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(54) **CLEANING DEVICE WITH INTERCHANGEABLE BRUSH**

REINIGUNGSVORRICHTUNG MIT AUSWECHSELBARER BÜRSTE

DISPOSITIF DE NETTOYAGE A BROSSE INTERCHANGEABLE

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(56) References cited:
DE-A- 1 459 663
DE-A- 4 139 693
FR-A- 2 225 134
GB-A- 2 266 230

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Description

FIELD OF THE INVENTION

[0001] The invention concerns a cleaning device comprising a box-like structure able to be moved on a surface to be cleaned and to contain at least a brush with a horizontal axis of rotation which, in cooperation with suction means, is able to remove dust and dirt from any surface whatsoever.

[0002] In the cleaning device according to the invention, the brush can be removed from the box-like structure to allow the user to replace it according to the specific surface to be cleaned or when the brush is worn.

BACKGROUND OF THE INVENTION

[0003] The state of the art includes cleaning devices equipped with a box-like structure provided at the upper part with a steering handle and at the lower part with a brush with a substantially horizontal axis of rotation.

[0004] In cooperation with conventional type suction means, the brush is able to remove the dust and dirt from any surface whatsoever.

[0005] It is well-known that a brush suitable to clean a soft surface like, for example, a moquette or a carpet, is not suitable to clean a hard surface like, for example, a wooden or tiled floor.

[0006] For this reason, some manufacturers have proposed cleaning devices wherein it is possible to replace the brush.

[0007] These devices, however, have not had much success due to the complex operations that users are obliged to make every time they want to replace the brush.

[0008] The state of the art includes, for example, a cleaning device which instead of being equipped with a single brush of a length a little less then the width of the box-like structure, is equipped with two half-brushes, each of which is able to be coupled to a respective end of a horizontal shaft able to receive rotational motion in correspondence with a median segment wherein a transmission belt turns, connected to an electric motor.

[0009] Using two short half-brushes instead of a single long brush not only entails a considerable increase in the cost of producing the cleaning device, it also entails the need for the user to make the same operations twice in order to prepare the device for cleaning a specific surface.

[0010] Moreover, the presence of a transmission belt located between the two half-brushes entails both a reduction in the usable working surface and also the possibility that the dust and dirt can compromise the grip of the belt on the horizontal shaft or even reach the electric motor or the other transmission organs, with consequent problems of malfunctioning.

[0011] On the other hand, the solutions proposed until now do not allow to use a single, interchangeable brush extending for a substantial part of the box-like structure since the cantilevered assembly of a similar brush would inevitably create imbalances in the transmission of motion and therefore, in the long term, problems of damage to the box-, like structure, the transmission organs and the brush itself.

[0012] It is also known document DE-A-1459663 which discloses a floor maintenance machine wherein a solid air separator is suspendly attached to an handle and includes an housing having a top opening, a bottom opening and an inlet connected to the outlet of a blower for receiving dust laden air from the blower. A closure pan is attached to the housing for closing the bottom opening and collecting dust falling through the bottom openings.

[0013] The present Applicant has devised and embodied this invention to overcome the shortcomings of the state of the art and to obtain other advantages as described hereafter.

SUMMARY OF THE INVENTION

[0014] The invention is set forth and characterized in the main claim, while the dependent claims describe other innovative characteristics of the invention.

[0015] The main purpose of the invention is to achieve a cleaning device equipped with at least an interchangeable brush with a horizontal axis of rotation, wherein the brush can be replaced by the user very simply and quickly and without using specific tools.

[0016] Another purpose of the invention is to provide a cleaning device wherein the transmission of rotational motion from the motor to the brush occurs without imbalances of forces and in such a fashion as to exploit the maximum power supplied by the motor.

[0017] A cleaning device according to the invention comprises, like convention cleaning devices, a box-like structure able to be moved, by steering means commanded by the user, on any surface to be cleaned and able to contain at least a brush with a horizontal axis of rotation.

[0018] The brush is able to be selectively coupled axially to a substantially horizontal rotation shaft, driven by a motor.

[0019] According to one characteristic of the invention, the box-like structure is laterally equipped with an aperture, axially aligned with the rotation shaft and able to be selectively closed by a closing element equipped with coupling means for a first end of the brush.

[0020] This characteristic allows both to use brushes which extend for a substantial part of the width of the box-like structure and also to simplify and accelerate the operations to couple and remove the brush.

[0021] According to a variant, the coupling means are able to allow to remove the brush from the closing element; in this way, the same closing element can be used for a plurality of different brushes.

[0022] In another variant of the invention, the coupling

means are able to allow the brush to move vertically with respect to the surface to be cleaned.

[0023] According to another characteristic of the invention, constraining means commanded by the user are provided to maintain the closing element coupled with the aperture of the box-like structure.

[0024] According to the invention, the constraining means can be achieved with any mechanism or device able to couple the closing element to the aperture of the containing structure in a simple, quick and secure manner.

[0025] In one embodiment of the invention, the constraining means comprise first clamping means provided on the closing element and second clamping means provided on the box-like structure, the first and second clamping means being able to interact.

[0026] According to a variant, the first clamping means, or the second clamping means, comprise one or more notching elements.

[0027] In one embodiment of the invention, the notching elements have a working position wherein they are able to protrude with respect to the outer perimeter of the closing element to interfere with a corresponding segment of the perimeter edge of the aperture provided on the box-like structure.

[0028] In this embodiment, the command means are able to selectively move each notching element towards the inside of the closing element into a position of non-interference with the perimeter edge of the aperture of the box-like structure.

[0029] This allows to dis-engage the closing element from the relative aperture and consequently to remove the brush associated therewith from the box-like structure.

[0030] According to another characteristic of the invention, the brush is able to receive rotational motion from the rotation shaft in correspondence with an inner coupling segment thereof.

[0031] This characteristic allows to increase the active surface of the brush, since there are no belts or similar on the working surface, and also to prevent dirt and dust from reaching the motion transmission members.

[0032] In the preferential embodiment of the invention, the inner coupling segment is provided in a substantially median position of the brush, thus allowing a better distribution of the forces transmitted by the motor.

[0033] The inner segment is equipped with first rapid coupling means able to be selectively connected to second rapid coupling means provided on the rotation shaft.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] These and other characteristics of the invention will become clear from the following description of a preferred form of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

Fig. 1 is a partial, three-dimensional view of a cleaning device with an interchangeable brush according to the invention;

Fig. 2 is a simplified front view of the cleaning device shown in Fig. 1;

Fig. 3 is a longitudinal section of the device in Fig. 1;

Fig. 4 is an inside view of the cleaning device in Fig. 1 with the brush assembled;

Fig. 5 is an inside view of the cleaning device in Fig. 1 with the brush removed;

Fig. 6 shows an enlarged detail of Fig. 3;

Fig. 7 is an exploded view of a detail of Fig. 4.

DETAILED DESCRIPTION OF PREFERENTIAL EMBODIMENT

[0035] The attached Figures show a partial view of a cleaning device 10 according to the invention which comprises a box-like structure 11 able to contain a brush 12, cylindrical in shape and able to be selectively coupled with a horizontal shaft 20 connected, as will be explained later in more detail, to a motor 13.

[0036] In this case, the box-like structure 11 is made in two parts coupled together; a lower part, or bottom, 11a is provided with an aperture 16, from which the brush 12 is able to partly protrude in order to brush the surface to be cleaned, and an upper part, or cover, 11b.

[0037] The brush 12 has a substantially conventional outer conformation and an inner conformation defined by four segments, respectively first 12a, second 12b, third 12c and fourth 12d, with a progressively decreasing transverse section (Fig. 6).

[0038] The third segment 12c, provided in a substantially median position of the brush 12, is equipped with a radial element 33 through which the brush 12 is able to receive motion generated by the motor 13.

[0039] The fourth segment 12d is able to be coupled, as will be explained later in more detail, to a closing element 21 able to cooperate with an aperture 35 provided on one side of the box-like structure 11 in a position axially aligned with the rotation shaft 20.

[0040] As shown in Fig. 4, the motor 13 is equipped with a shaft 36 onto which a first pulley 17 is keyed, connected by means of a toothed belt 39 to a second pulley 19 solid with a first end of the shaft 20.

[0041] The length of the shaft 20 is substantially half the overall length of the brush 12 and is coupled rotatably to a hollow cylindrical extension 14 of a supporting element 37 (Fig. 5).

[0042] The cylindrical extension 14, as shown in Figs. 3 and 5, is internally equipped with two bearings 15 which allow the shaft 20 to rotate with minimum friction around its longitudinal axis.

[0043] On the part of the shaft 20 which protrudes from the cylindrical extension 14 a cylindrical element 17 is coaxially coupled, provided with a disk 17a able to couple with the first segment 12a of the brush 12.

[0044] The shaft 20 is also equipped, on the end op-

posite that where the pulley 19 is keyed, with a coupling element 18 able to transmit the rotational motion to the brush 12.

[0045] In this case, the coupling element 18 comprises a first cylindrical part able to couple with the third segment 12c of the brush 12 and a second part consisting of two protrusions 18a defining a conformation substantially like a fork able to enclose the radial element 33 of the brush 12.

[0046] The insertion of the radial element 33 between the two protrusions 18a is facilitated both by the ogival transverse section of the radial element 33 and also by the rounded and bevelled profile of the two protrusions 18a.

[0047] According to the invention, the cleaning device 10 is equipped with a constraining assembly 40 which allows to maintain the closing element 21 coupled with the aperture 35.

[0048] In the embodiment shown here, the constraining assembly 40 comprises a clamping mechanism 38 provided on the closing element 21, able to be selectively dis-activated by the user by means of a lever 22 coupled with the box-like structure 11.

[0049] The closing element 21 is equipped on the inner face with holes and grooves which allow to couple with a plate 19 which is equipped with guide elements 29 which allow to couple with a vertically movable element 26.

[0050] The element 26 is equipped with a pin 30 onto which a radial bearing 31, able to be made solid with the fourth segment 12d of the brush 12, is able to be keyed.

[0051] The sliding of the element 26 in the guide elements 29 allows the brush 12 to move vertically with respect to the surface to be cleaned thanks to the fact that the supporting element 37 is able to rotate in a controlled fashion around the shaft 36 of the motor 13.

[0052] It is obvious that the device 10 according to the invention can also be of the type equipped with a brush 12 which cannot be adjusted in height; in this case the pin 30 will be solid with the plate 19 and the supporting element 37 will be solid with the lower part 11a of the box-like structure 11.

[0053] The clamping mechanism 38 is able to be positioned between the closing element 21 and the plate 19 and comprises two specular fins 27, movable horizontally, and an element 28 shaped like an upside down U and movable vertically.

[0054] The two fins 27 are coupled together by means of a compression spring 32 which tends to keep them distanced from each other.

[0055] The outer part of the fins 27 is able to interfere with the facing edges 35a of the aperture 35 to constrain the closing element 21 to the box-like structure 11.

[0056] To be more exact, when the closing element 21 is inserted into the aperture 35, the facing edges 35a of the latter are able to position themselves between the closing element 21 and the fins 27 so that the group consisting of the brush 12 and the closing element 21 is axially constrained to the box-like structure 11.

[0057] The lever 22, by means of an eyelet 23 made at a first end thereof, is able to pivot on the lower part 11a of the box-like structure 11; the lever 22 is equipped at a second end with a tooth 24 able to cooperate with the clamping mechanism 38 and, in a substantially median position, with a disk 25 able to protrude from an aperture 34 provided on the upper part 11b.

[0058] In the cleaning device 10 according to the invention, removing the brush 12 is extremely simple and quick since the user only has to press the disk 25.

[0059] When this happens, as shown in Fig. 7, the tooth 24 pushes the element 28 downwards which causes the two fins 27 to approach each other and the spring 32 to be compressed.

[0060] As they approach each other, the two fins 27 are released from the facing edges 35a of the aperture 35 allowing to remove, from the aperture 35, the closing element 21 and the brush 12 associated therewith.

[0061] At the same time, the radial element 33 is released from the element 28 without any further external interventions being required on the part of the user.

[0062] When the closing element 21 is completely removed from the aperture 35, the tooth 24 of the lever 22 is automatically released from the element 28, allowing the latter to return upwards.

[0063] This allows the spring 32 to return the two fins 27 to a position of maximum separation, ready to clamp the closing element 21 in the aperture 35 once more.

[0064] The operations to assemble the brush 12 to the box-like structure 11 are equally quick and easy since the user only has to insert the brush 12 into the aperture 35 and push the closing element 21 towards the inside until the two fins 27 of the clamping mechanism 38 are automatically constrained to the facing walls 35a of the aperture 35.

[0065] When the insertion has been completed, the shaft 20 is automatically constrained to the brush 12, and in particular the element 28 to the radial element 33, without further external interventions being required on the part of the user.

[0066] According to a variant which is not shown here, the closing element 21 can be externally equipped with a handle or other gripping element able to facilitate the operations to remove/insert the brush 12 from/into the box-like structure 11.

[0067] According to another variant, the element 28 is able to cooperate with a spring, or other elastic element, able to automatically push the group consisting of the brush 12 and the closing element 21 towards the outside of the box-like structure 11 when the disk 25 of the lever 22 is pressed by the user.

[0068] It is obvious that modifications or additions can be made to the invention without departing from the spirit and scope thereof.

[0069] For example, the bearings 15 and 31 can be replaced by disks made of material with a low friction coefficient.

[0070] Or the closing element 21, as well as the clamping mechanism 38, may have a command element with the same function as the lever 22.

[0071] Furthermore, the clamping mechanism 38 can be made in different ways and the lever 22 can be replaced by any other command element, chosen according to the type of mechanism 38 used.

[0072] Moreover, the element 18 can be of a different shape from that shown here, for example of the type comprising three or more extensions 18a able to cooperate with the same number of radial elements 33.

[0073] Or, instead of the radial element 33, the third segment 12c of the brush 12 can be equipped with a diaphragm provided with apertures into which the extensions 18a, appropriately shaped, of the element 18 are able to be inserted.

[0074] Moreover, it is within the spirit of the invention to provide cleaning devices 10 equipped with two or more brushes 12 coupled at a first end with the same closing element 21 or with respective closing elements 21.

[0075] Furthermore, the transmission of the rotational motion from the motor 13 to the shaft 20 can be achieved with any kinematic chain of a different type than that shown here.

Claims

1. Cleaning device comprising a box-like structure (11) able to contain at least a brush (12) able to be selectively coupled to a shaft (20) with a substantially horizontal axis of rotation coupled with a motor (13), wherein said box-like structure (11) is laterally equipped with an aperture (35) axially aligned with said rotation shaft (20) and able to be selectively closed by a closing element (21) equipped with coupling means for a first end of said brush (12), constraining means (40) being provided to maintain said closing element (21) coupled with said aperture (35), **characterized in that** said coupling means comprises a pin element (30) coaxial to and permanently inserted into said first end of said brush (12) for rotatably supporting said first and of said brush (12), said pin element being supported by said closing element (21) so that said closing element (21) and said brush (12) form a single group able to be removed from or inserted into said box-like structure (11) through said aperture (35); and **in that** said constraining means (40) comprise first clamping means (38) provided on said closing element (21) and second clamping means provided on said box-like structure (11) able to cooperate with each other, command means which can be selectively activated by the user being provided to command at least said first clamping means (38) to allow the disengagement of said closing element (21) from said aperture (35) and the simultaneous removal of said brush (12) associated to said closing element (21).

2. Cleaning device as in claim 1, **characterized in that** said first clamping means (38) comprise at least a protruding element (27) able to protrude with respect to the outer perimeter of said closing element (21) and that said second clamping means comprise at least a corresponding segment (35a) of the perimeter edge of said aperture (35), said protruding element (27) being able to interfere with said segment (35a).

3. Cleaning device as in claim 2, **characterized in that** said command means are able to selectively take said protruding element (27) towards the inside of said closing element (21) into a position of non-interference with said segment (35a) of the perimeter edge of said aperture (35).

4. Cleaning device as in claim 2, **characterized in that** said first clamping means (38) comprise two protruding elements (27), facing each other and able to be thrust towards the outside of the closing element (21) by elastic means (32), and a connection element (28) with a shape able to bring said protruding elements (27) closer together when said command means (22) are activated.

5. Cleaning device as in claim 4, **characterized in that** said command means (22) comprise a lever equipped with a first end (23) pivoting on said box-like structure (11), a second end (24) able to cooperate with the upper part of said connection element (28) and a central part (25) able to be selectively pressed by the user to thrust-said connection element (28) downwards to bring said protruding elements (27) closer together.

6. Cleaning device as in claim 1, **characterized in that** at least a radial bearing (31) is provided to couple said pin element (30) to said first end of said brush (12).

7. Cleaning device as in claim 1, **characterized in that** said coupling means are able to allow said brush (12) to move vertically with respect to the surface to be cleaned.

8. Cleaning device as in claim 7, **characterized in that** said pin element (30) is solid with an element (26) able to move vertically inside guide means (29) solid with said closing element (21).

9. Cleaning device as in claim 1, **characterized in that** said rotation shaft (20) is able to be inserted for a defined segment inside said brush (12) and is equipped with first coupling means able to be con-

nected to second coupling means provided in a defined inner segment (12c) of said brush (12).

10. Cleaning device as in claim 9, **characterized in that** said inner segment (12c) is provided in a substantially median position of said brush (12).

11. Cleaning device as in claim 9, **characterized, in that** said first, coupling means comprise a substantially cylindrical element (18) equipped with at least two protrusions (18a) and that said second coupling means comprise at least a radial element (33) able to be inserted between said protrusions (18a).

12. Cleaning device as in claim 1, **characterized in that** said element (18) comprises at least a segment with an outer transverse section mating with the inner transverse section of the brush (12) in an inner coupling segment (12c) thereof.

13. Cleaning device as in claim 1, **characterized in that** said rotation shaft (20) is coupled, through and free to rotate, with a cylindrical extension (14) able to be at least partly inserted inside said brush (12).

14. Cleaning device as in claim 13, **characterized in that** said rotation shaft (20) is coupled to said cylindrical extension (14) by means of at least a radial bearing (15).

15. Cleaning device as in claim 1, **characterized in that** said rotation shaft (20) is coupled at a first end with a pulley (19) connected, by means of flexible means (39), to a pulley (17) keyed onto the shaft (36) of said motor (13).

16. Cleaning device as in claim 1, **characterized in that** said rotation shaft (20) is equipped with at least a coaxial element (17) provided with at least a segment with an outer transverse section mating with the inner transverse section of the brush (12) in an inner coupling segment (12a) thereof.

Patentansprüche

1. Reinigungseinrichtung mit einer kastenartigen Konstruktion (11), die zumindest eine Bürste (12) aufnehmen kann, die selektiv an eine Welle (20) angeschlossen wurden kann, die eine im wesentlichen horizontale Drehachse besitzt und mit einem Motor (13) gekoppelt ist, wobei die kastenartige Konstruktion (11) seitlich mit einer Öffnung (35) ausgerüstet ist, die axial mit der drehbaren Welle (20) ausgefluchtet ist und selektiv mit einem Schließelement (21) geschlossen werden kann, das mit einer Kopplungseinrichtung für ein erstes Ende der Bürste (12) ausgerüstet ist, wobei eine Zwangseinrichtung (40) vorgesehen ist, um das Schließelement (21) in gekoppeltem Zustand mit der Öffnung (35) zu halten, **dadurch gekennzeichnet,**
daß die Kopplungseinrichtung ein Stiftelement (30) aufweist, das koaxial mit dem ersten Ende der Bürste (12) angeordnet und permanent in dieses erste Ende der Bürste (12) eingesetzt ist, um das erste Ende der ßürste (12) drehbar zu lagern, wobei das Stiftelement von dem Schließelement (21) getragen ist, so daß das Schließelement (21) und die Bürste (12) eine einzige Gruppe bilden, die durch die Öffnung (35) aus der kastenartigen Konstruktion (11) entfernt oder in diese eingesetzt werden kann; und **daß** die Zwangseinrichtung (40) eine erste Klemmeinrichtung (38), die an dem Schließelement (21) vorgesehen ist, und eine zweite Klemmeinrichtung aufweist, die an der kastenattigen Konstruktion (11) vorgesehen ist, wobei die Klemmeinrichtungen miteinander zusammenwirken können, wobei eine Betätigungseinrichtung, die selektiv von dem Benutzer aktiviert werden kann, vorgesehen ist, um zumindest die erste Klemmeinrichtung (38) zu betätigen, um es zu ermöglichen, den Eingriff des Schließelementes (21) aus der Öffnung (35) zu lösen, und um das gleichzeitige Entfernen der Bürste (12) zu ermöglichen, die dem Schließelement (21) zugeordnet ist.

2. Reinigungseinrichtung nach Anspruch 1,
dadurch gekennzeichnet,
daß die erste Klemmeinrichtung (38) zumindest ein vorstehendes Element (27) aufweist, das in der Lage ist, bezüglich des Außenumfanges des Schließelementes (21) vorzustehen,
und **daß** die zweite Klemmeinrichtung zumindest ein entsprechendes Segment (35) der Umfangskante der Öffnung (35) aufweist, wobei das vorstehende Element (27) mit dern Segment (35a) in Eingriff treten kann.

3. Reinigungseinrichtung nach Anspruch 2,
dadurch gekennzeichnet.
daß die Betätigungseinrichtung in der Lage ist, das vorstehende Element (27) selektiv zur Innenseite des Schließelementes (21) in eine Position ohne Eingriff mit dem Segment (35a) der Umfangskante der Öffnung (35) mitzunehmen.

4. Reinigungseinrichtung nach Anspruch 2,
dadurch gekennzeichnet,
daß die erste Klemmeinrichtung (38) zwei vorstehende Elemente (27), die einander gegenüberliegen und die in der Lage sind, von einer elastischen Einrichtung (32) zur Außenseite des Schließelementes (21) gedrückt zu werden, sowie ein Verbindungselement (28) mit einer Gestalt aufweist, die in der Lage ist, die vorstehenden Elemente (27) enger zusammenzubringen, wenn die Betätigungsein-

richtung (22) aktiviert wird.

5. Reinigungseinrichtung nach Anspruch 4, **dadurch gekennzeichnet,** **daß** die Betätigungseinrichtung (22) einen Hebel aufweist, der mit einem ersten Ende (23), das an der kastenartigen Konstruktion (11) angelenkt ist, mit einem zweiten Ende (24), das mit dem Oberteil des Verbindungselementes (28) zusammenwirken kann, und mit einem Mittelteil (25) ausgerüster ist, das von dem Benutzer selektiv gedrückt werden kann, um das Verbindungselement (28) nach unten zu drücken, um die vorstehenden Element (27) enger zusammenzubringen.

6. Reinigungseinrichtung nach Anspruch 1, **dadurch gekennzeichnet,** **daß** zumindest ein Radiallager (31) vorgesehen ist, um das Stiftelement (30) mit dem ersten Ende der Bürste (12) zu verbinden.

7. Reinigungseinrichtung nach Anspruch 1, **dadurch gekennzeichnet,** **daß** die Kopplungseinrichtung in der Lage ist, der Bürste (12) eine vertikale Bewegung bezüglich der zu reinigenden Oberfläche zu ermöglichen.

8. Reinigungseinrichtung nach Anspruch 7, **dadurch gekennzeichnet,** **daß** das Stiftelement (30) fest mit einem Element (26) ausgebildet ist, das in der Lage ist, sich vertikal innerhalb einer Führungseinrichtung (29) zu bewegen, die fest mit dem Schließelement (21) ausgebildet ist.

9. Reinigungseinrichtung nach Anspruch 1, **dadurch gekennzeichnet,** **daß** die drehbare Welle (20) dazu ausgelegt ist, für ein definiertes Segment innerhalb der Bürste (12) eingesetzt zu werden, und mit einer ersten Kopplungseinrichtung ausgerüstet ist, die mit einer zweiten Kopplungseinrichtung verbunden werden kann, die in einem definierten inneren Segment (12c) der Bürste (12) vorgesehen ist.

10. Reinigungseinrichtung nach Anspruch 9, **dadurch gekennzeichnet,** **daß** das innere Segment (12c) im wesentlichen in einer mittleren Position der Bürste (12) vorgesehen ist.

11. Reinigungseinrichtung nach Anspruch 9, **dadurch gekennzeichnet,** **daß** die erste Kopplungseinrichtung ein im wesentlichen zylindrisches Element (18) aufweist, das mit mindestens zwei Vorsprüngen (18a) ausgerüstet ist, und daß die zweite Kopplungseinrichtung mindestens ein radiales Element (33) aufweist, das zwischen den Vorsprüngen (18a) eingesetzt werden kann.

12. Reinigungseinrichtung nach Anspruch 1, **dadurch gekennzeichnet,** **daß** das Element (18) mindestens ein Segment mit einem äußeren Querschnitt aufweist, der mit dem inneren Querschnitt der Bürste (12) in einem inneren Kopplungssegment (12c) davon zusammenpaßt.

13. Reinigungseinrichtung nach Anspruch 1, **dadurch gekennzeichnet,** **daß** die drehbare Welle (20) mit einer zylindrischen Verlängorung (14), durch diese hindurch und frei zum Drehen, gekoppelt ist, wobei die zylindrische Verlängerung (14) zumindest teilweise in das Innere der Bürste (12) einsetzbar ist.

14. Reinigungseinrichtung nach Anspruch 13, **dadurch gekennzeichnet,** **daß** die drehbare Welle (20) zumindest mit einem Radiallager (15) mit der zylindrischen Verlängerung (14) gekoppelt ist.

15. Reinigungseinrichtung nach Anspruch 1, **dadurch gekennzeichnet,** **daß** die drehbare Welle (20) an einem ersten Ende mit einer Riemenscheibe (19) gekoppelt ist, die mittels einer flexiblen Einrichtung (39) mit einer Riemenscheibe (17) verbunden ist, welche mit der Welle (36) des Motors (13) verkeilt ist.

16. Reinigungseinrichtung nach Anspruch 1, **dadurch gekennzeichnet,** **daß** die drehbare Welle (20) zumindest mit einem koaxialen Element (17) ausgerüstet ist, das zumindest mit einem Segment mit einem äußeren Querschnitt versehen ist, der mit dem inneren Querschnitt der Bürste (12) in einem inneren Kupplungssegment (12a) davon zusammenpaßt.

Revendications

1. Dispositif de nettoyage comprenant une structure en forme de boîtier (11) pouvant contenir au moins une brosse (12) qu'il est possible de coupler de manière sélective à un arbre (20) doté d'un axe de rotation sensiblement horizontal couplé à un moteur (13), dans lequel ladite structure en forme de boîtier (11) est munie sur le côté d'une ouverture (35) alignée dans l'axe dudit arbre rotatif (20) et pouvant être fermée de manière sélective par un élément de fermeture (21) muni de moyens d'accouplement à une première extrémité de ladite brosse (12), de moyens de contrainte (40) prévus pour maintenir ledit élément de fermeture (21) couplé à ladite ouver-

ture (35), **caractérisé en ce que** lesdits moyens d'accouplement comprennent une broche (30) coaxiale à la brosse et introduite en permanence dans ladite première extrémité de ladite brosse (12) afin de supporter la rotation de ladite première extrémité de ladite brosse (12), ladite broche étant supportée par ledit élément de fermeture (21) de sorte que ledit élément de fermeture (21) et ladite brosse (12) forment un seul groupe qui puisse être introduit ou retiré de ladite structure en forme de boîtier (11) par ladite ouverture (35) ; et **caractérisé en ce que** lesdits moyens de contrainte (40) comprennent des premiers moyens de serrage (38) prévus sur ledit élément de fermeture (21) et des seconds moyens de serrage prévus sur ladite structure en forme de boîtier (11) et capables de travailler l'un avec l'autre, des moyens de commande pouvant être actionnés de manière sélective par l'utilisateur et prévus pour commander au moins lesdits premiers moyens de serrage (38) afin de permettre de dégager ledit élément de fermeture (21) de ladite ouverture (35) et de retirer simultanément ladite brosse (12) associée audit élément de fermeture (21).

2. Dispositif de nettoyage selon la revendication 1, **caractérisé en ce que** lesdits premiers moyens de serrage (38) comprennent au moins un élément en saillie (27) pouvant dépasser du périmètre externe dudit élément de fermeture (21) et **en ce que** lesdits seconds moyens de serrage comprennent au moins un segment correspondant (35a) du pourtour de ladite ouverture (35), ledit élément en saillie (27) étant capable d'interférer avec ledit segment (35a).

3. Dispositif de nettoyage selon la revendication 2, **caractérisé en ce que** lesdits moyens de commande sont capables d'amener de manière sélective ledit élément en saillie (27) vers l'intérieur dudit élément de fermeture (21), en position de non interférence avec ledit segment (35a) du pourtour de ladite ouverture (35).

4. Dispositif de nettoyage selon la revendication 2, **caractérisé en ce que** lesdits premiers moyens de serrage (38) comprennent deux éléments en saillie (27) se faisant face et pouvant être poussés vers l'extérieur de l'élément de fermeture (21) par des moyens élastiques (32), et un élément de liaison (28) dont la forme est capable de rapprocher lesdits éléments en saillie (27) l'un de l'autre lorsque lesdits moyens de commande (22) sont actionnés.

5. Dispositif de nettoyage selon la revendication 4, **caractérisé en ce que** lesdits moyens de commande (22) comprennent un levier muni d'une première extrémité (23) pivotant sur ladite structure en forme de boîtier (11), une seconde extrémité (24) pouvant travailler avec la partie supérieure dudit élément de liaison (28) et une partie centrale (25) sur laquelle l'utilisateur peut appuyer de manière sélective pour pousser ledit élément de liaison (28) vers le bas et rapprocher l'un de l'autre lesdits éléments en saillie (27).

6. Dispositif de nettoyage selon la revendication 1, **caractérisé par** la prévision d'au moins un palier à charge radiale (31) destiné à coupler ladite broche (30) à ladite première extrémité de ladite brosse (12).

7. Dispositif de nettoyage selon la revendication 1, **caractérisé par** l'aptitude desdits moyens d'accouplement à permettre le déplacement vertical de ladite brosse (12) par rapport à la surface à nettoyer.

8. Dispositif de nettoyage selon la revendication 7, **caractérisé en ce que** ladite broche (30) est solidaire d'un élément (26) capable de se déplacer verticalement à l'intérieur de moyens de guidage (29) solidaires dudit élément de fermeture (21).

9. Dispositif de nettoyage selon la revendication 1, **caractérisé en ce que** ledit arbre rotatif (20) peut être introduit à l'intérieur de ladite brosse (12) sur un segment donné et est muni de premiers moyens d'accouplement qui peuvent être reliés à des seconds moyens d'accouplement prévus dans un segment interne donné (12c) de ladite brosse (12).

10. Dispositif de nettoyage selon la revendication 9, **caractérisé en ce que** ledit segment interne (12c) se trouve sensiblement au milieu de ladite brosse (12).

11. Dispositif de nettoyage selon la revendication 9, **caractérisé en ce que** lesdits premiers moyens d'accouplement comprennent un élément sensiblement cylindrique (18) muni d'au moins deux saillies (18a) et **en ce que** lesdits seconds moyens d'accouplement comprennent au moins un élément radial (33) pouvant être introduit entre lesdites saillies (18a).

12. Dispositif de nettoyage selon la revendication 1, **caractérisé en ce que** ledit élément (18) comprend au moins un segment dont une section transversale externe s'ajuste à la section transversale interne de la brosse (12) dans l'un de ses segments d'accouplement internes (12c).

13. Dispositif de nettoyage selon la revendication 1, **caractérisé en ce que** ledit arbre rotatif (20) est couplé à une extension cylindrique (14) qu'il traverse en rotation libre et qui peut être introduite au moins partiellement à l'intérieur de ladite brosse (12).

14. Dispositif de nettoyage selon la revendication 13,

caractérisé en ce que ledit arbre rotatif (20) est couplé à ladite extension cylindrique (14) au moyen d'au moins un palier à charge radiale (15).

15. Dispositif de nettoyage selon la revendication 1, **caractérisé en ce que** ledit arbre rotatif (20) est couplé, à une première extrémité, à une poulie (19) reliée, par l'intermédiaire de moyens flexibles (39), à une poulie (17) calée sur l'arbre (36) dudit moteur (13).

16. Dispositif de nettoyage selon la revendication 1, **caractérisé en ce que** ledit arbre rotatif (20) est muni d'au moins un élément coaxial (17) pourvu d'au moins un segment dont une section transversale externe s'ajuste à la section transversale interne de la brosse (12), dans l'un de ses segments d'accouplement internes (12a).

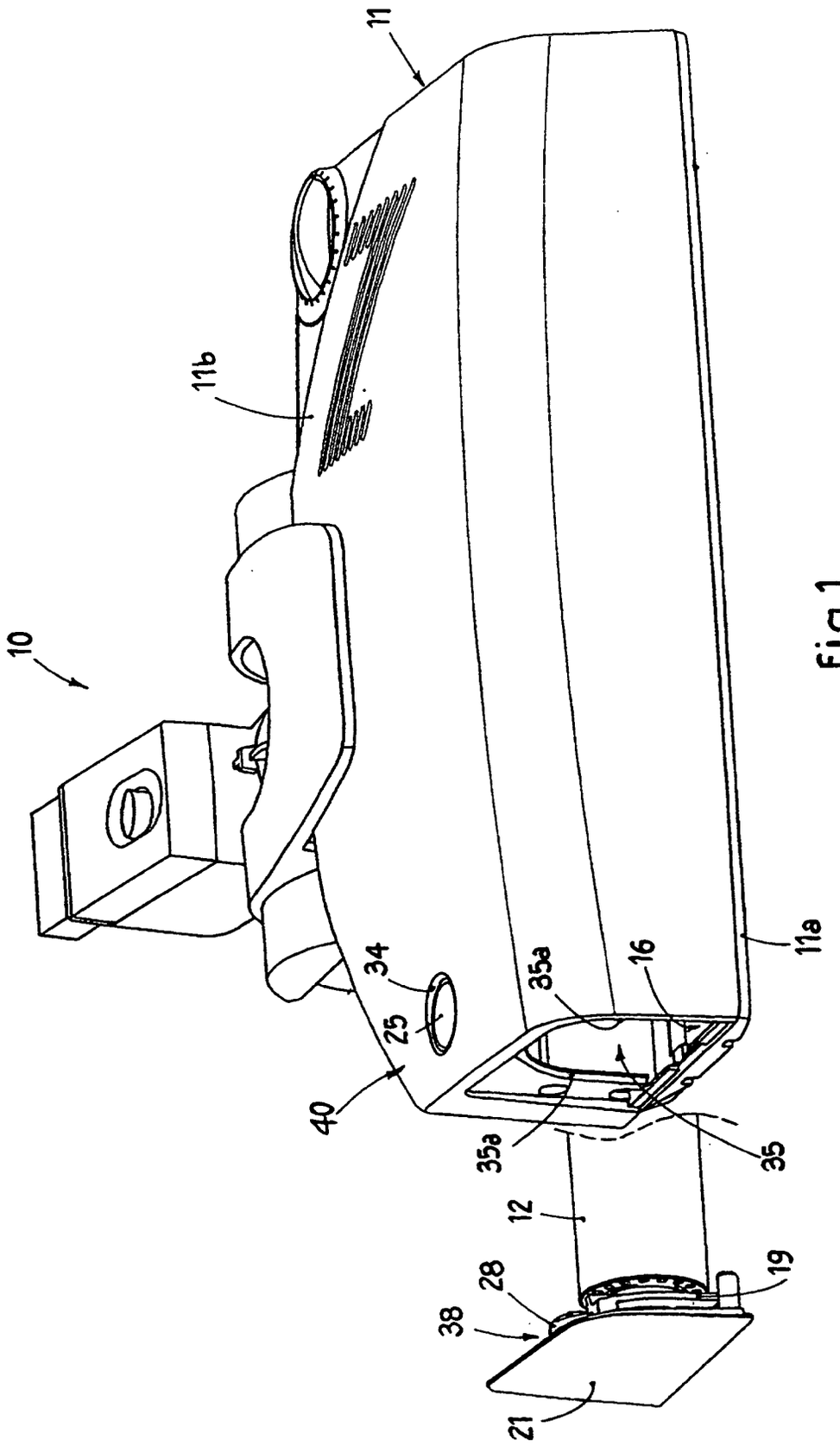

Fig.1

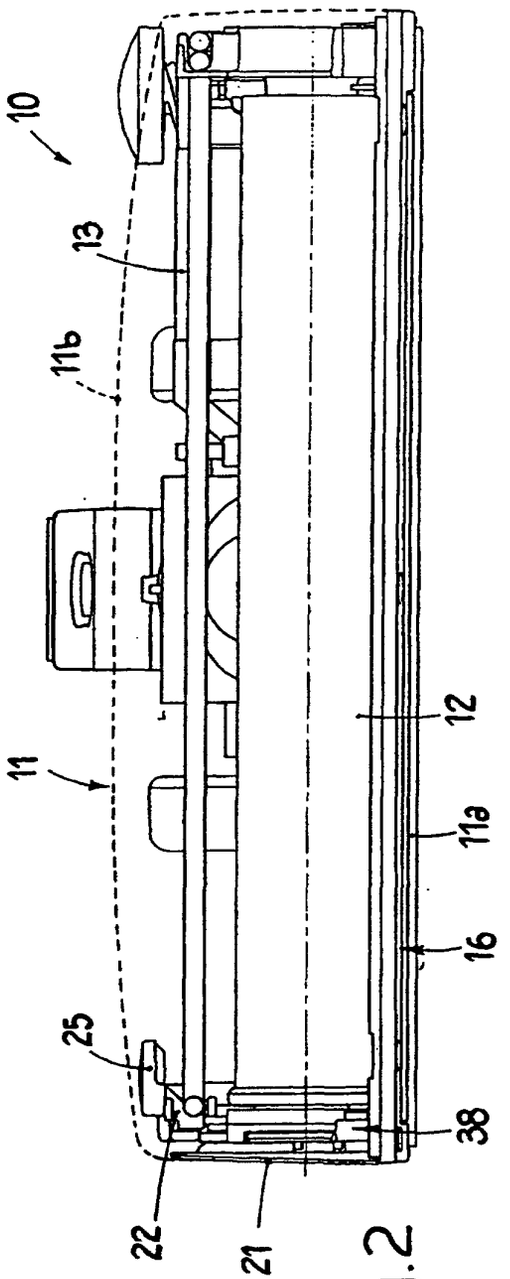
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Fig.2

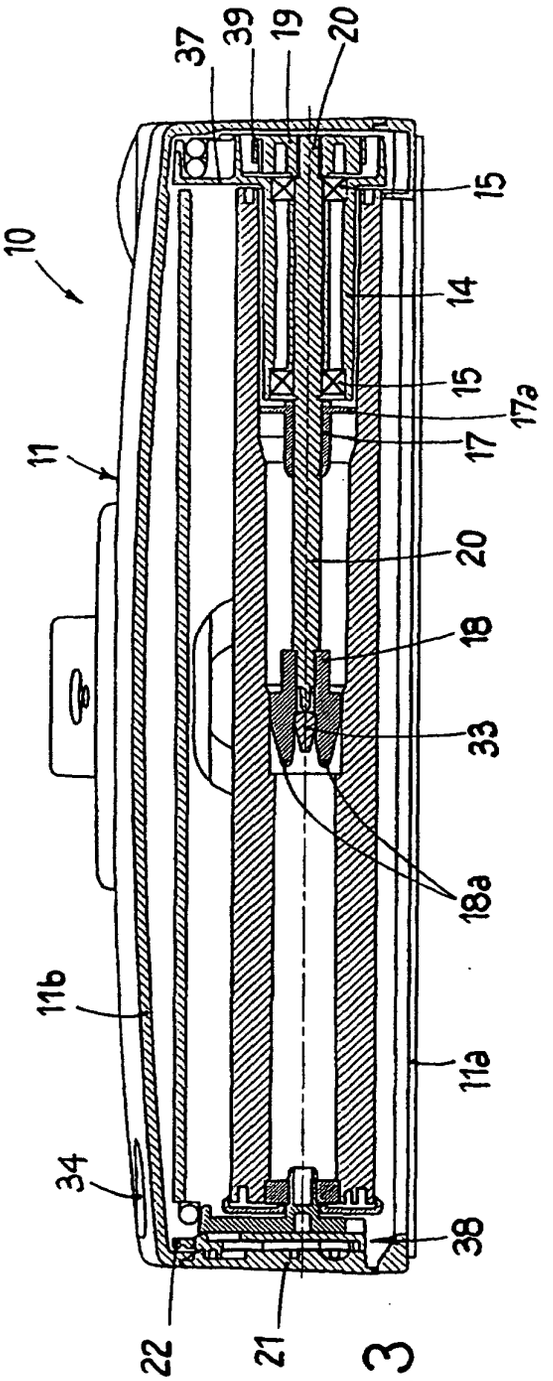
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Fig.3

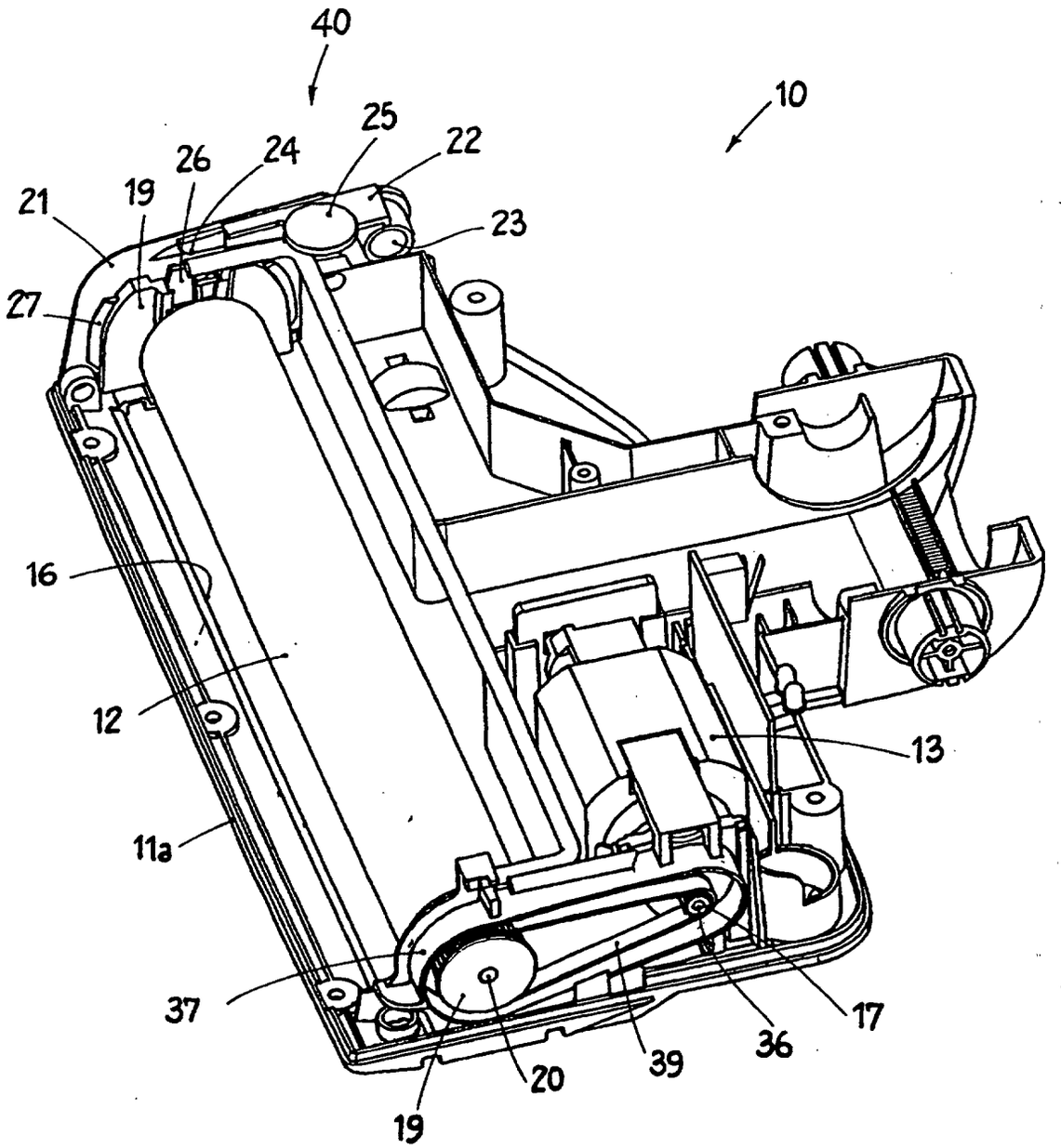

Fig. 4

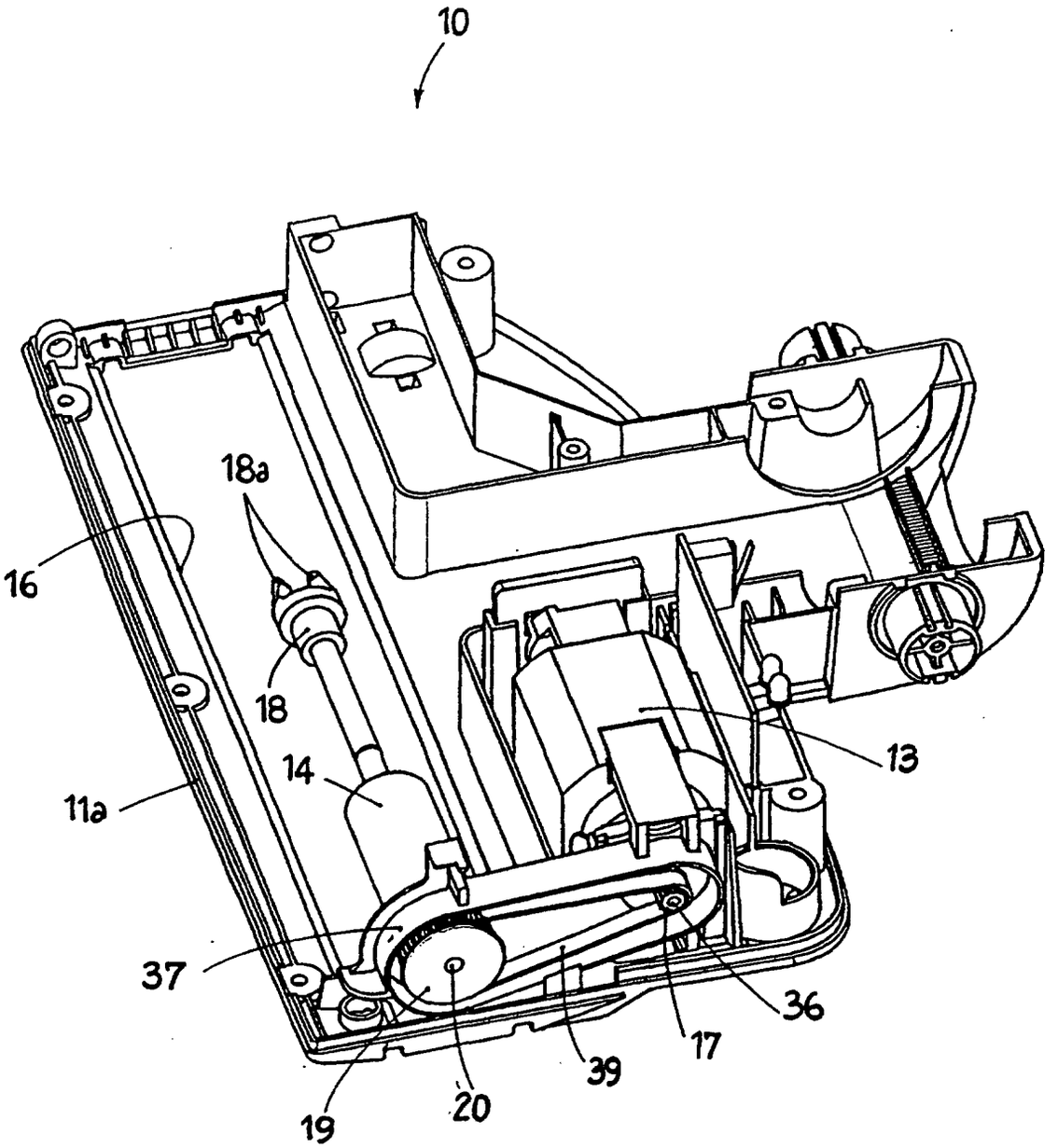

Fig.5

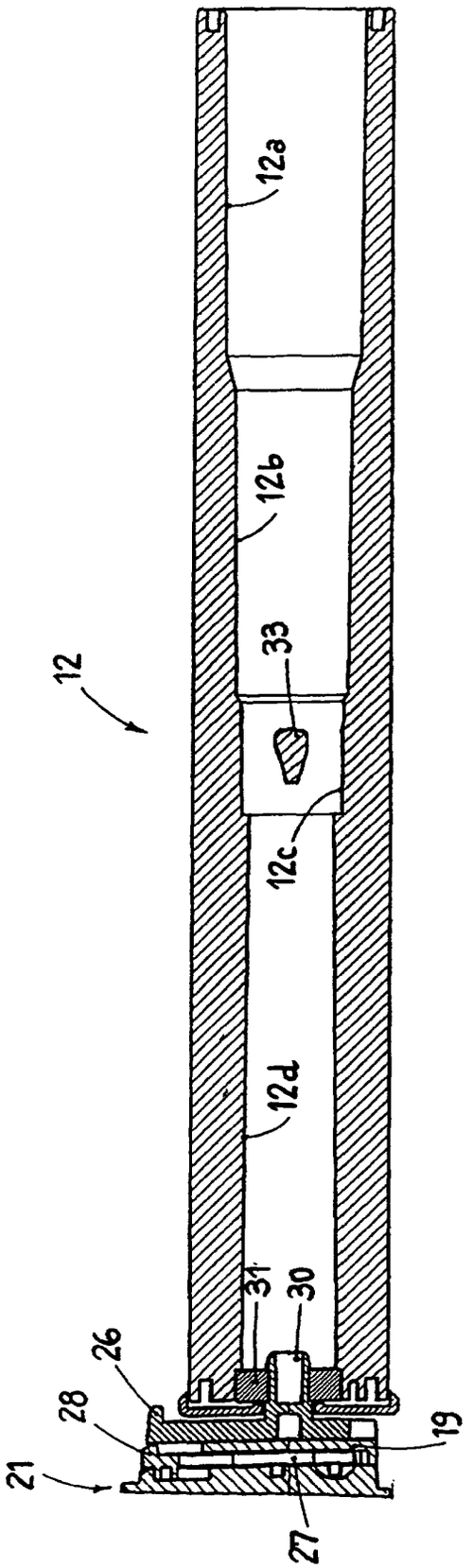

Fig.6

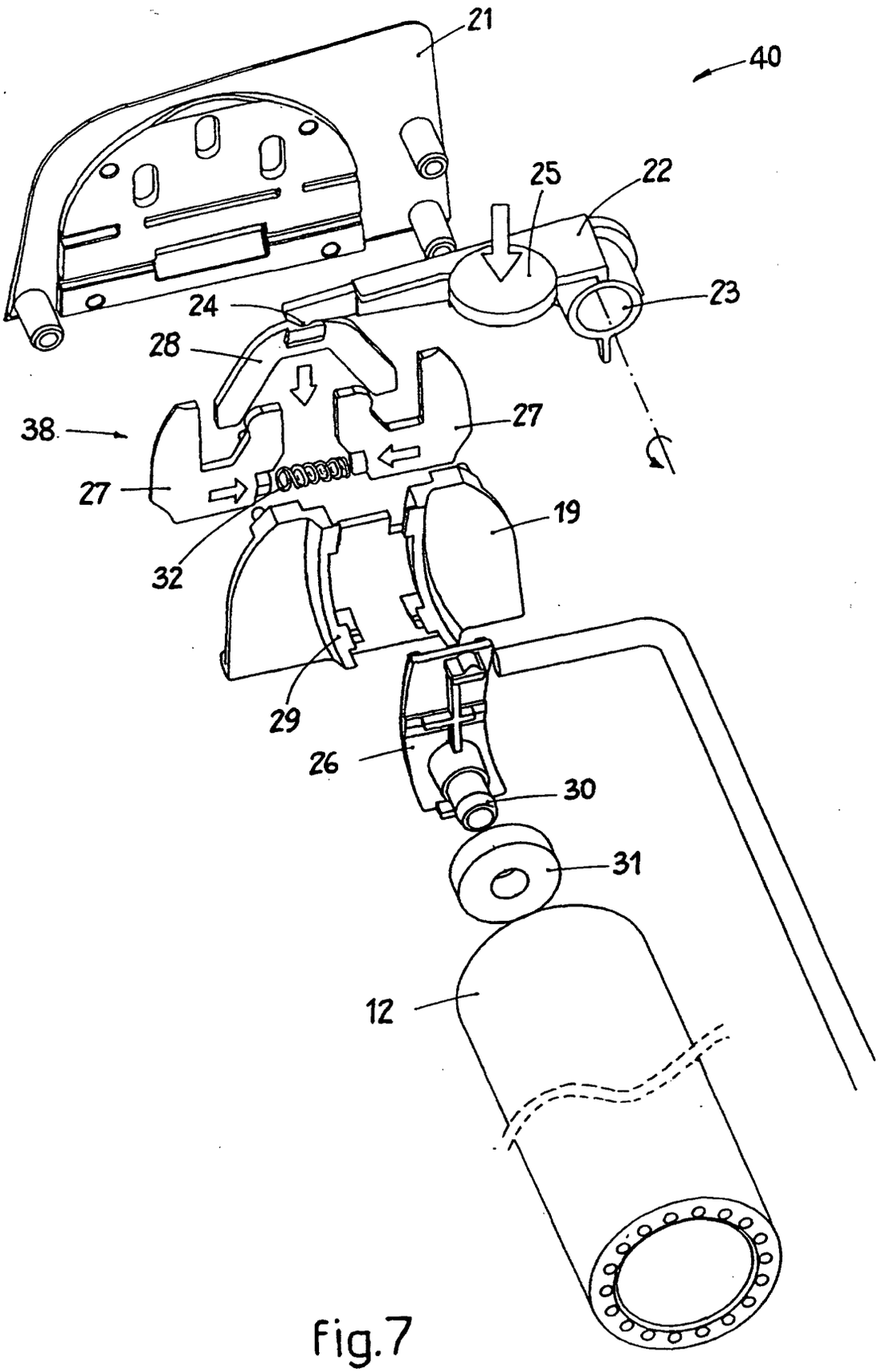

Fig.7