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(54) **FLOOR CLEANING HEAD FOR A SUCTION CLEANER**

BODENREINIGUNGSKOPF FÜR STAUBSAUGER

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Description

[0001] This invention relates to a floor cleaning head for a suction cleaner, and particularly (but not exclusively) to a floor cleaning head built integrally in the base of a floor-standing upright vacuum cleaner.

[0002] Suction cleaning devices provide motors for establishing flow of air through the device, to transport air and entrained dirt from a suction inlet formed at the floor cleaning head of the cleaner, or from the mouth of a suction hose or cleaning tool connected to the device, to an exhaust outlet for expelling air from the device. The air with entrained dirt is drawn through a separator assembly, removing coarse dirt from the air flow, and a substantial proportion of fine dirt, for storage within a dirt bin. The filtered air is drawn through the motor and is subsequently expelled from the device via the exhaust outlet.

[0003] It is common for a floor cleaning head of a cleaner to provide an agitation device driven by a motor, to assist in dislodging dirt from the surface being cleaned, and to guide or sweep the dirt into the suction inlet of the floor cleaning head. The shape and contours of the suction inlet, and the area surrounding the suction inlet, affect the performance of the floor cleaning head in terms of the efficiency of its pick-up (i.e. the ability to gather dirt from the surface being cleaned). A floor cleaner head according to the preamble is already known e.g. from EP-A-0285096.

[0004] The present invention seeks to reduce or overcome one or more of the deficiencies associated with the prior art.

[0005] According to a first aspect of the invention we provide a floor cleaning head for a suction cleaner, the floor cleaning head providing a housing having a suction inlet, and the housing providing:

an agitator chamber having ends forming a pair of side walls disposed on opposing sides of the floor cleaning head, and
an agitator configured such that each end of the agitator is supported between and enclosed by the side walls and configured to rotate about a lengthways central rotational axis,
wherein an end of the agitator chamber provides a ramp extending around a portion of a periphery of the agitator and inwardly from the side wall, the ramp providing a deflecting surface configured to deflect dirt particles inwardly from the side wall towards a central portion of the floor cleaning head.

[0006] The deflecting surface may be inclined relative to the rotational axis of the agitator. The angle of inclination between the deflecting surface and rotational axis of the agitator is α , wherein α may be defined such that $5^\circ \leq \alpha \leq 75^\circ$, or $15^\circ \leq \alpha \leq 60^\circ$, or $25^\circ \leq \alpha \leq 45^\circ$, or α is around 35° .

[0007] The ramp may extend around the periphery of the agitator between a start position rearward of the

rotational axis of the agitator, and an end position in front of the rotational axis of the agitator.

[0008] The end position may lie below the height of the rotational axis of the agitator.

[0009] At the end position of the ramp, the deflecting surface may extend from the side wall between a first edge at which it meets the side wall and at which it is radially offset by a distance D1 from the rotational axis of the agitator, and a second edge away from the side wall, and radially offset by a distance D2 from the rotational axis of the agitator, wherein $D2 > D1$.

[0010] At all positions between its start position and end position the radial offset D1 at the first edge of the deflecting surface may be less than the radial offset D2 at the second edge of the deflecting surface.

[0011] The ratio of D2:D1 may increase between the start position and the end position.

[0012] The ratio of D2:D1 may increase continuously between the start position and end position.

[0013] At least a portion of the ramp may lie above the rotational axis of the agitator.

[0014] The agitator may be driven, and may be driven at a speed of between 1700rpm and 2500rpm.

[0015] The agitator may be formed of a soft fibrous material, and may be formed of fibres having a length of between 5mm and 6mm.

[0016] The agitator may be a first agitator, and the floor cleaning head may provide a second agitator disposed rearwardly of the first agitator.

[0017] Each end of the agitator chamber may provide a respective ramp.

[0018] According to a second aspect of the invention we provide a suction cleaner, including:

a floor cleaning head according to the first aspect;
a motor for creating a suction flow of air through the cleaner between the suction inlet and an exhaust outlet; and
a separator assembly for separating dirt from the air flow between the suction inlet and the motor.

[0019] The floor cleaning head may be formed in a base portion of the suction cleaner.

[0020] Embodiments of the technology will now be described, by way of example only, with reference to the following figures, of which:

Figure 1 is a side view of a suction device according to embodiments of the technology;

Figure 2 is a rear view of the device illustrated in Figure 2;

Figure 3 is a perspective view of a portion of the upright body of the suction device of Figure 1, shown with the separator assembly removed from the device;

Figure 4 is a perspective view of a floor cleaning head of a cleaning device according to embodiments of the technology;

Figure 5 is a side cross-sectional view of a floor cleaning head according to embodiments of the technology;

Figure 6 is a front view of a floor cleaning head according to embodiments of the technology;

Figure 7 is a perspective cut-away view illustrating a portion of a floor cleaning head according to embodiments of the technology;

Figure 8 is a side cross-sectional view a portion of a floor cleaning head according to embodiments of the technology; and

Figures 9 and 10 are perspective views of a component of a floor cleaning head according to embodiments of the technology.

[0021] With reference to the drawings, we describe a suction cleaner 10 for cleaning a floor surface. The cleaner illustrated in this example embodiment is a floor-standing upright cleaner, although it should be understood that aspects of the invention may be applied to other types of suction cleaner, and in particular other forms of floor-standing cleaners, such as a canister type cleaner, or a cylinder cleaner, for example.

[0022] In general terms, and with reference to Figures 1, 2 and 3, we describe a suction cleaner 10 with a floor cleaning head 14 providing a nozzle that defines a suction inlet (or suction inlet) for applying a suction force to a surface being cleaned. A motor (the position of which is indicated generally at 39) creates a suction flow of air through the cleaner 10 between the suction nozzle and an exhaust outlet 26. Where the term 'floor cleaning head' is used, it is with reference to the base portion of the suction cleaner 10, generally providing a housing forming the suction inlet. The term floor cleaning head should be construed to cover both an integral base part of a floor-standing suction cleaner, and/or a separate floor cleaning head for use attached to a wand or the like, connected to a suction cleaner.

[0023] The suction cleaner 10 provides a separator assembly 18 for separating dirt from the air flow between the suction inlet and the motor 39, and an exhaust assembly for separating fine contaminants from the air flow between the motor 39 and the exhaust outlet 26.

[0024] In the embodiment illustrated, the suction cleaner 10 comprises an upright body 12 providing a handle portion 16 including a first user-graspable handle 30 to allow a user to operate and steer the device. The floor cleaning head 14 provides rollers 20 (e.g. wheels) for moving the suction cleaner 10 across a surface.

[0025] The floor cleaning head 14 provides one or more agitators for dislodging dirt from the floor surface and a floor cleaning head outlet from which air and entrained dirt are drawn from the floor cleaning head towards a separator assembly 18 via a suction passage 36. The suction passage 36 fluidly connects the floor cleaning head 14 to an inlet of the separator assembly 18. An outlet of the separator assembly 18 fluidly connects the separator assembly 18 to the motor 39, via which a

suction air flow is generated within the suction cleaner, so as to draw air and entrained dirt through the floor cleaning head 14, to the separator assembly 18, and to draw cleaned air from the separator assembly 18. An exhaust outlet 26 vents air from the suction device 10, downstream of the motor 39.

[0026] In embodiments, and as shown in Figure 3, the separator assembly 18 comprises a housing 22 that provides a collecting volume for collecting dirt separated from the incoming air flow. The housing 22 also contains a separator, which in embodiments is formed of a first stage cyclonic separator to remove large particles of dirt, and a second stage cyclonic separator for removing smaller particles of dirt from the air flow. In embodiments, the first stage separator provides a mesh shroud for filtering relatively large particles, and the second stage separator provides a plurality of cyclonic separators, each formed as cone shape as is known in the art, for filtering fine dirt particles from the air flow.

[0027] In embodiments, the separator assembly 18 is mounted on a portion 34 of the upright body 12 during use, but is detachable from the body 12 for the purpose of emptying the dirt from the separator assembly collecting volume. The separator assembly 18 may further include a pre-motor filter positioned downstream of the separator stages described above. In embodiments this pre-motor filter is housed within a removable lid portion 24 of the housing 22. In this way, the removable lid portion 24 may be detached to expose the filter for cleaning. The lid portion 24 may further provide a handle 32 to allow a user to lift away the housing 22 when detached from the upright body 12 of the cleaner. A motor inlet 38 communicates with the outlet of the separator assembly 18 when it is mounted on the upright body 12 of the suction cleaner 10.

[0028] The body 12 further provides a power source, which in embodiments is a rechargeable battery pack 31. The battery pack 31 may be rechargeable in situ, or when removed from the body 12, as is known in the art. Alternatively, or in addition, the suction cleaner 10 may be provided with a power cable for connection to a mains power source.

[0029] The body 12 further includes a carrying handle 28 configured to enable a user to lift and carry the device 10.

[0030] With reference to Figures 4 to 9, we now describe aspects of the floor cleaning head 14 according to embodiments of the technology. The floor cleaning head 14 includes a lead agitator 42 and a rear agitator 44, each formed as a rotational agitator disposed widthways of the floor cleaning head. The floor cleaning head 14 provides a housing 55 having a front end 50, which extends in front of the lead agitator 42, and provides a lower edge defining a front inlet 52 between the lower edge and the floor surface.

[0031] In embodiments, the floor cleaning head 14 is supported on the floor surface by the rollers 20 disposed at the rear for the floor cleaning head 14, and by one or

more further rollers disposed at or towards the front and/or midsection of the floor cleaning head 14. As shown in Figure 6, a pair of smaller floor-engaging wheels 58 is positioned at the front of the floor cleaning head 14, spaced outwardly from the ends of the lead agitator 42. These wheels 58 ensure that the floor cleaning head 14 sits at a desired ride height above a floor surface, establishing appropriate engagement between the agitators 42, 44 and the floor surface or carpet surface, for example.

[0032] A suction inlet 45 (or nozzle) is formed as an opening in the underside of the housing 55, through which debris is drawn under the motion of the agitators 42, 44 and the suction applied via the suction passage 36 leading to the suction motor.

[0033] In embodiments, the central axis X of the lead agitator 42, around which it rotates, lies above (i.e. higher than) the lower edge of the front end 50 of the floor cleaning head housing 55. The leading agitator 42 is preferably formed with fibres of a relatively soft material compared to the bristles of the rear agitator 44, such that it is suited to dislodging dirt and debris from a carpet, for example, and moving said debris rearwards towards or into the suction inlet formed behind the lead agitator 42. For example, the body of the lead agitator 42 may be formed of uniform soft fibres which are roughly 4-7 mm in length, preferably between 5mm and 6mm (and most preferably around 5.5mm in length). The lowermost part of lead agitator 42 lies roughly 0.7mm from the floor surface, when the suction cleaner 10 is used on a hard floor.

[0034] The lead agitator 42 is driven by an agitator motor (at a position generally indicated at 40) at a speed of between 1700rpm and 2500rpm. In embodiments, each of the agitators 42, 44 is driven via a drive belt mechanism, in which a portion of a drive belt is disposed around an end portion of each respective agitator 42, 44, to transfer drive from the motor 40, the motor 40 being disposed rearwardly of the rear agitator 44, within a rear portion of the housing 55.

[0035] In embodiments, one or both of the lead agitator 42 and rear agitator 44 are each removable axially from the housing via openings in a side of the housing which in use are sealed with removable end caps 48. The agitators 42, 44 may be inserted through the openings, and pushed by a user into contact with an engaging formation 62 disposed within the housing on the opposing side of the floor cleaning head 14. Alternatively, one or both of the lead agitator 42 and rear agitator 44 may be removable downwardly through the underside of the housing.

[0036] In embodiments, the rear agitator 44 is a bristled roller, having a row of relatively firm bristles 60 (i.e. firm compared to the lead agitator 42) extending outwardly from its cylindrical core. Preferably, the bristles are formed in clumps or tufts. Preferably, the rear agitator 44 provides multiple rows of bristles which wind around its perimeter in a chevron-style formation, for example. The one or more rows of bristles 60 may be interspersed

between one or more ridges or flaps formed of a plastic or rubberised material, extending outwardly from the core of the agitator 44. The ridges of material are preferably provided so as to impact the uppermost parts of a carpet surface, for example, to assist in dislodging dirt attached or lodged in the carpet, so that it can readily be swept into the suction inlet by the bristles 60 as the agitator rotates.

[0037] The rear agitator 44 is substantially housed within a suction chamber formed within the housing, to which suction is applied via the suction passage 36. In this way, the rear agitator 44 is disposed in the suction flow path formed between the suction inlet 45 and the suction passage 36. In embodiments, a rear sealing strip formed of a plastic, rubberised, or a fibrous material, is formed adjacent a rear portion of the suction inlet.

[0038] In broad terms, and with reference to Figures 7 to 10, we describe aspects of the housing surrounding the lead agitator 42. The floor cleaning head 14 provides the housing 55 having a suction inlet 45, and the housing 55 provides an agitator chamber 41 having ends forming a pair of side walls 66 disposed on opposing sides of the floor cleaning head 14. A dividing wall lies to the rear of the agitator 42, between the lead agitator 42 and rear agitator 44, forming a back part of the agitator chamber 41.

[0039] The lead agitator 42 is supported between the side walls 66 and configured to rotate about a lengthways central rotational axis X. In embodiments of the technology, the lead agitator 42 is supported at the respective side walls 66 at each end of the agitator, at a position substantially in line with the central rotational axis X, so that the ends of the lead agitator 42 are enclosed by the side walls 66 (i.e., to prevent ingress of dirt into the chamber inwardly from the direction of the side walls 66 or through openings in the side walls 66). In embodiments, at least one of the side walls 66 forms an external wall of the floor cleaning head 14.

[0040] In embodiments of the technology, the front end of the housing 50, together with the side walls 66 and the dividing wall lying rearward of the lead agitator 42 surround the lead agitator 42.

[0041] In embodiments of the technology, the lead agitator 42 is covered substantially along its entire length with a layer of a soft fibrous material (i.e., as opposed to bristles). In this way, the entire width of the chamber between the side walls 66 is subject to cleaning via the soft fibrous material on the lead agitator 42.

[0042] An end of the agitator chamber 72 provides a ramp 64 extending around a portion of a periphery of the agitator 42 and inwardly from the side wall 66, the ramp 64 providing a deflecting surface 68 configured to deflect dirt particles inwardly from the side wall 66 towards a central portion of the floor cleaning head 14. Preferably, a ramp 64 is provided at each end of the agitator chamber 72.

[0043] As the lead agitator 42 rotates, it is possible for small dirt particles to be lodged on its surface, and be drawn upwards on the surface of the lead agitator 42 as it

rotates, into the housing 55. While having a few dirt particles drawn into the housing 55 does not in itself pose a problem, large numbers of dirt particles may eventually clog the housing 55 in proximity to the agitator, inhibiting its ability to rotate, causing excessive power drain when powering the motor 40 to drive the agitator. Furthermore, it is undesirable for dirt particles to be entrained on the agitator surface, as they may be flung off the surface in a forward direction as the agitator rotates, for example.

[0044] The primary purpose of the ramp 64 is to prevent such dirt particles becoming lodged at an end of the agitator chamber 72 in this way, by guiding the movement of the particles inwardly of the floor cleaning head 14. In other words, any particle that is rotating with the lead agitator 42, at an end of the agitator, comes into contact with the deflecting surface 68 of the ramp 64 as the lead agitator 42 rotates. The deflecting surface 68 is inclined relative to the rotational axis X of the lead agitator 42, offset by an angle α . The angle α of offset between the ramp 64 and the rotational axis X of the lead agitator 42 is less than 90° , i.e. the ramp is not perpendicular to the axis, or else it would lie flat against the side wall 66. So, in this way, the deflecting surface 68 is also angled inwardly from the side wall 66 so that any particle hitting it face on is likely to be moved in a direction away from the side wall 66. At a more central position, the particle is likely to be swept backwards by the rotational movement of the lead agitator 42, to the suction inlet 45 disposed rearwardly of the lead agitator 42.

[0045] In embodiments of the technology, the angle α of inclination between the deflecting surface 68 and rotational axis X of the agitator is in the range of 5° to 75° , and preferably between 15° and 60° , and more preferably still between 25° and 45° . In embodiments, the angle α is 35° (or in the region of 35°).

[0046] As illustrated in Figure 8, the ramp 64 extends around a portion of the periphery of the lead agitator 42 (and, consequently, around a portion of the agitator chamber 72) from a start position A which is rearward of the rotational axis X of the lead agitator 42, i.e. behind the axis X in the direction of travel of the suction cleaner 10. A portion of the ramp 64 lies above the rotational axis X of the lead agitator 42. The ramp 64 may begin at a start position A which is angled at approximately 45° upwards from and to the rear of the axis X, and the ramp 64 extends to an end position B in front of the rotational axis X of the lead agitator 42.

[0047] In embodiments, the end position B of the ramp 64 coincides with the height of the lower edge of the front end 50 of the floor cleaning head housing 55. In this way, dirt that is deflected by the ramp 64 leaves the end of the ramp at the point where dirt enters the front inlet 52 beneath the front end 50 of the housing 55, so as to join the incoming passage of dirt into the floor cleaning head 14 through the front inlet 52.

[0048] In embodiments, and as shown in Figure 8, the end position B of the ramp 64 lies in front of the rotational axis X of the agitator, and below the height of the rota-

tional axis X of the agitator. In such a configuration, the rotational direction of motion of dirt leaving the end 70 of the ramp 64 is such that the dirt has a trajectory with downwards and backwards components. This causes the majority of dirt leaving the end 70 of the ramp 64 to be swept backwards underneath the rotating lead agitator 42 rather than moving forwardly outwards through the front inlet 52.

[0049] In embodiments of the technology, at the end position B of the ramp 64, the deflecting surface 68 extends from the side wall 66 between a first edge 74 at which it meets the side wall 66 and at which it is radially offset by a distance D1 from the rotational axis of the agitator X, and a second edge 76 away from the side wall 66, and radially offset by a greater distance D2 from the rotational axis of the agitator X. In other words, at the end 70 of the ramp 64, $D2 > D1$.

[0050] In embodiments of the technology, and as illustrated in Figures 9 and 10, the distance by which the deflecting surface 68 of the ramp 64 extends into the agitator chamber 72, from the side wall 66, increases along the length of the ramp 64 from the start position A to the end position B. So, in embodiments, at all positions between its start position A and end position B the radial offset D1 at the first edge 74 of the ramp 64 is less than the radial offset D2 at the second edge 76 of the ramp 64. In the embodiment shown, the ratio of D2:D1 increases between the start position A and the end position B. In some embodiments, the ratio of D2:D1 increases continuously between the start position and end position. In other embodiments, the increase may be stepped (i.e. so the ratio or distance does not increase continuously).

[0051] The lead agitator 42, as described above, effectively lies at the very front of (or slightly in advance of) the suction inlet 45, and acts to dislodge particles from a carpet surface, for example, in order to transfer those dirt particles back towards and into the suction inlet lying behind it. The dividing wall lies to the rear of the lead agitator 42, under which dislodged particles of dirt are flung by the rotational movement of the lead agitator 42. At either side of the housing, surrounding the lead agitator 42, the separating wall seals to the side wall of the housing, on which the agitator is supported and from which it extends inwardly towards the centre of the floor cleaning head 14.

[0052] In embodiments, the lead agitator 42 lies largely outside of the suction flow path, separated from the suction chamber by the dividing wall between the two agitators 42, 44. The lead agitator 42 preferably sits at a height such that the lowermost surface of the lead agitator 42 is raised slightly above the surface being cleaned, where that surface is a flat floor surface. When used on a carpet surface, the lower most portion of the lead agitator 42 impacts the carpet surface as the device moves across the carpet. A lower edge of the dividing wall sits at a position raised above the surface being cleaned, so as not to interfere with the carpet surface since doing so would create unwanted friction and drag on the sur-

face, and potentially cause snagging. A row of very fine bristles 54 may descend from the lower edge of the separating wall, to inhibit the flow of air between the lowest portion of the lead agitator 42 and the suction chamber located behind it. In this way, the fine bristles 54 have the effect of defining a front most portion of the suction inlet 45. It should be noted that the fine bristles 54 do not directly contact the floor surface; however, they provide an effective screen with the aim of concentrating the suction applied to the floor surface, to the area directly behind the row of bristles 54.

[0053] In embodiments, on either side of the floor cleaning head 14, air channels 56 are provided in the side walls of the floor cleaning head. The air channels 56 are disposed rearwardly of the lead agitator 42, and rearwardly of the dividing wall, so as to be at least partially aligned with the suction inlet 45. The air channels 56 provide an opening through the side wall of the housing 55, to allow air to flow inwardly from the sides of the floor cleaning head 14, into the suction inlet 45. This has the effect of drawing fine dirt from the sides of the floor cleaning head 14 into the suction inlet 45, and also assists in allowing air flow into the suction flow part when the device is used on a very deep carpet, to ensure the carpet does not entirely block access to the suction inlet 45. When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

[0054] The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

[0055] Although certain example embodiments of the invention have been described, the scope of the appended claims is not intended to be limited solely to these embodiments.

Claims

1. A floor cleaning head (14) for a suction cleaner (10), the floor cleaning head providing a housing (55) having a suction inlet (45), and the housing providing:

an agitator chamber (41) having ends forming a pair of side walls (66) disposed on opposing sides of the floor cleaning head,

characterized in that

the housing further provides an agitator (42) configured such that each end of the agitator is supported between and enclosed by the side

walls and configured to rotate about a lengthways central rotational axis, wherein an end of the agitator chamber provides a ramp (64) extending around a portion of a periphery of the agitator and inwardly from the side wall, the ramp providing a deflecting surface (68) configured to deflect dirt particles inwardly from the side wall towards a central portion of the floor cleaning head.

2. A floor cleaning head according to claim 1, wherein the deflecting surface is inclined relative to the rotational axis of the agitator.
3. A floor cleaning head according to claim 2, wherein the angle of inclination between the deflecting surface and rotational axis of the agitator is α , wherein $5^\circ \leq \alpha \leq 75^\circ$.
4. A floor cleaning head according to claim 3, wherein $15^\circ \leq \alpha \leq 60^\circ$, or wherein $25^\circ \leq \alpha \leq 45^\circ$, or wherein α is around 35° .
5. A floor cleaning head according to any preceding claim, wherein the ramp extends around the periphery of the agitator between a start position rearward of the rotational axis of the agitator, and an end position in front of the rotational axis of the agitator.
6. A floor cleaning head according to claim 5, wherein the end position lies below the height of the rotational axis of the agitator.
7. A floor cleaning head according to claim 5 or claim 6, wherein at the end position of the ramp, the deflecting surface extends from the side wall between a first edge (74) at which it meets the side wall and at which it is radially offset by a distance D1 from the rotational axis of the agitator, and a second edge (76) away from the side wall, and radially offset by a distance D2 from the rotational axis of the agitator, wherein $D2 > D1$.
8. A floor cleaning head according to claim 7, wherein at all positions between its start position and end position the radial offset D1 at the first edge of the deflecting surface is less than the radial offset D2 at the second edge of the deflecting surface.
9. A floor cleaning head according to claim 8, wherein the ratio of D2:D1 increases between the start position and the end position.
10. A floor cleaning head according to claim 9, wherein the ratio of D2:D1 increases continuously between the start position and end position.
11. A floor cleaning head according to any preceding

claim, wherein at least a portion of the ramp lies above the rotational axis of the agitator.

12. A floor cleaning head according to any preceding claim, wherein:

the agitator is driven; and/or
the agitator is driven and the agitator is driven at a speed of between 1700rpm and 2500rpm; and/or
the agitator is formed of a soft fibrous material; and/or
the agitator is formed of fibres having a length of between 5mm and 6mm; and/or
the agitator is a first agitator (42), and the floor cleaning head provides a second agitator (44) disposed rearwardly of the first agitator.

13. A floor cleaning head according to any preceding claim, wherein each end of the agitator chamber provides a respective ramp.

14. A suction cleaner, including:

a floor cleaning head (14) according to any one of claims 1 to 13;
a motor (39) for creating a suction flow of air through the cleaner between the suction inlet (45) and an exhaust outlet (26); and
a separator assembly (18) for separating dirt from the air flow between the suction inlet and the motor.

15. A suction cleaner according to claim 14, wherein the floor cleaning head is formed in a base portion of the suction cleaner.

Patentansprüche

1. Bodenreinigungskopf (14) für einen Staubsauger (10), wobei der Bodenreinigungskopf ein Gehäuse (55) mit einem Saugeinlass (45) bereitstellt und das Gehäuse Folgendes bereitstellt:

eine Agitorkammer (41) mit Enden, die ein Paar von Seitenwänden (66) bilden, die auf gegenüberliegenden Seiten des Bodenreinigungskopfes angeordnet sind,

dadurch gekennzeichnet, dass

das Gehäuse ferner einen Agitator (42) bereitstellt, der so konfiguriert ist, dass jedes Ende des Agitators zwischen den Seitenwänden abgestützt und von diesen umschlossen wird und dazu konfiguriert ist, sich um eine zentrale Längsdrehachse zu drehen, wobei ein Ende der Agitorkammer eine Rampe (64) bereitstellt, die sich um einen Abschnitt

einer Peripherie des Agitators und von der Seitenwand nach innen erstreckt, wobei die Rampe eine Ablenkfläche (68) bereitstellt, die dazu konfiguriert ist, Schmutzpartikel von der Seitenwand nach innen hin zu einem zentralen Abschnitt des Bodenreinigungskopfes abzulenken.

2. Bodenreinigungskopf nach Anspruch 1, wobei die Ablenkfläche relativ zu der Drehachse des Agitators geneigt ist.

3. Bodenreinigungskopf nach Anspruch 2, wobei der Neigungswinkel zwischen der Ablenkfläche und Drehachse des Agitators α beträgt, wobei $5^\circ \leq \alpha \leq 75^\circ$.

4. Bodenreinigungskopf nach Anspruch 3, wobei $15^\circ \leq \alpha \leq 60^\circ$ oder wobei $25^\circ \leq \alpha \leq 45^\circ$ oder wobei α rund 35° beträgt.

5. Bodenreinigungskopf nach einem beliebigen vorhergehenden Anspruch, wobei sich die Rampe um die Peripherie des Agitators zwischen einer Startposition hinter der Drehachse des Agitators und einer Endposition vor der Drehachse des Agitators erstreckt.

6. Bodenreinigungskopf nach Anspruch 5, wobei die Endposition unterhalb der Höhe der Drehachse des Agitators liegt.

7. Bodenreinigungskopf nach Anspruch 5 oder Anspruch 6, wobei, an der Endposition der Rampe, sich die Ablenkfläche von der Seitenwand zwischen einer ersten Kante (74), an der sie auf die Seitenwand trifft und an der sie um einen Abstand D1 von der Drehachse des Agitators radial versetzt ist, und einer zweiten Kante (76), die von der Seitenwand weg und um einen Abstand D2 von der Drehachse des Agitators radial versetzt ist, erstreckt, wobei $D2 > D1$.

8. Bodenreinigungskopf nach Anspruch 7, wobei, an allen Positionen zwischen seiner Startposition und seiner Endposition, der radiale Versatz D1 an der ersten Kante der Ablenkfläche weniger ist als der radiale Versatz D2 an der zweiten Kante der Ablenkfläche.

9. Bodenreinigungskopf nach Anspruch 8, wobei das Verhältnis von D2:D1 zwischen der Startposition und der Endposition zunimmt.

10. Bodenreinigungskopf nach Anspruch 9, wobei das Verhältnis von D2:D1 zwischen der Startposition und der Endposition kontinuierlich zunimmt.

11. Bodenreinigungskopf nach einem beliebigen vorhergehenden Anspruch, wobei mindestens ein Abschnitt der Rampe oberhalb der Drehachse des Agitators liegt.

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12. Bodenreinigungskopf nach einem beliebigen vorhergehenden Anspruch, wobei:

der Agitator angetrieben ist; und/oder
 der Agitator angetrieben ist und der Agitator mit einer Drehzahl von zwischen 1700 U/min und 2500 U/min angetrieben wird; und/oder
 der Agitator aus einem weichen faserigen Material gebildet ist; und/oder
 der Agitator aus Fasern mit einer Länge von zwischen 5 mm und 6 mm gebildet ist; und/oder
 der Agitator ein erster Agitator (42) ist und der Bodenreinigungskopf einen zweiten Agitator (44) bereitstellt, der hinter dem ersten Agitator angeordnet ist.

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13. Bodenreinigungskopf nach einem beliebigen vorhergehenden Anspruch, wobei jedes Ende der Agitorkammer eine jeweilige Rampe bereitstellt.

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14. Staubsauger, beinhaltend:

einen Bodenreinigungskopf (14) nach einem beliebigen der Ansprüche 1 bis 13;
 einen Motor (39) zum Erzeugen einer Saugluftströmung durch den Reiniger zwischen dem Saugeinlass (45) und einem Abführauslass (26); und
 eine Abscheideranordnung (18) zum Abscheiden von Schmutz aus der Luftströmung zwischen dem Saugeinlass und dem Motor.

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15. Staubsauger nach Anspruch 14, wobei der Bodenreinigungskopf in einem Basisabschnitt des Staubsaugers ausgebildet ist.

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Revendications

1. Une tête de nettoyage de sol (14) pour un aspirateur (10), la tête de nettoyage de sol fournissant un boîtier (55) présentant une entrée d'aspiration (45), et le boîtier fournissant :

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une chambre d'agitateur (41) munie d'extrémités formant une paire de parois latérales (66) placées sur des côtés opposés de la tête de nettoyage de sol,

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caractérisée en ce que :

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le boîtier fournit en sus un agitateur (42) configuré de telle manière que chaque extrémité de l'agitateur est soutenue entre et

entourée par les parois latérales et configuré pour tourner autour d'un axe de rotation central longitudinal,
 une extrémité de la chambre d'agitateur fournissant une rampe (64) s'étendant autour d'une partie d'une périphérie de l'agitateur et vers l'intérieur à partir de la paroi latérale, la rampe fournissant une surface de déviation (68) configurée pour faire dévier les particules de saleté vers l'intérieur depuis la paroi latérale vers une partie centrale de la tête de nettoyage de sol.

2. Une tête de nettoyage de sol selon la revendication 1, dans laquelle la surface de déviation est inclinée par rapport à l'axe de rotation de l'agitateur.

3. Une tête de nettoyage de sol selon la revendication 2, dans laquelle l'angle d'inclinaison entre la surface de déviation et l'axe de rotation de l'agitateur est α , où $5^\circ \leq \alpha \leq 75^\circ$.

4. Une tête de nettoyage de sol selon la revendication 3, dans laquelle $15^\circ \leq \alpha \leq 60^\circ$, ou dans laquelle $25^\circ \leq \alpha \leq 45^\circ$, ou dans laquelle α est d'environ 35° .

5. Une tête de nettoyage de sol selon une quelconque revendication précédente, dans laquelle la rampe s'étend autour de la périphérie de l'agitateur entre une position de départ à l'arrière de l'axe de rotation de l'agitateur, et une position terminale devant l'axe de rotation de l'agitateur.

6. Une tête de nettoyage de sol selon la revendication 5, dans laquelle la position terminale se trouve au-dessous de la hauteur de l'axe de rotation de l'agitateur.

7. Une tête de nettoyage de sol selon la revendication 1 ou la revendication 6, dans laquelle au niveau de la position terminale de la rampe, la surface de déviation s'étend depuis la paroi latérale entre un premier bord (74) où elle rencontre la paroi latérale et où elle est décalée radialement d'une distance D1 de l'axe de rotation de l'agitateur, et un deuxième bord (76) éloigné de la paroi latérale, et décalé radialement d'une distance D2 de l'axe de rotation de l'agitateur, où $D2 > D1$.

8. Une tête de nettoyage de sol selon la revendication 7, dans laquelle dans toutes les positions entre sa position de départ et sa position terminale, le décalage radial D1 au niveau du premier bord de la surface de déviation est inférieur au décalage radial D2 au niveau du deuxième bord de la surface de déviation.

9. Une tête de nettoyage de sol selon la revendication

8, dans laquelle le rapport D2:D1 augmente entre la position de départ et la position terminale.

10. Une tête de nettoyage de sol selon la revendication 9, dans laquelle le rapport D2:D1 augmente continuellement entre la position de départ et la position terminale. 5

11. Une tête de nettoyage de sol selon une quelconque revendication précédente, dans laquelle au moins une partie de la rampe se trouve au-dessus de l'axe de rotation de l'agitateur. 10

12. Une tête de nettoyage de sol selon une quelconque revendication précédente, dans laquelle : 15
 - l'agitateur est entraîné ; et/ou
 - l'agitateur est entraîné et l'agitateur est entraîné à une vitesse comprise entre 1700 tr/min et 2500 tr/min m; et/ou 20
 - l'agitateur est formé d'une matière fibreuse douce ; et/ou
 - l'agitateur est formé de fibres d'une longueur comprise entre 5 mm et 6 mm ; et/ou
 - l'agitateur est un premier agitateur (42), et la tête de nettoyage de sol fournit un deuxième agitateur (44) placé à l'arrière du premier agitateur. 25

13. Une tête de nettoyage de sol selon une quelconque revendication précédente, dans laquelle chaque extrémité de la chambre d'agitateur fournit une rampe respective. 30

14. Un aspirateur, comprenant : 35
 - une tête de nettoyage de sol (14) selon une quelconque des revendications 1 à 13 ;
 - un moteur (39) destiné à créer un flux d'aspiration d'air à travers l'aspirateur entre l'entrée d'aspiration (45) et une sortie d'échappement (26) ; et 40
 - un ensemble séparateur (18) destiné à séparer la saleté du flux d'air entre l'entrée d'aspiration et le moteur. 45

15. Un aspirateur selon la revendication 14, dans lequel la tête de nettoyage de sol est formée dans une partie de la base de l'aspirateur. 50

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FIGURE 1

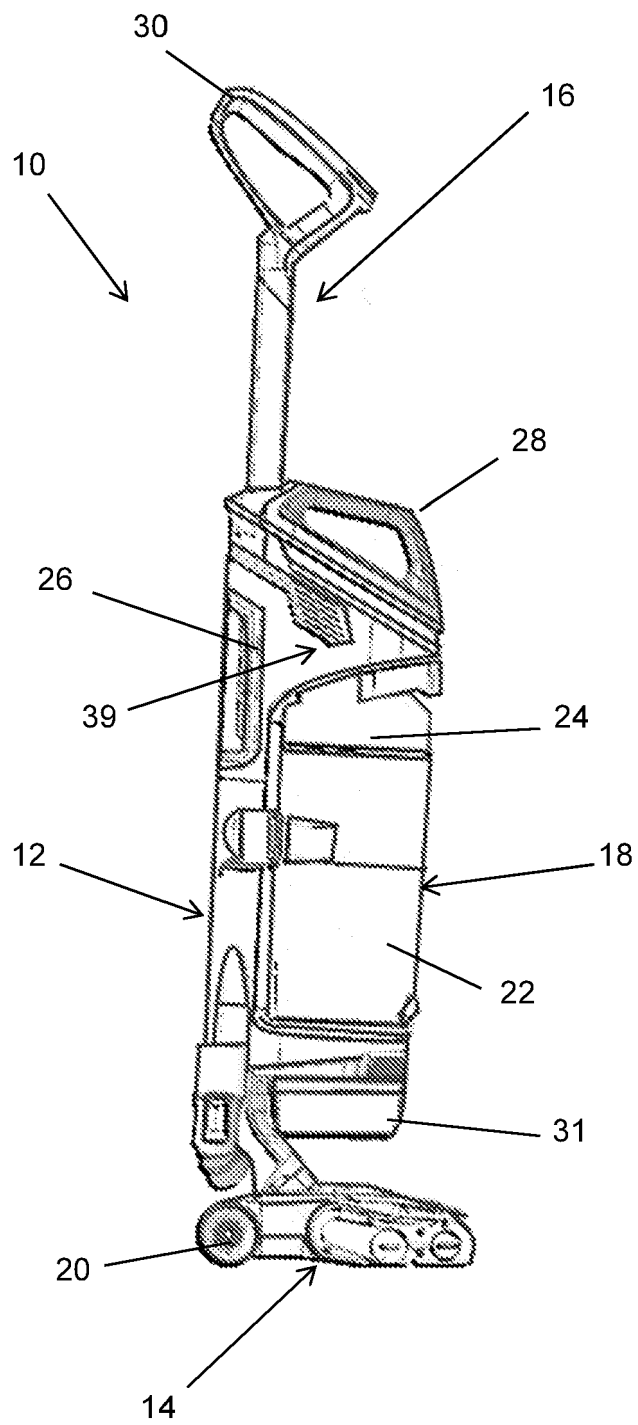


FIGURE 2

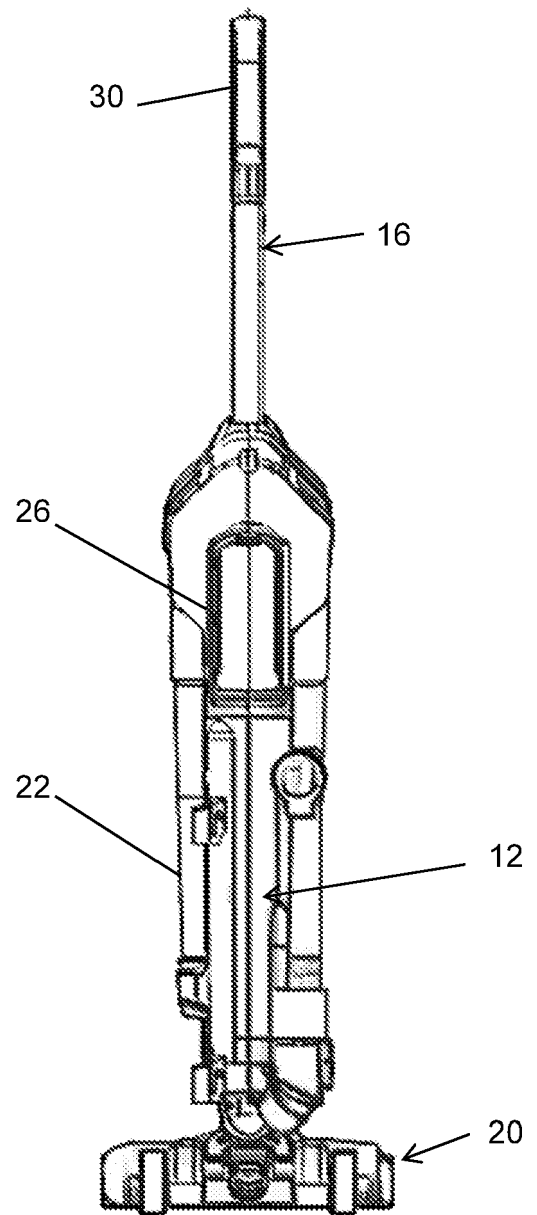


FIGURE 3

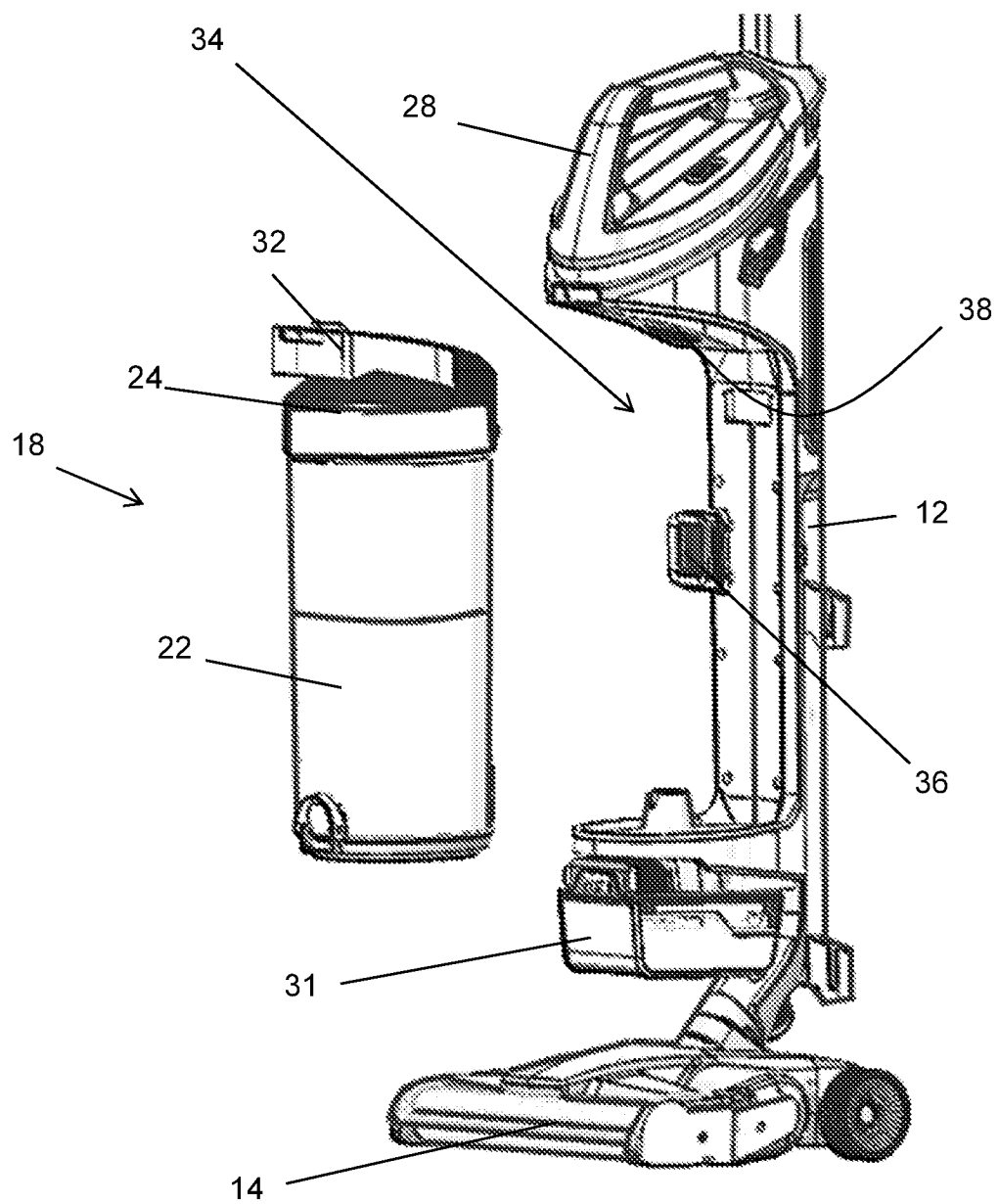


FIGURE 4

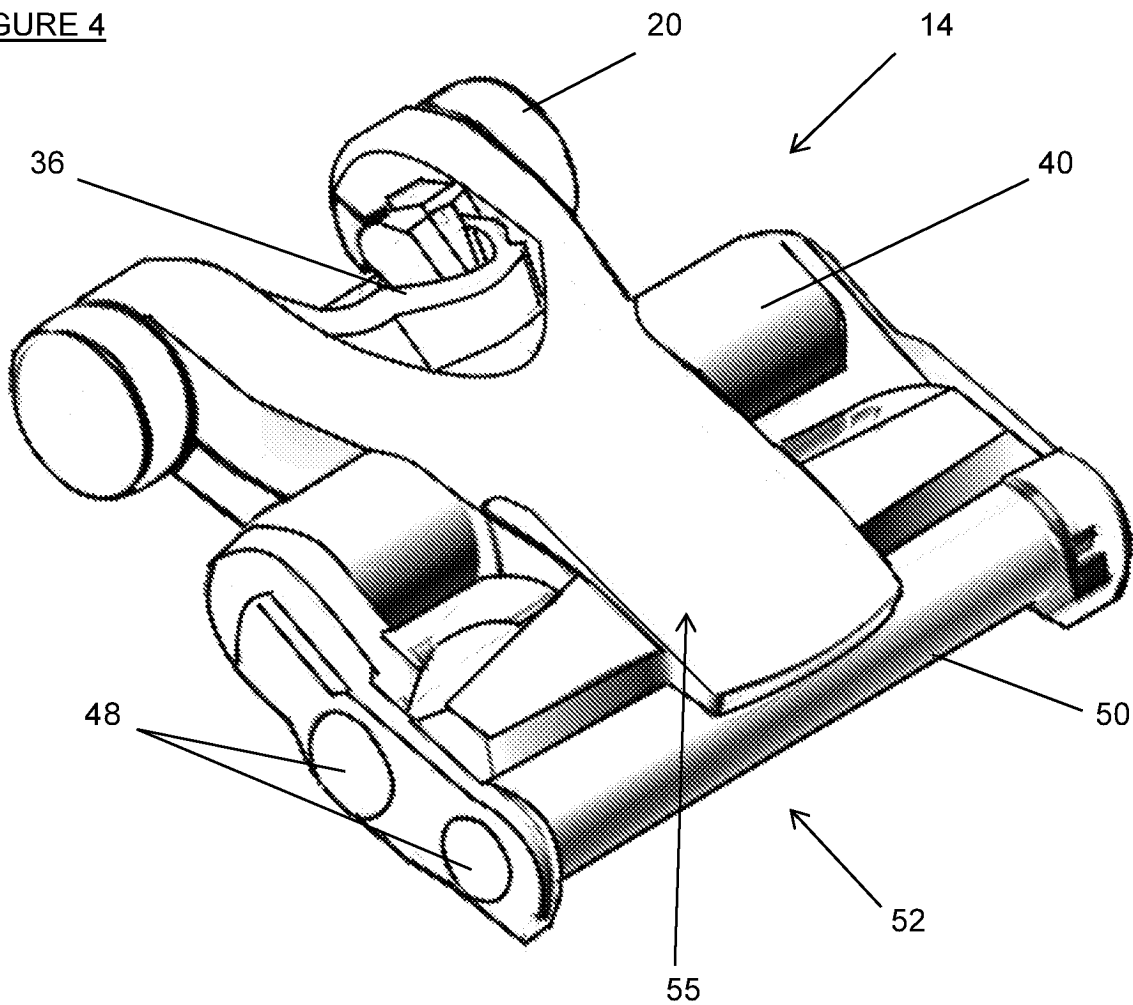


FIGURE 5

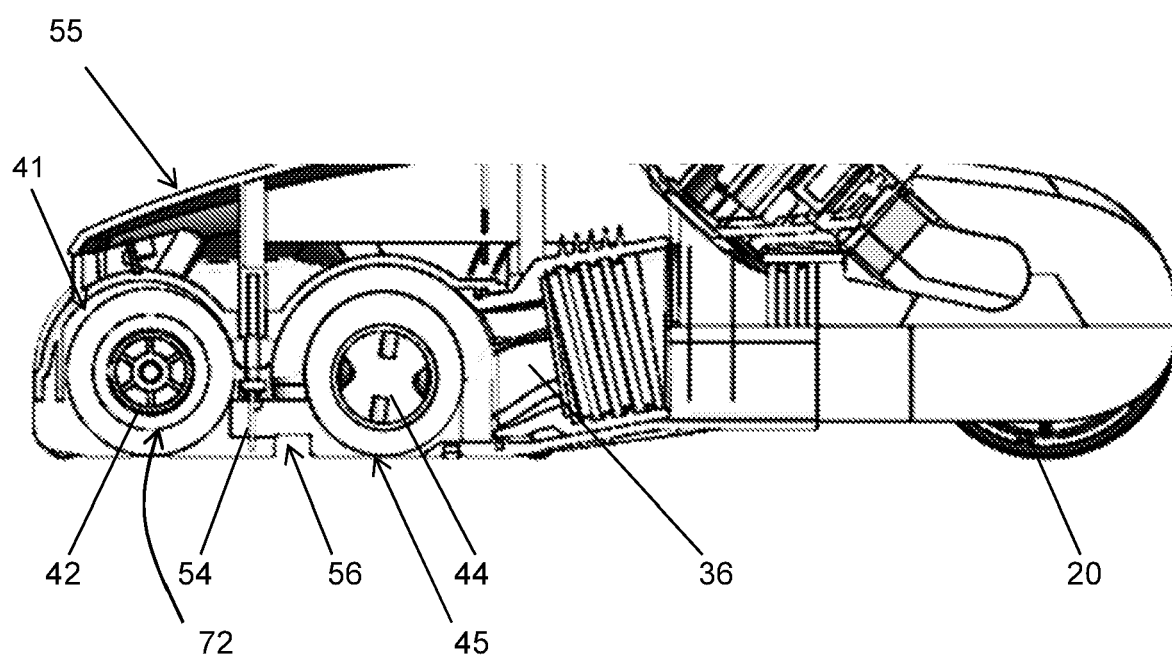


FIGURE 6

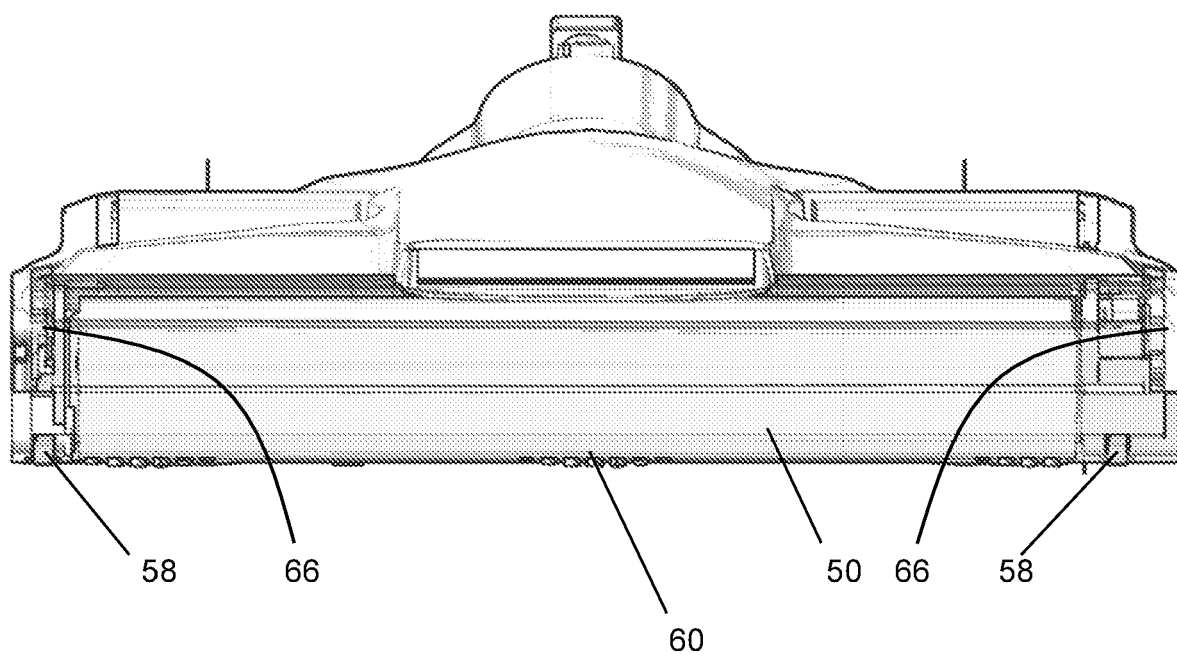


FIGURE 7

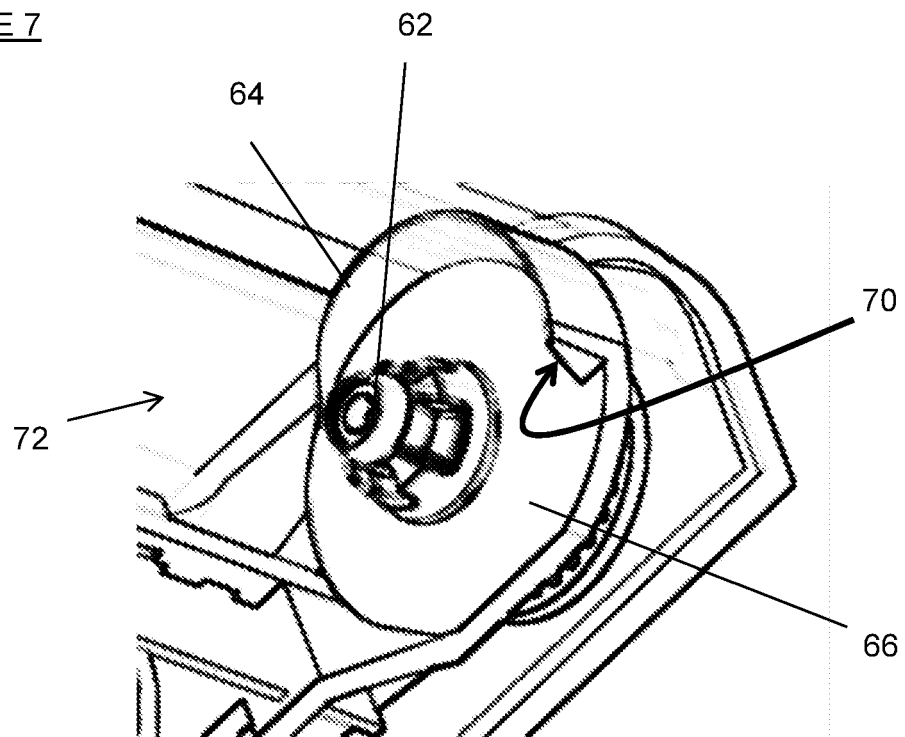


FIGURE 8

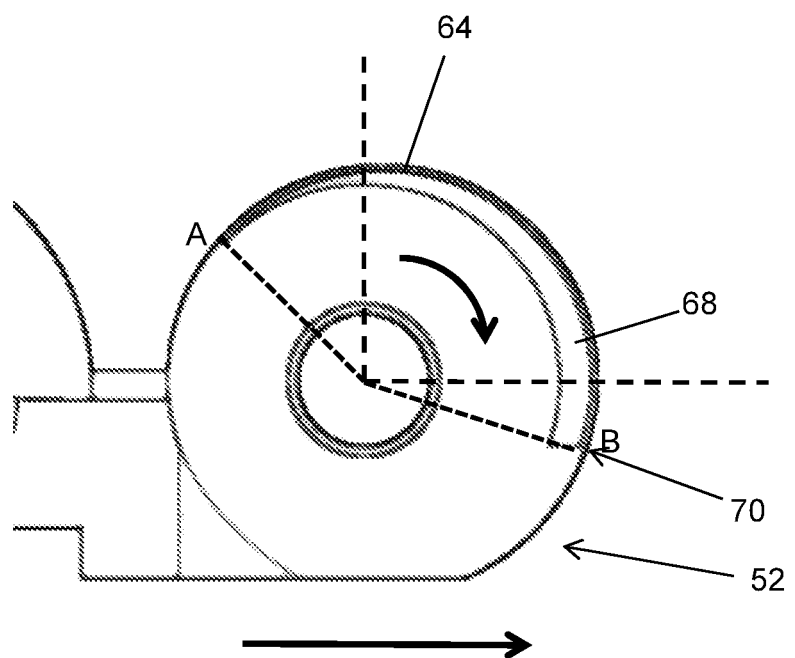


FIGURE 9

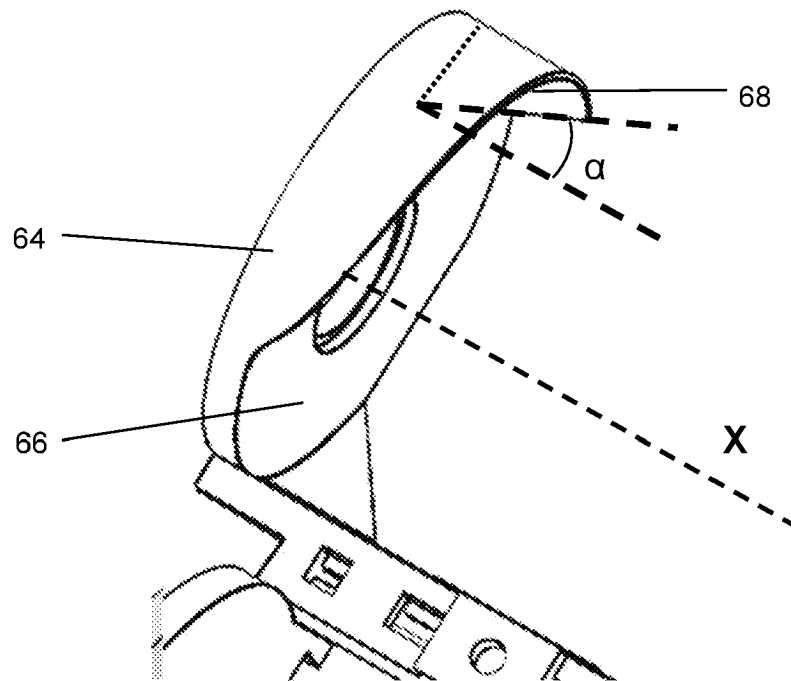
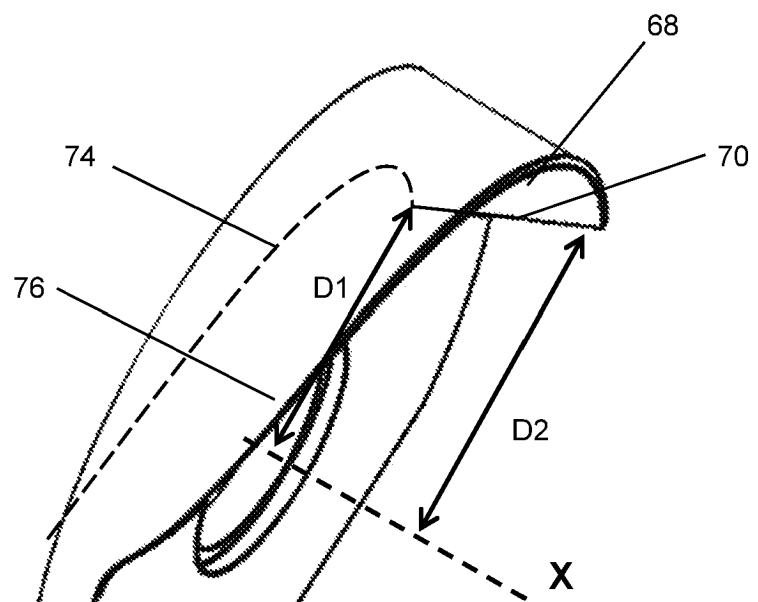


FIGURE 10



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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