(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 183 999 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
12.05.2010 Bulletin 2010/19

(51) Int Cl.:
A47L 11/283 *(2006.01)* ***A47L 11/293*** *(2006.01)*
A47L 11/40 *(2006.01)*

(21) Application number: **09174322.9**

(22) Date of filing: **28.10.2009**

(84) Designated Contracting States:
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 SE SI SK SM TR
Designated Extension States:
AL BA RS

(30) Priority: **05.11.2008 IT RE20080101**

(71) Applicant: **IP Cleaning S.p.A.**
30026 Portogruaro (VE) (IT)

(72) Inventor: **Vernazza, Giulio**
30026 Portogruaro (Venezia) (IT)

(74) Representative: **Corradini, Corrado et al**
Ing. C. Corradini & C. S.r.l.
Via Dante Alighieri 4
42100 Reggio Emilia (IT)

(54) A floor-cleaning machine

(57) A floor-cleaning machine comprising a support frame (2) which is mobile on a floor, on which support frame (2) are installed at least a rotating cleaning organ (50) which can be in contact with the floor, and a motor (51) to draw the cleaning organ (50) in rotation, the rotating cleaning organ (50) comprising a cleaning element (53) made of microfibre, which is destined to come into direct contact with the floor.

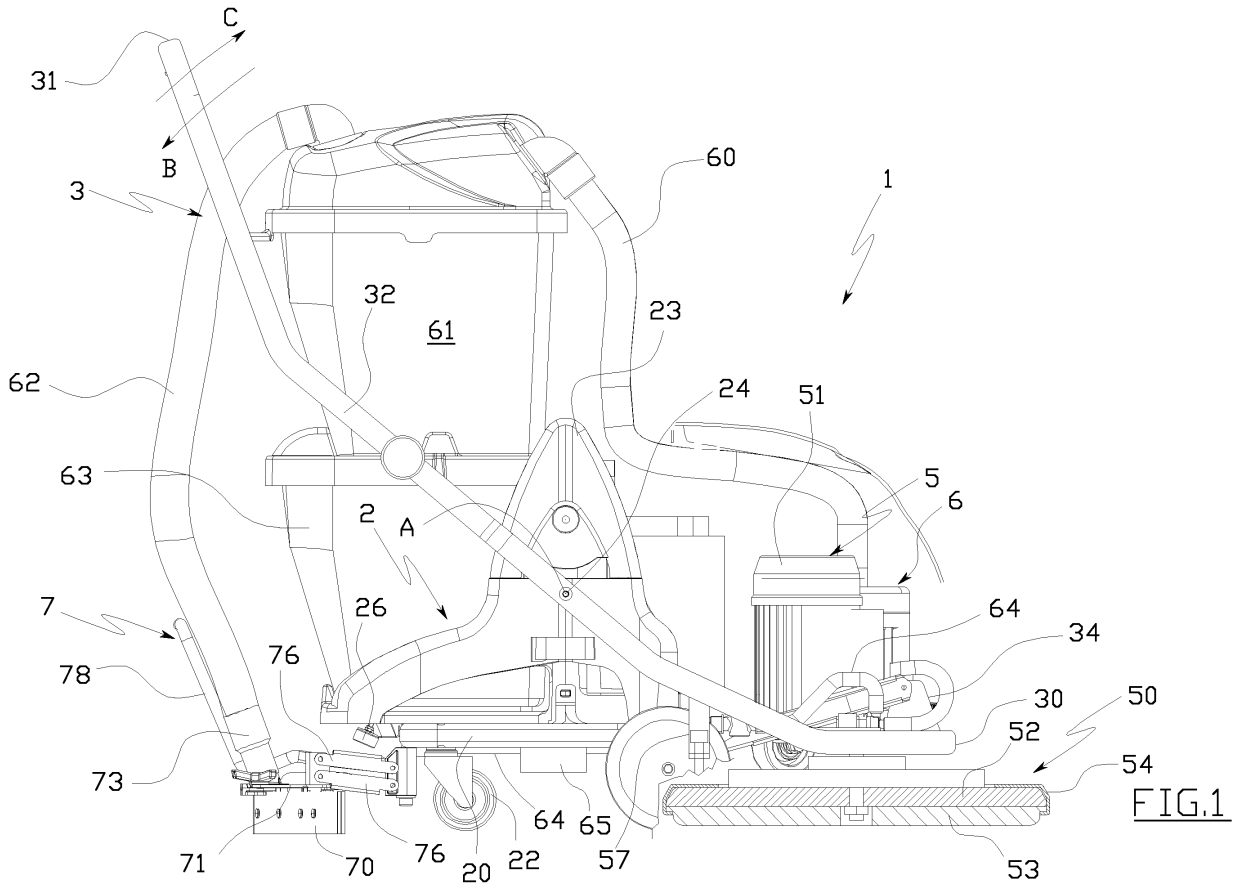

FIG.1

EP 2 183 999 A1

Description

[0001] The invention concerns a floor-cleaning machine, and in particular, a professional-type floor-cleaning machine which is mainly designed for cleaning relatively extensive floors, for example inside commercial and/or small industrial premises.

[0002] Professional floor-cleaning machines are usually divided into two different categories. Machines mounted on self-propelled vehicles, which are designed to be driven by an operative, are usually called "man on board" machines, while machines mounted on trolleys which are manually propelled by an operator walking behind the machine are referred to as "walk-behind" machines.

[0003] This invention concerns both types of floor-cleaning machines.

[0004] As is known, floor-cleaning machines in general comprise operating groups which perform specific floor-cleaning operations, among which, one or more motorised rotating organs which scrub the surfaces, a dispenser group which dispenses a detergent liquid, and a suction group to which a floor-wiping group is associated. The floor-wiping group normally comprises one or more flexible rubber blades, which slide on the floor to collect the detergent liquid and the dislodged dirt, facilitating removal thereof by the suction group.

[0005] The operating groups are usually covered by suitable plastic or sheet-metal covers, and are mounted on board a sturdy, solid support frame, usually of large dimensions, which is provided with wheels so that it can be moved, manually or by a motor, on the floor to be washed.

[0006] The rotating organs in the state of the art generally comprise a support disc which is connected to the shaft of a drive motor and is provided with a plurality of frontal bristles which project from the lower surface so as to be in direct contact with the floor to be washed.

[0007] Known rotating organs have the task of dislodging the dirt from the floor, which dirt, together with the water used for the washing operation, is then removed by the suction group.

[0008] As they move along the floor, the rotating organs however also have a certain abrasive effect, which makes these floor-cleaning machines unsuitable for cleaning delicate surfaces.

[0009] Further, after prolonged use, the bristles wear out rapidly and tend to lose their shape, flattening against the support disc and acquiring a bent shape which reduces their effectiveness.

[0010] For this and other reasons, the dirt removal delivered by traditional rotating organs is not always satisfactory, and in addition requires the use of a large quantity of detergent liquid or water.

[0011] The large quantity of detergent liquid or water in turn means that the floor is often rather wet after cleaning operations, whence the need for a very large suction group, thus giving rise to greater energy consumption in use.

[0012] The poor cleaning effectiveness of known rotating organs also means that they must be pressed hard against the floor to be washed.

[0013] This pressure gives rise to greater friction of the rotating organs on the floor and thus to greater resistance in opposition to the drive motor, which therefore consumes a large amount of energy.

[0014] The aim of this invention is to obviate the above-mentioned drawbacks at least in part, by providing a floor-cleaning machine which cleans more effectively than those presently available.

[0015] A further aim of the invention is to achieve the above aim with a simple, rational and relatively inexpensive solution.

[0016] These aims are achieved by the characteristics of the invention which are described in the independent claim herein below. The dependent claims delineate preferred and/or particularly advantageous aspects of the invention. In greater detail, the invention provides a floor-cleaning machine comprising a support frame which is mobile on the floor, upon which support frame are installed at least a rotating cleaning organ which remains in contact with the floor, and a motor for drawing in rotation the cleaning organ, the rotating cleaning organ comprising a microfibre cleaning element which is destined to be directly in contact with the floor.

[0017] Typically a microfibre is a synthetic fibre measuring less than a denier. The denier is a measure of the fineness of a yarn and expresses the linear density of the fibre. In more detail, the denier is defined as the mass in grams of 9000 metres of fibre: a fibre which measures 1 denier is a fibre which is so thin that 9000 metres of the fibre weighs 1 gram.

[0018] Thanks to the infinitesimal dimension of the yarn, the microfibre cleaning element performs a physical and mechanical action on dirt particles, removing them from the floor effectively and trapping them among the fibres. The cleaning element can be made of polymer microfibres, preferably polyester or polyamide, or of a combination of polyester microfibres and polyamide microfibres.

[0019] Polyester microfibres exhibit a hooked microstructure which, thanks to the presence of water, performs a non-abrasive, mechanical dirt-dislodging action, while polyamide microfibres have a high power of absorption, being capable of absorbing the water, and with it the dislodged dirt.

[0020] In this way, the cleaning element is not only capable of dislodging the dirt from the floor, but it also removes the dirt, together with the water used for washing.

[0021] When a cleaning element is full of dirt, it can be replaced by a new, clean one; the used cleaning element could potentially be washed for further multiple re-use.

[0022] Thanks to the microfibre cleaning element it is also possible to clean floors effectively using only water, without the addition of chemical detergent substances.

[0023] Since microfibres need only be damp to perform their cleaning action, the quantity of water required is further reduced by 90% compared with the amount required with traditional brushes.

[0024] The result is that floors are substantially almost dry after cleaning operations, to such an extent that in some circumstances it is no longer necessary to use the suction group, thus saving energy.

[0025] The greater cleaning effectiveness of the microfibre element further enables the pressure with which the microfibre must be pressed against floors to be reduced, thereby reducing friction and thus delivering further energy savings which are equal to approximately 60% of the consumption of present machines.

[0026] In particular, the pressure of the cleaning organ on the floor can be very low, between 3 kg and 15 kg, compared with between 15 kg and 90 kg for traditional machines, which means that the cleaning organ can be made to rotate at a comparatively higher number of revolutions, up to 800 rpm.

[0027] In a preferred aspect of the invention, the floor-cleaning machine can be fitted with a heating device, typically a small heater, for heating the water or more in general the cleaning liquid before the cleaning liquid is dispensed on the floor or onto the cleaning element.

[0028] This improves the standard of floor-cleaning obtained, since the hot liquid not only enables the microfibre cleaning element to dislodge and remove dirt more easily, but if the temperature is high enough it can also perform a certain antibacterial action.

[0029] The heater device is preferably provided with adjustment means, such as for example a thermostat, to allow the user to vary the temperature of the water according to requirements, for example from a minimum of 20°C to maximum temperatures which are high enough to transform the water into steam.

[0030] Further characteristics and advantages of the invention will emerge from the following detailed description provided by way of a non-limiting example, with the aid of the appended figures of the drawings.

[0031] Figure 1 is a side view of a floor-cleaning machine of the invention, in which the rotating cleaning organ is sectioned along an axial plane.

[0032] Figure 2 is a view of the floor-cleaning machine of figure 1 in which the cleaning organ is not sectioned and in which some components have been eliminated for greater clarity.

[0033] Figure 3 is a plan view of the floor-cleaning machine of figure 2.

[0034] Figure 4 is a side view of the floor-cleaning machine of figure 2, shown in a rest position.

[0035] The floor-cleaning machine 1 comprises a rather compact, lightweight support frame 2 which exhibits a horizontal base 20 and is provided with three support wheels, two of which are coaxial, fixed-axle, forward wheels 21, and one of which is a pivoting rear wheel 22.

[0036] Two oppositely-positioned salient side elements 23, which are identical in shape and preferably made of plastic, are fixed to the mobile support frame 2 and laterally delimit the loading space of the mobile support frame 2.

[0037] A rigid frame 3, which is preferably made from sheet steel, is hinged to the side elements 23.

[0038] As shown in figure 3, the frame 3 has rounded corners and exhibits two transverse bars, a forward transverse bar 30 and a rear transverse bar 31, which are connected by two oppositely-positioned, identical, shaped longitudinal bars 32.

[0039] The rigid frame 3 is inserted externally on the side elements 23 of the mobile support frame 2, to which mobile support frame 2 it is hinged by means of two hinge joints 24 which singularly join a respective side element 23 to the adjacent longitudinal bar 32.

[0040] The hinge joints 24 are perfectly coaxial, such as to define a single axis of rotation A of the rigid frame 3 with respect to the mobile support frame 2.

[0041] As shown in figure 1, the axis of rotation A is oriented such as to be horizontal when the mobile support frame 2 is resting on the floor, and is arranged in an intermediate position along the longitudinal bars 32, such that the rigid frame 3 is hinged to the mobile support frame 2 like a reciprocating lever.

[0042] In this way, a lowering of the rear transverse bar 31 corresponds to a raising of the forward transverse bar 30, and vice versa.

[0043] In more detail, the longitudinal bars 32 of the frame 3 extend downwardly, so that the forward transverse bar 30 projects beyond the base 20 and is arranged substantially at the same height as the base 20, while the rear transverse bar 31 is arranged at a higher level.

[0044] Thus the rear transverse bar 31, which serves as a grip for the user pushing the floor-cleaning machine 1, is arranged at a level where it can conveniently be gripped.

[0045] A support plate 33 is attached to the rigid frame 3 (see figure 2) at the forward transverse bar 30 position, an operating group denoted in its entirety by reference numeral 5 being installed upon the support plate 33; the operating group comprising a rotating cleaning organ 50 to which a gear reducer 51 is associated.

[0046] In particular, the cleaning organ 50 comprises a rigid support disc 52, preferably made of metallic material, to the lower surface of which a cleaning element 53 made of microfibre is attached.

[0047] The microfibre cleaning element 53 is conformed as a flat, thin, substantially circular element, which is arranged coaxially to, and almost completely covers, the lower surface of the support disc 52.

[0048] The cleaning element 53 can be a cloth, a mat, or a thin pad which is more or less soft.

[0049] The cleaning element 53 is preferably made of a composition of polyester microfibres and polyamide microfibres.

[0050] The cleaning organ 53 is attached to the support plate 52 by means of a perimetral frame 54 which surrounds both the cleaning organ 53 and the support plate

52, the transverse section of which is hook-shaped so as to press the edge of the cleaning organ 53 against the edge of the support plate 52 (see figure 1).

[0051] Obviously the perimetral frame 54 could be replaced by a plurality of hooks having the same transverse section as the frame 54 and being arranged at a distance from each other along the perimeter of the cleaning organ 53 and of the support plate 52; or by any other means for attaching.

[0052] The cleaning organ 50 is positioned beneath the support plate 33, with a substantially vertical axis of rotation, such as to rest the microfibre cleaning element 53 frontally on the floor.

[0053] The support disc 52 and the microfibre cleaning element 53 both exhibit a central hole, to allow the cleaning organ 50 to be keyed to the shaft of the gear reducer 51.

[0054] The geared motor 51 is controlled by a control lever 55 which is mounted on the rear transverse bar 31 of the rigid frame 3, and which is connected to the gear reducer 51 via flexible cables (not illustrated).

[0055] Further, a suction group, denoted in its entirely by 6, is mounted on the support plate 33, which suction group schematically comprises a pump with the relative drive motor.

[0056] The suction group 6 is also controlled by manual organs (not shown) which are preferably mounted on the rear transverse bar 31 of the rigid frame 3, so that they can be conveniently activated by the user.

[0057] As shown in figure 1, the suction group 6 is connected via a first flexible pipe 60 to a closed collecting reservoir 61, preferably made of plastic, which is arranged on board the mobile support frame 2, and is in turn connected, via a second flexible pipe 62, to a floor-cleaning group 7.

[0058] The collecting reservoir 61 rests upon a lower reservoir 63, which is mounted on the base 20 of the mobile support frame 2, which reservoir 63 contains a washing liquid, typically water or possibly water mixed with a detergent substance.

[0059] The reservoir 63 is connected to one or more washing liquid dispenser nozzles (not shown), which are attached to the rigid frame 3 at the cleaning organ 50 in order to dispense the liquid directly onto the floor or onto the cleaning element 53 made of microfibre.

[0060] The dispensing nozzles are connected to the reservoir 63 via at least one conduit 64 along which a manual adjustment valve (not visible) is generally arranged.

[0061] In a preferred aspect of the invention, a heater 65 is installed along the conduit 64, between the reservoir 63 and the dispenser nozzles, which heater 65 heats the cleaning water before the water is dispensed.

[0062] The heater 65 can be an electric heater, which heats the cleaning water just as it transits along the conduit 64.

[0063] A thermostat is associated to the heater 65, the thermostat being manually adjustable by the user to vary the water temperature, for example from a minimum of 20°C to a temperature such as to transform the water into steam. The thermostat can be adjusted via a control knob (not illustrated) which is preferably installed on the rear transverse bar 31, for convenient activation by the user.

[0064] The floor-cleaning group 7 is of known type and comprises two thin flexible blades 70, preferably made of rubber, which are oriented vertically so as to be arranged with edges thereof against the floor.

[0065] As shown in figure 3, the flexible blades 70 are joined together at the ends and are kept separate by a rigid framework 71, which defines a space that is downwardly open.

[0066] A connector 73 is associated to the rigid framework, which connector terminates within the space and is connected to the second flexible pipe 62 coming from the reservoir 61.

[0067] As shown in figure 1, the rigid framework 71 is connected to the mobile support frame 2 by means of two superposed connecting rods 76, which define a four-bar hinge enabling the floor-wiping group 7 to perform vertical movements which are driven manually via a handle bar 78.

[0068] In detail, the four-bar hinge enables the floor-wiping group 7 to be moved between the work position of figure 1, in which the flexible blades 70 are in contact with the floor, and the rest position of figure 4, in which the flexible blades 70 are raised and are not in contact with the floor.

[0069] The floor-cleaning group 7 can be blocked in the rest configuration thanks to a magnet 26 which is mounted on the mobile support frame 2 in such a way that it contactingly receives the upper connecting rod 76 of the four-bar hinge.

[0070] In operation, the floor-cleaning machine 1 is pushed and guided on the floor by the user, who proceeds on foot behind it while gripping the rear transverse rod 31 of the tilting support frame 3.

[0071] The tilting support frame 3 is in the configuration shown in figure 1, in which the operating group 5 is in a lowered work position in which the microfibre cleaning element 53 is frontally in contact with the floor.

[0072] For effective cleaning, the cleaning element 53 needs to exert a pressure of preferably between 3 kg and 15 kg on the floor.

[0073] For this reason, the machine 1 is generally provided with one or more weights which under the effect of gravity push the cleaning element 53 down onto the floor with adequate force.

[0074] The weights comprise the operating group 5 and the suction group 6, the force of the weight of which tends to make the tilting frame 3 rotate in a clockwise direction C, that is, in the direction which corresponds to a lowering of the forward transverse bar 30, thus pressing the microfibre cleaning element 53 onto the floor with a corresponding force.

[0075] If the weight of the operating group 5 and of the

suction group 6 is insufficient to reach the desired pressure values, suitable weights can be added which are applied to the support plate 33 of the tilting frame 3 as ballast.

[0076] If on the other hand the weight of the operating group 5 and of the suction group 6 is excessive, the machine 1 can be provided with contrasting means which limit the force unloaded onto the floor via the cleaning element 53.

[0077] In the example shown in figure 2, the contrasting means comprise a wheel 56 which rests on the floor, and which is connected to one of the longitudinal bars 32 of the tilting frame 3 via a vertically oriented telescopic arm 57 which is positioned downstream of the axis of rotation A.

[0078] Shortening of the telescopic arm 57 is contrasted by a spring 58 which is installed in two reciprocally sliding tracts of the telescopic arm 57, in such a way that the telescopic arm 57 can proportionally support a part of the weight of the operating group 5 and of the suction group 6, thus limiting the remaining part which is unloaded on the microfibre cleaning element 53.

[0079] During washing operations, the rotating cleaning organ 50 is made to rotate by the geared motor 51, while contemporaneously, dispensing of the liquid from the reservoir 63 is commanded.

[0080] The liquid is dispensed directly onto the floor or onto the cleaning element 53, in such a way that the scrubbing action of the cleaning element 53 and the detergent action of the liquid enable the dirt to be removed from the floor.

[0081] In detail, the polyester microfibres present in the cleaning elements 53, thanks to the water and their hooked microstructure, give rise to a non-abrasive mechanical dirt-removing action. The polyamide microfibres, thanks to their elevated absorbent power, absorb and retain the water, and together with the water, the removed dirt.

[0082] During the cleaning phase, the heater 65 can be kept active so as to heat the cleaning water to be dispensed later onto the floor.

[0083] In fact the use of hot water facilitates the dislodging and removal of dirt by the cleaning element 53.

[0084] Further, by adjusting the thermostat which is associated to the heater 65, the user can vary the temperature of the water cleaning according to requirements.

[0085] In particular, the user can choose to heat the water in the heater 65 to the point of transforming the water into steam, which is then used to improve the cleaning action or to perform an antibacterial action.

[0086] During the cleaning phase, the suction group 6 can also be activated, thus creating a depression in the reservoir 61 and, via the flexible conduit 62, in the gap defined between the flexible blades 70 of the floor-wiping group 7 which is in a lowered work position.

[0087] The liquid mixed with dirt which is not absorbed by the cleaning element 53 is then brushed and collected by the flexible blades 70 sliding on the floor, and is then sucked into the reservoir 61.

[0088] When washing operations are terminated, the user pushes the rear transverse bar 31 of the tilting frame 3 downwards, thus raising the forward bar 30.

[0089] In this way, the operating group 5 and the suction group 6 are raised from the floor until they reach a rest position shown in figure 4, in which the cleaning element 53 is not touching the floor and in which the tilting frame 3 is locked using known means.

[0090] In comparative tests which the Applicant has carried out, a floor-cleaning machine 1 provided with a microfibre cleaning element 53 requires a much smaller amount of water than a similar traditional floor-cleaning machine requires to obtain the same results.

[0091] In more detail, while a traditional floor-cleaning machine needs to dispense approximately 1.5 litres of water per minute, the floor-cleaning machine 1 with the microfibre cleaning element 53 needs only 0.15-0.2 litres of water per minute.

[0092] It is in fact sufficient for the microfibre cleaning element 53 to be damp for it to perform an effective cleaning action.

[0093] The result is that after floor-cleaning operations, floors are substantially almost dry, to the extent that in some circumstances it is not even necessary to use the suction group 6, thus saving energy.

[0094] Further, the damp cleaning element 53 has the effect of heating the dirt particles by friction, thus performing a bactericidal action.

[0095] The small quantity of water used provides the further advantage that the water can be heated in a low energy consumption heater 65.

[0096] Further, the pressure with which the microfibre cleaning element 53 is pressed on the floor is much less than the pressure with which the rotating brushes of traditional floor-cleaning machines are pressed on the floor, which pressure can reach 90 kg.

[0097] The reduced pressure makes it possible for the cleaning organ 50 to be made to rotate at a comparatively higher number of revolutions, up to 800 rpm, while since it also reduces friction, the geared motor 51 absorbs up to approximately 60% less energy than that absorbed by the motors of traditional floor-cleaning machines.

[0098] Obviously, a person skilled in the art might bring numerous technical and applicational modifications to the invention without forsaking the ambit of the invention as claimed herein below.

Claims

1. A floor-cleaning machine comprising a support frame (2) which is mobile on a floor, on which support frame (2) are installed at least a rotating cleaning organ (50) which can be in contact with the floor, and a motor (51) to draw the cleaning organ (50) in rotation, **characterised in that** the rotating cleaning organ (50) comprises a cleaning element (53) made

of microfibre, which is destined to come into direct contact with the floor.

2. The floor-cleaning machine of claim 1, **characterised in that** the cleaning element (53) comprises polymer microfibres.

3. The floor-cleaning machine of claim 1, **characterised in that** the cleaning element (53) comprises polyamide microfibres.

4. The floor-cleaning machine of claim 1, **characterised in that** the cleaning element (53) comprises polyester microfibres.

5. The floor-cleaning machine of claim 1, **characterised in that** the cleaning element (53) comprises polyamide microfibres and polyester microfibres.

6. The floor-cleaning machine of claim 1, **characterised in that** the cleaning organ (50) comprises a support disc (52), on a lower surface of which a thin flat microfibre element is attached, which microfibre element gives rise to the cleaning element (53).

7. The floor-cleaning machine of claim 1, **characterised in that** it comprises means (5, 6, 56, 57, 58) to keep the cleaning element (53) pressed against the floor.

8. The floor-cleaning machine of claim 7, **characterised in that** the means (5, 6, 56, 57, 58) are configured in such a way that the pressure exerted by the cleaning element (53) on the floor is between 3 kg and 15 kg.

9. The floor-cleaning machine of claim 7, **characterised in that** the means (5, 6, 56, 57, 58) comprise at least one weight (5, 6) which under effect of gravity presses the cleaning element (53) against the floor, and contrasting means (56, 57, 58) to limit the pressure of the cleaning element (53) on the floor.

10. The floor-cleaning machine of claim 1, **characterised in that** the cleaning organ (50) is attached to a rigid frame (3) which is hinged to the support frame (2) and acts as a reciprocating lever.

11. The floor-cleaning machine of claim 1, **characterised in that** it comprises heating means (65) for heating a washing liquid to be dispensed onto the floor.

12. The floor-cleaning machine of claim 11, **characterised in that** the heating means (65) are associated to adjustment means in order to vary a temperature of the washing liquid.

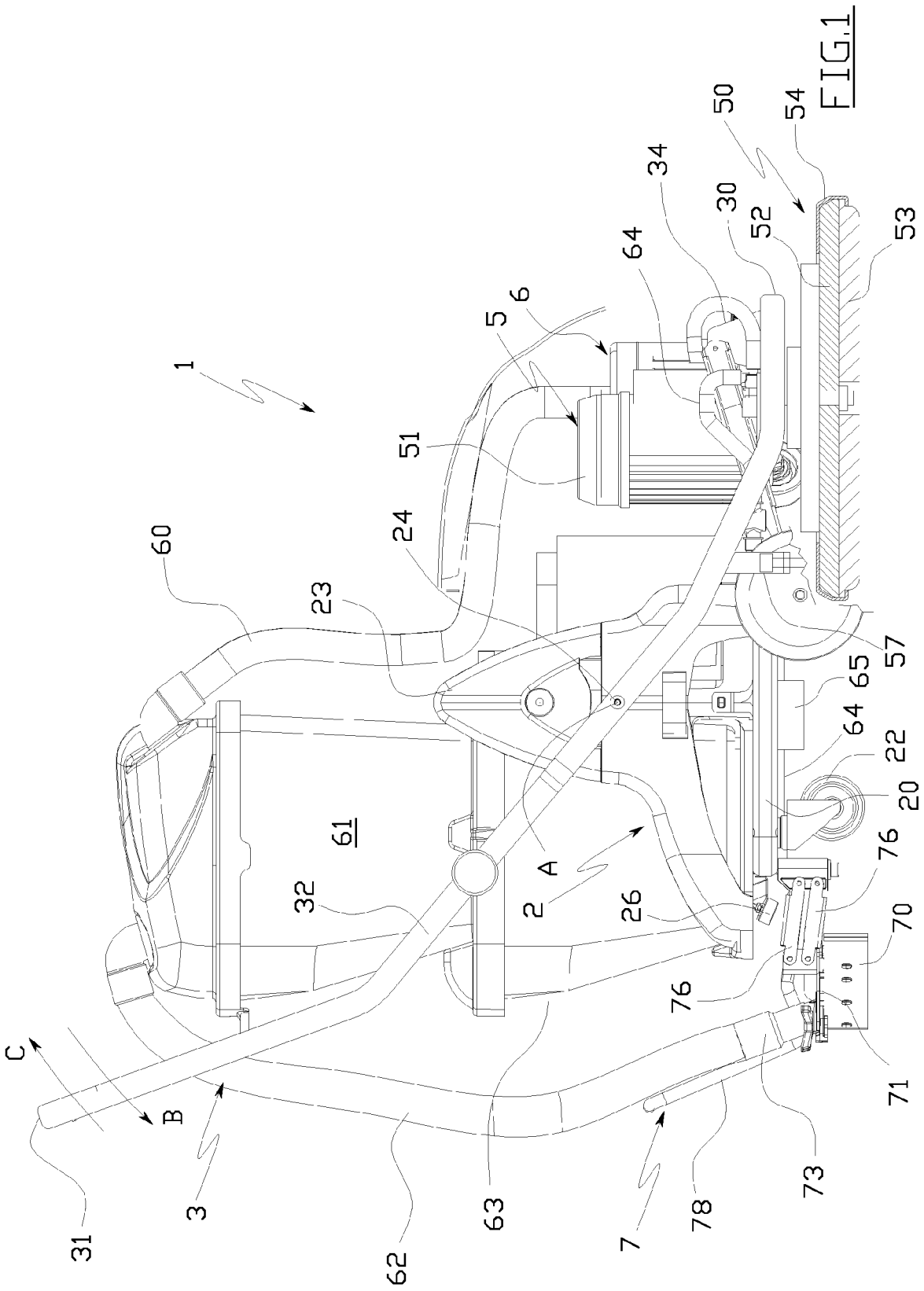
1
2
3
5
6
7
20
22
23
24
26
30
31
32
34
50
51
52
53
54
57
60
61
62
63
64
65
70
71
73
76
78
A
B
C

FIG.1

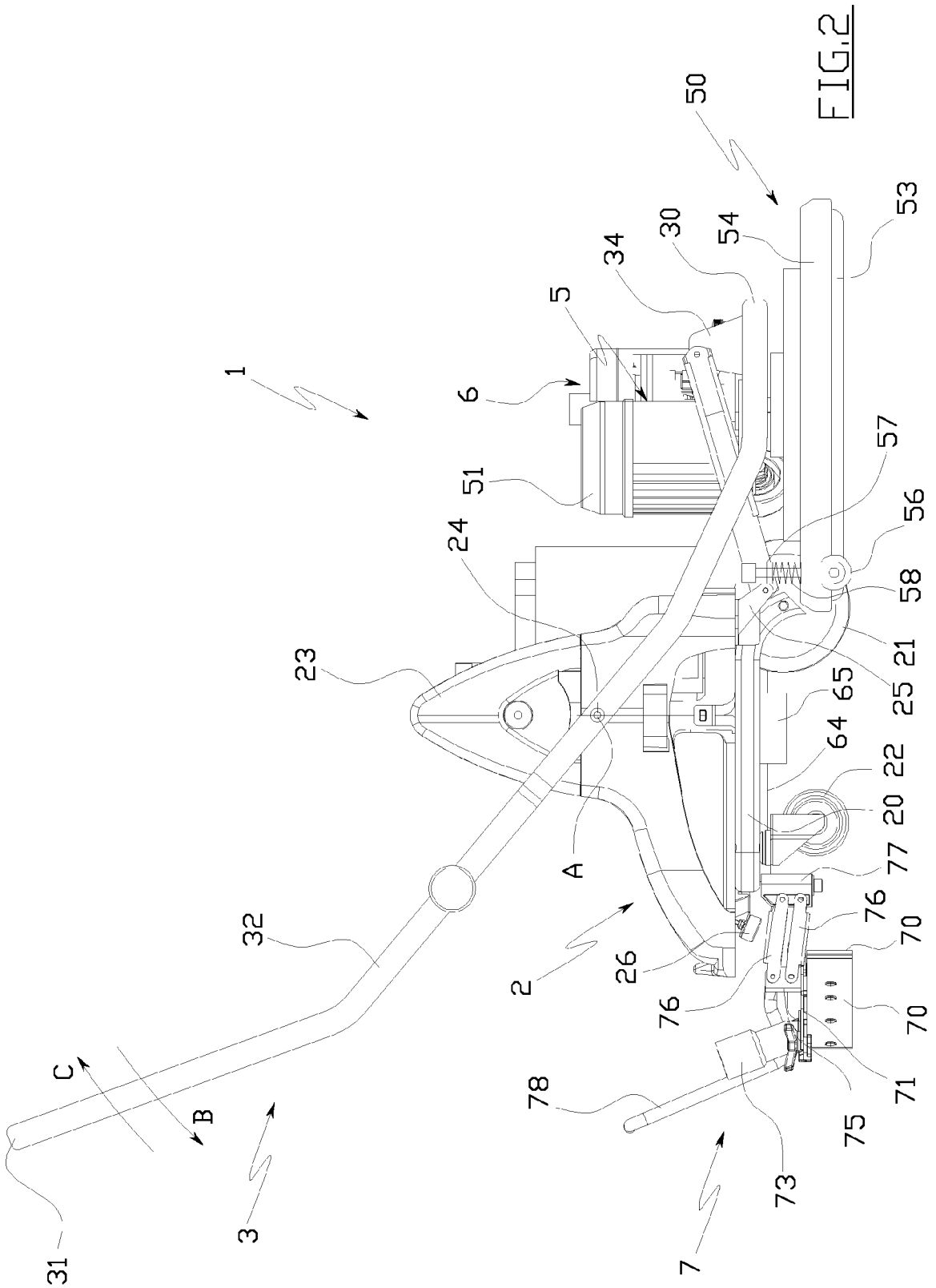
1
2
3
5
6
7
20
21
22
23
24
25
26
30
31
32
34
50
51
53
54
56
57
58
64
65
70
71
73
75
76
77
78
A
B
C

FIG.2

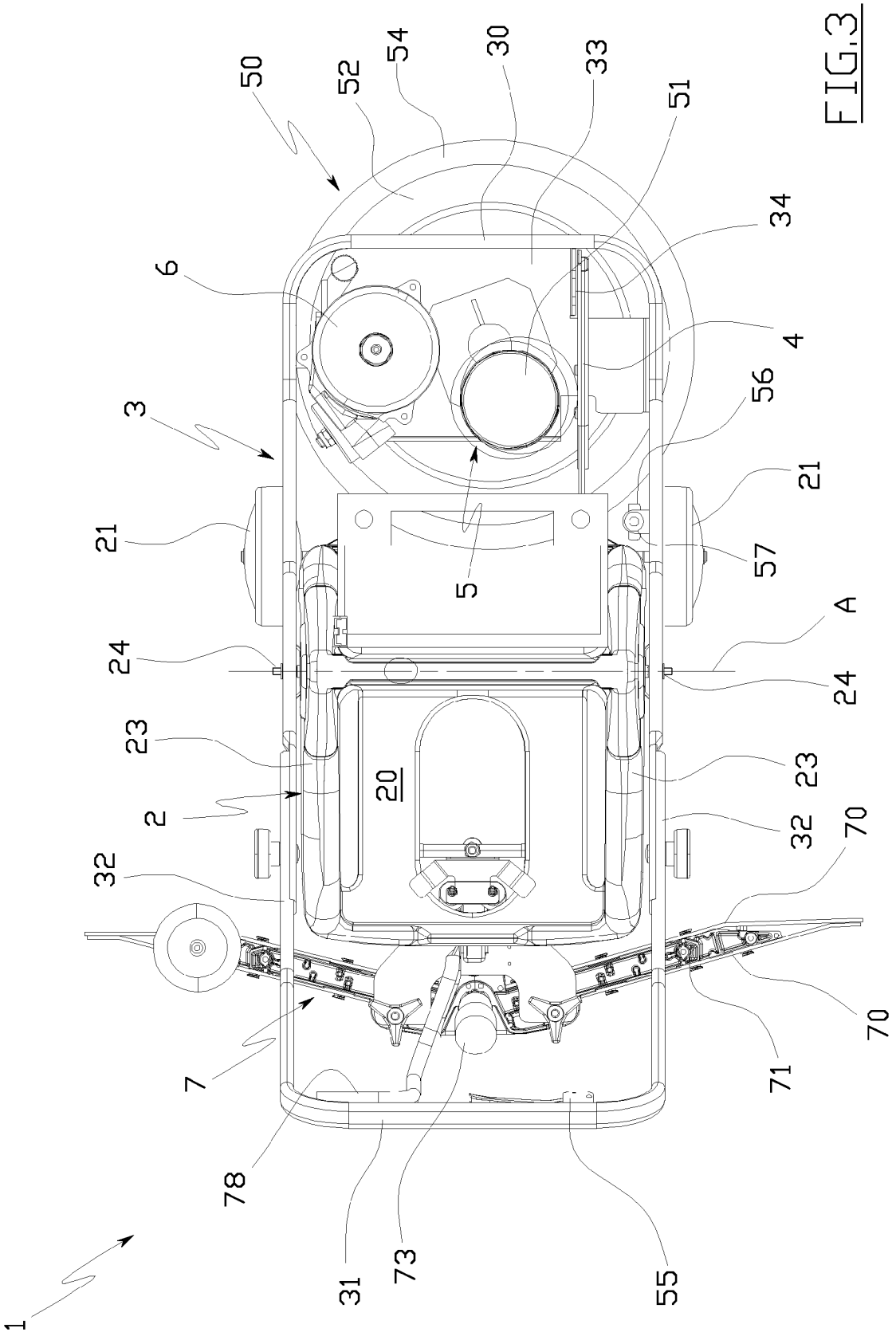
50
52
54
30
33
51
34
6
4
56
3
21
21
57
5
A
24
24
23
20
23
2
32
32
70
70
7
71
78
31
73
55
1

FIG.3

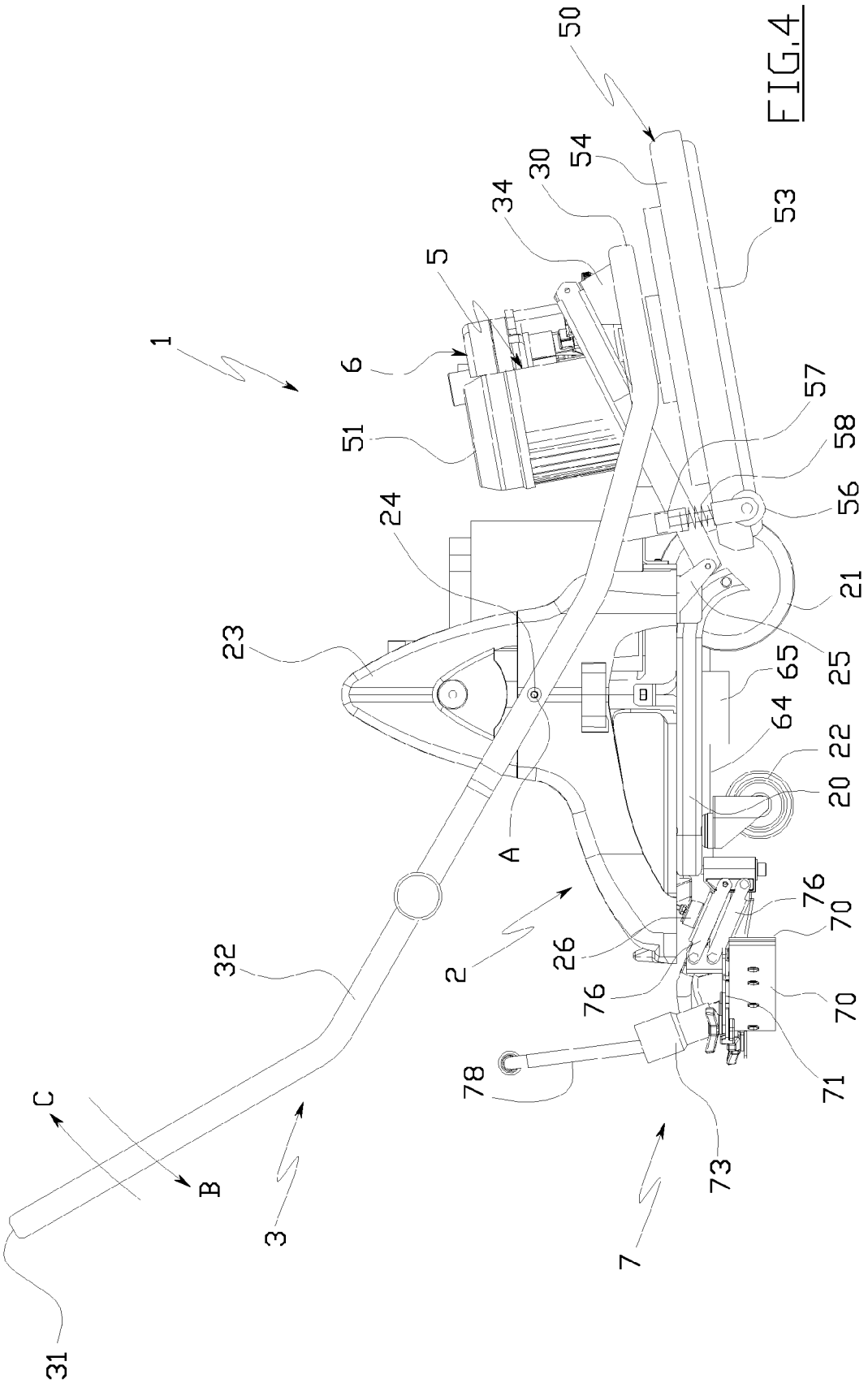
50
54
30
34
53
5
1
6
57
51
58
56
24
21
23
25
65
64
22
20
A
76
70
2
26
32
76
70
78
71
C
B
3
73
7
31

FIG.4

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 09 17 4322

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 5 287 583 A (LILJA BO V [SE]) 22 February 1994 (1994-02-22) * column 4, line 51 - column 6, line 49 * * column 7, line 4 - column 10, line 54; figures 1-7 *	1-3,6-9 4-5, 10-12	INV. A47L11/283 A47L11/293 A47L11/40
X	US 2005/005389 A1 (RAU MICHAEL A [US] ET AL) 13 January 2005 (2005-01-13) * paragraph [0019] - paragraph [0039]; figures 1,2 *	1,6	
Y	US 2006/150352 A1 (FIELD BRUCE F [US]) 13 July 2006 (2006-07-13) * paragraphs [0043], [0054] *	4-5	
Y	US 2004/025270 A1 (MITCHELL KEVIN [US] ET AL) 12 February 2004 (2004-02-12) * abstract; figure 2 *	10	
Y	US 2006/143843 A1 (BENEDICT MARK [US]) 6 July 2006 (2006-07-06) * paragraph [0040] *	11-12	
			TECHNICAL FIELDS SEARCHED (IPC) A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 February 2010	Hubrich, Klaus

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

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 17 4322

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

25-02-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5287583 A	22-02-1994	AT 123213 T	15-06-1995
		AU 636137 B2	22-04-1993
		AU 5264190 A	09-10-1990
		DE 69019821 D1	06-07-1995
		DE 69019821 T2	14-03-1996
		EP 0463035 A1	02-01-1992
		JP 2942933 B2	30-08-1999
		JP 4504069 T	23-07-1992
		WO 9010415 A1	20-09-1990
US 2005005389 A1	13-01-2005	NONE	
US 2006150352 A1	13-07-2006	NONE	
US 2004025270 A1	12-02-2004	NONE	
US 2006143843 A1	06-07-2006	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82