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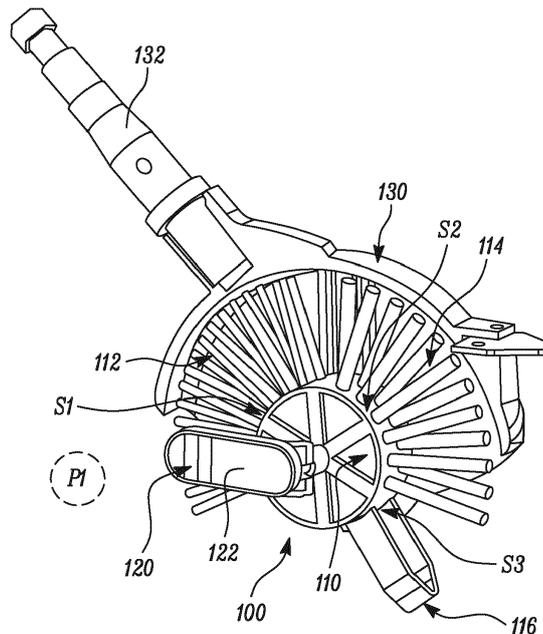
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(54) **A BRUSH ARRANGEMENT**

(57) A brush arrangement (100) includes a brushing device (110) such that the brushing device (110) is divided into multiple segments (S1, S2, S3) with at least two segments exhibiting different cleaning characteristics. An axle is configured to allow the brushing device

(110) to rotate around the axle. The brush arrangement (100) is characterized in that the rotation of the brushing device (110) around the axle is selectively locked by a locking mechanism (120).



**FIG. 1**

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## Description

### TECHNICAL FIELD

**[0001]** The present disclosure relates to a brush arrangement, and more particularly to a multi-purpose brush arrangement.

### BACKGROUND

**[0002]** A surface cleaning brush arrangement may be configured to clean a wide range of surfaces, such as a ground surface, a wall surface, or any other surface surrounding a user of the brush arrangement. The brush arrangement may include a brushing device that may further include a plurality of plastic bristles, or stainless-steel bristles, or any other type of bristles for cleaning the surface.

**[0003]** However, using a brushing device with only one kind of bristles may not be apt, as different cleaning surfaces may have different physical characteristics and may require different bristles for cleaning respectively. For example, the bristles of one kind may be suitable for cleaning a particular cleaning surface but the same kind of bristles may cause scratches on some other cleaning surface. Further, it may not be cost-effective, and ergonomic to carry and store different brush arrangements having different brushing devices for different cleaning surfaces. Hence, an improved brushing arrangement may be required that may have the brushing device with different kind of bristles (or different sets of bristles) such that a single brush arrangement may be configured to be effectively used for cleaning many different surfaces.

**[0004]** An example of an improved brush arrangement is provided in European Patent EP 3 031 352 B1 (hereinafter referred to as '352 reference). The '352 reference provides a brush arrangement with a disc brush. The disc brush is divided into various segments such that any two adjacent segments have different characteristics. The different characteristics of the segments are due to the difference in the lengths of corresponding bristles.

**[0005]** Another example of an improved brush arrangement is provided in European Patent Application EP 2 253 242 A1 (hereinafter referred to as '242 reference). The '242 reference provides the brush arrangement with a disc brush that exhibits bristles of different kinds in different sectors.

### SUMMARY OF THE INVENTION

**[0006]** In view of the above, it is an objective of the present invention to solve or at least reduce the drawbacks discussed above. The objective is at least partially achieved by a brush arrangement.

**[0007]** According to an aspect of the present invention, the brush arrangement includes a brushing device such that the brushing device is divided into multiple segments

with at least two segments exhibiting different cleaning characteristics. An axle is configured to allow the brushing device to rotate around the axle. The brush arrangement is characterized in that the rotation of the brushing device around the axle is selectively locked by a locking mechanism.

**[0008]** Thus, the present disclosure provides an improved brush arrangement which may be equally suitable for cleaning at least two different types of surfaces. The brush arrangement may be ergonomic in use, simple in design, and cost-effective. The brush arrangement may be versatile in its application and may be much more convenient to carry and store as opposed to carrying and storing a plurality of brush arrangements for cleaning a plurality of different surfaces. Further, the multiple segments of the brushing device may be any number of segments and may further include different types of bristles to exhibit different cleaning characteristics. For example, the material, and/ or the dimensions of the bristles may be different for multiple segments of the brushing device. Further, at least one segment from the multiple segments may include any other cleaning tool different from the bristle. Further, a user may conveniently be able to selectively switch between multiple segments of the brushing device for carrying out cleaning operation on at least two different surfaces. Further, the user may be able to lock the rotation of the brushing device around the axle when a desired segment of the brushing device is brought in an operative position such that in the operative position, the bristles of the desired segment face the surface to be cleaned.

**[0009]** According to an exemplary embodiment of the invention, the brushing device is coupled to a motor such that the motor drives the brushing device in an oscillating manner. The motor may be an electric motor. The motor may drive the brushing device in a back-and-forth manner. The back-and-forth or the oscillating movement of the brushing device may lead to thorough cleaning of the surface. Further, the oscillating movement of the brushing device may result in a low centrifugal force acting on dirt particles, and hence the dirt particles may be thrown less far away from the brushing device or the brushing arrangement. However, the brushing device may exhibit any other movement as well without departing from the spirit of the present invention. It is obvious to the one skilled in the art, that the brushing device has not to be driven by a motor at all, but can be used within as manually operated tool used to brush surfaces.

**[0010]** According to an exemplary embodiment of the invention, a gear arrangement is disposed between the motor and the brushing device. The motor and the gear arrangement may be functionally coupled to drive the brushing device in the oscillating manner.

**[0011]** According to an exemplary embodiment of the invention, the brush arrangement is housed in a housing. The housing may allow the coupling of the brush arrangement with any cleaning device. Further, the housing may prevent falling off the dirt particles on the user and the

surrounding environment. In other words, the housing may form a protective hood against dirt particles.

**[0012]** According to an exemplary embodiment of the invention, the housing may include a motor housing that may accommodate the motor and the gear arrangement. Further, the motor housing may have ventilation slots for extracting cooling air and for blowing out air on the opposite side.

**[0013]** According to an exemplary embodiment of the invention, the housing is removably coupled to a handle. The handle may allow manual guidance of the brush arrangement along the surface to be cleaned. The handle may be telescopic to adapt to the height of the user. The handle may allow the user to clean the surface in an ergonomic manner. The handle may allow the user to stand in a normal comfortable position and simultaneously clean the surface. The handle may be designed as a metal or plastic tube.

**[0014]** According to an exemplary embodiment of the invention, the handle may include a power switch or button to start and end the operation of the brush arrangement. Further, the handle may shield the wirings connecting the power switch and the motor. Further, the handle may accommodate a battery to power the motor.

**[0015]** According to an exemplary embodiment of the invention, the housing has a coupler associated with the handle to allow for a removable coupling of the handle. The coupler may function as a male coupling element and may be inserted into the handle for the removable coupling of the handle with the coupler and hence the housing.

**[0016]** According to an exemplary embodiment of the invention, the coupler may function as a small handle when the surface to be cleaned is within the ergonomic limits of the user.

**[0017]** According to an exemplary embodiment of the invention, the brushing device is a disc brush. The disc brush may be suitable for smaller cleaning surfaces such as joints of natural stone or concrete surfaces, amongst many other surfaces. Further, the disc brush may be provided with multiple segments having different cleaning characteristics.

**[0018]** According to an exemplary embodiment of the invention, the disc brush may be a plurality of disc brushes arranged on the axle of the brush arrangement. The plurality of disc brushes may aid cleaning of a larger portion of the cleaning surface at once.

**[0019]** According to an exemplary embodiment of the invention, the disc brush may have a width in the range 1 mm to 20 mm, preferably 2 mm to 10 mm.

**[0020]** According to an exemplary embodiment of the invention, the brushing device is a roller brush. The roller brush may also be referred to as a cylindrical brush. The roller brush may be highly versatile and adaptable because there may be many variations in bristle patterns with the most common bristle patterns being straight, spiral or helix, staggered, and herringbone. The roller brush may be suitable for wider cleaning surfaces.

**[0021]** According to an exemplary embodiment of the invention, the disc brush and the roller brush may be exchanged as per the requirement without any external tool.

5 **[0022]** According to an exemplary embodiment of the invention, the brushing device includes at least one plastic bristle, and/or at least one metal bristle, and/or at least one rake. The brushing device may include different sets or segments of bristles with different dimensions and materials to cater to cleaning needs of different surfaces. For example, the brushing device may include at least one plastic bristle and at least one metal bristle, or the brushing device may include only the plastic bristles of different dimensions. Further, the brushing device may also include at least one rake, or any other cleaning tool for cleaning surfaces or weeding. The brushing device may be a multi-purpose brushing device with many different cleaning characteristics that may alternatively be used for cleaning surfaces as per the requirements of the surfaces.

**[0023]** According to an exemplary embodiment of the invention, the brushing device may include at least one plastic bristle, and/or at least one metal bristle with a bristle diameter in the range of 0.5 to 1 mm.

25 **[0024]** According to an exemplary embodiment of the invention, the brushing device is manually rotated around the axle to switch between multiple segments of the brushing device. The brushing device may be easily rotated by the user to bring a particular segment of the brushing device in the operative position such that in the operative position, only that particular segment may face the surface to be cleaned.

**[0025]** According to an exemplary embodiment of the invention, the housing at least partially shields the brush arrangement. The housing may at least partially shield the brushing device while still allowing a better view of an area to be cleaned. Further, the housing may prevent falling off the dirt particles on the user and the surrounding environment.

40 **[0026]** According to an exemplary embodiment of the invention, the locking mechanism includes a rotatable lever. The locking mechanism may be any quick locking system to lock the rotation of the brushing device around the axle when the desired segment of the brushing device is brought in the operative position such that in the operative position, the bristles or the rake, or any other cleaning tool associated with the desired segment faces the surface to be cleaned.

50 **[0027]** According to an exemplary embodiment of the invention, the brush arrangement is configured for cleaning an ambient surface. The ambient surface may include any surface surrounding the user of the brush arrangement. For example, the ambient surface may be a ceiling surface, a garden surface, or a balcony surface.

55 **[0028]** Before discussing the invention with the help of the drawings the invention will be briefly discussed in general. A brush arrangement with a brushing device that may include multiple segments such that the brushing

device may alternatively be used for cleaning and weeding. The multiple segments of the brushing device may include bristles made of different materials, and a rake such that at least two segments of the brushing device may exhibit different cleaning characteristics. The brushing device may be a disc brush and a user may be able to switch from one segment to the other segment very quickly and easily by turning the disc brush. Further, the brushing arrangement may include a locking mechanism that may be a quick locking system with a toggle. The locking mechanism may lock the rotation of the disc brush when a desired segment of the brushing device or the disc brush is brought in an operative position such that in the operative position, the bristles or the rake of the desired segment face the surface to be cleaned.

**[0029]** The brush arrangement according to the present invention may provide a quick change of the multiple segments of the disc brush (or the brushing device) that may carry bristles of different materials and a rake. The quick change of the multiple segments of the disc brush may be done by turning the disc brush.

**[0030]** According to an exemplary embodiment of the invention, the brush arrangement may include a rotatable disc brush with many different tools like plastic or steel bristles, or rake, or some other tools.

**[0031]** Other features and aspects of this invention will be apparent from the following description and the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0032]** The invention will be described in more detail with reference to the enclosed drawings, wherein:

**FIG. 1** illustrates a perspective side view of a brush arrangement, in accordance with an exemplary embodiment of the present disclosure;

**FIG. 2** illustrates another perspective side view of a brush arrangement, in accordance with an exemplary embodiment of the present disclosure;

**FIG. 3** illustrates a perspective side view of a housing that houses a brush arrangement, in accordance with an exemplary embodiment of the present disclosure;

**FIG. 4** illustrates another perspective side view of a housing that houses a brush arrangement, in accordance with an exemplary embodiment of the present disclosure;

**FIG. 5** illustrates a perspective side view of a housing that houses a brush arrangement such that at least one plastic bristle is in an operative position, in accordance with an exemplary embodiment of the present disclosure;

**FIG. 6** illustrates another perspective side view of a housing that houses a brush arrangement such that at least one plastic bristle is in an operative position, in accordance with an exemplary embodiment of the present disclosure;

**FIG. 7** illustrates a perspective side view of a housing that houses a brush arrangement such that at least one rake is in an operative position, in accordance with an exemplary embodiment of the present disclosure; and

**FIG. 8** illustrates another perspective side view of a housing that houses a brush arrangement such that at least one rake is in an operative position, in accordance with an exemplary embodiment of the present disclosure.

#### DETAILED DESCRIPTION OF THE DRAWINGS

**[0033]** The present invention will be described more fully hereinafter with reference to the accompanying drawings, in which example embodiments of the invention incorporating one or more aspects of the present invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. For example, one or more aspects of the present invention may be utilized in other embodiments and even other types of structures and/or methods. In the drawings, like numbers refer to like elements.

**[0034]** Certain terminology is used herein for convenience only and is not to be taken as a limitation on the invention. For example, "upper", "lower", "front", "rear", "side", "longitudinal", "lateral", "transverse", "upwards", "downwards", "forward", "backward", "sideward", "left", "right", "horizontal", "vertical", "upward", "inner", "outer", "inward", "outward", "top", "bottom", "higher", "above", "below", "central", "middle", "intermediate", "between", "end", "adjacent", "proximate", "near", "distal", "remote", "radial", "circumferential", or the like, merely describe the configuration shown in the Figures. Indeed, the components may be oriented in any direction and the terminology, therefore, should be understood as encompassing such variations unless specified otherwise.

**[0035]** **FIG. 1** illustrates a perspective side view of a brush arrangement **100**. The brush arrangement **100** may be configured for cleaning an ambient surface. The brush arrangement **100** includes a brushing device **110**. The brushing device **110** may be formed as a disc brush or a roller brush. The brushing device **110** of the present invention is exemplified as the disc brush. The brushing device **110** is divided into multiple segments "**S1**, **S2**, **S3**" such that at least two segments exhibit different cleaning characteristics. The multiple segments

"S1, S2, S3" of the present invention are exemplified as three segments "S1, S2, S3" and may include at least one metal bristle 112, and/ or at least one plastic bristle 114, and/ or at least one rake 116 to provide different cleaning characteristics to the brushing device 110. The three segments "S1, S2, S3", as shown in exemplary FIG. 1 includes at least one metal bristle 112, and at least one plastic bristle 114, and at least one rake 116 respectively.

[0036] The brush arrangement 100 further includes a driving mechanism that includes a motor (not shown), a gear arrangement (not shown), and an axle (not shown). The driving mechanism is configured to drive the brushing device 110 of the brush arrangement 100. The brushing device 110 is operatively coupled to the axle. The axle is further operatively coupled to the motor. Further, the brushing device 110 is operatively coupled to the motor via the axle. Further, the gear arrangement is disposed between the motor and the brushing device 110.

[0037] Further, the coupling between the brushing device 110 and the axle has an engaged state and a disengaged state. In the engaged state, the relative motion between the axle and the brushing device 110 is not possible whereas in the disengaged state, the relative motion between the axle and the brushing device 110 is possible. In other words, the axle is configured to allow the brushing device 110 to rotate around the axle in the disengaged state.

[0038] Further, a locking mechanism 120 is configured to allow the axle and the brushing device 110 to obtain the engaged state and the disengaged state. The locking mechanism 120 includes a rotatable lever 122. The rotatable lever 122 has a first position "P1" as shown in FIG. 1 and a second position (not shown). The first position "P1" may be substantially orthogonal to the second position. The rotatable lever 122 in the first position "P1" does not allow rotation of the brushing device 110 around the axle. In other words, when the rotatable lever 122 is in the first position "P1", the axle, and the brushing device 110 are in the engaged state. Further, the rotatable lever in the second position allows rotation of the brushing device 110 around the axle. In other words, when the rotatable lever 122 is in the second position, the axle, and the brushing device 110 are in the disengaged state. In the disengaged state, the rotation of the brushing device 110 around the axle is allowed to selectively switch between three segments "S1, S2, S3" of the brushing device 110.

[0039] During operation of the brush arrangement 100, the rotatable lever 122 is initially set to the second position such that the brushing device 110 is allowed to rotate around the axle. When the rotatable lever 122 is in the second position, the axle, and the brushing device 110 are in the disengaged state. The brushing device 110 is manually rotated around the axle by a user of the brush arrangement 100 to selectively switch between three segments "S1, S2, S3" of the brushing device 110. Once, a desired segment "S1" or "S2" or "S3" of the brushing

device 110 is brought in an operative position, the rotatable lever 122 is rotated back from the second position of the rotatable lever 122 to the first position "P1" of the rotatable lever 122. When the rotatable lever 122 is in the first position "P1", the axle, and the brushing device 110 are in the engaged state and no further rotation of the brushing device 110 around the axle is allowed. Further, in the operative position, only the desired segment "S1" or "S2" or "S3" of the brushing device 110 faces the surface to be cleaned.

[0040] Further, the drive mechanism is activated by activating the motor once the desired segment "S1" or "S2" or "S3" of the brushing device 110 is brought in the operative position. The motor drives the axle and the brushing device 110 mimics the motion of the axle as there is no relative movement now possible between the axle and the brushing device 110 in the engaged state of the axle and the brushing device 110. The motor drives the brushing device 110 in an oscillating manner. In other words, the motor drives the axle in a manner such that the brushing device 110 exhibits the oscillating or a back-and-forth motion to clean the surface using the desired segment "S1" or "S2" or "S3".

[0041] Further, when the brush arrangement 100 is required to clean some other surface with different physical characteristics, the motor is deactivated such the motion of the axle is stopped. The rotatable lever 122 is rotated from the first position "P1" of the rotatable lever 122 to the second position of the rotatable lever 122 such that the relative motion between the axle, and the brushing device 110 is again allowed. The brushing device 110 is again manually rotated to bring some other segment "S1" or "S2" or "S3" of the brushing device 110 suitable for the other surface to be cleaned in the operative position. After selection of the segment "S1" or "S2" or "S3", the rotatable lever 122 is rotated from the second position of the rotatable lever 122 to the first position "P1" of the rotatable lever 122 such that the relative motion between the axle, and the brushing device 110 is again disallowed. Further, the motor is again activated, and the cleaning process is carried out again in a manner as described above.

[0042] With continuous reference to FIG. 1, the brush arrangement 100 is housed in a housing 130. The housing 130 at least partially shields the brush arrangement 100. FIG. 1 shows a cross-sectional view of the housing 130. The housing 130 has a circular cross-section. Further, the housing 130 has a coupler 132. The coupler 132 is a rod-shaped element. The coupler 132 is removable coupled to the housing 130. The coupler 132 is further associated with a handle (not shown) to allow for a removable coupling of the handle with the housing 130. In other words, the housing 130 is removably coupled to the handle via the coupler 132.

[0043] FIG. 2 illustrates another perspective side view of the brush arrangement 100. The brushing device 110 is manually rotatable around the axle as per the requirement of the surface to be cleaned. The brushing device

**110** is rotatable around the axle using a rotary element **140**. The rotary element **140** has a circular cross-section. The rotary element **140** is disposed in a direction opposite to the direction of the rotatable lever **122**. In other words, the rotary element **140** and the rotatable lever **122** are disposed on opposite sides of the housing **130**. Further, the rotary element **140** is manually rotatable to rotate the brushing device **110** only when the rotatable lever **122** of the locking mechanism **120** is in the second position and the axle, and the brushing device **110** are in the disengaged state.

**[0044]** FIG. 3 illustrates a perspective side view of the housing **130** that houses the brush arrangement **100**. The housing **130** has two side surfaces and a top surface. Further, the housing **130** is open from bottom such that at least one metal bristle **112**, or at least one plastic bristle **114**, or at least one rake **116** may pop out of the housing **130** for efficient cleaning of the surface. The housing **130** at least partially shields the brush arrangement **100**. The rotatable lever **122** of the locking mechanism **120** is not shielded by the housing **130** and hence is visible from outside and is easy to operate. The rotatable lever **122** of the locking mechanism **120** selectively locks the rotation of the brushing device **110** around the axle. In other words, the rotation of the brushing device **110** around the axle is selectively locked by the locking mechanism **120**.

**[0045]** Further, the brush arrangement **100** of FIG. 3 employs at least one metal bristle **112** for cleaning the surface. The at least one metal bristle **112** exhibits the oscillating motion while cleaning the surface. The at least one metal bristle **112** is brought in operative position by rotation of the brushing device **110** around the axle by first bringing the rotatable lever **122** of the locking mechanism **120** in the second position of the rotatable lever **122**. Further, when the at least one metal bristle **112** is in the operative position, the at least one plastic bristle **114**, and the at least one rake **116** are at least partially shielded by the housing **130** and do not perform any cleaning operation.

**[0046]** FIG. 4 illustrates another perspective side view of the housing **130** that houses the brush arrangement **100**. The rotary element **140** is not shielded by the housing **130** and hence is visible from outside and is easy to operate. The rotary element **140** is disposed on opposite side of the housing **130** relative to the positioning of the rotatable lever **122**. The rotary element **140** is configured to manually rotate the brushing device **110** when the rotatable lever **122** is in the second position. In other words, the rotary element **140** is configured to manually rotate the brushing device **110** when the axle, and the brushing device **110** are in the disengaged state.

**[0047]** FIG. 5 illustrates a perspective side view of the housing **130** that houses the brush arrangement **100** such that the at least one plastic bristle **114** is in the operative position. The at least one plastic bristle **114** oscillates and cleans the surface when the motor of the driving mechanism is activated. Further, when the at least

one plastic bristle **114** oscillates, the axle, and the brushing device **110** are in the engaged state such that there is no relative motion between the axle, and the brushing device **110**.

**[0048]** FIG. 6 illustrates another perspective side view of the housing **130** that houses the brush arrangement **100** such that the at least one plastic bristle **114** is in the operative position. The rotary element **140** is configured to manually rotate the brushing device **110** such that the at least one plastic bristle **114** is utilized for cleaning the surface. The rotary element **140** transfers the torque produced by the user to the brushing device **110**.

**[0049]** FIG. 7 illustrates a perspective side view of the housing **130** that houses the brush arrangement **100** such that the at least one rake **116** is in the operative position. The at least one rake **116** oscillates and cleans the surface when the motor of the driving mechanism is activated. Further, when the at least one rake **116** oscillates, the axle, and the brushing device **110** are in the engaged state such that there is no relative motion between the axle, and the brushing device **110**. In the engaged state of the axle, and the brushing device **110**, the rotatable lever **122** is in the first position "P1" of the rotatable lever **122**.

**[0050]** FIG. 8 illustrates another perspective side view of the housing **130** that houses the brush arrangement **100** such that the at least one rake **116** is in the operative position. The at least one rake **116** is brought to the operative position by manually rotating the rotary element **140** provided with the brush arrangement **100**.

**[0051]** In the drawings and specification, there have been disclosed exemplary embodiments and examples of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for the purpose of limitation of the scope of the invention being set forth in the following claims.

#### LIST OF ELEMENTS

**[0052]**

<b>100</b>	Brush Arrangement
<b>110</b>	Brushing Device
<b>112</b>	Metal Bristle
<b>114</b>	Plastic Bristle
<b>116</b>	Rake
<b>120</b>	Locking Mechanism
<b>122</b>	Rotatable Lever
<b>130</b>	Housing
<b>132</b>	Coupler
<b>140</b>	Rotary Element
<b>S1</b>	Segment
<b>S2</b>	Segment
<b>S3</b>	Segment
<b>P1</b>	First Position

**Claims**

1. A brush arrangement **(100)**, comprising:  
 a brushing device **(110)**, wherein the brushing device **(110)** is divided into multiple segments **(S1, S2, S3)** with at least two segments exhibiting different cleaning characteristics; and  
 an axle configured to allow the brushing device **(110)** to rotate around the axle;

**characterized in that:**

the rotation of the brushing device **(110)** around the axle is selectively locked by a locking mechanism **(120)**.

2. The brush arrangement **(100)** according to claim 1, wherein the brushing device **(110)** is coupled to a motor such that the motor drives the brushing device **(110)** in an oscillating manner.

3. The brush arrangement **(100)** according to claim 2, wherein a gear arrangement is disposed between the motor and the brushing device **(110)**.

4. The brush arrangement **(100)** according to any one of the preceding claims, wherein the brush arrangement **(100)** is housed in a housing **(130)**.

5. The brush arrangement **(100)** according to claim 4, wherein the housing **(130)** is removably coupled to a handle.

6. The brush arrangement **(100)** according to claim 4 or 5, wherein the housing **(130)** has a coupler **(132)** associated with the handle to allow for a removable coupling of the handle.

7. The brush arrangement **(100)** according to any one of claims 4-6, wherein the housing **(130)** at least partially shields the brush arrangement **(110)**.

8. The brush arrangement **(100)** according to any one of the preceding claims, wherein the brushing device **(110)** is a disc brush.

9. The brush arrangement **(100)** according to any of claims 1-7, wherein the brushing device **(110)** is a roller brush.

10. The brush arrangement **(100)** according to any one of the preceding claims, wherein the brushing device **(110)** includes at least one plastic bristle **(114)**, and/ or at least one metal bristle **(112)**, and/ or at least one rake **(116)**.

12. The brush arrangement **(100)** according to any one of the preceding claims, wherein the locking

mechanism **(120)** includes a rotatable lever **(122)**.

13. The brush arrangement **(100)** according to any one of the preceding claims, wherein the brush arrangement **(100)** is configured for cleaning an ambient surface.

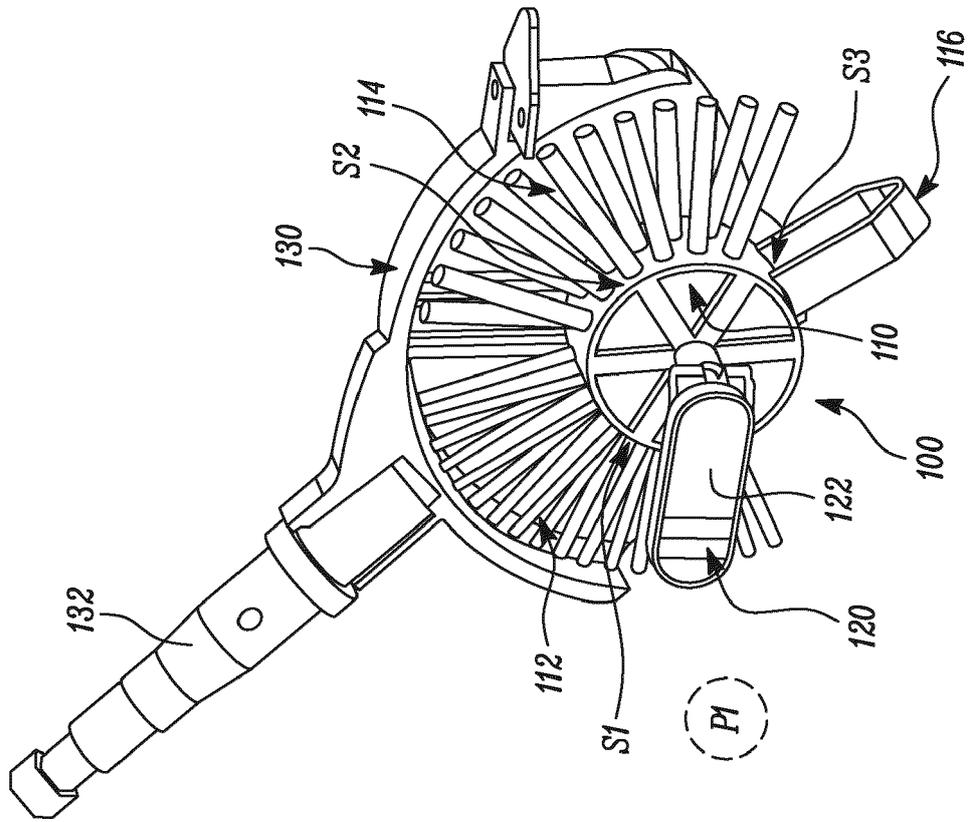


FIG. 1

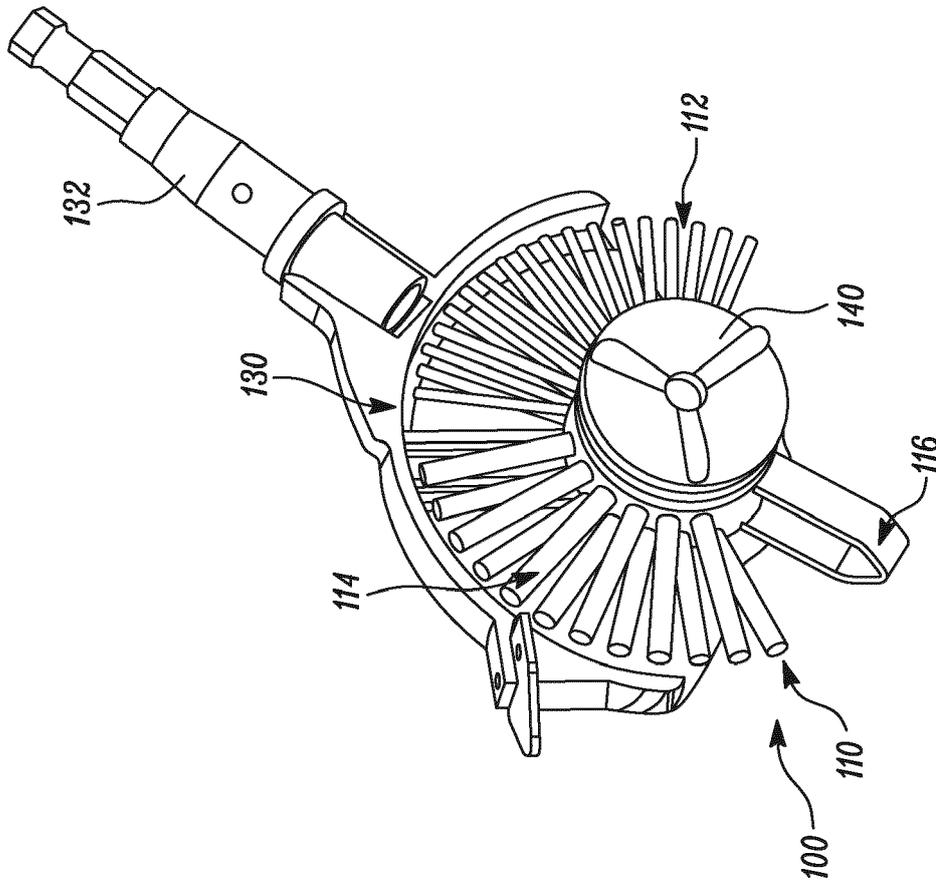


FIG. 2

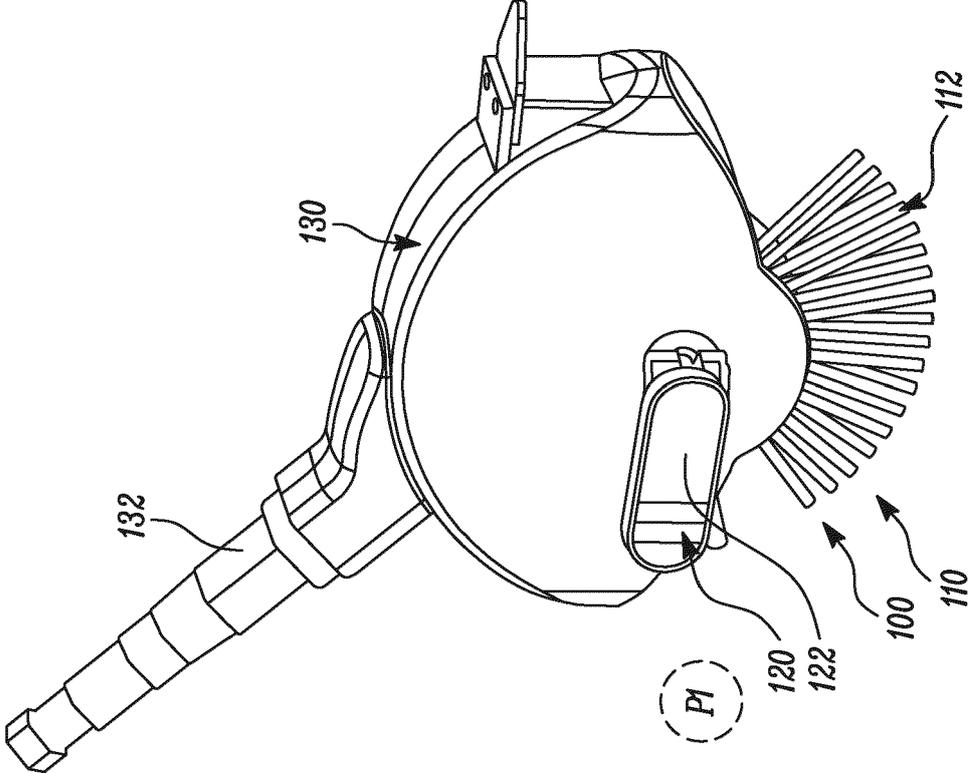


FIG. 3

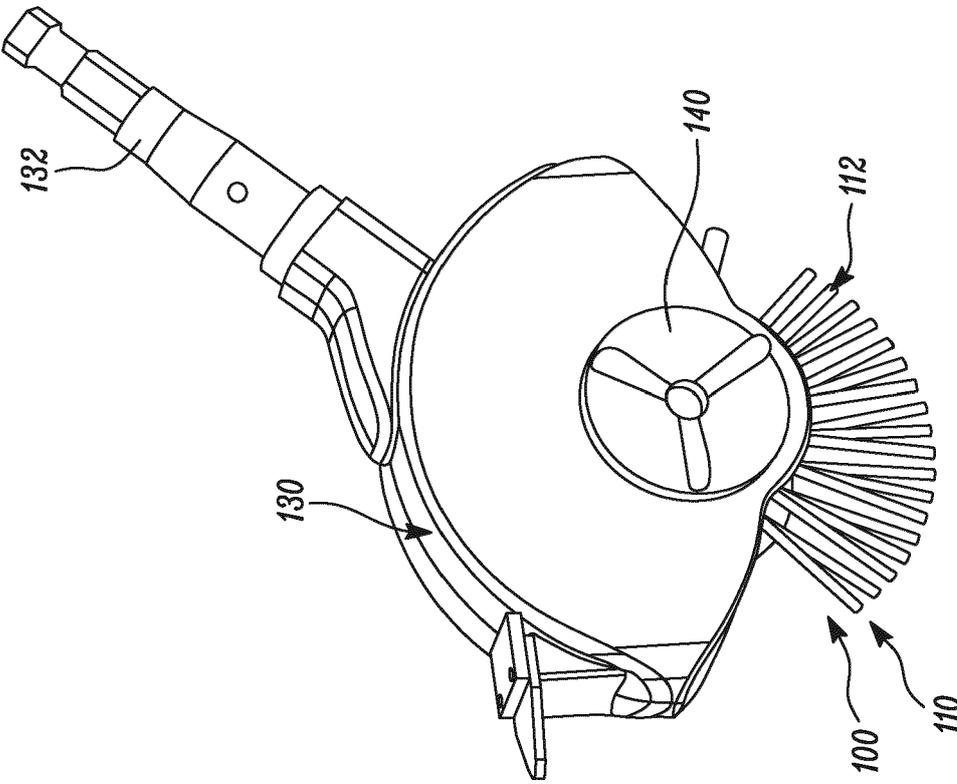


FIG. 4

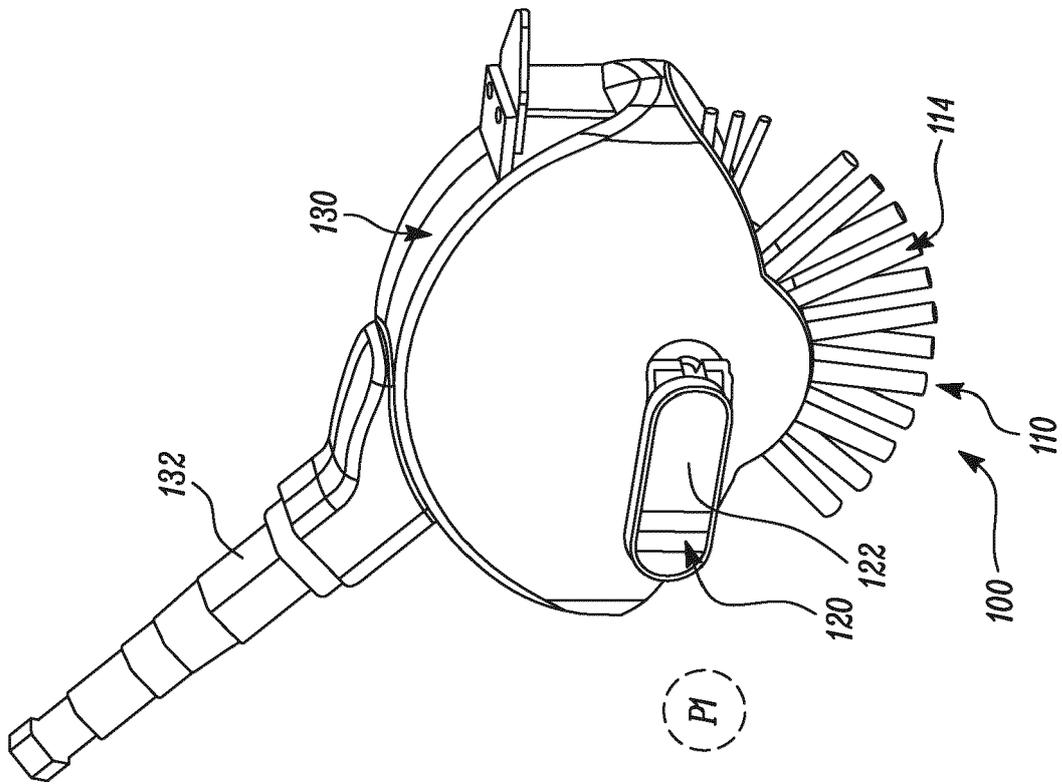
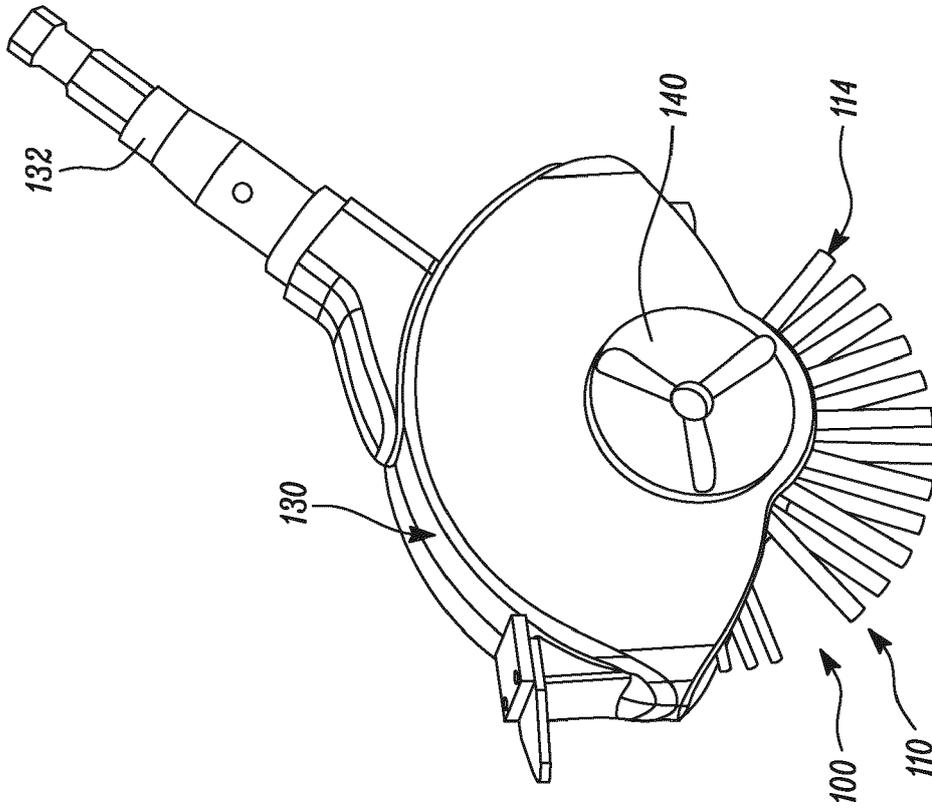


FIG. 5



*FIG. 6*

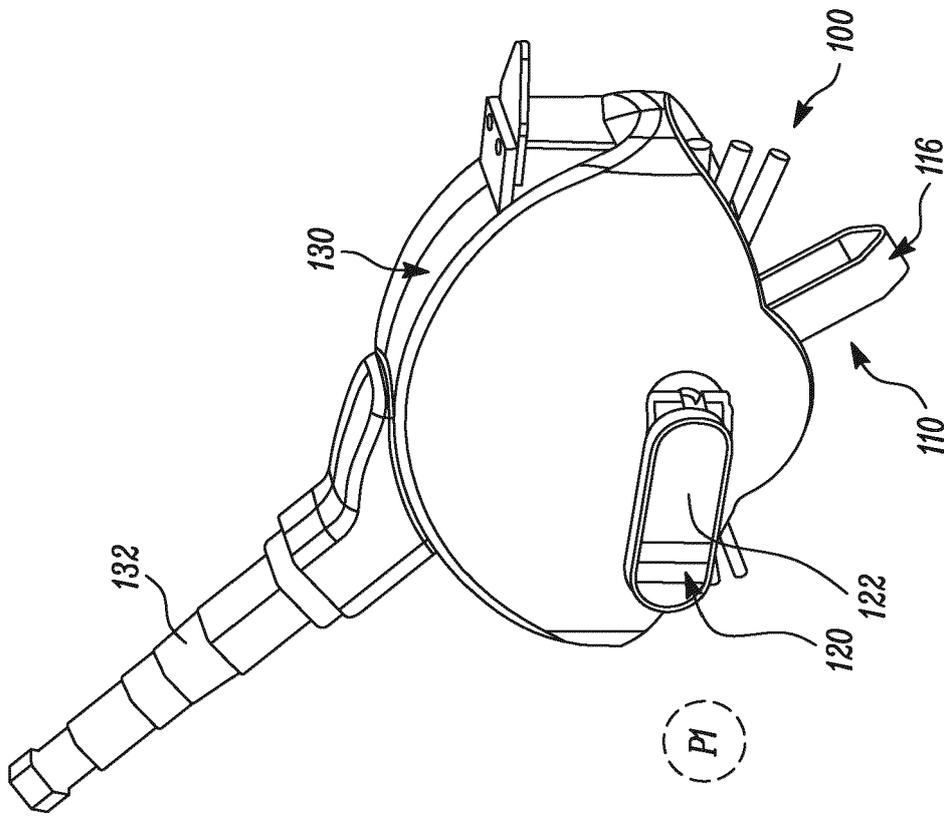
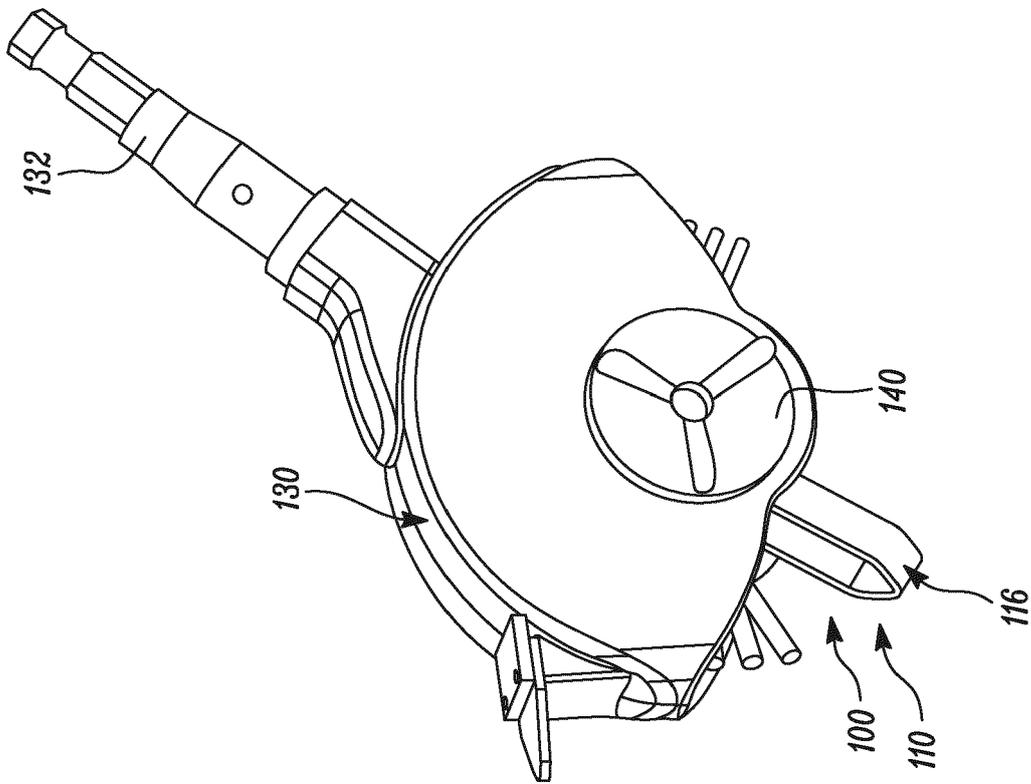


FIG. 7



*FIG. 8*



EUROPEAN SEARCH REPORT

Application Number

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			TECHNICAL FIELDS SEARCHED (IPC)
			A46B A47L
The present search report has been drawn up for all claims			
Place of search <b>The Hague</b>		Date of completion of the search <b>12 April 2024</b>	Examiner <b>Kun, Karla</b>
CATEGORY OF CITED DOCUMENTS		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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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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