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(54) **SYSTEM FOR CONNECTING WASHING MEANS TO THE DRIVE SHAFT OF A FLOORWASHER**

SYSTEM ZUM VERBINDEN VON REINIGUNGSMITTELN MIT DER ANTRIEBSWELLE EINER BODENREINIGUNGSMASCHINE

SYSTÈME DE RACCORDEMENT DE MOYENS DE LAVAGE À L'ARBRE D'ENTRAÎNEMENT D'UN LAVE-SOL

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Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to a system for connecting washing means of a floorwasher to its drive motor. Specifically, the present invention provides a system that uses connection means that can be mounted on floorwashers of a common type, for transmitting the rotational motion from the motor to the washing means, thus enabling said washing means to fit the topography of the surfaces to be washed.

STATUS OF THE ART

[0002] The devices in use for treating floors are configured for transmitting a motion, for example a rotational motion, from the drive motor to the washing means, for example brushes, and consequently require a connection device between the motor and the washing means, properly configured for enabling said washing means to be integral with the drive shaft, so as to allow, for example, to drive the brushes into rotation.

[0003] For example, the system in use in the common floorwashers uses a so-called "3-pin" connector. Thanks to this system, the rotational motion is transmitted to the washing means of the floorwasher, so as to make the mounting and dismounting operations of said washing means onto/from the drive shaft easy. According to a configuration that is known in the present status of the art, the connection system comprises a main body, integral with the drive shaft, consisting of a plate having a central circular hole and a plurality of openings in the form of open slots, usually three openings, arranged laterally, along the circumference of said main body, symmetrically with respect to the central circular hole. The connection and transmission function is implemented by way of said three open slots present in the main body, which engage an equal number of pins, arranged on the surface of the brush, which shall couple with the main body of the connection system. Every pin is engaged by its corresponding slot by way of a brush retention spring and the brush is hold in position, thus implementing a safety stop to prevent the brush from disengaging the connection when lifted away from the surface to be washed. During the normal operating conditions of the floorwasher, every pin is pushed against the bottom of its corresponding slot by the rotational motion of the brush.

[0004] This "3-pin" connection system has a disadvantage in that, if no appropriate countermeasures are taken, the assembly formed of the brush and the motor of the floorwasher behaves as a rigid structure system, wherein the washing means are rigidly coupled with the drive shaft. Such a system does not provide sufficient degrees of freedom to the washing means to fit the different tilt angles of the surfaces to be washed, hence it jeopardises the cleaning performances of the floorwasher.

[0005] It is therefore necessary to introduce a "lability" in the floorwasher, between the drive shaft and the three-pin connection system. In the present status of the art, this goal is obtained in different ways. A very frequent solution is that of inserting some kind of elastic rubber element between the drive shaft and the body of the brush connector, which provides a degree of freedom to the washing means in order for them to fit the topography of the surfaces to be washed. Usually, the elastic element is tailored in order to minimize the vertical dimension of the connector, considering that no elements are available on the market usable for this specific purpose. This circumstance entails further investment costs in dies and fixtures. As a further disadvantage of this solution, an elastic rubber element provides a limited degree of lability, in that it allows minor displacements only.

[0006] Another solution is proposed in patent EP3847941A1, which describes a cleaning device having a turntable structure performing a telescopic function, which comprises a cleaning turntable, an adjustment component, and a pressure unit (for example, a spring). The adjustment component is connected to the cleaning turntable in a relatively slidable manner. A drive motor is connected to the adjustment component, and it drives the rotation of the adjustment component and of the cleaning turntable. The adjustment component is capable of sliding with respect to the axis of the drive shaft along a reference direction Y, for example one coinciding with that of the drive shaft, or its opposite direction, this way fitting the position of the cleaning turntable to the topography of the floor. The displacement ratio of the adjustment component to the cleaning turntable is provided by the pressure unit interposed between the two component parts, which is configured for applying a vertical force downwards to the cleaning turntable whenever the reference direction is perpendicular to the horizontal plane. Whenever the reference direction is tilted with respect to the horizontal plane, the force exerted by the pressure unit onto the cleaning turntable can be either vertical downwards or tilted with respect to the horizontal plane (for example, parallel to the reference direction).

[0007] According to one embodiment, the adjustment component might even swing relative the drive shaft. In this way, whenever the reference direction is perpendicular to the horizontal plane, the cleaning turntable can move up and down, or swing relative to the driving shaft, so that the cleaning means can adapt to the uneven and inclined floor for cleaning, thereby improving the cleaning effect..

[0008] The technical effect of providing degrees of freedom to the cleaning device in order to fit the floor is thus achieved thanks to the particular type of coupling of the drive shaft and of the adjustment component: as a matter of fact, since the end of the drive shaft has a spherical shape and the lateral surface of the adjustment component, along which the cleaning turntable is driven, has a conical shape, an empty space or "gap" is generated, which allows to create a clearance through which an os-

cillation of the cleaning turntable is determined.

[0009] Conversely, a peculiarity of the present invention with respect to the solution proposed in the present status of the art consists of using a washing means connection system that exploits the structure of an articulated joint, whose contact surfaces are coupled in a permanent manner, without taking advantage of any clearance, which exploits such a small dimensional difference between the coupled surfaces as to allow a relative motion therebetween. Such structure is a kinematically determined one and is implemented according to the scheme of a tripod joint, which is used in the automotive field.

[0010] According to another aspect, in the common practice, the floorwashers are configured for dispensing a certain quantity of a washing liquid to the washing means, such as, for example, rotary brushes, which are in contact with the surfaces to be washed, for example by making some drops of a washing solution fall down onto the outer edge of said rotary brushes, so that the washing solution reaches the bristles underneath through a number of holes arranged in the upper part of the disk supporting the bristles themselves.

[0011] Being able to bring a washing solution to the middle of the brushes instead of the periphery thereof would advantageously mean being able to provide for a better distribution of the washing solution and would suppress, or at least would strongly limit, the problem related to the production of the side splashes, that are laterally projected because of the centrifugal force produced by the rotational motion of the brush body. Historically, a number of technical solutions have been studied and tested to solve or limit said problem, for example the implementation of splash containment systems, comprising side brush-cover devices or sumps having such shapes and mechanisms as to allow their adjustment; brushes equipped with "containment" rings; or brushes having a sequence of bristles on the periphery featuring a thickness lower and a density greater than the central one, so as to implement a "barrier" against splashes, or screens featuring different shapes on the upper part, with the purpose of limiting water projections outwards.

[0012] A less common solution consists of using a gearmotor with a hollow shaft interposed between the motor and the washing means of the floorwasher, through which water flows from a tank to the washing means in a position that is central with respect to said washing means. Disadvantages of this solution are in that it features a higher cost, because of a more complex structure, its hollow shaft is subject to corrosion effects, and its implementation is more complicated, because of problems related to the fixation of the brushes to the drive shaft.

[0013] The present invention provides a solution to the mentioned technical problems, which allows to drive the washing means into rotation in such a way as to warranty a connection of the washing means to the drive shaft via permanently coupled surfaces, which enables them to better fit changes of planarity of the surfaces to be treated and allows to dispense the washing solution in the middle of the said washing means.

SUMMARY OF THE INVENTION

[0014] A general purpose of the present invention is to provide a system for connecting replaceable washing means to the drive motor of a floorwasher.

[0015] In particular, a specific purpose of the present invention is to provide a washing means connection system that allows to replace said washing means, for example brushes, should they experience wear problems, for example bristle wear, or it is simply required to replace a brush with another of a different type.

[0016] A further purpose of the present invention is to make the washing means integral with the structure of the drive shaft to make it possible for said means to be operated, for example to be driven into rotation.

[0017] Another purpose of the present invention is to provide a system for connecting washing means to a motor shaft that enables said washing means, for example brushes, to tilt with respect to the floor plane, so as to "fit" changes of planarity of the surfaces to be washed.

[0018] Finally, another purpose of the present invention is to impart a special shape to the washing means connection system, for example brushes, that allows to dispense the washing solution to the middle of said means.

[0019] These purposes and others are achieved by the present invention as defined in the attached claims.

[0020] According to a preferred embodiment of the present invention, the system for connecting washing means to the drive shaft of a floorwasher comprises a connection interface consisting of a main body and an articulated joint featuring a cylindrical shape, accommodated in the middle of said main body, and capable of providing the necessary flexibility to the connection system, in order to enable the washing means to fit the topographies of the surfaces to be treated. According to one preferred embodiment, said articulated joint consists of a central body, surrounded by three ball units symmetrically coupled around said central body by way of an equal number of connection shafts that are free to slide internally to a hole having an axis perpendicular to that of said central body, i.e., perpendicular to the axis of the drive shaft. Said articulated joint is connected to said main body of said connection interface by way of the three ball units of said articulated joint coupling with an equal number of cylindrical cavities present in the main body of the connector.

[0021] The advantage offered by this special configuration of the connector is in that it allows to transmit a torque to the washing means, while leaving them free to assume any tilt angles with respect to the drive shaft.

[0022] Advantageously said connection system is configured in such a way as to allow for a washing solution to pass through at the middle of the connector, so as to make it flow in a central position with respect to said wash-

ing means.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

- Figure 1 - a tridimensional exploded view of the washing module (100), comprising: a drive motor (1), a motor support (2), accessories for the washing liquid (3), a connection interface (4) between the washing means and the drive motor, a washing base comprising washing means, for example a brush (5).
- Figure 2 - a tridimensional exploded view of a connection interface (200) between the washing means and the drive motor of a floorwasher according to one embodiment of the present invention.
- Figures 3a), 3b), 3c) - Prospective views showing the mechanism used to couple the connection system to the washing means in the case of clockwise rotational motion.
- Figures 4a), 4b), 4c) - Perspective views showing the mechanism used for coupling the connection system to the washing means in the case of counterclockwise rotational motion.
- Figures 5a), 5b) - Cross sectional views of a connection system according to the present invention, showing the mechanism used to make the washing means fit to the surfaces to be treated, in the case of a floor featuring a horizontal plane (5a), or a floor featuring a tilted plane (5b) .
- Figure 6 - Cross sectional view (6a) and longitudinal sectional view (6b) of a connection system according to the present invention, highlighting the path followed by the washing solution in the washing means from the input port to the output port.
- Figure 7 - a tridimensional exploded view of a detail of the washing head according to one embodiment, comprising a frame (21), a counterframe (22), and rubber dampers (23).
- Figure 8 - top view (Fig. 8a) and cross-sectional view (CC) of a washing head (Fig. 8b) comprising a frame (21), a counterframe (22), and rubber dampers (23).

DETAILED DESCRIPTION OF THE INVENTION

[0024] The following description aims at putting a person skilled in the art, in a position to produce and exploit the invention. It will be apparent to those skilled in the art that various modifications might be introduced in the embodiments presented in this description, without departing from the scope of protection of the present invention, as claimed.

[0025] As discussed in more details below, an aspect of the present invention is that of providing a connection system for connecting washing means, for example rotary brushes, to a drive motor of a floorwasher, said system being compatible with brush connection systems of a traditional "3-pin" type. The connection interface of the connection system here claimed comprises a main body which connects to pins integral with brushes, and an adaption joint, or articulated joint, capable of providing a "flexible" coupling, which in fact provides for transmission of the rotational motion of a motor driver, while leaving a certain degree of lability to the brush itself, which, in this way, can fit the surface of the floor to be washed.

[0026] A traditional floorwasher basically comprises three component parts: a washing head, formed of a base body accommodating, for example, washing means, comprising rotary brushes; a guide body elongated upwards, comprising, for instance, a drive shaft and a support frame; and a guide means terminating in a handle operatable by a user. Traditionally the washing means are connected to the guide body elongated upwards via a junction element, or articulated joint, said junction element being articulated by rotation around at least one axis, arranged orthogonally with respect to the drive shaft.

[0027] The drive motors can be arranged, alternatively, inside the guide body or on the surface of the washing base, or internally to the base itself.

[0028] In the following description reference is made, for exemplary purposes only, to a configuration of a floorwasher provided with a washing base, comprising washing means, such as, for example, a rotary brush, and at least one drive motor, said motor being arranged on the upper part of said washing base. However, note that different configurations of the floorwasher might be taken into consideration without departing from the scope of protection of the present invention. The assembly formed of said washing base and said drive motor is here below referred to as washing module.

[0029] Fig. 1 separately shows, in a tridimensional exploded view, all component parts forming a washing module (100) of a floorwasher according to one embodiment of the present invention. As schematically shown in Fig. 1, a washing module (100) comprises: at least one drive motor (1), a support base (2) supporting said motor (1), here represented as a simple portion of a flat metal sheet for exemplary purposes only, a washing solution diffuser (3), a connection interface (4), and a washing means, here represented in the form of a rotary brush (5) with bristles, said rotary brush (5) comprising three pins (5a, 5b, 5c) for coupling the washing means, for example the rotary brush (5), to the connection interface (4). The body of said drive motor (1) is connected to the support base (2) via four screw fixing elements (3', 3", 3‴, 3""). Said fixing elements (3', 3", 3‴, 3"") simultaneously engage the holes in the washing solution diffuser (3) and the holes in the support base (2), which results in also holding said diffuser (3) installed under the support base (2) in position.

[0030] Fig. 2 shows an exploded view of the structure that makes-up the connection interface (200) between the washing means and the drive motor. According to one preferred embodiment, said connection interface (200) consists of a main body (10); an articulated joint

(20), said articulated joint comprising a central body (7), three ball units (8) connected to said central body (7) by an equal number of shafts (9) and at least one retention spring (11) for retaining the washing means; a closing metal sheet (30). The main body (10) of said connection interface (200) features a circular shape and includes a cylindrical thicker central portion (10a), projecting upwards, comprising a lower surface in contact with the upper portion of the washing means and an upper surface in contact with the closing metal sheet (30), and a thinner peripheral portion (10b), featuring a circular structure, which laterally surrounds said central body, on which there are a number of openings in the form of open slots (12), elongated in such a way as to form two half-circles in a direction parallel to the circumference and used to engage three pins (5a, 5b, 5c) present in the body of the washing means, for example a brush (5). The retention springs (11) are secured to the upper surface of said peripheral portion (10b) of said main body (10) by way of screw elements and are used to engage the pins (5a, 5b, 5c) and hold the washing means, for example the brush (5), in position. In the middle of said main body (10) there is an opening (13), featuring a cylindrical shape, where the central body (7) is accommodated. Around said cylindrical opening (13) three cylindrical cavities (14) are present, open in correspondence with said cylindrical opening (13), which receive three ball units (8) of said articulated joint (20) .

[0031] As shown in figures 5a and 5b, the technical effect consisting of the possibility for the washing means, for example the brushes, of tilting with respect to the floor plane, so as to fit any changes of planarity thereof is implemented thanks to the fact that every ball unit (8) is free to vertically move inside the cylindrical cavity (14), whereas every shaft (9) of said ball unit (8) can move internally to a hole (15), derived internally to the base of the central body (7), and having an axis perpendicular to that of said central body (7) (i.e. perpendicular to the axis of the drive shaft). In this way, it is possible to transmit a torque to the washing means, for example a brush (5), and to make it simultaneously assume any tilt angles with respect to the drive shaft. In particular, Figs. 5a and 5b illustrate the mechanism whereby the washing means fit the floor inclination; more specifically, Fig. 5b shows a horizontal displacement of the shaft (9) internally to the hole (15), whose direction of displacement is indicated by a horizontal arrow (16), and the vertical movement of the ball unit (8) inside the cylindrical cavity (14), whose direction of movement is indicated by a vertical arrow (17). Note that the distance of the ball unit (8) from the central body (7) is greater when the main body (10) of the connection interface is tilted with respect to the horizontal plane than when it is parallel thereto. Therefore, to allow the inclination of the washing means, it is necessary that the shaft (9) on which the ball (8) is fixed can slide along its axis inside the hole (15).

[0032] Figures 3a, 3b, 3c and figures 4a, 4b, 4c show the mechanism whereby the retention springs (11) engage said pins present in the body of the washing means, for example a brush (5). As shown in said figures for exemplary purposes only, the spring (11) engages the pin (5a) and holds the brush (5) in position in the slot (12). It is really a matter of a safety stop, in order for the brush not to be disengaged whenever the floorwasher is lifted away. In normal operating conditions, the pin (5a) is pushed against the wall of the slot (12) by the rotational motion of the washing means. In particular, in figures 3b and 3c the pin (5a) is pushed into the slot (12), arranged at the right-hand side of the pin, by a counterclockwise rotational motion imparted to the washing means. Vice versa, in figures 4b and 4c, the pin (5a) is pushed inside the slot (12), arranged at the lefthand side of the pin by a clockwise rotational motion imparted to the washing means.

[0033] According to another aspect of the present invention, the drive motors are connected to the washing means via a frame-counterframe system provided with specific rubber dampers in order to absorb any vibrations that might be produced during the operation of the floorwasher by the rotation and tilting of the washing means.

[0034] With reference to figures 7 and 8, according to one embodiment, a frame (21) is secured to the guide means of the floorwasher, whereas a counterframe (22) is integral with the drive motors via a bolt fixing system (24). The frame and the counterframe are connected to each other by eight elastic damping elements (23) in total, of types available on the market, performing a decoupling function. For example, Fig. 7 shows that the motors (31) are secured to the counterframe (22), whereas the frame (21) is integral with the guide means of the floorwasher; the frame (21) and the counterframe (22) are separated from each other by four rubber dampers (23). Fig. 8 shows that the rubber dampers are submitted to a compressive stress by an opposite combination of the weight force (whose direction of application is indicated by an arrow vertically oriented downwards) exerted by the upper body comprising the motors, and a reaction force (whose direction of application is indicated by the arrows vertically oriented upwards) due to the floor.

[0035] This solution basically offers the two following advantages:

1) it provides a certain degree of freedom in a vertical direction, in that it behaves as a suspension system that damps the stresses transmitted to the upper structure and to the guide means (hence to the user) because of the disconnections and small differences in height present in the floor;
2) it damps the inertial effects due to the individual motors being driven into rotation and stopped, thus reducing the stresses transmitted to the frame.

[0036] This solution has been studied in order to integrate at the best and to operate synergically with the present connection system comprising an articulated joint.

[0037] According to another aspect of the present invention, as shown in the tridimensional exploded view of Fig. 1, it is possible, thanks to the specific shape characteristics of the connection interface, to insert a washing solution diffuser (3) internally to the washing module (100), which allows to dispense the washing solution at the middle of the washing means, this way limiting the production of lateral splashes of washing solution possibly produced by the centrifugal force. Reference is made, for example, to figures 6a and 6b, which show a top view (Fig. 6b) and a cross sectional view (Fig. 6a) of the connection system cut along the direction AB indicated in Fig. 6b. According to one embodiment of the present invention, the dashed line shown in Fig. 6a indicates the path followed by the washing solution at the middle of the connection system. The washing solution conveyor sump (17) is secured to the lower section of the support base (18). Therefore, a closed space is created in a gap, having an input port through a hole (19) present in the support base (18), far away from the motor body and a funnel-like output port (19b) in correspondence with the central section of the body of the washing means. The latter passage section features an annular shape arranged concentrically around the drive shaft and the central body of the connection system. The special shape of the three-ball articulated joint makes it possible to have a free section through which the washing solution is free to flow from the upper section of the connection down to the lower section of the washing means, said section being only intercepted by the shafts (9) of the three ball elements (8).

[0038] Finally, it is clear that numerous modifications and variants might be introduced to the present invention, all falling within the scope of protection of the invention, as set forth in the attached claims.

Claims

1. A connection system for connecting washing means (5) to a drive motor (1) of a floorwasher in a non-permanent manner, said connection system comprising:

- a connection interface (4, 200) comprising a main body (10) and an articulated joint (20), said articulated joint (20) being accommodated at the middle of said main body (10) and being configured for adding degrees of freedom to said connection system, thus enabling said washing means (5) to fit the different topographies of the surfaces to be treated;
- a closing metal sheet (30), and
- at least one retention spring (11) for retaining said washing means (5)

characterized in that said articulated joint (20) further comprises:

- a central body (7),
- three ball units (8) connected to said central body (7) by an equal number of shafts (9).

2. The connection system according to claim 1 **characterized in that** said degrees of freedom comprise displacements of said articulated joint (20) in mutually orthogonal directions, so as to allow for said washing means (5) to be tilted according to the topography of the floor plane.

3. The connection system according to claim 1 **characterized in that** said main body (10) comprises three cylindrical cavities (14) so that said articulated joint (20) is connected to said main body (10) of said connection interface (4, 200) through the coupling of said three ball units (8) of said articulated joint (20) with said three cylindrical cavities (14) arranged in said main body (10).

4. The connection system according to claim 3 **characterized in that** said ball units (8) are free to vertically move internally to said cylindrical cavities (14), and each of said shafts (9) can move internally to a hole (15) present internally to said central body (7) whose axis is perpendicular to that of said central body (7).

5. The connection system according to any of the previous claims **characterized in that** said main body (10) comprises a cylindrical central portion (10a), projecting upwards, comprising a lower surface in contact with the upper section of said washing means (5) and an upper surface in contact with said closing sheet (30), and a peripheral portion (10b) having a thickness lower than that of said central portion (10a), said peripheral portion (10b) having a circular structure and laterally surrounding said central portion (10a), said peripheral portion (10b) having a plurality of openings in the form of open slots (12), said slots being elongated to form two half-circles in a direction parallel to the circumference.

6. The connection system according to claim 5 **characterized in that** said main body (10) is configured for connecting to said washing means (5) via said open slots (12), said slots (12) engaging an equal number of pins (5a, 5b, 5c) arranged on the body of said washing means (5).

7. The connection system according to claim 6 **characterized in that** said at least one retention spring (11) used for retaining said washing means (5) is configured for being secured to the upper surface of said peripheral portion (10b) of said main body (10) via screw elements, said at least one retention spring (11) used for retaining said washing means (5) engaging said pins (5a, 5b, 5c) via said open slots (12)

in order to hold said washing means (5) in position.

8. The connection system according to any of the previous claims further comprising a washing solution diffuser (3) configured for dispensing the washing solution in the middle of said washing means (5).

9. The connection system according to claim 8 wherein said washing solution diffuser (3) is interposed between said drive motor (1) and said connection interface (4) and includes an input port via a hole (19a) derived in the support base (18) of said drive motors (1), and a funnel-shaped output port (19b) arranged in correspondence with the central portion of said washing means (5), said washing solution flowing from said hole (19a) down to said output port (19b) via a section of said connection interface (4) arranged between said ball elements (8) and said shafts (9) of said articulated joint (20).

10. The connection system according to any of the previous claims wherein between said drive motor (1) and said washing means (5) is interposed a system comprising a frame (21), secured to the upper body of said floorwasher, and a counterframe (22), secured to said motor (1) and to said washing means (5), said frame (21) and said counterframe (22) being separated from each other by damping elastic elements (23).

11. The connection system according to claim 10 wherein said damping elastic elements (23) comprise rubber dampers.

12. The connection system according to claims 10 or 11 wherein said damping elastic elements (23) are configured for damping the stresses transmitted to the upper structure of said floorwasher because of disconnections and small differences in height present in the surfaces to be treated.

Patentansprüche

1. Verbindungssystem zum nicht dauerhaften Verbinden von Waschmitteln (5) mit einem Antriebsmotor (1) eines Bodenreinigers, wobei das Verbindungssystem umfasst:

- eine Verbindungsschnittstelle (4, 200), die einen Hauptkörper (10) und ein Gelenk (20) umfasst, wobei das Gelenk (20) in der Mitte des Hauptkörpers (10) angeordnet ist und dazu konfiguriert ist, dem Verbindungssystem Freiheitsgrade hinzuzufügen, wodurch es ermöglicht wird, dass sich die Waschmittel (5) an die verschiedenen Topographien der zu behandelnden Oberflächen anpassen;
- einem Abschlussmetallblech (30), und
- mindestens eine Haltefeder (11) zum Halten der Waschmittel (5)

dadurch gekennzeichnet, dass das Gelenk (20) weiterhin umfasst:

- einen Zentralkörper (7),
- drei Kugeleinheiten (8), die durch eine gleiche Anzahl von Wellen (9) mit dem Zentralkörper (7) verbunden sind.

2. Verbindungssystem nach Anspruch 1, **dadurch gekennzeichnet, dass** die Freiheitsgrade Verschiebungen des Gelenks (20) in zueinander orthogonalen Richtungen umfassen, um ein Neigen der Waschmittel (5) entsprechend der Topographie der Bodenebene zu ermöglichen.

3. Verbindungssystem nach Anspruch 1, **dadurch gekennzeichnet, dass** der Hauptkörper (10) drei zylindrische Hohlräume (14) umfasst, so dass das Gelenk (20) durch die Kopplung der drei Kugeleinheiten (8) des Gelenks (20) mit den drei zylindrischen Hohlräumen (14), die im Hauptkörper (10) angeordnet sind, mit dem Hauptkörper (10) der Verbindungsschnittstelle (4, 200) verbunden ist.

4. Verbindungssystem nach Anspruch 3, **dadurch gekennzeichnet, dass** sich die Kugeleinheiten (8) im Inneren der zylindrischen Hohlräume (14) vertikal frei bewegen können und sich jede der Wellen (9) im Inneren zu einem Loch (15) bewegen kann, das sich im Inneren des Zentralkörpers (7) befindet, dessen Achse senkrecht zu der des Zentralkörpers (7) verläuft.

5. Verbindungssystem nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Hauptkörper (10) einen nach oben ragenden zylindrischen Mittelabschnitt (10a) mit einer unteren Fläche, die in Kontakt mit dem oberen Abschnitt der Waschmittel (5) ist, und eine oberen Fläche umfasst, die in Kontakt mit dem Verschlussblech (30) sind, sowie einen Randabschnitt (10b) mit einer geringeren Dicke als der Mittelabschnitt (10a) aufweist, wobei der Randabschnitt (10b) eine kreisförmige Struktur aufweist und den Mittelabschnitt (10a) seitlich umgibt, wobei der Randabschnitt (10b) mehrere Öffnungen in Form von offenen Schlitzen (12) aufweist, wobei die Schlitze so verlängert sind, dass sie in einer zum Umfang parallelen Richtung zwei Halbkreise bilden.

6. Verbindungssystem nach Anspruch 5, **dadurch gekennzeichnet, dass** der Hauptkörper (10) für eine Verbindung mit den Waschmitteln (5) über die offenen Schlitze (12) konfiguriert ist, wobei die Schlitze

(12) in eine gleiche Anzahl von Stiften (5a, 5b, 5c) eingreifen, die am Körper der Waschmittel (5) angeordnet sind.

7. Verbindungssystem nach Anspruch 6, **dadurch gekennzeichnet, dass** die mindestens eine Haltefeder (11), die zum Halten der Waschmittel (5) verwendet wird, so konfiguriert ist, dass sie über Schraubelemente an der oberen Fläche des Randabschnitts (10b) des Hauptkörpers (10) befestigt werden kann, wobei die mindestens eine Haltefeder (11), die zum Halten der Waschmittel (5) verwendet wird, über die offenen Schlitze (12) in die Stifte (5a, 5b, 5c) eingreift, um die Waschmittel (5) in Position zu halten.

8. Verbindungssystem nach einem der vorhergehenden Ansprüche, umfassend außerdem einen Waschlösungsdiffusor (3), der zum Abgeben der Waschlösung in der Mitte der Waschmittel (5) konfiguriert ist.

9. Verbindungssystem nach Anspruch 8, wobei der Waschlösungsdiffusor (3) zwischen dem Antriebsmotor (1) und der Verbindungsschnittstelle (4) angeordnet ist und einen Eingangsanschluss über ein Loch (19a) aufweist, das in der Trägerbasis (18) der Antriebsmotoren (1) verläuft, sowie einen trichterförmigen Ausgangsanschluss (19b), der in Übereinstimmung mit dem Mittelabschnitt der Waschmittel (5) angeordnet ist, wobei die Waschlösung über einen Abschnitt der Verbindungsschnittstelle (4), der zwischen den Kugelelementen (8) und den Wellen (9) des Gelenks (20) angeordnet ist, von dem Loch (19a) nach unten zu dem Ausgangsanschluss (19b) fließt.

10. Verbindungssystem nach einem der vorhergehenden Ansprüche, wobei zwischen dem Antriebsmotor (1) und den Waschmitteln (5) ein System eingefügt ist, das einen Rahmen (21) umfasst, der an dem oberen Körper des Bodenreinigers befestigt ist, und einen Gegenrahmen (22), der an dem Motor (1) und den Waschmitteln (5) befestigt ist, wobei der Rahmen (21) und der Gegenrahmen (22) durch dämpfende elastische Elemente (23) voneinander getrennt sind.

11. Verbindungssystem nach Anspruch 10, wobei die dämpfenden elastischen Elemente (23) Gummidämpfer umfassen.

12. Verbindungssystem nach Anspruch 10 oder 11, wobei die dämpfenden elastischen Elemente (23) so konfiguriert sind, dass sie die Spannungen dämpfen, die aufgrund von Unterbrechungen und kleinen Höhenunterschieden in den zu behandelnden Oberflächen auf die obere Struktur des Bodenreinigers übertragen werden.

Revendications

1. Système de connexion pour connecter un moyen de lavage (5) à un moteur d'entraînement (1) d'un lave-sol de manière non permanente, ledit système de connexion comprenant :

- une interface de connexion (4, 200) comprenant un corps principal (10) et un joint articulé (20), ladite articulation (20) étant logée au milieu dudit corps principal (10) et étant configurée pour ajouter des degrés de liberté audit système de connexion, permettant ainsi auxdits moyens de lavage (5) de s'adapter aux différentes topographies des surfaces à traiter;
- une tôle de fermeture (30), et
- au moins un ressort de retenue (11) pour retenir ledit moyen de lavage (5)

caractérisé en ce que ledit joint articulé (20) comprend en outre :

- un corps central (7),
- trois unités à billes (8) reliées audit corps central (7) par un nombre égal d'arbres (9).

2. Système de connexion selon la revendication 1, **caractérisé en ce que** lesdits degrés de liberté comprennent des déplacements dudit joint articulé (20) dans des directions mutuellement orthogonales, de manière à permettre auxdits moyens de lavage (5) d'être inclinés en fonction de la topographie du plan du sol.

3. Système de connexion selon la revendication 1, **caractérisé en ce que** ledit corps principal (10) comprend trois cavités cylindriques (14) de sorte que ledit joint articulé (20) soit connecté audit corps principal (10) de ladite interface de connexion (4, 200) à travers l'accouplement desdites trois unités à billes (8) dudit joint articulé (20) avec lesdites trois cavités cylindriques (14) disposées dans ledit corps principal (10).

4. Système de connexion selon la revendication 3, **caractérisé en ce que** lesdites unités à billes (8) sont libres de se déplacer verticalement à l'intérieur desdites cavités cylindriques (14), et chacun desdits arbres (9) peut se déplacer intérieurement vers un trou (15) présent intérieurement pour ledit corps central (7) dont l'axe est perpendiculaire à celui dudit corps central (7).

5. Système de connexion selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit corps principal (10) comprend une partie centrale cylindrique (10a), en saillie vers le haut, comprenant une surface inférieure en contact avec la

section supérieure desdits moyens de lavage (5) et une surface supérieure en contact avec ladite tôle de fermeture (30), et une partie périphérique (10b) ayant une épaisseur inférieure à celle de ladite partie centrale (10a), ladite partie périphérique (10b) ayant une structure circulaire et entourant latéralement ladite partie centrale (10a), ladite partie périphérique (10b) présentant une pluralité d'ouvertures en forme de fentes ouvertes (12), lesdites fentes étant allongées pour former deux demi-cercles dans une direction parallèle à la circonférence.

6. Système de connexion selon la revendication 5, **caractérisé en ce que** ledit corps principal (10) est configuré pour se connecter audit moyen de lavage (5) par lesdites fentes ouvertes (12), lesdites fentes (12) engageant un nombre égal de broches (5a, 5b, 5c) disposés sur le corps dudit moyen de lavage (5).

7. Système de connexion selon la revendication 6, **caractérisé en ce que** ledit au moins un ressort de retenue (11) utilisé pour retenir lesdits moyens de lavage (5) est configuré pour être fixé à la surface supérieure de ladite partie périphérique (10b) dudit corps principal (10), par des éléments à vis, ledit au moins un ressort de retenue (11) utilisé pour retenir lesdits moyens de lavage (5) engageant lesdites broches (5a, 5b, 5c) par lesdites fentes ouvertes (12) afin de maintenir lesdits moyens de lavage (5) en position.

8. Système de connexion selon l'une quelconque des revendications précédentes, comprenant en outre un diffuseur de solution de lavage (3) configuré pour distribuer la solution de lavage au milieu dudit moyen de lavage (5).

9. Système de connexion selon la revendication 8, dans lequel ledit diffuseur de solution de lavage (3) est interposé entre ledit moteur d'entraînement (1) et ladite interface de connexion (4) et comprend un port d'entrée par un trou (19a) ménagé dans la base de support (18) desdits moteurs d'entraînement (1), et un port de sortie en forme d'entonnoir (19b) disposé en correspondance avec la partie centrale desdits moyens de lavage (5), ladite solution de lavage s'écoulant dudit trou (19a) jusqu'audit port de sortie (19b) par une section de ladite interface de connexion (4) disposée entre lesdits éléments à billes (8) et lesdits arbres (9) dudit joint articulé (20).

10. Système de connexion selon l'une quelconque des revendications précédentes, dans lequel entre ledit moteur d'entraînement (1) et lesdits moyens de lavage (5) est interposé un système comprenant un châssis (21), fixé au corps supérieur dudit lave-sol, et un contre-châssis (22), solidaire dudit moteur (1) et desdits moyens de lavage (5), ledit châssis (21) et ledit contre-châssis (22) étant séparés l'un de l'autre par des éléments élastiques amortisseurs (23).

11. Système de connexion selon la revendication 10, dans lequel lesdits éléments élastiques amortisseurs (23) comprennent des amortisseurs en caoutchouc.

12. Système de connexion selon les revendications 10 ou 11 dans lequel lesdits éléments élastiques amortisseurs (23) sont configurés pour amortir les contraintes transmises à la structure supérieure dudit lave-sol en raison des déconnexions et des petites différences de hauteur présentes dans les surfaces à traiter.

Fig.1

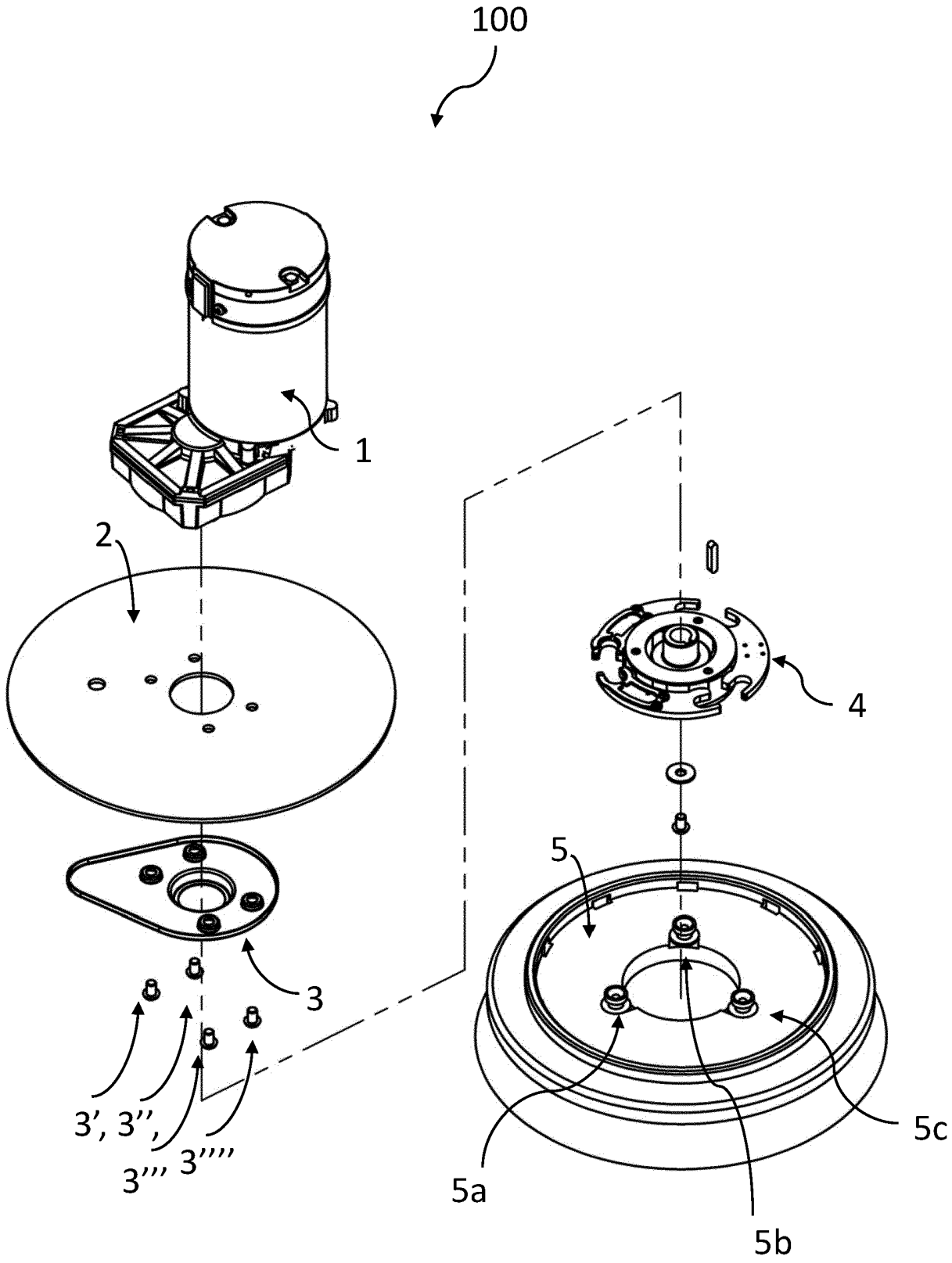


Fig.2

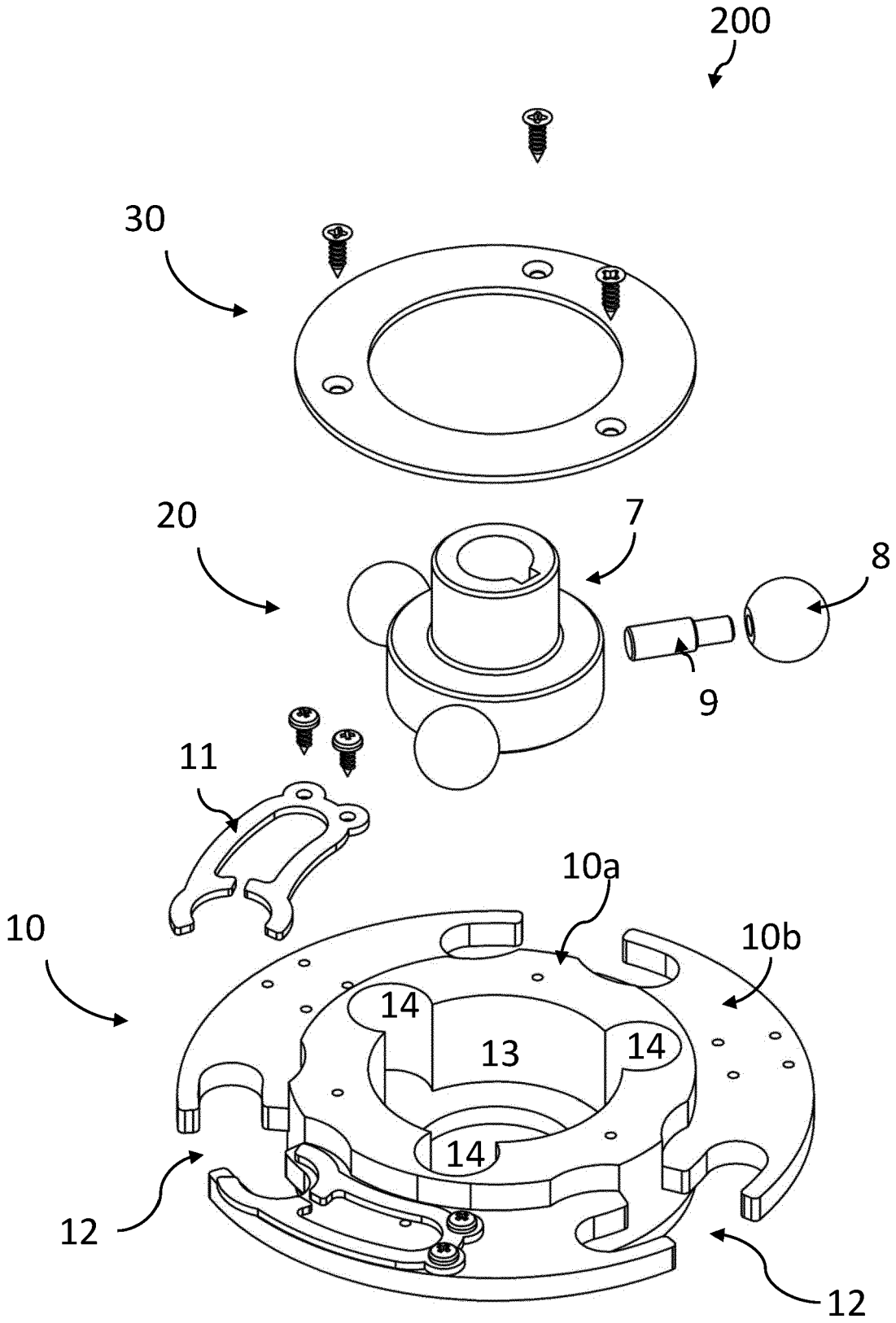


Fig.3a

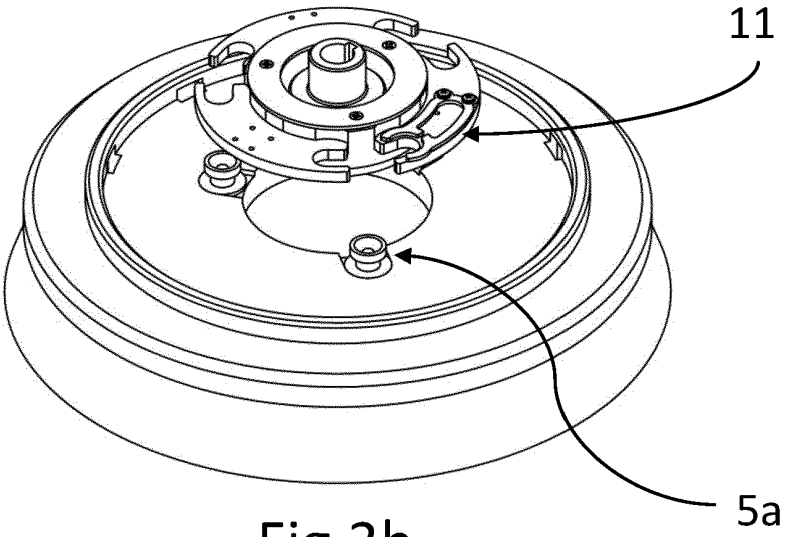


Fig.3b

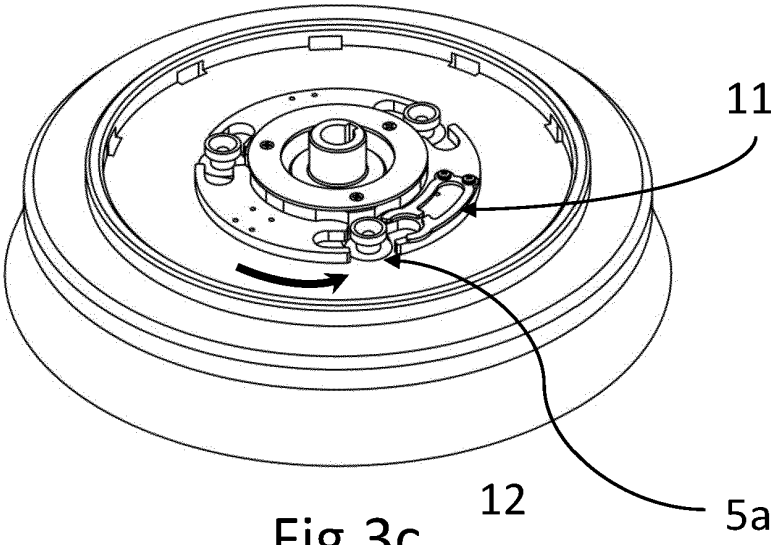
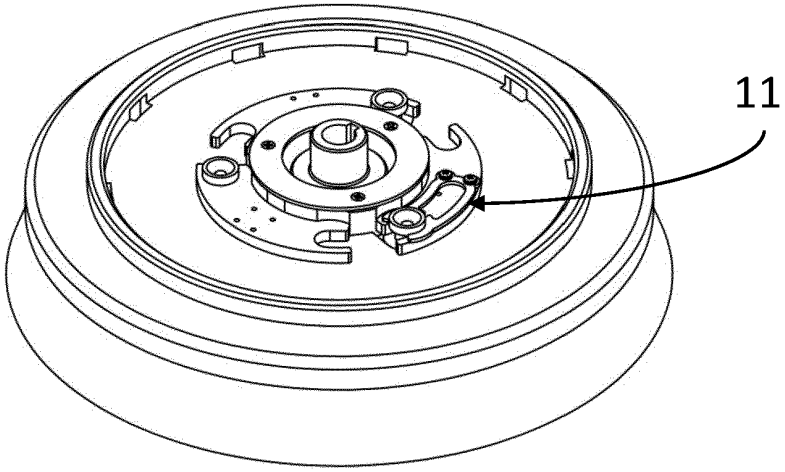


Fig.3c



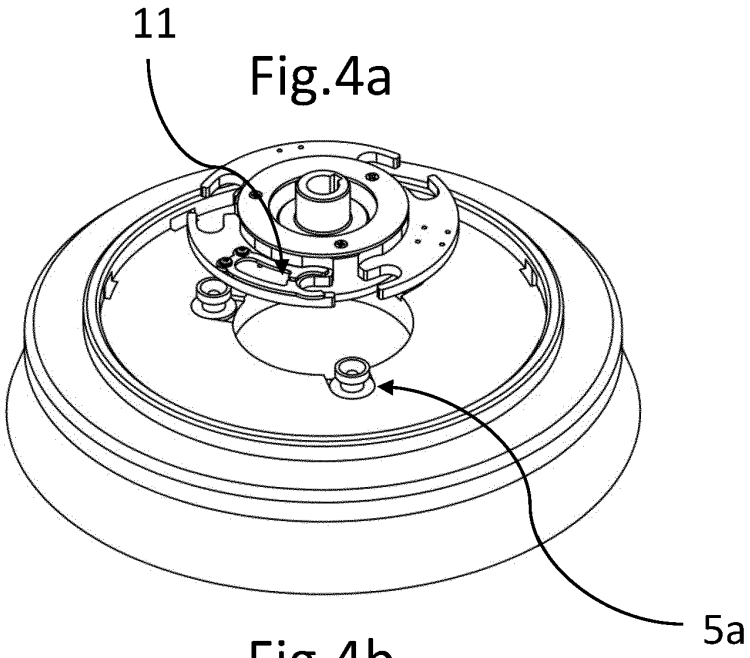


Fig.4a

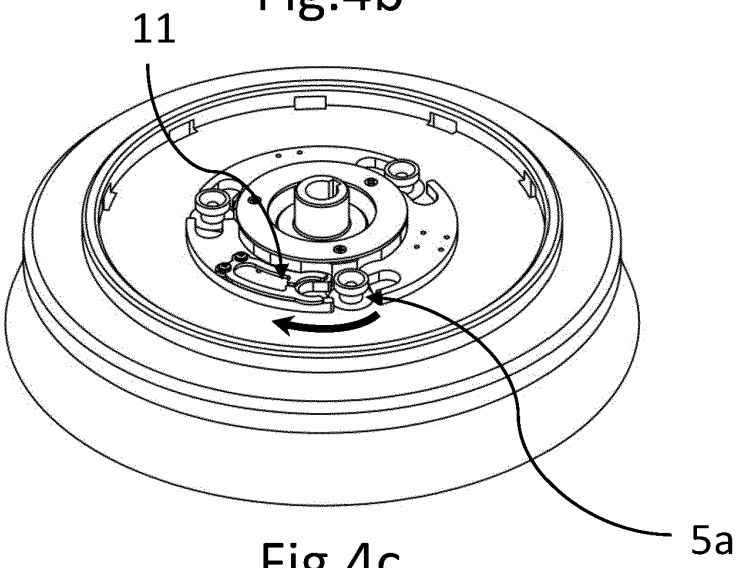


Fig.4b

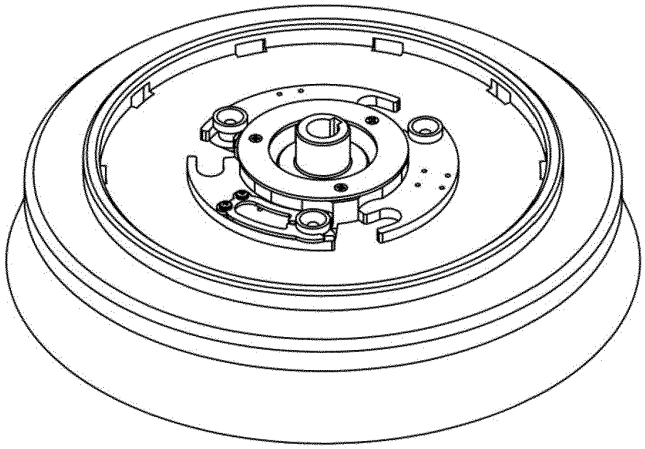


Fig.4c

Fig.5a

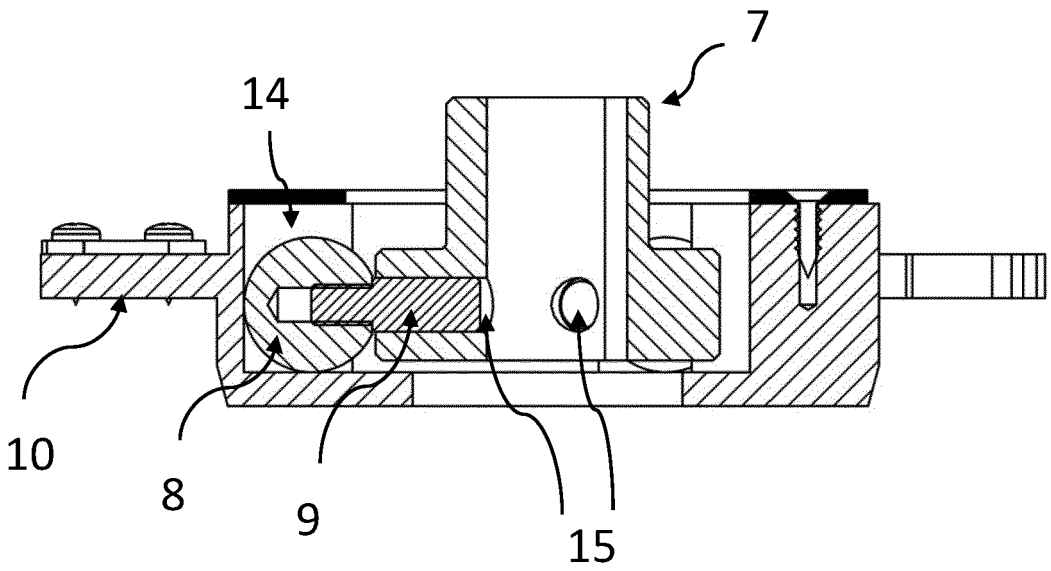


Fig.5b

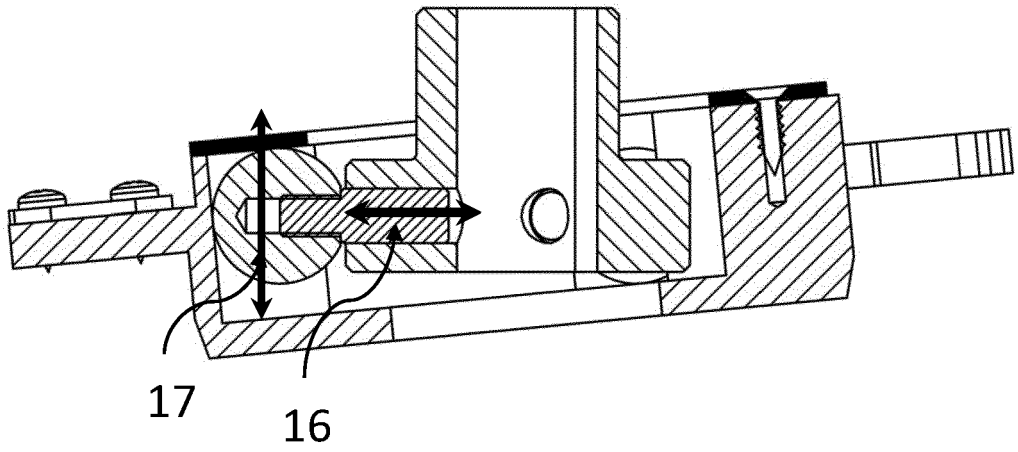


Fig.6a

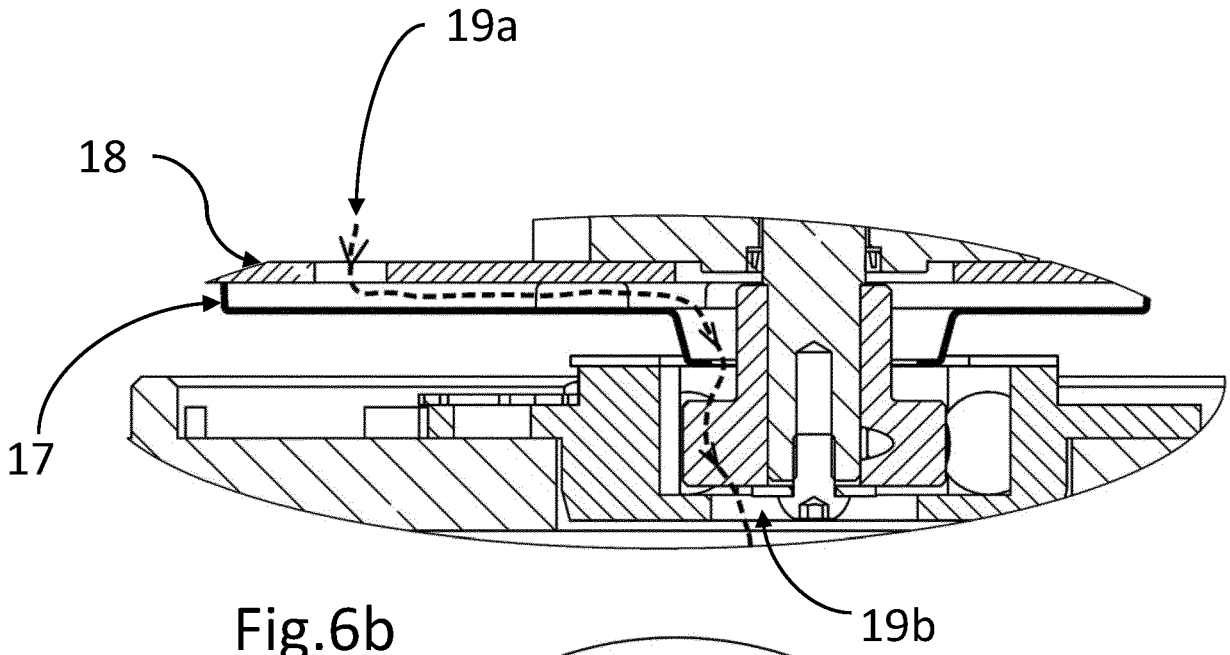


Fig.6b

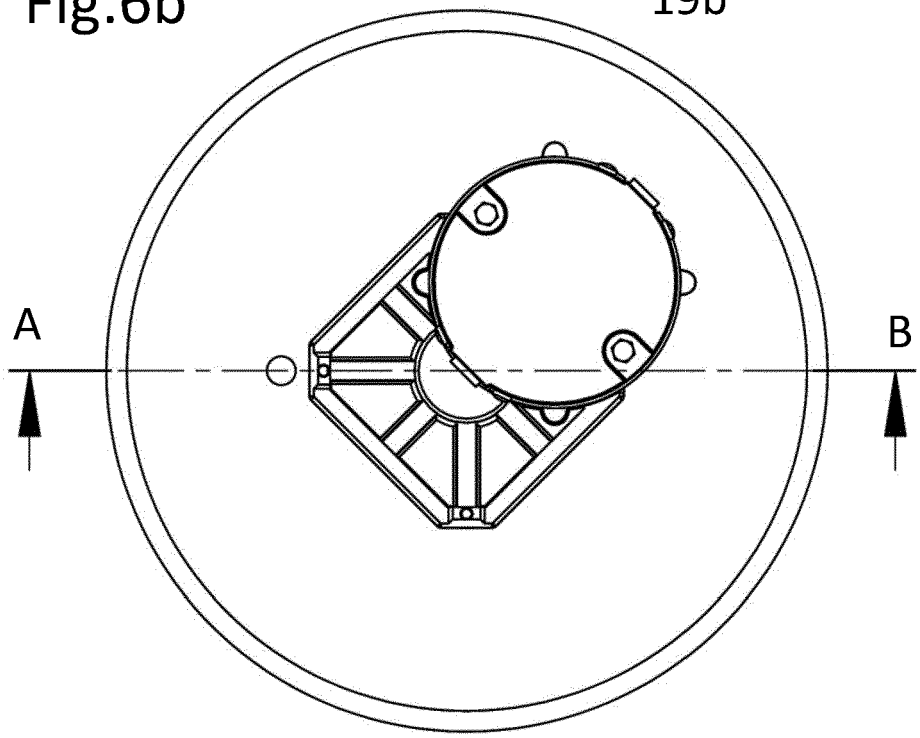


Fig.7

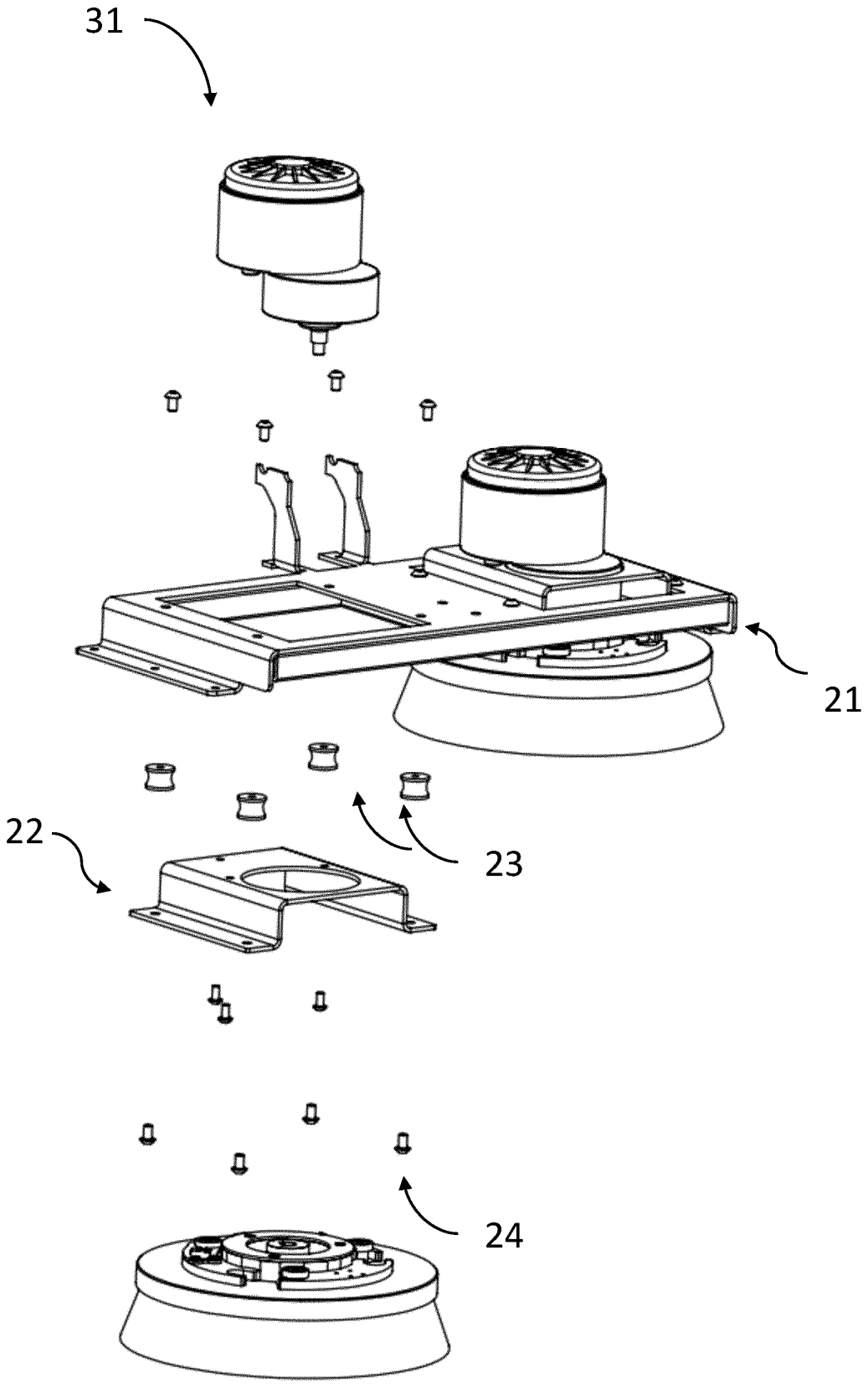


Fig.8a

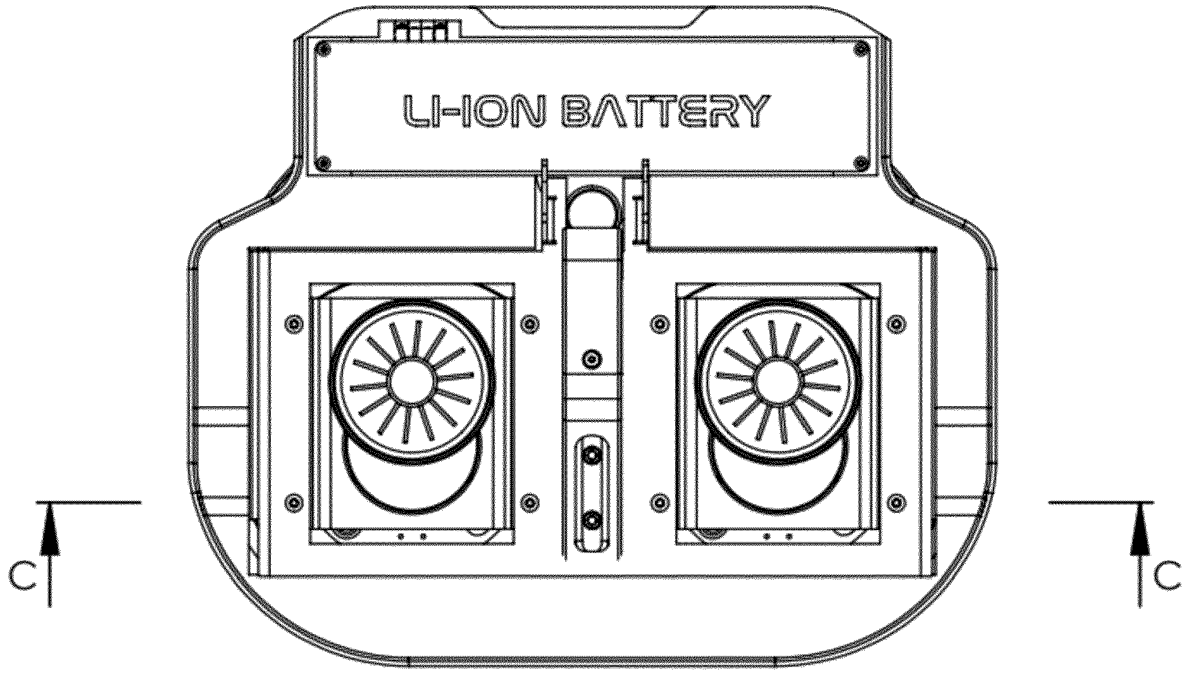
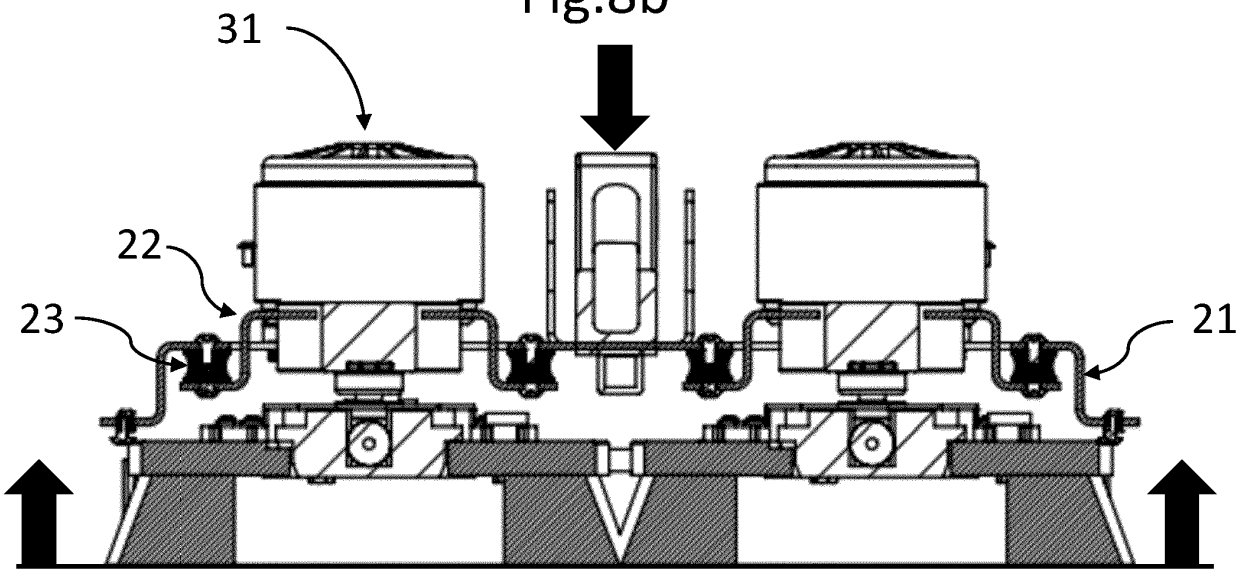


Fig.8b



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