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(54) **CLEANING ACCESSORY FOR VACUUM CLEANERS, AND VACUUM CLEANER EQUIPPED WITH SAID ACCESSORY**

(57) A cleaning accessory is described, which is adapted for application to a vacuum cleaner equipped with a motor, and which is further adapted for use on surfaces with joints, characterized in that it is made as one rigid piece equipped with:
- a neck (BC) for fitting to the vacuum cleaner,
- a suction area (AS) shaped as a wide rectangle, having a width dimension (L) and a depth dimension (P), wherein the width is greater than the depth,
- an enlargement (AL) symmetrically diverging between said neck and said suction area, creating an internal height development between said suction area and said neck having a minimum value in the areas of the two ends (ES) of the accessory and a maximum value at the center towards the neck.

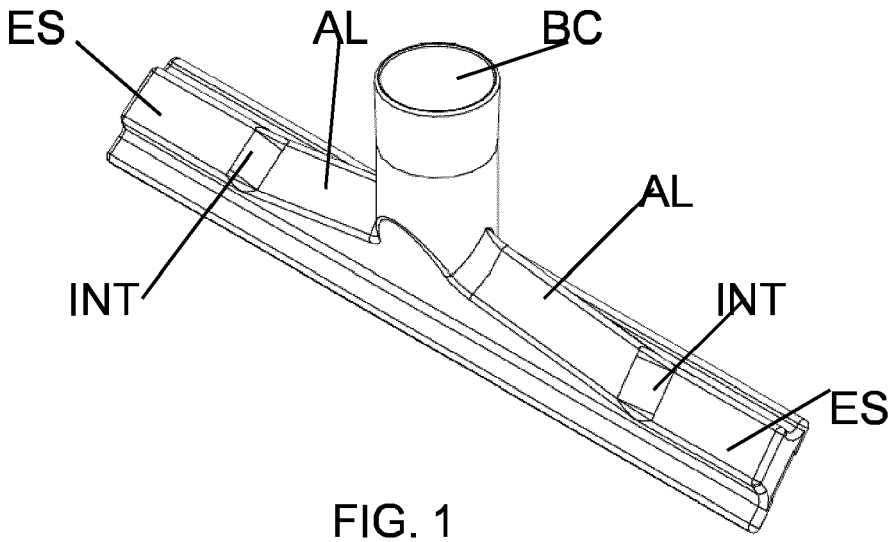

FIG. 1

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Description

Field of the invention

[0001] The present invention relates to the field of suction and cleaning systems, more specifically to a cleaning accessory for vacuum cleaners and to a vacuum cleaner equipped with said accessory.

Background art

[0002] The vacuum cleaner is a particular household appliance intended for cleaning floors and other surfaces. Its internal mechanism allows it to suck dust and other particles mixed with air, and to hold them inside its body by means of a filter element, so as to release clean air.

[0003] The motor, in particular, which is typically and electric one, allows sucking external air by creating a sort of a vacuum, by means of a fan, inside the vacuum cleaner.

[0004] Various types of vacuum cleaners are known, which can be used for cleaning surfaces of any kind. In particular, the most common types are:

- pull-along vacuum cleaner: this type of vacuum cleaner has a body that encloses the internal mechanism, possibly fitted with castors for easy movement, to which a flexible or at least partly rigid extension tube is connected, which in turn is connected to cleaning accessories such as brushes or nozzles,
- electric broom: this is a type of vacuum cleaner that commonly has the body directly connected to the cleaning accessory.

[0005] Hereafter, the term "vacuum cleaner" will refer to either one of the above-listed types.

[0006] The cleaning accessories (hereafter also referred to as brushes) adapted for use in a vacuum cleaner are characterized by different shapes, each one being specially suited for particular applications.

[0007] The cleaning accessories known in the art cannot however meet all application needs, particularly when one wants to clean hard surfaces with parallel and/or intersecting joints (e.g. tiles or wood boards, such as parquet) having certain width and depth dimensions (typically a few millimeters) relative to the surface on which the accessory has to slide.

Summary of the invention

[0008] It is therefore an object of the present invention to propose a cleaning accessory for vacuum cleaners and a vacuum cleaner equipped with said accessory, which can overcome the above-mentioned problems.

[0009] The present invention provides a cleaning accessory adapted for application to a vacuum cleaner equipped with a motor, and further adapted for use on surfaces with joints, characterized in that it is made as one rigid piece equipped with:

- a neck for fitting to the vacuum cleaner,
- a suction area shaped as a wide rectangle, having a width dimension and a depth dimension, wherein the width is greater than the depth,
- an enlargement symmetrically diverging between said neck and said suction area, creating an internal height development between said suction area and said neck having a minimum value in the areas of the two ends of the accessory and a maximum value at the center towards the neck.

[0010] It is a particular object of the present invention to provide a cleaning accessory for vacuum cleaners and a vacuum cleaner equipped with said accessory as set out in the claims, which are an integral part of the present description.

Brief description of the drawings

[0011] Further objects and advantages of the present invention will become apparent from the following detailed description of a preferred embodiment (and variants) thereof and from the annexed drawings, which are only supplied by way of nonlimiting example, wherein:

Figures 1 to 4 show several views, namely an axonometric top view, an axonometric bottom view, a bottom view and a front view, of the cleaning accessory according to the invention.

In the drawings, the same reference numerals and letters identify the same items or components.

Detailed description of some embodiments of the invention

[0012] For simplicity, in the following description the cleaning accessory for vacuum cleaners will be referred to as brush, being it understood that it is applicable to any type of vacuum cleaner. The latter is equipped with a motor adapted to create the suction effect.

[0013] With reference to the annexed drawings, the brush of the invention is made as one piece, with a substantially rectangular usable suction area AS characterized by a width dimension L and a depth dimension P, such dimensions being internal.

[0014] In view of a main intended use for cleaning joints as defined above, it has been observed that the brush must create a very concentrated and fast suction air flow in order to be able to effectively remove dust or any other material from a very narrow space such as a joint, but on the other hand it is necessary to ensure minimal energy consumption by minimizing the operating time, with a limited number of passes on the joints.

[0015] It follows that the suction area AS has to be appropriately sized as a product of the depth P by the

width L, wherein the width has a value substantially greater than the depth.

[0016] The material to be removed from the joints being equal, a brush having a greater width L will be more effective because it will be able to clean a larger surface in less time, thus consuming less energy; on the other hand, this may also lead to increased dispersion of the suction flow, and therefore the value of the width L must be a trade-off between these two requirements.

[0017] Furthermore, the smaller dimension, i.e. the depth P, must be as small as possible, so as to maximize the velocity of the suction flow, while the width L must be greatest to reduce specific consumption, so as to require fewer brush passes for cleaning a given surface.

[0018] The suction area can be defined as a "wide rectangle", according to the definition given in Wikipedia under "rectangle" (http://it.wikipedia.org/wiki/Rettangolo):
" .....When a rectangle is presented in the Cartesian plane and it has two horizontal sides significantly longer than the other two, this is referred to as a *wide rectangle;* on the contrary, if the longer sides are vertical, this is referred to as a *tall rectangle* or a *thin rectangle. ....."*

[0019] Another parameter to be taken into account is the distance of the brush (in particular of the suction area) from the surface on which it slides, which distance must be minimal to create the utmost suction effect, also because the joint is lower than the plane whereon the brush slides, and there is normally a certain distance between the brush sliding plane and the joint level.

[0020] Moreover, the brush may slide on delicate, though rigid, surfaces, such as wood (parquet).

[0021] Therefore, suitable spacers DS made of soft material, e.g. fabric, preferably having a flat shape, are inserted along the contour C of the suction area AS, which are adapted to keep the brush slightly distant from the sliding plane (thus obtaining said minimal distance), but also in adherence to the plane, without causing damage, such as streaks, to the surface.

[0022] Other parameters that need to be taken into account concern the height development of the brush. These parameters affect the distribution of the suction flow over the suction area.

[0023] The suction flow must be such as to effectively exert a sucking action up to the ends of the brush, without being concentrated at the center thereof. In addition to the quantity of flow, also the direction of the latter along the suction area is important.

[0024] Therefore, the suction power level must be highest at the center of the brush, but not much lower on the sides. At the ends, the air flow will be preferably radial, so as to convey the particles being removed towards the center, where they will be actually sucked in. At the center, instead, the air flow will be vertical, towards the suction body of the vacuum cleaner.

[0025] In summary, the brush is made as one rigid piece, e.g. made of plastic, which is hollow inside, with a neck BC adapted to fit into a matching connection point in the vacuum cleaner. The only constraint concerning the shape of the neck is the shape of the connection point in the vacuum cleaner.

[0026] From the neck, an enlargement AL extends which is symmetrically diverging on both sides of the brush, e.g. triangular in shape, towards the suction area AS. Preferably, its inclination is 15° +/- 10%.

[0027] The suction area is shaped like a wide rectangle having a width L and a depth P, and also has an internal height development, i.e. between the suction area and the neck, having its lowest value at the ends ES (e.g. 0 cm) and its highest value at the center (e.g. 2 cm +/-5%). Therefore, said diverging development of the enlargement AL ends at symmetrically intermediate points INT of the suction area, e.g. at half the distance between the ends and the center, from which said internal height then takes a minimal constant value.

[0028] It has also been observed that there is a correlation between the power of the motor of the vacuum cleaner and the width of the brush.

[0029] Preferably, the Power/Width ratio is 31 W/cm +/- 10%, preferably 31 W/cm +/-5%.

[0030] By way of example, the following table of nominal values of the width L is obtained for different power ratings.

Power [W]	Width [cm]
800	25
1000	33
1200	40

[0031] According to a further aspect of the invention, in order to optimize the velocity of the suction flow, the suction area is preferably 37.5 cm^2 +/- 5% , as a consequence of the above-mentioned Power/Width ratio.

[0032] By way of example, the following table of nominal values of the depth P is obtained, which is related to the above-listed width values.

Power [W]	Depth [cm]
800	1.5
1000	1.15
1200	0.95

[0033] The above-described example of embodiment may be subject to variations without departing from the protection scope of the present invention, including all equivalent designs known to a man skilled in the art.

[0034] The elements and features shown in the various preferred embodiments may be combined together without however departing from the protection scope of the present invention.

[0035] From the above description, those skilled in the art will be able to produce the object of the invention without introducing any further construction details.

Claims

1. Cleaning accessory adapted for application to a vacuum cleaner equipped with a motor, further adapted for use on surfaces with joints, **characterized in that** it is made as one rigid piece equipped with:

   - a neck (BC) for fitting to the vacuum cleaner,
   - a suction area (AS) shaped as a wide rectangle, having a width dimension (L) and a depth dimension (P), wherein the width is greater than the depth,
   - an enlargement (AL) symmetrically diverging between said neck and said suction area, creating an internal height development between said suction area and said neck having a minimum value in the areas of the two ends (ES) of the accessory and a maximum value at the center towards the neck.

2. Cleaning accessory according to claim 1, wherein said symmetrically diverging development ends at symmetrically intermediate points (INT) of said suction area, from said symmetrically intermediate points said internal height developing in a constant and minimal manner towards the ends.

3. Cleaning accessory according to claim 1, wherein said symmetrically diverging development is triangular.

4. Cleaning accessory according to claim 3, wherein said triangular development has an inclination of 15° +/- 10%.

5. Cleaning accessory according to claim 1, comprising spacers (DS) applied to the contour (C) of the suction area (AS).

6. Cleaning accessory according to claim 5, wherein said spacers (DS) are made of soft material, preferably flat fabric.

7. Vacuum cleaner equipped with a cleaning accessory according to any one of the preceding claims.

8. Vacuum cleaner according to claim 7, wherein said width dimension (L) is correlated to the power of said motor.

9. Vacuum cleaner according to claim 8, wherein the Power/Width ratio is 31 W/cm +/- 10%, preferably 31 W/cm +/- 5%.

10. Vacuum cleaner according to claim 8 or 9, wherein the surface of said suction area is 37.5 cm^2 +/- 5%.

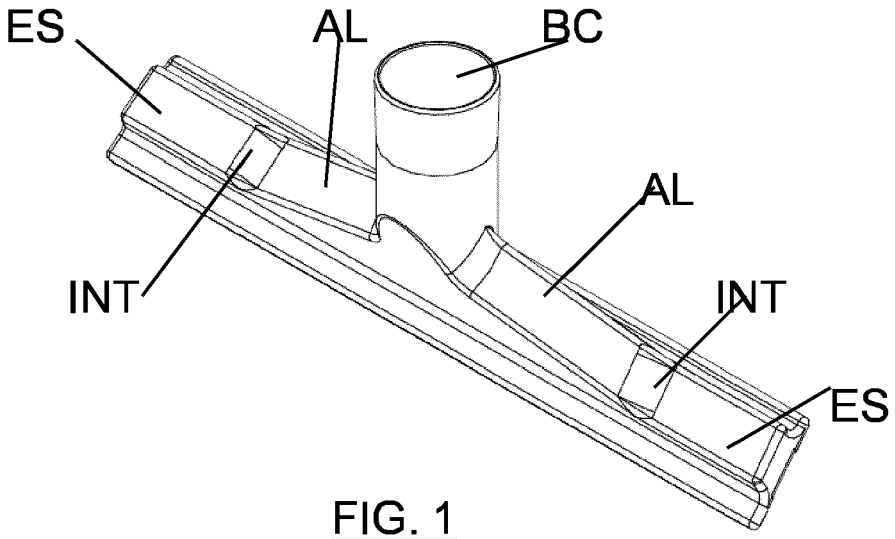

FIG. 1

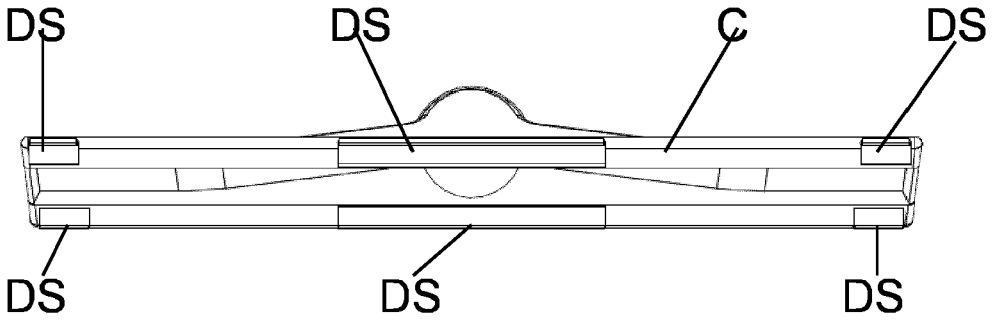

FIG. 2

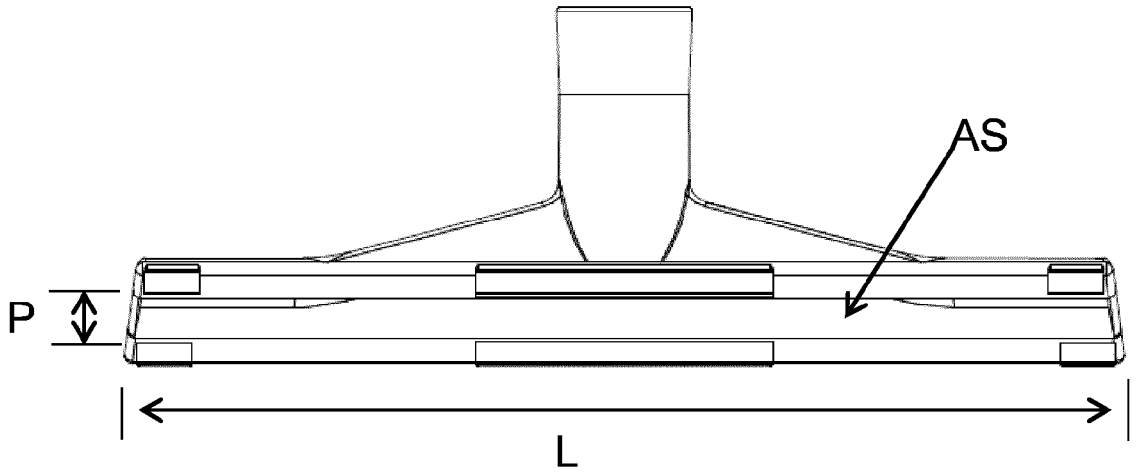

FIG. 3

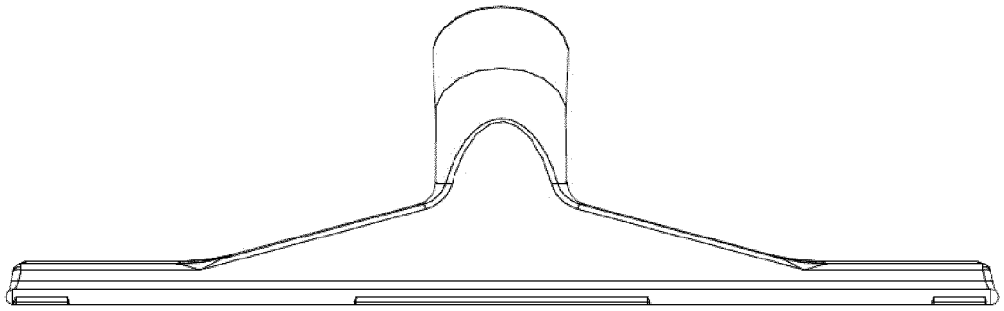

FIG. 4