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### (54) Multifunctional cleaning machine

(57) A multifunctional cleaning machine comprises a handle (7) having a first end (7a) provided with a handgrip (8), a base (2) fastened to a second end (7b) of the handle (7) and provided with at least one main suction opening (4), suction means (9) in fluid communication with the main suction opening (4), a steam-producing boiler (15) positioned in the base (2) and connected with at least one aperture (16) placed on the active portion (3). The machine (1) further comprises a reservoir (18) installed on the handle (7) and in fluid communication with the boiler (15), to supply the boiler itself (15) with water.

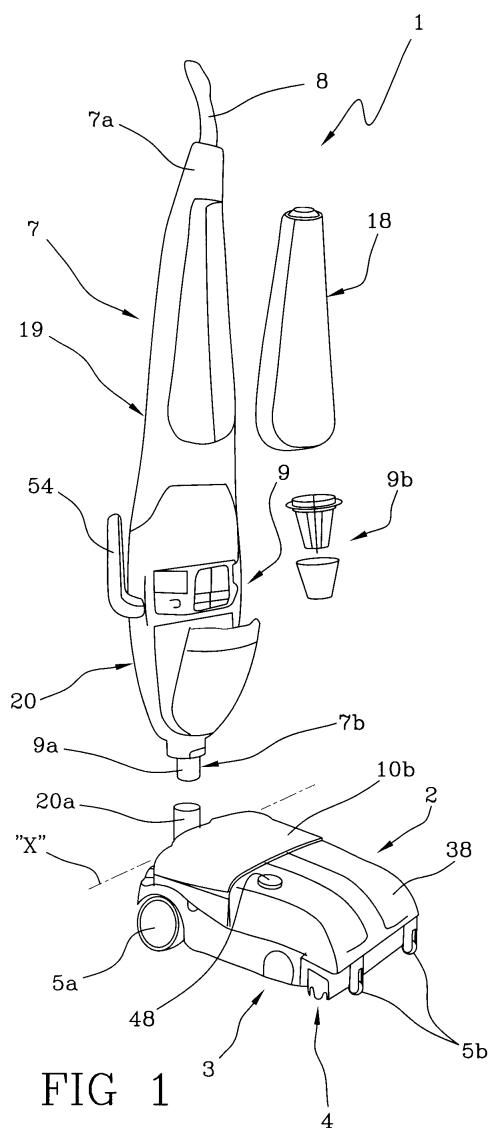


FIG 1

## Description

**[0001]** The present invention relates to a multifunctional cleaning machine of the type comprising the features recited in the preamble of claim 1.

**[0002]** In more detail, the machine in accordance with the invention falls within the field of the electric suction brooms with water filtering and combined steam generation that are used, preferably in the housework, for cleaning a plurality of surfaces, such as floors, carpets, sofas, windowpanes, tapestry/ upholstery, etc.

**[0003]** From the Italian utility model application No. BS20020037U in the name of the same Applicant, it is known a steam broom of the above mentioned type. This broom comprises a base body resting on wheels to which a handle is fastened which extends in height and is used for movement of the base. The handle carries a powered suction unit connected through a suitable duct with a suction opening placed on a lower portion of the base body. Further enclosed in the base body is a filtering water unit and a boiler for steam production. The steam is sent close to the suction opening to enable it to dissolve the dirt separating it from the surface to be cleaned, so that it is sucked into the opening. Disadvantageously, the boiler takes up a great part of the inner volume of the base in order to enable it to hold a sufficient water amount for operation of the broom for an acceptable period of time.

**[0004]** The Applicant has found that the machines of the above described type can be improved under different points of view, above all in connection with the number of functions implemented in a single machine and as regards the machine efficiency.

**[0005]** In accordance with the present invention, the Applicant has identified the possibility of carrying out improvements on the above described machines which are capable of increasing the efficiency of the cleaning operations.

**[0006]** Accordingly, it is an aim of the present invention to provide a multifunctional cleaning machine that is able to efficiently operate on a plurality of surfaces having different features.

**[0007]** The foregoing and further aims that will become more apparent in the course of the following description are reached by a multifunctional cleaning machine comprising the features recited in claim 1 and/or in one or more of the claims depending thereon.

**[0008]** Further features and advantages will be best understood from the detailed description of a preferred, but not exclusive, embodiment of a multifunctional cleaning machine in accordance with the present invention.

**[0009]** This description will be set out hereinafter with reference to the accompanying drawings, given by way of non-limiting example, in which:

- Fig. 1 shows a multifunctional cleaning machine in accordance with the present invention;
- Fig. 2 shows a first portion to an enlarged scale of the machine seen in Fig. 1;

- Fig. 3 shows a second portion to an enlarged scale of the machine seen in Fig. 1;
- Fig. 4 shows a third portion to an enlarged scale of the machine seen in Fig. 1 with some elements removed to better show others;
- Fig. 5 is a diagrammatic representation of a first element of the third portion shown in Fig. 4;
- Fig. 6 is a diagrammatic view in section of a second element of the third portion seen in Fig. 4;
- Fig. 7 is an exploded view of a third element of the third portion seen in Fig. 4;
- Figs. 8a and 8b show a detail of the enlarged third portion seen in Fig. 4 in the respective operating positions; and
- Fig. 9 shows the machine seen in Fig. 1 in a different operating configuration.

**[0010]** With reference to the drawings, a multifunctional cleaning machine in accordance with the present invention has been generally denoted at 1.

**[0011]** The machine 1 comprises a base of a box-shaped structure 2 which has an active portion 3 designed to face a surface to be cleaned. In the drawings the active portion 3 corresponds to a lower face of base 2 and is therefore hidden. The active portion 3 is provided with at least one main suction opening 4 that, when the base 2 bears on the surface to be cleaned, lies opposite to the latter (Fig. 4). To facilitate sliding of the machine 1 on the surface to be cleaned, the base 2 can be provided with wheels 5a, 5b resting on the ground. In the preferred embodiment herein shown, the machine 1 comprises a pair of rear wheels 5a and a pair of front wheels 5b mounted in the vicinity of the main suction opening 4 (Fig. 1). The main suction opening 4 extends along a front edge of base 2 and carries at least one flexible tailpiece 6 slightly touching the surface to be cleaned (Fig. 4). In more detail, two flexible tailpieces 6 are preferably provided and they delimit the suction opening 4 on respectively opposite sides.

**[0012]** The machine 1 further comprises a handle 7 having a first end 7a provided with a handgrip 8 and a second end 7b opposite to the first one 7a, which is fastened to base 2. Handle 7 extends vertically from base 2 to enable a user to easily hold the handgrip 8, and is movable relative to base 2 around at least an articulation axis "X" perpendicular to the advancing direction of the machine 1.

**[0013]** Suction means 9, preferably installed on handle 7, is in fluid communication with the main suction opening 4, for the purpose of generating an air flow entering opening 4 and adapted to take in the dirt from the surface to be cleaned. According to a known scheme, the suction means 9 comprises an electric motor and a sucking fan, both not shown, in fluid communication with a pipe 9a (partly shown in Figs. 1, 3 and 9) communicating with the main suction opening 4.

**[0014]** The air flow entraining the dirt particles is filtered by a filtering unit 10 preferably comprising a filtering tank

(Fig. 7). The filtering tank 10 is installed in a suitable housing 11 formed in the base 2 (Fig. 4) and at a lower portion 10a thereof contains a filtering liquid, water for example, adapted to filter the sucked air and to retain the dirt. To this end, the filtering tank 10 is interposed between the main suction opening 4 and the suction means 9 and has an inlet 12 directly in communication with the lower portion 10a, to enable the sucked air to be directly admitted into the water, and an outlet, not shown, which is disposed over the water surface. The outlet is formed in an upper portion of tank 10, defined by a lid 10b, for example (Fig. 1). As viewed from Fig. 7, tank 10 is provided with a conveyor 13 having an entry 13a communicating with the suction opening 4 through the inlet 12 and an exit 13b dipped in the filtering liquid.

**[0015]** Advantageously and unlike the machines of known type, in tank 10, into the filtering liquid, an impeller 14 is mounted the function of which is to break the air bubbles formed by the suction air to enable better mixing of the collected dirt present in the liquid and therefore a much more efficient filtering effect. To this end, the sucked air flow is conveyed against the impeller 14 by means of the conveyor 13 the exit 13b of which faces the impeller 14 itself. In addition to the above described filtering unit 10, the machine 1 may further comprise a filter cartridge 9b mounted in a removable manner in pipe 9a just before the fan belonging to the suction means 9 (Fig. 1).

**[0016]** Further associated with the machine 1 is a boiler 15 for steam production which is defined by a casing 15a integrating an electric resistor "R" (Fig. 5). Boiler 15 is positioned in the base 2 and is connected to at least one aperture 16 disposed on the active portion 3, preferably at the main suction opening 4. In the embodiment shown in Fig. 4, the boiler 15 is positioned between the tank 10 and the main suction opening 4. Aperture 16, possibly provided with a suitable diffuser not shown as it can be made in any known manner, is connected to boiler 15 through a pair of pipes 17 extending from an upper portion of the boiler 15 itself.

**[0017]** The multifunctional cleaning machine 1 in accordance with the present invention further comprises a reservoir 18 installed on handle 7 and in fluid communication with boiler 15, to supply the boiler with water (Fig. 1).

**[0018]** In more detail, handle 7 comprises a first portion 19 holding the reservoir 18 and a second portion 20 holding the suction means 9. The two portions 19, 20 are aligned along a major extension direction of handle 7 and, as visible in Fig. 2, can be separated from each other. In particular, the second portion 20 is connected to the base 2 through a joint 20a mounted on the base 2 itself and rotatable relative to said base around the articulation axis "X". Starting of the motor belonging to the suction means 9 can be obtained by inclining handle 7 relative to the vertical portion, through activation of a switch, of known type and therefore not shown.

**[0019]** The reservoir 18 is connected to boiler 15

through a duct 21, seen in Figs. 2, 3, 4 and 5, running through the first portion 19, the second portion 20 and the base 2, to open into the area close to boiler 15 (Fig. 4).

**[0020]** The reservoir 18 is placed in a removable manner in a seat 22 formed in the first portion 19 (Fig. 1) and is preferably provided with a valve, of known type and therefore not shown, fitted close to duct 21, which valve is designed to prevent water leakage when the reservoir, still partly filled for example, is disengaged from handle 7.

**[0021]** A first stretch 23 of duct 21 extends starting from the reservoir 18 and terminates with an end 23a hooking a first end 24a of a second stretch 24 mounted in the second portion 20 (Fig. 2). The second stretch 24 terminates with a second end 24b to be connected to the first end 25a of a third stretch 25 extending in the base 2 (Fig. 3). Fig. 3 further shows electric contacts "C" set to power supply the resistor "R" of boiler 15.

**[0022]** Preferably, the hooking end 23a of the first stretch 23 as well and the second end 24b of the second stretch 24 are provided with respective valves designed to prevent water leakage when the first portion 19 is separated from the second one 20 and when the second portion 20 is separated from base 2, respectively. In addition, the third stretch 25 of duct 21 passes through the joint 20a and between two locators, not shown, one of which is fixedly mounted on base 2 and the other is movable with the joint 20a itself around axis "X". When handle 7 is perpendicular to the ground and the suction means 9 is shut off, the two locators lie close to each other and carry out a sandwiching action on duct 21, pressing it to such an extent that water passage is prevented. Alternatively, water delivery from the reservoir 18 can be controlled by a solenoid valve to be activated for opening following activation of the boiler and/or upon command of the user.

**[0023]** It is to be pointed out that arrangement of the reservoir 18 in the handle 7 enables the sizes of boiler 15 placed in the base 2 to be reduced, as compared with the sizes of the boilers used in the machines of known type. In fact, in the boiler 15 of the invention no water supply is required to be contained, except for the amount necessary for steam production. The required water is obtained, preferably in an automatic manner, from the reservoir 18. In fact, duct 21, shown in Figs. 2, 3, 4 and 5, brings the water into boiler 15 by gravitational fall.

**[0024]** An actuator 26 is operatively active on duct 21 to open or close water passage along duct 21 based on the water level in boiler 15. As viewed from Fig. 5, actuator 26 comprises a level sensor 27 mounted in boiler 15 and a closure member 28 connected to the level sensor 27. The closure member 27 is movable between a first position at which it shuts duct 21, and a second position at which it opens duct 21. In the preferred embodiment diagrammatically shown in Fig. 5, the level sensor 27 is defined by a float. Float 27 is hinged to a rod 29 in turn hinged to the casing 15a of boiler 15. The closure member 28 is mounted on the rod 29 and is therefore movable together with float 27. The closure member 28 also faces

a second end 25b of the third stretch 25 opening into boiler 15. Lowering of the water level, following water conversion into steam, causes lowering of the float 27 and the closure member 28 therewith, said closure member under a predetermined level value causing opening of duct 21. Then the water that from duct 21 flows into the boiler 15 causes a new level increase and rising of the float 27 and the closure member 28 until duct 21 is closed again.

**[0025]** The important reduction in the volume taken up by boiler 15 as compared with traditional boilers enables a rotating brush 30 to be mounted on the active portion 3, close to the main suction opening 4, said brush getting in contact with the surface to be cleaned, without involving an important increase in the bulkiness of the base 2. Preferably, the rotating brush 30 is disposed in side by side relationship with the main suction opening 4 (Figs. 4, 8a and 8b).

**[0026]** In the preferred embodiment, the rotating brush 30 comprises a shaft 31 extending parallel to and alongside the main suction opening 4. Shaft 31 is provided with bristles 32 radially moving away from the shaft 31 itself (Figs. 4, 8a and 8b).

**[0027]** Preferably, an auxiliary suction opening 33 is positioned within the base 2 and over the rotating brush 30, to take in the dust and dirt removed by the brush 30 itself. To this end, the auxiliary suction opening 33 is in fluid communication with the same suction means 9 that is active on the main opening 4 (Figs. 8a, 8b).

**[0028]** The suction openings 4, 33 converge and open into a common suction duct 55, only partly shown, entering the filtering tank 10 but, preferably, said suction openings can be alternately activated through a closing device 34 active both on the main suction opening 4 and the auxiliary suction opening 33 (Figs. 8a, 8b). The closing device 34 is movable between a first position at which it closes the communication between the suction means 9 and the main suction opening 4, and a second position at which it closes the communication between the suction means 9 and the auxiliary suction opening 33.

**[0029]** In the embodiment shown in Figs 8a and 8b the closing device 34 consists of a plate 35 slidably mounted to the base 2, at the region where the auxiliary 33 and main 4 suction openings meet. Plate 35 is provided with a passage so as to define a solid half 35a and a holed half 35b.

**[0030]** In more detail, the main opening 4 and auxiliary opening 33 converge into the common suction duct 55 through respective narrow stretches, each defined by a respective mouth 36, 37 (Figs. 8a, 8b). The holed plate 35 slides on both mouths 36, 37 and alternately closes either of them. In the configuration in Fig. 8a, the holed plate 35 with its solid half 35a closes the mouth 37 of the auxiliary opening 33. In the configuration in Fig. 8b the solid half 35a is superposed on and closes the mouth 36 of the main opening 4 and the plate passage is aligned with the mouth 37 of the auxiliary opening 33.

**[0031]** Movement of the closing device 34 is carried

out manually, access to plate 35 taking place through a door 56 shown in chain line and formed in an upper shield 38 of base 2 covering the boiler 35 and brush 30. Door 56, in the closed condition, extends flush with the upper shield and at the upper part delimits the common suction duct 55.

**[0032]** To cause rotation of brush 30, the machine 1 advantageously comprises a turbine 39 installed along the common suction duct 55, between the auxiliary suction opening 33 or the main suction opening 4 and the suction means 9. The turbine 39 is connected to brush 30 and causes rotation of the brush through the suction air flow.

**[0033]** As illustrated in Fig. 4, the turbine 39 is fitted on a shaft 40 rotatably mounted to the base 2. Shaft 40 lies parallel to and superposed on brush 30 and transmits motion to the latter by means of a drive belt 41. As an alternative solution to turbine 39, in accordance with a variant not shown, the machine 1 may comprise an electric motor connected to the brush.

**[0034]** The machine 1 is further provided with means 42 to dispense a detergent close to the suction opening 4. Referring particularly to Figs. 5 and 6, this means 42 preferably comprises a measuring dispenser 43 for the detergent, an inlet duct 44 entering the dispenser 43 and in fluid communication with the reservoir 18 installed on handle 7 and an outlet duct 45 coming out of the dispenser 43 and opening onto the rotating brush 30. The outlet duct 45 therefore brings the waterdetergent mixture to the brush.

**[0035]** In the embodiment shown in Fig. 5, duct 21 carrying out water supply by gravitational fall is provided with a branch 52 close to boiler 15; this branch 52 has a first outlet connected to the second end 25b of the third stretch 25 and a second outlet opening into the inlet duct 44 (Figs. 4 and 5).

**[0036]** In more detail, the measuring dispenser 43 comprises a container 46 for solid soap in the form of tablets or powder. The container 46 has an inlet passage port 46a in communication with the inlet duct 44 and an outlet passage port 46b in communication with the outlet duct 45. The container 46 further has adjusting means 47 to modify the width of the inlet passage port 46a and/or the outlet passage port 46b and consequently vary the amount of water mixed with the detergent and conveyed to the brush 30. Advantageously, the adjusting means 47 is controlled through a knob 48 also defining the closing plug of container 46; the user can easily rotate said knob so as to adjust the passage ports 46a, 46b. Knob 48 is positioned above the shield 38 of base 2 (Fig. 1).

**[0037]** In the embodiment shown in Fig. 6, the container 46 adapted to define the adjusting means comprises an inner casing 49 integral with plug 48 and rotatably mounted in an outer casing 50. The inlet duct 44 and outlet duct 45 are rigidly fixed to the outer casing 50, while openings 50a, 50b are formed in the inner casing 49. Each passage port 46a, 46b is defined by a superposition between each opening 50a, 50b and the respec-

tive duct 44, 45. Rotation of the plug 48 and the inner casing 49 therewith enables this superposition and the width of the ports 46a, 46b to be varied between a fully closed configuration and a fully open configuration.

**[0038]** In order to distribute the water/detergent mixture along the whole brush 30, the machine 1 comprises a diffuser 51 that is in fluid communication with the outlet duct 45 and faces the rotating brush 30.

**[0039]** In addition and preferably, as shown in Fig. 5, the outlet duct 45 passes through the boiler 15 before reaching the diffuser 51. The stretch passing through the boiler 15 is preferably provided with a heat exchanger co-operating in heating the water and detergent passing through duct 45, to improve mixing and efficiency of them for cleaning purposes.

**[0040]** In use, the machine in accordance with the present invention can be utilised following different operating modalities.

**[0041]** In a first operating mode, in which boiler 15 keeps turned off and reservoir 18 is possibly removed, the machine 1 acts like a vacuum cleaner provided with a water filter, with or without the aid of the rotating brush 30.

**[0042]** In a second operating mode, with the reservoir 18 installed in the seat 22 and the boiler 15 turned on, the machine 1 works like a steam generator with or without simultaneous suction.

**[0043]** A third operating mode is obtained by acting on plug 48 to spray the brush 30 with the detergent contained in the container 46, simultaneously with or independently of steam delivery and/or suction.

**[0044]** In addition, by separating the second portion 20 from the base 2 and possibly separating the reservoir 18 from the first portion 19, the handle 7 can be used as a vacuum cleaner with a filter cartridge in a dry state.

**[0045]** Possibly, the second portion 20 can be provided with universal attachment means for connection to suction mouths 52, rigid or flexible extension pipes/hoses or other auxiliary elements designed for operation of the machine as a vacuum cleaner (Fig. 9). In this configuration, handle 7 can be provided with a strap 53 for easy handling and transport.

**[0046]** Finally, the second portion 20 has a handhold or handle 54 and further it can be easily separated also from the first portion 19, so as to define a dry vacuum cleaner of the portable type.

**[0047]** The present invention achieves the intended purposes and has important advantages.

**[0048]** First of all, due to the presence of the reservoir 18 in handle 7, bulkiness of the boiler 15 can be reduced and therefore additional elements capable of making the machine 1 much more efficient than the machines of known type can be installed on the base 2. In particular, the greater efficiency of the machine 1 in accordance with the invention results from adopting the rotating brush 30 and spraying the same with a heated detergent. A greater efficiency is also obtained through adoption of the impeller 14 enabling the filtering effect of tank 10 to

be improved.

**[0049]** In addition, due to the possibility of simultaneously or alternately using the brush 30, a detergent sprayed thereon, and/or steam, and also due to the possibility of dismantling the machine 1 so as to use only part of the same, the machine appears to be very versatile and adapted to clean any surface.

## 10 Claims

1. A multifunctional cleaning machine, comprising: a handle (7) having a first end (7a) provided with a handgrip (8) and a second end (7b) opposite to the first one (7a); a base (2) fastened to the second end (7b) of the handle (7) and having an active portion (3) designed to face a surface to be cleaned and provided with at least one main suction opening (4); suction means (9) in fluid communication with the main suction opening (4); a boiler (15) for steam production, positioned in the base (2) and connected to at least one aperture (16) formed in the active portion (3); **characterised in that** it further comprises a reservoir (18) installed on the handle (7) and in fluid communication with the boiler (15), to supply said boiler (15) with water.
2. A machine as claimed in claim 1, wherein a duct (21) extends between the reservoir (18) and the boiler (15) to bring the water into the boiler (15) by gravitational fall.
3. A machine as claimed in claim 2, wherein an actuator (26) is operatively active on the duct (21) to open or close said duct (21) based on the level of the water present in the boiler (15).
4. A machine as claimed in claim 3, wherein the actuator (26) comprises a level sensor (27) mounted in the boiler (15), and a closure member (28) connected to the level sensor (27); the closure member (28) being movable between a first position at which it closes the duct (21) and a second position at which it opens the duct (21).
5. A machine as claimed in claim 4, wherein the level sensor (27) is a float and the closure member (28) is movable together with said float (27).
6. A multifunctional cleaning machine in particular as claimed in claim 1, wherein a rotating brush (30) is mounted on the active portion (3) close to the main suction opening (4), to get into contact with the surface to be cleaned.
7. A machine as claimed in claim 6, wherein the rotating brush (30) is disposed in side by side relationship

with the main suction opening (4).

8. A machine as claimed in claim 7, wherein an auxiliary suction opening (33) is positioned within the base (2) and over the rotating brush (30) and is in fluid communication with the suction means (9).

9. A machine as claimed in claim 8, wherein a closing device (34) is active on the main suction opening (4) and the auxiliary suction opening (33).

10. A machine as claimed in claim 9, wherein the closing device (34) is movable between a first position at which it closes the communication between the suction means (9) and the main suction opening (4), and a second position at which it closes the communication between the suction means (9) and the auxiliary suction opening (33).

11. A machine as claimed in claim 6, further comprising a turbine (39) installed between the auxiliary suction opening (33) or the main suction opening (4) and the suction means (9) and connected to the brush (30), to cause rotation of said brush (30) by means of a sucking air flow.

12. A machine as claimed in claim 1, further comprising means (42) for dispensing a detergent in the region close to the suction opening (4).

13. A machine as claimed in claim 12, wherein the means (42) for dispensing the detergent comprises a measuring dispenser (43) for the detergent, an inlet duct (44) entering the measuring dispenser (43) and in fluid communication with the reservoir (18) installed on the handle (7), an outlet duct (45) coming out of the measuring dispenser (43) and opening onto a region close to the suction opening (4).

14. A machine as claimed in claims 6 and 13, wherein said outlet duct opens onto the rotating brush (30) to bring the water admixed with the detergent to said brush (30).

15. A machine as claimed in claim 13 or 14, further comprising a diffuser (51) in fluid communication with the outlet duct (45) coming out of the measuring dispenser (43).

16. A machine as claimed in claim 13, wherein the outlet duct (45) passes through the boiler (15), to heat the water admixed with the detergent.

17. A machine as claimed in claim 13, wherein the measuring dispenser (43) comprises a container (46) for the soap which has an inlet passage port (46a) in communication with the inlet duct (44) and an outlet passage port (46b) in communication with the outlet

5 duct (45).

18. A machine as claimed in claim 17, wherein the container (46) further has adjusting means (47) to modify the width of at least one of said inlet passage port (46a) and outlet passage port (46b) and vary the flow rate of the water admixed with the detergent along the outlet duct (45).

10 19. A multifunctional cleaning machine, in particular as claimed in claim 1, further comprising a filtering tank (10) installed in the base (2) and interposed between the main suction opening (4) and the suction means (9), to filter the sucked air and retain the dirt in a filtering liquid, preferably water, contained in said tank (10).

15 20. A machine as claimed in claim 19, wherein an impeller (14) is mounted in the tank (10) into the liquid, to break the suction air bubbles.

20 21. A machine as claimed in claim 20, further comprising a conveyor (13) having an inlet (13a) communicating with the main suction opening (4) and an outlet (13b) dipped into the filtering liquid and facing the impeller (14), to direct the sucked air against said impeller (14).

25 22. A machine as claimed in claim 1, wherein the reservoir (18) is removably in engagement with said handle (7).

20 23. A machine as claimed in claim 1, wherein the handle (7) comprises a first portion (19) carrying the reservoir (18) and a second portion (20) carrying the suction means (9), the second portion (20) being separable from the base (2) and the first portion (19) being separable from the second portion (20).

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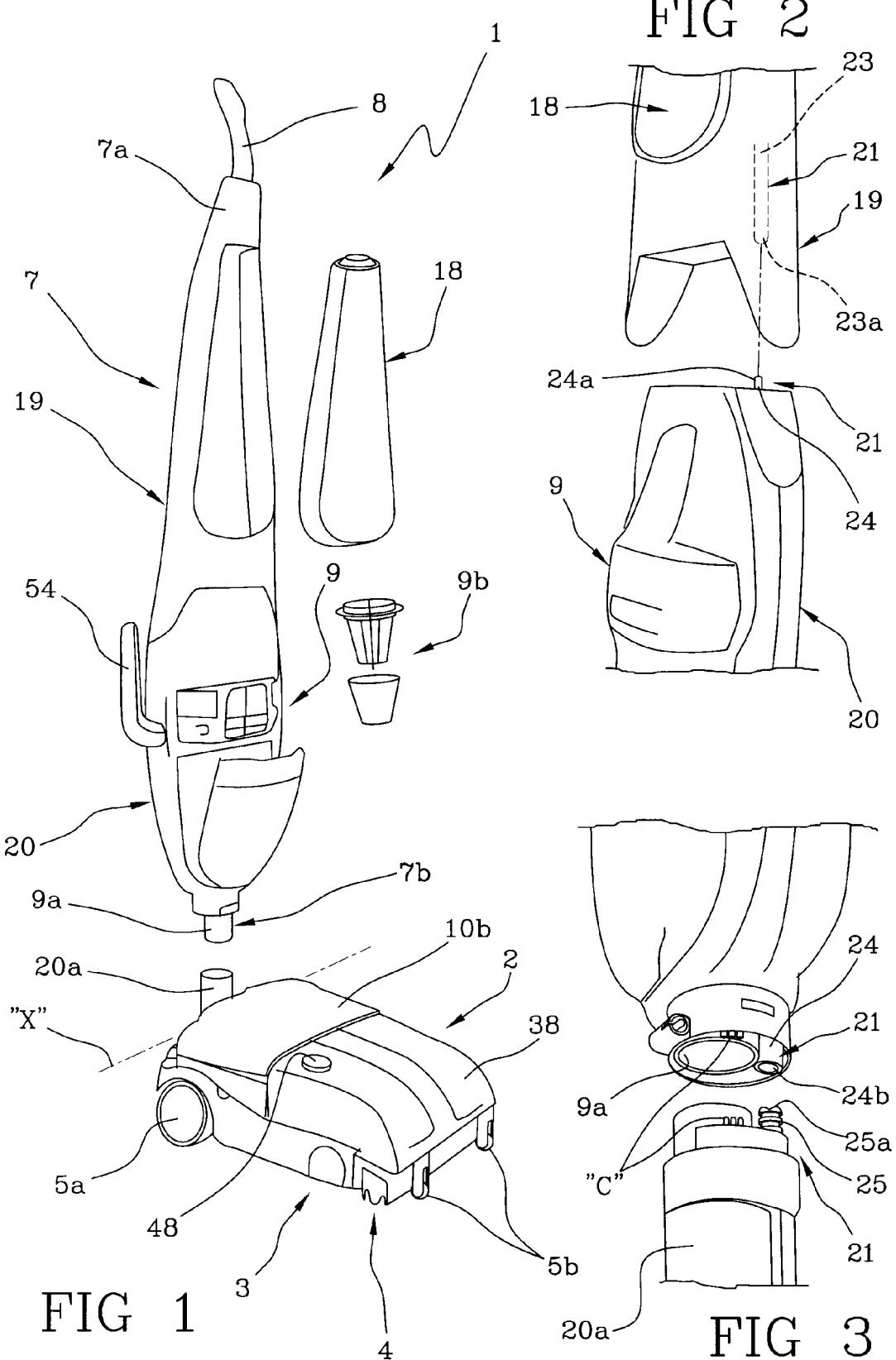


FIG 6

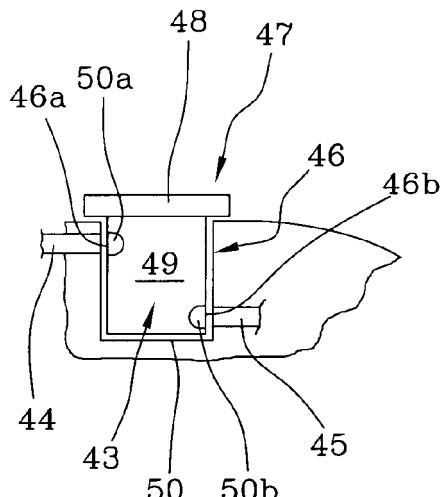


FIG 5

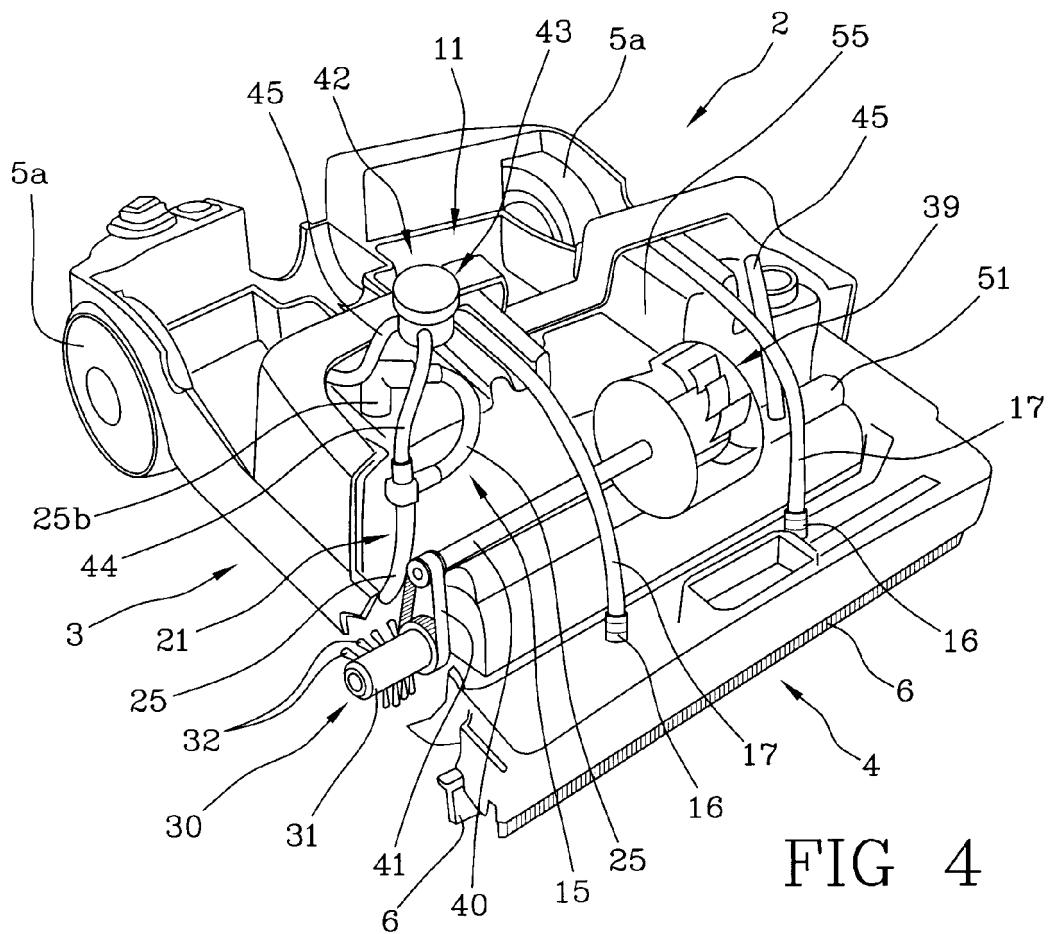


FIG 4

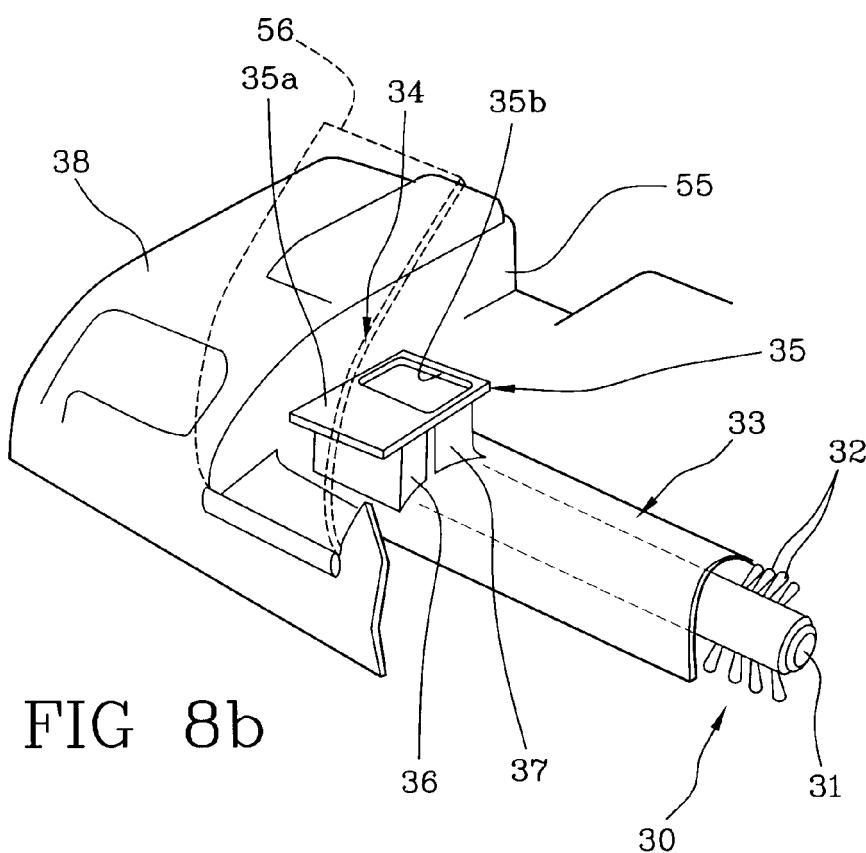
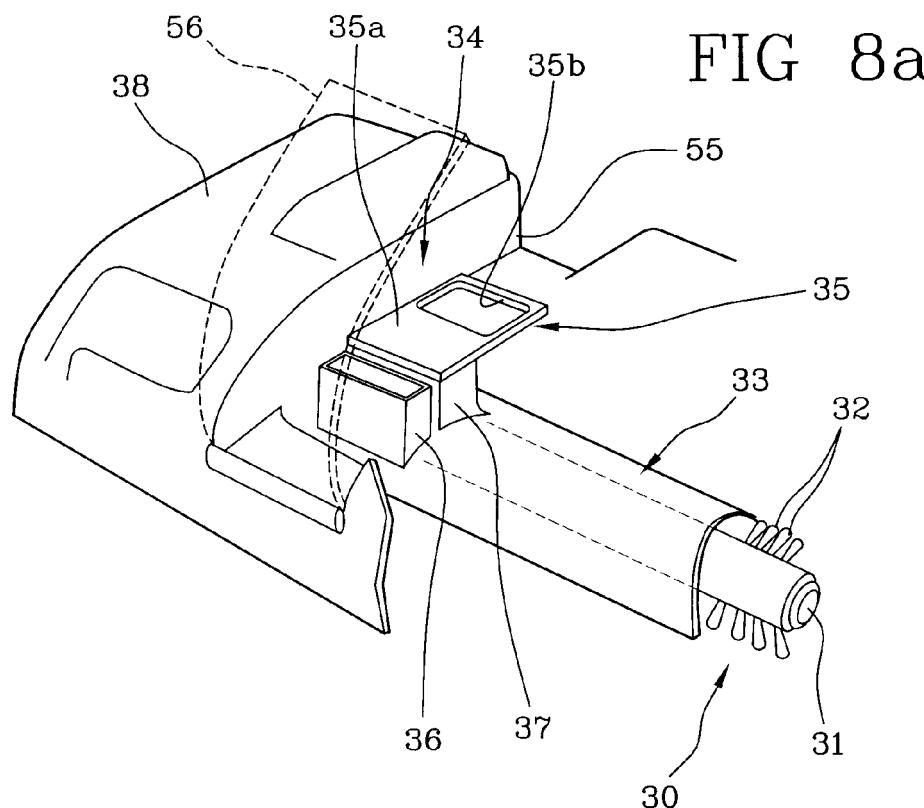


FIG 9

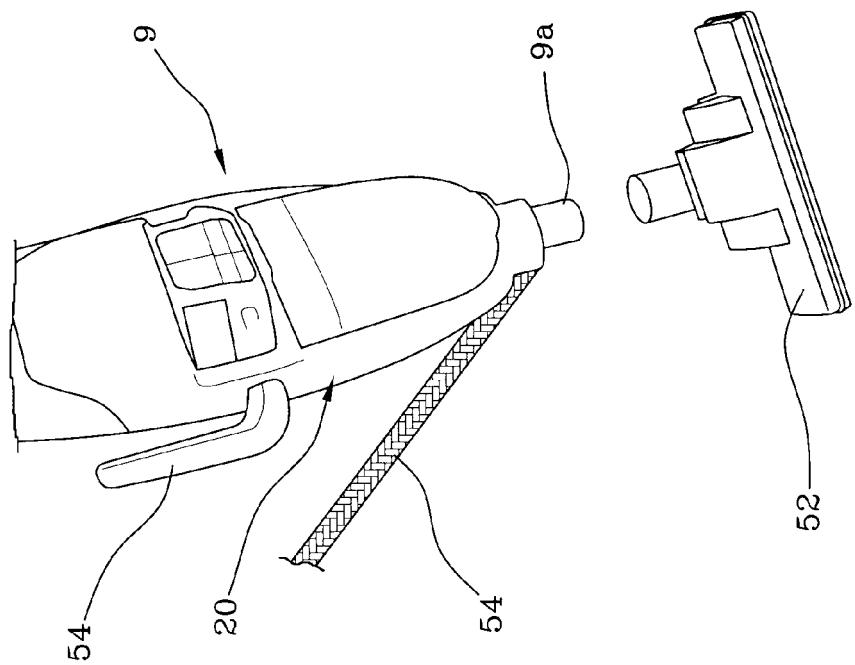
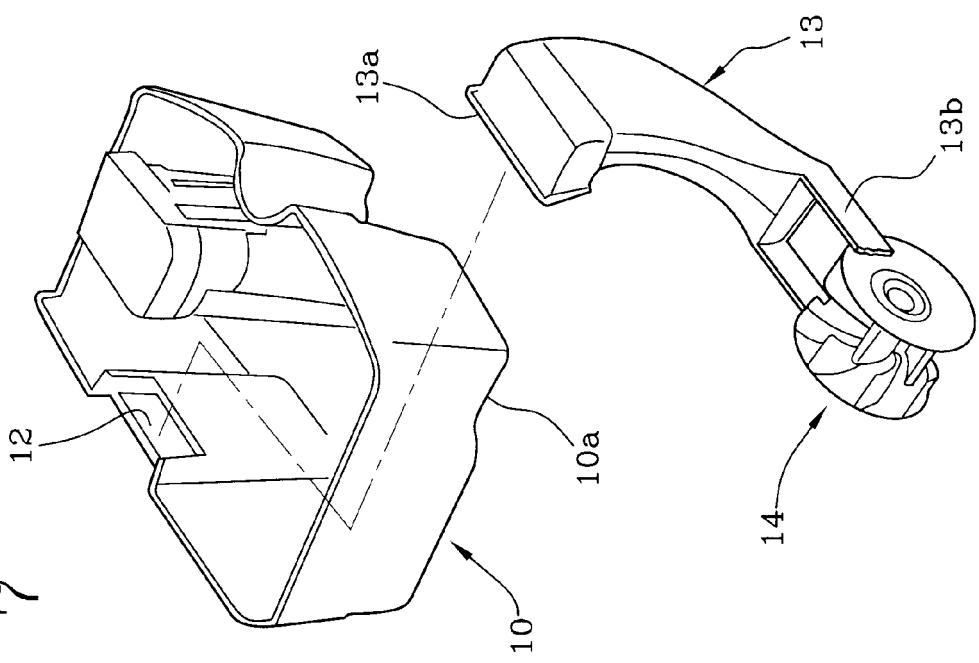


FIG 7





DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	EP 1 027 855 A (DOUSS LINE S.R.L) 16 August 2000 (2000-08-16) * paragraphs [0011], [0013]; figures 1-3,8 *	1-3,22	A47L11/34 A47L5/30 A47L1/02 A47L9/00
Y		4,5,12, 13, 15-18,23	
Y	----- EP 0 625 331 A (SAMSUNG ELECTRONICS CO., LTD) 23 November 1994 (1994-11-23) * column 3, line 18 - line 20; figures 2,3 *	4,5	
Y	----- EP 0 567 044 A (T.P.A. IMPEX ITALIA S.R.L) 27 October 1993 (1993-10-27) * figure 3 *	12,13, 15-18	
Y	----- US 2003/051310 A1 (MORGAN JEFFERY A ET AL) 20 March 2003 (2003-03-20) * figures 1,3A,4 *	23	
A	----- US 4 284 127 A (COLLIER ET AL) 18 August 1981 (1981-08-18) * column 3, line 46 - line 53; figure 6 *	5	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	----- FR 2 745 169 A (VAP INDUSTRIES FRANCE SA) 29 August 1997 (1997-08-29) * page 4, line 25 - line 28; figure 5 *	5	A47L
A	----- US 5 697 119 A (MUSSALO ET AL) 16 December 1997 (1997-12-16) * column 5, line 50 - line 53; figure 1 *		
A	----- WO 01/21054 A (GISOWATT S.P.A; SOZZI, VALIDIO) 29 March 2001 (2001-03-29) * abstract; figures 1,5 *		
	----- ----- -/-		
The present search report has been drawn up for all claims			
2	Place of search Munich	Date of completion of the search 11 February 2005	Examiner Papadimitriou, S
CATEGORY OF CITED DOCUMENTS		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	
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 06, 30 April 1998 (1998-04-30) -& JP 10 043099 A (TEC CORP), 17 February 1998 (1998-02-17) * abstract; figure 2 * -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
The present search report has been drawn up for all claims			
2	Place of search	Date of completion of the search	Examiner
	Munich	11 February 2005	Papadimitriou, S
CATEGORY OF CITED DOCUMENTS		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) 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			

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-5, 12, 13, 15-18, 22, 23



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-5,12,13,15-18,22,23

a multifunctional cleaning machine with a reduced size boiler  
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2. claims: 6-11,14

a multifunctional cleaning machine with a rotatable brush  
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3. claims: 19-21

a multifunctional cleaning machine with a dirt filtering  
means  
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ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 04 42 5807

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.

11-02-2005

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