



(11) **EP 2 053 954 B9**

(12) **CORRECTED EUROPEAN PATENT SPECIFICATION**

(15) Correction information:
Corrected version no 1 (W1 B1)
Corrections, see
Description Paragraph(s) 3, 37
Claims EN 6

(51) Int Cl.:
A47L 5/36 ^(2006.01) **A47L 7/02** ^(2006.01)
A47L 9/22 ^(2006.01) **A47L 5/14** ^(2006.01)
A47L 7/00 ^(2006.01) **A47L 11/40** ^(2006.01)

(86) International application number:
PCT/IB2007/002014

(48) Corrigendum issued on:
21.08.2013 Bulletin 2013/34

(87) International publication number:
WO 2008/012620 (31.01.2008 Gazette 2008/05)

(45) Date of publication and mention
of the grant of the patent:
06.03.2013 Bulletin 2013/10

(21) Application number: **07735009.8**

(22) Date of filing: **06.07.2007**

(54) **VACUUM CLEANER WITH ADDITIONAL FUNCTIONS**
STAUBSAUGER MIT ZUSÄTZLICHEN FUNKTIONEN
ASPIRATEUR AVEC DES FONCTIONS SUPPLÉMENTAIRES

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE
SI SK TR

(30) Priority: **24.07.2006 IT CR20060018**

(43) Date of publication of application:
06.05.2009 Bulletin 2009/19

(73) Proprietor: **Pedrazzini Bertolazzi, Marino**
26020 Madignano (IT)

(72) Inventor: **Pedrazzini Bertolazzi, Marino**
26020 Madignano (IT)

(74) Representative: **Marcio', Paola**
Ing. Mari & C. SRL
Via Garibotti, 3
26100 Cremona (IT)

(56) References cited:
EP-A- 0 252 265 GB-A- 2 199 653
JP-A- 8 275 912 US-A1- 2003 129 065
US-B1- 6 351 870

EP 2 053 954 B9

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention relates to a vacuum cleaner equipped with additional functions, for example designed to work also as a high-pressure pump, compressor, etcetera.

[0002] Conventional vacuum cleaners, as is known, essentially comprise a container for a vacuum created by an electric motor that drives a suction fan, also called "turbine," and possibly a cooling fan.

[0003] The object of the present invention is to add additional functions to a vacuum cleaner, creating a multipurpose machine for household, semi-professional or professional users. A vacuum cleaner is disclosed in US 6 351 870 B1, wherein the drive shaft of the drive motor means is coaxially mounted both to the suction turbine and pressure pump.

[0004] The object is achieved with the vacuum cleaner of claim 1. Further preferred embodiment of the cleaner of the invention are claimed in the remaining claims.

[0005] As explained hereafter, the present invention makes use of electric or two stroke type motors.

[0006] The term additional machine means any machine or device of a known type. The additional function preferably consists in a high-pressure pump (pressure cleaner) and/or an air compressor and/or a machine tool (e.g., a grinding machine).

[0007] The idle gear bearings as in the present invention are advantageous when it is possible to reverse the direction of rotation of the motor, that therefore is the electric or two stroke type.

[0008] A particularly preferred application has a "canister" type of vacuum cleaner that additionally comprises a high-pressure pump unit, fitted on the opposite side to the vacuum cleaner fan or on the same side, off axis, and driven by the motor by an idle gear and a speed reduction unit, as will be better illustrated hereunder.

[0009] Another preferred embodiment has, in addition to the vacuum cleaner, a compressor and a compressed air reservoir or cylinder that can be detached from the main unit, for handier use.

[0010] Another embodiment has a high-pressure pump unit and a compressor that are fitted on the same vacuum cleaner.

[0011] Characteristics and advantages of the invention will be clearer with the help of the following description and the attached figures, in which:

Figs. 1 and 2 represent functional diagrams, by way of example, of a vacuum cleaner modified according to the invention;

Fig. 3 shows a vacuum cleaner which is not according to the present invention.

Fig. 4 shows an exploded view of a suction "canister" modified according to the invention, with the addition of a pressure cleaner.

cleaner is illustrated that comprises a container or "canister" 1 inside which there is an electric motor 2 that drives at least one suction fan 3.

[0013] The motor 2, by means of an appropriate selector of a known type (not illustrated), can be started up in either direction of rotation.

[0014] Said motor 2 can operate also a high-pressure pump 4 of the piston and swash-plate type, via a selective type of transmission that, in the example, comprises a pinion 5 that engages a cogwheel 6 fitted on an idle gear bearing 7. The connection with the fan 3, on the contrary, is direct.

[0015] The pinion 5 and the wheel 6 produce a reduction in speed, since the electric motor 2 typically has a much higher speed of rotation than the rated speed of operation of the pump 4.

[0016] It is understood that, due to the presence of the idle gear 7, the pump 4 can be operated selectively, making the motor 2 start in one direction of rotation or in the other.

[0017] The drum 1 is of a type in itself known and it comprises a suction union 8, to which a pipe can be connected in order to use it as a vacuum cleaner.

[0018] Referring to Fig. 2, an analogous embodiment is shown, that also comprises a compressor 10, besides the high-pressure pump 4.

[0019] Said compressor 10 is driven by the motor 2 by a magnetic clutch 11 and a belt 12. In particular, the magnetic clutch 11 is fitted in order to couple the shaft of the compressor with the driven pulley, which is connected to the driving pulley: this enables selectively engaging and disengaging the compressor 10.

[0020] The transmission between the motor and compressor can also be direct, via gears.

[0021] Advantageously, a reservoir or cylinder 13 is provided for the compressed air supplied by the compressor 10. Even more preferably, said reservoir 13 can be detached from the drum 1, so that the user can carry around a reserve of compressed air.

[0022] The inlet 8 is advantageously equipped with a valve that enables cutting off suction during operation as a compressor, which avoids losing power. The valve can be operated automatically (for example with a clapet) that automatically shuts off the inlet 8 on extracting the suction pipe, that is normally connected to said inlet. The valve can be provided with a narrow passage (e.g., a hole of diameter 8 mm) that lets a small amount of air enter to cool the motor even when the diaphragm of the valve is shut.

[0023] The same valve can be alternatively positioned at the end of the suction pipe or on the mouthpiece of the accessories with the activation system on the hand-grip.

[0024] Fig. 3 illustrates an example of embodiment with a two or four stroke combustion engine. In this example of embodiment there is a combustion engine 20, that drives an electric generator 21 above or under said engine, always engaged. The engine 20 moreover drives

[0012] Referring to the diagram of Fig. 1, a vacuum

the suction fan 3, pump 4 and compressor, 10, in the manner described above. However this example does not belong to the present invention, since in this example the motor can only rotate in one direction.

[0025] With all types of engine (electric motor or combustion engine) it is possible to have either the arrangement of Figs. 1-2 with the motor inside the drum 1 or the arrangement of Fig. 3 with the motor outside, above the drum. Any other equivalent arrangement of the mechanical members will in any case be able to be used by the sector technician.

[0026] Fig. 4 shows an example of application of the invention, that is substantially equivalent to the diagram of Fig. 1 and it involves modifying a known vacuum cleaner, of the "suction canister" type, by fitting a high-pressure pump. This produces a multipurpose vacuum cleaner/pressure cleaner machine.

[0027] More in detail, the machine comprises a drum or container 101 with a suction inlet 108 and a top mouth 109 where a cartridge 110 is inserted preferably of the "wet&dry" type.

[0028] The machine comprises an electric motor 102 coupled directly to a suction fan 103; the modification involves adding a high-pressure pump 104, from the opposite side of the fan 103 with respect to the motor, creating a suction-pump "unit" that as an assembly is indicated as 120.

[0029] It must be noted that said unit 120 is particularly compact being contained between the drum 101 and a cover 105, so that the complete machine substantially has the overall dimensions of a common "suction canister."

[0030] The reduction in speed and the idle gear bearing (numbers 5, 6 and 7 of Fig. 1) are substantially housed by the flange 121, that couples the electric motor 102 to the pump 104.

[0031] Said pump 104 has a mains water inlet 122 and an outlet for the pressurized water 123; preferably the pump is of the type with pistons and swash-plate.

[0032] The motor 102 is electrically connected to a selector 130 that allows reversing the direction of rotation and, via the idle gear bearing, operating the pump 104 selectively.

[0033] Basically, starting the motor in one direction provides operation as a vacuum cleaner, while the pump 104 stays stationary; starting the motor instead in the other direction the said pump 104 is also operated, having pressurized water for the most varied uses, while the fan 103 turns with no load.

[0034] In this case, in which there are only two operating machines and it is possible to reverse the direction of rotation, the presence of the valve is superfluous in the suction inlet 108.

[0035] All the additional machines are independent of each other and therefore the vacuum cleaner can be equipped with one or more of them according to need.

[0036] For reasons of space, if there are more than two operating machines added, the gears of the transmission

system can be arranged along arcs of circumference rather than along a line.

[0037] It is clear that the application potential is not limited to the examples described and illustrated and in particular any motor and any combination of machines or devices of a known type can be used, as far as they fall within the terms of claim 1.

10 Claims

1. Vacuum cleaner comprising a container (1,101) provided with a suction mouth (8,108), motor means (2,20,102), at least one suction fan (3,103) and at least one additional machine (4,104) connected to said motor means through transmission means (5,6,7,121) that can be activated selectively, wherein said motor means (2,20,102) are permanently connected both to said at least one suction fan (3,103) and said additional machine (4,104), said at least one suction fan (3,103) being directly connected to the drive shaft of said motor means, whereas the connection to said additional machine (4, 104) is carried out by means of an idle gear bearing (7) and a speed reduction unit (5,6,121), said motor means being further connected to a selector (130) of their direction of rotation, so that starting said motor means in one direction of rotation provides operation of said at least one suction fan (3,103), while said additional machine (4,104) stays stationary and, when starting said motor means in the other direction of rotation, said additional machine (4,104) is operated, while said at least one suction fan (3,103) turns with no load, and whereby said idle gear bearing (7) is contained into said speed reduction unit (5,6,121), in that said idle gear bearing (7) is fitted to a driven shaft which rotates at a lower speed than the drive shaft, and the driven shaft axis is offset from the drive shaft axis.
2. Vacuum cleaner according to claim 1, **characterized in that** said motor means comprise an electric motor (2).
3. Vacuum cleaner according to claim 1, **characterized in that** said motor means comprise a combustion engine (20).
4. Vacuum cleaner according to any of the preceding claims, **characterized in that** said transmission means comprise at least one magnetic clutch (11).
5. Vacuum cleaner according to any of the preceding claims, **characterized in that** said transmission means comprise at least one mechanical clutch.
6. Vacuum cleaner according to any of the preceding claims, **characterized in that** it comprises at least

one high-pressure pump (4).

7. Vacuum cleaner according to any of the preceding claims, **characterized in that** it comprises at least one air compressor (10).
8. Vacuum cleaner according to claim 8, **characterized in that** it comprises a reservoir or cylinder (13) for compressed air, connected in a detachable way to said container (1).
9. Vacuum cleaner according to any of the preceding claims, **characterized in that** it comprises a suction inlet (8) with a valve that enables shutting off the suction during the operation of said at least one additional machine.
10. Vacuum cleaner according to claim 1, **characterized in that** it comprises a container (101) with a suction inlet (108) and a unit (120) comprising said electric motor (102) connected to said selector (130) of the direction of rotation, in which this motor (102) is connected directly to said suction fan (103) and it is connected via said speed reduction unit and said idle gear bearing to a high-pressure pump (104).

Patentansprüche

1. Staubsauger, umfassend einen Staubraum (1, 101), ausgerüstet mit einem Saugmund (8, 108), Antriebsmitteln (2, 20, 102), mindestens einem Sauggebläse (3, 103) und mindestens einer zusätzlichen Vorrichtung (4, 104), die mit genannten Antriebsmitteln durch Übertragungsmittel (5, 6, 7, 121) verbunden ist, die wahlweise aktiviert werden können, worin genannte Antriebsmittel (2, 20, 102) auf feste Weise sowohl mit mindestens einem Sauggebläse (3, 103) als auch mit der genannten zusätzlichen Vorrichtung (4, 104) verbunden sind, wobei mindestens ein Sauggebläse (3, 103) mit der Antriebswelle der genannten Antriebsmittel direkt verbunden ist, während die Verbindung zur genannten zusätzlichen Vorrichtung (4, 104) durch eine Leerganglagerung (7) und eine Untersetzungseinheit (5, 6, 121) realisiert wird, wobei genannte Antriebsmittel ferner mit einem Wählschalter (130) in ihre Drehrichtung verbunden sind, so dass der Start der genannten Antriebsmittel in eine Drehrichtung den Arbeitsvorgang von mindestens einem Sauggebläse (3, 103) bestimmt, während genannte zusätzliche Vorrichtung (4, 104) stationär bleibt und beim Start der genannten Antriebsmittel in die andere Drehrichtung die genannte zusätzliche Vorrichtung (4, 104) arbeitet, während das genannte mindestens eine Sauggebläse (3, 103) mit Nulllast läuft und wodurch die genannte Leerganglagerung (7) in genannter Untersetzungseinheit (5, 6, 121) enthalten ist, worin die ge-

nannte Nullganglagerung (7) an eine angetriebene Welle angebracht ist, die bei einer geringeren Geschwindigkeit als die Antriebswelle dreht, und die angetriebene Welle von der Achse der Antriebswelle versetzt ist.

5

10

15

20

25

30

35

40

45

50

55

2. Staubsauger nach Anspruch 1, **dadurch gekennzeichnet, dass** genannte Antriebsmittel einen Elektromotor (2) umfassen.
3. Staubsauger nach Anspruch 1, **dadurch gekennzeichnet, dass** genannte Antriebsmittel einen Verbrennungsmotor (20) umfassen.
4. Staubsauger nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** genannte Übertragungsmittel mindestens eine Magnetkupplung (11) umfassen.
5. Staubsauger nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** genannte Übertragungsmittel mindestens eine mechanische Kupplung umfassen.
6. Staubsauger nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** er mindestens eine Hochdruckpumpe (4) umfasst.
7. Staubsauger nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** er mindestens einen Luftverdichter (10) umfasst.
8. Staubsauger nach Anspruch 8, **dadurch gekennzeichnet, dass** er einen Behälter oder Zylinder (13) für Druckluft umfasst, der auf abnehmbare Weise mit dem genannten Staubraum (1) verbunden ist.
9. Staubsauger nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** er einen Saugeinlass (8) mit einem Ventil umfasst, welches das Abschalten des Saugvorgangs während des Betriebes der genannten mindestens einen zusätzlichen Vorrichtung ermöglicht.
10. Staubsauger nach Anspruch 1, **dadurch gekennzeichnet, dass** er einen Staubraum (101) mit einem Saugeinlass (108) und eine Einheit (120) umfasst, welche den genannten mit dem genannten Drehrichtungsschalter (130) verbundenen Elektromotor (102) umfasst, in der dieser Motor (102) mit dem genannten Sauggebläse (103) direkt verbunden ist und über die genannte Untersetzungseinheit und die genannte Leerlauf Lagerung mit einer Hochdruckpumpe (104) verbunden ist.

Revendications

1. Aspirateur comprenant un conteneur (1, 101) muni d'une bouche d'aspiration (8, 108), un dispositif moteur (2, 20, 102), au moins un ventilateur aspirant (3, 103) et au moins une machine supplémentaire (4, 104) reliée audit dispositif moteur par un dispositif de transmission (5, 6, 7, 121) qui peut être actionné sélectivement, où ledit dispositif moteur (2, 20, 102) est relié de manière permanente à la fois audit au moins un ventilateur aspirant (3, 103) et à ladite machine supplémentaire (4, 104), ledit au moins un ventilateur aspirant (3, 103) étant directement relié à l'arbre d'entraînement dudit dispositif moteur, tandis que la liaison à ladite machine supplémentaire (4, 104) est réalisée au moyen d'un palier pignon intermédiaire (7) et d'une unité de réduction de vitesse (5, 6, 121), ledit dispositif moteur étant ultérieurement relié à un sélecteur (130) pour sa direction de rotation, de sorte que, lorsque ledit dispositif moteur est démarré dans une direction de rotation, il permet le fonctionnement dudit au moins un ventilateur aspirant (3, 103), tandis que ladite machine supplémentaire (4, 104) reste stationnaire et, lorsque ledit dispositif moteur est démarré dans l'autre direction de rotation, ladite machine supplémentaire (4, 104) est actionnée, tandis que ledit au moins un ventilateur aspirant (3, 103) tourne à vide, et où ledit palier pignon intermédiaire (7) est contenu dans ladite unité de réduction de vitesse (5, 6, 121), de sorte que ledit palier pignon intermédiaire (7) est installé sur un arbre mené qui tourne à une vitesse inférieure à celle de l'arbre d'entraînement, et l'axe de l'arbre mené étant déporté par rapport à l'axe de l'arbre d'entraînement.

35
2. Aspirateur selon la revendication 1, **caractérisé par le fait que** ledit dispositif moteur comprend un moteur électrique (2).

40
3. Aspirateur selon la revendication 1, **caractérisé par le fait que** ledit dispositif moteur comprend un moteur à combustion (20).

45
4. Aspirateur selon l'une des revendications précédentes, **caractérisé par le fait que** ledit dispositif de transmission comprend au moins un embrayage magnétique (11).

50
5. Aspirateur selon l'une des revendications précédentes, **caractérisé par le fait que** ledit dispositif de transmission comprend au moins un embrayage mécanique.

55
6. Aspirateur selon l'une des revendications précédentes, **caractérisé par le fait qu'il** comprend au moins une pompe haute pression (4).

5
7. Aspirateur selon l'une des revendications précédentes, **caractérisé par le fait qu'il** comprend au moins un compresseur pneumatique (10).

5
8. Aspirateur selon la revendication 8, **caractérisé par le fait qu'il** comprend un réservoir ou une bouteille (13) pour l'air comprimé, relié de manière détachable audit conteneur (1).

10
9. Aspirateur selon l'une des revendications précédentes, **caractérisé par le fait qu'il** comprend une bouche d'aspiration (8) avec une valve permettant l'interruption de l'aspiration durant le fonctionnement de ladite au moins une machine supplémentaire.

15
10. Aspirateur selon la revendication 1, **caractérisé par le fait qu'il** comprend un conteneur (101) muni d'une bouche d'aspiration (108) et une unité (120) comprenant ledit moteur électrique (102) relié audit sélecteur (130) pour la direction de rotation, dans laquelle ce moteur (102) est relié directement audit ventilateur aspirant (103) et relié par l'intermédiaire de la ladite unité de réduction de vitesse et dudit palier pignon intermédiaire à une pompe haute pression (104).

20

25

30

35

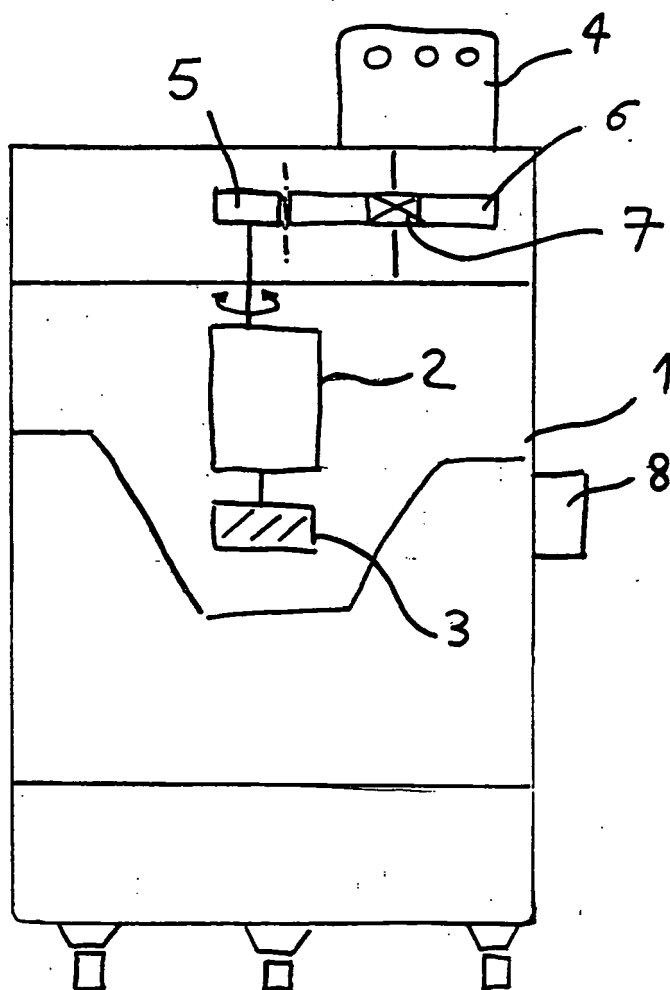


FIG. 1

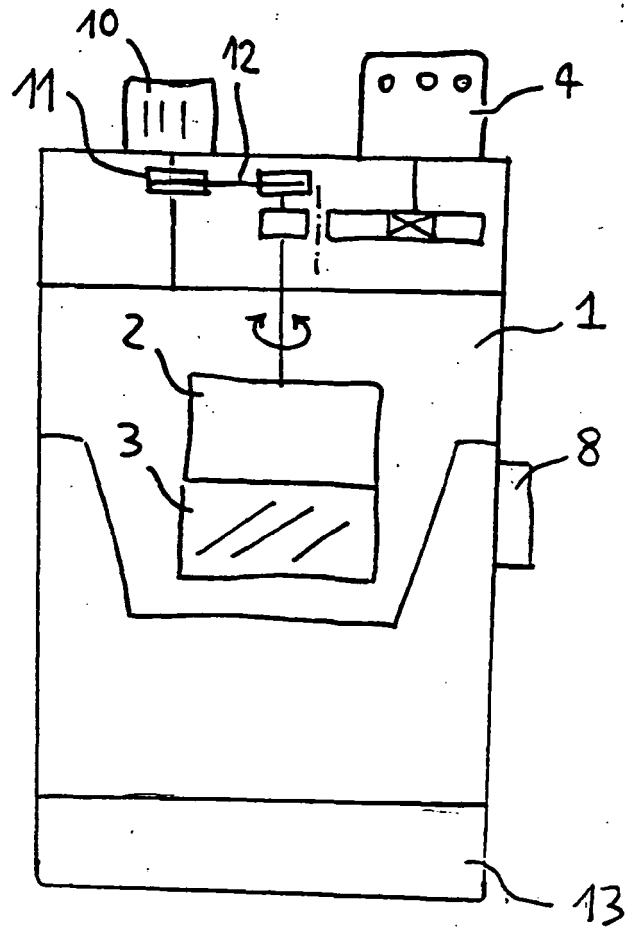


FIG. 2

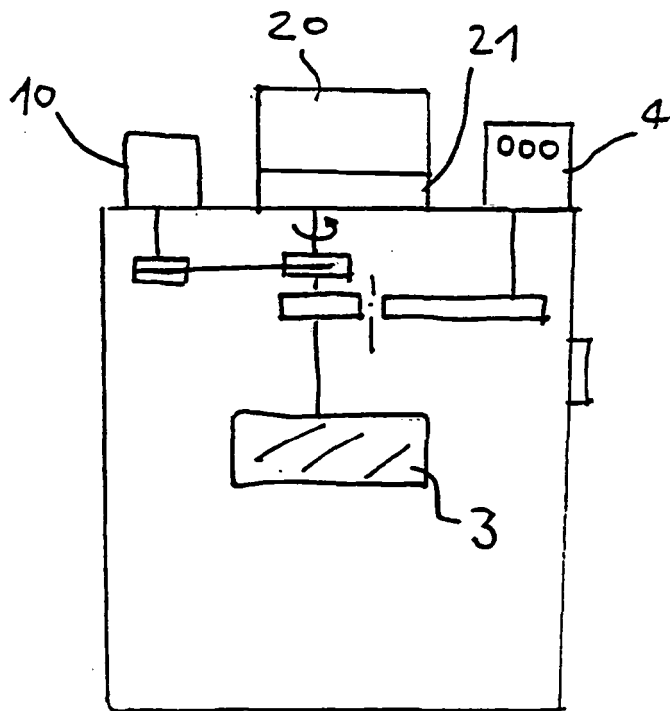


FIG. 3

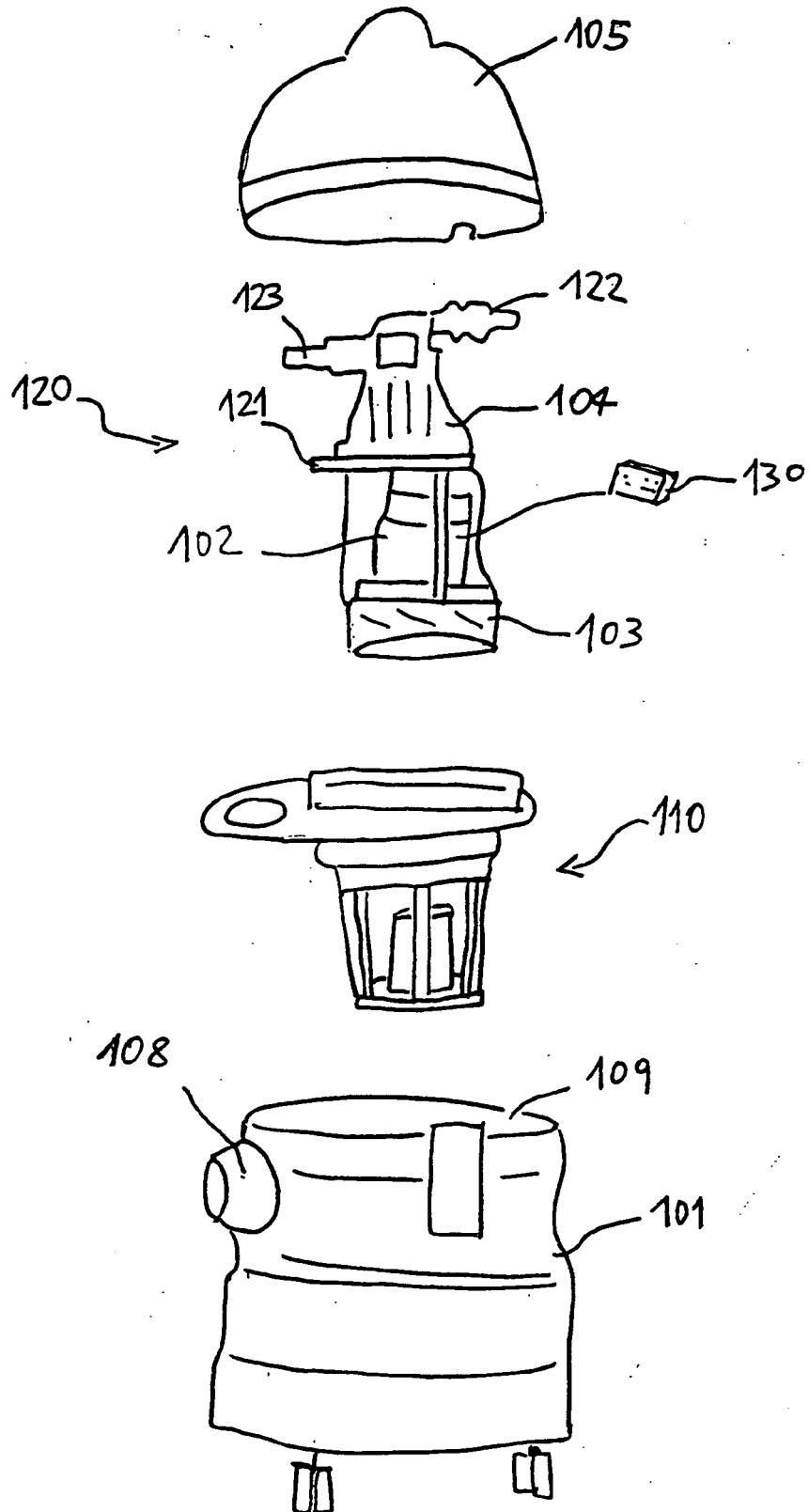


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 6351870 B1 [0003]