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(54) METHOD AND VACUUM CLEANER ASSEMBLY

(57) The disclosure concerns a vacuum cleaner assembly (2) comprising a first vacuum cleaner (4), a second vacuum cleaner (6) removably connected to the first vacuum cleaner (4), and a control arrangement (44). The control arrangement (44) is configured to: - run both first and second motor-fan units (16, 24) while the second vacuum cleaner (6) is in a connected state with the first vacuum cleaner (4), - detect a removal of the second vacuum cleaner (6) from the first vacuum cleaner (4), and in response thereto - perform at least one action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6).

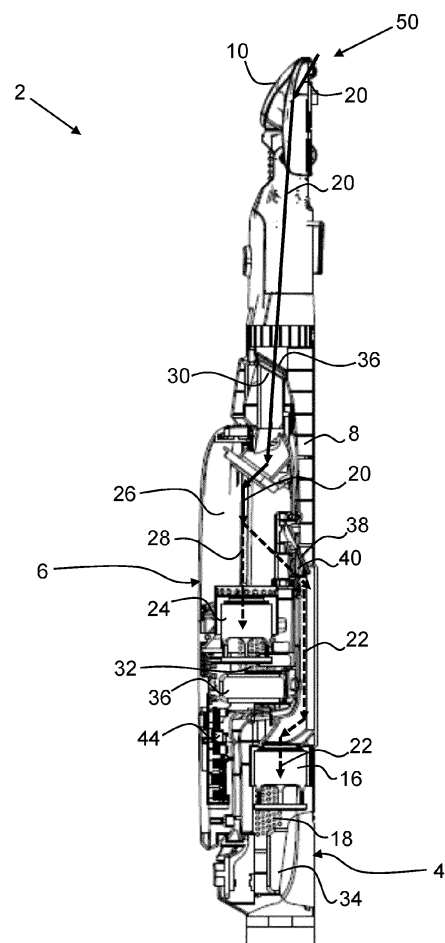


Fig. 2

Description

TECHNICAL FIELD

[0001] The invention relates to a method for controlling a vacuum cleaner assembly and to a vacuum cleaner assembly.

BACKGROUND

[0002] Vacuum cleaners of different types are known. One type of vacuum cleaner is referred to as a stick-type vacuum cleaner. The stick-type vacuum cleaner comprises essentially a slender body with a handle at one end, and a floor nozzle at the other end. Inside the body a motor-fan unit is arranged for producing an airflow through the vacuum cleaner and a main separation unit for separating dust and debris from the airflow. The stick-type vacuum cleaner is designed for standing use, the user grasping the handle and moving the nozzle over a surface to be cleaned, typically a floor surface.

[0003] An advantage of the stick-type vacuum cleaner is that it is compact and thus, easily stowed. It may be used as a complement to a larger vacuum cleaner for quickly vacuum cleaning a smaller area, or as a main vacuum cleaner in smaller living spaces, such as a one or two room apartment.

[0004] Some vacuum cleaners of the stick-type include a hand unit, which in itself may be used for vacuum cleaning e.g., for vacuum cleaning other surfaces than floor surfaces. The motor-fan unit of the hand unit is utilised also for drawing dust and debris through the floor nozzle of the stick-type vacuum cleaner.

[0005] More specifically, the hand unit is releasably connected to the body of the stick-type vacuum cleaner. During use of the stick-type vacuum cleaner the hand unit is mounted in the body of the stick-type vacuum cleaner. The hand unit produces an airflow through the floor nozzle, which airflow is lead into a main separation unit arranged in the hand unit. For vacuum cleaning e.g., a table or other furniture, the hand unit is released from the body of the stick-type vacuum cleaner and used as a standalone handheld vacuum cleaner.

[0006] It has been suggested to provide a motor-fan unit not only in the hand unit but an additional motor-fan unit in the body of the stick-type vacuum cleaner.

[0007] For instance, DE 102014111181 discloses a combination suction system comprising a handheld unit with a suction fan, an energy storage, and a dust filter; and a floor unit with a floor nozzle. The floor unit comprises a receiving shaft into which the handheld unit can be inserted. The floor unit comprises a further suction fan and a further energy storage. When the handheld unit is positioned in the receiving shaft, the suction fan and the further suction fan are arranged in one suction air flow path.

[0008] WO 2022/069049 discloses a vacuum cleaner apparatus comprising a first vacuum cleaner unit and a

removable second vacuum cleaner unit. The apparatus comprises a first motor-fan unit arranged in the first vacuum cleaner unit and a second motor-fan unit arranged in the second vacuum cleaner unit. The apparatus further comprises a control arrangement capable of operating the apparatus in a cooperative cleaning mode in which the first and second motor-fan units are operated simultaneously.

10 SUMMARY

[0009] It has been realised that the presence of two motor-fan units in a vacuum cleaner assembly comprising a first vacuum cleaner e.g., in the form of a stick-type vacuum cleaner, and a therefrom removable second vacuum cleaner e.g., in the form of a hand unit vacuum cleaner, will benefit from further coordination of the control of the respective first and second vacuum cleaners.

[0010] It would be advantageous to facilitate handling of a vacuum cleaner assembly comprising a first vacuum cleaner and a therefrom removable second vacuum cleaner. In particular, it would be desirable to coordinate actions performed with respect to the first and/or second vacuum cleaner of a vacuum cleaner assembly. To better address one or more of these concerns, at least one of a method and a vacuum cleaner assembly defined in one or more of the independent claims is provided.

[0011] According to an aspect, there is provided a method for controlling a vacuum cleaner assembly comprising a first vacuum cleaner and a second vacuum cleaner removably connected to the first vacuum cleaner. The first vacuum cleaner comprises a first motor-fan unit arranged in a first airflow path extending from a floor nozzle to a first air outlet and the second vacuum cleaner comprises a second motor-fan unit arranged in a second airflow path. When the second vacuum cleaner is connected to the first vacuum cleaner, at least a portion of the second airflow path forms a portion of the first airflow path. The method comprises steps of:

- running both the first and second motor-fan units while the second vacuum cleaner is in a connected state with the first vacuum cleaner,
- detecting a removal of the second vacuum cleaner from the first vacuum cleaner, and in response thereto
- performing at least one action related to the first vacuum cleaner and/or the second vacuum cleaner.

[0012] Since, the method comprises the steps of: - running both the first and second motor-fan units while the second vacuum cleaner is in the connected state with the first vacuum cleaner,

- detecting a removal of the second vacuum cleaner from the first vacuum cleaner, and in response thereto: - performing the at least one action related to the first vacuum cleaner and/or the second vacuum

cleaner - the method provides for coordinated operation of the first and second vacuum cleaners of the vacuum cleaner assembly in connection with removal of the second vacuum cleaner from the first vacuum cleaner. Particularly, such coordination facilitates handling of the vacuum cleaner assembly when a user releases the second vacuum cleaner from the first vacuum cleaner while both the first and second motor-fan units are running.

[0013] According to a further aspect, there is provided a vacuum cleaner assembly comprising a first vacuum cleaner, a second vacuum cleaner removably connected to the first vacuum cleaner, and a control arrangement for controlling a first motor-fan unit and a second motor-fan unit. The first vacuum cleaner comprises a floor nozzle, a first airflow path extending from the floor nozzle to a first air outlet, and the first motor-fan unit arranged in the first airflow path. The second vacuum cleaner comprises a second airflow path, a separation unit for separating dust and debris arranged in the second airflow path, and the second motor-fan unit arranged in the second airflow path. When the second vacuum cleaner is connected to the first vacuum cleaner, at least a portion of the second airflow path forms a portion of the first airflow path. The control arrangement is configured to:

- run both the first and second motor-fan units while the second vacuum cleaner is in a connected state with the first vacuum cleaner,
- detect a removal of the second vacuum cleaner from the first vacuum cleaner, and in response thereto
- perform at least one action related to the first vacuum cleaner and/or the second vacuum cleaner.

[0014] Since the control arrangement is configured to - run both the first and second motor-fan units while the second vacuum cleaner is in a connected state with the first vacuum cleaner,

- detect a removal of the second vacuum cleaner from the first vacuum cleaner, and in response thereto: - perform at least one action related to the first vacuum cleaner and/or the second vacuum cleaner - the vacuum cleaner assembly provides for coordinated operation of the first and second vacuum cleaners of the vacuum cleaner assembly in connection with removal of the second vacuum cleaner from the first vacuum cleaner. Particularly, such coordination facilitates handling of the vacuum cleaner assembly when a user releases the second vacuum cleaner from the first vacuum cleaner while both the first and second motor-fan units are running.

[0015] The vacuum cleaner assembly may comprise the first vacuum cleaner in the form of a stick-type vacuum cleaner and the second vacuum cleaner in the form of a hand unit vacuum cleaner. The hand unit vacuum

cleaner is releasably connected to the stick-type vacuum cleaner.

[0016] Accordingly, the first vacuum cleaner may comprise an elongated body with a handle arranged at one end thereof and the floor nozzle at its other end. The first vacuum cleaner and accordingly, the vacuum cleaner assembly with the second vacuum cleaner connected to the first vacuum cleaner is configured for upright use i.e., with the elongated body generally extending at an angle within a range of 50 - 90 degrees to a surface to be cleaned, typically a floor surface. Accordingly, during use of the first vacuum cleaner and the vacuum cleaner assembly in upright use, a user grasps the handle and moves the floor nozzle over a surface to be cleaned. Occasionally, e.g. for cleaning underneath furniture, the elongated body may extend at a much flatter angle to the surface to be cleaned, such as at an angle of 10 - 30 degrees.

[0017] The second vacuum cleaner may be short and compact in comparison with the first vacuum cleaner. Suitably the second vacuum cleaner is lighter than the first vacuum cleaner. The second vacuum cleaner may be used for standalone use without the first vacuum cleaner, for vacuum cleaning other surfaces than floor surfaces e.g., table surfaces and other furniture surfaces.

[0018] In connection with the second vacuum cleaner, the terms remove and release, removable and releasable, etc. are used interchangeably.

[0019] The first vacuum cleaner may be used only with the second vacuum cleaner connected to the first vacuum cleaner. That is, the first vacuum cleaner may only be used in connection with the whole vacuum cleaner assembly being used. The second vacuum cleaner on the other hand, can be used separate from the first vacuum cleaner, as a detached vacuum cleaning unit.

[0020] The floor nozzle is configured for being moved along a floor surface to be cleaned, in abutment therewith. The floor nozzle may comprise bristles for abutting contact with hard floor surfaces and/or may comprise smooth surfaces for abutting contact with carpeted floor surfaces.

[0021] The floor nozzle may comprise a rotatable brush roll for assisting transport of dust and debris into the first vacuum cleaner and its first airflow path.

[0022] Each of the first and second airflow paths may be defined and/or delimited inter alia by conduits, pipes, units, containers, filters, nozzle sections, air outlet sections, etc.

[0023] The separation unit of the second vacuum cleaner may be the only separation unit of the vacuum cleaner assembly. Alternatively, also the first vacuum cleaner may comprise a separation unit for separating dust and debris, which separation unit in such case may be arranged in the first airflow path in the first vacuum cleaner.

[0024] The second airflow path extends from a nozzle of the second vacuum cleaner via the separation unit of the second vacuum cleaner to a second air outlet of the

second vacuum cleaner.

[0025] As mentioned above, when the second vacuum cleaner is connected to the first vacuum cleaner, at least a portion of the second airflow path forms a portion of the first airflow path. The portion of the second airflow path that forms a portion of the first airflow path may form part of a common airflow path within the vacuum cleaner assembly.

[0026] Accordingly, during use of the vacuum cleaner assembly, the second motor-fan unit contributes to an airflow produced in the common airflow path. The common airflow path includes a portion of the first airflow path downstream of the floor nozzle and upstream of the second airflow path and the above-mentioned portion of the second airflow path.

[0027] The control arrangement for controlling the first and second motor-fan units may be arranged in the second vacuum cleaner.

[0028] The control arrangement for controlling the first and second motor-fan units may be a distributed control arrangement, one part thereof being arranged in the first vacuum cleaner and one part thereof being arranged in the second vacuum cleaner.

[0029] The connected state of the second vacuum cleaner is a state wherein the second vacuum cleaner is connected to the first vacuum cleaner. After removal of the second vacuum cleaner from the first vacuum cleaner, the second vacuum cleaner is in a released state and thus, ready to be used separate from the first vacuum cleaner.

[0030] Herein, the removal of the second vacuum cleaner that is detected, is detected while both the first and second motor-fan units are running. Typically, a user of the vacuum cleaner assembly removes the second vacuum cleaner from the first vacuum cleaner during use of the vacuum cleaner assembly with the motor-fan units running.

[0031] According to embodiments, the at least one action related to the first vacuum cleaner and/or the second vacuum cleaner may comprise to:

- stop the first motor-fan unit. In this manner, operation of the first and second motor-fan units may be coordinated.

[0032] Thus, a user of the vacuum cleaner assembly may not be required to manually switch off the first vacuum cleaner in an action separate from the removal of the second vacuum cleaner from the first vacuum cleaner, or at least not be required to manually stop the first motor-fan unit.

[0033] According to embodiments, the at least one action related to the first vacuum cleaner and/or the second vacuum cleaner may comprise to: either

- continue to run the second motor-fan unit, or
- stop the second motor-fan unit. In this manner, operation of the first and second motor-fan units may be

coordinated.

[0034] Thus, according to the first alternative, a user of the vacuum cleaner assembly may not be required to manually switch on the second vacuum cleaner in an action separate from the removal of the second vacuum cleaner from the first vacuum cleaner.

[0035] According to the second alternative, a user of the vacuum cleaner assembly may not be surprised by the second vacuum cleaner continuing to operate when the second vacuum cleaner is removed from the first vacuum cleaner. The user may instead, manually start the second vacuum cleaner when ready to use the same.

[0036] The control arrangement of the vacuum cleaner assembly may be configured to be set by a user to respond according to one of the two above-mentioned alternatives with respect to continued running or stopping of the second motor-fan unit when the second vacuum cleaner is removed from the first vacuum cleaner. Such a setting may remain the default mode of operation until reset at a later occasion.

[0037] According to embodiments, the first vacuum cleaner may comprise at least one electrically powered auxiliary device, and the at least one action related to the first vacuum cleaner and/or the second vacuum cleaner may comprise to:

- deactivate the at least one electrically powered auxiliary device. In this manner, operation of the at least one electrically powered auxiliary device may be coordinated with the removal of the second vacuum cleaner from the first vacuum cleaner.

[0038] Thus, a user of the vacuum cleaner assembly may not be required to manually switch off the at least one electrically powered auxiliary device in an action separate from the removal of the second vacuum cleaner from the first vacuum cleaner.

[0039] Examples of such electrically powered auxiliary devices are an electric motor for driving a brush roll and an electrically powered light source.

[0040] According to embodiments, the control arrangement may be further configured to:

- detect a reconnecting of the second vacuum cleaner to the first vacuum cleaner with the second motor-fan unit running, and in response thereto
- perform at least one further action related to the first vacuum cleaner and/or the second vacuum cleaner. In this manner, coordinated operation of the first and second vacuum cleaners of the vacuum cleaner assembly in connection with reconnecting of the second vacuum cleaner to the first vacuum cleaner may be achieved.

[0041] According to embodiments, the at least one further action related to the first vacuum cleaner and/or the second vacuum cleaner may comprise to:

- run the first motor-fan unit and the second motor-fan unit at a predetermined setting. In this manner, operation of the first and second motor-fan units may be coordinated upon reconnection of the second vacuum cleaner to the first vacuum cleaner.

[0042] According to embodiments, the at least one further action related to the first vacuum cleaner and/or the second vacuum cleaner may comprise to:

- stop the first motor-fan unit and the second motor-fan unit. Also in this manner, operation of the first and second motor-fan units may be coordinated upon reconnection of the second vacuum cleaner to the first vacuum cleaner.

[0043] According to embodiments, the first vacuum cleaner may be a stick-type vacuum cleaner and the second vacuum cleaner may be a handheld vacuum cleaner.

[0044] Further features of, and advantages with, the invention will become apparent when studying the appended claims and the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0045] Various aspects and/or embodiments of the invention, including its particular features and advantages, will be readily understood from the example embodiments discussed in the following detailed description and the accompanying drawings, in which:

- Fig. 1 illustrates a vacuum cleaner assembly according to embodiments,
- Fig. 2 illustrates a partial cross sectional through a portion of the vacuum cleaner assembly,
- Fig. 3 illustrates an embodiment of a second vacuum cleaner of a vacuum cleaner assembly,
- Fig. 4 schematically illustrates embodiments of a control arrangement of a vacuum cleaner assembly, and
- Fig. 5 illustrates a method for controlling a vacuum cleaner assembly according to embodiments.

DETAILED DESCRIPTION

[0046] Aspects and/or embodiments of the invention will now be described more fully. Like numbers refer to like elements throughout. Well-known functions or constructions will not necessarily be described in detail for brevity and/or clarity.

[0047] **Fig. 1** illustrates a vacuum cleaner assembly 2 according to embodiments.

[0048] The vacuum cleaner assembly 2 comprises a first vacuum cleaner 4 and a second vacuum cleaner 6. The second vacuum cleaner 6 is removably connected to the first vacuum cleaner 4.

[0049] In the illustrated embodiments, the first vacuum

cleaner 4 is a stick-type vacuum cleaner and the second vacuum cleaner 6 is a hand unit vacuum cleaner i.e., a compact handheld vacuum cleaner.

[0050] The vacuum cleaner assembly 2, with the second vacuum cleaner 6 in a connected state, is configured for being used as a stick-type vacuum cleaner e.g., for vacuum cleaning floor surfaces. With the second vacuum cleaner 6 in a released state, the second vacuum cleaner 6 is configured for separate vacuum cleaning tasks, such as for vacuum cleaning of furniture surfaces.

[0051] The first vacuum cleaner 4 comprises an elongated main body 8 housing various parts of the first vacuum cleaner 4 and being configured for the second vacuum cleaner 6 to be releasably connected thereto.

[0052] The first vacuum cleaner 4 comprises a floor nozzle 10 arranged at one end portion of the main body 8. Through the floor nozzle 10, the vacuum cleaner assembly 2 collects dust and debris from a surface to be cleaned.

[0053] A first handle 12 is typically arranged at an opposite end portion of the main body 8. The handle 12 is arranged to be held by a user for moving the vacuum cleaner assembly 2 along a surface to be cleaned. The first handle 12 may optionally comprise a first control interface 15a, including e.g. a push button or a slider, for control of at least one of a motor-fan unit effect, a nozzle function or any other vacuum cleaner function which may be arranged to be adjustable. For instance, the first control interface 15a can be operated by a user to switch the vacuum cleaner assembly 2 on and off. Alternatively, the first control interface 15a may be arranged elsewhere on the main body 8 suitably, within convenient reach of a user.

[0054] The second vacuum cleaner 6 is releasably connected to the main body 8. The second vacuum cleaner 6 comprises a second handle 14 typically being arranged at one end portion of the second vacuum cleaner 6 to be held by a user for moving the second vacuum cleaner 6 along a surface to be cleaned. The second vacuum cleaner 6 e.g., at the second handle 14 may optionally comprise a second control interface 15b, including e.g. a push button or a slider, for control of at least one of a motor-fan unit effect, a nozzle function or any other function for controlling the second vacuum cleaner 6 which may be arranged to be adjustable. For instance, the second control interface 15b can be operated by a user to switch the second vacuum cleaner 6 on and off.

[0055] **Fig. 2** illustrates a partial cross sectional through a portion of the vacuum cleaner assembly 2 of **Fig. 1**.

[0056] As mentioned above, the first vacuum cleaner 4 comprises a floor nozzle 10. Further, the first vacuum cleaner 4 comprises a first motor-fan unit 16 and a first air outlet 18. A first airflow path 20, 22 extends from the floor nozzle 10 to the first air outlet 18. The first motor-fan unit 16 is arranged in the first airflow path 20, 22.

[0057] In a known manner, the first motor-fan unit 16 comprises a motor and a fan to be rotated by the motor.

The first motor-fan unit 16 is configured for creating an airflow along the first airflow path 20, 22 during use of the vacuum cleaner assembly 2 when the second vacuum cleaner 6 is connected to the first vacuum cleaner 4.

[0058] The vacuum cleaner assembly 2 comprises the second vacuum cleaner 6 releasably connected to the first vacuum cleaner 4. The second vacuum cleaner 6 comprises a second motor-fan unit 24 and a separation unit 26 for separating dust and debris. The second motor-fan unit 24 and the separation unit 26 are arranged in a second airflow path 20, 28. The second airflow path 20, 28 extends from a nozzle 30 of the second vacuum cleaner 6 to a second air outlet 32 of the second vacuum cleaner 6.

[0059] Accordingly, the second airflow path 20, 28 extends to a second air outlet 32 in the second vacuum cleaner 6.

[0060] In a known manner, the second motor-fan unit 24 comprises a motor and a fan to be rotated by the motor. In the released state from the first vacuum cleaner 4, the second motor-fan unit 24, alone, is configured for creating an airflow along the second airflow path 20, 28 during use of the second vacuum cleaner 6. As mentioned above, the second airflow path 20, 28 extends from the nozzle 30 of the second vacuum cleaner 6 to the second air outlet 32 of the second vacuum cleaner 6.

[0061] When the second vacuum cleaner 6 is connected to the first vacuum cleaner 4, at least a portion of the second airflow path 20, 28 forms a portion of the first airflow path 20, 22.

[0062] Accordingly, with the second vacuum cleaner 6 in the connected state, during use of the vacuum cleaner assembly 2, the first and second motor-fan units 16, 24 collectively, produce an airflow along a portion 20 of the first airflow path 20, 22.

[0063] Put differently, the vacuum cleaner assembly 2 comprises a common airflow path 20 extending from the floor nozzle 10 of the first vacuum cleaner 4 to a portion of the second airflow path 20, 28 between the nozzle 30 of the second vacuum cleaner 6 and the second motor-fan unit 24.

[0064] In **Fig. 2**, the common airflow path 20 is indicated with full line arrows. With the second vacuum cleaner 6 in its connected state, the common airflow path 20 ends within the second vacuum cleaner 6. Downstream of the common airflow path 20, the first airflow path 22 and the second airflow path 28 are indicated with broken line arrows.

[0065] For instance, a portion of the second airflow path 20, 28 forming a portion of the first airflow path 20, 22 may be achieved in the following manner: In the connected state, the nozzle 30 of the second vacuum cleaner 6 is configured to connect to the first airflow path 20, 22 via a first opening 36 of the elongated main body 8. The second vacuum cleaner 6 further comprises an outlet opening 38 configured to connect to a second opening 40 of the elongated main body 8. The outlet opening 38 is arranged upstream of the second motor-fan unit 24, such

as at the separation unit 26. Thus, the portion of the second airflow path 20, 28 forming a portion of the first airflow path 20, 22, extends from the nozzle 30 of the second vacuum cleaner 6 to the outlet opening 38.

[0066] Accordingly, during use of the vacuum cleaner assembly 2, up to and through at least part of the separation unit 26, air is drawn along the common airflow path 20 by the first and second motor-fan units 16, 24. Downstream of the separation unit 26, the first and second airflow paths 22, 28 are separated with air being drawn therethrough individually by the respective first and second motor-fan units 16, 24. That is, downstream of the separation unit 26, the first and second airflow paths 22, 28 extend in parallel and accordingly, the first and second motor-fan units 16, 24 are arranged in parallel in the vacuum cleaner assembly 2.

[0067] Further, in the connected state, during use of the vacuum cleaner assembly 2, an airflow being drawn into the nozzle 30 of the second vacuum cleaner 6 and into the separation unit 26 by the first and second motor-fan units 16, 24 exits the second vacuum cleaner 6 as two airstreams, one via the second air outlet 32 and one via the outlet opening 38. In the released state, during use of the second vacuum cleaner 6, an airflow being drawn into the nozzle 30 of the second vacuum cleaner 6 and into the separation unit 26 by the second motor-fan unit 24 exits the second vacuum cleaner 6 as one airstream via the second air outlet 32.

[0068] In the connected state, during use of the vacuum cleaner assembly 2, it may be an option to use only one of the first and second motor-fan units 16, 24 to create an airflow from the floor nozzle 10.

[0069] The separation unit 26 is configured to separate dust and debris from an airflow passing through the separation unit 26. To this end, the separation unit 26 may comprise a cyclone separator or other means for separating the dust, such as a filter, a dust bag or the like.

[0070] According to some embodiments, also the first vacuum cleaner 4 may comprise a separation unit. Such a separation unit may be arranged in the first airflow path, upstream or downstream of the second airflow path.

[0071] The first and second motor-fan units 16, 24 are powered by respective batteries 34, 36 arranged within each of the first and second vacuum cleaners 4, 6.

[0072] At the floor nozzle 10, there may be arranged at least one electrically powered auxiliary device 50 such as a light source and/or a brush roll.

[0073] **Fig. 3** illustrates an embodiment of a second vacuum cleaner 6 of a vacuum cleaner assembly, such as the vacuum cleaner assembly 2 of **Figs. 1 and 2**. Accordingly, in the following reference is also made to **Figs. 1 and 2**.

[0074] The second vacuum cleaner 6 accordingly, is shown in a released state having been removed from the first vacuum cleaner 4 to be operated separately for removing dust from a surface to be cleaned via its nozzle 30.

[0075] As shown in **Fig. 3**, the outlet opening 38 of the

second vacuum cleaner 6 is arranged with a closing member 42 for covering the outlet opening 38 upon the second vacuum cleaner 6 being operated separately to avoid any air undesirably flowing through the outlet opening 38.

[0076] The closing member 42 e.g., may be spring-biased such that the applied spring-force closes the closing member 42 upon the second vacuum cleaner 6 being removed from the first vacuum cleaner 4. A protruding member or the like on the elongated main body 8 of the first vacuum cleaner 4 may push the closing member 42 open upon the second vacuum cleaner 6 being connected to the first vacuum cleaner 4.

[0077] With reference to **Figs. 1 - 3**, the vacuum cleaner assembly 2 comprises a control arrangement 44 for controlling the first motor-fan unit 16 and the second motor-fan unit 24, see **Fig. 2**.

[0078] Optionally, the control arrangement 44 may control further features of the vacuum cleaner assembly 2.

[0079] For instance, the control arrangement 44 may be arranged in the second vacuum cleaner 6. The control arrangement 44 may be a distributed control arrangement, components of which are arranged both in the first and the second vacuum cleaner 4, 6.

[0080] **Fig. 4** schematically illustrates embodiments of a control arrangement 44 of a vacuum cleaner assembly, such as the vacuum cleaner assembly 2 discussed above with reference to **Figs. 1 - 3**. Accordingly, in the following reference is also made to **Figs. 1 - 3**.

[0081] The control arrangement 44 comprises a first calculation unit 46 arranged in the first vacuum cleaner 4 and a second calculation unit 46' arranged in the second vacuum cleaner 6. The first and second calculation units 46, 46' may take the form of substantially any suitable type of processor circuit or microcomputer, e.g. a circuit for digital signal processing (digital signal processor, DSP), a Central Processing Unit (CPU), a processing unit, a processing circuit, a processor, an Application Specific Integrated Circuit (ASIC), a microprocessor, or other processing logic that may interpret and execute instructions. The herein utilised expression calculation unit may represent a processing circuitry comprising a plurality of processing circuits, such as, e.g., any, some or all of the ones mentioned above. The control arrangement 44 comprises first and second memory units 48, 48', each of which communicating with one of the first and second calculation units 46, 46'. The memory units 48, 48' provide the calculation units 46, 46' e.g., with stored programme code and/or stored data which the calculation units 46, 46' require to enable them to do calculations. The calculation units 46, 46' may also be adapted to storing partial or final results of calculations in the memory units 48, 48'. The memory units 48, 48' may comprise physical devices utilised to store data or programs, i.e., sequences of instructions, on a temporary or permanent basis, such as e.g. a memory card, a flash memory, a USB memory, a hard disc, or another similar volatile or

non-volatile storage unit for storing data such as e.g. ROM (Read-Only Memory), PROM (Programmable Read-Only Memory), EPROM (Erasable PROM), EEPROM (Electrically Erasable PROM).

[0082] The first and second calculation units 46, 46' of the control arrangement 44 are connected inter alia to respective of the first and second motor-fan units 16, 24 for controlling them e.g., in accordance with the method 100 discussed herein. The first calculation unit 46, of the control arrangement 44 may be connected to at least one electrically powered auxiliary device 50 for controlling it e.g., in accordance with embodiments of the method 100 discussed herein. The first and second control interfaces 15a, 15b may be connected to the first and second calculation units 46, 46' of the control arrangement 44 for providing user input to them.

[0083] The first and second calculation units 46, 46' are arranged from communicating with each other via a wireless connection or via a wired connection. In the latter case, the wired connection may include separable electrical contact elements e.g., comprised in a plug and socket connection. Accordingly, the wired connection exists while the second vacuum cleaner 6 is connected to the first vacuum cleaner 4. Alternatively, e.g. in case of a wireless connection, or additionally, at least one sensor, not shown, may be provided for determining whether the second vacuum cleaner 6 is connected to the first vacuum cleaner 4.

[0084] The control arrangement 44 is configured for determining whether the second vacuum cleaner 6 is in the connected state i.e., connected to the first vacuum cleaner 4 or in the released state i.e., removed from the first vacuum cleaner 4. For instance, the control arrangement 44 may so determine utilising the above mentioned at least one sensor or by determining whether the wired connection is established or interrupted.

[0085] According to some embodiments, one of the first and second calculation units 46, 46' may be configured to control the power of both of the first and second motor/fan units 16, 24 when the second vacuum cleaner 6 is connected to the first vacuum cleaner 4 i.e., in the connected state. According to these embodiments, the controlling calculation unit 46, 46' may transmit relevant control data to the other motor-fan unit 16, 24 via the other of the calculation units 46, 46'.

[0086] In the released state, the second calculation unit 46 is configured to control the power of the second motor/fan unit 24.

[0087] The control arrangement 44 is configured to perform a method 100 according to any one of aspects and/or embodiments discussed herein, see e.g. below with reference to **Fig. 5**.

[0088] The control arrangement 44 is configured to:

- run both the first and second motor-fan units 16, 24 while the second vacuum cleaner 6 is in the connected state with the first vacuum cleaner 4,
- detect a removal of the second vacuum cleaner 6

from the first vacuum cleaner 4, and in response thereto

- perform at least one action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6.

[0089] Thus, the vacuum cleaner assembly 2 provides for coordinated operation of the first and second vacuum cleaners 4, 6 of the vacuum cleaner assembly 2 in connection with removal of the second vacuum cleaner 6 from the first vacuum cleaner 4.

[0090] According to embodiments, the at least one action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6 may comprise to:

- stop the first motor-fan unit 16.

[0091] Thus, operation of the first and second motor-fan units 16, 24 may be coordinated in connection with removal of the second vacuum cleaner 6 from the first vacuum cleaner 4 while the vacuum cleaner assembly 2 is operated with both the first and second motor-fan units 16, 24 running. Accordingly, in these embodiments, after the at least one action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6 has been performed, the first vacuum cleaner 4 has been switched off while the second motor-fan unit 24 may continue to run for the user to continue using the second vacuum cleaner 6 or the second motor-fan unit 24 may be stopped for the user to control the operation of the second vacuum cleaner 6 separate from the first vacuum cleaner 4.

[0092] According to embodiments, the at least one action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6 may comprise to: either

- continue to run the second motor-fan unit 24, or
- stop the second motor-fan unit 24.

[0093] Thus, operation of the second motor-fan unit 24 may be coordinated in connection with removal of the second vacuum cleaner 6 from the first vacuum cleaner 4 while the vacuum cleaner assembly 2 is operated with both the first and second motor-fan units 16, 24 running. Accordingly, in these embodiments, after the at least one action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6 has been performed, the second motor-fan unit 24 may either continue to run for the user to continue using the second vacuum cleaner 6 or the second motor-fan unit 24 may be stopped for the user to control the operation of the second vacuum cleaner 6 separate from the first vacuum cleaner 4.

[0094] According to embodiments, the first vacuum cleaner 4 may comprise at least one electrically powered auxiliary device 50, and the at least one action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6 may comprise to:

- deactivate the at least one electrically powered auxiliary device 50.

[0095] Thus, operation of the at least one electrically powered auxiliary device 50 may be coordinated with the removal of the second vacuum cleaner 6 from the first vacuum cleaner 4.

5 **[0096]** For instance, the at least one electrically powered auxiliary device 50 may comprise one or more of a light source, such as an LED, or a brush roll arranged at the floor nozzle 10 of the first vacuum cleaner 4.

[0097] According to embodiments, the control arrangement 50 may be further configured to:

- detect a reconnecting of the second vacuum cleaner 6 to the first vacuum cleaner 4 with the second motor-fan unit 24 running, and in response thereto:
- 15 - perform at least one further action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6.

[0098] Thus, coordinated operation of the first and second vacuum cleaners 4, 6 of the vacuum cleaner assembly 2 in connection with reconnecting of the second vacuum cleaner 6 to the first vacuum cleaner 4 may be provided.

25 **[0099]** According to embodiments, the at least one further action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6 may comprise to:

- run the first motor-fan unit 16 and the second motor-fan unit 24 at a predetermined setting.

30 **[0100]** Thus, operation of the first and second motor-fan units 16, 24 may be coordinated upon connecting the second vacuum cleaner 6 to the first vacuum cleaner 4. Accordingly, erratic behaviour of the vacuum cleaner assembly 2 upon reconnecting of the second vacuum cleaner 6 to the first vacuum cleaner 4 may be avoided.

[0101] According to embodiments, the predetermined setting may be one of a current setting of the first vacuum cleaner 4, a current setting of the second vacuum cleaner 6, or a preprogrammed setting. In this manner, a user of the vacuum cleaner assembly 2 will experience a consistent behaviour of the vacuum cleaner assembly 2 upon reconnection of the second vacuum cleaner 6 to the first vacuum cleaner 4.

45 **[0102]** For instance, each of the first and second vacuum cleaners 4, 6 may have two or more settings relating to a power output of the respective first and second motor-fan units 16, 24, such as a low, a medium, and a high power setting. Moreover, the first and second vacuum cleaners 4, 6 each may be switched off. Being switched off may also count as a current setting.

[0103] The predetermined setting and/or the preprogrammed setting may include a stopping of the first and second motor-fan units 16, 24.

55 **[0104]** The preprogrammed setting may be a setting that has been programmed by a manufacturer of the vacuum cleaner assembly 2 or it may be a setting that a user of the vacuum cleaner assembly 2 may select in a programming

operation that only has to be performed once and may be repeated only if the user wants to change the preprogrammed setting.

[0105] Accordingly, the predetermined setting provides for the user of the vacuum cleaner assembly 2 to experience a consistent behaviour of the vacuum cleaner assembly 2 upon reconnection of the second vacuum cleaner 6 to the first vacuum cleaner 4. Also, inconsistent individual current settings of the first and second vacuum cleaners 4, 6 upon reconnection of the second vacuum cleaner 6 to the first vacuum cleaner 4 thus, will be handled by the control arrangement 44.

[0106] According to embodiments, the at least one further action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6 may comprises to:

- activate the at least one electrically powered auxiliary device 50.

[0107] In this manner, for instance, at least one electrically powered auxiliary device 50, such as a brush roll and/or a light source may be activated upon reconnection of the second vacuum cleaner 6 to the first vacuum cleaner 4 without a user having to take specific action.

[0108] Fig. 5 illustrates a method 100 for controlling a vacuum cleaner assembly according to embodiments.

[0109] The vacuum cleaner assembly may be a vacuum cleaner assembly 2 as discussed above with reference to Figs. 1 - 4. Accordingly, in the following reference is also made to Figs. 1 - 4.

[0110] For instance, one or more steps of the method 100 may be performed by the control arrangement 44 discussed above. Accordingly, advantages of configurations of the control arrangement 44 may correspond to advantages of corresponding steps of the method 100.

[0111] Accordingly, again, the vacuum cleaner assembly 2 comprises a first vacuum cleaner 4 and a second vacuum cleaner 6 removably connected to the first vacuum cleaner 4. The first vacuum cleaner 4 comprises a first motor-fan unit 16 arranged in a first airflow path 20, 22 extending from a floor nozzle 10 to a first air outlet 18 and the second vacuum cleaner 6 comprises a second motor-fan unit 24 arranged in a second airflow path 20, 28. When the second vacuum cleaner 6 is connected to the first vacuum cleaner 4, at least a portion of the second airflow path 20, 28 forms a portion of the first airflow path 20, 22.

[0112] The method 100 comprises steps of:

- running 102 both the first and second motor-fan units 16, 24 while the second vacuum cleaner 6 is in a connected state with the first vacuum cleaner 4,
- detecting 104 a removal of the second vacuum cleaner 6 from the first vacuum cleaner 4, and in response thereto
- performing 106 at least one action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6.

[0113] Thus, the method 100 provides for coordinated operation of the first and second vacuum cleaners 4, 6 of the vacuum cleaner assembly 2 in connection with removal of the second vacuum cleaner 6 from the first vacuum cleaner 4.

[0114] According to embodiments, the step of performing 106 at least one action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6 may comprise a step of:

- stopping 108 the first motor-fan unit 16.

[0115] In this manner, the method may provide for operation of the first and second motor-fan units 16, 24 to be coordinated in connection with removal of the second vacuum cleaner 6 from the first vacuum cleaner 4 while the vacuum cleaner assembly 2 is operated with both the first and second motor-fan units 16, 24 running. Accordingly, in these embodiments, after the step of stopping 108 the first motor-fan unit 16, the first vacuum cleaner has been switched off. The second motor-fan unit 24 may continue to run for the user to continue using the second vacuum cleaner 6 or the second motor-fan unit 24 may be stopped for the user to control the operation of the second vacuum cleaner 6 separate from the first vacuum cleaner 4.

[0116] According to embodiments, the step of performing 106 at least one action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6 may comprise a step of: either

- continue running 110 the second motor-fan unit 24, or
- stopping 112 the second motor-fan unit 24.

[0117] In this manner, the method 100 may provide for operation of the second motor-fan unit 24 to be coordinated in connection with removal of the second vacuum cleaner 6 from the first vacuum cleaner 4 while the vacuum cleaner assembly 2 is operated with both the first and second motor-fan units 16, 24 running. Accordingly, in these embodiments, in connection with the step of stopping 108 the first motor-fan unit 16, the step of continue running 110 the second motor-fan unit 24 may provide for the user to continue using the second vacuum cleaner 6 or the step of stopping 112 the second motor-fan unit 24 may provide for the user to control the operation of the second vacuum cleaner 6 separate from the first vacuum cleaner 4.

[0118] One of the steps of continue running 110 the second motor-fan unit 24 or stopping 112 the second motor-fan unit 24 may be preprogrammed in the control arrangement 44 of the vacuum cleaner assembly 2.

[0119] According to embodiments, wherein the first vacuum cleaner 4 comprises at least one electrically powered auxiliary device 50, the step of performing 106 at least one action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6 may comprises a

step of:

- deactivating 114 the at least one electrically powered auxiliary device 50.

[0120] In this manner, operation of the at least one electrically powered auxiliary device 50 may be coordinated with the removal of the second vacuum cleaner 6 from the first vacuum cleaner 4.

[0121] According to embodiments, the method 100 further may comprise steps of:

- detecting 116 a reconnecting of the second vacuum cleaner 6 to the first vacuum cleaner 4 with the second motor-fan unit running 24, and in response thereto
- performing 118 at least one further action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6.

[0122] In this manner, coordinated operation of the first and second vacuum cleaners 4, 6 of the vacuum cleaner assembly 2 in connection with reconnecting of the second vacuum cleaner 6 to the first vacuum cleaner 4 may be provided.

[0123] According to embodiments, the step of performing 118 at least one further action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6 may comprise a step of:

- running 120 the first motor-fan unit 16 and the second motor-fan unit 24 at a predetermined setting.

[0124] In this manner, the step of running 120 the first motor-fan unit 16 and the second motor-fan unit 24 at a predetermined setting may provide for operation of the first and second motor-fan units 16, 24 to be coordinated upon connecting the second vacuum cleaner 6 to the first vacuum cleaner 4. Accordingly, erratic behaviour of the vacuum cleaner assembly 2 upon reconnecting of the second vacuum cleaner 6 to the first vacuum cleaner 4 may be avoided.

[0125] According to embodiments, the step of performing 118 at least one further action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6 may comprise a step of:

- stopping 121 the first motor-fan unit 16 and the second motor-fan unit 24..

[0126] In this manner, the step of stopping 121 the first motor-fan unit 16 and the second motor-fan unit 24 may provide for operation of the first and second motor-fan units 16, 24 to be coordinated upon connecting the second vacuum cleaner 6 to the first vacuum cleaner 4. Accordingly, erratic behaviour of the vacuum cleaner assembly 2 upon reconnecting of the second vacuum cleaner 6 to the first vacuum cleaner 4 may be avoided.

[0127] According to embodiments, the predetermined setting may be one of a current setting of the first vacuum cleaner 4, a current setting of the second vacuum cleaner 6, or a preprogrammed setting.

[0128] In this manner, the predetermined setting provides for the user of the vacuum cleaner assembly 2 to experience a consistent behaviour of the vacuum cleaner assembly 2 upon reconnection of the second vacuum cleaner 6 to the first vacuum cleaner 4. Also, inconsistent individual current settings of the first and second vacuum cleaners 4, 6 upon reconnection of the second vacuum cleaner 6 to the first vacuum cleaner 4 thus, will be handled.

[0129] According to embodiments, the step of performing 118 at least one further action related to the first vacuum cleaner 4 and/or the second vacuum cleaner 6 may comprise a step of:

- activating 122 the at least one electrically powered auxiliary device 50.

[0130] In this manner, for instance, at least one electrically powered auxiliary device 50, such as a brush roll and/or a light source may be activated upon reconnection of the second vacuum cleaner 6 to the first vacuum cleaner 4 without a user having to take specific action.

[0131] It is to be understood that the foregoing is illustrative of various example embodiments and that the invention is defined only by the appended claims. A person skilled in the art will realize that the example embodiments may be modified, and that different features of the example embodiments may be combined to create embodiments other than those described herein, without departing from the scope of the invention, as defined by the appended claims.

Claims

1. A method (100) for controlling a vacuum cleaner assembly (2) comprising a first vacuum cleaner (4) and a second vacuum cleaner (6) removably connected to the first vacuum cleaner (4), wherein

the first vacuum cleaner (4) comprises a first motor-fan unit (16) arranged in a first airflow path (20, 22) extending from a floor nozzle (10) to a first air outlet (18) and the second vacuum cleaner (6) comprises a second motor-fan unit (24) arranged in a second airflow path (20, 28), wherein

when the second vacuum cleaner (6) is connected to the first vacuum cleaner (4), at least a portion of the second airflow path (20, 28) forms a portion of the first airflow path (20, 22), and wherein

the method (100) comprises steps of:

- running (102) both the first and second motor-fan units (16, 24) while the second vacuum cleaner (6) is in a connected state with the first vacuum cleaner (4) and,
 - detecting (104) a removal of the second vacuum cleaner (6) from the first vacuum cleaner (4), and in response thereto
 - performing (106) at least one action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6).
2. The method (100) according to claim 1, wherein the step of performing (106) at least one action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6) comprises a step of:
- stopping (108) the first motor-fan unit (16).
3. The method (100) according to claim 1 or 2, wherein the step of performing (106) at least one action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6) comprises a step of: either
- continue running (110) the second motor-fan unit (24), or
 - stopping (112) the second motor-fan unit (24).
4. The method (100) according to any one of the preceding claims, wherein the first vacuum cleaner (4) comprises at least one electrically powered auxiliary device (50), and wherein the step of performing (106) at least one action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6) comprises a step of:
- deactivating (114) the at least one electrically powered auxiliary device (50).
5. The method (100) according to any one of the preceding claims, wherein the method (100) further comprises steps of:
- detecting (116) a reconnecting of the second vacuum cleaner (6) to the first vacuum cleaner (4) with the second motor-fan unit (24) running, and in response thereto
 - performing (118) at least one further action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6).
6. The method (100) according to claim 5, wherein the step of performing (118) at least one further action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6) comprises a step of:
- running (120) the first motor-fan unit (16) and the second motor-fan unit (24) at a predeter-

mined setting.

7. The method (100) according to claim 6, wherein the predetermined setting is one of a current setting of the first vacuum cleaner (4), a current setting of the second vacuum cleaner (6), or a preprogrammed setting.
8. The method (100) according to claim 6, wherein the step of performing (118) at least one further action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6) comprises a step of:
- stopping (121) the first motor-fan unit (16) and the second motor-fan unit (24).
9. The method (100) according to claim 4 and any one of claims 5 - 8, wherein the step of performing (118) at least one further action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6) comprises a step of:
- activating (122) the at least one electrically powered auxiliary device (50).
10. A vacuum cleaner assembly (2) comprising a first vacuum cleaner (4), a second vacuum cleaner (6) removably connected to the first vacuum cleaner (4), and a control arrangement (44) for controlling a first motor-fan unit (16) and a second motor-fan unit (24), wherein
- the first vacuum cleaner (4) comprises a floor nozzle (10), a first airflow path (20, 22) extending from the floor nozzle (10) to a first air outlet (18), and the first motor-fan unit (16) arranged in the first airflow path (20, 22), wherein the second vacuum cleaner (6) comprises a second airflow path (20, 28), a separation unit (26) for separating dust and debris arranged in the second airflow path (20, 28), and the second motor-fan unit (24) arranged in the second airflow path (20, 28), wherein when the second vacuum cleaner (6) is connected to the first vacuum cleaner (4), at least a portion of the second airflow path (20, 28) forms a portion of the first airflow path (20, 22), and wherein the control arrangement (44) is configured to:
- run both the first and second motor-fan units (16, 24) while the second vacuum cleaner (6) is in a connected state with the first vacuum cleaner (4),
 - detect a removal of the second vacuum cleaner (6) from the first vacuum cleaner (4), and in response thereto
 - perform at least one action related to the

- first vacuum cleaner (4) and/or the second vacuum cleaner (6).
11. The vacuum cleaner assembly (2) according to claim 10, wherein the at least one action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6) comprises to:
- stop the first motor-fan unit (16).
12. The vacuum cleaner assembly (2) according to claim 10 or 11, wherein the at least one action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6) comprises to: either
- continue to run the second motor-fan unit (24), or
 - stop the second motor-fan unit (24).
13. The vacuum cleaner assembly (2) according to any one of claims -10 - 12, wherein the first vacuum cleaner (4) comprises at least one electrically powered auxiliary device (50), and wherein the at least one action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6) comprises to:
- deactivate the at least one electrically powered auxiliary device (50).
14. The vacuum cleaner assembly (2) according to any one of claims -10 - 13, wherein the control arrangement (44) is further configured to:
- detect a reconnecting of the second vacuum cleaner (6) to the first vacuum cleaner (4) with the second motor-fan unit (24) running, and in response thereto
 - perform at least one further action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6).
15. The vacuum cleaner assembly (2) according to claim 14, wherein the at least one further action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6) comprises to:
- run the first motor-fan unit (16) and the second motor-fan unit (24) at a predetermined setting.
16. The vacuum cleaner assembly (2) according to claim 14, wherein the at least one further action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6) comprises to:
- stop the first motor-fan unit (16) and the second motor-fan unit (24).
17. The vacuum cleaner assembly (2) according to claim 15, wherein the predetermined setting is one of a current setting of the first vacuum cleaner (4), a current setting of the second vacuum cleaner (6), or a preprogrammed setting.
18. The vacuum cleaner assembly (2) according to claim 13 and any one of claims 14 - 17, wherein the at least one further action related to the first vacuum cleaner (4) and/or the second vacuum cleaner (6) comprises to:
- activate the at least one electrically powered auxiliary device (50).
19. The vacuum cleaner assembly (2) according to any one of claims -10 - 18, wherein the second airflow path (20, 28) extends to a second air outlet (32) in the second vacuum cleaner (6).
20. The vacuum cleaner assembly (2) according to any one of claims -10 - 19, wherein the first vacuum cleaner (4) is a stick-type vacuum cleaner and the second vacuum cleaner (6) is a handheld vacuum cleaner.

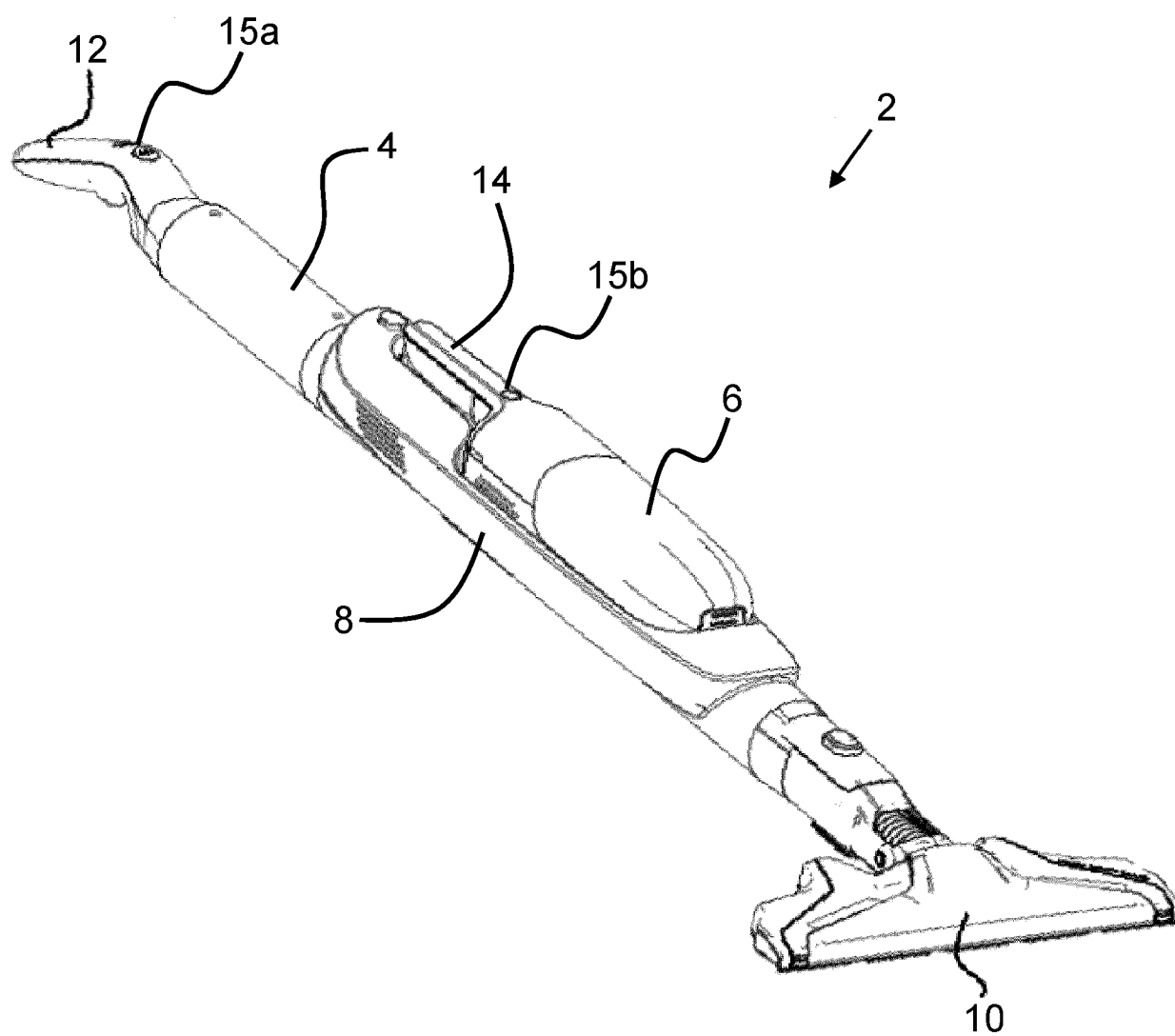


Fig. 1

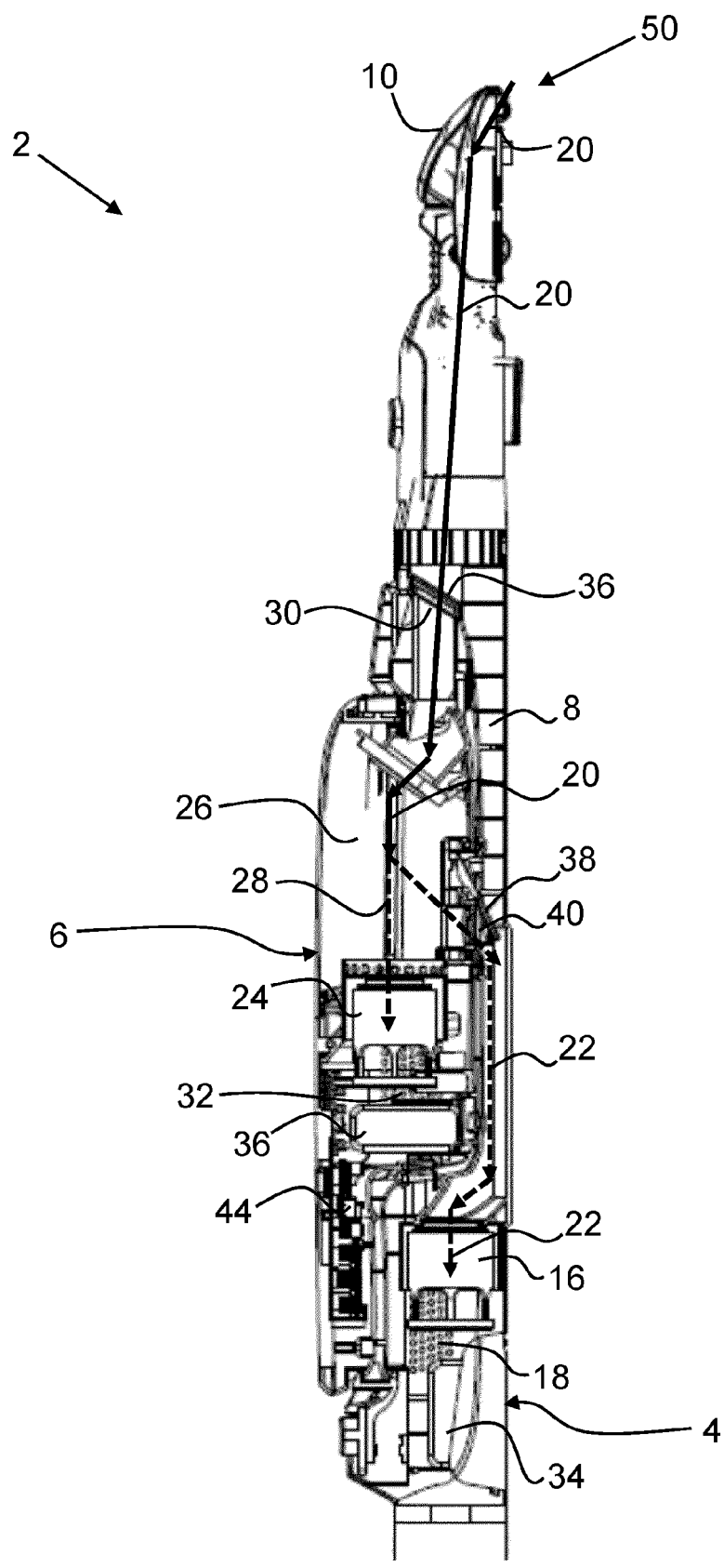


Fig. 2

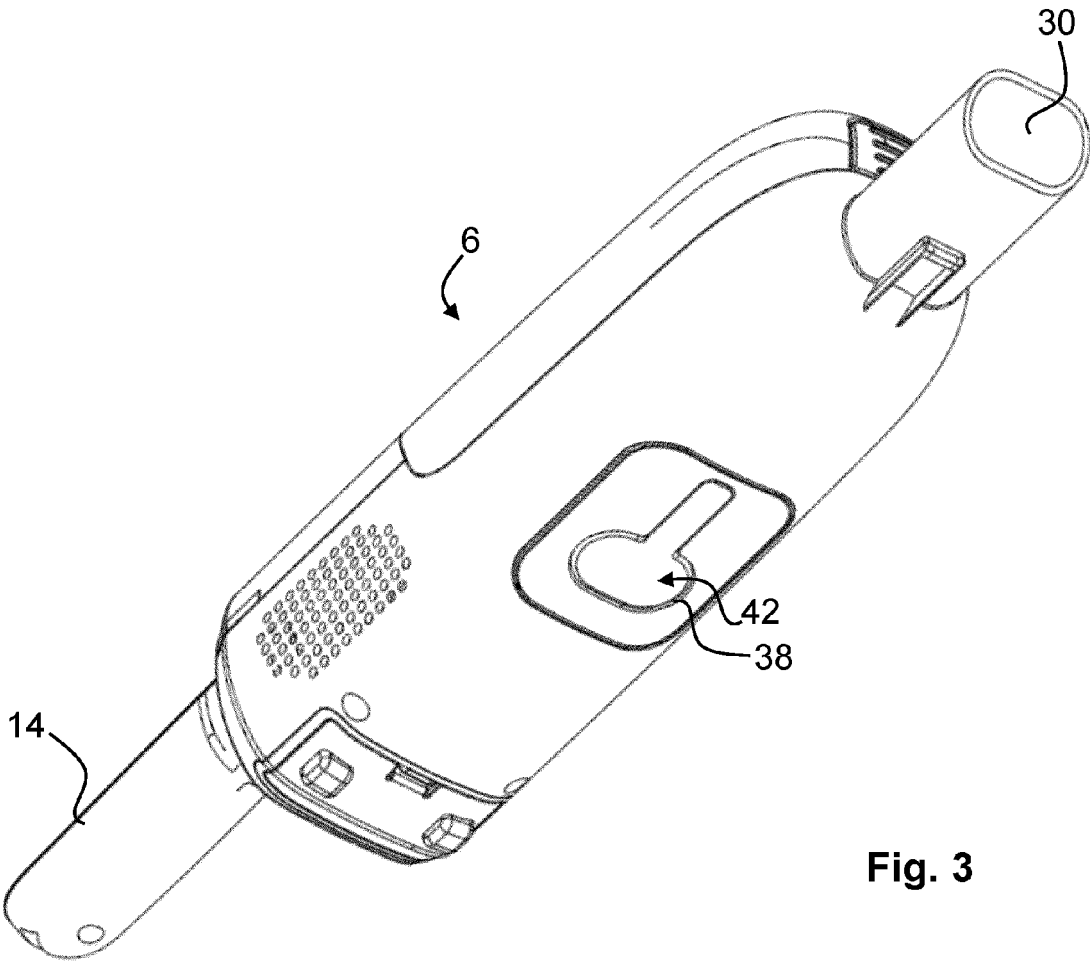


Fig. 3

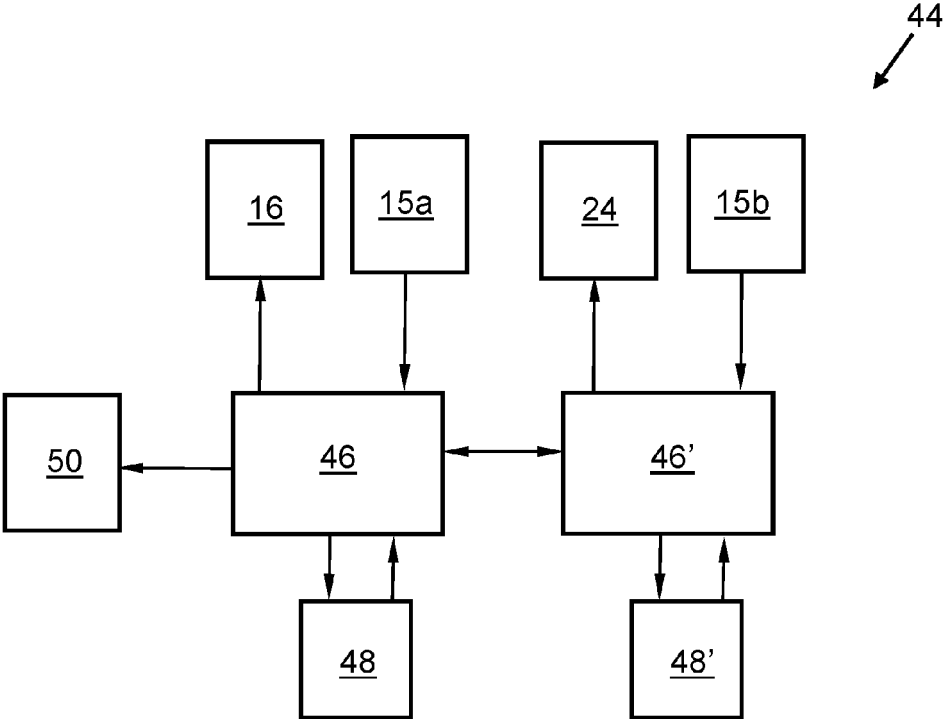
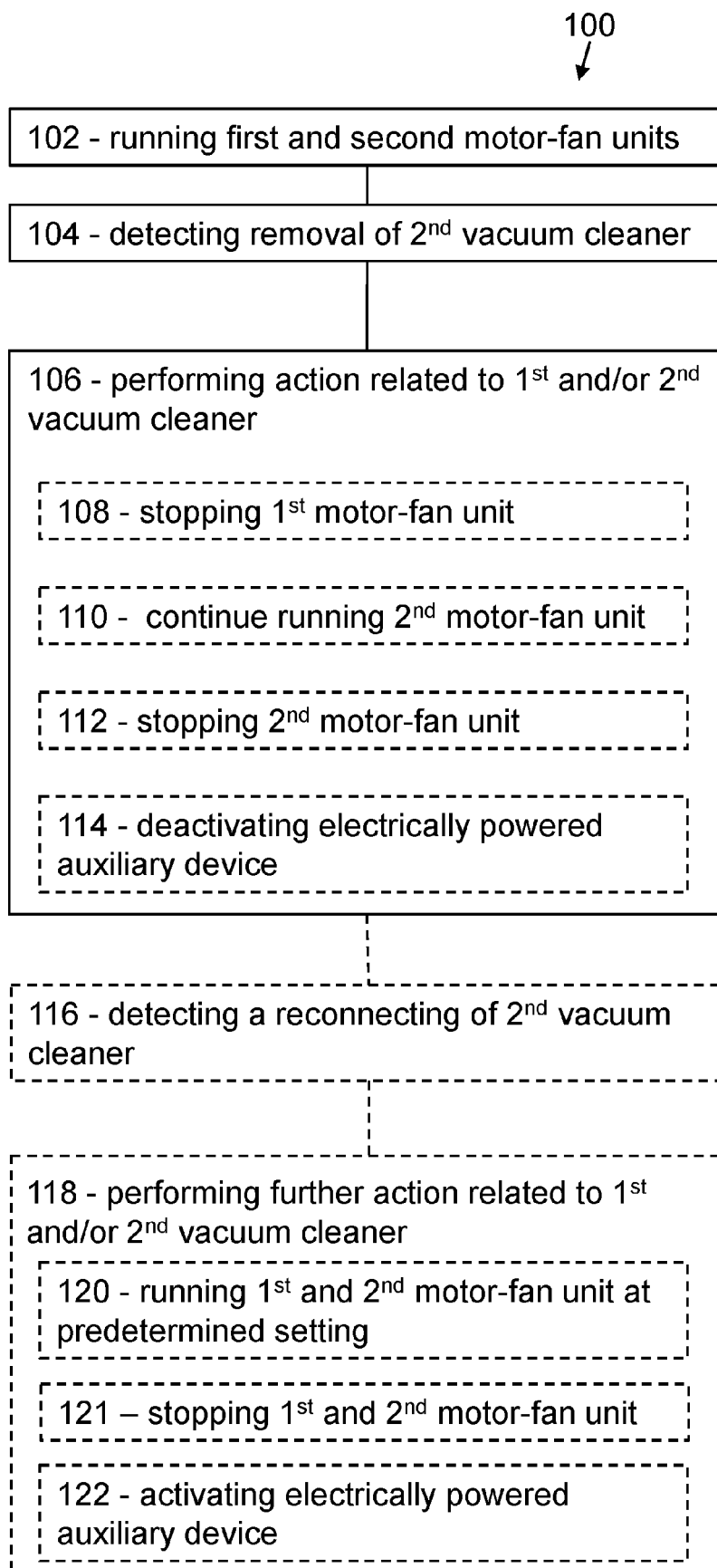


Fig. 4

**Fig. 5**



EUROPEAN SEARCH REPORT

Application Number

EP 24 17 9208

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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
Munich		6 November 2024	Rippel, Andreas
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