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Description

The invention relates to a suction device with a suction unit to generate a suction flow and with a suction device housing in which a dirt collection chamber is arranged, which has a suction inlet and is flow-connected to the suction unit via at least one filter and a suction channel arrangement, wherein at least one external air inlet closable by an external air valve is arranged on the suction channel arrangement between the filter and the suction unit, wherein the external air valve has an external air valve body to close the external air inlet, which is adjustable by adjusting an actuation body along an adjustment path between a closed position closing the external air inlet and an feed-through position releasing the external air inlet, in which external air flowing in through the external air inlet flows through the at least one filter to clean in the direction of the dirt collection chamber.

A suction device of this type is for example described in WO 97/19630 A1 or EP 1 340 446 A1. In the case of the suction device known from EP 1 340 446 A1, a so-called counter current cleaning is carried out. The external air valve body is suddenly impinged into the feed-through position by negative pressure provided by the suction unit such that external air flows in through the external air inlet and can flow through the filter in the direction of the dirt collection chamber, whereby particles adhering to the filter are pushed in the direction of the dirt collection chamber. The closing body is designed as a flap to which relatively high force, which is provided by an electromagnet, must be applied in the direction of the closed position. The construction is complex.

A suction device emerges from WO 2011/003441 A1, whose external air inlet is closed with a valve body, which is actuatable by an energy storage means from a closed position to an open position. The energy storage means is supplied with energy for storage by actuating an actuation body.

Manual actuation of an external air valve requires a high degree of force and should be very quick so that optimal cleaning of the filter is possible by a current change that is as sudden as possible. This is difficult to design in practice.

Therefore, the object of the present invention is to provide a suction device with an improved cleaning design.

In order to achieve the object, in the case of a suction device of the type mentioned at the beginning, it is provided that a transmission gearing is arranged between the
5 actuation body and the external air valve body, which enables an adjustment of the actuation body via at least one clearance section of the adjustment path without acting on the external air valve body and on an actuation section of the adjustment path of the actuation body releases the external air valve body for an adjustment
10 from the closed position to the feed-through position and/or transfers an adjustment force of the actuation body acting in the feed-through position to the external air valve body.

It is a basic concept of the present invention that the actuation body is not fixedly connected or directly connected to the external air valve body, but rather via a transmission gearing. The transmission gearing, as a mechanical gear, has a type of
15 clearance via at least one partial path or partial section of the adjustment path such that an operator or a drive motor actuates the actuation body, but the effect on the external air valve body is absent on the clearance section. The at least one clearance section can be used for further mechanical functions, for example to tension one or a plurality of springs, which for example can serve to reset the
20 external air valve body to the closed position and/or the actuation body in the starting position. A configuration is also possible in which an opening spring is pre-tensioned or so to speak charged to open the at least one external air valve body, which is preferably suddenly released in order to adjust the external air valve body to the feed-through position. In this case, it is possible that the external air valve
25 body is adjusted using the actuation body so to speak actively in the direction of the feed-through position, for example it undergoes a corresponding pressure force or pushing force. However, it is also possible that the external air valve body is loaded in another manner, for example by spring force and/or negative pressure, in the direction of the feed-through position and is released on the actuation section in
30 the direction of the feed-through position.

The external air valve body can be in multiple parts, for example it can comprise a plurality of closing bodies which are accordingly assigned to a plurality of external air inlets. Furthermore, it is possible that using a single actuation body, a plurality of separate external air valve bodies can be actuated or driven. Therefore, the wording
5 external air valve body per se can also read “at least one external air valve body”, which, however, cannot be implemented like this for reasons of simplicity and better understanding in the claims and the following description.

The adjustment path of the actuation body extends for example from a starting position, which is assigned to the closed position of the external air valve body, to
10 an end position, which is furthest remote from the starting position. The actuation section can be located between these positions. It is also possible that the actuation section is for example close to the end position. The adjustment path can for example be passed through by the actuation body in an oscillating manner or in a movement back and forth. However, a circular adjustment path or a rotational
15 movement of the actuation body is for example also conceivable in order to influence the transmission gearing, wherein a corresponding clearance section is assigned to this rotational movement.

The at least one clearance section can comprise one or a plurality of clearance sections. For example, it is possible that the at least one clearance section of the
20 adjustment path comprises a clearance section which extends between a starting position of the actuation body, assigned to the closed position of the external air valve body, and the actuation section. Therefore, a corresponding spring mechanism or other energy storage device can for example already be charged on this clearance section by the actuation body directly or using the transmission
25 gearing. It is also possible that the actuation body is accelerated on this so to speak first clearance section or gains speed such that the external air valve body can be actuated on the following actuation section with correspondingly great force or high speed in the direction of the feed-through position. The actuation body expediently has an oscillating mass.

Alternatively or in addition to the explained clearance section, a clearance section can, however, also be provided which extends between the actuation section and an end position of the actuation body, which is not assigned to the feed-through position of the external air valve or is furthest remote from the starting position of the actuation body.

It is advantageous when the actuation element and/or the transmission gearing form or comprise an adjustment mechanism to adjust the external air valve body in the direction of its closed position. Therefore, the actuation body or the transmission gearing, on the one hand, can advantageously serve for the adjustment along the adjustment path, to release or actively actuate the external air valve body in the direction of its feed-through position, but, on the other hand, to actuate or drive the external air valve body in the direction of its closed position.

It is preferably provided that the suction device has an energy storage device to adjust the external air valve body into the feed-through position or the closed position. The energy storage device serves to provide an adjustment force actuating the external air valve body in the direction of the feed-through position or the closed position. The energy storage device can for example comprise at least one spring or a spring arrangement. The spring or spring arrangement for example comprises a screw spring or a plurality of screw springs, a rubber-elastic buffer or the like. However, the energy storage device can also comprise at least one fluidic storage device, for example a pressure storage device. For example, a pneumatic spring can be charged as the energy storage device. Furthermore, the energy storage device can also be a storage device for storing electric energy which can be discharged preferably suddenly, for example a capacitor.

The energy storage device can at the same time form an adjustment mechanism to adjust the external air valve body to the feed-through position or the closed position or the adjustment mechanism can be formed by the energy storage device. Thus, for example a spring, which directly loads the external air valve body in the direction of the closed position, is at the same time such an adjustment mechanism and a corresponding energy storage device.

It is expedient when the energy storage device in the case of an actuation of the actuation body can be charged along at least one clearance section. The energy storage device, in the case of an actuation of the actuation body, can advantageously be charged along at least two clearance sections or each clearance section. Therefore, the clearance of the actuation body can thus advantageously serve to charge the energy storage device, for example to tension a spring. The at least one clearance section thus has a particular benefit because it allows the energy storage device to be charged without, as a result, releasing the external air valve body or being actuatable or being actuated in the direction of the feed-through position. The energy storage device or the spring arrangement can also be readily charged or tensioned during an adjustment of the actuation body along the actuation section. It is preferred when the energy storage device is charged or tensioned over the entire or substantially the entire adjustment path of the actuation body.

It is advantageous when the energy storage device is coupled to the actuation body and/or the transmission gearing and/or the external air valve body as a respective actuation component such that the energy storage device is charged in the case of a movement of the actuation component, i.e. the actuation body, of the transmission gearing or of the external air valve body. Thus, for example when the external air valve body is actuated from the closed position into the feed-through position, it can charge or tension the energy storage device, for example a return spring. It is also possible that the transmission gearing acts on and therefore charges the energy storage device. Of course, it is possible that an energy storage device can be actuated for example by two actuation components, for example the transmission gearing and the actuation body. It is preferred and represented in the drawing that the energy storage device is charged or tensioned by the actuation body when it is adjusted along its adjustment path.

It is expediently provided that the actuation body is loaded by a return spring in the direction of the starting position.

It is preferred when the actuation body charges or tensions the energy storage device in the case of its adjustment along its adjustment path. The actuation body is preferably loaded by the energy storage device, for example a spring arrangement or the spring arrangement, in the direction of the starting position of the adjustment path, which is in turn assigned to the closed position of the valve body. When the actuation body is adjusted along the at least one clearance section, it pre-tensions the spring arrangement or charges the energy storage device.

It is advantageous when the energy storage device acts, via a force-amplifying gear, for example the transmission gearing, on the external air valve body to adjust into the feed-through position or the closed position. The force-amplifying gear can also comprise the actuation body. It is preferred when the force-amplifying gear for example comprises an inclined surface gear, a lever gear or the like. The force-amplifying gear can for example be arranged on the actuation body, for example in the manner of an inclined surface gear or wedge gear. The force-amplifying gear can, however, also be formed at least partially by the actuation body, for example when it is designed as a lever, with which the external air valve body is adjustable into the closed position.

The actuation body can for example comprise an actuation lever or actuation slider.

It is preferred when the actuation body is manually actuatable. However, it is also possible that the actuation body is drivable by an adjustment motor or adjustment drive, which forms a component of the suction device. It is also advantageous in this case when the actuation body has a certain clearance without affecting the external air valve body, wherein this clearance for example serves to charge the energy storage device already explained.

A combination of motorised drive and manual operability of the actuation body is also readily possible. Thus, the actuation body can be manually actuatable for example in the case of failure of the adjustment motor in the manner of an emergency operation. To this end, it is for example possible that the adjustment motor is coupled via a clearance gearing to the actuation body so that it is manually actuatable in an emergency also free of resistances of the adjustment motor or with

reduced resistance by the adjustment motor. It is also possible that an adjustment motor amplifies a manual force on the actuation body.

The actuation body or in any case a manual actuation region or section of the actuation body is preferably arranged on an upper part or an upper side of the suction device housing. The upper part or the upper side of the suction device housing is conveniently accessible when using the suction device.

In particular in the case of a manual operation design, it is advantageous when the operator exerts a force in the direction of the suction device housing, in particular in the direction of the ground. It is for example expedient when the actuation body has a manually actuatable actuation region or actuation section, wherein the transmission section for adjusting the external air valve body in the direction of the feed-through position passes through a movement path in the direction to the suction device housing and/or to the ground, on which the suction device is placed. The force direction of the actuation force or the adjustment path thus does not run tangentially past the suction device housing, but rather in the direction of the suction device housing. As a result, the suction device housing so to speak provides a resistance or forms a counter bearing. This counter bearing can, however, also so to speak be formed by the ground on which the suction device is placed during its use. The movement path of the actuation section already explained is preferably oriented such that in order to adjust the external air valve body in the direction of the feed-through position it runs towards a base side of the suction device housing, which is directed to the ground or is assigned to the ground. Thus, for example when the actuation body is arranged on an upper part or an upper side of the suction device housing, which is advantageous, the operator can exert force or pressure on the actuation body downwards in the direction of the lower part of the suction device housing or in the direction of the ground, which is very ergonomic.

It is also advantageous when a force direction or actuation direction for manual actuation of the actuation body using when the suction device is oriented roughly vertically. A transmission section of the actuation body could for example be provided upwards in front of the suction device and be pressed downwards by the

operator in the direction of the suction device housing. The transmission section can, however, also be provided laterally in front of the suction device housing and be pressed downwards by the operator.

The actuation body is expediently mounted so as to be slidingly movable in relation
5 to the suction device housing, for example using a slide bearing, and/or pivotably movable, for example by a pivot bearing. In the case of the slide bearing, linear adjustability is advantageous. In the case of the pivot bearing, a bearing of the actuation body in the manner of a pivot lever is expedient. For example, the actuation body can comprise a slider or a corresponding pivot lever or pivot arm.
10 However, a pivot-slide bearing is also readily possible, i.e. that the actuation body is movably mounted for adjustment along the adjustment path with a plurality of degrees of freedom of movement.

It is advantageously provided that the transmission gearing is designed for a sudden release of the external air valve body or a sudden transfer of the adjustment force
15 of the actuation body to the external air valve body in the direction of the feed-through position. Therefore, an advantageous mode of operation is possible, in the case of which the external air inlet is suddenly released.

A relatively longer adjustment path is advantageous, in the case of which the actuation section is relatively short. It is expediently provided that the at least one
20 clearance section is at least twice as long, preferably at least three times as long, as the actuation section. Therefore, the energy storage device can thus for example be charged or tensioned over a relatively long path of the actuation body such that it accordingly provides high forces required to adjust the external air valve body. The energy storage device is particularly favourably suitable in this situation to reset the
25 external air valve body similarly suddenly or very quickly in the direction of the closed position such that the cleaning operation achieves a pulse-like quality and therefore enables optimal cleaning of the filter.

It is also expediently provided that the adjustment path of the actuation body is notably longer than a closing path of the external air valve body between the feed-
30 through position and the closed position. For example, the adjustment path of the

actuation body is at least 1.5 times, preferably twice or three times longer than the closing path of the external air valve body.

It is preferred when the transmission gearing has a pawl and/or step and/or inclined surface and/or an actuation slider. The pawl or step can for example be arranged on
5 the external air valve body and be suddenly released by the transmission gearing, for example the actuation slider, when the actuation section is passed through.

A step can for example be arranged directly on the actuation body. The external air valve body can for example be held in the closed position along an adjustment section, which is located in front of the step, by the transmission gearing or
10 actuation body, but be released at the step and therefore suddenly enter into the feed-through position. It is possible that an inclined surface is also arranged on such a step, for example to slow down the external air valve body before reaching the feed-through position.

The transmission gearing can for example comprise an inclined surface gear.
15 Furthermore, it is possible that the transmission gearing comprises a lever gear. For example, the transmission gearing can comprise the actuation element as a lever or the actuation body can act on a lever. One of the aforementioned levers expediently serves to adjust the external air valve body in the direction of the closed position or feed-through position. An inclined surface can for example be
20 provided on the actuation body, along which an entrainment section of the external air valve body glides such that, in the case of the adjustment of the actuation body in the direction of its starting position, the external air valve body is entrained in the direction of the closed position.

It is advantageous when the transmission gearing is designed for force amplification
25 of an energy storage device loading the external air valve body in the direction of its closed position, for example a spring arrangement or a return spring. For example, the spring arrangement can act on the actuation body, can thus actuate it in the direction of its starting position, wherein the transmission gearing amplifies the return force of this spring arrangement, for example via an inclined surface
30 arrangement and/or via a lever, which can also be formed by the actuation body.

The transmission gearing acts on the external air valve body in the direction of the closed position. Furthermore, it is possible that the energy storage device, for example the spring arrangement, actuates the actuation body in the direction of the starting position and in this case adjusts the external air valve body in the direction
5 of the closed position via an inclined surface gear, which is preferably arranged directly on the actuation body.

An inclined surface arrangement of the transmission gearing to adjust the external air valve body, in particular into its closed position, expediently has a first inclined surface and a second inclined surface, which have different pitches. Therefore, the
10 inclined surfaces have different force amplifications. In particular, this measure is advantageous in connection with the energy storage device already explained or with a return spring. Thus, for example a first inclined surface may be steeper than a second inclined surface adjoined thereto such that the second inclined surface provides a greater force amplification for the return force or the adjustment force
15 of the energy storage device than the first inclined surface. The first inclined surface in turn can cause a very rapid and quick adjustment. Thus, for example it is possible that the energy storage device firstly moves the external air valve body very quickly in the direction of the closed position over the first steeper inclined surface, while the second inclined surface at the end of the adjustment path provides a greater
20 force amplification at the final closure of the external air inlet.

It is possible that at least one inclined surface and at least one step are arranged directly on the actuation body.

An advantageous configuration provides that the at least one inclined surface to adjust the external air valve body into the closed position and a release contour, in
25 particular a step, are movement-coupled in such a manner and/or are arranged behind one another in relation to the adjustment path of the actuation body such that firstly the at least one inclined surface to adjust the external air valve body into the closed position and then the release contour act on the external air valve body or are operative in relation to these.

An entrainment region of the external air valve body is expediently received in a slidingly movable manner in a receiving means of the actuation body. The actuation body can be moved along a sliding path of the receiving means relative to the external air valve body. Thus, it is for example possible that the external air valve body remains in its closed position, while the actuation body is actuated in the direction of its end position assigned to the open position or feed-through position of the external air valve body. The receiving means on the actuation body is moved relative to the external air valve body which in turn remains stationary and closes the external air opening. As soon as the external air valve body is released, it opens the external air inlet, thus adopts its feed-through position. In this case, the entrainment region of the external air valve body is moved to an end region of the receiving means of the actuation body. When the actuation body is then adjusted back into the starting position, it entrains the external air valve body in the direction of the closed position by a counter bearing section of the external air valve body stopping or abutting on the actuation body.

An advantageous measure provides that the transmission gearing has an actuation element designed in particular as an actuation slider which remains stationary on the at least one clearance section unactuated by the actuation body relative to the external air valve body and is entrained by the actuation body on the actuation section to adjust the external air valve body in the feed-through position. The actuation element is expediently loaded by a spring arrangement in its position holding the external air valve body in the closed position. The actuation element can be a pivot-mounted component. However, it is preferably mounted so as to be slidingly movable, as also represented in the drawing. For example, the actuation element can be an actuation slider, with respect to which the actuation body is relatively displaceable or relatively pivotable in order to be able to move via the at least one clearance section relative to the actuation element. However, when the end of the clearance section is reached, i.e. the actuation section is reached, the actuation body entrains the actuation element with an entrainment which in turn for example actively acts on the external air valve body in the direction of the feed-

through position or, which is represented in the drawing, releases the external air valve body to move in the direction of the feed-through position.

It is preferred when the external air valve body is loaded by a negative pressure application of the suction unit in the direction of its feed-through position. It is

- 5 expedient when a side facing the negative pressure region of the suction unit or the dirt collection chamber, in particular an underside, of the external air valve body is provided to adjust the external air valve body in the direction of the feed-through position. The force of the suction unit or negative pressure, which is in particular still present in the dirt collection chamber prior to the cleaning, is relatively large
- 10 and therefore particularly suitable to adjust the external air valve body and therefore to open the external air inlet. This measure advantageously contributes to a fast, sudden cleaning of the filter.

Alternatively or in addition to a negative pressure application of the external air valve body in the direction of the feed-through position, it is, however, also possible

- 15 that the external air valve body is impinged or driven by an opening spring arrangement and/or a motorised opening drive in the direction of the feed-through position. Expediently, the suction device has an opening spring arrangement and/or a motorised opening drive, for example an electromagnet or an arrangement of electromagnetic drives, to actuate or drive the external air valve body in the
- 20 direction of the feed-through position. The opening spring arrangement for example comprises an opening spring, in particular a screw spring. The opening spring is expediently supported, on the one hand, on a component fixedly connected to the suction device housing or provided by said suction device housing and, on the other hand, on the external air valve body.

- 25 It is for example expediently provided that the suction device has a closing spring arrangement and/or a motorised closing drive, in particular a spring drive, to actuate or drive the external air valve body in the direction of the closed position.

For example, the external air valve body is impinged by the closing spring in the direction of the closed position. The closing spring is supported for example on the

external air valve body and on a component connected to the suction device housing or directly on the suction device housing.

The external air inlet is preferably located on a wall of the suction device housing, for example on a cover of the suction device housing, next to the actuation
5 chamber housing. The external air inlet can for example be arranged between an upper side of a cover of the suction device housing or a wall side of the suction device housing.

It is advantageous when a have the actuation body the actuation body is arranged above the external air inlet *[sic]*. In particular in the case of this configuration,
10 however also in the case of a support laterally next to the external air inlet, the external air valve body can advantageously be suspended or supported on the actuation arrangement.

An advantageous configuration provides that a linear adjustment axis of the actuation body and an adjustment axis of the valve body run at an angle to one
15 another between the closed position and the feed-through position, for example orthogonally.

The suction device is preferably a mobile suction device, in particular a household vacuum cleaner or a workshop vacuum cleaner. Rollers are preferably arranged on the suction device housing. The suction device can have a carrying handle.

20 A filter sack or collection container can be arranged in the dirt collection chamber. The suction device can have a bracket for a filter sack or collection container.

Exemplary embodiments of the invention are explained below using the drawing, wherein:

Figure 1 shows a perspective, longitudinally sectioned oblique view of a first
25 suction device in the case of normal suction operation,

Figure 2 shows an external air valve of the suction device according to Figure 1, perspectively from above,

Figure 3 shows the view according to Figure 1, but directly from the side,

Figure 4 shows the view according to Figure 3, but in a cleaning operation,

Figure 5 shows a perspective oblique representation of the external air valve according to preceding figures in the closed position in the case of normal suction operation,

5 Figure 6 shows a detail D from Figure 5,

Figure 7 shows the external air valve according to Figures 5, 6 in the case of the actuation in the direction of the feed-through position, which is represented in Figure 8,

Figure 9 shows a perspective, longitudinally sectioned oblique view of a
10 second suction device in the case of normal suction operation,

Figure 10 shows an external air valve of the suction device, represented perspectively obliquely from above, according to Figure 9 in the closed position, and

Figure 11 shows the external air valve according to Figure 10, but in a feed-through position.

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A suction device 10 is for example configured as a household suction device or workshop vacuum cleaner. A stationary configuration of the suction device 10 for a central suction system is, however, in principle possible. A suction device 110 according to Figures 9-11 corresponds, in relation to its suction device housing and
20 the fundamental functionality, to the suction device 10 such that identical reference numerals are used for identical components on the suction devices 10, 110. They are explained below in relation to the suction device 10. In the case of the suction device 110, partly similar components to the suction device 10 are provided, which are provided with reference numerals greater by 100 to indicate differences.

25 The suction device 10 is represented partly highly schematically in the drawing. For example, it can have, on its suction device housing 12, rollers 11 with which it can be rolled or placed on the ground.

The suction device housing 12 has for example a lower part 20 and a cover 24. The lower part 20 can be provided with the rollers 11. A suction inlet 18 for the inflow of a suction flow T, i.e. air flow laden with dirt, dust or the like, is provided on the lower part 20 in a dirt collection chamber 21.

- 5 A connection fitting 19 to connect, in particular to plug in or insert, a hose 16 is provided on the suction inlet 18. The hose can for example be connected or connectable at its other end region to a suction nozzle, a hand-held machine tool or the like.

The dirt collection chamber 21 is provided in the suction device housing 12, into
10 which the suction inlet 18 leads. A filter 29, which filters out particles P contained in the suction flow T, is arranged between the dust inlet 18 and a suction unit 15 of the suction device 10, which is provided to generate a suction flow T such that the particles are retained in the dirt collection chamber 21. Thus, for example, an accumulation of dust or dirt S is formed on a bottom wall 22 of the suction device
15 housing 12, in particular the lower part 20. The particles P usually fall downwards, i.e. to the bottom wall 22, but adhere at least to a side surface 29A facing the dirt collection chamber 21, for example an underside, of the filter 29. The filter 29 is thus gradually soiled or obstructed with particles P in the case of the suction operation of the suction device 10.

- 20 On the discharge side, however, the suction flow T is cleaned by the filter 29 such that it forms a so to speak cleaner suction flow T2 when it flows via a side surface 29B of the filter 29 in the direction of an air outlet 17. The suction unit 15 is connected to the air outlet 17. The air outlet 17 is provided on a suction channel arrangement 25, which is arranged upstream of the filter 29 in relation to the
25 suction flow T.

The suction unit 15 is for example a common suction turbine and an associated drive motor which is not explained in detail. Of course, in the case of each suction device according to the invention, not only in the case of the suction device 10, a suction turbine and a drive motor are suitable as the suction unit.

The dirt collection chamber 21 is delimited by the bottom wall 22 and side walls 23. A front side wall 23 is not represented in the sectional representations of the drawing. The lower part 20 is covered by a cover 24 which is expediently detachable from the lower part 20 such that dirt accumulated in the dirt collection chamber 21 can be easily removed. It would be possible for a collection container, for example a filter sack, to be arranged in the dirt collection chamber 21. In the case of a cleaning operation still to be explained, such a filter sack is, in contrast, not necessary because the filter 29 is effectively cleaned.

The suction channel arrangement 25 is provided on the suction device housing 12, in particular on the cover 24.

For example, a bracket 27 for the filter 29 is on a top wall 24A of the cover 24. The filter 29 is for example inserted into an opening 24B of the top wall 24A and seals it such that the dirt S is retained in the dust collection chamber or dirt collection chamber 21. A bracket 27 for the filter 29 is preferably provided on the opening 24B.

Next to the filter 29 or on its outer circumference, a side wall or circumferential wall 26 is provided and above the filter 29 a top wall 28 of the suction channel arrangement 25 is provided. The circumferential wall 26 and the top wall 28 can for example delimit a chamber and/or a suction channel of the suction channel arrangement 25, which leads to the air outlet 17.

An external air inlet 30 for cleaning air or external air F is provided on the section channel arrangement 25, which can flow through the filter 29 counter to the current direction of the suction flow T and therefore impact on particles P adhering to the filter 29 in the direction of the dirt collection chamber 21.

Both suction devices 10, 110 thus in each case have an external air inlet 30 through which external air F can flow to clean the filter 29. To close and open a respective external air inlet 30, external air valves 35, 135 explained below, but actuatable in different manners, are provided.

The external air inlet 30 is closable by the external air valves 35, 135, with these adopting their closed position L and in the normal suction operation of the suction device 10 corresponding to Figures 1 and 9, the suction flow T flowing from the suction inlet 18 through the dirt collection chamber 21 and the filter 29 in the direction of the air outlet 17.

However, for a cleaning operation, the external air inlet 30 is opened by the external air valve 35, 135 located in its feed-through position O, i.e. the external air F can flow in through the external air inlet 30 and is so to speak suctioned by the negative pressure volume present in the dust collection chamber 21 or the negative pressure prevailing there, whereby the filter 29 is cleaned of particles P.

The external air valve 35, 135 comprises an external air valve body 37, 137, which is configured in the manner of a plate 38, 138 or has a plate 38, 138. The at least partially plate-shaped external air valve body 37, 137 abuts on a valve seat 36 in the closed position L which extends around the external air inlet 30. When the external air valve body 37, 137, abuts on the valve seat 36, the external air inlet 30 is closed.

A seal 39 to tightly close the external air inlet 30 is advantageously provided on the plate 38, 138 or on the valve seat 36 or both.

The seal 39 advantageously still has a damping function when the plate 38 or the external air valve body 37, 137 is moved into the closed position L in the direction of the external air inlet 30 and stops there.

An entrainment section 40 for actuation by an actuation arrangement 60 protrudes from the external air valve body 37. The entrainment section 40 comprises connection arms 41 protruding from the external air valve body 37, which are connected for connection with a support section or force transmission section 42 configured for example as a bridge 43 or having a bridge 43. For example, projections 46 of the connection arms 41 are inserted into receiving means 45 of the bridge 43. The bridge 43 extends between the connection arms 41.

The bridge 43 serves to adjust the external air valve body 37 into the closed position L closing the external air inlet 30 or into the feed-through position O opening the

external air inlet 30. For this purpose, the entrainment section 40 is mounted so as to be displaceable using a slide bearing 50 in relation to a valve base 31 having the external air inlet 30 or in relation to the valve seat 36. The valve base 31 is for example provided by the top wall 28 or is arranged on the top wall 28.

- 5 The bridge 43 can also be designated as a support body, entrainment body or as a support bridge.

The slide bearing 50 comprises guide bodies 51. The guide bodies 41 protrude for example in the manner of supports 52 or columns 52 from the valve base 31. The guide sections 47 of the entrainment section 40 are guided linearly between in each
 10 case one pair of guide bodies 51. The guide sections 47 are for example provided on the bridge 43.

The actuation arrangement 60 comprises an actuation body 61, for example a slider 62, which is adjustable in relation to the valve base 31 along an adjustment axis V. The actuation body 61 is mounted so as to be linearly displaceable on a guide body
 15 53, which extends over the external air inlet 30 and is arranged on the valve base 31.

For example, the guide body 53 is supported with support arms 54, 55 on the valve base 31. The support arms 54, 55 protrude for example in a spider-like manner or splayfoot manner laterally in front of the guide body 53 having a longitudinal gap
 20 per se. Connection members 59, in particular screw bolts or the like, are for example provided at the end regions of the support arms 54, 55 in order to connect the guide body 53 to the valve base 31 and/or the top wall 28.

The guide body 53 has a guide receiving means or guide contour 56 extending along the adjustment axis V in which the slider 62 or the actuation body 61 is displaceably
 25 received. The actuation body 61 thus cannot be moved transverse to the adjustment axis V, but rather only along the adjustment axis V.

The actuation body 61 has guide contour 63 configured for example as protruding ribs or steps, which engages behind the guide contour 56 or guide receiving means 56.

The actuation body 61 is loaded into its starting position VA represented in Figure 1-3 and 5 by a spring arrangement 71, for example comprising a screw spring. The spring arrangement 71 is supported on a counter bearing 57 of the valve base 31. For example, a screw spring of the spring arrangement 71 is received in a receiving means 58 of the counter bearing 57.

The screw spring of spring arrangement 71 is supported on the slider 62 or actuation body 61, for example on a counter bearing 72. A guide section 73 to guide the spring arrangement or the screw spring 71 protrudes in front of the counter bearing 72. For example, the guide section 73 engages in the manner of a guide projection into an interior of the screw spring 71. At the same time, a free end region 74 of the guide section 73 is provided as a stop to impact on the counter bearing 57 such that the actuation body 61 can move along an adjustment path VS between the starting position VA and the end position VE delimited by the counter bearing 57.

The spring arrangement 71 forms an energy storage device 70, which is charged, in the case of the adjustment of the actuation body 61 from the starting position VA to the end position VE, in order to reset the external air valve 35 from the feed-through position O into the closed position L. For this purpose, inclined surfaces 67, 68 are arranged on the actuation body 61, which represent as a whole actuation contours of an inclined surface gear 66. The bridge 43 can glide along the inclined surfaces 67, 68, for which purpose glide surfaces can for example be provided. However, the movement in the present case is simplified since rollers 44 are provided on the bridge 43, which can roll along the inclined surfaces 67, 68. Thus, when the slider 62 or the actuation body 61 moves from the end position VE into the starting position VA, the bridge 43 and therefore the transmission section 42 of the external air valve body 37 is accelerated at relatively high speed in the direction of the closed position L, wherein the external air valve body 37 is adjusted by the seal 39 dampened in the direction of the valve seat 36. A pitch of the inclined surface 68 is, in contrast, somewhat flatter than that of the inclined surface 67 such that the inclined surface gear 66 can exert a stronger force in the direction of the

closed position L, this means that the external air valve body 37 is moved with a contact force on the valve seat 36, which is greater than a contact force achievable by the inclined surface 67. Therefore, the external air valve 35 is thus reliably moved into the closed position L by the actuation body 61 in connection with the
 5 inclined surface gear 66.

The adjustment path VS of the actuation body 61, even in the region of the incline surface gear 66, is, however, notably longer [*sic - than*] a closing path W of the external air valve body 37 between the feed-through position O and the closed position L.

10 In order that the external air valve 35 is movable as suddenly as possible from the closed position L into the feed-through position O, but the energy storage device 70 can also be charged to a sufficient extent, the following measures are taken.

Proceeding from the starting position VA, the actuation body 61 already begins to exert pressure on the screw spring of the spring arrangement 71 on a clearance
 15 section VF1 of the adjustment path VS when an actuation force B acts on an actuation region 69 actuatable manually and configured for example as an actuation arm.

A gripping piece 69A can for example be arranged on the actuation region 69 on which an operator can conveniently press with for example one finger.

20 However, the external air valve body 37 remains unactuated on the clearance section VF1, thus in the closed position L. The entrainment section 40, for example the bridge 43, is still supported, in the case of the movement of the actuation body 61 along the clearance section VF1, on an actuation element 81 of a transmission gearing 80, which holds the external air valve body 37 in the closed position L. For
 25 example, two of the rollers 44 are supported on a holding surface 84 of the actuation element 81.

The actuation element 81 for example comprises a slide body or a carriage. The actuation element 81 is mounted on a guide 82 so as to be displaceable in the direction of the adjustment axis V.

For example, the actuation element 81 has an intermediate space 83, which is penetrated by the actuation body 61. The inclined surfaces 67, 68 are arranged in the intermediate space 83, wherein the inclined surfaces 67, 68 are displaceable in relation to the holding surface 84. As a result, the entrainment section 40 is
5 optimally supported at points spaced apart from one another, the two holding surfaces 84, laterally next to the inclined surfaces 67, 68.

The actuation body 61 is displaceable relative to the actuation element 81 along the adjustment axis V such that in the clearance section VF1 the actuation body 61 is displaceable independently of the actuation element 81 along the adjustment axis V
10 in relation to the valve base 31.

The external air valve body 37 is loaded by the negative pressure U prevailing in the dirt collection chamber 21 in the direction of the feed-through position O, thus only remains in the closed position L because the entrainment section 40 is supported on the actuation element 81, more specifically its holding surface 84. The negative
15 pressure U is in any case lower than an atmospheric pressure A, which acts on the side of the external air valve body 37, 137 facing away from the dirt collection chamber 21.

When the actuation body 61 at the end of the clearance section VF1 is pushed further into the direction of the end position VE, it passes through an actuation
20 section VB, in which an entrainment stop 64 abuts on the actuation element 81 and entrains it in the direction of the end position VE. In this case, the holding surface 84 is so to speak pulled away under the rollers 44, wherein the rollers 44 roll along over an inclined surface 86 and a step 85 adjoining thereto and so to speak suddenly reach a stop surface 87, for example at the bottom in the drawing. As a
25 result, the external air valve body 37 suddenly opens the external air inlet 30 through which external air F or cleaning air then flows in the direction of the filter 29.

The stop surface 87 delimits the movement of the external air valve body 37 in the direction of the feed-through position D. A height of the step 85, which could be
30 designated as the release contour, corresponds to the closing path W.

The actuation body 61 can be expediently actuated beyond the actuation section VB further in the direction of the end position VE in order to thereby further charge the energy storage device 70. The spring arrangement 71 is further tensioned as a result.

- 5 The actuation element 81, so to speak a carriage, can be entrained further in the direction of the end position VE and passes through a further clearance section VF2. The external air valve body 37 remains, in the case of the adjustment of the actuation body 61 along the clearance section VF2, in the feed-through position O or at the end of the closing path W, thus it remains unactuated. The stop surface 87
10 accordingly extends along the clearance section VF2.

- When the operator releases the actuation body 61, the energy storage device 70 can actuate the actuation body 61 in a function as a return mechanism for the external air valve body 37 the same *[sic]* from the feed-through position O into the closed position L. In this case, the actuation body 61 gains speed so to speak on the
15 clearance section VF2 before the inclined surface gear 66 actively actuates the external air valve body 37 in the direction of the closed position L. When this operation has concluded, the external air valve body 37 thus abuts on the valve seat 36 and the entrainment section 40 is lifted to the extent that the holding surface 84 is movable under the bridge 43 or the actuation section 42, a return stop 65 of the
20 actuation body 61 enters into engagement with the actuation element 81, the carriage, and entrains it in the direction of the starting position VA, whereby the holding surface 83 enters under the bridge 43 or its rollers 44 and therefore the external air valve body 37 is fixed in the closed position L. Optionally, the inclined surface 86 can still be moved past the rollers 44 in order to actuate the external air
25 valve body 37 with corresponding adjustment force in the direction of the closed position L and/or enable an adjustability of the holding surface 83 under the bridge 43.

- It is recognised that, in the case of the exemplary embodiment represented in the Figures 1 to 8, an actuation force could run tangential to the suction device housing
30 12 such that an operator must support said suction device housing for example

from rolling away. However, it is readily possible that for example a deflection gear is provided between the actuation body 61 and the external air valve 35 such that the operator could exert an actuation force in the direction of the ground on which the suction device 10 is placed.

- 5 Alternatively or additionally, an adjustment motor 88 to adjust the actuation body 61 along the adjustment path VS (schematically marked in Figure 7) would, however, also be possible. The adjustment motor 88 could for example have a pinion which meshes with a toothed rod section on the actuation body 61. The adjustment motor could for example be movement-coupled with the actuation
- 10 body 61 in the direction of the end position VE, but have a freewheel in the direction of the starting position VA.

In the case of the exemplary embodiment represented in the Figures 9-11, an actuation force B is advantageously directed in the direction of the ground or a bottom side of the suction device housing 12 such that even in this case, a

15 corresponding actuation force B can be exerted on an actuation body 161 using a corresponding adjustment drive or adjustment motor 288, but also conveniently a manual actuation by an operator.

The adjustment motor 288 has for example a linearly adjustable adjustment member 289 in order to exert the actuation force B. The adjustment motor 288 can

20 for example be a pressurised air drive, an electric motorised linear drive or the like.

The external air valve body 137 of the external air valve 135 has an entrainment section 140, which is actuatable in the region of a transmission section 142 by an actuation arrangement 160. The external air valve body 137 is also load by the negative pressure U in the direction of the feed-through position O, but is held by

25 the actuation arrangement 160 in the closed position L.

An actuation projection 141 for example protrudes from the external air valve body 137 in the manner of a pin, said actuation projection penetrating an entrainment receiving means 156 of the actuation body 161. The actuation body 161 comprises an actuation lever 162, which is pivotably mounted on a pivot bearing 150.

The pivot bearing 150 for example comprises a bearing block 152, which protrudes from the valve base 31. A bearing bolt is for example held on the bearing block 152, which engages a bearing receiving means 151 at one end region of an arm section 167 of the actuation lever 162.

- 5 The external air valve body 137 can be actuated from the feed-through position O into the closed position L using the actuation lever 162, which forms a component of a lever gear 166.

The entrainment receiving means 142 is arranged between the arm section 167 and a further arm section 168, on whose free end region an actuation region 169 is
10 provided for gripping or actuation by an operator.

When the actuation lever 162 is moved away from the external air inlet 30, a head 143 is supported on the free end region of the actuation projection 141 on the side of the actuation lever 162 facing away from the external air valve body 137 such that the actuation lever 162 entrains the external air valve body 137 into the closed
15 position L. A lever gear 166 is formed by the lever arm at least of the arm section 167, which actuates the external air valve body 137 in the direction of the closed position L in the sense of a force amplification.

The actuation body 161 is loaded in the direction of a starting position VA assigned to the closed position L by an energy storage device 170. The energy storage device
20 170 comprises a spring arrangement 171, for example a screw spring. The spring arrangement 171 is supported, on the one hand, on a counter bearing 157 in relation to the valve base 31 comprising the external air inlet 30, on the other hand, on the arm section 168. A receiving means 173 is for example provided there for the spring of the spring arrangement 171. A receiving means 158 for the spring of the
25 spring arrangement 171 is for example provided on the sides of the valve base 31. Consequently, the energy storage device 170 or the spring arrangement 171 acts, in the end region of the actuation lever 162 remote from the pivot bearing 150, on the same which functions in the sense of a force amplification. This contributes to the external air valve body 137 being impinged with proportionally strong force, in any

case with a force amplification for an adjustment force of the energy storage device 170, in the direction of the closed position L.

The actuation region 169 pivots about the pivot axis of the pivot bearing 150. The energy storage device 170 can be charged or the spring arrangement 171 can be
 5 tensioned over virtually the entire pivot path of the actuation region 169, which represents the adjustment path VS. In this case, the actuation body 161 firstly passes through a clearance section VF1 proceeding from the starting position VA, at which clearance section the spring arrangement 171 is tensioned, but the external
 10 air valve body 137 still remains in the closed position L, i.e. it is not released. The corresponding movement is for example discernible from the overview of the Figures 9 and 10. In this case, the entrainment receiving means 156 is moved along the entrainment section 140 such that the head or pin 143 comes away from the actuation lever 161, i.e. protrudes in front of it (see Figure 10). The spring arrangement 171 is tensioned in this case.

15 An actuation projection 163 engages with an actuation element 181 of a transmission gearing 180 on a further actuation section VB of the adjustment path VS, which adjoins the clearance section VF1. The actuation element 181 for example comprises a slider, which is mounted on a guide 182 so as to be displaceable in relation to the valve base 31. The slider or the actuation element 181 has a holding
 20 projection or holding section 184, which engages into the positions according to Figures 9 and 10 or engages behind a holding surface 144, which is provided on the entrainment section 140. As long as the holding section 184 or the actuation element 181 engages with the holding surface 144, the external air valve body 137 cannot enter into the feed-through position O. The holding surface 144 is located
 25 for example on a holding projection 147, which protrudes from the entrainment section 140 or the actuation projection 141.

The actuation element 181 is rod-shaped. It is for example received in a guide receiving means 183 of a bearing element 185 so as to be displaceable along the adjustment axis V such that it is movable out of engagement with the holding
 30 surface 144.

The actuation element 181 is for example loaded by a spring arrangement 186, for example a screw spring, into the holding position holding the entrainment section 140 and therefore holding the external air valve body 137 in the closed position L, thus into engagement with the holding surface 144. For example, the spring arrangement 186, on the one hand, is supported on a counter bearing surface 187. The counter bearing surface 187 is for example provided on an end region opposite to the end region comprising the holding section 184. The spring arrangement 186 is supported, on the other hand, for example on a support surface 188 of the valve base 31, for example on an outer circumference of a cylindrical surface comprising the receiving means 158.

In order to actuate the actuation element 181 into a release position, i.e. out of engagement with the holding surface 144, an actuation projection 163 is provided on the actuation body 161. The actuation projection 163 engages into an entrainment receiving means 189 of the actuation element 181. When the actuation body 161 is actuated proceeding from the starting position VA in the direction of the end position VE, an entrainment contour 164 acts against a stop region or longitudinal end region of the entrainment receiving means 189 in order to move the actuation element 181 away from the holding surface 144 or from the entrainment section 140, i.e. therefore to release the external air valve body 137 such that it enters in the direction of the feed-through position O by being impinged with the negative pressure U. This occurs suddenly since, in principle, the external air valve body 137 so to speak is released from the closed position L. The holding projection 147 could also be designated as pawl 145.

The external air valve body 137 impacts in the feed-through position O with the head 143 on the actuation body 161.

In order to adjust from the feed-through position O into the closed position L, the energy storage device 170 in turn acts, as explained already. In order that the actuation element 181 can pass the holding projection 147, an actuation slope 146 is provided thereon which has a pitch to adjust the actuation element 181 into the release position. The actuation element 181 preferably glides with the slope 190

along the actuation slope 146. Consequently, an inclined surface gear or wedge gear is thus provided in order to actuate the actuation element 181 in the case of the adjustment of the external air valve body 137 or the entrainment section 140 in the direction of the closed position L. However, it is possible that for example a
5 return contour 165 on the actuation projection 163 impacts on the entrainment receiving means 189 and such that the actuation element 181 actuates in the direction of the release position when the actuation body 161 pivots in the direction of the starting position VA.

It is understood that a further clearance section, which is not designated in more
10 detail, can be provided between the end position VE and the actuation section VB in order to further charge the energy storage device 170 or to tension the spring arrangement 171 more strongly such that the force to reset the external air valve body 137 into the closed position L is correspondingly greater.

The possibility is only schematically indicated that, for example, using an actuation
15 projection 263 on the actuation body 161, the external air valve body 137 is also actively actuatable in the direction of the feed-through position O. This variant can for example support the actuation of the external air valve body 137 through negative pressure U or in such exemplary embodiments, in the case of which the external air valve body is held by negative pressure in the closed position, that the
20 external air valve open *[sic]* by a corresponding adjustment force being exerted on the external air valve body in the direction of the feed-through position O.

A pivotable component can, however, also be provided instead of the slidingly movable actuation elements 81, 181, for example a hook, which reaches under the bridge 43 or the holding surface 144 and can be deflected by the actuation body 61,
25 161 on the actuation section VO into a disengagement position or release position.

Patentkrav

1. Sugeindretning med et sugeaggregat (15) til generering af en sugestrøm og med et sugerhus (12), hvori der er anbragt et snavsopsamlingsrum (21), som har en sugeindgang (18) og via mindst et filter (29) og en udsugningskanalanordning (25) er strømningsforbundet med sugeaggregatet (15), hvor der på udsugningskanalanordningen (25) mellem filteret (29) og sugeaggregatet (15) er anbragt mindst en fremmedluftindgang (30), som kan lukkes ved hjælp af en fremmedluftventil (35, 135), hvor fremmedluftventilen (35) har et fremmedluftventillegeme (37) til lukning af fremmedluftindgangen (30), som kan justeres ved justering af et aktiveringsorgan (61; 161) langs en justeringsvej (VS) mellem en lukkestilling (L), der lukker fremmedluftindgangen (30), og en gennemgangsstilling (O), som frigiver fremmedluftindgangen (30), i hvilken gennemgangsstilling fremmedluft (F), som strømmer ind gennem fremmedluftindgangen (30), strømmer gennem det mindst ene filter (29) for at rengøre i retning mod snavsopsamlingsrummet (21), **kendetegnet ved, at** der mellem aktiveringsorganet (61; 161) og fremmedluftventillegemet (37) er anbragt et overførigsgear (80; 180), som muliggør en justering af aktiveringsorganet (61; 161) via mindst et frigangsafrnit (VF1; VF2) af justeringsvejen (VS) uden indvirkning på fremmedluftventillegemet (37; 137) og på et aktiveringsorgan (VB) af aktiveringsorganets (61; 161) justeringsvej (VS) frigiver fremmedluftventillegemet (37; 137) til en justering fra lukkestillingen (L) til gennemgangsstillingen (O) og/eller overfører en justeringskraft fra aktiveringsorganet (61; 161) til fremmedluftventillegemet (37; 137), hvilken justeringskraft virker ind i gennemgangsstillingen (O).

2. Sugeindretning ifølge krav 1, **kendetegnet ved, at** det mindst ene frigangsafrnit (VF1; VF2) af justeringsvejen (VS) omfatter et frigangsafrnit (VF1; VF2), som strækker sig mellem en udgangsstilling (VA) af aktiveringsorganet (61; 161), hvilken udgangsstilling er tilordnet lukkestillingen (L), og aktiveringsafrnittet (VB), og/eller et frigangsafrnit (VF1; VF2), der strækker sig mellem aktiveringsafrnittet (VB) og en endestilling (VE) af aktiveringsorganet (61; 161), hvilken endestilling er længst væk fra en udgangsstilling (VA), som er tilordnet lukkestillingen (L), eller er dannet derved.

3. Sugeindretning ifølge krav 1 eller 2, **kendetegnet ved, at** aktiveringsorganet (61; 161) og/eller overførigsgæret (80; 180) danner eller har en justeringsindretning til justering af fremmedluftventillegemet (37; 137) i retning mod dets lukkestilling.

4. Sugeindretning ifølge et af de foregående krav, **kendetegnet ved, at** den har en energiakkumulator (70; 170), især en fjederanordning (71; 171), til justering af fremmedluftventillegemet (37; 137) til gennemgangsstillingen (O) eller lukkestillingen (L), hvor energiakkumulatoren (70; 170) er tilvejebragt for at stille en justeringskraft til rådighed, som aktiverer fremmedluftventillegemet (37; 137) i retning mod gennemgangsstillingen (O) eller lukkestillingen (L).

5. Sugeindretning ifølge krav 4, **kendetegnet ved, at** energiakkumulatoren (70; 170) kan oplades ved en justering af aktiveringsorganet (61; 161) langs det mindst ene frigangsaftsnit (VF1; VF2), især i det væsentlige den samlede justeringsvej (VS), og/eller er koblet med en aktiveringskomponent, som omfatter aktiveringsorganet (61; 161) og/eller overføringsgearet (80; 180) og/eller fremmedluftventillegemet (37; 137), således at energiakkumulatoren (70; 170) oplades ved en bevægelse af aktiveringskomponenten, og/eller at aktiveringsorganet (61; 161) oplader energiakkumulatoren (70; 170) ved sin justering langs sin justeringsvej (VS), og/eller at aktiveringsorganet (61; 161) er belastet af energiakkumulatoren (70; 170), især fjederanordningen (71; 171), i retning mod en udgangsstilling (VA) af justeringsvejen (VS), hvilken udgangsstilling er tilordnet fremmedluftventillegemets (37; 137) lukkestilling, og/eller at energiakkumulatoren (70; 170) via et kraftforstærkende gear, især overføringsgearet (80; 180) og/eller et skråfladegear og/eller et armgear, indvirker på fremmedluftventillegemet (37; 137).

6. Sugeindretning ifølge et af de foregående krav, **kendetegnet ved, at** aktiveringsorganet (61; 161) kan aktiveres manuelt og/eller kan drives ved hjælp af en justeringsmotor (88; 288), som udgør en bestanddel af sugeindretningen (10).

7. Sugeindretning ifølge et af de foregående krav, **kendetegnet ved, at** aktiveringsorganet (61; 161) er anbragt på en overside af sugerhuset (12), hvilken overside er i afstand fra et underlag ved anvendelse af sugeindretningen (10), og/eller aktiveringsorganet (61; 161) har et aktiveringsafsnit (69; 169), der kan aktiveres manuelt, hvor aktiveringsafsnittet (69; 169) til justering af fremmedluftventillegemet (37; 137) i retning mod gennemgangsstillingen (O) går gennem en bevægelsesvej i retning mod sugerhuset (12) og/eller i retning af en anvendelse af sugeindretningen (10) mod en bundside af sugerhuset (12), hvilken bundside er rettet mod et underlag eller tilordnet underlaget, og/eller at en kraftretning til manuel aktivering af aktiveringsorganet (61; 161) er

orienteret omtrent vertikalt ved anvendelse af sugeindretningen (10).

5 **8.** Sugeindretning ifølge et af de foregående krav, **kendetegnet ved, at** aktiveringsorganet (61; 161) er monteret på sugerhuset (12) via et skydeleje (50) skydebevægeligt og/eller et svingleje (150) svingbevægeligt.

10 **9.** Sugeindretning ifølge et af de foregående krav, **kendetegnet ved, at** overføringsgearet (80; 180) er udformet til en lynhurtig frigivelse af fremmedluftventillegemet (37; 137) i retning mod gennemgangsstillingen (O) eller en lynhurtig overføring af aktiveringsorganets (61; 161) justeringskraft til fremmedluftventillegemet (37; 137) i retning mod gennemgangsstillingen (O).

15 **10.** Sugeindretning ifølge et af de foregående krav, **kendetegnet ved, at** det mindst ene frigangsafrnit (VF1; VF2) eller summen af dets dele er mindst dobbelt så lang, fortrinsvis mindst tre gange eller fire gange eller fem gange så lang, som aktiveringsafsnittet (VB) og/eller justeringsvejen (VS) af aktiveringsorganet (61; 161) er længere, især mindst 1,5 gange eller to gange eller tre gange så lang som en lukkevej af fremmedluftventillegemet (37; 137) mellem dets åbne stilling og dets lukkestilling.

20 **11.** Sugeindretning ifølge et af de foregående krav, **kendetegnet ved, at** overføringsgearet (80; 180) har en pal (145), som er tilordnet aktiveringsorganet (VB), og/eller et trin og/eller en skråflade og/eller en aktiveringsskyder, og/eller at overføringsgearet (80; 180) omfatter et armgear og/eller et skråfladegear (66).

25 **12.** Sugeindretning ifølge et af de foregående krav, **kendetegnet ved, at** overføringsgearet (80; 180) er udformet til kraftforstærkning af en energiakkumulator (70; 170), som belaster fremmedluftventillegemet (37; 137) i retning mod dets lukkestilling.

30 **13.** Sugeindretning ifølge et af de foregående krav, **kendetegnet ved, at** overføringsgearet (80; 180) har et aktiveringselement (81; 181), som især er udformet som en aktiveringsskyder, og som bliver stående stationært på det mindst ene frigangsafrnit (VF1; VF2) ikke-aktiveret af aktiveringsorganet (61; 161) i forhold til fremmedluftventillegemet (37; 137) og medtages af aktiveringsorganet (61; 161) på aktiveringsafsnittet (VB) til justering, især til frigivelse, af fremmedluftventillegemet (37; 137) til gennemgangsstillingen (O).

35

5 **14.** Sugeindretning ifølge et af de foregående krav, **kendetegnet ved, at** aktiveringsorganet (61; 161) har et medbringerafsnit, især en skråflade, til justering af fremmedluftventillegemet (37; 137) i retning mod lukkestillingen, og/eller et medbringerområde af fremmedluftventillegemet (37; 137) er skydebevægeligt optaget i en optagelse af aktiveringsorganet (61; 161).

10 **15.** Sugeindretning ifølge et af de foregående krav, **kendetegnet ved, at** fremmedluftventillegemet (37; 137) er belastet af en undertryks-påvirkning fra sugeaggregatet (15) i retning mod sin gennemgangsstilling (O), og/eller der er tilvejebragt en side af fremmedluftventillegemet (37; 137), hvilken side vender mod snavsopsamlingsrummet, for at justere fremmedluftventillegemet (37; 137) i retning mod gennemgangsstillingen (O).

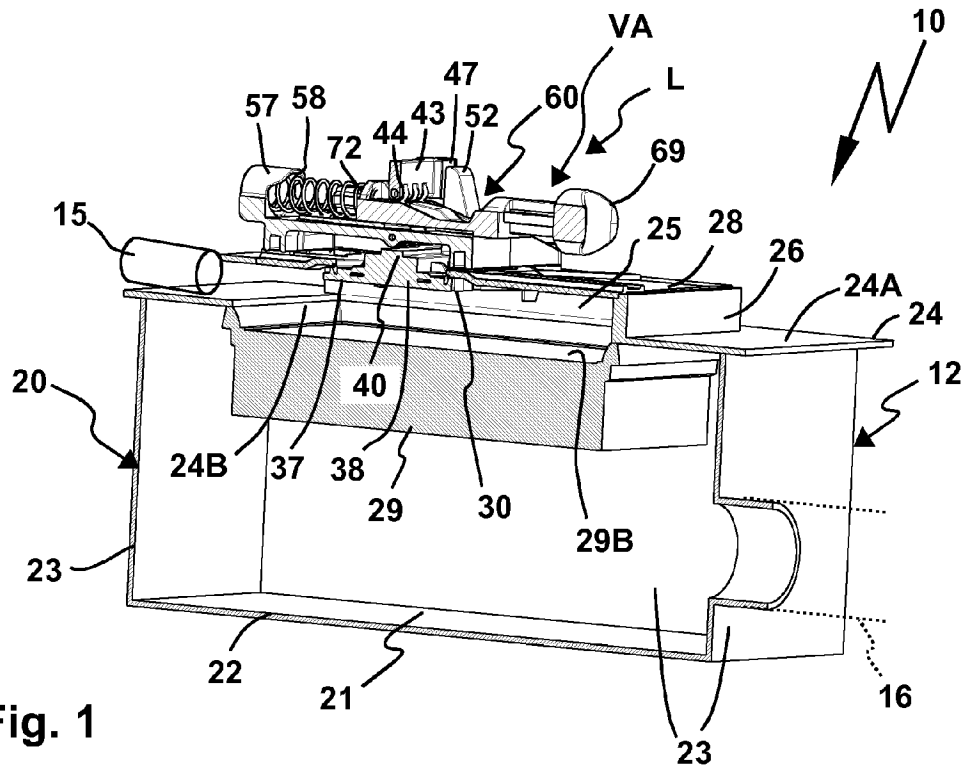


Fig. 1

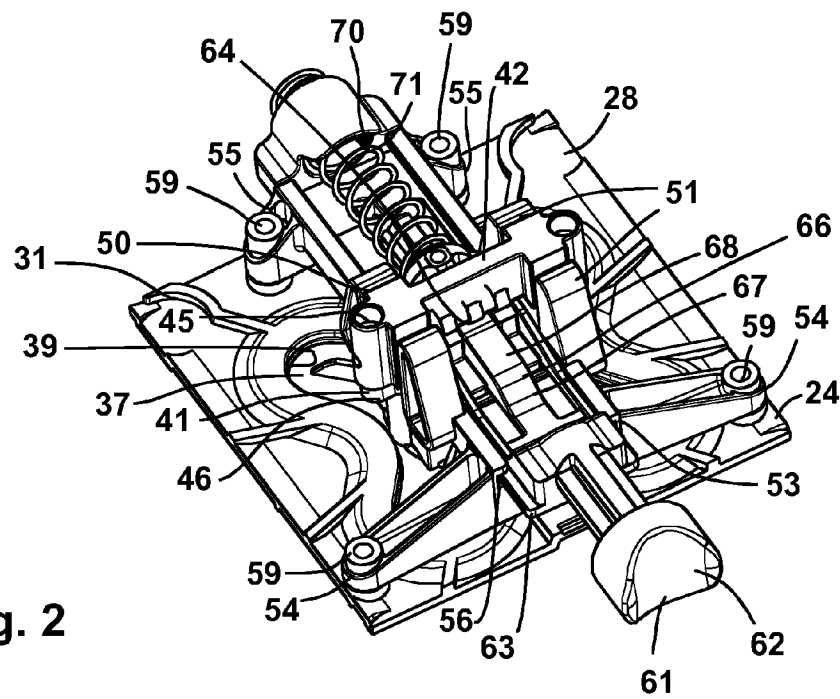
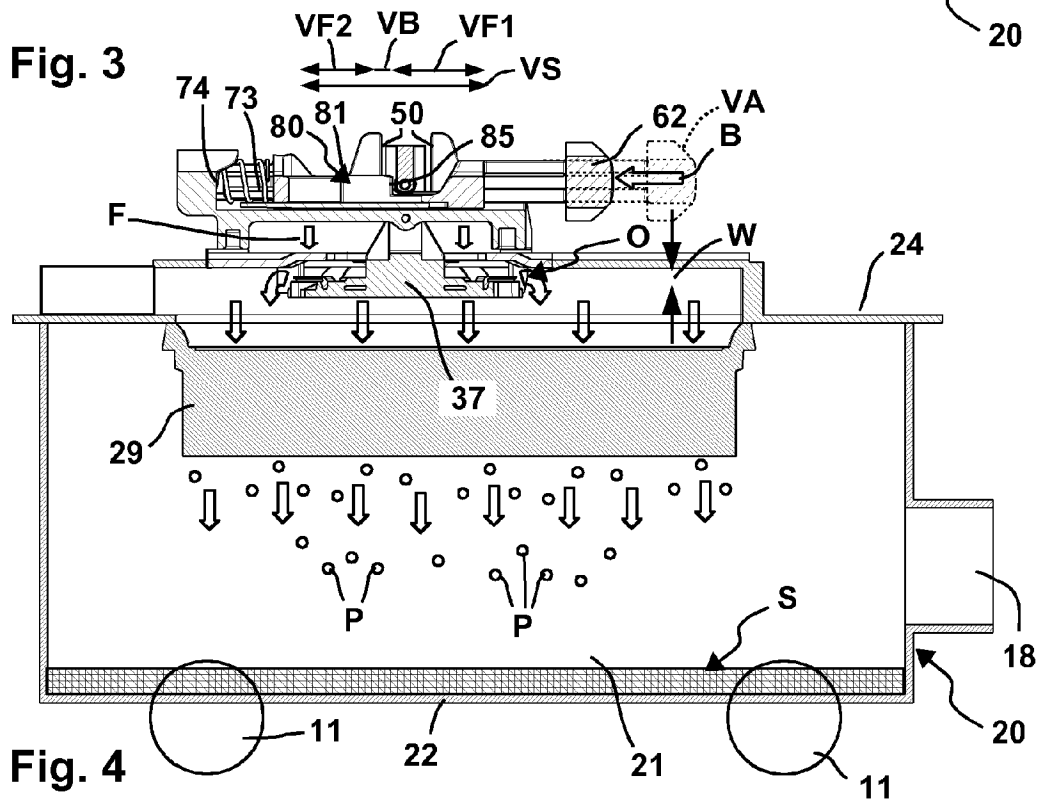
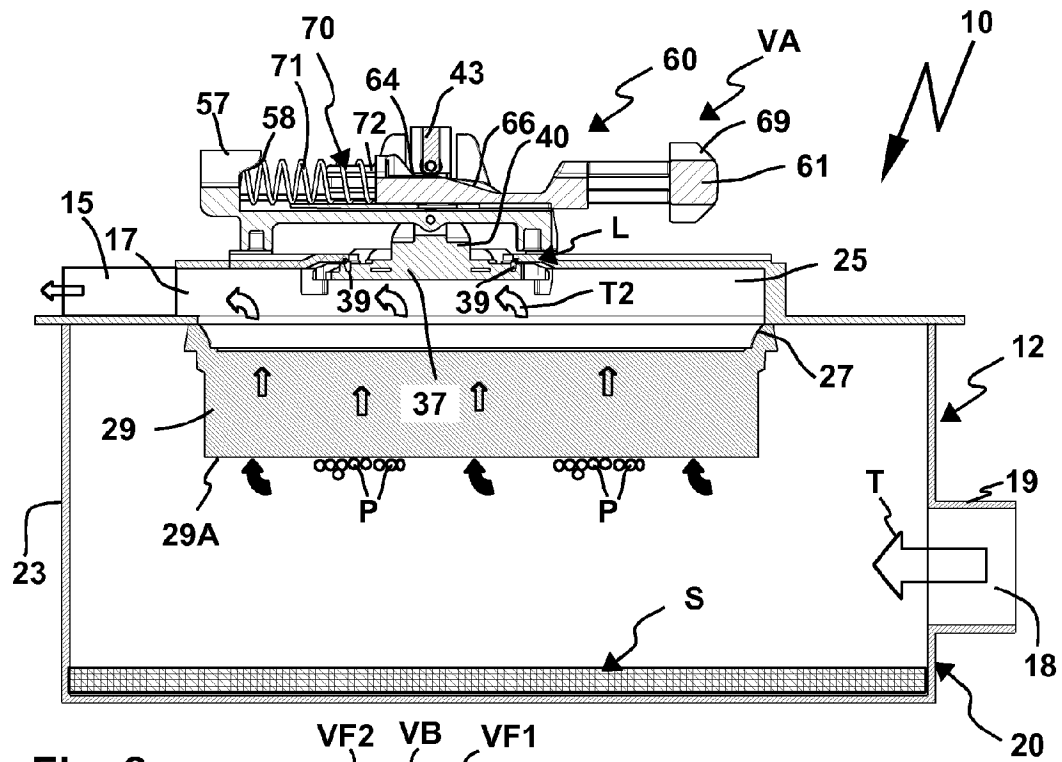
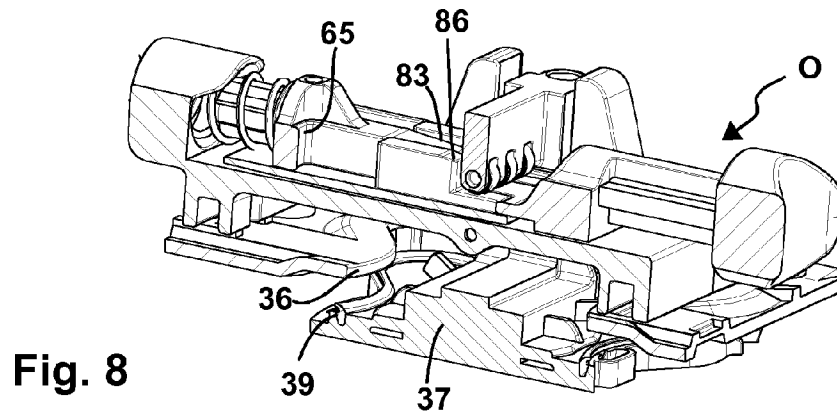
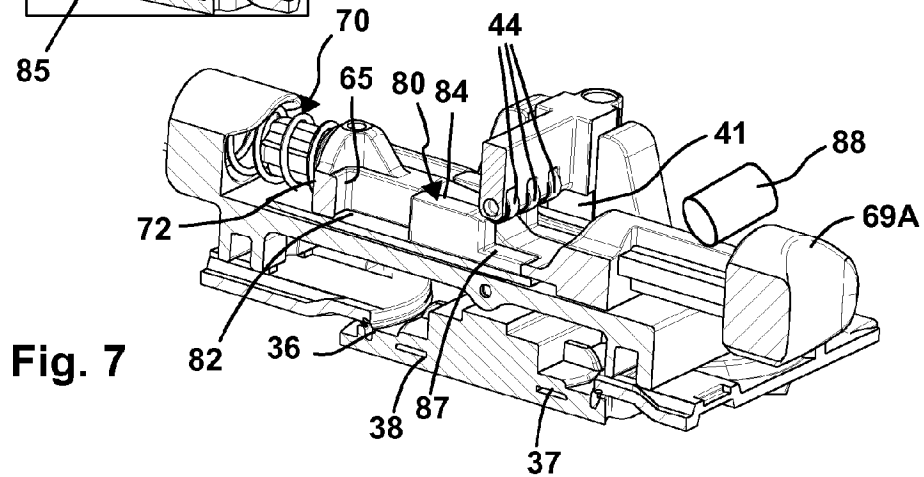
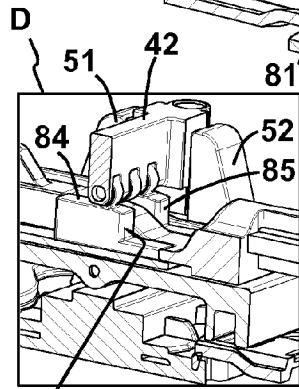
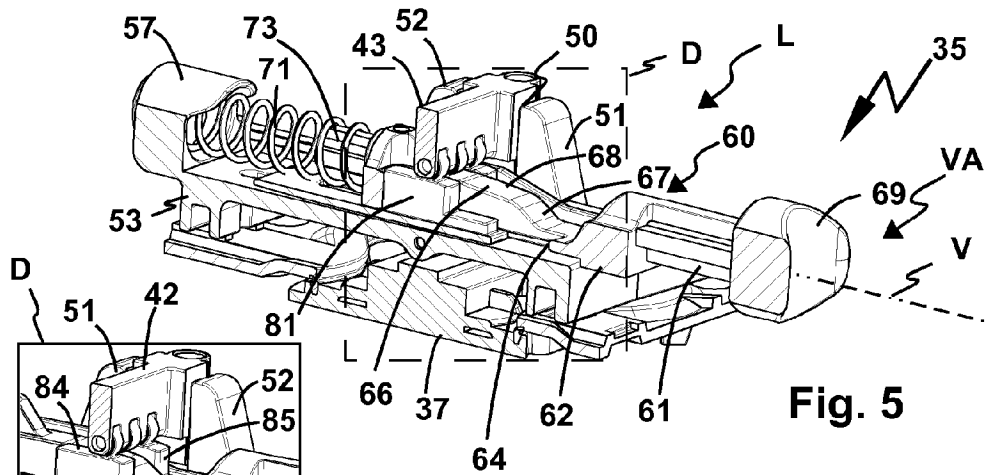


Fig. 2





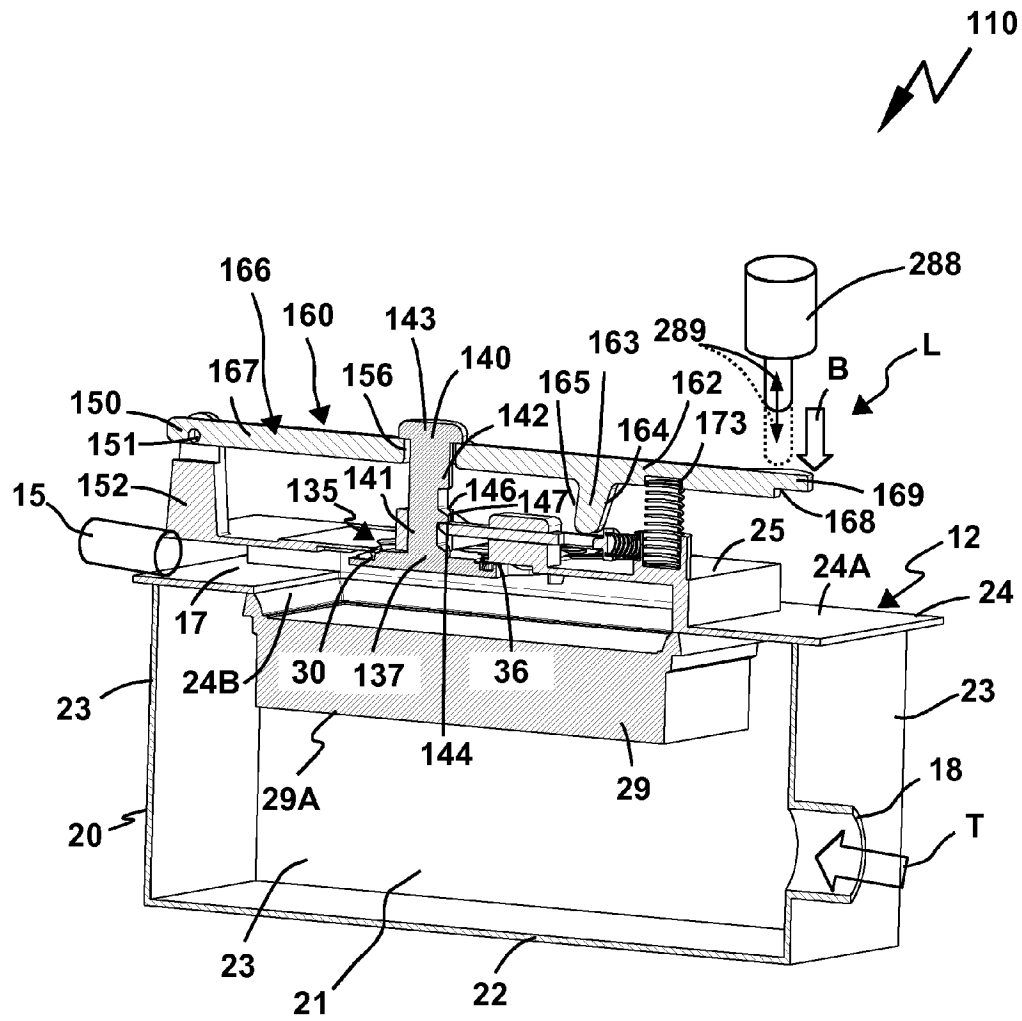


Fig. 9

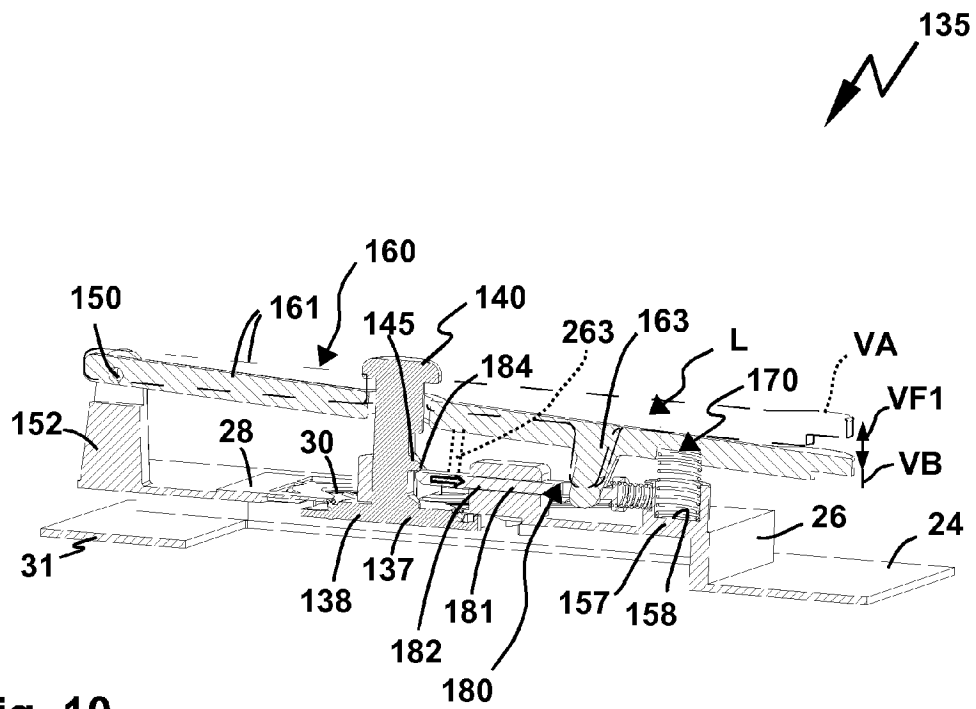


Fig. 10

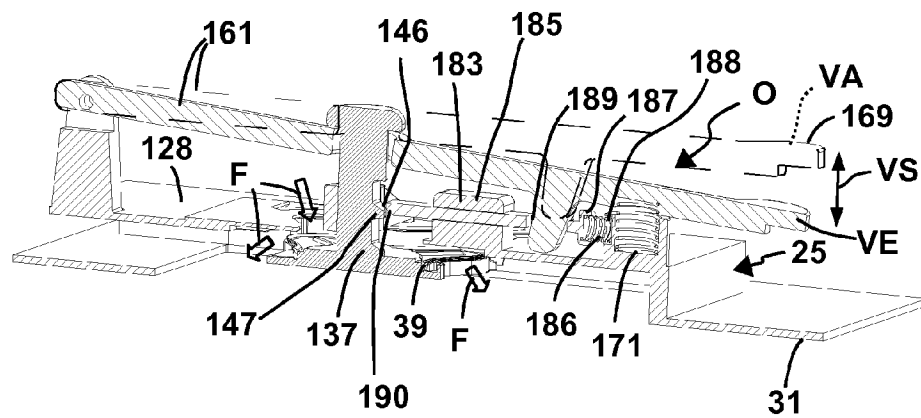


Fig. 11