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(54) **CLEANING HEAD AND CLEANING APPARATUS**

(57) The present invention relates to a cleaning head and a cleaning apparatus. The cleaning head has a first operation mode and a second operation mode, and comprises: a housing in which a suction chamber and a ventilation port communicated with the suction chamber are provided; an air valve mechanism which is configured to be switchable between an open position for opening the ventilation port and a closed position for closing the ventilation port; a cleaning mechanism which comprises a cleaning member configured to be switchable between an extended position in which the cleaning member protrudes out of a bottom of the housing and a retracted position in which the cleaning member retracts back into the housing; and an actuation mechanism which makes correlative movement with the air valve mechanism and the cleaning mechanism respectively; the first operation mode and the second operation mode can be switched by actuating the actuation mechanism; in the first operation mode, the air valve mechanism is in the open position, and the cleaning member is in the retracted position; and in the second operation mode, the air valve mechanism is in the closed position, and the cleaning member is in the extended position. The cleaning head can conveniently meet the cleaning requirements of different surfaces to be cleaned.

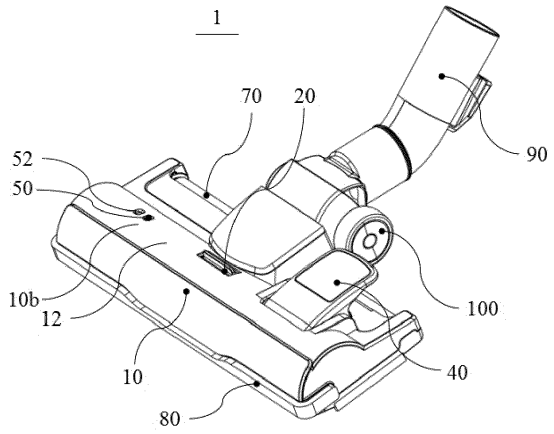

Fig.1

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Description

FIELD OF THE INVENTION

[0001] The present disclosure relates to the technical field of cleaning apparatus, and specifically to a cleaning head and a cleaning apparatus.

BACKGROUND OF THE INVENTION

[0002] Just as the name suggests, a cleaning apparatus is a mechanical device designed for cleaning. It can effectively reduce labor cost while also improving cleaning efficiency and cleaning effect. It is widely used in hotels, healthcare, warehousing and logistics, homes and other places.

[0003] There are various types of cleaning apparatuses, such as vacuum cleaners, dust and water aspirators, and floor scrubbers. The vacuum cleaner is one of the most common cleaning apparatuses. The vacuum cleaner generally includes components such as a cleaning head, an electric motor, a filter screen, and a dust collection bin. The working principle of the vacuum cleaner is to use the electric motor to drive vanes to rotate at a high speed, thereby generating a negative pressure inside the cleaning head, so that dirt such as dust, lint and hair on the surface to be cleaned is sucked into the cleaning head with the air under the action of negative pressure, and then the dirt is filtered by the filter screen before being collected into the dust collection bin.

[0004] Due to the different materials of the surfaces to be cleaned, the suction force requirements of vacuum cleaners are also different. For example, the surface of a carpet is relatively rough, and if the suction force of the vacuum cleaner is too large, the vacuum cleaner cannot move smoothly; the surface of a floor is relatively smooth, and if the suction force of the vacuum cleaner is too small, the vacuum cleaner cannot effectively suck the dust. In order to meet the cleaning requirements of different surfaces to be cleaned, a vacuum cleaner floor brush (or referred to as "cleaning head") with a bleed valve has been developed in the prior art such as in Chinese Invention Patent No. CN102755137B. The cleaning head includes a base located at the front and provided with a brushroll chamber, and a brushroll housed in the brushroll chamber. The base is also provided therein with a bleed valve which is able to be connected to or disconnected from the brushroll chamber, and the bleed valve can reduce the suction force by releasing a small amount of air when the suction force is too large, so as to ensure smooth movement of the cleaning head. However, the cleaning head can adjust the cleaning mode only by turning on or off the bleed valve, and the adjustment mode is relatively single, which still cannot meet the cleaning requirements of different surfaces to be cleaned.

[0005] Accordingly, there is a need for a new technical solution in the art to solve the above problem.

SUMMARY OF THE INVENTION

[0006] In order to solve the technical problem that the cleaning heads in the prior art cannot meet the cleaning requirements of different surfaces to be cleaned, the present invention provides a cleaning head. The cleaning head has a first operation mode and a second operation mode, and comprises: a housing in which a suction chamber and a ventilation port communicated with the suction chamber are provided; an air valve mechanism configured to be switchable between an open position for opening the ventilation port and a closed position for closing the ventilation port; a cleaning mechanism comprising a cleaning member configured to be switchable between an extended position in which the cleaning member protrudes out of a bottom of the housing and a retracted position in which the cleaning member retracts back into the housing; and an actuation mechanism configured to make a correlative movement with the air valve mechanism and the cleaning mechanism respectively; wherein the actuation mechanism is configured to be actuated to render the first operation mode and the second operation mode to be switched; in the first operation mode, the air valve mechanism is in the open position, and the cleaning member is in the retracted position; and in the second operation mode, the air valve mechanism is in the closed position, and the cleaning member is in the extended position.

[0007] In a preferred technical solution of the cleaning head, the air valve mechanism is configured to be manually controllable to switch between the open position and the closed position independently of the actuation mechanism.

[0008] In a preferred technical solution of the cleaning head, the cleaning head further includes a third operation mode in which the air valve mechanism is in the open position and the cleaning member is in the extended position; or the air valve mechanism is in the closed position and the cleaning member is in the retracted position; wherein the air valve mechanism is manually controlled to switch from the first operation mode or the second operation mode to the third operation mode, and the actuation mechanism is actuated to switch from the third operation mode to the first operation mode or the second operation mode.

[0009] In a preferred technical solution of the cleaning head, the housing comprises: a base in which the suction chamber and the ventilation port are provided; and a top cover which encloses an accommodation chamber together with the base, the accommodation chamber being spaced apart from the suction chamber, and the air valve mechanism, the cleaning mechanism and the actuation mechanism being arranged in the accommodation chamber.

[0010] In a preferred technical solution of the cleaning head, the suction chamber has a dirty air inlet located at the bottom of the housing, and the ventilation port is positioned above the dirty air inlet.

[0011] In a preferred technical solution of the cleaning head, the actuation mechanism comprises a rotating shaft which is rotatably installed on the housing and which is connected to the air valve mechanism and the cleaning mechanism respectively; and an actuating member which is connected to the rotating shaft and extends to outside of the housing, so that an external force is able to be applied on the actuating member to drive the rotating shaft to rotate.

[0012] In a preferred technical solution of the cleaning head, the actuation mechanism further comprises a pressing plate, wherein the pressing plate is fixedly connected to the rotating shaft, and the rotating shaft is connected to the cleaning mechanism through the pressing plate.

[0013] In a preferred technical solution of the cleaning head, the rotating shaft, the pressing plate and the actuating member are integrally formed.

[0014] In a preferred technical solution of the cleaning head, an actuation reset member is also provided between the actuating member and the housing.

[0015] In a preferred technical solution of the cleaning head, the actuation mechanism further comprises a locking assembly which is connected to the housing and the actuating member respectively, and which is configured to be capable of constraining the rotating shaft at different rotational positions forming predetermined angles in a circumferential direction.

[0016] In a preferred technical solution of the cleaning head, the rotational positions include a first rotational position and a second rotational position; when the rotating shaft is constrained at the first rotational position and the cleaning head is in the first operation mode, the air valve mechanism is in the open position, and the cleaning member is in the retracted position; and when the rotating shaft is constrained at the second rotational position and the cleaning head is in the second operation mode, the air valve mechanism is in the closed position, and the cleaning member is in the extended position.

[0017] In a preferred technical solution of the cleaning head, an annular guide groove is formed on the actuating member, and the locking assembly comprises: a locking member which is pivotally connected to the housing and is formed with a locking rod thereon that can slide in a single direction within the annular guide groove; and an elastic member, one end of which is fixed on the housing, and the other end of which is fixed on the locking member.

[0018] In a preferred technical solution of the cleaning head, the annular guide groove has a first locking position and a second locking position spaced apart from each other; when the locking rod is positioned at the first locking position, the rotating shaft is constrained at the first rotational position; and when the locking rod is positioned at the second locking position, the rotating shaft is constrained at the second rotational position.

[0019] In a preferred technical solution of the cleaning head, the cleaning mechanism further comprises: a lifting plate which has a fixed end pivotally connected to the housing and a movable end opposite to the fixed end, the cleaning member being fixed on the movable end, and the lifting plate being configured to be capable of abutting against the actuation mechanism to urge the cleaning member to move to the extended position, and to be capable of disengaging from the actuation mechanism to allow the cleaning member to return to the retracted position; and a cleaning reset member which is arranged between the lifting plate and the housing, so that when the lifting plate disengages from the actuation mechanism, the cleaning member is urged to return to the retracted position.

[0020] In a preferred technical solution of the cleaning head, the cleaning member is detachably fixed on the movable end.

[0021] In a preferred technical solution of the cleaning head, the cleaning member is a brush strip or a bristle strip.

[0022] In a preferred technical solution of the cleaning head, the cleaning head further comprises an indicator mechanism comprising: an indicator board connected to the rotating shaft, the indicator board being provided thereon with indicator signs corresponding to a working status of the cleaning mechanism; and an indicator hole provided on the top of the housing to display the indicator signs through the indicator hole.

[0023] In a preferred technical solution of the cleaning head, the air valve mechanism comprises: a valve body for opening or closing the ventilation port; and a connecting member which is connected to the valve body and the rotating shaft respectively, so that the valve body is controlled via the actuation mechanism to open or close the ventilation port.

[0024] In a preferred technical solution of the cleaning head, the connecting member comprises: a snap-fit portion which clamps the rotating shaft so that the snap-fit portion can rotate together with the rotating shaft; and a clamping portion which is connected to the snap-fit portion and clamps the valve body, so that in the first operation mode or the second operation mode, when the rotating shaft rotates in the forward or reverse direction, the clamping portion drives the valve body to move in a direction toward the ventilation port to close the ventilation port, or move in a direction away from the ventilation port to open the ventilation port.

[0025] In a preferred technical solution of the cleaning head, the connecting member further comprises a toggle portion which is formed on a side of the snap-fit portion that is away from the clamping portion and extends to outside of the housing, and which is configured in such a way that when a predetermined external force is applied to the toggle portion, the snap-fit portion can rotate relative to the rotating shaft, thus urging the cleaning head to enter the third operation mode.

[0026] In a preferred technical solution of the cleaning head, a flexible sealing gasket is provided on a side of the valve body that faces the ventilation port.

[0027] In a preferred technical solution of the cleaning

head, the flexible sealing gasket is made of material of EVA or EPDM.

[0028] In a preferred technical solution of the cleaning head, the cleaning head further comprises a floating rolling wheel mechanism which is configured to be switchable between a first floating position close to the housing and a second floating position away from the housing.

[0029] In a preferred technical solution of the cleaning head, when the cleaning member is in the retracted position, the cleaning mechanism disengages from the floating rolling wheel mechanism, and the floating rolling wheel mechanism is in the first floating position; and when the cleaning member is in the extended position, the cleaning mechanism abuts against the floating rolling wheel mechanism, and the floating rolling wheel mechanism is in the second floating position.

[0030] In a preferred technical solution of the cleaning head, the floating rolling wheel mechanism comprises: an installation bracket which is movably fixed on the housing and which is configured to be capable of abutting against the cleaning mechanism to urge the floating rolling wheel mechanism to enter the first floating position, and to be capable of disengaging from the cleaning mechanism to allow the floating rolling wheel mechanism to return to the second floating position; a rolling wheel which is rotatably fixed on the installation bracket; and a bracket reset member which is connected to the installation bracket and the housing respectively, and which is configured in such a way that when the installation bracket disengages from the cleaning mechanism, the floating rolling wheel mechanism is urged to return to the second floating position.

[0031] In a preferred technical solution of the cleaning head, the cleaning head further comprises a roller mechanism which is arranged at a rear edge of the bottom of the housing and which is spaced apart from the cleaning member adjacent to a front edge of the bottom of the housing; and the roller mechanism is fixed on the housing in a detachable and floating way.

[0032] In a preferred technical solution of the cleaning head, the roller mechanism comprises: a roller body; an installation groove and/or installation protrusions arranged at two ends of the roller body respectively, each of the installation groove and/or installation protrusion matching with a corresponding limiting protrusion and/or limiting groove on the housing; wherein the installation groove allows the limiting protrusion inserted into the installation groove to move by a predetermined height in a height direction of the housing, and the limiting groove allows the installation protrusion inserted into the limiting groove to move by the predetermined height in the height direction.

[0033] In order to solve the technical problem that the cleaning heads in the prior art cannot meet the cleaning requirements of different surfaces to be cleaned, the present disclosure provides a cleaning apparatus which comprises the cleaning head as described in any one of the above items.

[0034] It can be understood by those skilled in the art that the cleaning head of the present invention has a first operation mode and a second operation mode to meet the cleaning requirements of different surfaces to be cleaned. The cleaning head includes a housing, an air valve mechanism, a cleaning mechanism, and an actuation mechanism. A suction chamber and a ventilation port that can be communicated with the suction chamber are provided in the housing. The air valve mechanism can switch between an open position for opening the ventilation port and a closed position for closing the ventilation port to adjust the magnitude of suction force of the cleaning head. The cleaning mechanism includes a cleaning member. The cleaning member has an extended position in which the cleaning member protrudes out of the bottom of the housing and a retracted position in which the cleaning member retracts back into the housing, so as to determine whether the cleaning member participates in cleaning. The actuation mechanism makes a correlative movement with the air valve mechanism and the cleaning mechanism respectively, so that both the air valve mechanism and the cleaning mechanism can be controlled simultaneously through the same actuation mechanism. Further, the first operation mode and the second operation mode can be switched by actuating the actuation mechanism. In the first operation mode, the air valve mechanism is in the open position, and the cleaning member is in the retracted position. In this way, the suction force is small between the cleaning head and the surface to be cleaned, and the cleaning member does not participate in cleaning, thus meeting the cleaning requirements of the surface to be cleaned of materials such as carpets, and ensuring that the cleaning head can move smoothly. In the second operation mode, the air valve mechanism is in the closed position, and the cleaning member is in the extended position. In this way, the suction force is large between the cleaning head and the surface to be cleaned, and the cleaning member participates in cleaning, thus meeting the cleaning requirements of the surface to be cleaned of materials such as floors and tiles, and ensuring the cleaning effect of the cleaning head.

[0035] Preferably, the air valve mechanism is configured to be manually controlled to switch between the open position and the closed position independently of the actuation mechanism. This not only allows for more flexible adjustment of the opening and closing of the air valve mechanism, but also can conveniently meet corresponding test requirements (such as Dust Pick Up Test, etc.).

[0036] Preferably, the arrangement of the third operation mode enables the cleaning head of the present invention to better meet the cleaning requirements of different surfaces to be cleaned.

[0037] Preferably, the arrangement of the base and the top cover can simplify the structure of the housing and facilitate processing and manufacturing.

[0038] Preferably, the ventilation port is positioned

above the dirty air inlet, so that the suction force in the suction chamber can be quickly adjusted by opening and closing the ventilation port.

[0039] Preferably, the arrangement of the rotating shaft and the actuating member not only can conveniently realize correlative movement of the actuation mechanism, the air valve mechanism and the cleaning mechanism, but also allows users to conveniently drive the rotating shaft to rotate by applying an external force to the actuating member.

[0040] Preferably, the arrangement of the pressing plate allows the rotating shaft to conveniently match with the cleaning mechanism during rotation, thereby controlling the movement of the cleaning mechanism.

[0041] Preferably, the rotating shaft, the pressing plate and the actuating member are integrally formed, which can simplify the machining process and reduce the machining cost.

[0042] Preferably, the arrangement of the actuation reset member enables the actuating member to be conveniently reset, ensuring smooth correlative movement between various components.

[0043] Preferably, the arrangement of the locking assembly can constrain the rotating shaft at different rotational positions, thereby ensuring the stability of the positions of various components in different operation modes (including the first operation mode, the second operation mode, and the third operation mode).

[0044] Preferably, the arrangement of the first rotational position and the second rotational position can conveniently position the air valve mechanism and the cleaning member at the corresponding positions in the first operation mode and the second operation mode.

[0045] Preferably, the locking rod is configured to be capable of sliding in a single direction within the annular guide groove, thus simplifying a movement trajectory of the locking member and ensuring smooth correlative movement (or associated action) of various components. The arrangement of the elastic member can apply an appropriate elastic action on the locking member to ensure smooth sliding of the locking rod within the annular guide groove.

[0046] Preferably, the arrangement of the first locking position and the second locking position enables the rotating shaft to be stably positioned at the corresponding first rotational position and second rotational position.

[0047] Preferably, the arrangement of the lifting plate can play a role in connecting the cleaning member, and the lifting plate can also conveniently cooperate with the actuation mechanism and make a correlative movement with the actuation mechanism. In addition, the arrangement of the cleaning reset member can conveniently urge the cleaning member to reset to the retracted position when the lifting plate disengages from the actuation mechanism.

[0048] Preferably, the cleaning member is configured to be detachably fixed on the movable end, so that the cleaning member can be conveniently disassembled and assembled, cleaned and replaced.

[0049] Preferably, by selecting different types of cleaning member (brush strip or bristle strip), the cleaning requirements of different surfaces to be cleaned can be further met.

[0050] Preferably, the arrangement of the indicator mechanism enables users to conveniently and clearly know the current operation mode of the cleaning head of the present disclosure, making it convenient for users to choose and adjust according to actual needs.

[0051] Preferably, the valve body can conveniently open or close the ventilation port. In addition, the connecting member connected to the valve body is configured to be connected to the rotating shaft, so that the actuation mechanism can conveniently control the valve body to open or close the ventilation port.

[0052] Preferably, the snap-fit portion is configured to clamp the rotating shaft. On one hand, the snap-fit portion can rotate together with the rotating shaft, thereby achieving correlative movement (or associated action) control of the air valve mechanism and the actuation mechanism; on the other hand, the snap-fit portion can rotate relative to the rotating shaft to adjust the valve body more flexibly. The arrangement of the clamping portion can conveniently connect the connecting member with the valve body.

[0053] Preferably, the arrangement of the toggle portion allows users to conveniently apply an external force to the connecting member to manually control the opening and closing of the valve body.

[0054] Preferably, the arrangement of the flexible sealing gasket can enhance the sealing performance between the valve body and the ventilation port.

[0055] Preferably, by selecting flexible sealing gaskets made of different materials (such as EVA or EPDM), product types can be enriched to meet differentiated needs of users.

[0056] Preferably, the arrangement of the floating rolling wheel mechanism enables the cleaning head of the present disclosure to always move smoothly on different surfaces to be cleaned.

[0057] Preferably, when the cleaning member is in the retracted position, the floating rolling wheel mechanism is in the first floating position adjacent to the housing, so that the housing is adjacent to the surface to be cleaned to appropriately increase the suction force; and when the cleaning member is in the extended position, the floating rolling wheel mechanism is in the second floating position away from the housing, so that a sufficient space is formed between the housing and the surface to be cleaned, which can reduce the suction force appropriately and also ensure smooth movement of the cleaning head.

[0058] Preferably, the arrangement of the installation bracket, the rolling wheel and the bracket reset member make the entire floating rolling wheel mechanism have a simple structure and easy to manufacture.

[0059] Preferably, the arrangement of the roller mech-

anism can further reduce the resistance to the movement of the cleaning head, ensuring its smooth movement. In addition, the roller mechanism is configured to be fixed on the housing in a detachable and floating way, so that it can be conveniently disassembled and assembled, cleaned and replaced, and can also cooperate with the floating rolling wheel mechanism conveniently to ensure the stability of the movement of the cleaning head.

[0060] Preferably, the installation groove and/or installation protrusion arranged at two ends of the roller body can conveniently match with the corresponding limiting protrusion and/or limiting groove arranged on the housing to facilitate the disassembly and assembly of the roller body. In addition, the installation groove allows the limiting protrusion inserted into the installation groove to move by a predetermined height in the height direction of the housing, and the limiting groove allows the installation protrusion inserted into the limiting groove to move by the predetermined height in the height direction of the housing, so that the roller body can descend conveniently under its own gravity and ascend conveniently under the support action of the surface to be cleaned.

[0061] It can be understood by those skilled in the art that the cleaning apparatus of the present disclosure includes the cleaning head as described in any one of the above items, and it can conveniently operate in different operation modes to meet the cleaning requirements of different surfaces to be cleaned.

[0062] Solution 1. A cleaning head (1), wherein the cleaning head (1) has a first operation mode and a second operation mode, and comprises: a housing (10) in which a suction chamber (112) and a ventilation port (113) communicated with the suction chamber (112) are provided; an air valve mechanism (20) configured to be switchable between an open position for opening the ventilation port (113) and a closed position for closing the ventilation port (113); a cleaning mechanism (30) comprising a cleaning member (32) configured to be switchable between an extended position in which the cleaning member (32) protrudes out of a bottom (10a) of the housing (10) and a retracted position in which the cleaning member (32) retracts back into the housing (10); and an actuation mechanism (40) configured to make a correlative movement with the air valve mechanism (20) and the cleaning mechanism (30) respectively; wherein the actuation mechanism (40) is configured to be actuated to render the first operation mode and the second operation mode to be switched; wherein in the first operation mode the air valve mechanism (20) is in the open position, and the cleaning member (32) is in the retracted position; and in the second operation mode the air valve mechanism (20) is in the closed position, and the cleaning member (32) is in the extended position.

[0063] Solution 2. The cleaning head (1) according to Solution 1, wherein the air valve mechanism (20) is configured to be manually controllable to switch between the open position and the closed position independently of the actuation mechanism (40).

[0064] Solution 3. The cleaning head (1) according to Solution 2, wherein the cleaning head (1) further includes a third operation mode in which the air valve mechanism (20) is in the open position and the cleaning member (32) is in the extended position; or the air valve mechanism (20) is in the closed position and the cleaning member (32) is in the retracted position; and wherein the first operation mode or the second operation mode is switched to the third operation mode by manually controlling the air valve mechanism (20), and the third operation mode is switched to the first operation mode or the second operation mode by actuating the actuation mechanism (40).

[0065] Solution 4. The cleaning head (1) according to any one of Solutions 1 to 3, wherein the housing (10) comprises: a base (11) in which the suction chamber (112) and the ventilation port (113) are provided; and a top cover (12) which encloses an accommodation chamber (13) together with the base (11), the accommodation chamber (13) being spaced apart from the suction chamber (112), and the air valve mechanism (20), the cleaning mechanism (30) and the actuation mechanism (40) being arranged in the accommodation chamber (13).

[0066] Solution 5. The cleaning head (1) according to Solution 4, wherein the suction chamber (112) has a dirty air inlet (1121) located at the bottom (10a) of the housing (10), and the ventilation port (113) is positioned above the dirty air inlet (1121).

[0067] Solution 6. The cleaning head (1) according to any one of Solutions 1 to 5, wherein the actuation mechanism (40) comprises a rotating shaft (41) which is rotatably installed on the housing (10) and which is connected to the air valve mechanism (20) and the cleaning mechanism (30) respectively; and an actuating member (43) which is connected to the rotating shaft (41) and extends to the outside of the housing (10), so that tan external force is able to be applied on the actuating member (43) to drive the rotating shaft (41) to rotate.

[0068] Solution 7. The cleaning head (1) according to Solution 6, wherein the actuation mechanism (40) further comprises a pressing plate (42); the pressing plate (42) is fixedly connected to the rotating shaft (41), and the rotating shaft (41) is connected to the cleaning mechanism (30) through the pressing plate (42).

[0069] Solution 8. The cleaning head (1) according to Solution 7, wherein the rotating shaft (41), the pressing plate (42) and the actuating member (43) are integrally formed.

[0070] Solution 9. The cleaning head (1) according to Solution 6, wherein an actuation reset member (44) is also provided between the actuating member (43) and the housing (10).

[0071] Solution 10. The cleaning head (1) according to any one of Solutions 6 to 9, wherein the actuation mechanism (40) further comprises a locking assembly (45) which is connected to the housing (10) and the actuating member (43) respectively, and which is configured to be capable of constraining the rotating shaft (41) at different rotational positions forming predetermined

angles in a circumferential direction.

[0072] Solution 11. The cleaning head (1) according to Solution 10, wherein the rotational positions include a first rotational position and a second rotational position; when the rotating shaft (41) is constrained at the first rotational position and the cleaning head (1) is in the first operation mode, the air valve mechanism (20) is in the open position, and the cleaning member (32) is in the retracted position; and when the rotating shaft (41) is constrained at the second rotational position and the cleaning head (1) is in the second operation mode, the air valve mechanism (20) is in the closed position, and the cleaning member (32) is in the extended position.

[0073] Solution 12. The cleaning head (1) according to Solution 11, wherein an annular guide groove (4321) is formed on the actuating member (43), and the locking assembly (45) comprises: a locking member (451) which is pivotally connected to the housing (10) and is formed thereon with a locking rod (4513) that can slide in a single direction within the annular guide groove (4321); and an elastic member (452), one end of which is fixed on the housing (10), and the other end of which is fixed on the locking member (451).

[0074] Solution 13. The cleaning head (1) according to Solution 12, wherein the annular guide groove (4321) has a first locking position (43211) and a second locking position (43212) spaced apart from each other; when the locking rod (4513) is positioned at the first locking position (43211), the rotating shaft (41) is constrained at the first rotational position; and when the locking rod (4513) is positioned at the second locking position (43212), the rotating shaft (41) is constrained at the second rotational position.

[0075] Solution 14. The cleaning head (1) according to any one of Solutions 6 to 13, wherein the cleaning mechanism (30) further comprises: a lifting plate (31) which has a fixed end (31a) pivotally connected to the housing (10) and a movable end (31b) opposite to the fixed end (31a), the cleaning member (32) being fixed on the movable end (31b), and the lifting plate (31) being configured to be capable of abutting against the actuation mechanism (40) to urge the cleaning member (32) to move to the extended position, and to be capable of disengaging from the actuation mechanism (40) to allow the cleaning member (32) to return to the retracted position; and a cleaning reset member which is arranged between the lifting plate (31) and the housing (10), so that when the lifting plate (31) disengages from the actuation mechanism (40), the cleaning member (32) is urged to return to the retracted position.

[0076] Solution 15. The cleaning head (1) according to Solution 14, wherein the cleaning member (32) is detachably fixed on the movable end.

[0077] Solution 16. The cleaning head (1) according to Solution 15, wherein the cleaning member (32) is a brush strip or a bristle strip.

[0078] Solution 17. The cleaning head (1) according to any one of Solutions 6 to 13, wherein the cleaning head (1) further comprises an indicator mechanism (50) which comprises: an indicator board (51) connected to the rotating shaft (41), the indicator board (51) being provided thereon with an indicator signs (511) corresponding to a working status of the cleaning mechanism (30); and an indicator hole (52), the indicator hole (52) being provided on a top (10b) of the housing (10) to display the indicator signs (511) through the indicator hole (52).

[0079] Solution 18. The cleaning head (1) according to any one of Solutions 6 to 13, wherein the air valve mechanism (20) comprises: a valve body (21) for opening or closing the ventilation port (113); and a connecting member (22) which is connected to the valve body (21) and the rotating shaft (41) respectively, so that the valve body (21) can be controlled via the actuation mechanism (40) to open or close the ventilation port (113).

[0080] Solution 19. The cleaning head (1) according to Solution 18, wherein the connecting member (22) comprises: a snap-fit portion (221) which clamps the rotating shaft (41) so that the snap-fit portion (221) can rotate together with the rotating shaft (41); and a clamping portion (222) which is connected to the snap-fit portion (221) and clamps the valve body (21), so that in the first operation mode or the second operation mode, when the rotating shaft (41) rotates in the forward or reverse direction, the clamping portion (222) drives the valve body (21) to move in a direction toward the ventilation port (113) to close the ventilation port (113), or move in a direction away from the ventilation port (113) to open the ventilation port (113).

[0081] Solution 20. The cleaning head (1) according to Solution 19, wherein the connecting member (22) further comprises a toggle portion (223) which is formed on a side of the snap-fit portion (221) that is away from the clamping portion (222) and extends to the outside of the housing (10), and which is configured in such a way that when a predetermined external force is applied to the toggle portion (223), the snap-fit portion (221) can rotate relative to the rotating shaft (41), thus urging the cleaning head (1) to enter the third operation mode.

[0082] Solution 21. The cleaning head (1) according to any one of Solutions 18 to 20, wherein a flexible sealing gasket is provided on a side of the valve body (21) that faces the ventilation port (113).

[0083] Solution 22. The cleaning head (1) according to Solution 21, wherein the material of the flexible sealing gasket is EVA or EPDM.

[0084] Solution 23. The cleaning head (1) according to any one of Solutions 1 to 22, wherein the cleaning head (1) further comprises a floating rolling wheel mechanism (60) which is configured to be switchable between a first floating position close to the housing (10) and a second floating position away from the housing (10).

[0085] Solution 24. The cleaning head (1) according to Solution 23, wherein when the cleaning member (32) is in the retracted position, the cleaning mechanism (30) disengages from the floating rolling wheel mechanism (60), and the floating rolling wheel mechanism (60) is in

the first floating position; and when the cleaning member (32) is in the extended position, the cleaning mechanism (30) abuts against the floating rolling wheel mechanism (60), and the floating rolling wheel mechanism (60) is in the second floating position.

[0086] Solution 25. The cleaning head (1) according to Solution 24, wherein the floating rolling wheel mechanism (60) comprises: an installation bracket (61) which is movably fixed on the housing (10) and which is configured to be capable of abutting against the cleaning mechanism (30) to urge the floating rolling wheel mechanism (60) to enter the first floating position, and to be capable of disengaging from the cleaning mechanism (30) to allow the floating rolling wheel mechanism (60) to return to the second floating position; a rolling wheel (62) which is rotatably fixed on the installation bracket (61); and a bracket reset member (63) which is connected to the installation bracket (61) and the housing (10) respectively, and which is configured in such a way that when the installation bracket (61) disengages from the cleaning mechanism (30), the floating rolling wheel mechanism (60) is urged to return to the second floating position.

[0087] Solution 26. The cleaning head (1) according to any one of Solutions 1 to 25, wherein the cleaning head (1) further includes a roller mechanism (70), which is arranged at a rear edge of the bottom (10a) of the housing (10) and which is spaced apart from the cleaning member (32) adjacent to a front edge of the bottom (10a) of the housing (10); and the roller mechanism (70) is fixed on the housing (10) in a detachable and floating way.

[0088] Solution 27. The cleaning head (1) according to Solution 26, wherein the roller mechanism (70) comprises: a roller body (71); an installation groove (73) and/or installation protrusion (72) arranged at two ends of the roller body (71) respectively, each of the installation groove (73) and/or the installation protrusion (72) matching with a corresponding limiting protrusion (75) and/or limiting groove on the housing (10); and wherein the installation groove (73) allows the limiting protrusion (75) inserted into the installation groove (73) to move by a predetermined height in a height direction of the housing (10), and the limiting groove allows the installation protrusion (72) inserted into the limiting groove to move by the predetermined height in the height direction.

[0089] Solution 28. A cleaning apparatus, including the cleaning head (1) according to any one of Solutions 1-27.

BRIEF DESCRIPTION OF THE DRAWINGS

[0090] Preferred embodiments of the present invention will be described below in connection with the accompanying drawings, in which:

FIG. 1 is a schematic view of a front structure of an embodiment of the cleaning head of the present invention in the first operation mode;

FIG. 2 is a schematic view of a rear structure of the embodiment of the cleaning head of the present invention in the first operation mode;

FIG. 3 is a schematic view of a front structure of an embodiment of the cleaning head of the present invention in the second operation mode;

FIG. 4 is a schematic view of a rear structure of the embodiment of the cleaning head of the present invention in the second operation mode;

FIG. 5 is a schematic view of the structure of an embodiment of the cleaning head of the present invention with a top cover and an adapter removed;

FIG. 6 is a schematic sectional view of the embodiment of the cleaning head of the present invention with the top cover and the adapter removed, taken along section line A-A shown in FIG. 5;

FIG. 7 is a schematic view of the structure of an embodiment of the base of the cleaning head of the present invention;

FIG. 8 is a schematic view of the structure of an embodiment of the air valve mechanism, the cleaning mechanism and the actuation mechanism of the cleaning head of the present invention;

FIG. 9 is a schematic view of the structure of an embodiment of the air valve mechanism of the cleaning head of the present invention;

FIG. 10 is a schematic view of the structure of an embodiment of the cleaning mechanism of the cleaning head of the present invention;

FIG. 11 is a schematic view of the structure of an embodiment of the rotating shaft, the pressing plate and the actuating member in the actuation mechanism of the cleaning head of the present invention;

FIG. 12 is a locally enlarged view of the annular guide groove in the actuation mechanism of the cleaning head of the present invention;

FIG. 13 is a schematic view of the structure of an embodiment of the locking member in the actuation mechanism of the cleaning head of the present invention;

FIG. 14 is a schematic view of the structure of an embodiment of the floating rolling wheel mechanism of the cleaning head of the present invention; and

FIG. 15 is a schematic view of the structure of an embodiment of the roller body of the cleaning head

of the present invention

List of reference signs:

[0091] 1: cleaning head; 10: housing; 10a: bottom; 10b: top; 11: base; 111: installation hole; 112: suction chamber; 1121: dirty air inlet; 1122: dirty air outlet; 113: ventilation port; 114: stop wall; 1141: front stop wall; 1142: side stop wall; 11421: valve body shaft hole; 115: rotating shaft support seat; 116: lifting plate support seat; 117: locking member support seat; 118: installation bracket fixing portion; 1181: fixed column perforation; 1182: rib perforation; 1182a: first rib perforation; 1182b: second rib perforation; 119: electrostatic strip; 12: top cover; 13: accommodation chamber; 14: opening; 20: air valve mechanism; 21: valve body; 211: main body of valve body; 212: valve body rotating shaft; 22: connecting member; 221: snap-fit portion; 222: clamping portion; 223: toggle portion; 30: cleaning mechanism; 31: lifting plate; 31a: fixed end; 31b: movable end; 311: first lifting plate; 3111: avoidance hole; 3112: through hole; 312: second lifting plate; 313: connecting plate; 32: cleaning member; 40: actuation mechanism; 41: rotating shaft; 411: rotating shaft body; 412: indicator board guide bracket; 42: pressing plate; 421: first pressing plate; 422: second pressing plate; 43: actuating member; 431: actuating member body; 432: lateral wall; 4321: annular guide groove; 43211: first locking position; 43212: second locking position; 43213: inclined guide wall; 44: actuation reset member; 45: locking assembly; 451: locking member; 4511: locking member body: 4512: locking member rotating shaft; 4513: locking rod; 4514: connecting protrusion; 4515: reinforcing protrusion; 452: elastic member; 50: indicator mechanism; 51: indicator board; 511: indicator sign; 52: indicator hole; 53: indicator board reset member; 60: floating rolling wheel mechanism; 61: installation bracket; 611: installation bracket body; 612: fixed column; 613: rib; 613a: first rib; 613b: second rib; 62: rolling wheel; 63: bracket reset member; 64: tightening screw; 70: roller mechanism; 71: roller body; 72: installation protrusion; 73: installation groove; 74: snap-fit groove; 75: limiting protrusion; 76: unlocking button; 80: anti-collision wool strip; 90: adapter; 100: wheel.

DETAILED DESCRIPTION OF THE EMBODIMENT(S) OF THE INVENTION

[0092] Preferred embodiments of the present invention will be described below with reference to the accompanying drawings. It should be understood by those skilled in the art that these embodiments are only used to explain the technical principle of the present invention, and are not intended to limit the scope of protection of the present invention.

[0093] It should be noted that in the description of the present disclosure, terms indicating directional or positional relationships, such as "upper", "lower", "left", "right", "inner", "outer" and the like, are based on the directional or positional relationships shown in the accompanying drawings. They are only used for ease of description, and do not indicate or imply that the device or element must have a specific orientation, or be constructed or operated in a specific orientation; therefore, they should not be considered as limitations to the present disclosure. In addition, terms "first" and "second" are only used for descriptive purpose, and should not be understood as indicating or implying relative importance.

[0094] In addition, it should also be noted that in the description of the present disclosure, unless otherwise clearly specified and defined, terms "install", "arrange" and "connect" should be understood in a broad sense; for example, the connection may be a fixed connection, or may also be a detachable connection, or an integral connection; it may be a direct connection, or an indirect connection implemented through an intermediate medium, or internal communication between two elements. For those skilled in the art, the specific meaning of the above terms in the present disclosure can be interpreted according to specific situations.

[0095] In order to solve the technical problem that the cleaning heads in the prior art cannot meet the cleaning requirements of different surfaces to be cleaned, the present invention provides a cleaning head 1. The cleaning head 1 has a first operation mode and a second operation mode, and comprises: a housing 10 in which a suction chamber 112 and a ventilation port 113 communicated with the suction chamber 112 are provided; an air valve mechanism 20 configured to be switchable between an open position for opening the ventilation port 113 and a closed position for closing the ventilation port 113; a cleaning mechanism 30 comprising a cleaning member 32 configured to be switchable between an extended position in which the cleaning member 32 protrudes out of a bottom 10a of the housing 10 and a retracted position in which the cleaning member 32 retracts back into the housing 10; and an actuation mechanism 40, which makes a correlative movement with the air valve mechanism 20 and the cleaning mechanism 30 respectively; the first operation mode and the second operation mode can be switched by actuating the actuation mechanism 40; in the first operation mode, the air valve mechanism 20 is in the open position, and the cleaning member 32 is in the retracted position; and in the second operation mode, the air valve mechanism 20 is in the closed position, and the cleaning member 32 is in the extended position.

[0096] In this document, unless explicitly stated to the contrary, the technical term "surfaces to be cleaned" refers to surfaces of objects that need to be cleaned, including but not limited to the ground covered with carpets, floors, tiles, etc., as well as surfaces of objects such as sofas and beds.

[0097] FIG. 1 is a schematic view of a front structure of an embodiment of the cleaning head of the present invention in the first operation mode; FIG. 2 is a schematic view of a rear structure of the embodiment of the cleaning

head of the present invention in the first operation mode; FIG. 3 is a schematic view of a front structure of an embodiment of the cleaning head of the present invention in the second operation mode; and FIG. 4 is a schematic view of a rear structure of the embodiment of the cleaning head of the present invention in the second operation mode. As shown in FIGS. 1-4, in one or more embodiments, the cleaning head 1 of the present invention includes components such as the housing 10, the air valve mechanism 20, the cleaning mechanism 30, and the actuation mechanism 40. The air valve mechanism 20, the cleaning mechanism 30 and the actuation mechanism 40 are all arranged on the housing 10. The cleaning head 1 has the first operation mode (see FIGS. 1 and 2) and the second operation mode (see FIGS. 3 and 4) to meet the cleaning requirements of different surfaces to be cleaned. The actuation mechanism 40 can be actuated to control the air valve mechanism 20 and the cleaning mechanism 30 in association, thereby achieving the switching of the cleaning head 1 between the first operation mode and the second operation mode.

[0098] FIG. 5 is a schematic view of the structure of an embodiment of the cleaning head of the present invention with a top cover and an adapter removed; FIG. 6 is a schematic sectional view of the embodiment of the cleaning head of the present invention with the top cover and the adapter removed, taken along section line A-A shown in FIG. 5; and FIG. 7 is a schematic view of the structure of an embodiment of a base of the cleaning head of the present invention. As shown in FIGS. 1-7, the housing 10 has a base 11 and a top cover 12 that match each other. Four installation holes 111 spaced apart from each other in the length direction of the base 11 (based on the orientation shown in FIG. 7, i.e., the left-and-right direction) are arranged on the base 11. Each of the installation holes 111 can match with a suitable fastener (such as a screw) to fix the base 11 and the top cover 12 together. Alternatively, the number of the installation holes 111 can also be set to another suitable number that is larger than four or smaller than four, such as three, five. Alternatively, the base 11 and the top cover 12 can also be fixed together by snap-fit or other suitable means. The base 11 and the top cover 12 together enclose an accommodation chamber 13 (see FIG. 5). The air valve mechanism 20, the cleaning mechanism 30 and the actuation mechanism 40 are arranged in the accommodation chamber 13. At the front of the base 11, the base 11 and the top cover 12 also enclose an opening 14 together, which extends in the length direction of the base 11. Through the opening 14, the cleaning member 32 of the cleaning mechanism 30 can protrude out of the housing 10 (see FIG. 4) and retract back into the housing 10 (see FIG. 2).

[0099] With continued reference to FIGS. 2, 4 and 7, in one or more embodiments, the base 11 has a roughly rectangular shape. A hollow suction chamber 112 is formed on the base 11 (see FIG. 6). The suction chamber 112 has a dirty air inlet 1121 and a dirty air outlet 1122 opposite to each other. The dirty air inlet 1121 is located at the bottom of the base 11 (i.e., the bottom 10a of the housing 10), and the dirty air outlet 1122 is located at the rear of the base 11. A negative pressure effect can be formed inside the suction chamber 112 (that is, the air pressure inside the suction chamber 112 is lower than the atmospheric pressure of the external environment), so that when the dirty air inlet 1121 is adjacent to the surface to be cleaned, dirt such as dust, lint debris and hair on the surface to be cleaned will enter the suction chamber 112 from the dirty air inlet 1121. In addition, one wheel 100 is provided on each of left and right sides of the dirty air outlet 1122 at the rear of the base 11 to allow the base 11 and other components of the cleaning head 1 arranged on the base 11 (including the top cover 12, the air valve mechanism 20, the cleaning mechanism 30, and the actuation mechanism 40, etc.) to move back and forth on the surface to be cleaned. An adapter 90 is also installed on the dirty air outlet 1122 for connection with other components of the cleaning device, such as a suction machine. The adapter 90 and the dirty air outlet 1122 can be connected by snap-fit for quick disassembly and assembly. In addition, the adapter 90 can rotate relative to the housing 10 by a certain angle around an axis of the adapter 90, so as to flexibly adjust a movement angle of the base 11 and other components of the cleaning head 1 arranged on the base 11 on the surface to be cleaned, thereby making it more convenient to clean the surface to be cleaned.

[0100] With continued reference to FIGS. 6 and 7, the ventilation port 113 is arranged on the base 11 for adjusting the magnitude of suction force inside the suction chamber 112. The ventilation port 113 is located between the dirty air inlet 1121 and the dirty air outlet 1122. In one or more embodiments, the ventilation port 113 is positioned above the dirty air inlet 1121. In this way, the air from the external environment can enter the suction chamber 112 through the ventilation port 113 (from the top 10b of the housing 10) without interfering with the air flow entering the suction chamber 112 through the dirty air inlet 1121 (from the bottom 10a of the housing 10), thereby quickly adjusting the suction force inside the suction chamber 112. In one or more embodiments, the ventilation port 113 has a rectangular shape that extends roughly in the length direction of the housing 10. Alternatively, the ventilation port 113 can also be configured into square or circular shape or other suitable shapes.

[0101] With continued reference to FIG. 7, a stop wall 114 is also arranged on the base 11 to define the position of the air valve mechanism 20. The stop wall 114 includes a front stop wall 1141 and side stop walls 1142 located on left and right sides of the front stop wall 1141 respectively. The front stop wall 1141 and the side stop walls 1142 together enclose a U-shaped structure with an opening facing the ventilation port 113. Specifically, the front stop wall 1141 extends roughly in the length direction of the base 11. The front stop wall 1141 is arranged opposite to an arc-shaped wall (not marked in the figure) on which the ventilation port 113 is provided. The side

stop walls 1142 extend perpendicularly from both ends of the front stop wall 1141 toward a rear side of the base 11. A valve body shaft hole 11421 is also provided on each of the side stop walls 1142 to receive a valve body rotating shaft 212 of a valve body 21 of the air valve mechanism 20, so that the valve body 21 can rotate stably relative to the base 11.

[0102] With continued reference to FIG. 7, two rotating shaft support seats 115 spaced apart from each other in the length direction of the base 11 are also arranged on the base 11. The rotating shaft support seats 115 are located at the front of the base 11. Each of the rotating shaft support seats 115 is provided with a corresponding shaft hole (not marked in the figure). Each shaft hole can receive a corresponding end of a rotating shaft 41 of the actuation mechanism 40, so that the rotating shaft 41 is rotatably fixed on the base 11.

[0103] With continued reference to FIG. 7, four lifting plate support seats 116 spaced apart from each other in the length direction of the base 11 are also arranged on the base 11. The lifting plate support seats 116 are located at the rear of the base 11. Each of the lifting plate support seats 116 is also provided with a corresponding shaft hole (not marked in the figure). Each shaft hole can receive a corresponding rotating shaft of a lifting plate 31 of the cleaning mechanism 30, so that the lifting plate 31 is rotatably fixed on the base 11.

[0104] With continued reference to FIG. 7, two locking member support seats 117 located between the rotating shaft support seats 115 and the lifting plate support seats 116 are also arranged on the right side of the base 11 (based on the orientation shown in FIG. 7). The two locking member support seats 117 are spaced spart from each other in the length direction of the base 11. Each of the locking member support seats 117 is also provided with a shaft hole (not marked in the figure). Each shaft hole can receive a corresponding locking member rotating shaft 4512 of a locking member 451 of the actuation mechanism 40, so that the locking member 451 is rotatably fixed on the base 11.

[0105] With continued reference to FIGS. 2 and 4, in one or more embodiments, an electrostatic strip 119 extending roughly in the length direction of the base 11 is also arranged at the bottom of the base 11. The electrostatic strip 119 can be fixed to the base 11 by snap-fit for facilitating disassembly and assembly, cleaning, and replacement. Based on the orientation shown in FIGS. 2 and 4, the electrostatic strip 119 is arranged behind the dirty air inlet 1121. The arrangement of the electrostatic strip 119 not only provides a sealing effect, generating a strong suction force inside the suction chamber 112, but also effectively adsorbs fine dirt on the surface to be cleaned, thus improving the cleaning effect.

[0106] FIG. 8 is a schematic view of the structure of an embodiment of the air valve mechanism, the cleaning mechanism and the actuation mechanism of the cleaning head of the present invention, and FIG. 9 is a schematic view of the structure of an embodiment of the air valve mechanism of the cleaning head of the present invention. As shown in FIGS. 8 and 9, the air valve mechanism 20 is connected to the rotating shaft 41 of the actuation mechanism 40, so as to open or close the ventilation port 113 under the driving of the rotating shaft 41. Correspondingly, the air valve mechanism 20 has an open position for opening the ventilation port 113 (see FIG. 6) and a closed position for closing the ventilation port 113.

[0107] As shown in FIG. 9, in one or more embodiments, the air valve mechanism 20 includes a valve body 21 and a connecting member 22 that match with each other. The valve body 21 is configured to open or close the ventilation port 113. The connecting member 22 is connected to the valve body 21 and the rotating shaft 41 respectively, so as to drive the valve body 21 to open or close the ventilation port 113 under the driving of the rotating shaft 41.

[0108] With continued reference to FIG. 9, in one or more embodiments, the valve body 21 includes a roughly rectangular main body 211 of the valve body. The area of the main body 211 of the valve body is larger than the area of the ventilation port 113, so as to effectively close the ventilation port 113. Alternatively, the main body 211 of the valve body can also be configured into square or circular shape or other suitable shapes, as long as it can match with the ventilation port 113. In one or more embodiments, a flexible sealing gasket (not shown in the figure) is also provided on one side of the main body 211 of the valve body that faces the ventilation port 113 to ensure the sealing effect of the valve body 21. The material of the flexible sealing gasket can be, but is not limited to, EVA (a copolymer of ethylene and vinyl acetate) or EPDM (ethylene-propylene-diene-monomer rubber). A valve body rotating shaft 212 extending perpendicularly outward is provided on each of left and right sides of the main body 211 of the valve body. The valve body rotating shaft 212 is rotatably fixed in the corresponding valve body shaft holes 11421 on the side stop walls 1142 of the base 11, so that the main body 211 of the valve body is stably and rotatably fixed on the base 11.

[0109] With continued reference to FIG. 9, in one or more embodiments, the connecting member 22 includes a snap-fit portion 221 and a clamping portion 222 connected to each other. The snap-fit portion 221 is roughly C-shaped. In an assembled state, an opening of the snap-fit portion 221 faces the front of the housing 10. The snap-fit portion 221 clamps the rotating shaft 41 with a predetermined clamping force, which ensures that the snap-fit portion 221 can rotate together with the rotating shaft 41. The clamping portion 222 is located below the snap-fit portion 221 (based on the orientation shown in FIG. 9). The clamping portion 222 clamps the valve body 21, so that when the rotating shaft 41 rotates in the forward or reverse direction, the clamping portion 222 drives the valve body 21 to move in a direction toward the ventilation port 113 to close the ventilation port 113, or move in a direction away from the ventilation port 113 to open the ventilation port 113.

[0110] With continued reference to FIG. 9, in one or more embodiments, the connecting member 22 further includes a toggle portion 223. The toggle portion 223 is arranged on a side of the snap-fit portion 221 that is away from the clamping portion 222. Based on the orientation shown in FIG. 9, the toggle portion 223 is located above the snap-fit portion 221. In the assembled state, the toggle portion 223 extends roughly in the left-and-right direction of the housing 10 and protrudes out of the housing 10. By applying an external force to the toggle portion 223 to overcome the clamping force applied by the snap-fit portion 221 on the rotating shaft 41, the user can toggle the toggle portion 223 forward or backward so that the snap-fit portion 221 can rotate relative to the rotating shaft 41, thus manually adjusting the valve body 21 to open or close the ventilation port 113 according to actual needs. In this way, the air valve mechanism 20 can be manually controlled to switch between the open position and the closed position independently of the actuation mechanism 40.

[0111] FIG. 10 is a schematic view of the structure of an embodiment of the cleaning mechanism of the cleaning head of the present invention. As shown in FIGS. 8 and 10, in one or more embodiments, the cleaning mechanism 30 includes a lifting plate 31 and a cleaning member 32 connected to each other. The lifting plate 31 has a fixed end 31a and a movable end 31b opposite to each other. A pivotal connection is formed between the fixed end 31a and the base 11, and the cleaning member 32 is fixed on the movable end 31b. When the fixed end 31a rotates relative to the base 11, the cleaning member 32 can switch between the extended position in which the cleaning member 32 protrudes out of the bottom 10a of the housing 10 (see FIG. 4) and the retracted position in which the cleaning member 32 retracts back into the housing 10 (see FIG. 2). In addition, the lifting plate 31 can abut against the actuation mechanism 40 to urge the cleaning member 32 to move to the extended position, and can disengage from the actuation mechanism 40 to allow the cleaning member 32 to return to the retracted position, thereby achieving correlative movement (or associated action) between the cleaning mechanism 30 and the actuation mechanism 40.

[0112] With continued reference to FIG. 10, in one or more embodiments, the lifting plate 31 includes a first lifting plate 311 and a second lifting plate 312 spaced apart from each other, as well as a connecting plate 313 located between the first lifting plate 311 and the second lifting plate 312. Based on the orientation shown in FIG. 10, the first lifting plate 311 is located on the right side of the entire lifting plate 31, and the second lifting plate 312 is located on the left side of the entire lifting plate 31. A rotating shaft (not marked in the figure) that extends roughly in the left-and-right direction is arranged on each of the first lifting plate 311 and the second lifting plate 312. The rotating shaft can be inserted into the corresponding shaft holes on the lifting plate support seats 116 of the base 11, so that the first lifting plate 311 and the second lifting plate 312 are rotatably fixed on the base 11. In one or more embodiments, two through holes 3112 near the movable end 31b are also arranged on each of the first lifting plate 311 and the second lifting plate 312. In addition, an avoidance hole 3111 near the fixed end 3 1a is also arranged on the first lifting plate 311.

[0113] With continued reference to FIG. 10, in one or more embodiments, the cleaning member 32 is snap-fitted to the movable end 31b of the lifting plate 31. Specifically, the cleaning member 32 extends roughly in the left-and-right direction and is snap-fitted to the connecting plate 313 of the lifting plate 31. The cleaning member 32 is snap-fitted to the lifting plate 31 for facilitating disassembly and assembly, cleaning, and replacement of the cleaning member 32. The cleaning member 32 can be, but is not limited to, a brush strip or a bristle strip.

[0114] In one or more embodiments, the cleaning mechanism 30 further includes a cleaning reset member (not shown in the figure). The cleaning reset member is arranged between the lifting plate 31 and the base 11. When the lifting plate 31 rotates in a direction toward the base 11 under the action of external force, the cleaning reset member is compressed and contracted, and the cleaning member 32 protrudes out of the housing 10 and is then in the extended position; after the external force applied to the lifting plate 31 is removed, the cleaning reset member rebounds under its own elastic action, thereby driving the lifting plate 31 to rotate in a direction away from the base 11, and the cleaning member 32 returns to the retracted position. The cleaning reset member can be, but is not limited to, a coil spring.

[0115] FIG. 11 is a schematic view of the structure of an embodiment of the rotating shaft, the pressing plate and the actuating member in the actuation mechanism of the cleaning head of the present disclosure. As shown in FIGS. 8 and 11, in one or more embodiments, the actuation mechanism 40 includes components such as a rotating shaft 41, a pressing plate 42 and an actuating member 43. The rotating shaft 41 is rotatably fixed on the base 11. The rotating shaft 41 is connected to the air valve mechanism 20 and the cleaning mechanism 30 respectively, so as to achieve correlative movement (or associated action) of the actuation mechanism 40, the air valve mechanism 20 and the cleaning mechanism 30. The pressing plate 42 is fixedly connected to the rotating shaft 41 and can abut against or disengage from the cleaning mechanism 30 to apply or remove an external force to/from the cleaning mechanism 30. The actuating member 43 is connected to the rotating shaft 41 and protrudes out of the top 10b of the housing 10, allowing the user to conveniently apply an external force to the actuating member 43. For example, the actuating member 43 is of a pedal structure or another suitable structure. In one or more embodiments, the rotating shaft 41, the pressing plate 42 and the actuating member 43 are integrally formed to simplify the machining process and reduce the machining cost. Alternatively, the rotating shaft 41, the pressing plate 42 and the actuating member 43

can also be machined separately and then assembled together.

[0116] As shown in FIG. 11, in one or more embodiments, the rotating shaft 41 has a rotating shaft body 411 having a roughly columnar shape and extending roughly in the left-and-right direction. Two ends of the rotating shaft body 411 are respectively inserted into the corresponding shaft holes on the rotating shaft support seats 115 of the base 11, so that the rotating shaft 41 is rotatably fixed on the base 11. In one or more embodiments, at least one end of the rotating shaft body 411 is further sleeved with a buffer spring (not shown in the figure), so that the rotating shaft 41 rotates more smoothly relative to the base 11. In one or more embodiments, an indicator board guide bracket 412 is provided at one end of the rotating shaft body 411 that is away from the actuating member 43, so as to drive an indicator board 51 of an indicator mechanism 50 to rotate together with the rotating shaft 41, thereby clearly displaying the current operation mode of the cleaning head 1.

[0117] With continued reference to FIG. 11, in one or more embodiments, the pressing plate 42 includes a first pressing plate 421 and a second pressing plate 422 spaced apart from each other in the length direction of the rotating shaft 41. The first pressing plate 421 is arranged below the actuating member 43, and the second pressing plate 422 is arranged below the indicator board guide bracket 412. The first pressing plate 421 can match with the first lifting plate 311 and the second pressing plate 422 can match with the second lifting plate 312 to apply or remove an external force to/from the cleaning mechanism 30.

[0118] With continued reference to FIG. 11, based on the orientation shown in FIG. 11, the actuating member 43 is arranged on the left side of the rotating shaft 41. The actuating member 43 has an actuating member body 431. The actuating member body 431 is fixedly connected to the rotating shaft 41, so that when the user applies a downward external force to the actuating member body 431, the rotating shaft 41 will rotate clockwise (based on the orientation shown in FIG. 11). In one or more embodiments, an actuation reset member 44 is further provided between the actuating member body 431 and the base 11 (see FIG. 8). The actuation reset member 44 can pass through the avoidance hole 3111 on the first lifting plate 311, allowing the actuation reset member 44 to be conveniently arranged between the base 11 and the actuating member 43 of the actuation mechanism 40. The actuation reset member 44 can be, but is not limited to, a coil spring. When the user applies a downward external force to the actuating member body 431, the actuation reset member 44 is compressed and contracted. When the external force applied to the actuating member body 431 is removed, the actuation reset member 44 can rebound under its own elastic action and drive the rotating shaft 41 to rotate counterclockwise.

[0119] FIG. 12 is a locally enlarged view of an annular guide groove in the actuation mechanism of the cleaning head of the present invention. As shown in FIGS. 11 and 12, the actuating member body 431 has a lateral wall 432 away from the second lifting plate 312. The lateral wall 432 extends roughly in a vertical direction. An annular guide groove 4321 extending perpendicularly inward is formed on the lateral wall 432. The annular guide groove 4321 is roughly heart-shaped. The annular guide groove 4321 has a first locking position 43211 and a second locking position 43212 opposite to each other. The first locking position 43211 is located at a lowest point of the annular guide groove 4321, and the second locking position 43212 is located above the first locking position 43211 and at a lowest point protruding toward the first locking position 43211. In one or more embodiments, an inclined guide wall 43213 forming a step is also arranged within the annular guide groove 4321.

[0120] In one or more embodiments, the actuation mechanism 40 further includes a locking assembly 45. FIG. 13 is a schematic view of the structure of an embodiment of a locking member in the actuation mechanism of the cleaning head of the present invention. As shown in FIGS. 8 and 13, in one or more embodiments, the locking assembly 45 includes a locking member 451 and an elastic member 452 matching with the locking member 451. The locking member 451 includes a locking member body 4511 extending roughly in the vertical direction. Based on the orientation shown in FIG. 13, locking member rotating shafts 4512 extending in the left-and-right direction respectively are arranged below the locking member body 4511. Each of the locking member rotating shafts 4512 can be inserted into the shaft hole of the corresponding locking member support seat 117 on the base 11, so that the locking member 451 is rotatably fixed on the base 11. A locking rod 4513 extending perpendicularly rightward is arranged above the locking member body 4511. In the assembled state, the locking rod 4513 extends toward the annular guide groove 4321 and is inserted into the annular guide groove 4321. The annular guide groove 4321 allows the locking rod 4513 to slide within it, thereby constraining the rotating shaft 41 at different rotational positions that form predetermined angles in the circumferential direction. The specific values of the predetermined angles can be adjusted according to actual needs, such as 15°, 20°, 25°, etc. When the locking rod 4513 is at the first locking position 43211, the rotating shaft 41 is at a first rotational position (see FIG. 8); and when the locking rod 4513 is at the second locking position 43212, the rotating shaft 41 is at a second rotational position (not shown in the figure) spaced apart from the first rotational position by a predetermined angle. The inclined guide wall 43213 in the annular guide groove 4321 can ensure that the locking rod 4513 slides more smoothly along the annular guide groove 4321.

[0121] As shown in FIG. 13, in one or more embodiments, a connecting protrusion 4514 extending perpendicularly leftward is arranged in the middle of the locking member body 4511. The connecting protrusion 4514 can be connected to one end of the elastic member 452. The

other end of the elastic member 452 is fixed to the base 11 through suitable fasteners (such as screws, etc.). The arrangement of the elastic member 452 can apply a predetermined tensile force to the locking member 451, so that the locking rod 4513 can be stably constrained at the first locking position 43211 or the second locking position 43212. In one or more embodiments, a reinforcing protrusion 4515 extending perpendicularly leftward is also arranged above the locking member body 4511. The reinforcing protrusion 4515 can abut against the locking member support seat 117 on the base 11, thereby enhancing the stability of the rotation of the locking member 451. In addition, in one or more embodiments, a buffer spring (not shown in the figure) located between the locking member support seat 117 and the locking member body 4511 is also sleeved on the reinforcing protrusion 4515, so that the locking member 451 rotates more smoothly.

[0122] In alternative embodiments, in addition to the components included in the above embodiments, the cleaning head 1 of the present disclosure further includes one or more of an indicator mechanism 50, a floating rolling wheel mechanism 60, a roller mechanism 70, and an anti-collision wool strip 80 to further enhance the function of the cleaning head 1.

[0123] As shown in FIGS. 1, 3, and 8, in one or more embodiments, the cleaning head 1 of the present invention further includes an indicator mechanism 50. The indicator mechanism 50 includes an indicator board 51 and an indicator hole 52. The indicator board 51 has a roughly arc-shaped indicator board body (not marked in the figure). Indicator signs 511 staggered from each other are arranged on left and right sides of the indicator board body. The specific form of the indicator signs 511 is not limited; for example, different colors, patterns and stripes are used to indicate the corresponding operation mode of the cleaning head 1. A rotating shaft (not marked in the figure) extending in the left-and-right direction is arranged below the indicator board body. The rotating shaft can be inserted into a corresponding guide hole (not marked in the figure) of the indicator board guide bracket 412 on the rotating shaft 41. The indicator hole 52 is provided at the top 10b of the housing 10. Specifically, two indicator holes 52 spaced apart from each other in the length direction of the housing 10 are arranged on the top cover 12. Each of the indicator holes 52 can be opposite to the corresponding indicator sign 511 on the indicator board 51, making it easy to observe the indicator sign 511 through the indicator hole 52, thereby allowing users to know the current operation mode of the cleaning head 1. In one or more embodiments, the indicator mechanism 50 further includes an indicator board reset member 53. One end of the indicator board reset member 53 is fixed on the rotating shaft of the indicator board 51, and the other end of the indicator board reset member 53 is fixed on a connecting column (not marked in the figure) of the second lifting plate 312. The arrangement of the indicator board reset member 53 enables the indicator board 51 to rotate more smoothly and synchronously with the rotating shaft 41.

[0124] FIG. 14 is a schematic view of the structure of an embodiment of a floating rolling wheel mechanism of the cleaning head of the present invention. As shown in FIGS. 2, 4 and 14, in one or more embodiments, the cleaning head 1 of the present disclosure further includes a floating rolling wheel mechanism 60. The floating rolling wheel mechanism 60 is arranged at the bottom 10a of the housing 10, and is close to a front edge of the housing 10. Two floating rolling wheel mechanisms 60 are spaced apart from each other in the length direction of the housing 10. Alternatively, the floating rolling wheel mechanism 60 can also be set to another suitable number that is larger or smaller than two, such as one, three. The floating rolling wheel mechanism 60 has a first floating position near the bottom 10a of the housing 10 (see FIG. 2) and a second floating position away from the bottom 10a of the housing 10 (see FIG. 4).

[0125] With continued reference to FIG. 14, each floating rolling wheel mechanism 60 includes components such as an installation bracket 61, a rolling wheel 62, and a bracket reset member 63. The installation bracket 61 has a roughly rectangular installation bracket body 611. A shaft hole (not shown in the figure) for receiving the rolling wheel 62 is arranged at a lower part of the installation bracket body 611, so that the rolling wheel 62 is rotatably fixed on the installation bracket 61. Two fixed columns 612 extending vertically upward and spaced apart from each other in the left-and-right direction (based on the orientation shown in FIG. 14) are arranged at an upper part of the installation bracket body 611. Correspondingly, as shown in FIG. 7, two installation bracket fixing portions 118 spaced apart from each other in the length direction of the base 11 are also arranged on the base 11 for installing the floating rolling wheel mechanism 60. The installation bracket fixing portions 118 are located at the front of the base 11. Two fixed column perforations 1181 spaced apart from each other in the length direction of the base 11 are arranged on each of the installation bracket fixing portions 118. Each of the fixed column perforations 1181 has a roughly circular shape. Each of the fixed columns 612 can extend through the corresponding fixed column perforation 1181. In addition, each of the fixed columns 612 extends through a corresponding through hole 3112 on the first lifting plate 311 and the second lifting plate 312, so that the installation bracket 61 can also match with the lifting plate 31. The bracket reset member 63 is sleeved on the fixed columns 612. Fastening screws 64 are fixed at the top of the fixed columns 612. A diameter of the fastening screw 64 is larger than a diameter of the fixed column perforation 1181, so that in the assembled state, the installation bracket 61 is fixed on the base 11 in a floating and detachable way (without falling off the base 11).

[0126] Ribs 613 are also arranged at an upper part of the installation bracket body 611. Specifically, a roughly "I"-shaped first rib 613a is arranged between the two fixed

columns 612, and a roughly "-"-shaped second rib 613b is arranged on left and right sides of the two fixed columns 612 respectively. Correspondingly, as shown in FIG. 7, a rib perforation 1182 that allows the corresponding rib 613 on the installation bracket 61 to pass through is also arranged on each of the installation bracket fixing portions 118. Specifically, a roughly "I"-shaped first rib perforation 1182a is arranged in the middle of the two fixed column perforations 1181, and a roughly "-"-shaped second rib perforation 1182b is arranged on left and right sides of the two fixed column perforations 1181 respectively. Each rib 613 can extend through the corresponding rib perforation 1182 on the base 11, so that the installation bracket 61 can float smoothly relative to the base 11 without interference. In addition, when the lifting plate 31 of the cleaning mechanism 30 is driven by the actuation mechanism 40 to rotate toward the base 11, the lifting plate 31 will abut against the rib 613, thereby driving the installation bracket 61 to move in a direction away from the base 11 (i.e., toward the second floating position). When the lifting plate 31 disengages from the rib 613, the compressed bracket reset member 63 rebounds under its own elastic action, thereby driving the installation bracket 61 to move in a direction toward the base 11 (i.e., toward the first floating position).

[0127] FIG. 15 is a schematic view of the structure of an embodiment of a roller body of the cleaning head of the present invention. As shown in FIGS. 2, 4 and 15, in one or more embodiments, the cleaning head 1 of the present disclosure includes a roller mechanism 70. The roller mechanism 70 is arranged at the bottom 10a of the housing 10, and is close to a rear edge of the housing 10. The roller mechanism 70 is spaced apart from the cleaning member 32 arranged at the front edge of the housing 10. The arrangement of the roller mechanism 70 can further reduce the resistance to the movement of the cleaning head 1 so that the cleaning head 1 can move smoothly.

[0128] With continued reference to FIGS. 2, 4 and 15, the roller mechanism 70 includes a roller body 71. The roller body 71 extends roughly in the length direction of the housing 10. In one or more embodiments, an installation protrusion 72 is arranged at one end of the roller body 71, and an installation groove 73 is arranged at the other end of the roller body 71. Correspondingly, a limiting groove (not shown in the figure) that matches with the installation protrusion 72 is arranged on the base 11, and a limiting protrusion 75 that matches with the installation groove 73 is also arranged on the base 11. In the assembled state, the limiting groove allows the installation protrusion 72 inserted into the limiting groove to move by a predetermined height in the height direction of the housing 10, and the installation groove 73 allows the limiting protrusion 75 inserted into the installation groove 73 to move by the predetermined height in the height direction of the housing 10. The specific value of the predetermined height can be adjusted according to actual needs, such as 3mm, 5mm, 7mm, etc. In addition, a snap-fit groove 74 is also arranged at one end of the roller body 71, and a snap-fit protrusion (not shown in the figure) that can match with the snap-fit groove 74 is arranged on the base 11. The snap-fit protrusion can be locked with and detached from the snap-fit groove 74 through an unlocking button 76, so that a detachable fixed connection is formed between the roller body 71 and the base 11. Through the above arrangement, the roller body 71 can freely descend under its own gravity, and can also flexibly ascend when it comes into contact with the surface to be cleaned, thereby better fitting the roller body 71 with the surface to be cleaned and ensuring a rolling effect. Alternatively, the installation protrusions 72 are arranged at both ends of the roller body 71, and the limiting grooves matching with the installation protrusions 72 are arranged on the base 11. Alternatively, the installation grooves 73 can also be arranged at both ends of the roller body 71, and the limiting protrusions 75 matching with the installation grooves 73 are arranged on the base 11.

[0129] As shown in FIGS. 1-6, in one or more embodiments, the cleaning head 1 of the present invention includes an anti-collision wool strip 80. The anti-collision wool strip 80 is arranged in front of the housing 10. Specifically, the anti-collision wool strip 80 is roughly U-shaped, and a wool strip groove (not shown in the figure) that can accommodate the anti-collision wool strip 80 is formed on the top cover 12. The anti-collision wool strip 80 is bonded inside the wool strip groove through adhesive. The arrangement of the anti-collision wool strip 80 can prevent the plastic housing 10 from colliding with furniture, thus providing a good protective effect.

[0130] As shown in FIGS. 1, 2, 5, 6 and 8, when the cleaning head 1 of the present invention is in the first operation mode, the actuating member 43 of the actuation mechanism 40 is located above, and the rotating shaft 41 is in the first rotational position. The locking rod 4513 in the locking assembly 45 of the actuation mechanism 40 is in the first locking position 43211 of the annular guide groove 4321. At this time, the toggle portion 223 of the air valve mechanism 20 faces the front of the housing 10, and the valve body 21 of the air valve mechanism 20 is in the open position. The air from the external environment can enter the suction chamber 112 through the ventilation port 113, thereby reducing the suction force of the suction chamber 112. Correspondingly, the cleaning member 32 of the cleaning mechanism 30 is in the retracted position in which the cleaning member 32 retracts back into the housing 10. The lifting plate 31 of the cleaning mechanism 30 disengages from the installation bracket 61 of the floating rolling wheel mechanism 60, and the floating rolling wheel mechanism 60 is in the first floating position near the base 11. The indicator sign 511 on the indicator mechanism 50 displays the current operation mode as the first operation mode through the indicator hole 52.

[0131] As shown in FIGS. 3 and 4, when the cleaning head 1 of the present invention is in the second operation mode, the actuating member 43 of the actuation mech-

anism 40 is subjected to a downward external force (e.g., by foot stepping) and is located below, and the rotating shaft 41 is in the second rotational position. The locking rod 4513 in the locking assembly 45 of the actuation mechanism 40 is in the second locking position 43212 of the annular guide groove 4321. Based on the orientation shown in FIG. 12, when the cleaning head 1 switches from the first operation mode to the second operation mode, the locking rod 4513 moves clockwise from the first locking position 43211 to the second locking position 43212. At this time, the connecting member 22 of the air valve mechanism 20 rotates together with the rotating shaft 41, so that the toggle portion 223 faces the rear of the housing 10. The valve body 21 of the air valve mechanism 20 is in the closed position, and the air from the external environment cannot enter the suction chamber 112 through the ventilation port 113. The suction force of the suction chamber 112 is strong. Correspondingly, the lifting plate 31 of the cleaning mechanism 30 is driven by the pressing plate 42 on the rotating shaft 41 to move in a direction toward the base 11, and the cleaning member 32 protrudes out of the housing 10 and is in the extended position. The lifting plate 31 simultaneously abuts against the ribs 613 of the installation bracket 61 of the floating rolling wheel mechanism 60, thereby forcing the floating rolling wheel mechanism 60 to be in the second floating position away from the base 11. The indicator sign 511 on the indicator mechanism 50 displays the current operation mode as the second operation mode through the indicator hole 52.

[0132] When the cleaning head 1 switches from the second operation mode to the first operation mode, the user can switch through the actuation mechanism 40. Specifically, the user continues to apply a downward external force to the actuating member 43 of the actuation mechanism 40 (e.g., by foot stepping). Based on the orientation shown in FIG. 12, the locking rod 4513 will continue to move clockwise from the second locking position 43212 to the first locking position 43211. The rotating shaft 41 will reset from the second rotational position to the first rotational position. The toggle portion 223 of the air valve mechanism 20 moves together with the rotating shaft 41 toward the front of the housing 10, and the valve body 21 of the air valve mechanism 20 resets to the open position. At the same time, the pressing plate 42 on the rotating shaft 41 disengages from the lifting plate 31 of the cleaning mechanism 30, and the lifting plate 31 resets under the elastic action of the cleaning reset member itself, thereby driving the cleaning member 32 to retract back into the housing 10 and move to the retracted position. Correspondingly, the lifting plate 31 disengages from the ribs 613 of the installation bracket 61 of the floating rolling wheel mechanism 60, and the installation bracket 61 resets under the elastic action of the bracket reset member 63 itself, thereby driving the entire floating rolling wheel mechanism 60 to reset to the first floating position. In addition, the indicator board 51 on the indicator mechanism 50 also resets together with the rotating shaft 41, thereby displaying the current operation mode as the first operation mode through the indicator hole 52.

[0133] In one or more embodiments, the user can also manually control the air valve mechanism 20 to control the operation mode of the cleaning head 1 more flexibly. Specifically, when the cleaning head 1 is in the first operation mode, the user can manually toggle the toggle portion 223 of the air valve mechanism 20, so that the toggle portion 223 rotates from originally facing the front of the housing 10 to facing the rear of the housing 10. During this process, the valve body 21 moves from the original open position for opening the ventilation port 113 to the closed position for closing the ventilation port 113. Since the snap-fit portion 221 on the connecting member 22 of the air valve mechanism 20 can rotate relative to the rotating shaft 41, the user can conveniently adjust the opening and closing of the valve body 21. At this time, the cleaning head 1 is in the third operation mode. In the third operation mode, the air valve mechanism 20 is in the closed position, and the cleaning member 32 is still in the retracted position. Correspondingly, when the cleaning head 1 is in the second operation mode, the user can also manually toggle the toggle portion 223 of the air valve mechanism 20, so that the toggle portion 223 rotates from originally facing the rear of the housing 10 to facing the front of the housing 10. During this process, the valve body 21 moves from the original closed position for closing the ventilation port 113 to the open position for opening the ventilation port 113. At this time, the cleaning head 1 is also in the third operation mode, and in the third operation mode, the air valve mechanism 20 is in the open position and the cleaning member 32 is still in the extended position.

[0134] In addition, by actuating the actuation mechanism 40, the cleaning head 1 can also switch from the third operation mode to the first operation mode or second operation mode. Specifically, when the cleaning head 1 is in the third operation mode, the user applies a downward external force to the actuating member 43 of the actuation mechanism 40, and the rotating shaft 41 switches between the first rotational position and the second rotational position. The locking rod 4513 switches between the first locking position 43211 and the second locking position 43212 of the annular guide groove 4321. At this time, the valve body 21 of the air valve mechanism 20 either abuts against the front stop wall 1141 of the stop wall 114, or abuts against the arc-shaped wall opposite to the front stop wall 1141 (the ventilation port 113 being provided on the arc-shaped wall), so that the connecting member 22 will not rotate with the rotating shaft 41. The valve body 21 of the air valve mechanism 20 will remain in the open position corresponding to the first operation mode or in the closed position corresponding to the second operation mode, making it convenient to switch from the third operation mode to the first operation mode or the second operation mode. It should be pointed out that the user can also continue to manually switch the cleaning head 1 from the third operation mode to the

first operation mode or the second operation mode without actuating the actuation mechanism 40. Through the above arrangement, the cleaning head 1 of the present disclosure can conveniently switch between multiple operation modes, thereby meeting the cleaning requirements of different surfaces to be cleaned and improving the user experience.

[0135] In order to solve the technical problem that the cleaning heads in the prior art cannot meet the cleaning requirements of different surfaces to be cleaned, the present disclosure provides a cleaning device (not shown in the figure). The cleaning device includes the cleaning head 1 as described in any of the above embodiments. The cleaning device can be, but is not limited to, a vacuum cleaner, a dust and water aspirator, and a floor scrubber, etc.

[0136] Hitherto, the technical solutions of the present disclosure have been described in connection with the preferred embodiments shown in the accompanying drawings, but it is easily understood by those skilled in the art that the scope of protection of the present disclosure is obviously not limited to these specific embodiments. Without departing from the principles of the present disclosure, those skilled in the art can make equivalent changes or replacements to relevant technical features, and all the technical solutions after these changes or replacements will fall within the scope of protection of the present disclosure.

Claims

1. A cleaning head (1), wherein the cleaning head (1) has a first operation mode and a second operation mode, and comprises:

   a housing (10) in which a suction chamber (112) and a ventilation port (113) communicated with the suction chamber (112) are provided;
   an air valve mechanism (20) configured to be switchable between an open position for opening the ventilation port (113) and a closed position for closing the ventilation port (113);
   a cleaning mechanism (30) comprising a cleaning member (32) configured to be switchable between an extended position in which the cleaning member (32) protrudes out of a bottom (10a) of the housing (10) and a retracted position in which the cleaning member (32) retracts back into the housing (10); and
   an actuation mechanism (40) configured to make a correlative movement with the air valve mechanism (20) and the cleaning mechanism (30) respectively; wherein the actuation mechanism (40) is configured to be actuated to render the first operation mode and the second operation to be switched; and wherein in the first operation mode the air valve mechanism (20) is in the open position, and the cleaning member (32) is in the retracted position; and in the second operation mode the air valve mechanism (20) is in the closed position, and the cleaning member (32) is in the extended position.

2. The cleaning head (1) according to claim 1, wherein the air valve mechanism (20) is configured to be manually controllable to switch between the open position and the closed position independently of the actuation mechanism (40).

3. The cleaning head (1) according to claim 2, wherein the cleaning head (1) further comprises a third operation mode in which the air valve mechanism (20) is in the open position and the cleaning member (32) is in the extended position; or the air valve mechanism (20) is in the closed position and the cleaning member (32) is in the retracted position; and wherein the first operation mode or the second operation mode is switched to the third operation mode by manually controlling the air valve mechanism (20), and the third operation mode is switched to the first operation mode or the second operation mode by actuating the actuation mechanism (40).

4. The cleaning head (1) according to any one of claims 1 to 3, wherein the housing (10) comprises:

   a base (11) in which the suction chamber (112) and the ventilation port (113) are provided; and
   a top cover (12) which encloses an accommodation chamber (13) together with the base (11), the accommodation chamber (13) being spaced apart from the suction chamber (112), wherein the air valve mechanism (20), the cleaning mechanism (30) and the actuation mechanism (40) are arranged in the accommodation chamber (13).

5. The cleaning head (1) according to claim 4, wherein the suction chamber (112) has a dirty air inlet (1121) located at the bottom (10a) of the housing (10), and the ventilation port (113) is positioned above the dirty air inlet (1121).

6. The cleaning head (1) according to any one of claims 1 to 5, wherein the actuation mechanism (40) comprises:

   a rotating shaft (41) which is rotatably installed on the housing (10) and which is connected to the air valve mechanism (20) and the cleaning mechanism (30) respectively; and
   an actuating member (43) which is connected to the rotating shaft (41) and extends to outside of the housing (10), so that an external force is able to be applied on the actuating member (43)

to drive the rotating shaft (41) to rotate.

7. The cleaning head (1) according to claim 6, wherein the actuation mechanism (40) further comprises: a pressing plate (42), wherein the pressing plate (42) is fixedly connected to the rotating shaft (41), and the rotating shaft (41) is connected to the cleaning mechanism (30) through the pressing plate (42).

8. The cleaning head (1) according to claim 7, wherein the rotating shaft (41), the pressing plate (42) and the actuating member (43) are integrally formed.

9. The cleaning head (1) according to claim 6, wherein an actuation reset member (44) is also provided between the actuating member (43) and the housing (10).

10. A cleaning apparatus, comprising the cleaning head (1) according to any one of claims 1-9.

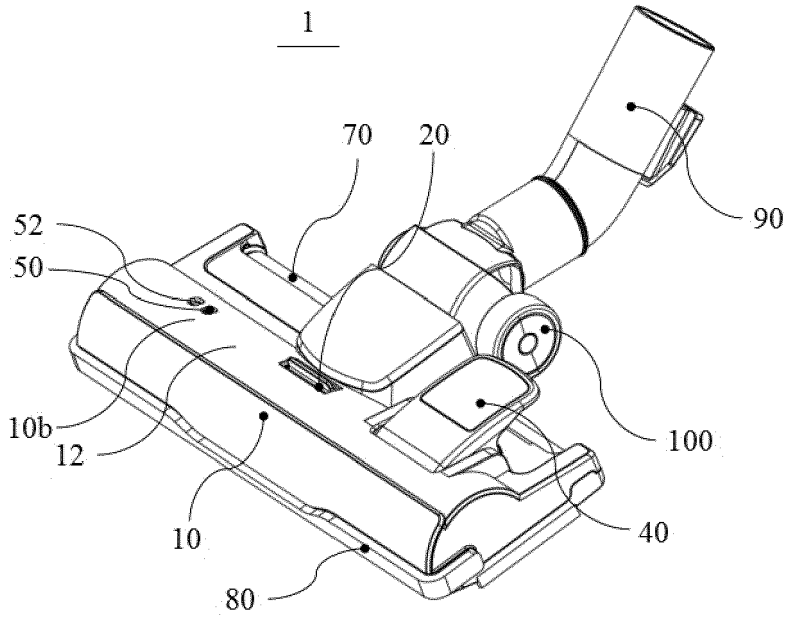
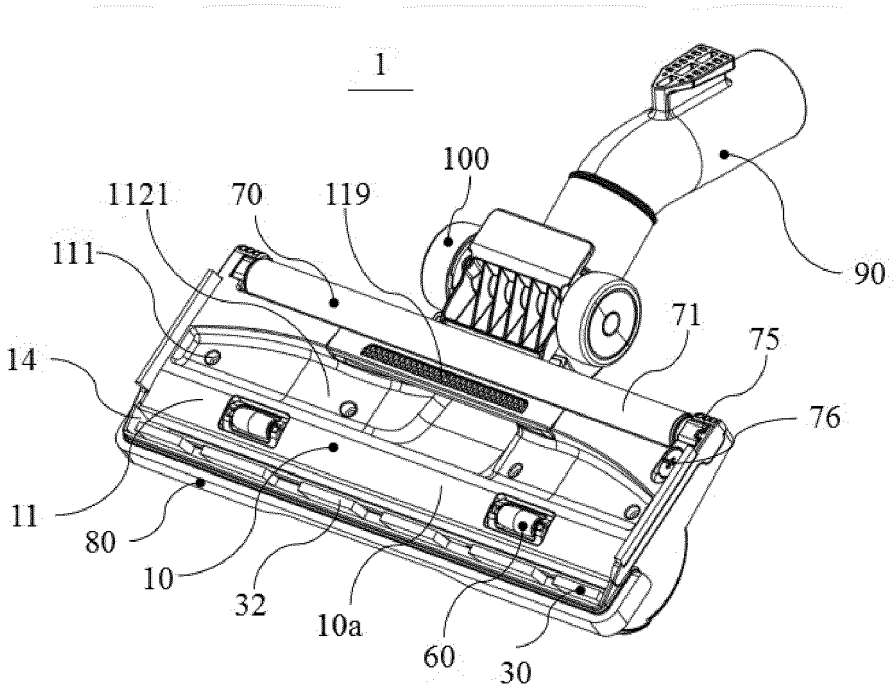

1
70
20
90
52
50
10b
12
10
80
100
40

Fig.1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119
111
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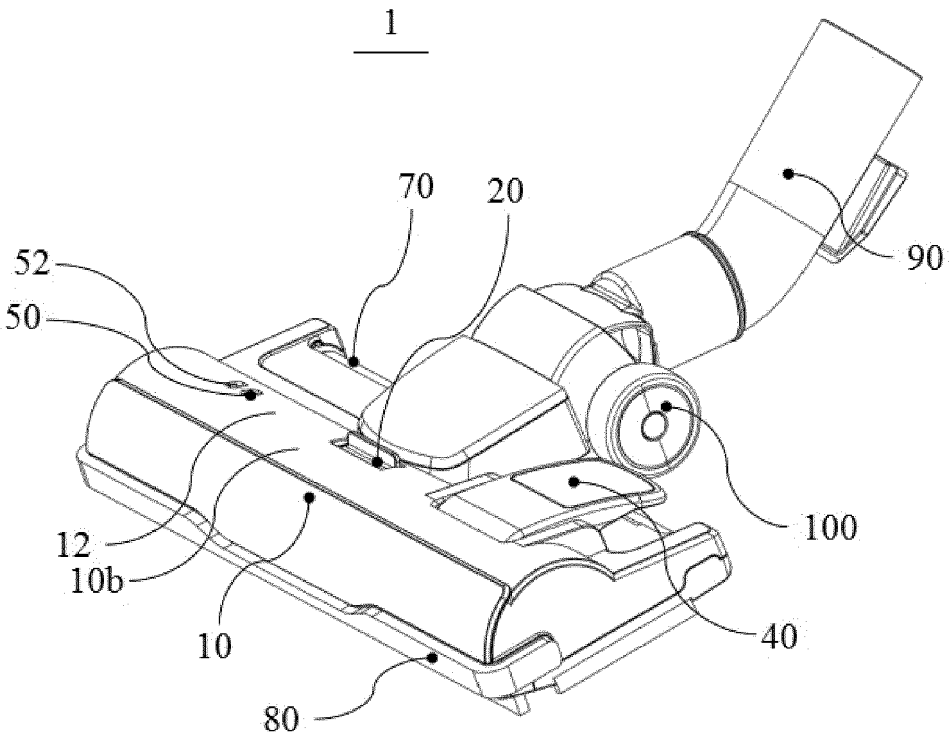
71
75
14
76
11
80
10
32
10a
60
30

Fig. 2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10b
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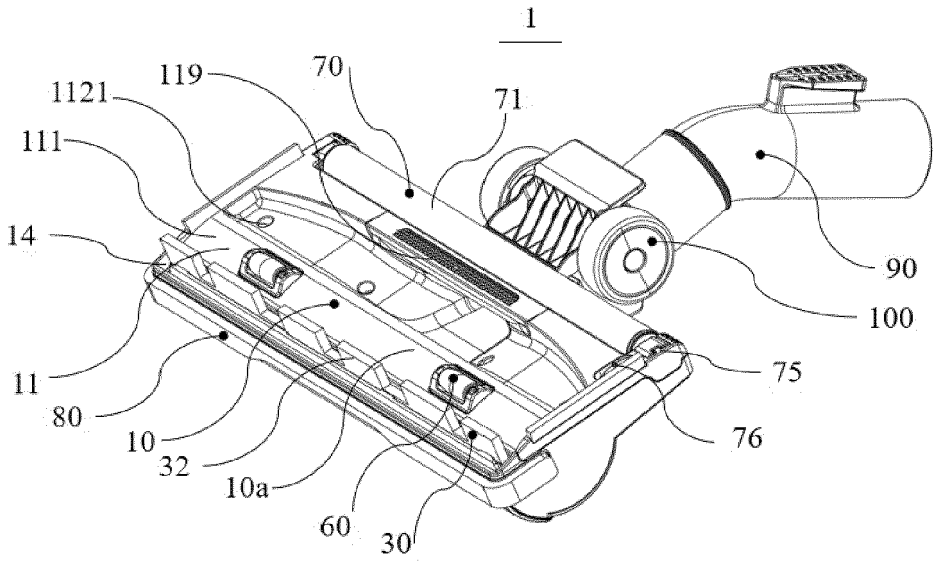
10
40
80

Fig. 3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1121
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111
14
90
100
11
75
80
76
10
32
10a
60
30

Fig. 4

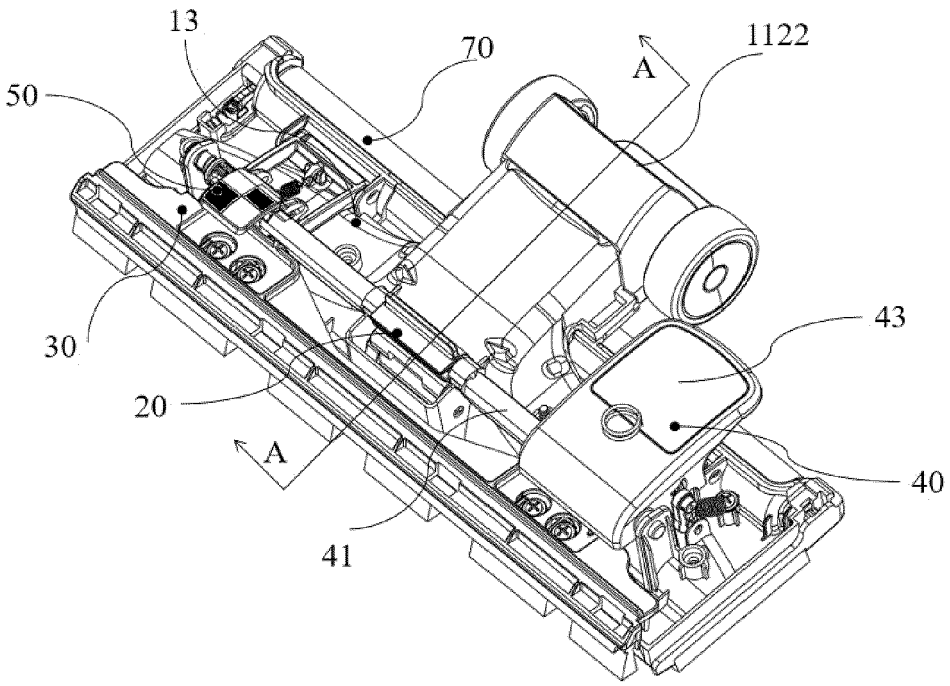
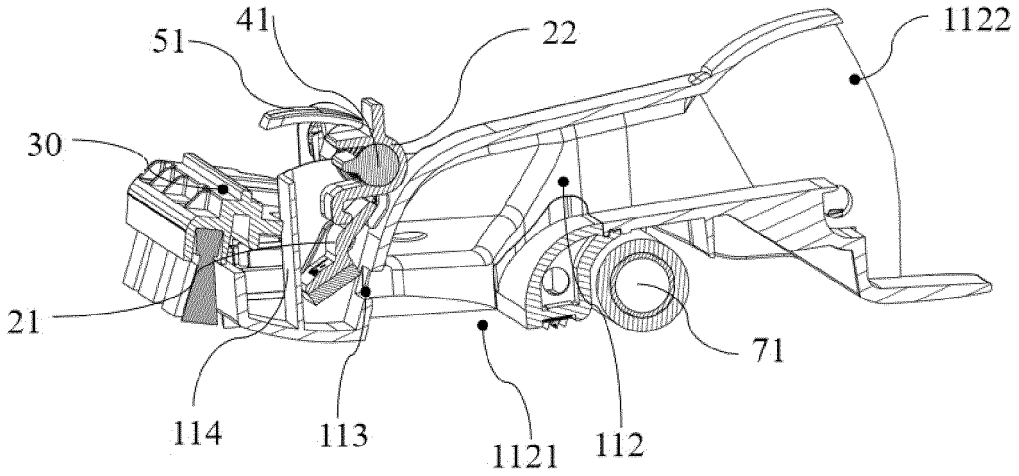

13
70
1122
A
50
43
30
20
A
40
41

Fig. 5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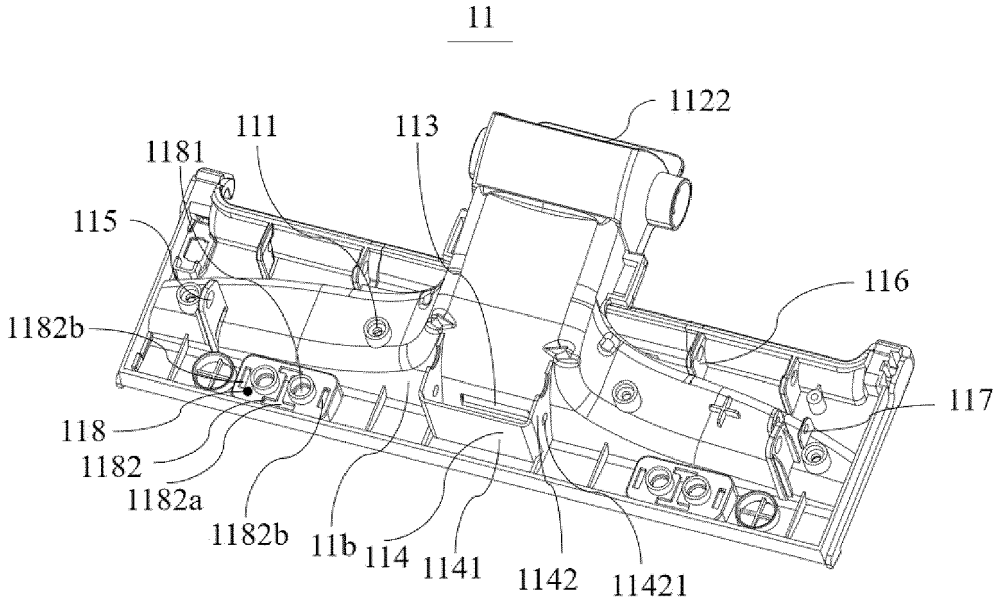
51
22
1122
30
21
71
114
113
1121
112

Fig. 6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1122
111
113
1181
115
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1182b
117
118
1182
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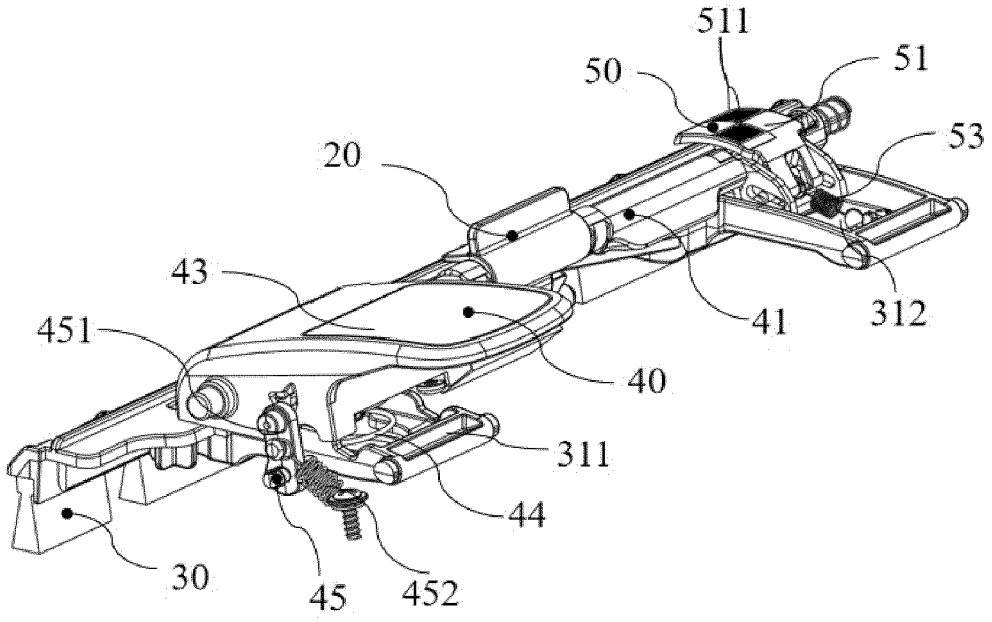
1182b
11b
114
1141
1142
11421

Fig. 7


511
50
51
53
20
43
41
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451
40
311
44
30
45
452

Fig. 8

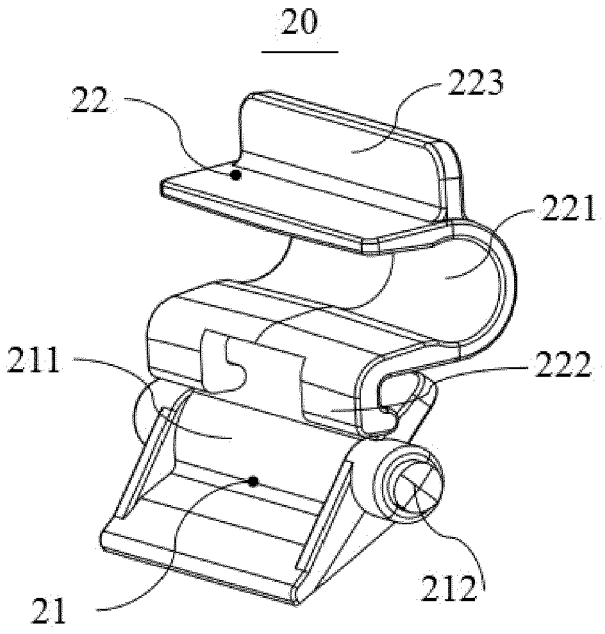
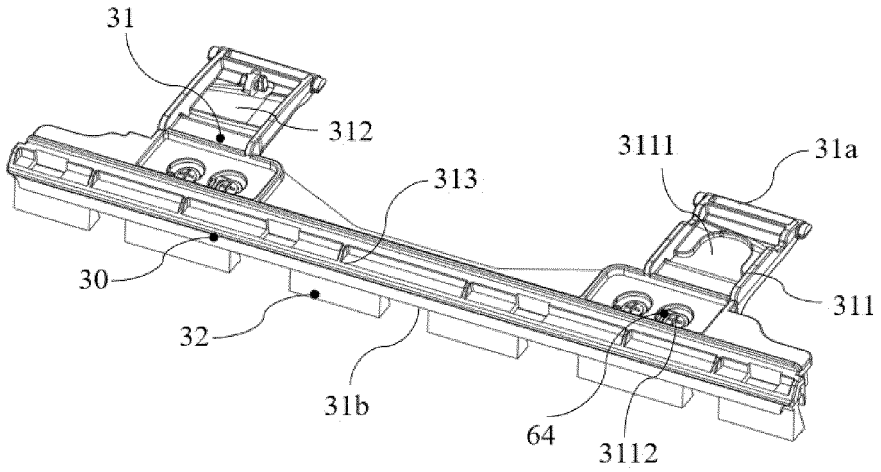

20
22
223
221
211
222
21
212

Fig. 9


31
312
313
3111
31a
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311
32
31b
64
3112

Fig. 10

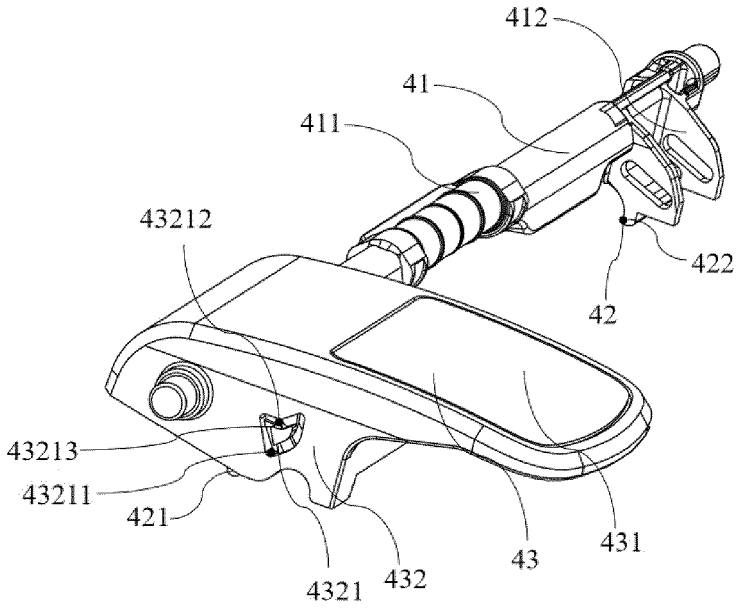
412
41
411
43212
422
42
43213
43211
421
4321
432
43
431

Fig. 11

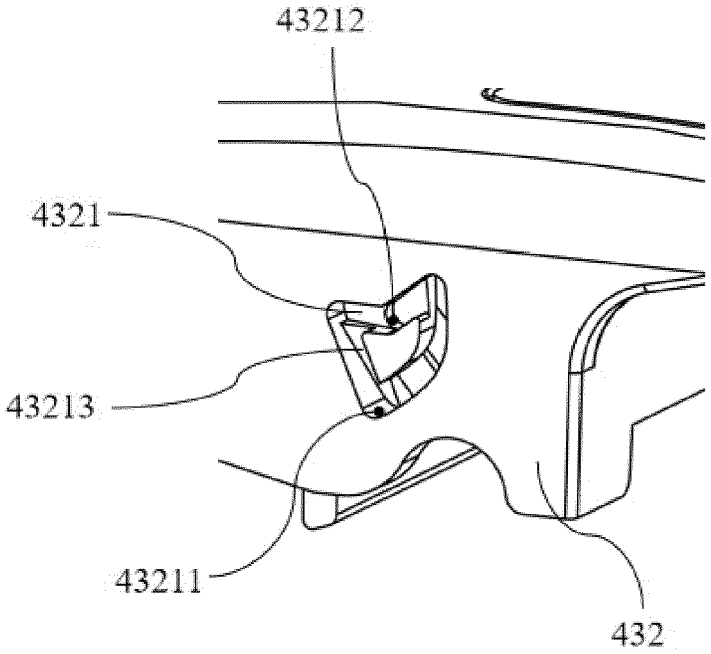
43212
4321
43213
43211
432

Fig. 12

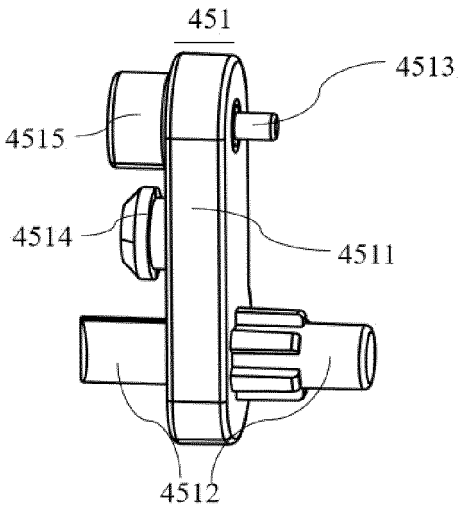

Fig. 13

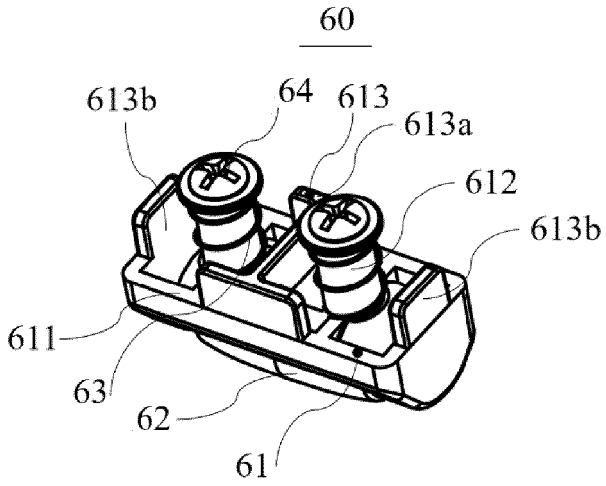

Fig. 14

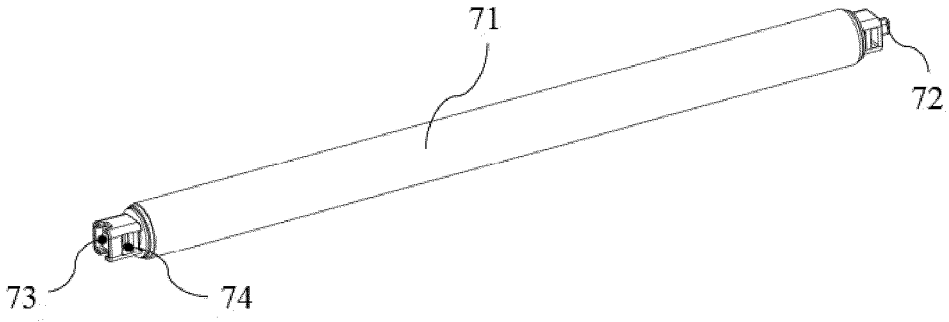

Fig. 15

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 24 17 9571

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CN 101 889 554 B (DYSON TECHNOLOGY LTD) 10 October 2012 (2012-10-10) * the whole document *	1-10	INV. A47L9/00 A47L9/06
A	DE 10 2016 101040 A1 (VORWERK CO INTERHOLDING [DE]) 27 July 2017 (2017-07-27) * paragraph [0032] - paragraph [0038]; figures 1-9 *	1-10	
A	GB 2 063 657 A (ELECTROLUX LTD) 10 June 1981 (1981-06-10) * the whole document *	1-10	
A	US 3 599 271 A (LJUNG HANS GEORG ET AL) 17 August 1971 (1971-08-17) * abstract; figures 1-10 *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC) A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 November 2024	Hubrich, Klaus

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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P : intermediate document

T : theory or principle underlying the invention
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Erroneously filed documents

Erroneously filed claims (or parts thereof)

1. An acoustic and fire retarding insulation panel (10), comprising a backing (12) of sound absorbing insulation material and a number of individual and mutually spaced elongate elements (14, 14a, 14b, 20) of a fire-retardant material.

2. An acoustic and fire retarding insulation panel (10) according to claim 1, wherein said backing (12) being flexible, such as a polymer, a compressed rock or glass wool, or low-density wood fibers.

3. An acoustic and fire retarding insulation panel (10) according to claim 1 or 2, said individual elongated elements (14, 14a, 14b, 20) comprising a layer of gypsum or gypsum composite, interposed between two supporting layers (22a, 22b) of e.g., paper or cardboard.

4. An acoustic and fire retarding insulation panel (10) according to any of the previous claims, said elongated elements (14a, 14b) comprising a laminate of at least two individual layers of gypsum (16) or gypsum composite interposed between two supporting layers (22a, 22b) of e.g., paper or cardboard.

5. An acoustic and fire retarding insulation panel (10) according to claims 3 or 4, wherein said elongated elements (14, 14a, 14b) comprises a covering layer (18) on the supporting layer (22a) opposite said backing (12), or on both said supporting layer (22a) opposite said backing and said supporting layer (22b) facing said backing.

6. An acoustic and fire retarding insulation panel (10) according to claim 4 or 5, wherein said elongated elements (14a, 14b) comprising a first layer of gypsum or gypsum composite has a shape complementary to a groove (24) arranged in said backing (12), and a second layer or gypsum or gypsum composite extending above the surface of the backing (12).

7. An acoustic and fire retarding insulation panel (10) according to any of the previous claims, said fire-retardant material composite comprising an added color.

8. An acoustic and fire retarding insulation panel (10) according to claim 7, said color being incorporated into a gypsum (16) or gypsum composite.

9. An acoustic and fire retarding insulation panel (10) according to any of claims 4-8, said individual layers of gypsum or gypsum composite are arranged in a bond.

10. An acoustic and fire retarding insulation panel (10), comprising an upper and lower main surface and comprising two layers of gypsum or gypsum composite, each layer of gypsum interposed between two supporting layers (22a, 22b) of e.g., paper or cardboard, said panel on one side, comprising at least one groove, such as a milling, said groove having a depth extending into part of only one of the layers, such as approximate 50% of the one layer.

11. A method of manufacturing an acoustic and fire retarding insulation panel (10), comprising the following steps providing a backing (12), providing a number of elongated elements (14, 14a, 14b, 20) of gypsum or gypsum composite, gluing said elongated elements in a spaced a parallel relationship to said backing.

12. A method according to claim 11, wherein said step of providing a number of elongated elements (14, 14a, 14b, 20) of gypsum or gypsum composite comprises the step of arranging at least one of said elongated elements (14a, 14b) from two layers of gypsum, each layer having a supporting layer (22a, 22B) of e.g., paper or cardboard.

13. A method according to claim 11 or 12, wherein said step of providing a number of elongated elements (14, 14a, 14b, 20) of gypsum or gypsum composite, comprising the steps of providing a colored powder, such as a color iron oxide powder, in an amount of water, adding water to mineral gypsum or composite forming a mixture, arranging a layer of said mixture and allowing said layer to harden.