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(54) **CLEANING HEAD FOR A WET VACUUM CLEANER**

(57) A cleaning head for a wet vacuum cleaner has first and second rotary brushes, each extending across a width of a housing. The housing comprises a first projection extending inwardly into a space between the brushes and having a first guide channel creating an air cavity over the floor, and a second projection extending

inwardly the said space. The second projection has a second guide channel creating another cavity over the floor. These cavities promote lateral air flow into the space between the brushes and thereby reduce pooling of water.

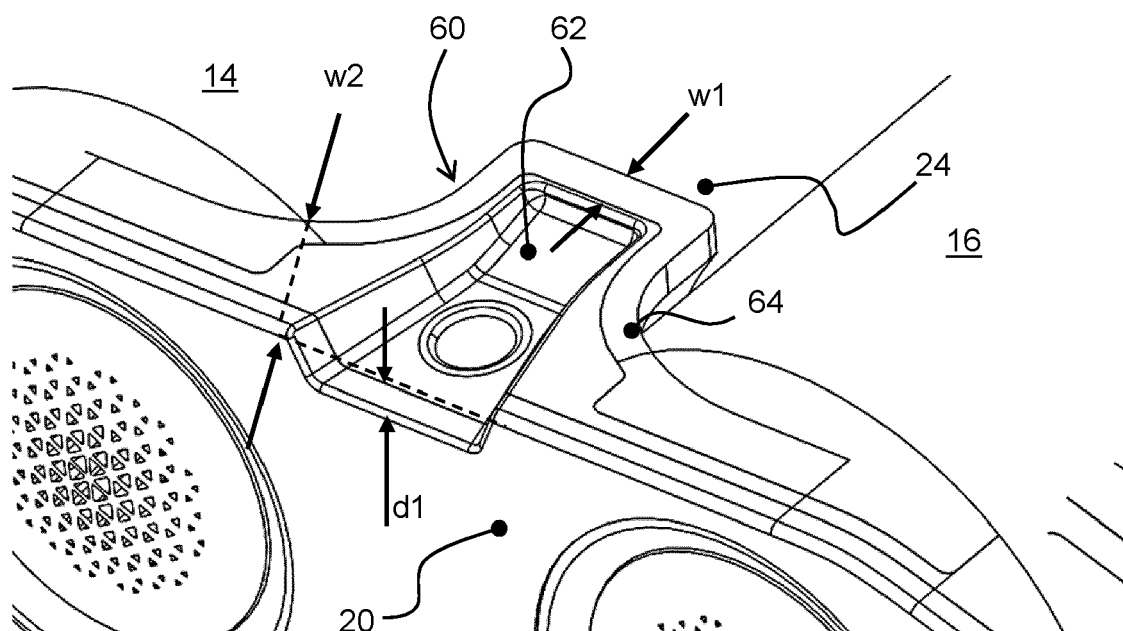


FIG. 6

Description

FIELD OF THE INVENTION

[0001] This invention relates to a cleaning head for a wet vacuum cleaner.

BACKGROUND OF THE INVENTION

[0002] Wet vacuum cleaners are known in which the cleaning head (often known as the "nozzle") has two counter-rotating brushes. Suction is applied at least to the space between the brushes to draw up liquid from the floor that has been delivered to the floor by the vacuum cleaner. The brushes contact the floor to perform a scrubbing action.

[0003] There are mains-powered as well as battery-operated wet vacuum cleaners. For battery-operated devices, there is a desire to consume a minimum amount of power and to have a small footprint of the cleaning head.

[0004] A problem with this reduction in footprint is that water puddles may form on the floor being cleaned.

[0005] In some known designs, the picking up of water is achieved using vacuum suction in combination with an external squeegee. High air velocities along the squeegee create drag on the water, which pulls the water into the suction nozzle. The vacuum suction can also generate a drag force outside the reach of the brush, so even if there is space between the brush and the squeegee, the airflow can pull the water along the floor, towards the squeegee and towards the suction nozzle.

[0006] In other designs, the water is picked up using a capillary effect of the brush tufts themselves. When a brush tuft hits the floor, it momentarily has no centrifugal acceleration, so it is then able to soak in some water via capillary effects. Next, the tuft is driven off the floor surface and into the air. This provides active fluid transport by the brushes.

[0007] The rear brush is for example fed with water continuously, so that it will fling water around continuously, both to the inner housing, to the floor, as well as to the front brush. Water that is picked up from the floor will also be flung around and will partly hit the front brush.

[0008] The front brush is therefore wetted by three phenomena:

- (i) The back brush spraying water onto it.
- (ii) The wet floor in contact with the front brush.
- (iii) The water that is on the inside of the housing, which will drop onto the brush, or will be guided back into the brush by means of a spoiler (which is the last element contact with the brush before it leaves the housing).

[0009] The benefit of this water pickup principle using tufts, instead of by airflow and a squeegee, is that it is much more effective in picking up water hence uses less

energy, and it can cope with uneven surfaces easily because the tufts are indented by the floor as part of the water pickup mechanism for example by about 3mm.

[0010] However, whenever water is out of reach of the brush tips, it will no longer be pulled into the brush anymore and will thus start to pool and thereby create a puddle.

[0011] During movement of the cleaner head, the drag on the floor will pull the water into one of the brushes, but during standstill, there are no forces acting on the water puddle to remove it. This leaves it on the floor when the nozzle is removed, which is undesirable.

[0012] There is a need for a cleaner head design which reduces puddling, in particular without using a squeegee.

SUMMARY OF THE INVENTION

[0013] The invention is defined by the claims.

[0014] According to examples in accordance with an aspect of the invention, there is provided a cleaning head for a wet vacuum cleaner, comprising:

a housing having a width between first and second side walls and a length, the length being parallel to an intended main direction of movement of the cleaning head over a floor to be cleaned, wherein the housing has a minimum spacing over the floor to be cleaned;

first and second rotary brushes, each extending across the width of the housing between the first and second side walls, with parallel rotation axes, and side by side in the length direction; and

a suction channel for delivering suction to at least a space between the first and second rotary brushes; wherein the housing comprises:

a first projection extending inwardly from the first side wall into said space, the first projection having a first guide channel creating a first region of greater spacing than the minimum spacing; and

a second projection extending inwardly from the second side wall into said space, the second projection having a second guide channel creating a second region of greater spacing than the minimum spacing.

[0015] This cleaning head has a pair of rotary brushes side by side. Air can enter the space between the rotary brushes by means of the first and second guide channels, formed at inward projections which extend into the space between the brushes. This assists in clearing any puddles formed on the floor to be cleaned, for example if the cleaning head is stationary. The guide channels form an enlarged spacing to the floor to be cleaned, to promote air flow, driven by the suction applied to the cleaning head.

[0016] The guide channels in particular prevent pool-

ing of water at the ends of the rotary brushes. Such pooling at the ends is particularly responsible for curved water traces if the cleaning head is moved along a sharp curved path, because centrifugal forces drive liquid out from the end of the space between the rotary brushes.

[0017] The head design thus reduces pooling as well as reducing curved traces, during use of the cleaning head.

[0018] The housing may be rectangular so that the side walls are parallel, but the side walls may be non-parallel for example with a triangular or trapezium shaped housing. The first and second brushes may have the same length (in the width direction of the head) or they may have different lengths.

[0019] The first and second projections may each extend across the space between the first and second rotary brushes in the length direction.

[0020] The projections thus define a closed loop around the space between the rotary brushes at the ends of the rotary brushes, and thereby prevent liquid pooling at the ends of the brushes, which can lead to curved traces.

[0021] The first and second projections may each comprise a rim around the respective guide channel, wherein the rim is formed at the minimum spacing.

[0022] Thus, the part of the housing that defines the minimum spacing also forms a rim around the projection, and this is for example continuous with an edge around the whole of the cleaning head.

[0023] The rim for example has a thickness, parallel to the plane defined by the minimum spacing, in the range 1mm to 15mm.

[0024] The first and second regions of greater spacing may have a spacing between 1mm and 6mm greater than the minimum spacing.

[0025] This increased spacing formed by the guide channels is sufficient to create an inward air flow to the space between the brushes. In particular it is comparable with or greater than the minimum spacing over the floor.

[0026] The minimum spacing is for example in the range 1.5 mm to 5 mm such as 2mm to 3mm.

[0027] This minimum spacing is the amount by which the brushes project below a lowest bottom surface of the cleaning head into contact with the floor. The spacing is chosen to promote air flow, driven by the suction applied to the cleaning head.

[0028] The cleaning head may further comprise a support wheel arrangement for mounting the housing at the minimum spacing over the floor to be cleaned.

[0029] The contact of the support wheel arrangement with the floor, and the mounting of the support wheel arrangement to the housing, defines the spacing by which the housing is mounted over the floor.

[0030] The support wheel arrangement may comprise:

a first support wheel in the space between the first and second rotary brushes, set back from the first side wall; and

a second support wheel in the space between the first and second rotary brushes, set back from the second side wall.

[0031] To save space, first and second support wheels are positioned between the rotary brushes, near, but set back from, the ends. Instead of positioning the first and second support wheels at or beyond the ends of the rotary brushes, they are set back from the ends. In other words, the outermost extent of the support wheels in the width direction does not reach the ends of the rotary brushes. In this way, the wheels do not leave traces on the floor as they are covered by the brushes. Furthermore, air can enter via the guide channels without initially being blocked by the first and second support wheels.

[0032] The cleaning head may further comprise a third support wheel in front of or behind the first and second rotary brushes in the length direction, and optionally a fourth support wheel side-by-side with the third support wheel.

[0033] A third support wheel is positioned behind or in front of the rotary brushes, to form at least a triangular support for the cleaning head. A fourth support wheel provides a stable four point support for the cleaning head.

[0034] The first and second support wheels are for example each set back by a distance in the range 1cm to 5cm from the respective ends of the rotary brushes, for example in the range 2cm to 4cm. This amount of the recessing of the wheels for example corresponds approximately to a length (in the width direction) of the projections.

[0035] The cleaning head preferably further comprises a drive arrangement for driving the first and second rotary brushes in opposite rotation directions.

[0036] The brushes thus pick up debris and moisture from the floor. The drive arrangement is for example for driving the rotary brushes to have an upward movement at the sides which face each other. This upward movement feeds a suction nozzle.

[0037] The drive arrangement for example comprises:

a single motor and a belt drive for driving the rotary brushes; or

a respective motor for each of the first and second rotary brushes.

[0038] When a separate motor is provided, it may be mounted in the core of the respective rotary brush.

[0039] The cleaning head preferably further comprises a fluid delivery arrangement for delivering fluid to the first and/or second rotary brushes.

[0040] Fluid may for example be delivered to the rotary brush at the back of the cleaning head.

[0041] The invention also provides a wet vacuum cleaner comprising:

the cleaning head defined above;
a pump for delivering suction to the suction channel

of the cleaning head; and a fluid reservoir delivering cleaning fluid to the cleaning head.

[0042] These and other aspects of the invention will be apparent from and elucidated with reference to the embodiment(s) described hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0043] For a better understanding of the invention, and to show more clearly how it may be carried into effect, reference will now be made, by way of example only, to the accompanying drawings, in which:

Fig. 1 shows a known layout for a wet floor cleaner head;

Fig. 2 shows another known layout to achieve a smaller and more compact cleaning head;

Fig. 3 shows a cross section through one of the rear support wheels of the cleaning head of Fig. 2;

Fig. 4 shows where a water puddle is formed, for example if the cleaning head is stationary for a while or lifted;

Fig. 5 shows another related problem with the water puddle;

Fig. 6 shows a cleaning head design in accordance with an example of the invention;

Fig. 7 shows how the wheels are positioned; and

Fig. 8 shows a view of the underside of the cleaning heads.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0044] The invention will be described with reference to the Figures.

[0045] It should be understood that the detailed description and specific examples, while indicating exemplary embodiments of the apparatus, systems and methods, are intended for purposes of illustration only and are not intended to limit the scope of the invention. These and other features, aspects, and advantages of the apparatus, systems and methods of the present invention will become better understood from the following description, appended claims, and accompanying drawings. It should be understood that the Figures are merely schematic and are not drawn to scale. It should also be understood that the same reference numerals are used throughout the Figures to indicate the same or similar parts.

[0046] The invention provides a cleaning head for a wet vacuum cleaner that has first and second rotary brushes, each extending across a width of a housing. The housing comprises a first projection extending inwardly into a space between the brushes and having a first guide channel creating an air cavity over the floor, and a second projection extending inwardly the said space. The second projection has a second guide channel creating another cavity over the floor. These cavities

promote lateral air flow into the space between the brushes and thereby reduce pooling of water.

[0047] Fig. 1 shows a known layout for a wet floor cleaner head 10, viewed from the underside. The head comprises a housing 12 which supports a first, front brush 14 and a second, rear brush 16. A set of four support wheels 18 is arranged in a rectangular configuration behind the rear brush 16.

[0048] A main direction of motion of the cleaning head in use is parallel to a length direction of the cleaning head, perpendicular to the width direction of the housing as defined above. The main direction of movement is shown by the large arrow. This motion tends to roll the brushes over the floor.

[0049] Fig. 2 shows another known layout to achieve a smaller and more compact cleaning head, for example more suitable for a battery-operated device.

[0050] The head 10 again comprises a housing 12 which supports a first, front brush 14 and a second, rear, brush 16.

[0051] The housing 12 has width W between first and second side walls 20, 22 and a length L, the length being parallel to the intended main direction of movement of the cleaning head over a floor to be cleaned.

[0052] The first and second rotary brushes 14, 16, each extend across the width of the housing between the first and second side walls 20, 22, with parallel rotation axes, and side by side in the length direction. A suction channel is provided for delivering suction to at least a space 24 between the first and second rotary brushes 14, 16. Indeed the suction will be applied to the general volume of the housing.

[0053] This definition of the width direction and length direction of the cleaning head is applicable throughout this text.

[0054] The support wheel arrangement in this design comprises a first support wheel 30 in the space 24 between the first and second rotary brushes and a second support wheel 32 in the space 24 between the first and second rotary brushes. The outer faces of the wheels are, in the known design, approximately flush with the side walls.

[0055] Mounting the first and second support wheels between the rotary brushes saves space. There is a third support wheel 34 behind the first and second rotary brushes (it could instead be in front) in the length direction, and a fourth support wheel 36 side-by-side with the third support wheel 34.

[0056] Fig. 3 shows a cross section through one 34 of the rear support wheels 34, 36 of the cleaning head of Fig. 2, and shows the support wheel 30 further back (behind the plane of the cross section). It shows that the first and second rotary brushes 14, 16 are driven in opposite rotation directions, so that they move upwardly where they face each other, in the space 24. A suction channel 40 delivers suction to at least the space 24 between the first and second rotary brushes.

[0057] The rotary brushes are driven by a drive ar-

rangement which may comprise single motor and a belt drive for driving the two rotary brushes. Alternatively, each rotary brush may have its own a respective motor mounted in the core of the respective rotary brush.

[0058] The cleaning head also has a fluid delivery arrangement (not shown) for delivering fluid to the first and/or second rotary brushes. Fluid may for example be delivered to the rotary brush 16 at the back of the cleaning head from a reservoir formed in a main housing of the vacuum cleaner.

[0059] The rotation of the first and second brushes results in the cleaning head blowing outwardly from the front and back. It also creates an under pressure in the space between the brushes (since air is removed continuously), which creates lateral air suction.

[0060] The mounting of the support wheels by the housing defines a minimum spacing S between a bottom surface of the housing and the floor surface. This minimum spacing is for example in the range 1.5 mm to 3 mm. The rotary brushes project below the level of the floor (when the floor is not present) so that the tufts are deformed by the presence of the floor. This defines a floor indentation and it is part of the water gathering function, as explained above.

[0061] Fig. 3 also shows front and rear spoilers 42 for guiding water which has been sprayed against the housing back to the brushes.

[0062] A problem with the compact head design is that larger puddles are formed. In particular, the new support wheel positions, in particular the first and second support wheels between the brushes at their outermost sides, prevents air flow from the sides and it leads to accumulation of a larger water puddle.

[0063] Fig. 4 shows where a water puddle 50 is formed, for example if the cleaning head is lifted or not moved for a period of time.

[0064] Fig. 5 shows another related problem with the water puddle. It can create an additional wet stripe 52 when the cleaning head makes sharp turns (shown by the arrow). This is due to centrifugal force pulling the water out from underneath the cleaning head. In particular, during steering, there are no forces acting on the water to make it follow the turns. Instead, the water moves in a straight line, while the cleaning head nozzle is making a turn. At some point during the turn, a puddle will have moved to the side sufficiently to attempt to escape the cleaning head from the side, leaving the stripe 52 of water on the floor.

[0065] The increased pooling is for example mainly the result of the blockage created by the first and second support wheels. The issue is exacerbated for a battery operated device, because of a reduced airflow rate that is achievable, for example around 6 liters/second instead of around 10 liters/second for a mains system.

[0066] A lateral inward flow is desirable as it blows water inwardly from the sides, so it is no longer present to create stripes when making a turn. An inward air flow will also form a smaller area but thicker puddle. The thicker

puddles will have a tendency to spread out, but since spreading laterally outwardly is inhibited by the inward air flow, the spreading will be towards the brushes such that the puddle is picked up more effectively.

5 **[0067]** The lighter cleaning head and the wheel layout (of Fig. 2) is more maneuverable so that sharp turns are more likely.

[0068] Fig. 6 shows a cleaning head design in accordance with an example of the invention.

10 **[0069]** The cleaning head has the general layout shown in Fig. 2, so is suitable for a low power battery operated wet vacuum cleaner. However, an arrangement is provided for promoting inward lateral air flow. In addition, the first and second support wheels inset from the side walls as explained below.

15 **[0070]** Fig. 6 shows the underside of the cleaning head (without showing the support wheels) at one lateral side 20 of the housing, and hence at one end of the brushes 14, 16.

20 **[0071]** At each lateral side, there is a projection extending inwardly from the respective side wall into the space 24 between the brushes 14, 16. Each projection has a guide channel creating a first region of greater spacing over the floor to be cleaned than the minimum spacing.

25 **[0072]** Fig. 6 thus shows a first projection 60 extending inwardly from the first side wall 20 into the space 24. The first projection 60 has a first guide channel 62 creating a first region of greater spacing than the minimum spacing. This region of greater spacing is in particular formed as an opening in the side wall 20 so that when viewed from the side, there is a region of increased height above the floor, functioning as an air opening into a cavity defined by the guide channel 62.

30 **[0073]** The guide channel has a U-shape, with a wide opening at the lateral side 20 and a closed end at the inset end of the projection.

35 **[0074]** Air can laterally enter the space between the rotary brushes by means of the first guide channel 62. This assists in clearing any wet puddles formed on the floor to be cleaned, for example if the cleaning head is stationary. The guide channels form an enlarged spacing to the floor to be cleaned, to promote air flow, driven by the suction applied to the cleaning head as well as by the rotation of the brushes.

40 **[0075]** The guide channels in particular prevent pooling of water at the ends of the rotary brushes. Such pooling at the ends is particularly responsible for curved water traces if the cleaning head is moved along a sharp curved path, because centrifugal forces drive liquid out from the end of the space between the rotary brushes.

45 **[0076]** The head design thus reduces pooling as well as reducing curved traces, during use of the cleaning head.

50 **[0077]** The first projection 60 extends across the space between the first and second rotary brushes 14, 16 in the length direction but without inhibiting the rotation of the brushes. The projection acts both as a blocking tray, so that water from inside the housing does not drip to the

floor at the ends of the rotary brushes, and as a frame for creating an air flow channel.

[0078] The first projection 60 has a rim 64 around the guide channel 62. The rim is coplanar with the main underside of the housing such that the rim 64 is formed as part of the housing which defines the minimum spacing. The guide channel 62 is formed as a raised region (raised when the cleaning head is in the upright orientation) such that an enlarged channel opening is defined at the lateral side 20 of the housing.

[0079] The rim for example has a width (i.e. thickness), parallel to the plane defined by the minimum spacing, in the range 1mm to 15mm. The particular shape shown has a minimum rim width w_1 of around 3mm and a maximum rim width w_2 of around 11mm.

[0080] The channel opening for example has a depth d_1 in the range 1mm to 6mm. In one example is it approximately 4mm (in the range 3mm to 5mm). The distance to the floor is thus greater than the minimum spacing (e.g. 1.5mm to 5mm, such as 2.75mm) set by the housing by an amount corresponding to the dimension d_1 .

[0081] This increased spacing formed by the guide channels is sufficient to create an inward air flow to the space between the brushes. In particular it is comparable with or greater than the minimum spacing S itself.

[0082] The guide channel 62 is for example tapered in its depth so that it merges with the rim at the lateral inward end of the projection 60. Air is pulled in towards brushes through the cavity. This airflow prevents the water accumulating to form a puddle.

[0083] Fig. 7 shows how the wheels are positioned. The first and second support wheels are mounted in the space 24 between the first and second rotary brushes, but set back from the respective side wall. Thus, Fig. 7 shows the first support wheel 30 set back from the first side wall 20.

[0084] The first and second support wheels (in particular their sides closest to the respective side wall of the housing) are for example each set back by a distance D in the range 1cm to 5cm from the respective ends of the rotary brushes, for example in the range 2cm to 4cm. Traces made by the wheels are thereby covered by the brushes.

[0085] The design of the invention makes use of the lateral inward airflow, explained above, to push water laterally inwardly, by creating a high velocity airstream that pushes the water into the cleaning head.

[0086] The guide channel, and the resulting cavity, reduces the resistance for air to enter the cleaning head from the side. This allows for the airflow (in liters/second) to remain as high as possible for the available power of the vacuum pump.

[0087] Because the inward end of the projection terminates at the rim (at the minimum spacing above the floor), the flow into the cavity is converted into a high speed air flow by means of a small slit (i.e. the gap to the floor). The rim around the guide channel 62 in the example shown has a general U-shape, thereby defining a U-

shaped guide channel, and the guide channel extends into the space between the brushes to reduce the open area. A U-shaped channel is just an example. The guide channel may be any desired shape, with a curved or an angular outer shape, such as rectangular or triangular.

[0088] The side arms of the guide channel that are next to the brushes direct water that is leaving the housing back into the brushes again. In particular, the rim around each guide channel directs the water towards the center of the cleaning head (in the lateral width direction), making it harder for water to be released from the sides.

[0089] The overall shape of the rim also creates an air barrier/fence through which water cannot escape as air not only blows laterally inwardly but also sideways. This air barrier/fence is very efficient in preventing water from escaping from the sides during steering of the cleaning head.

[0090] The lateral inward and sideways air flow from the guide channels contributes to the functioning of this air barrier/fence. The high-speed air that passes through the small slit underneath the rim, at the laterally inward end of the guide channels, also continuously pushes water towards the center, thereby preventing stripes even during sharp turns as well as reducing the size of a puddle in the center.

[0091] The guide channel is also designed to create a low air resistance entrance at the laterally outermost ends of the guide channels, so that the air power of the vacuum cleaner is able to drive a desired air flow under the rim.

[0092] Fig. 8 shows a view of the underside of the cleaning heads. It shows the first projection 60 as well as the second protection 80, and the first guide channel 62 as well as the second guide channel 82.

[0093] The housing is shown as generally rectangular so that the side walls 20, 22 are parallel, but the side walls may be non-parallel for example with a triangular or trapezium shaped housing. The first and second brushes may have the same length (in the width direction of the head) or they may have different lengths.

[0094] The cleaning head is preferably part of wet vacuum cleaner comprising a pump for delivering suction to the suction channel of the cleaning head and a fluid reservoir delivering cleaning fluid to the cleaning head.

[0095] Variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure and the appended claims. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality.

[0096] The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

[0097] If the term "adapted to" is used in the claims or description, it is noted the term "adapted to" is intended to be equivalent to the term "configured to".

[0098] Any reference signs in the claims should not be construed as limiting the scope.

Claims

1. A cleaning head (10) for a wet vacuum cleaner, comprising:

a housing (12) having a width between first and second side walls (20, 22) and a length, the length being parallel to an intended main direction of movement of the cleaning head over a floor to be cleaned, wherein the housing has a minimum spacing (S) over the floor to be cleaned;

first and second rotary brushes (14, 16), each extending across the width of the housing (12) between the first and second side walls (20, 22) with parallel rotation axes, and side by side in the length direction; and

a suction channel (40) for delivering suction to at least a space (24) between the first and second rotary brushes (14, 16);

wherein the housing (12) comprises:

a first projection (60) extending inwardly from the first side wall into said space, the first projection having a first guide channel (62) creating a first region of greater spacing than the minimum spacing; and

a second projection (80) extending inwardly from the second side wall into said space, the second projection having a second guide channel (82) creating a second region of greater spacing than the minimum spacing.

2. The cleaning head of claim 1, wherein the first and second projections (60, 80) each extend across the space between the first and second rotary brushes in the length direction.

3. The cleaning head of claim 1 or 2, wherein the first and second projections (60, 80) each comprise a rim (64) around the respective guide channel, wherein the rim (64) is formed at the minimum spacing.

4. The cleaning head of claim 3, wherein the rim (64) has a thickness, parallel to the plane defined by the minimum spacing, in the range 1mm to 15mm.

5. The cleaning head of any one of claims 1 to 4, wherein the first and second regions of greater spacing have a spacing (d1) between 1mm and 6mm greater than the minimum spacing.

6. The cleaning head of any one of claims 1 to 5, where-

in the minimum spacing (S) is in the range 1.5mm to 5mm.

7. The cleaning head of any one of claims 1 to 6, further comprising a support wheel arrangement (30, 32, 34, 36) for mounting the housing at the minimum spacing over the floor to be cleaned.

8. The cleaning head of claim 7, wherein the support wheel arrangement comprises:

a first support wheel (30) in the space (24) between the first and second rotary brushes, set back from the first side wall (20); and

a second support wheel (32) in the space (24) between the first and second rotary brushes, set back from the second side wall (22).

9. The cleaning head of claim 8, further comprising a third support wheel (34) in front of or behind the first and second rotary brushes in the length direction, and optionally a fourth support wheel (36) side-by-side with the third support wheel.

10. The cleaning head of claim 8 or 9, wherein the first and second support wheels (30, 32) are each set back by a distance (D) in the range 1cm to 5cm from the respective ends of the rotary brushes, for example in the range 2cm to 4cm.

11. The cleaning head of any one of claims 1 to 10, further comprising a drive arrangement for driving the first and second rotary brushes in opposite rotation directions.

12. The cleaning head of claim 11, wherein the drive arrangement comprises:

a single motor and a belt drive for driving the rotary brushes; or
a respective motor for each of the first and second rotary brushes.

13. The cleaning head of any one of claims 1 to 12, further comprising a fluid delivery arrangement for delivering fluid to the first and/or second rotary brushes.

14. A wet vacuum cleaner comprising:

the cleaning head of any one of claims 1 to 13;
a pump for delivering suction to the suction channel of the cleaning head; and
a fluid reservoir delivering cleaning fluid to the cleaning head.

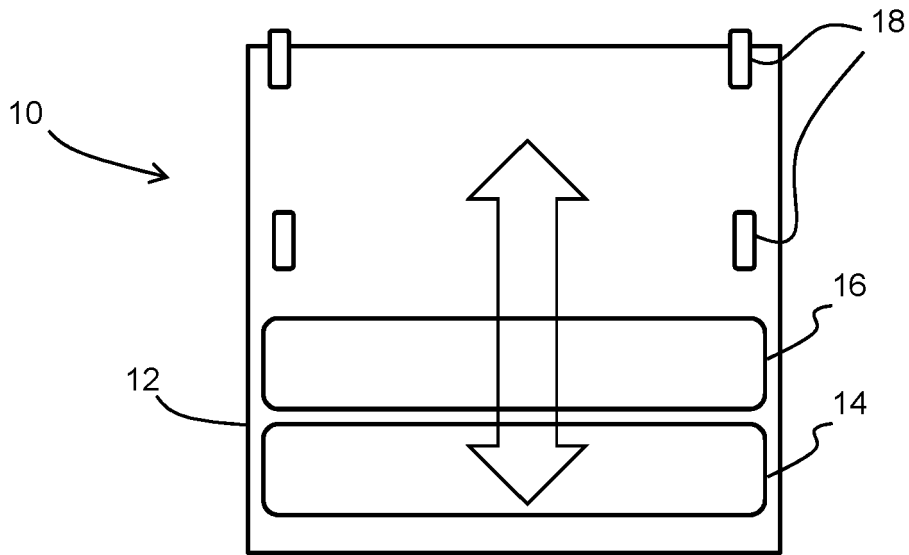


FIG. 1

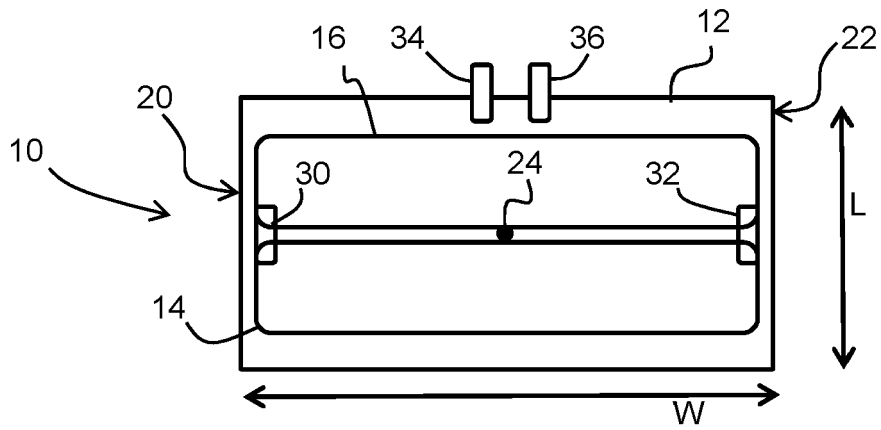


FIG. 2

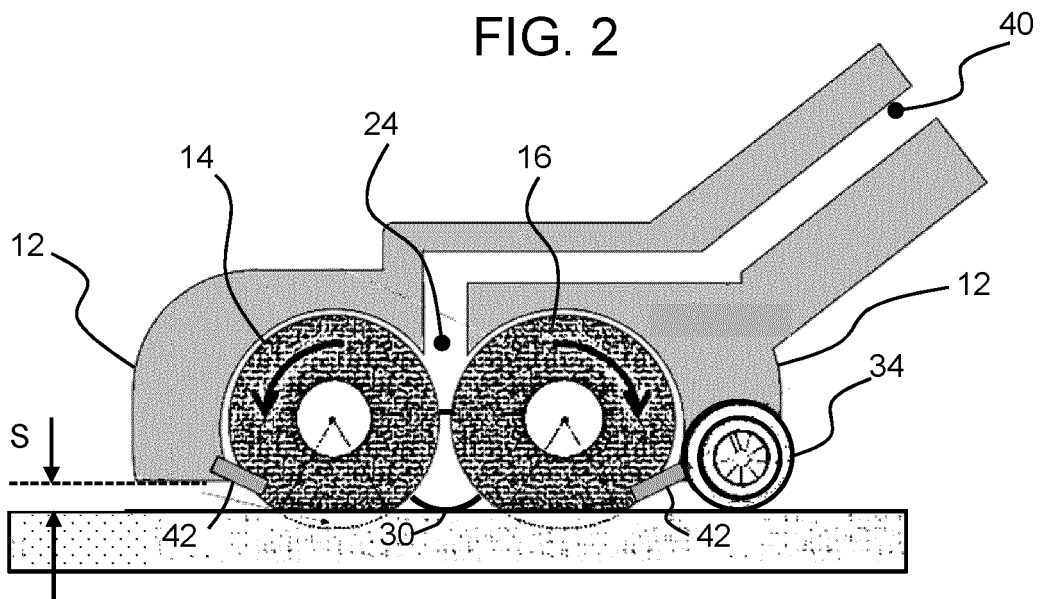


FIG. 3

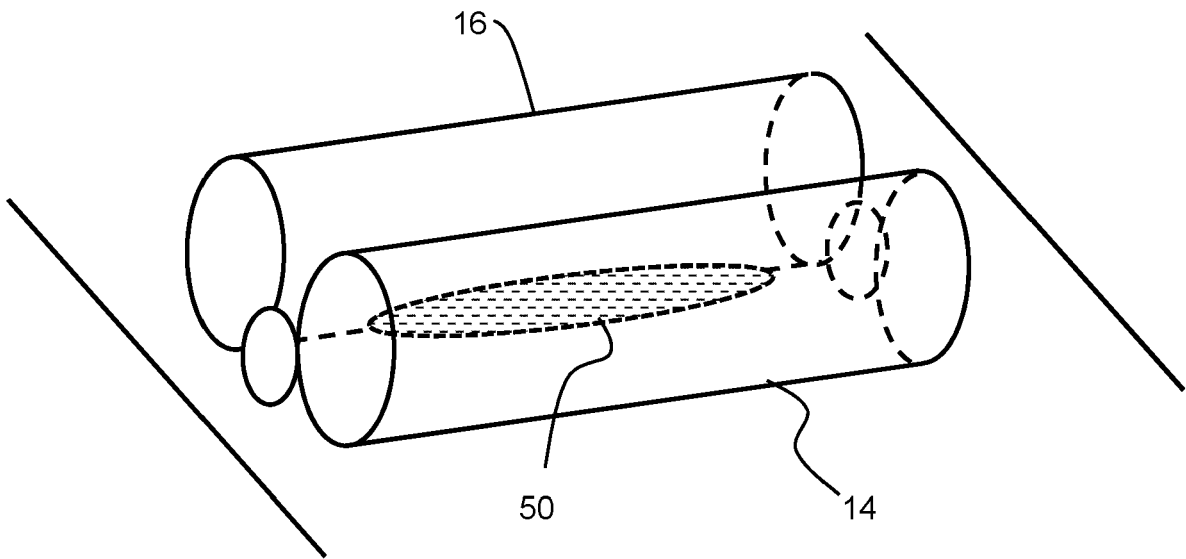


FIG. 4

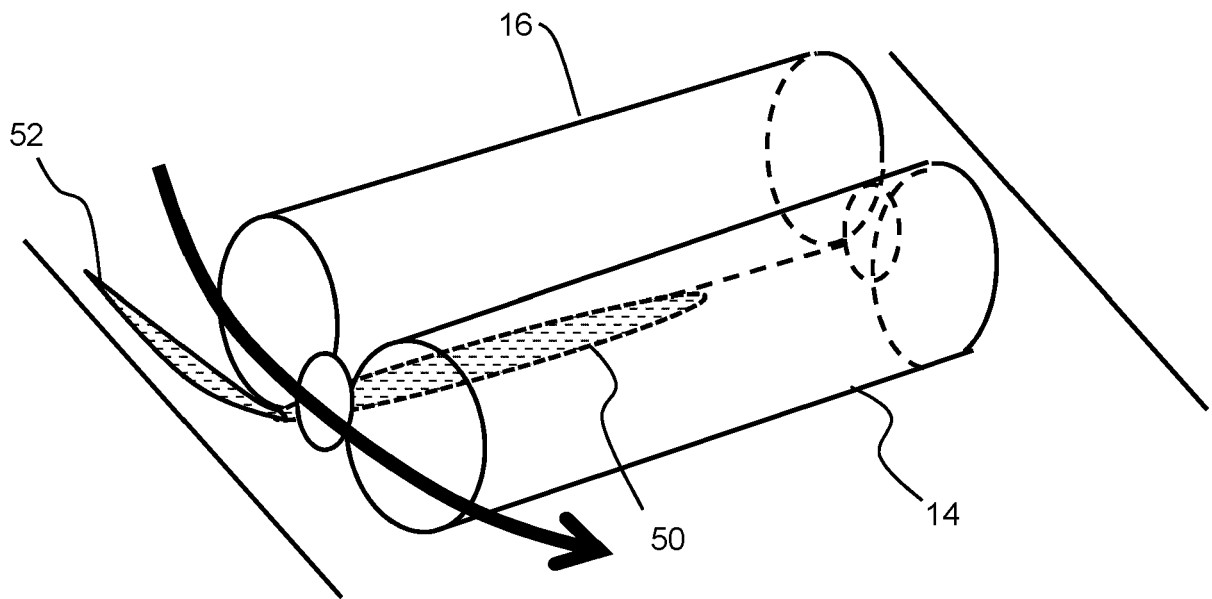


FIG. 5

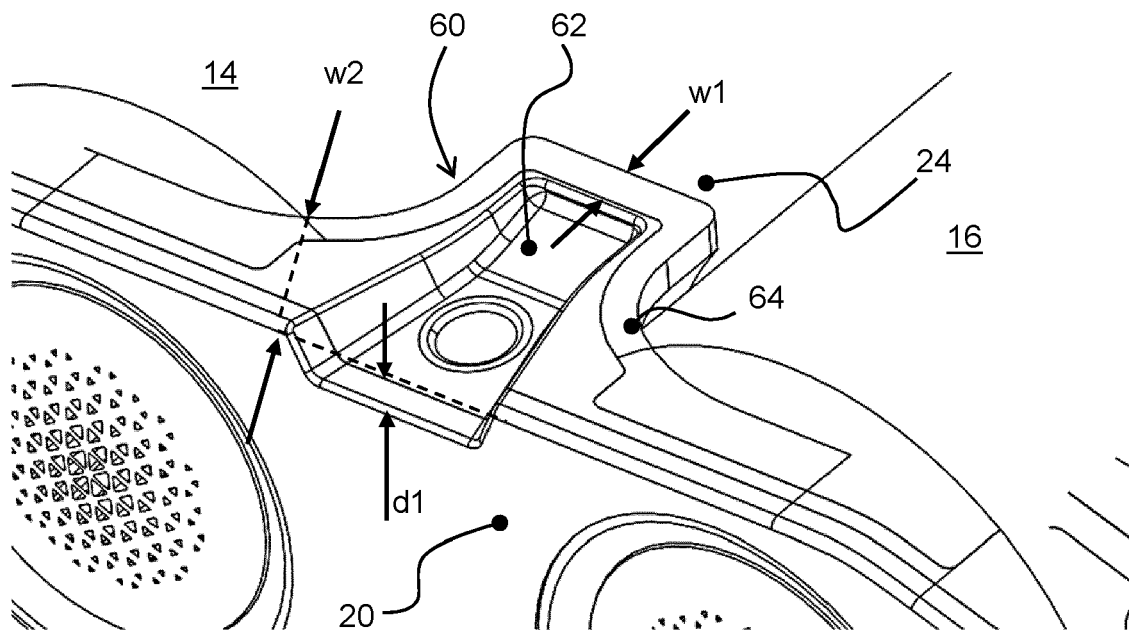


FIG. 6

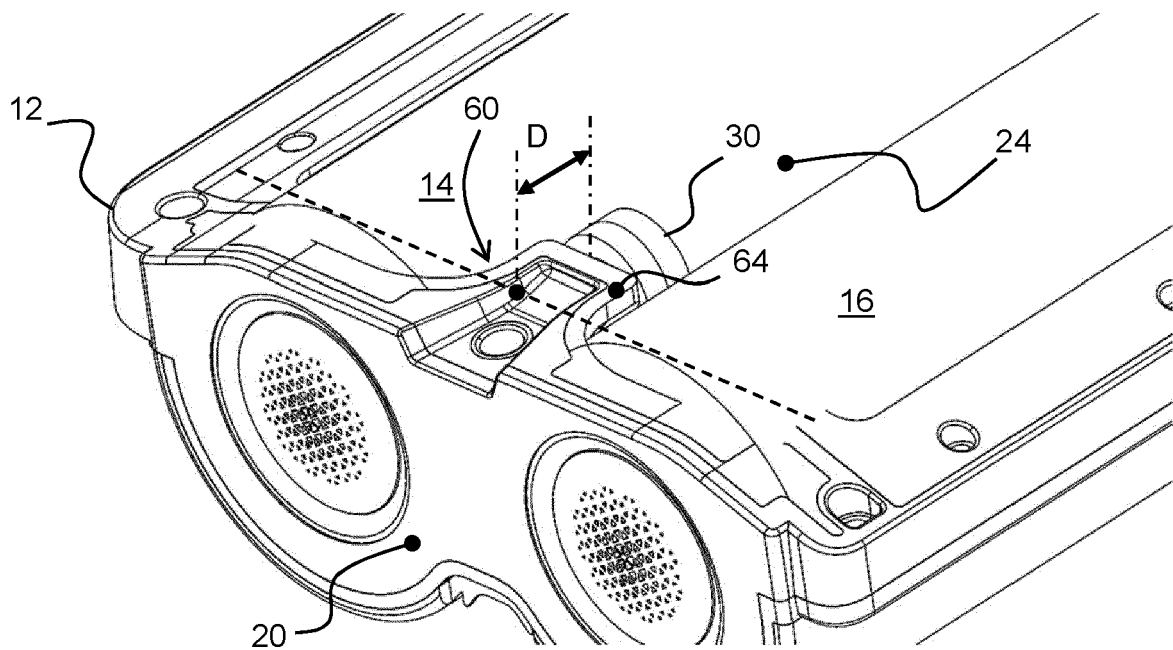


FIG. 7

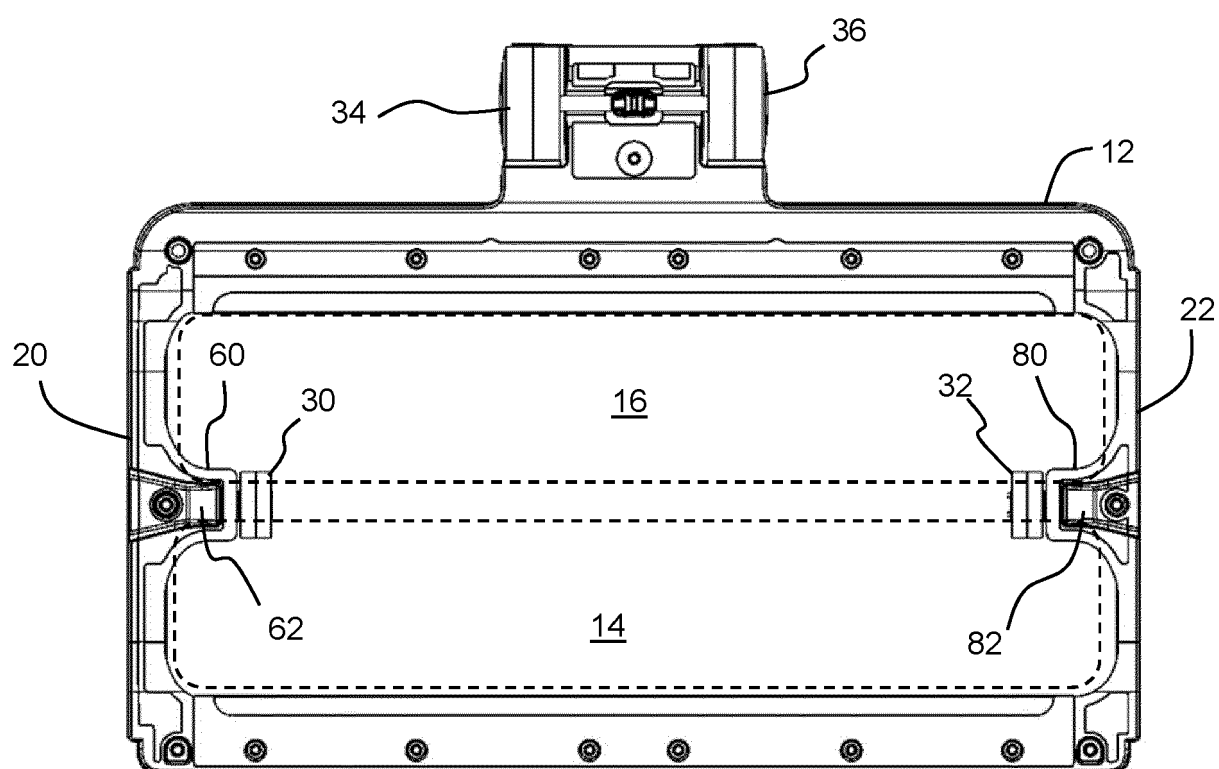


FIG. 8



EUROPEAN SEARCH REPORT

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