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# (54) A TOOL FOR A SURFACE CLEANING APPARATUS

SAUGWERKZEUG FÜR EIN FLÄCHENREINIGUNGSGERÄT

OUTIL D'ASPIRATION POUR UN APPAREIL DE NETTOYAGE DE SURFACES

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## Description

**[0001]** This invention relates to a tool for a surface cleaning apparatus and in particular, but not exclusively, to a surface cleaning apparatus including such a tool.

**[0002]** EP1110493A2 describes a tool according to the preamble of claim 1 for a vacuum cleaner in which pressurised filtered exhaust air from a motorised fan in a vacuum cleaner body passes on an exhaust path to a floor suction tool.

**[0003]** EP0338513A2 describes a suction nozzle with a rotary brush for a vacuum cleaner having a front side flexible member, provided along the vicinity of an opening front edge of a suction opening of a suction nozzle main body with a plurality of opening grooves.

**[0004]** US2016/015229A1 discloses a hand carryable surface cleaning apparatus.

**[0005]** Tools for surface cleaning apparatus often require electrical power for an electrical component in the floor head of the tool, e.g. a motor. Routing the wires around moving or articulating components of the tool can be difficult and in use often leads to pinching or breaking of wires. This can result in the tool not working properly or being a safety concern. The present invention seeks to address this problem.

**[0006]** According to a first aspect of the invention we provide a tool for a surface cleaning apparatus, including:

a floor head;
a connecting member for connecting the tool to a surface cleaning apparatus; and
a passage for carrying dirt-laden air from the floor head to the apparatus
wherein the floor head and connecting member are pivotally connected to each other about an axis A,
wherein the connecting member includes an articulated joint having first and second parts which are pivotable relative to each other about an axis B, wherein axis B extends transversely to axis A,
where the tool includes an electrical cable passage through which electrical cables may extend to provide an electric connection between the apparatus and an electrical component in the floor head,
wherein a first part of the electrical cable passage is provided in or by the first part of the articulated joint,
wherein the portion of the first part of the electrical cable passage extends in an arcuate or substantially arcuate path around the axis B, and wherein the first part of the electrical cable passage terminates at an opening which is positioned above the axis B and which opening extends upwardly away from the floor head, said opening communicating with a second part of the electrical cable passage which is provided in or by the second part of the articulated joint,
wherein the opening and a portion of the first part of the electrical cable passage adjacent the opening are positioned in or substantially in the same plane,
characterised in that the passage is a corrugated tube.

**[0007]** According to a second aspect of the invention we provide a surface cleaning apparatus including a tool according to the first aspect of the invention.

**[0008]** Further features of the invention are set out in the appended claims.

**[0009]** Embodiments of the invention will be set out below by way of example only with reference to the accompanying figures, of which:

Figure 1 is a perspective view of a surface cleaning apparatus;

Figure 2 is a front view of the apparatus of figure 1;

Figure 3 is a side view of the apparatus figure 1;

Figure 4 is an opposite side view of the apparatus figure 1;

Figure 5 is a perspective view of a housing of the apparatus of figure 1, which housing is operable as a handheld surface cleaning apparatus;

Figure 6 is a side view of the housing of figure 5;

Figure 7 is an opposite side view of the housing of figure 5;

Figure 8 is a perspective view of a tool of the apparatus;

Figure 9 is a front view of the tool of figure 8;

Figure 10 is a rear view of components parts of the tool of figure 8;

Figure 11 is a rear view of components parts of the tool in a first configuration;

Figure 12 is a rear view of components parts of the tool in a second configuration;

Figure 13 is a perspective view of component parts of the tool;

Figure 14 is an exploded perspective view of the components shown in figure 13;

Figure 15 is a rear perspective view of the tool; and

Figure 16 is a magnified view of part of figure 15.

**[0010]** Referring to the figures, these show a surface cleaning apparatus 10 in accordance with the present invention. The apparatus 10 includes a tool 11 with a floor head 12, a housing 16 and an elongate member 14

connecting the floor head 12 to the housing 16. The housing 16 in this example is operable as a handheld surface cleaning apparatus, commonly known as a hand vac, when the elongate member 14 and floor head 12 are not connected thereto. The housing 16 supports a suction source, a dirt container 18 and a cyclonic separator. In this example the suction source is an electric motor driving a rotatable fan, but any appropriate suction source may be used. All that is necessary is for the suction source to be able to draw air through the floor head 12 and elongate member 14 towards the dirt collection container.

**[0011]** In this example the housing 16 supports or contains a battery to provide electrical power to the suction motor and other components of the apparatus 10. In alternative embodiments, the apparatus 10 may be mains powered.

**[0012]** Whilst in the present embodiment the apparatus 10 includes a cyclonic separator to separate dirt from the air flowing through the apparatus 10, this is not essential. Indeed, embodiments are envisaged where the apparatus 10 includes a filter bag which collects dirt, or any other appropriate device to separate the dirt from the air. The apparatus 10 includes a pivotally moveable door 18a which enables a user to empty dirt collected within the container 18.

**[0013]** The elongate member 14 includes a passage for carrying dirt-laden air from the floor head 12 to the dirt collection container 18. In this example the floor head 12 includes a motor for driving a rotatable floor agitating member or brush, so the elongate member 14 includes a further passage through which electrical cables may extend to provide an electric connection between the housing 16 and the motor in the floor head.

**[0014]** The floor head 12 is disconnectable from the elongate member 14, so that, for example, another tool can be connected to the free end of the elongate member 14. The elongate member 14 is also disconnectable from the housing 16, by way of a manually operated switch 17. This enables the housing 16 to be used as handheld surface cleaning apparatus, with the option of being able to connect another tool to the location from where the elongate member 16 is removed.

**[0015]** The housing 16 includes a handle for holding the apparatus 10, said handle including first 20 and second 21 user-graspable portions which are connected to each other substantially at right-angles. A first end of the first user-graspable portion 20 is connected to the housing 16 and extends generally rearwardly away therefrom and from the elongate member 14. A first end of the second user-graspable portion 21 is connected to the housing 16 and extends generally upwardly therefrom. Respective second ends of the first 20 and second 21 user-graspable portions are connected to each other. Essentially, the first 20 and second 21 user-graspable portions form a handle which is L-shaped and which provides two locations each of which is sized such that it can be grasped fully by a hand of a user. A device 22, e.g. a switch, for turning the apparatus "on" is positioned at the connection of the second ends of the first 20 and second 21 user-graspable portions to each other.

**[0016]** Figures 8 to 16 focus on features of the tool 11, its floor head 12 and its connection to the elongate member 14. The tool 11 includes a connecting member, indicated generally at 200, for connecting the tool 11 to the elongate member. The connecting member 200 includes an articulated joint having first 201 and second 202 parts which are pivotable relative to each other about an axis B. The floor head 12 and the second part 202 of the connecting member are pivotally connected to each other about an axis A which extends transversely to axis A. The floor head 12 also includes a pair of rearwardly mounted wheels 150.

**[0017]** The tool 11 also includes a passage 203 for carrying dirt-laden air from the floor head 12 to the housing 16, in the form of a corrugated tube. The tool 11 also includes an electrical cable passage through which electrical cables 204, 205 extend to provide an electric connection between the housing 16 (e.g. a battery housed therein) and an electrical component in the floor head 12. In this example, the floor head 12 includes a floor surface agitator member 13 rotatable by an electric motor (not shown). Thus, electrical power is provided to the motor in the floor head 12 by way of the wires 204, 205. The electrical cable passage in this example is positioned rearwardly of the passage 203, but embodiments are envisaged where it is positioned forwardly of the passage 203.

**[0018]** Figures 13 and 14 show the various component parts which make up connecting member 200. In more detail, the first part 201 is generally n-shaped when viewed from the rear or front of the tool 11. It has downwardly extending leg portions 223, 224 which are spaced from each other to permit the passage 203 to pass therebetween. Each portion 223, 224 is provided with a generally cylindrical projection 225, 226 which are received in corresponding openings in the floor head 12. The projections 225, 226 facilitate the pivoting of the floor head 12 relative to the connecting member about the axis A. An opposite end 220 of the first part 201 is provided with formations 221, 222 which are again spaced from each other and which provide one half of the articulation between the first 201 and second 202 parts.

**[0019]** The second part 202 is generally cylindrical with an opening to receive the passage 203. An end of the second part 202 which faces the first part 201 is provided with formations 211, 212 which are spaced from each other and which provide the other half of the articulation between the first 201 and second 202 parts. The formation 212 is connected to the formation 222 by a fastener. The formation 211 is connected to the formation 221 by a connector 213, which provides a snap-fit. Additionally, the connecting member includes a part 215 which is shaped to provide a releasable connection to the elongate member 14. Essentially, the part 215 is a sub-part of the second part 202 of the connecting member 200.

**[0020]** The electrical cable passage has a first part 250 which is provided in the first part 201 of the articulated joint, and a second part 270 which is provided in the second part 202 of the articulated joint. The first part 250 of the electrical cable passage terminates at an opening 260 which is positioned above, preferably directly vertically above, the axis B. The opening 260 extends upwardly away from the axis B and the floor head 11 and communicates with the second part 270 of the electrical cable passage. In the figures, the wires 204, 205 can be seen extending through the opening 260. The opening 260, as can be seen from figure 16, is generally square in cross-section, but flares outwardly as it extends away from the axis B. Thus, an upper portion of the opening 260 has a greater cross-sectional area than a lowermost portion of the opening 260. This ensures that there is a greater freedom of movement of the wires 204, 205 the further the wires 204, 205 are away from the axis B.

**[0021]** Advantageously, a portion of the first part 250 (which portion is adjacent the opening 260) and the opening 260 are positioned in or substantially in the same plane. This means that the electrical wires 204, 205 do not need to change direction (i.e. be bent) as they pass from the first part 250 and into (and out from) the opening 260. This reduces the likelihood of the wires breaking during use, as the parts 201, 202 are pivoted relative to each other.

**[0022]** Additionally, it can be seen that the first part 250 is shaped so that a portion 250a of it extends around one side of the axis B, e.g. laterally to one side of the axis B. The portion 250a of the first part 250 of the passage therefore extends to one side and above the axis B. More particularly, it can be seen that the portion 250a of the first part 250 of the electrical cable passage extends in an arcuate or substantially arcuate path around the axis B. A lowermost portion of the first portion 250a of the passage terminates at an opening 251 which is positioned laterally to one side of the axis B. The opening 251 also flares outwardly as it extends downwardly away from the axis B, thus giving the wires 204, 205 more room to move.

**[0023]** As can be seen from the figures, the electrical wires 204, 205 extend downwardly through the first portion 250a of the first part 250 until they pass through the opening 251. At this point, the wires 204, 205 pass downwardly into a second portion 250b of the first part 250. The second portion 250b extends towards the floor head 12 and to a lateral side of said passage 203 where it is enclosed by a cover member 230, a wall 232 of which is positioned laterally to the passage 203 and engages a lip 202a provided on an inwardly facing surface of the leg portion 223. The cover 230, which also has a wall 231 for mating with the formation 222, is positioned in between the passage 203 and a portion the floor head 12. The cover 230 therefore defines part of the second portion 250b of the passage and it can be seen that the wall shaped to correspond substantially to the adjacent passage 203. The shaping of the wall, i.e. that it is curved, increases as much as possible the volume of the second portion 250b of the passage, so as to maximise space for the wires 204, 205. Advantageously, the cover 230 is removable to gain access to the wires 204, 205. As can be seen from the figures, the second portion 250b of the passage terminates at an opening 233 which extends through the projection 225, with the opening being coaxial with the axis A. The wires 204, 205 therefore pass through this opening 233 and into the floor head 12 to the motor.

**[0024]** When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

## Claims

**1.** A tool (11) for a surface cleaning apparatus (10), including:

a floor head (12);
a connecting member (200) for connecting the tool to a surface cleaning apparatus; and
a passage (203) for carrying dirt-laden air from the floor head to the apparatus,
wherein the floor head and connecting member are pivotally connected to each other about an axis A,
wherein the connecting member includes an articulated joint having first (201) and second parts (202) which are pivotable relative to each other about an axis B, wherein axis B extends transversely to axis A,
where the tool includes an electrical cable passage through which electrical cables (204, 205) may extend to provide an electric connection between the apparatus and an electrical component in the floor head,
wherein a first part of the electrical cable passage is provided in or by the first part of the articulated joint, and wherein the first part (250) of the electrical cable passage terminates at an opening which is positioned above the axis B and which opening (260) extends upwardly away from the floor head, said opening communicating with a second part (270) of the electrical cable passage which is provided in or by the second part of the articulated joint,
wherein the opening and a portion of the first part of the electrical cable passage adjacent the opening are positioned in or substantially in the same plane,
**characterised in that** the passage (203) is a corrugated tube.

**2.** A tool according to claim 1 wherein the first part of

the connecting member is connected, preferably pivotally connected, to the floor head.

3. A tool according to claim 1 or claim 2 wherein the second part of the connecting member is connectable directly or indirectly to the apparatus.

4. A tool according to any preceding claim wherein the first part is generally n-shaped when viewed from the rear of the tool.

5. A tool according to any preceding claim wherein the floor head includes a floor surface agitator member (13) rotatable by an electric motor, and wherein the floor head includes electrical cables passing through the electric cable passage to provide electrical power to the motor.

6. A surface cleaning apparatus including a floor head according to any preceding claim.

7. A surface cleaning apparatus according to claim 6 wherein the apparatus includes a cyclonic separation device for separating dirt from the airflow passing through the apparatus.

**Patentansprüche**

1. Instrument (11) für eine Oberflächenreinigungsvorrichtung (10), Folgendes beinhaltend:

einen Bodenaufsatz (12),
ein Verbindungselement (200) zum Verbinden des Instruments mit einer Oberflächenreinigungsvorrichtung und
einen Durchlass (203) zum Wegführen von schmutzhaltiger Luft von dem Bodenaufsatz zu der Vorrichtung,
wobei der Bodenaufsatz und das Verbindungselement um eine Achse A schwenkbar miteinander verbunden sind,
wobei das Verbindungselement eine Gelenkverbindung beinhaltet, die einen ersten (201) und einen zweiten (202) Teil aufweist, die im Verhältnis zueinander um eine Achse B schwenkbar sind, wobei sich die Achse B quer zur Achse A erstreckt,
wobei das Instrument einen Elektrokabeldurchlass beinhaltet, durch den sich Elektrokabel (204, 205) erstrecken können, um eine elektrische Verbindung zwischen der Vorrichtung und einer elektrischen Komponente in dem Bodenaufsatz bereitzustellen,
wobei ein erster Teil des Elektrokabeldurchlasses in dem oder durch den ersten Teil der Gelenkverbindung bereitgestellt ist und wobei der erste Teil (250) des Elektrokabeldurchlasses an einer Öffnung endet, die über der Achse B positioniert ist, und wobei sich eine Öffnung (260) weg von dem Bodenaufsatz nach oben erstreckt, wobei die Öffnung mit einem zweiten Teil (270) des Elektrokabeldurchlasses in Verbindung steht, der in dem oder durch den zweiten Teil der Gelenkverbindung bereitgestellt ist, wobei die Öffnung und ein Abschnitt des ersten Teils des Elektrokabeldurchlasses neben der Öffnung auf oder im Wesentlichen auf der gleichen Ebene positioniert sind,
**dadurch gekennzeichnet, dass** der Durchlass (2303) ein Wellrohr ist.

2. Instrument nach Anspruch 1, wobei der erste Teil des Verbindungselements mit dem Bodenaufsatz verbunden ist, vorzugsweise schwenkbar verbunden.

3. Instrument nach Anspruch 1 oder Anspruch 2, wobei der zweite Teil des Verbindungselements direkt oder indirekt mit der Vorrichtung verbindbar ist.

4. Instrument nach einem vorhergehenden Anspruch, wobei der erste Teil, von der Rückseite des Instruments betrachtet, im Allgemeinen n-förmig ist.

5. Instrument nach einem vorhergehenden Anspruch, wobei der Bodenaufsatz ein Bodenoberflächen-Aufwirbelungselement (13), das durch einen Elektromotor drehbar ist, beinhaltet und wobei der Bodenaufsatz Elektrokabel beinhaltet, die durch den elastischen Elektrokabeldurchlass verlaufen, um Elektroenergie für den Motor bereitzustellen.

6. Oberflächenreinigungsvorrichtung, einen Bodenaufsatz nach einem vorhergehenden Anspruch beinhaltend.

7. Oberflächenreinigungsvorrichtung nach Anspruch 6, wobei die Vorrichtung eine Zyklonabscheideeinrichtung zum Abscheiden von Schmutz von dem Luftstrom beinhaltet, der durch die Vorrichtung verläuft.

**Revendications**

1. Un outil (11) pour un appareil de nettoyage de surface (10), comprenant :

une tête à sol (12) ;
un élément de liaison (200) pour relier l'outil à un appareil de nettoyage de surface ; et
un passage (203) pour transporter l'air chargé de poussières de la tête à sol à l'appareil,
la tête à sol et l'élément de liaison étant reliés l'un à l'autre de manière pivotante autour d'un

axe A,
l'élément de liaison comprenant un joint articulé doté d'une première (201) et d'une deuxième (202) parties qui peuvent pivoter l'une par rapport à l'autre autour d'un axe B, l'axe B s'étendant transversalement à l'axe A,
l'outil comprenant un passage à câbles électriques à travers lequel les câbles électriques (204, 205) peuvent s'étendre pour fournir une connexion électrique entre l'appareil et un composant électrique dans la tête à sol,
une première partie du passage à câbles électriques étant prévue dans ou par la première partie du joint articulé, et la première partie (250) du passage à câbles électriques se terminant au niveau d'une ouverture positionnée au-dessus de l'axe B, cette ouverture (260) s'étendant vers le haut en s'éloignant de la tête à sol, ladite ouverture communiquant avec une deuxième partie (270) du passage à câbles électriques qui est prévue dans ou par la deuxième partie du joint articulé,
l'ouverture et une section de la première partie du passage à câbles électriques adjacente à l'ouverture étant positionnées dans ou sensiblement dans le même plan,
**caractérisé en ce que** le passage (203) est un tube ondulé.

**2.** Un outil selon la revendication 1, dans lequel la première partie de l'élément de liaison est relié, de préférence relié de manière pivotante, à la tête à sol.

**3.** Un outil selon la revendication 1 ou la revendication 2, dans lequel la deuxième partie de l'élément de liaison peut être relié directement ou indirectement à l'appareil.

**4.** Un outil selon une quelconque revendication précédente, dans lequel la première partie est généralement en forme de n lorsqu'elle est vue depuis l'arrière de l'outil.

**5.** Un outil selon une quelconque revendication précédente, dans lequel la tête à sol comprend un élément agitateur pour surface du sol (13) pouvant être mis en rotation par un moteur électrique, la tête à sol comprenant des câbles électriques passant à travers le passage à câbles électriques pour fournir l'alimentation électrique au moteur.

**6.** Un appareil de nettoyage de surface comprenant une tête à sol conforme à une quelconque revendication précédente.

**7.** Un appareil de nettoyage de surface selon la revendication 6, l'appareil comprenant un dispositif de séparation à cyclone destiné à séparer les poussières du flux d'air passant à travers l'appareil.

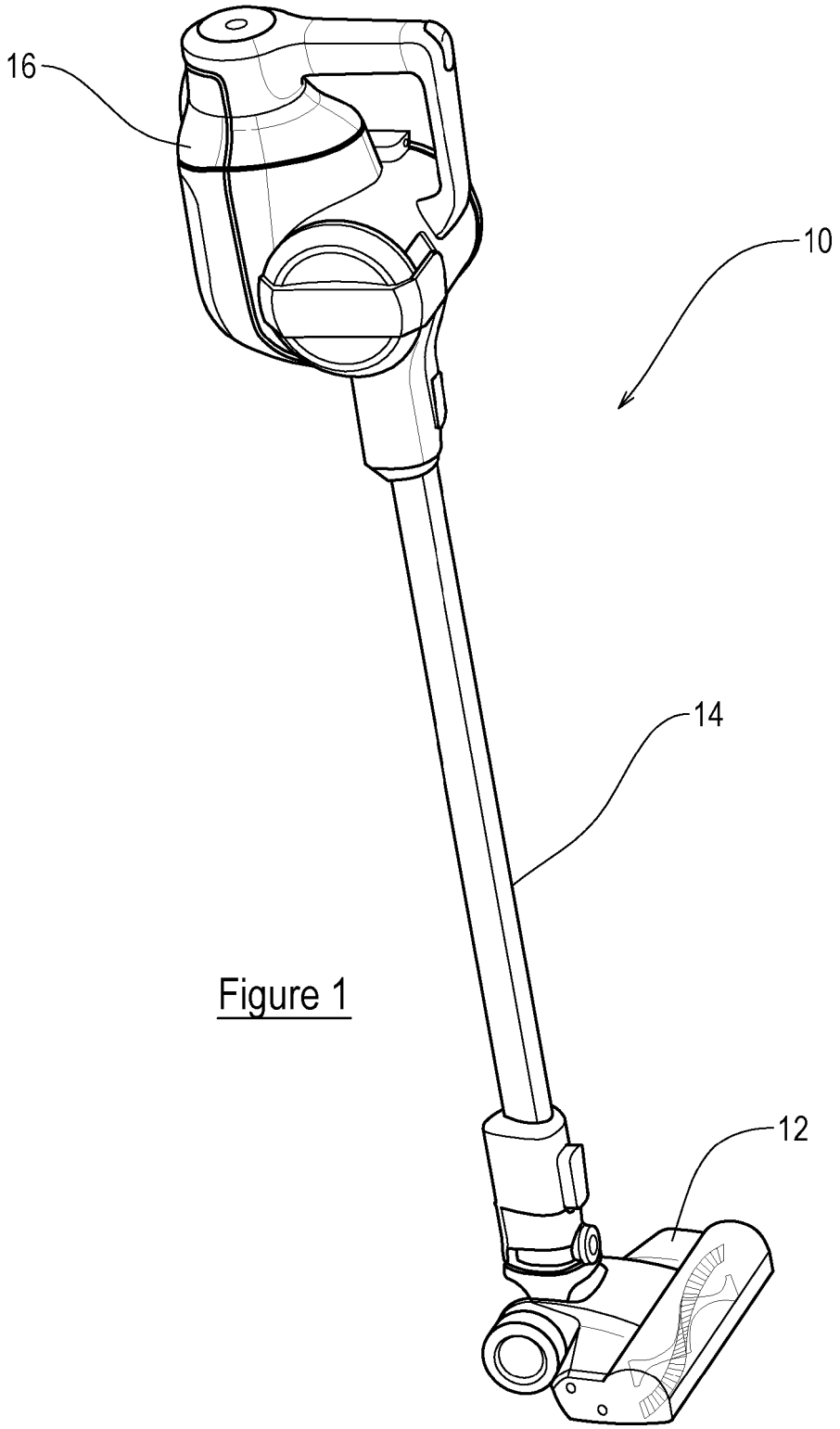



Figure 1

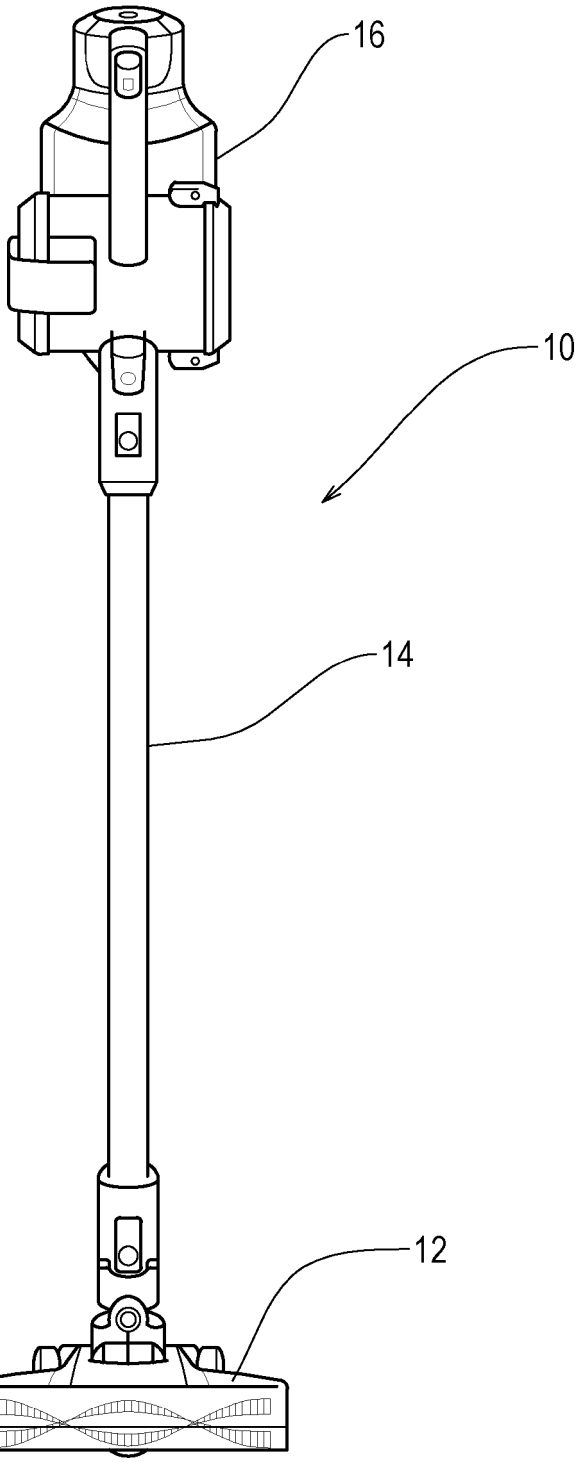



Figure 2

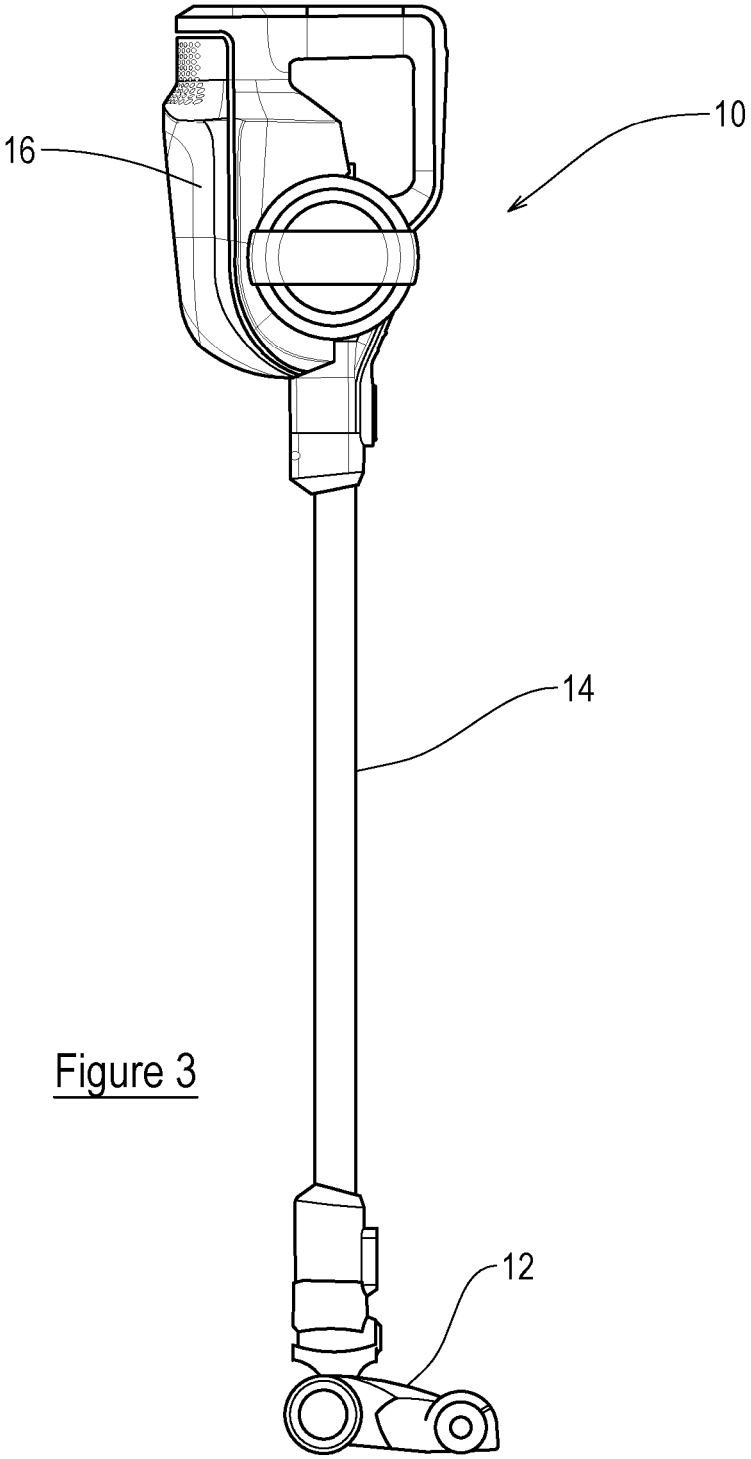



Figure 3

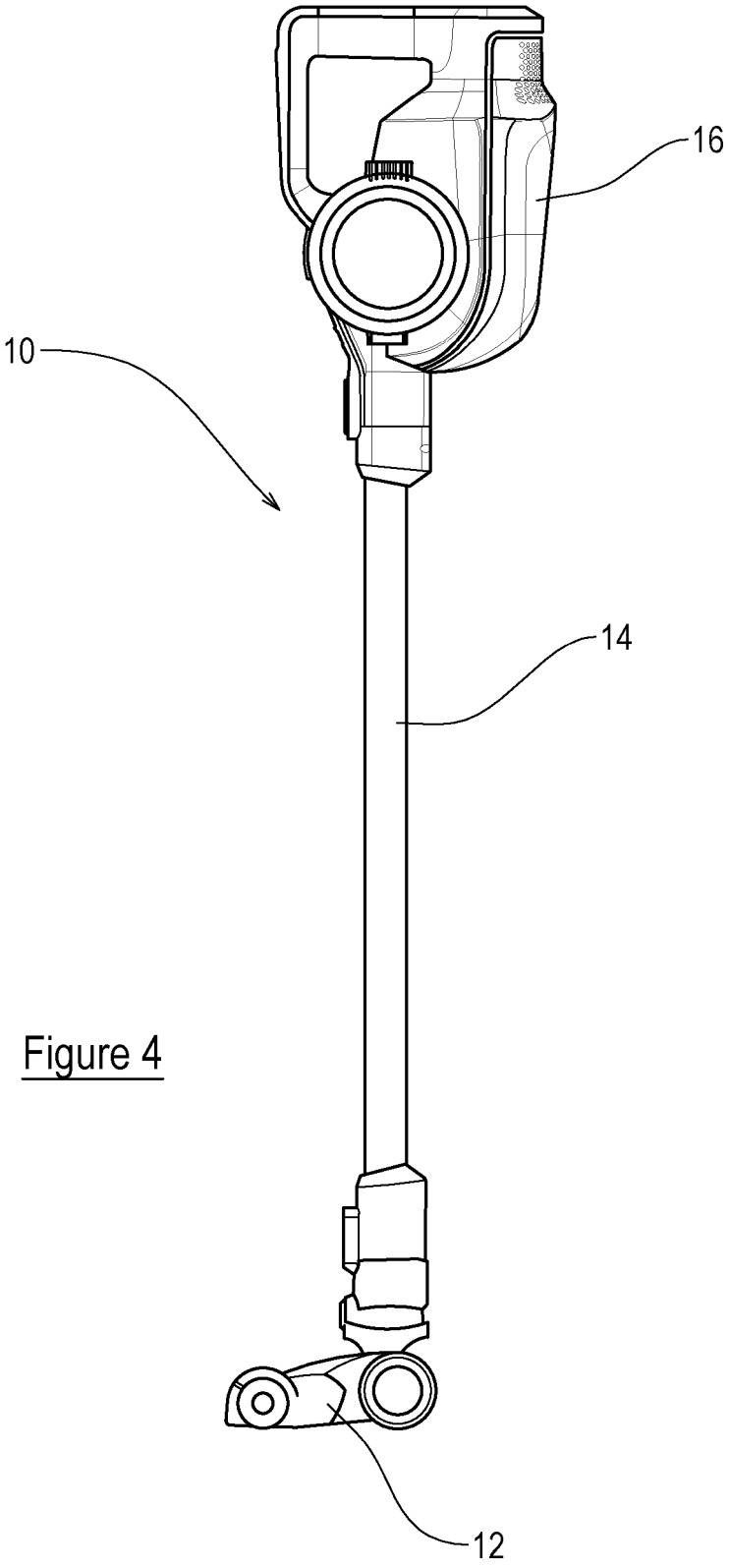



Figure 4

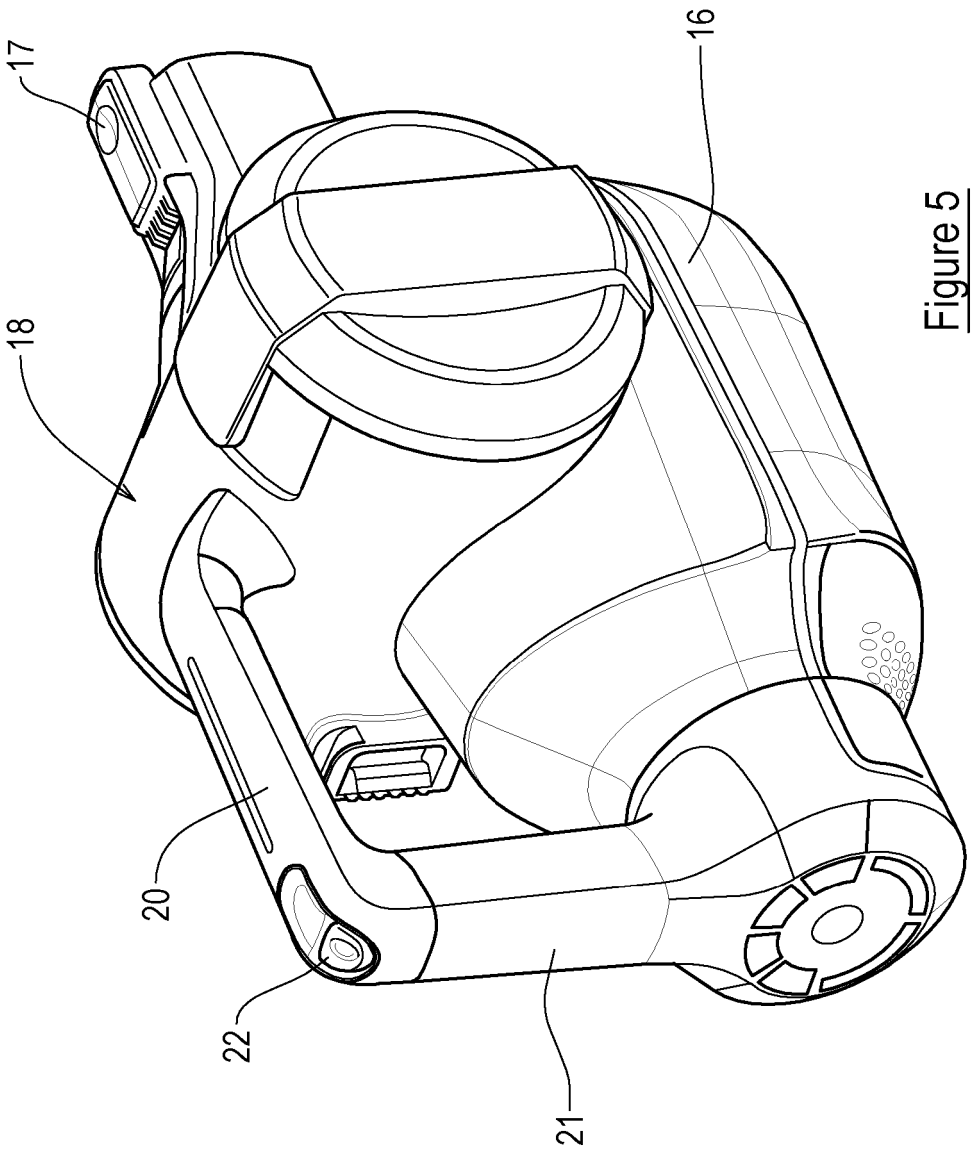



Figure 5

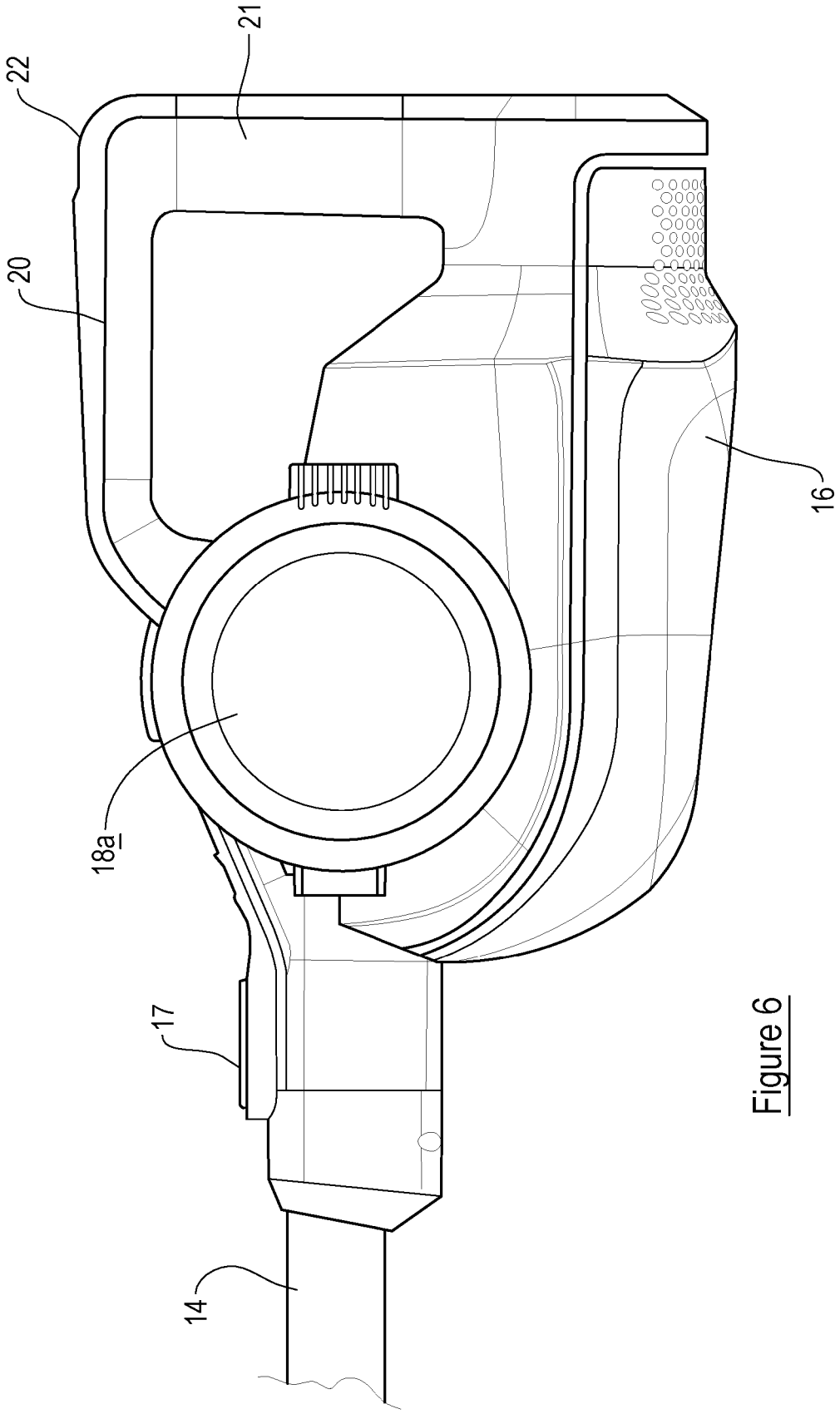



Figure 6

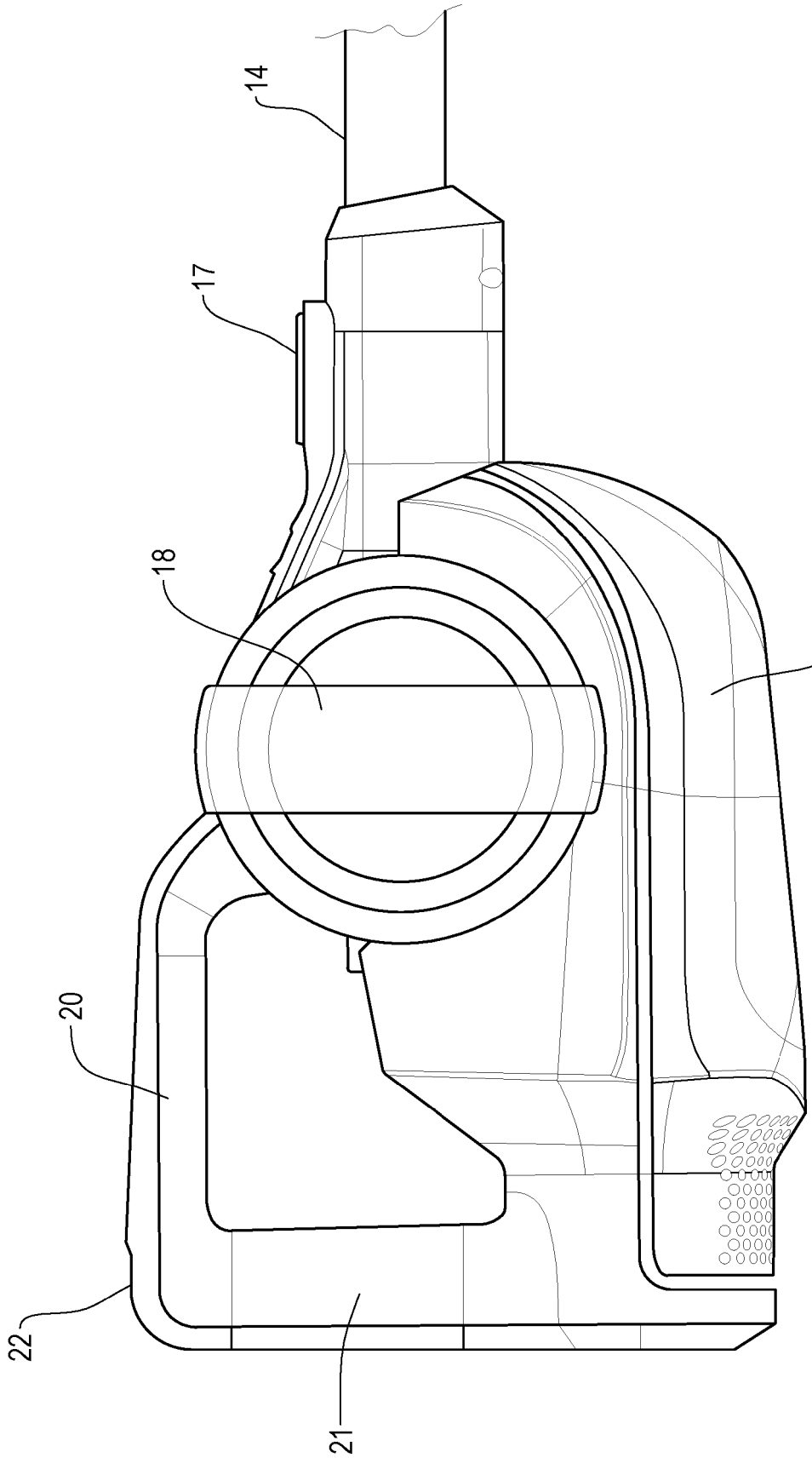



Figure 7

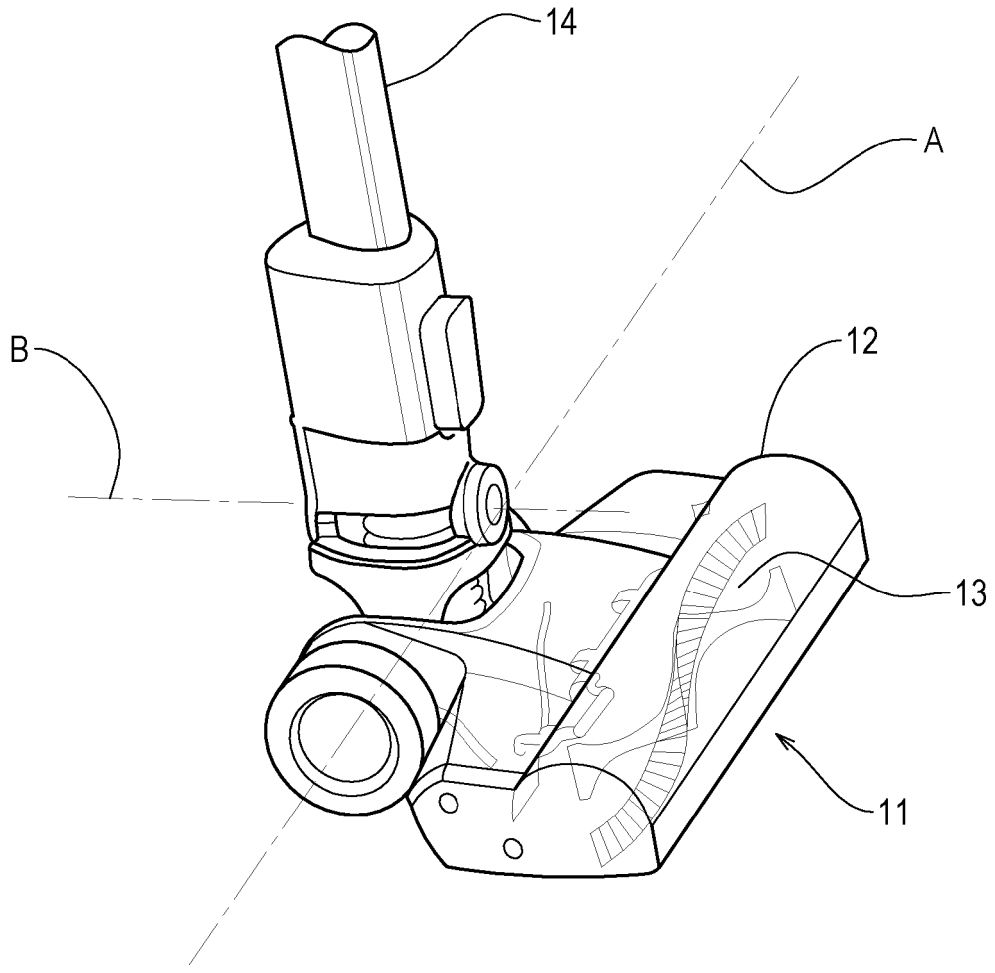



Figure 8

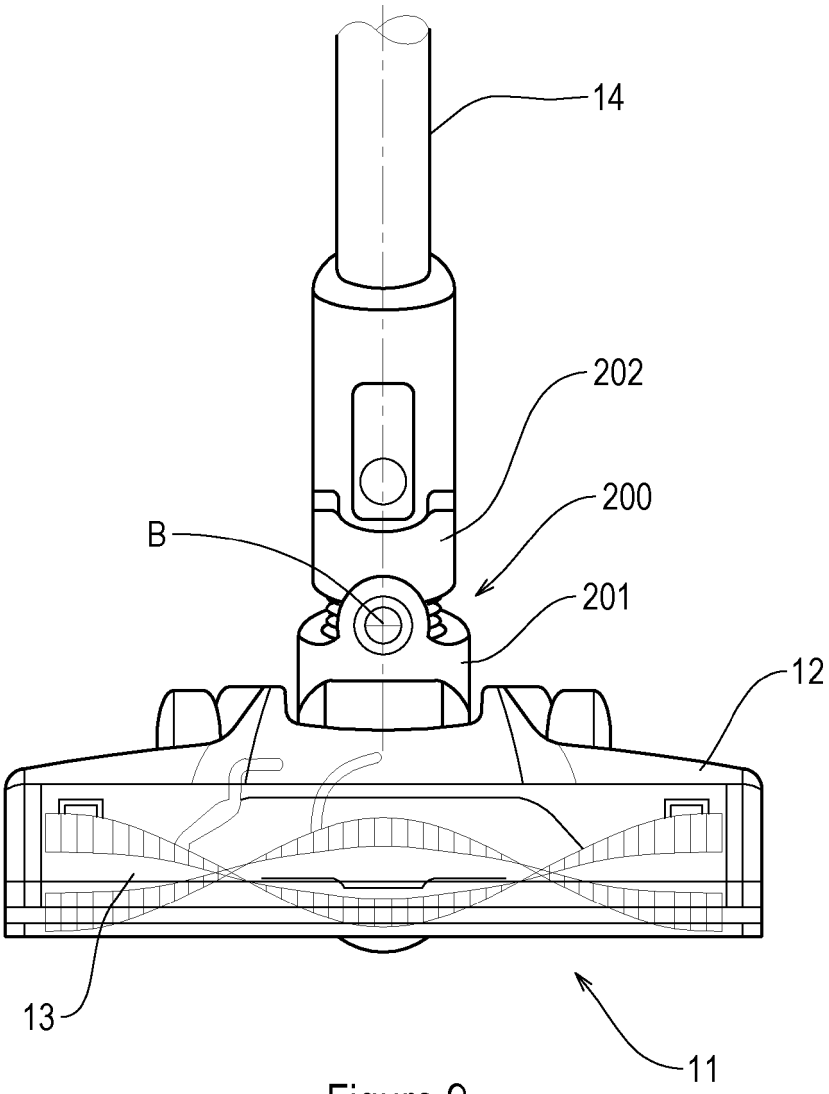



Figure 9

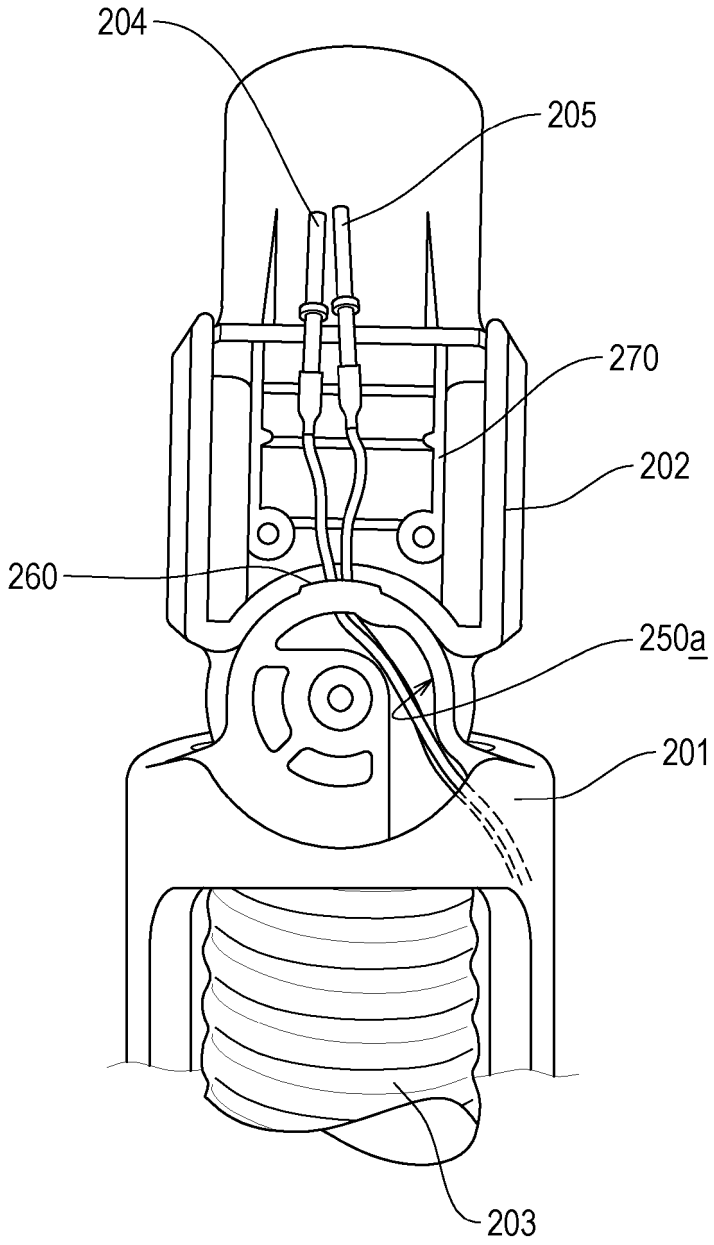



Figure 10

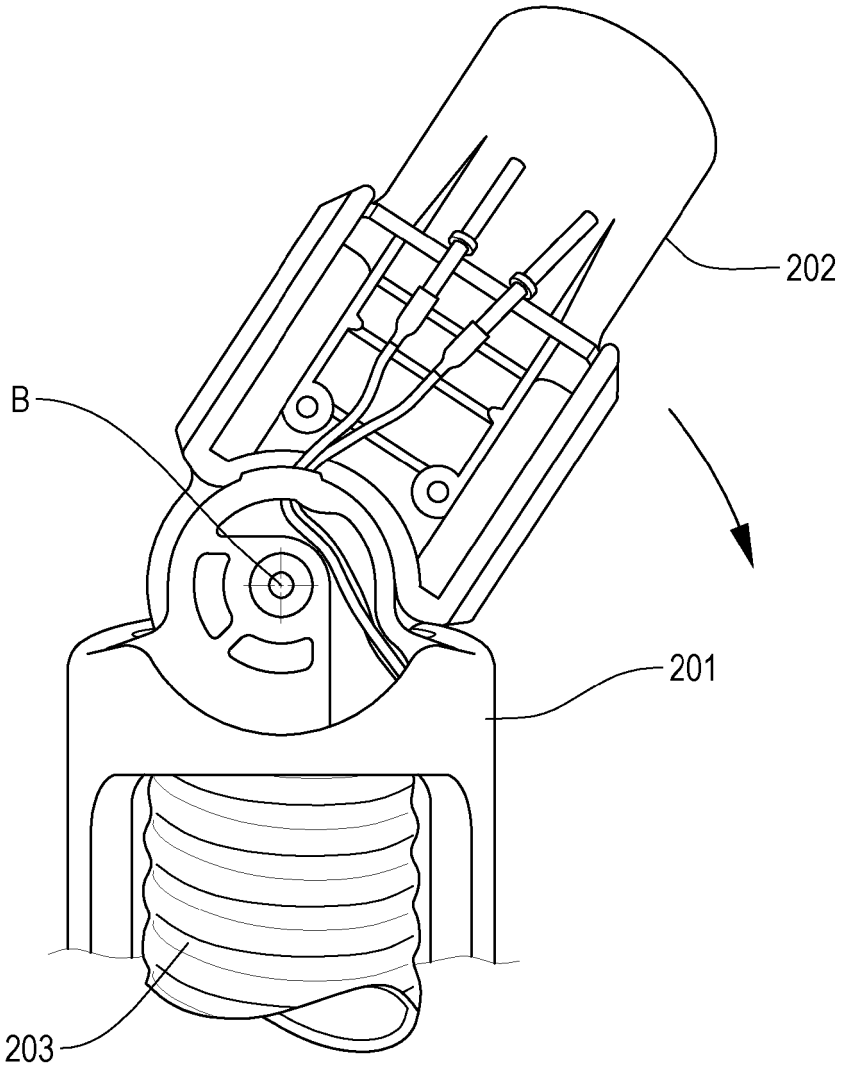



Figure 11

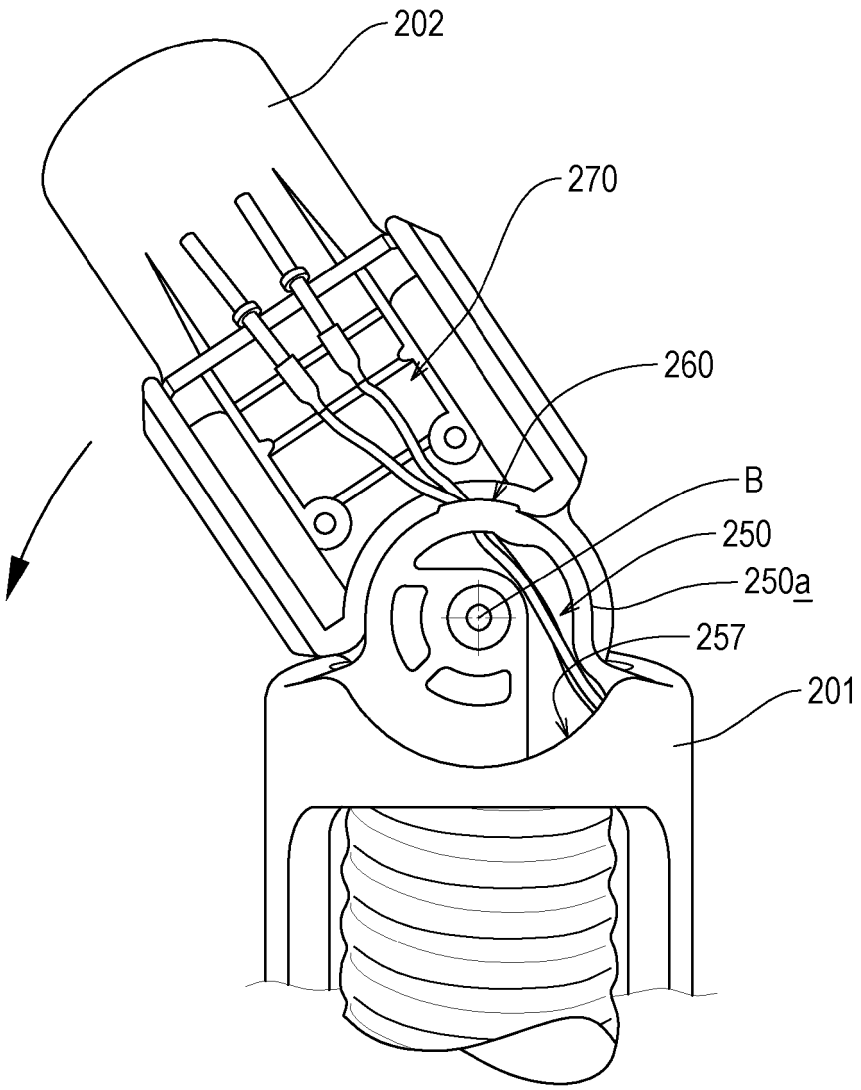



Figure 12

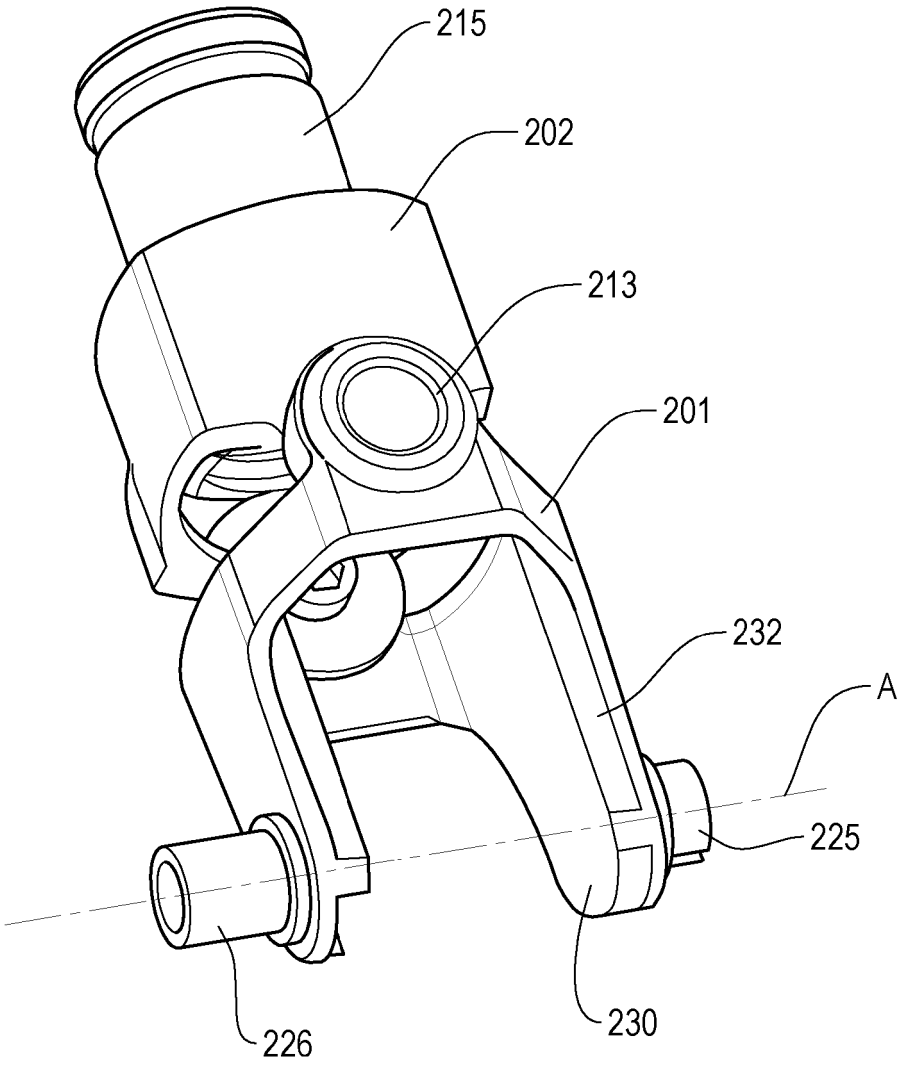
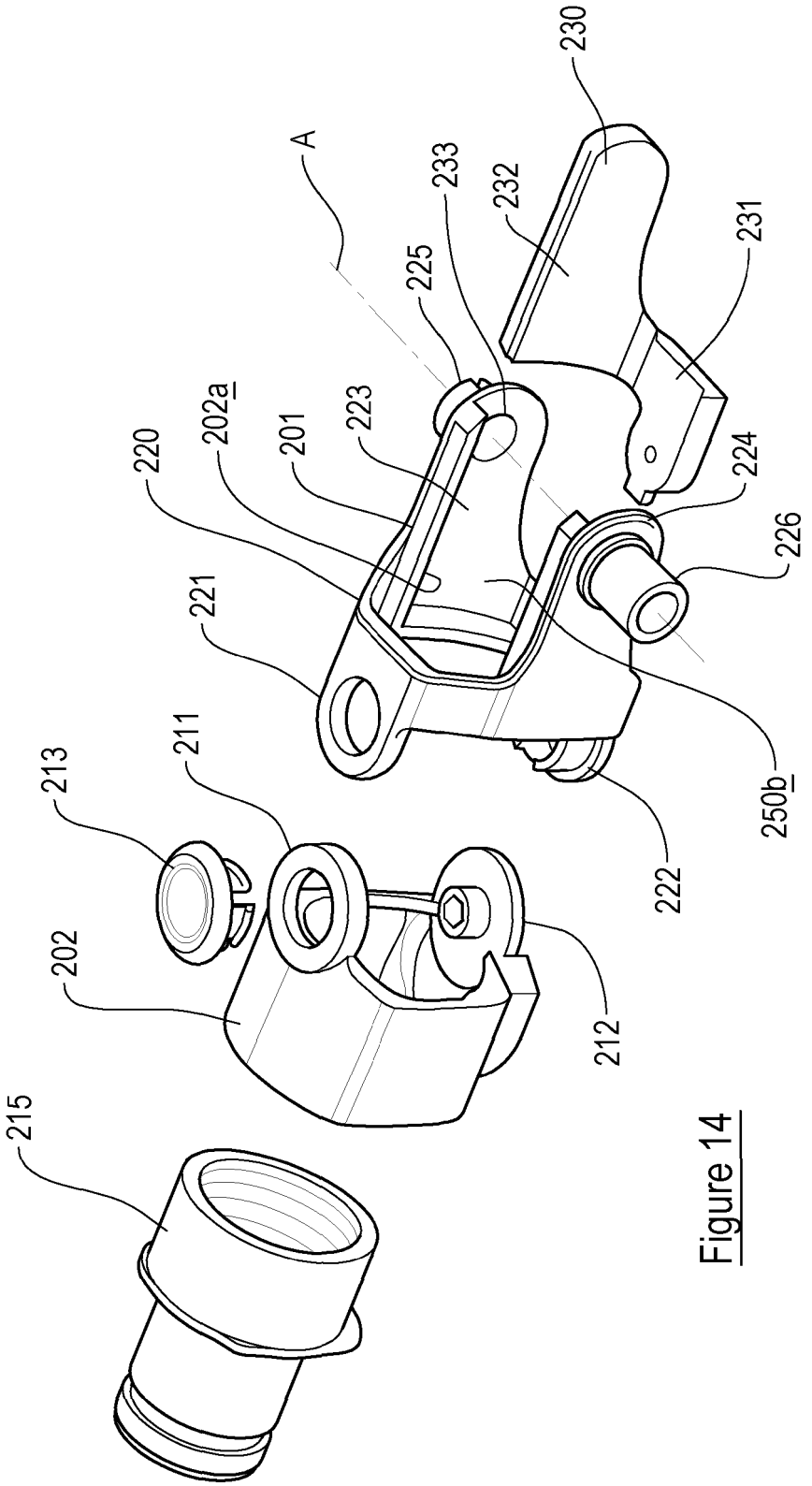



Figure 13


230
A
233
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225
202a
201
223
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226
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250b
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Figure 14

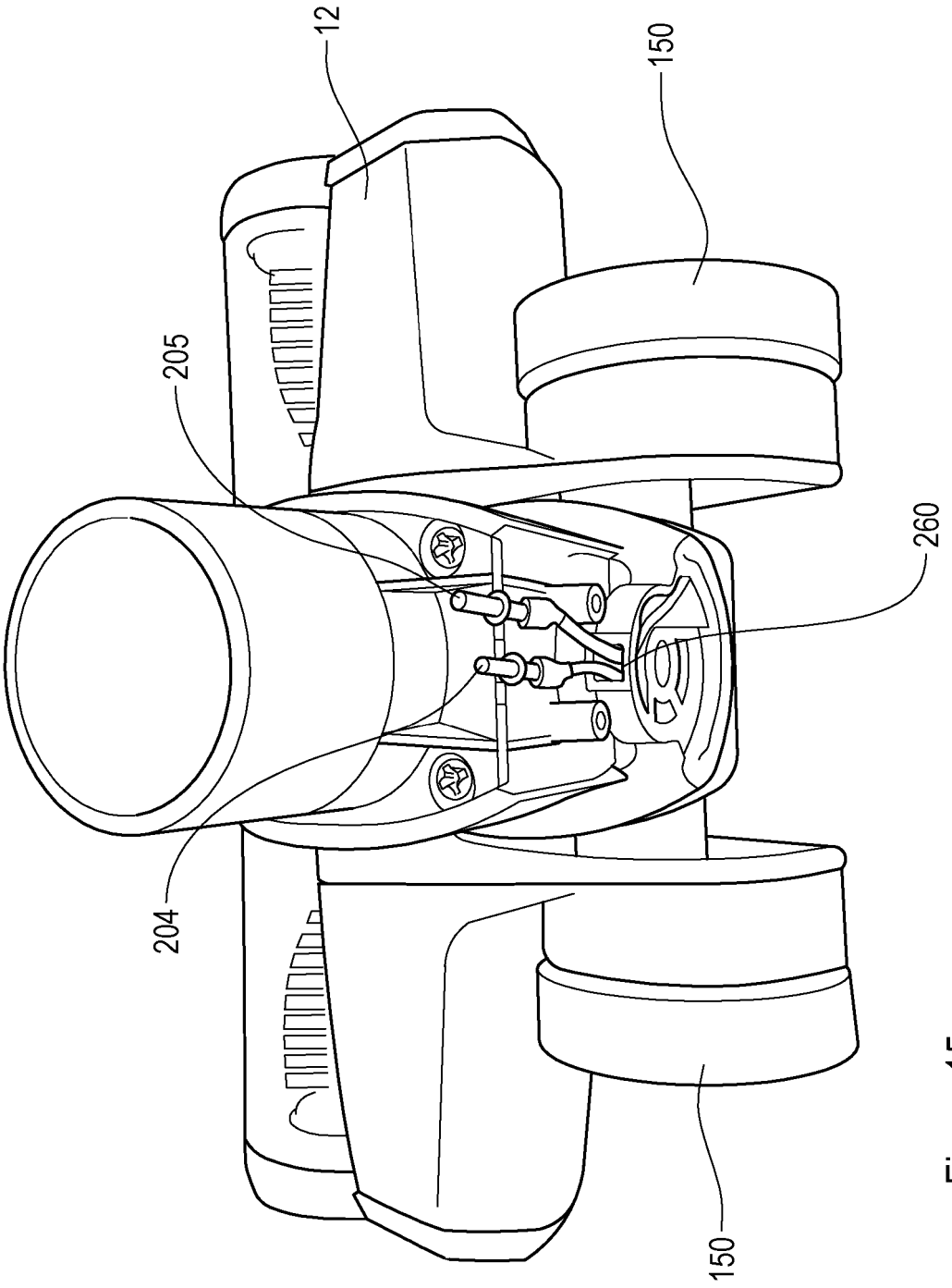


Figure 15

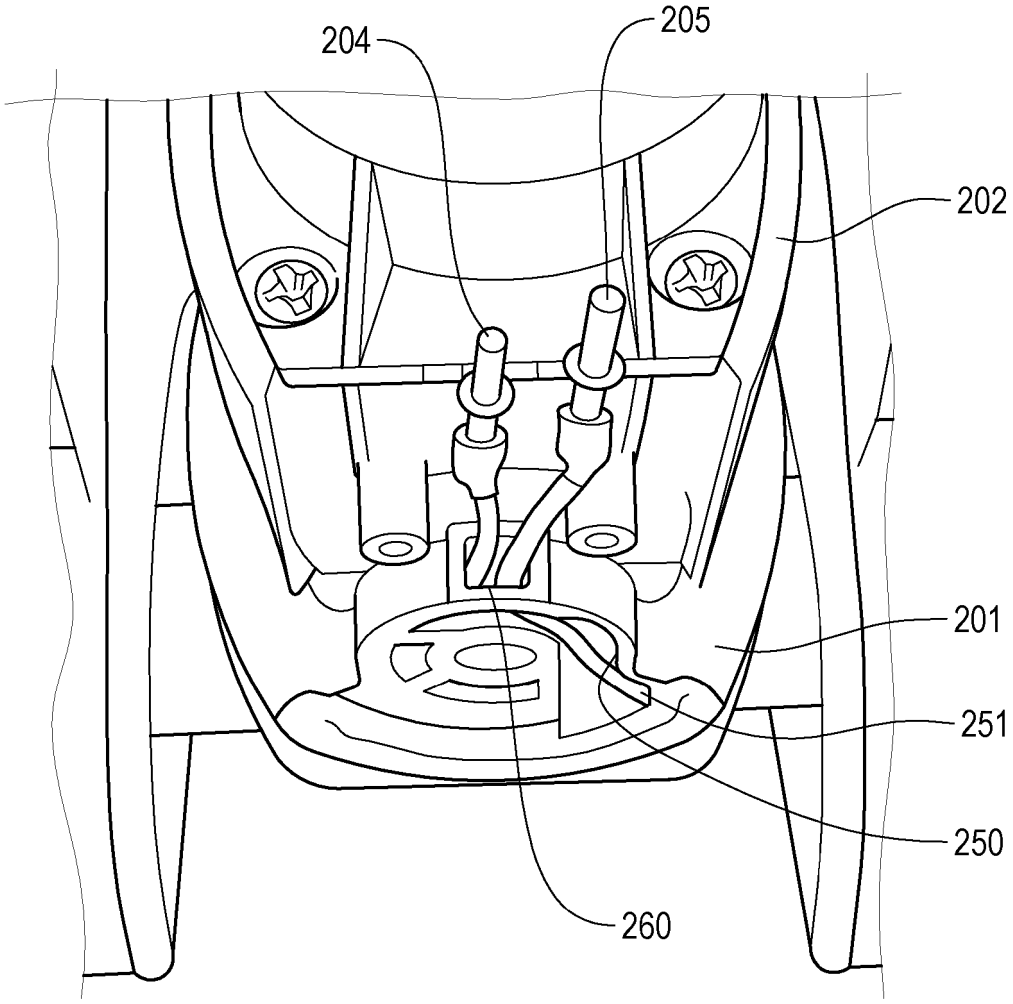


Figure 16

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- EP 1110493 A2 **[0002]**
- EP 0338513 A2 **[0003]**
- US 2016015229 A1 **[0004]**