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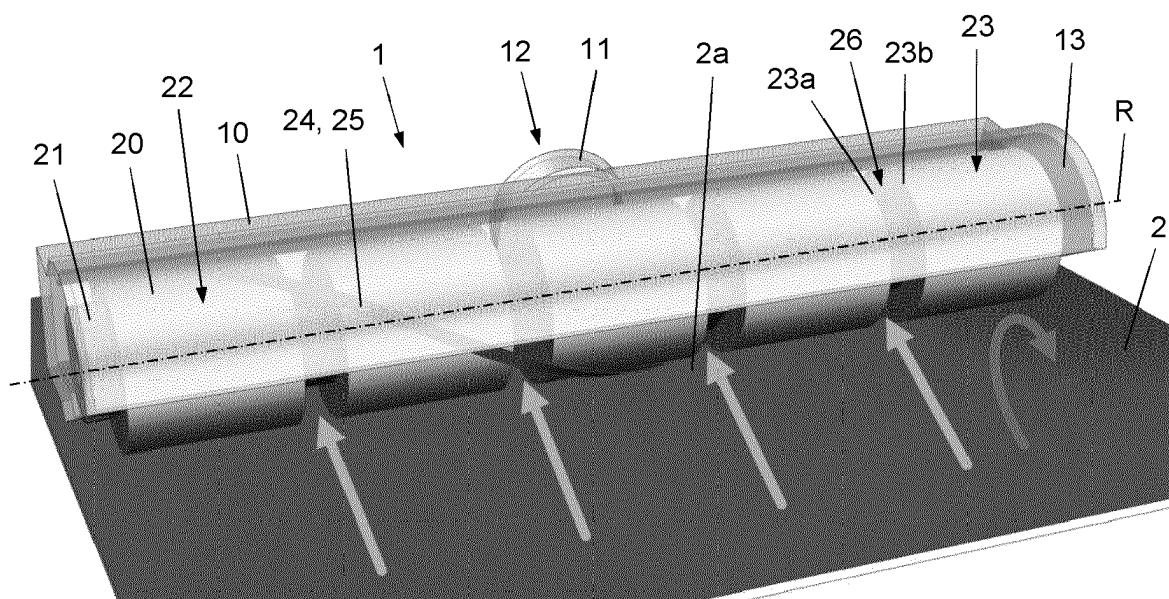
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(71) Applicant: **Koninklijke Philips N.V.**
5656 AG Eindhoven (NL)
(72) Inventor: **STEEMAN, Jonne**
5656 AE Eindhoven (NL)
(74) Representative: **de Vries, Janna et al**
Philips Domestic Appliances Nederland B.V.
High Tech Campus 42
5656 AE Eindhoven (NL)

(54) AGITATOR AND SUCTION HEAD

(57) An agitator (20) is configured to be rotatably arranged in a suction head (1) of a vacuum cleaner and includes flexible cleaning elements (22) arranged on a core element (21) for touching a surface (2) to be cleaned. The cleaning elements (22) are arranged along the length of the agitator (20) in a cleaning field (23), wherein the cleaning field (23) is interrupted by at least one air passage (26) that is configured to enable an airflow between

internal edges (23a, 23b) of the cleaning field (23) delimiting the at least one air passage (26). Outside of the at least one air passage (26), the cleaning elements (22) are arranged at close range relative to each other whereby an airflow between the cleaning elements (22) is disabled or at most enabled to a significantly smaller extent than at the position of the at least one air passage (26).

**Fig. 1****EP 4 008 227 A1**

Description

FIELD OF THE INVENTION

[0001] The invention relates to an agitator configured to be used in a suction head that is configured to be applied in a vacuum cleaner and to perform a cleaning action on a surface when the suction head is in an operational cleaning position relative to the surface, wherein the agitator is configured to be rotatably arranged in the suction head and includes a core element and flexible cleaning elements arranged on the core element, wherein an outer portion of each of the cleaning elements is configured to be moved over the surface during a part of each revolution of the agitator when the agitator is arranged in the suction head and the suction head is in the operational cleaning position, and wherein the cleaning elements are arranged along the length of the agitator in a cleaning field.

[0002] Further, the invention relates to a suction head configured to be applied in a vacuum cleaner and to perform a cleaning action on a surface when the suction head is in an operational cleaning position relative to the surface, the suction head comprising: a housing including a coupling area configured to enable coupling of the housing to an air suction source of the vacuum cleaner, and an agitator as mentioned, wherein the agitator is arranged in the housing and the housing is configured to expose a portion of the agitator to the surface, and wherein the agitator is rotatable in the housing about a rotation axis extending in the direction of a longitudinal axis of the core element.

[0003] In a further aspect, the invention also relates to a vacuum cleaner comprising an air suction source and a suction head as mentioned. In yet another further aspect, the invention also relates to a vacuum cleaner comprising an air suction source and an agitator as mentioned.

BACKGROUND OF THE INVENTION

[0004] In the field of suction heads configured to be applied in a vacuum cleaner, it is known to take measures aimed at limiting the air flow to the aggregate during operation. The fact is that by hindering the air flow in certain areas, higher air velocities can be obtained in the remaining unhindered areas. This is advantageous in view of the fact that air velocity is an important factor in getting dirt particles airborne and transporting dirt particles to a dust storage unit.

[0005] For example, a suction head is known in which a front edge is designed with a triangular zigzag pattern. At the position of the openings between the triangles, an airflow is enabled during operation, while the remainder of the suction head is closed off, so that high air velocities can be obtained at the position of the openings. The lead angle of the triangles causes dirt particles to be accumulated towards the openings, the triangles acting like fun-

nels in this respect. However, the air velocities in front of the triangles is quite low, resulting in poor cleaning results at the front of the suction head. Especially when the front of the suction head is pushed against objects such as plinths, it is noticeable that not all dirt particles are removed.

[0006] In the case of suction heads including an agitator that is rotated during operation and that supports tufts of fiber-like cleaning elements, it is possible to have an open structure of the pattern of cleaning elements, in which case some flow limiting geometry in front of the suction head is needed in order to avoid loss of air velocity. Alternatively, it is possible to have a dense structure of the pattern of cleaning elements, so that the use of a flow limiting geometry in front of the suction head can be avoided. In such a case, the agitator is at the very front of the suction head, resulting in a compact architecture of the suction head and enabling the agitator to be pushed against objects. A downside of this possibility is a lack of airflow in front of the suction head, so that when the suction head is pushed against an object, dirt particles will stay in their position in front of the suction head where the agitator cannot reach.

SUMMARY OF THE INVENTION

[0007] It is an object of the invention to provide a possibility of omitting a flow limiting geometry in front of a suction head and relying on a dense structure of a pattern of cleaning elements on an agitator of the suction head while still enabling the suction head to remove dirt particles as may be present in front of the suction head.

[0008] In view of the foregoing, the invention provides an agitator configured to be used in a suction head that is configured to be applied in a vacuum cleaner and to perform a cleaning action on a surface when the suction head is in an operational cleaning position relative to the surface, wherein the agitator is configured to be rotatably arranged in the suction head and includes a core element and flexible cleaning elements arranged on the core element, wherein an outer portion of each of the cleaning elements is configured to be moved over the surface during a part of each revolution of the agitator when the agitator is arranged in the suction head and the suction head is in the operational cleaning position, wherein the cleaning elements are arranged along the length of the agitator in a cleaning field, wherein the cleaning field is interrupted by at least one air passage that is configured to enable an airflow between internal edges of the cleaning field delimiting the at least one air passage, and wherein outside of the at least one air passage, the cleaning elements are arranged at close range relative to each other whereby an airflow between the cleaning elements is disabled or at most enabled to a significantly smaller extent than at the position of the at least one air passage.

[0009] Also, the invention relates to a suction head configured to be applied in a vacuum cleaner and to perform a cleaning action on a surface when the suction

head is in an operational cleaning position relative to the surface, the suction head comprising: a housing including a coupling area configured to enable coupling of the housing to an air suction source of the vacuum cleaner, and an agitator as mentioned, wherein the agitator is arranged in the housing and the housing is configured to expose a portion of the agitator to the surface, wherein the agitator is rotatable in the housing about a rotation axis extending in the direction of a longitudinal axis of the core element, wherein the agitator is configured to enable an airflow passing the agitator from a position on the surface upstream of the agitator in a direction towards the coupling area of the housing at the position of the at least one air passage in the cleaning field of the agitator when the suction head is in the operational cleaning position, and wherein the agitator is configured to disable or at most enable to a significantly smaller extent an airflow passing the agitator from a position on the surface upstream of the agitator in a direction towards the coupling area of the housing at a position that is outside of the at least one air passage when the suction head is in the operational cleaning position.

[0010] An alternative definition of the suction head according to the invention is as follows: a suction head configured to be applied in a vacuum cleaner and to perform a cleaning action on a surface when the suction head is in an operational cleaning position relative to the surface, the suction head comprising: a housing including a coupling area configured to enable coupling of the housing to an air suction source of the vacuum cleaner, and an agitator including a core element and flexible cleaning elements arranged on the core element, wherein the agitator is arranged in the housing and the housing is configured to expose a portion of the agitator to the surface, wherein the agitator is rotatable in the housing about a rotation axis extending in the direction of a longitudinal axis of the core element, wherein an outer portion of each of the cleaning elements is configured to be moved over the surface during a part of each revolution of the agitator when the suction head is in the operational cleaning position, wherein the cleaning elements are arranged along the length of the agitator in a cleaning field, wherein the cleaning field is interrupted by at least one air passage that is configured to enable an airflow passing the agitator from a position on the surface upstream of the agitator in a direction towards the coupling area of the housing when the suction head is in the operational cleaning position, and wherein outside of the at least one air passage, the cleaning elements are arranged at close range relative to each other whereby an airflow passing the agitator from a position on the surface upstream of the agitator in a direction towards the coupling area of the housing is disabled or at most enabled to a significantly smaller extent than at the position of the at least one air passage when the suction head is in the operational cleaning position.

[0011] The airflow referred to in the context of the invention may particularly be an airflow as can be induced

under the influence of suction power normally related to operation of a vacuum cleaner, i.e. as can normally be induced by an air suction source of a vacuum cleaner.

[0012] It follows from the foregoing that according to the invention, a cleaning field in which the cleaning elements of the agitator are arranged is interrupted by at least one air passage that is configured to enable an airflow between internal edges of the cleaning field delimiting the at least one air passage. In this way, it is achieved that both the benefits of having a cleaning field packed with cleaning elements on the one hand and the benefits of having an airflow passing the agitator from a position on the surface upstream of the agitator, i.e. a position in front of the agitator, are obtained when the invention is put to practice. As already explained in the background of the invention section, having a cleaning field packed with cleaning elements enables a configuration of the suction head in which it is not necessary to use a flow limiting geometry like zigzags. This implies that in the case of the invention, front cleaning and reach of the agitator can be improved. Having an airflow passing the agitator from a position on the surface upstream of the agitator constitutes a further contribution to good front cleaning. Further, application of the invention does not involve any complex constructional requirements. In fact, it suffices to realize an appearance of the agitator in which the cleaning field is interrupted such that one or more air passages are present in the cleaning field at the position of which local airflows are created and dirt particles are sucked up during operation of the suction head, i.e. when the agitator is rotated and the suction head is coupled to an air suction source that is in an active state. The suction head can be of compact design and can be small compared to conventional suction heads, which is beneficial to the reach and agility of the suction head.

[0013] In respect of the at least one air passage, it is noted that either the at least one air passage is free from the cleaning elements or the at least one air passage does include the cleaning elements but at a significantly lower packing density than the cleaning field. What matters is that the presence of the air passage on the agitator enables a local airflow at a defined position in the cleaning field, which local airflow is significantly larger or (almost) even infinitely larger than a local airflow at a position in the cleaning field that is outside of the at least one air passage, should the latter local airflow exist. Further, the invention covers the possibility that the at least one air passage includes other elements than the cleaning elements, such as (similar) elements of shorter radial dimension. An advantage of this possibility relates is of aesthetic nature: the agitator does not necessarily need to have a look including disturbing bare portions in this way. The other elements may be packed with a packing density that is the same as or similar to the packing density of the cleaning elements.

[0014] In view of the intended rotation movement of the agitator, it is practical if the at least one air passage extends in a peripheral direction around the core ele-

ment, wherein it may be so that the at least one air passage spans the entire periphery of the core element. The orientation of the air passage on the agitator may be such that the at least one air passage extends perpendicular to the longitudinal axis of the core element. In that way, it is possible to obtain an unhampered airflow between the agitator and the surface when the suction head is in the operational cleaning position.

[0015] In respect of the cleaning elements of the agitator, it is noted that the cleaning elements may comprise fiber hairs, a linear mass density of the cleaning elements being lower than 300 g per 10 km, preferably lower than 250 g per 10 km. A practical example of an arrangement of the fiber hairs on the core element is an arrangement of the fiber hairs in tufts. In this respect, it is noted that a packing density of the cleaning elements in the cleaning field outside of the at least one air passage may be at least 30 tufts per area of 1 cm by 1 cm, wherein the number of cleaning elements per tuft may be at least 500, i.e. at least 15,000 cleaning elements per area of 1 cm by 1 cm, which does not alter the fact that other values may be applicable in the framework of the invention as well. A practical example of the material of the cleaning elements is nylon.

[0016] The invention covers an embodiment of the agitator in which the agitator includes at least one agitator element in addition to the cleaning elements, wherein the at least one agitator element is significantly less flexible than the cleaning elements, and wherein an outer portion of the at least one agitator element is configured to be moved over the surface during a part of each revolution of the agitator when the suction head is in the operational cleaning position. Such one or more agitator elements may particularly have a function in mechanically cleaning the surface, scraping dirt from the surface, agitating carpet piles in case the surface is a carpet, etc., whereas the cleaning elements are suitable for blocking/hampering an airflow on the one hand but admitting dirt particles and agitating fine dust on the other hand. The at least one agitator element may be mounted on the agitator in any suitable way. For example, it may be practical if the at least one agitator element is arranged on at least one strip-shaped body, and if the at least one strip-shaped body is arranged to spiral around the core element at a position of the outer portions of the cleaning elements. It may be advantageous if the at least one agitator element spans the length of the cleaning field. Practical examples of the material of the at least one agitator element are nylon and rubber.

[0017] In respect of the housing of the suction head, it is noted that it may be practical if the housing includes a cover partially covering the agitator at close range along the length of the agitator, wherein it may be so that the portion of the agitator that is exposed to the surface is only of minimal size.

[0018] The above-described and other aspects of the invention will be apparent from and elucidated with reference to the following detailed description of a practical

embodiment of a suction head comprising a housing and an agitator arranged in the housing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The invention will now be explained in greater detail with reference to the figures, in which equal or similar parts are indicated by the same reference signs, and in which:

Figure 1 diagrammatically shows a perspective view of a suction head according to an embodiment of the invention, comprising a housing and an agitator according to an embodiment of the invention, arranged in the housing, and

Figure 2 diagrammatically shows a side view of the suction head.

[0020] In both figures, a cover that is part of the housing of the suction head is shown as being semi-transparent.

DETAILED DESCRIPTION OF EMBODIMENTS

[0021] Figure 1 diagrammatically shows a perspective view of a suction head 1 according to an embodiment of the invention, and Figure 2 diagrammatically shows a side view of the suction head 1.

[0022] The suction head 1 is configured to be applied in a vacuum cleaner and to perform a cleaning action on a surface 2 when the suction head 1 is in an operational cleaning position relative to the surface 2, as shown in the figures. The vacuum cleaner may be a so-called dry vacuum cleaner or a vacuum cleaner that is at least operable in a dry mode, i.e. a mode in which the cleaning action is performed under dry conditions, without any supply of cleaning fluid. In general, in the art, a suction head 1 is also commonly referred to as nozzle.

[0023] The suction head 1 comprises a housing 10 and an agitator 20 arranged in the housing 10. The housing 10 is configured to be coupled to an air suction source of the vacuum cleaner at the position of a coupling area 11 that includes an air suction passage 12. Further, the housing 10 includes a cover 13 that partially covers the agitator 20 at close range along the length of the agitator 20, wherein the housing 10 exposes only a portion of the agitator 20 to the surface 2.

[0024] The agitator 20 includes a core element 21 and flexible cleaning elements 22 arranged on the core element 21. Such a type of agitator 20 is also commonly referred to as brush. Further, the agitator 20 is rotatable in the housing 10 about a rotation axis R extending in the direction of a longitudinal axis of the core element 21, and an outer portion of each of the cleaning elements 22 is configured to be moved over the surface 2 during a part of each revolution of the agitator 20 when the suction head 1 is in the operational cleaning position. As can be seen in Figure 1, the cleaning elements 22 are arranged along the length of the agitator 20 in a cleaning field 23.

In the shown example, the cleaning field 23 spans the entire periphery of the core element 21. In the figures, individual cleaning elements 22 cannot be discerned, but that does not alter the fact that it is clearly indicated where the cleaning elements 22 are present.

[0025] In the shown example, the agitator 20 includes agitator elements 24 in addition to the cleaning elements 22. As is the case with the cleaning elements 22, an outer portion of each of the agitator elements 24 is configured to be moved over the surface 2 during a part of each revolution of the agitator 20 when the suction head 1 is in the operational cleaning position. However, the agitator elements 24 are significantly less flexible than the cleaning elements 22. In view thereof, the agitator elements 24 are suitable for mechanically cleaning the surface 2, scraping dirt from the surface 2, agitating carpet piles in case the surface 2 is a carpet, etc., while the cleaning elements 22 are suitable for agitating fine dust on the surface 2 while also admitting dirt particles. The figures illustrate the practical option of the agitator elements 24 being arranged on a strip-shaped body 25 that is arranged to spiral around the core element 21 at a position of the outer portions of the cleaning elements 22, that extends along the length of the cleaning field 23, and that is anchored on the core element 21 at a number of appropriate positions along the length of the cleaning field 23. In the figures, individual agitator elements 24 cannot be discerned, but that does not alter the fact that it is clear where the agitator elements 24 are present, namely on the strip-shaped body 25.

[0026] In view of the difference in flexibility, the agitator elements 24 may be denoted as being hard and the cleaning elements 22 may be denoted as being soft. The suction head 1 comprising the agitator 20 including both types of elements 22, 24 is suitable for cleaning any type of surface 2, and may be denoted as being a dual purpose hard and soft floor nozzle.

[0027] In respect of the cleaning elements 22, the following aspects are noted. The cleaning elements 22 are arranged at close range relative to each other whereby an airflow passing the agitator 20 from a position 2a on the surface 2 upstream of the agitator 20 in a direction towards the coupling area 11 of the housing 10 is disabled or at least hampered when the suction head 1 is in the operational cleaning position. In Figure 1, the blocked/hampered airflow is indicated by means of a curved arrow, and in Figure 2, the suction is indicated by means of a straight arrow. For example, the situation of the cleaning elements 22 blocking/hampering an airflow between them can be the result of applying cleaning elements 22 in the agitator 20 in the form of fiber hairs, especially when a linear mass density of the cleaning elements 22 is chosen so as to be lower than 300 g per 10 km so that the cleaning elements 22 are highly flexible. Such fiber hairs can be placed on the core element 21 in a dense arrangement, indeed, so as to very effectively interact with the surface 2 and clean the surface 2, wherein it may be so that a packing density of the fiber hairs is

at least 15,000 fiber hairs per area of 1 cm by 1 cm, and wherein it may be practical if the fiber hairs are arranged in tufts. A practical example of the speed at which the agitator 20 is rotated during operation of the suction head 1 is 4,200 rpm.

[0028] Blocking/hampering the airflow involves the advantageous effect of efficient use of suction power at the very position where the suction head 1 is on the surface 2, but also involves the effect of the suction head 1 not being capable to remove dirt particles as may be present in an area that is in front of the suction head 1, i.e. at a position 2a on the surface 2 that is upstream of the agitator 20 in the air suction direction, which effect is all the more disadvantageous if that area is an area right alongside an object such as a plinth so that the suction head 1 cannot be placed on that area. In view thereof, the agitator 20 is designed so as to have a segmented appearance, wherein the cleaning field 23 is interrupted by at least one air passage 26 that is configured to enable an airflow passing the agitator 20 from a position 2a on the surface 2 upstream of the agitator 20 in the direction towards the coupling area 11 of the housing 10 when the suction head 1 is in the operational cleaning position. In terms of the agitator 20 as such, this implies that the least one air passage 26 is configured to enable an airflow between internal edges 23a, 23b of the cleaning field 23 delimiting the at least one air passage 26. In the shown example, as can be seen in Figure 1, the number of air passages 26 is four, and the local airflows which are allowed at the position of those air passages 26 are indicated by means of straight arrows in the figure. Further, in the shown example, each of the air passages 26 spans the entire periphery of the core element 21 and extends perpendicular to the longitudinal axis of the core element 21.

[0029] It follows from the foregoing that the cleaning elements 22 span the entire periphery of the core element 21 but not the entire length of the core element 21. The agitator 20 is provided with intermediate areas where there are no cleaning elements 22 in a dense arrangement so that openings for airflows are created. As a result, the suction head 1 is enabled to remove dirt particles at the front after all. At the positions of the air passages 26, coarse dirt and bigger particles are also allowed to pass the agitator 20 in the direction towards the coupling area 11 of the housing 10, and dirt particles in/near tricky areas such as plinths, crevices and legs of furniture are allowed to become airborne and to be sucked in. The number and size of the air passages 26 can be chosen such that the advantageous effect of the dense arrangement of the cleaning elements 22 in the cleaning field 23 on the efficiency of the use of suction power is only compromised to an acceptable extent. In other words, the number and size of the air passages 26 can be chosen such that air velocities can be obtained which are sufficient to enable particle pick-up, by creating focused and targeted local airflows, while at the same time providing optimal underpressure inside the suction head 1 so that

dirt particles can be sucked from crevices and carpets. In this respect, assuming usual dimensions of the suction head 1, three or four may be a suitable number. Practical examples of dimensions of the air passages 26 are in a range of 6 mm to 8 mm in respect of a length of the air passages 26, and in the same range in respect of a radial depth of the air passages 26, in which case areas having dimensions in a range of 6x6 mm to 8x8 mm are available above the surface 2 at the position of the air passages 26 when the suction head 1 is in the operational cleaning position.

[0030] It will be clear to a person skilled in the art that the scope of the invention is not limited to the examples discussed in the foregoing, but that several amendments and modifications thereof are possible without deviating from the scope of the invention as defined in the attached claims. It is intended that the invention be construed as including all such amendments and modifications insofar they come within the scope of the claims or the equivalents thereof. While the invention has been illustrated and described in detail in the figures and the description, such illustration and description are to be considered illustrative or exemplary only, and not restrictive. The invention is not limited to the disclosed embodiments. The drawings are schematic, wherein details which are not required for understanding the invention may have been omitted, and not necessarily to scale.

[0031] Variations to the disclosed embodiments can be understood and effected by a person skilled in the art in practicing the claimed invention, from a study of the figures, the description and the attached claims. In the claims, the word "comprising" does not exclude other steps or elements, and the indefinite article "a" or "an" does not exclude a plurality. Any reference signs in the claims should not be construed as limiting the scope of the invention.

[0032] Elements and aspects discussed for or in relation with a particular embodiment may be suitably combined with elements and aspects of other embodiments, unless explicitly stated otherwise. Thus, 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.

[0033] The terms "comprise" and "include" as used in this text will be understood by a person skilled in the art as covering the term "consist of". Hence, the term "comprise" or "include" may in respect of an embodiment mean "consist of", but may in another embodiment mean "contain/have/be equipped with at least the defined species and optionally one or more other species".

[0034] Notable aspects of the invention are summarized as follows. An agitator 20 is configured to be rotatably arranged in a suction head 1 of a vacuum cleaner and includes a core element 21 and flexible cleaning elements 22 arranged on the core element 21. An outer portion of each of the cleaning elements 22 is configured to be moved over a surface 2 to be cleaned during a part

of each revolution of the agitator 20 when the agitator 20 is arranged in the suction head 1 and the suction head 1 is in an operational cleaning position relative to the surface 2. Generally speaking, the cleaning elements 22 serve for touching the surface 2. The cleaning elements 22 are arranged along the length of the agitator 20 in a cleaning field 23, wherein the cleaning field 23 is interrupted by at least one air passage 26 that is configured to enable an airflow between internal edges 23a, 23b of the cleaning field 23 delimiting the at least one air passage 26. Outside of the at least one air passage 26, the cleaning elements 22 are arranged at close range relative to each other whereby an airflow between the cleaning elements 22 is disabled or at most enabled to a significantly smaller extent than at the position of the at least one air passage 26.

Claims

1. Agitator (20) configured to be used in a suction head (1) that is configured to be applied in a vacuum cleaner and to perform a cleaning action on a surface (2) when the suction head (1) is in an operational cleaning position relative to the surface (2), wherein the agitator (20) is configured to be rotatably arranged in the suction head (1) and includes a core element (21) and flexible cleaning elements (22) arranged on the core element (21), wherein an outer portion of each of the cleaning elements (22) is configured to be moved over the surface (2) during a part of each revolution of the agitator (20) when the agitator (20) is arranged in the suction head (1) and the suction head (1) is in the operational cleaning position, wherein the cleaning elements (22) are arranged along the length of the agitator (20) in a cleaning field (23), wherein the cleaning field (23) is interrupted by at least one air passage (26) that is configured to enable an airflow between internal edges (23a, 23b) of the cleaning field (23) delimiting the at least one air passage (26), and wherein outside of the at least one air passage (26), the cleaning elements (22) are arranged at close range relative to each other whereby an airflow between the cleaning elements (22) is disabled or at most enabled to a significantly smaller extent than at the position of the at least one air passage (26).
2. Agitator (20) according to claim 1, wherein either the at least one air passage (26) is free from the cleaning elements (22) or the at least one air passage (26) does include the cleaning elements (22) but at a significantly lower packing density than the cleaning field (23).
3. Agitator (20) according to claim 1 or 2, wherein the

at least one air passage includes elements extending from the core element (21) along a shorter radial distance than the cleaning elements (22).

4. Agitator (20) according to any of claims 1-3, wherein the at least one air passage (26) extends in a peripheral direction around the core element (21). 5
5. Agitator (20) according to claim 4, wherein the at least one air passage (26) extends perpendicular to the longitudinal axis of the core element (21). 10
6. Agitator (20) according to claim 4 or 5, wherein the at least one air passage (26) spans the entire periphery of the core element (21). 15
7. Agitator (20) according to any of claims 1-6, wherein the cleaning elements (22) comprise fiber hairs, a linear mass density of the cleaning elements (22) being lower than 300 g per 10 km. 20
8. Agitator (20) according to any of claims 1-7, wherein the cleaning elements (22) are arranged on the core element (21) in tufts. 25
9. Agitator (20) according to claim 8, wherein a packing density of the cleaning elements (22) in the cleaning field (23) outside of the at least one air passage (26) is at least 15,000 cleaning elements (22) per area of 1 cm by 1 cm. 30
10. Agitator (20) according to any of claims 1-9, including at least one agitator element (24) in addition to the cleaning elements (22), wherein the at least one agitator element (24) is significantly less flexible than the cleaning elements (22), and wherein an outer portion of the at least one agitator element (24) is configured to be moved over the surface (2) during a part of each revolution of the agitator (20) when the agitator (20) is arranged in the suction head (1) and the suction head (1) is in the operational cleaning position. 35 40
11. Agitator (20) according to claim 10, wherein the at least one agitator element (24) is arranged on at least one strip-shaped body (25), and wherein the at least one strip-shaped body (25) is arranged to spiral around the core element (21) at a position of outer portions of the cleaning elements (22). 45 50
12. Agitator (20) according to claim 10 or 11, wherein the at least one agitator element (24) spans the length of the cleaning field (23). 55
13. Suction head (1) configured to be applied in a vacuum cleaner and to perform a cleaning action on a surface (2) when the suction head (1) is in an operational cleaning position relative to the surface (2),

the suction head (1) comprising:

a housing (10) including a coupling area (11) configured to enable coupling of the housing (10) to an air suction source of the vacuum cleaner, and
 an agitator (20) according to any of claims 1-12, wherein the agitator (20) is arranged in the housing (10) and the housing (10) is configured to expose a portion of the agitator (20) to the surface (2),
 wherein the agitator (20) is rotatable in the housing (10) about a rotation axis (R) extending in the direction of a longitudinal axis of the core element (21),
 wherein the agitator (20) is configured to enable an airflow passing the agitator (20) from a position (2a) on the surface (2) upstream of the agitator (20) in a direction towards the coupling area (11) of the housing (10) at the position of the at least one air passage (26) in the cleaning field (23) of the agitator (20) when the suction head (1) is in the operational cleaning position, and
 wherein the agitator (20) is configured to disable or at most enable to a significantly smaller extent an airflow passing the agitator (20) from a position (2a) on the surface (2) upstream of the agitator (20) in a direction towards the coupling area (11) of the housing (10) at a position that is outside of the at least one air passage (26) when the suction head (1) is in the operational cleaning position.

14. Vacuum cleaner, comprising an air suction source and a suction head (1) according to claim 13.
15. Vacuum cleaner, comprising an air suction source and an agitator (20) according to any of claims 1-12.

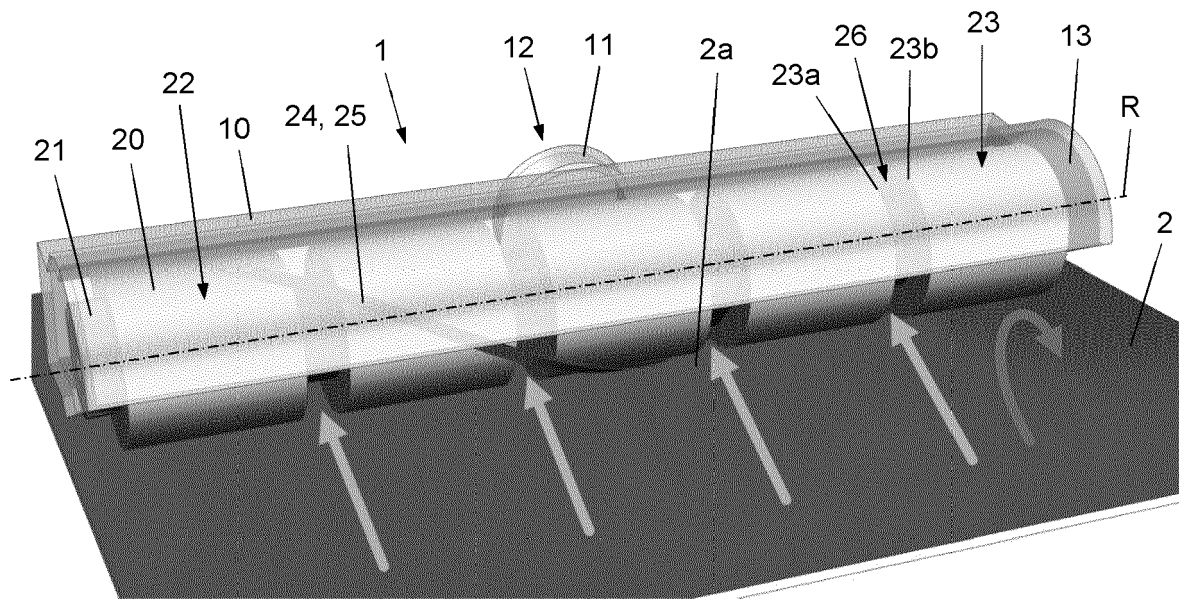


Fig. 1

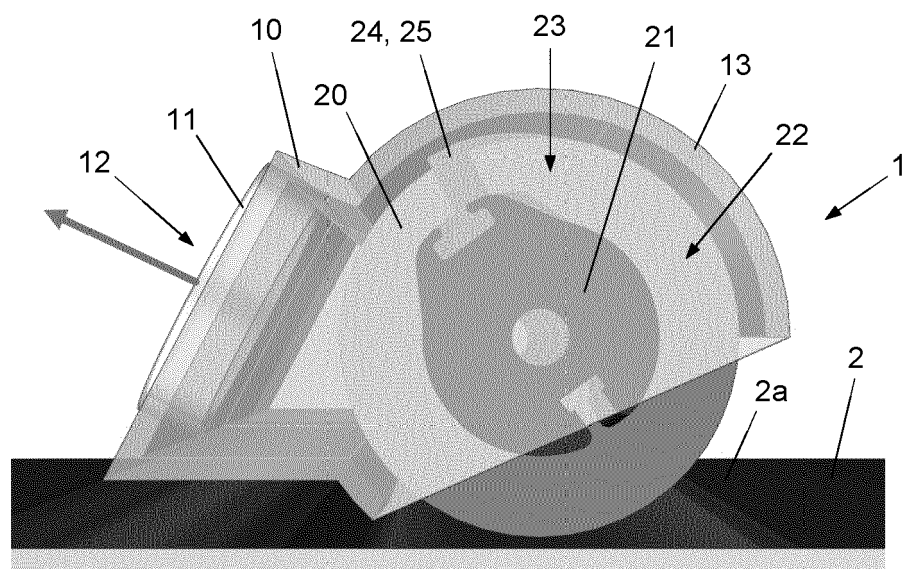


Fig. 2



EUROPEAN SEARCH REPORT

 Application Number
EP 20 21 1714

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* paragraph [0053] - paragraph [0064]; figure 4 *	3,6,10-12	
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A	* paragraph [0043] - paragraph [0051]; figure 8 *	3,6,7,9	
X	KR 2014 0140854 A (LG ELECTRONICS INC [KR]) 10 December 2014 (2014-12-10)	1-5,13-15	
A	* paragraph [0089] - paragraph [0120]; figures 9,10 *	6-12	
			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 April 2021	Examiner Blumenberg, Claus
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 20 21 1714

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-04-2021

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