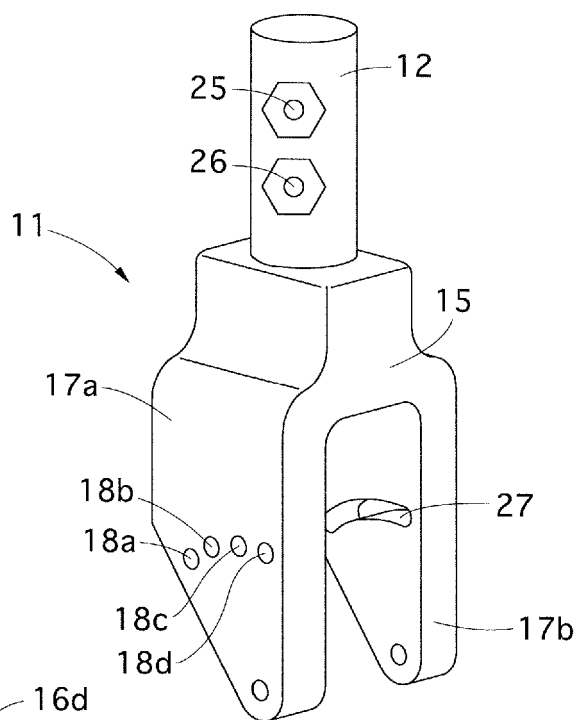


Fig. 10

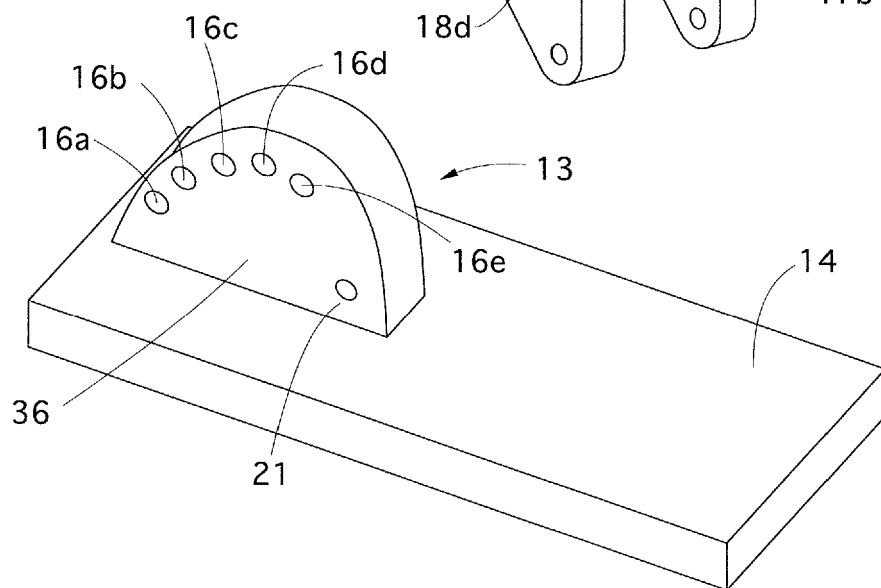


Fig. 11



EUROPEAN SEARCH REPORT

Application Number

EP 24 21 0260

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	US 2010/205759 A1 (DONDI ANDREA [IT] ET AL) 19 August 2010 (2010-08-19) * paragraphs [0054], [0118], [0120] - [0123], [0126], [0129]; claim 67; figures 36-42,44 *	1-10	INV. A46B5/00
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		4 March 2025	Rossini, Marco
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

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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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