(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 055 289 A1

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
06.05.2009 Bulletin 2009/19

(21) Application number: **07704729.8**

(22) Date of filing: **15.02.2007**

(51) Int Cl.:
A61H 15/00 *(2006.01)*

(86) International application number:
PCT/ES2007/000015

(87) International publication number:
WO 2008/012379 (31.01.2008 Gazette 2008/05)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(30) Priority: **21.07.2006 ES 200601949**

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(54) MECHANISM FOR MASSAGING THE LOWER PARTS OF A USER'S LEGS

(57) It comprises two pairs of massaging discs (1a, 1b) connected to an actuating mechanism (4) and joined in a fixed and eccentric manner and in convergent inclined planes to respective rotary axes (A, B), the discs being designed for massaging opposite sides of the lower part of a leg (3a, 3b); at least one clutch mechanism (5) with an internal housing (6) that comprises two stop elements (6a, 6b), a channel (6c) of arcuate vertical cross section between said stop elements (6a, 6b) and a projection (6d) between the stops (6a, 6b); an intermediate massaging element (15, 18, 21) whose massaging surface is at least semicylindrical and is actuated by performing a transverse movement over the surface to be massaged; an intermediate massaging element consisting of a plate (27) provided with vibration means for applying a vibrating massage; and means for regulating the distance between the discs (1a, 1b; 2a, 2b), in order to adapt to the size of the part to be massaged.

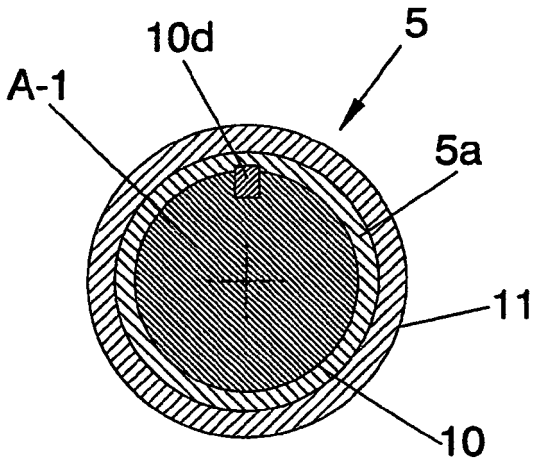

FIG. 10
(IV-IV')

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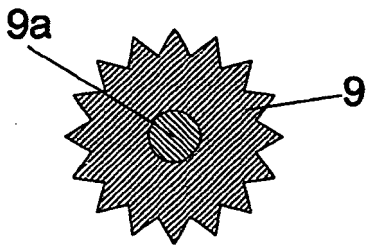

FIG. 18

Description

TECHNICAL FIELD OF THE INVENTION

[0001] This invention belongs to the technical field of the automatic massage mechanisms, and more specifically to the sector of the automatic mechanisms for massaging the lower part of users' legs.

STATE OF THE TECHNIQUE BEFORE THE INVENTION

[0002] The automatic mechanisms used to give massages to the lower part of people's legs, that is the calf muscles, had for many years been equipment either independent or incorporated in massage armchairs.

[0003] To give the massage, mechanisms are usually used with a first pair of revolving massage discs connected permanently and eccentrically to a first revolving shaft, separated in order to give massages on opposite sides of the lower part of the user's first leg, the revolving discs of the first pair of discs in the first rotation planes being inclined with respect to the first revolving shaft, and a second pair of revolving massage discs fixed together and eccentrically to a second revolving shaft, separated to give massages on opposite sides of the lower part of a second user leg, the revolving discs of the second pair of discs in the second rotation planes being inclined with respect to the second revolving shaft. In turn, the revolving axes are connected to an activation mechanism capable of turning the revolving axes in the first direction, and in a second direction opposite to the first. Mechanisms of this kind are described, for example, in the application for Japanese patent SHO-59-28963, in the application for Japanese patent HEI 4-78307 and in the application for Japanese patent HEI 2-109628. This kind of mechanisms, though enabling efficient massage,have the drawback of giving a single type of kneading massage given simultaneously and equally on both of the user's legs, which means they give users very little variation.

[0004] The application for European patent EP-A-1000600 describes a mechanism which enables different types of massage to be given to the lower part of a user's legs by means of a massage mechanism that includes a revolving shaft, a pair of right and left massage rollers mounted on an intermediate part of the revolving shaft in an inclined manner, with respect to a geometric axis of the revolving shaft, means of actuation to turn the revolving shaft and switching means to change the position of the right and left massage rollers to a kneading position in which the massage rollers are inclined opposite each other, and a non-kneading position in which the massage rollers are inclined parallel to each other. Although this mechanism allows kneading and non-kneading massages to be given to the user's legs, it has the drawback that this is achieved by means of a relatively complicated mechanism for each of the user's legs.

[0005] It was therefore desirable to have a mechanism to allow users to be offered more kinds of massages of the bottoms of their legs than those offered by conventional mechanisms, and which at the same time, should not have such a complex structure as the mechanism described in application for European patent EP-A-10000600.

[0006] It might also be possible to mention the document of Japanese patent JP 2003-665, in which the massaging elements are constituted by pairs of long plates set out on inclined planes with respect to the revolving shaft, so that they move while changing the degree of information with respect to the length of the part to be massaged. Furthermore, between the long plates an intermediate element is planned which is constituted by a base, one end of which is fixed to a spring and also leans on a cam provided on the revolving shaft. All of this is intended to produce a rising-falling movement in the base, and as a result of the user's leg, as it is located between the long plates and lies on the base of the intermediate massage element, so the position of the leg is modified with respect to the long plates when the user's leg is raised or dropped by the effect of the movement of the base.

[0007] In this case, the intermediate massage element used has the drawback that from a horizontal position, the rising movement causes a lateral variation in the massage area, but not on the rear part of the leg, and fails to achieve the desired effect, for the movement made has an effect substantially different from that caused by a masseur, which is a drawback.

DESCRIPTION OF THE INVENTION

[0008] This invention is intended to overcome the drawbacks of the mechanisms of the state of the technique, by means of a mechanism which, while conventional, includes a first pair of massage discs supported eccentrically on a first revolving shaft, separated to give massages on opposite sides of the lower part of the user's first leg, the discs of the first pair of discs being set out on first inclined planes with respect to the first revolving shaft, and the second pair of massage discs supported eccentrically on a second revolving shaft, separated to give massages on opposite sides of the lower leg of the user's second leg, the discs of the second pair of discs being set out on second inclined planes with respect to the second revolving shaft, and in which the revolving shafts are connected to an activation mechanism capable of rotating the said revolving shafts in a first direction, and in the second opposite direction to the first, the mechanism of which, according to the invention, also includes at least one clutch mechanism with at least one internal housing, which includes a first stop element and a second stop element, the vertical section passage, arched between the said stop elements, and a protrusion between the said stops, the protrusion coming up against one or the other of the stop elements depending on the turning direction of the revolving shafts; a first end part at least

of the second revolving shaft, coupled in the clutch mechanism housing; where the passage and the stop elements are laid out on a plane perpendicular to the longitudinal axis of the revolving shafts; the passage is an insert selected between an exterior insert, formed in one part of the external perimeter of the first end of the second revolving shaft and an interior insert in one part of an internal wall of the housing to which the said first end of the second revolving shaft is coupled; the protrusion is selected between an interior protrusion which emerges from the internal perimeter of the housing, and an exterior protrusion which emerges from the external perimeter of the first end of the second revolving shaft; and the stop elements and the protrusion are laid out in such a way that the protrusion comes into contact with one of the stop elements when the revolving shafts turn in the said first direction, and makes contact with the opposite stop element when the revolving shafts are turning in the said second direction.

[0009] The discs of each pair of discs are revolving, so they are fixed to the shaft, or may also be fixed to the shaft by means of an eccentric and connected to a fixed point to prevent their turning.

[0010] This layout of elements means that, depending on the rotation direction of the revolving shafts, the discs of the first pair of massage discs of the first revolving shaft and the discs of the second pair of discs of the second revolving shaft are in identical positions, or in dysphase and even inverted positions. In this way, depending on the turning direction, the pairs of massage discs may perform a kneading massage on the same part of each of the user's legs or at different heights of the respective leg, in other words, in one turn of the shafts, massaging a higher part of the first leg by means of the first pair of discs and massaging the other leg at a lower part, using the second pair of discs, and performing the respective massages in inverted positions on the following turn of the revolving shafts.

[0011] In a first manufactured version of the invention, the clutch mechanism is attached to the first end of the first revolving shaft, whereas in a second version of the invention, the clutch mechanism allows the first end of the first revolving shaft in the arched section passage to turn. In both versions, the clutch mechanism may be set out between the first revolving shaft, and the first end of the second revolving shaft, the first end of the second revolving shaft then being coupled in the housing. Alternatively, the activating mechanism may be connected to a second end of one of the revolving shafts. However, in the first version, that is, when the clutch is attached to the first end of the first revolving shaft, the first end of the first revolving shaft is coupled permanently to the clutch mechanism, and the first end of the second revolving shaft is coupled in the housing. The arched vertical section passage may extend in an arc of between 40 and 270°, particularly between 160 and 200°, preferably between 170 and 190° and more preferably of approximately 180°.

[0012] The clutch mechanism may include a clutch housing that has an internal cavity with an intermediate cavity connected to a first cylindrical lateral passage, a second cylindrical lateral passage, and an access passage to the intermediate cavity between the cylindrical lateral passages; a first bushing housed revolvingly in the first lateral passage, and a second bushing housed revolvingly in the second lateral passage, each bushing emerging into the intermediate cavity at one of their ends. In this case, the first end of the first revolving shaft is coupled to the first bushing and the first end of the second revolving shaft is coupled to the second bushing, whereas the internal housing for the first end of the second revolving shaft is formed inside the second bushing.

[0013] Likewise, the ends of the bushings which emerge into the intermediate cavity may both have gearing means which mesh with complementary actuation means, such as a helicoidal actuation shaft, which enters through the access passage into the intermediate cavity of the clutch housing, or a gearwheel, which meshes with the gearing means of each bushing.

[0014] When the first end of the first shaft can turn inside the clutch mechanism, it may include an additional internal housing, which has a first additional stop element and a second additional stop element, an additional arched vertical section passage between the additional stop elements, and an additional protrusion between the additional stops. This additional protrusion comes into contact with one or the other of the additional stop elements depending on the turning direction of the revolving shafts, so that the first end of the first[1] revolving shaft is coupled in the additional housing of the clutch mechanism. In this case, the additional passage and the additional stop elements are also set out on a plane perpendicular to the longitudinal axis of the revolving shafts, the additional passage being an entering element selected between an additional exterior entering element formed on a first end of the external perimeter of the first revolving shaft and an additional interior entering element in an internal wall of the additional housing in which the first end of the first revolving shaft is coupled. In this setup, the additional stop elements and the additional protrusion are set out in such a way that the additional protrusion comes into contact with one of the additional stop elements when the revolving shafts turn in the first action, and comes into contact with the other additional stop element when the revolving shafts turn in the second opposite direction. In turn, the additional protrusion may be an additional interior protrusion which emerges from the internal perimeter of the additional housing, or an additional external protrusion which emerges from the external perimeter of the first end of the first shaft. In this case, the additional internal housing for the first end of the first revolving shaft may be formed inside the first revolving bushing. The arched vertical section passage and the arched vertical section additional passage may together have an arc extension of between 40 and 270°, particularly between 160 and 200°, preferably between 170 and

190°, and more preferably 180°.

[0015] In other versions of the invention, the inclusion is planned of an intermediate massage element located between the discs of each pair of discs to achieve a more complete massage.

[0016] Therefore, in the invention, the intermediate massage element is expected to include at least one body not perpendicular to the revolving shaft during the massage process and which is activated by making a transversal movement on the rear part of the surface to be massaged.

[0017] This setup has the great advantage that the massage surface of the intermediate massage element provides a transversal movement similar to that provided by a masseur of the type known as "kneading", unlike the intermediate massage element described in the document of Japanese patent JP 2003-665, in which the said intermediate massage element causes a rising-falling movement on the leg so that the massaged surface is varied by the long plates and so that the said intermediate massage element causes gentle "tapping" on the lower part of the leg which has nothing to do with the "kneading" massage provided by the current invention.

[0018] In another version of the invention, the intermediate massage element includes a body lying on the revolving shaft, with a massage surface longitudinal with respect to the rear part of the surface to be massaged, on which the transversal movement roughly defines an "eight".

[0019] In this version of the invention, the intermediate massage element is connected to a fixed point by means of at least a first elastic element, to avoid the said intermediate massage element turning when activated, keeping the massage surface in contact with the surface to be massaged.

[0020] In another version of the invention, the intermediate massage element is supported on one of the discs of a pair of discs instead of on the revolving shaft, as occurred in the previous version.

[0021] The intermediate massage element may be constituted by a lateral extension connected to one of the discs of the pair of discs, or, on the other hand, the latter extension may be supported on one of the discs of the pair of discs by means of a shaft which allows it to turn.

[0022] In these last two cases, the discs of each pair of discs are connected to a fixed point, by means of at least a second elastic element to prevent it from turning with the angular movement of the revolving shaft, and to keep the massage surface of the intermediate massage element in contact with the part to be massaged.

[0023] If the intermediate massage element is supported on one of the discs, the invention plans for the said intermediate massage element to include a body with a massage surface that is stretched and longitudinal with respect to the surface to be massaged, and of the type described when the intermediate massage element is supported on the revolving shaft. There is also the possibility that the intermediate massage element might include a long body inclined towards the revolving shaft, with a massage surface corresponding to one of its ends.

[0024] In cases where the lateral extensions, which constitute the intermediate massage element, are fixed to the disc by means of a shaft that allows them to turn, this connection is expected to be made by means of a third elastic element to keep the massage surface in contact with the part to be massaged.

[0025] In addition, the long inclined body directed towards the revolving shaft stops at a pivot connected to one of discs. This stop is planned to use the third elastic element to keep the long body in contact with the said stop.

[0026] In the invention, it is planned that each of the discs which constitute the pair of discs should include a lateral extension connected to the said discs, so that these extensions might be identical or different depending on the different types of extensions described before.

[0027] If the intermediate massage element includes a long element inclined towards the revolving shaft, the movement made by the long body is approximately circular.

[0028] The massage surface of the intermediate massage element is at least semi cylindrical in all the previous versions.

[0029] Another possible version of the invention provides for the intermediate massage element to be determined by a plate, which includes means of vibration to apply a vibrating movement and give a massage of such characteristics to the user's leg.

[0030] In this case, the plate is fixed to the chassis of the mechanism or on one or both discs of each pair of discs.

[0031] In the preferential version of the invention, the plate is fixed to the chassis and one of its ends, leaving the other end free to facilitate the vibration.

[0032] The means of vibration include a motor with two opposite shafts provided with a counterweight at the ends, also the motor lying in a housing fixed to the lower side of the plate, so that when it is activated, the motor causes the vibration thereto.

[0033] Furthermore, the invention includes means for regulating the separation between the discs of the pairs of discs, means which allow the axial movement of at least one of the said discs of each pair of discs on the revolving shaft. These means are preferably constituted by a fourth elastic element, which keeps at least one of the discs of each pair of discs pressed against a stop, so that at least one of the discs of each pair of discs moves to overcome the action of the fourth elastic element, when a massage surface is located with larger dimensions than the separation planned between the discs of each pair of discs.

BRIEF DESCRIPTION OF THE FIGURES

[0034] There follows a description of some aspects and versions of the invention on the basis of some draw-

ings, in which

figure 1 is a front raised schematic view of the first version of the mechanism of this invention in a first massage position, which is achieved when the revolving shafts turn anticlockwise;
figure 2 is a front raised schematic view of the mechanism shown in figure 2, in a second massage position, which is achieved when the revolving shafts turn clockwise;
figure 3 is a cross section schematic view of the first version of a clutch mechanism that may be included in the massage mechanism shown in figures 1 and 2, when the revolving shafts turn as shown in figure 1;
figure 4 is a cross-section schematic view, along line I-I' shown in figure 3;
figure 5 is a cross-section schematic view, along line II-II' shown in figure 3;
figure 6 is a cross-section schematic view, corresponding to figure 5, but where the revolving shafts have begun to turn clockwise to the position corresponding to figure 2;
figure 7 is a cross-section view, which shows the clutch mechanism of figures 3 to 6 when the revolving shafts have reached the position of the massage mechanism illustrated in figure 2;
figure 8 is a cross-section schematic view, along line III-III' shown in figure 7;
figure 9 is a cross-section schematic view of a second version of a clutch mechanism which can be included in the massage mechanism shown in figures 1 and 2, when the revolving shafts turn has shown in figure 1;
figure 10 is a cross-section schematic view along line IV-IV shown in figure 9;
figure 11 is a cross-section schematic view along line V-V shown in figure 9;
figure 12 is a cross-section schematic view corresponding to figure 11, but where the revolving shafts have begun to turn clockwise to the position corresponding to figure 2;
figure 13 is a cross-section view, which shows the clutch mechanism of figures 7 to 12 when the revolving shafts have reached the position of the massage mechanism illustrated in figure 2;
figure 14 is a cross-section schematic view along line VI-VI' shown in figure 13;
Figure 15 is a front raised schematic view of the second version of the mechanism of this invention in a first massage position, which is achieved when the revolving shafts turn clockwise;
figure 16 is a front raised schematic view of the mechanism shown in figure 2, in a second massage position, which is achieved when the revolving shafts turn anticlockwise;
figure 17 is a cross-section schematic view of a version of a clutch mechanism which can be included in the massage mechanism shown in figures 15 and 16, when the revolving shafts turn as shown in figure 15;
figure 18 is an upper plane schematic view of the complementary means of actuation shown in figure 17;
figure 19 is a front schematic view of the second bushing shown in figure 17, from line VII-VII';
figure 20 is a cross-section schematic view of the second bushing along line VIII-VIII' shown in figure 19;
figure 21 is a cross-section schematic view of another version of a clutch mechanism that can be included in the massage mechanism shown in figures 15 and 16, when the revolving shafts turn as shown in figure 15;
figure 22 is a front schematic view of the second bushing shown in figure 21, from line IX-IX';
figure 23 is a front schematic view of the first bushing shown in figure 21, from line X-X';
figure 24 is a view in perspective of a possible example version of the device of the invention, in which between each of the discs of the pair of discs, different versions are included of an intermediate massage element;
figure 25 is a lower perspective view of the previous figure;
figure 26 is a view of figure 24, but with the difference that the intermediate massage element is located in another different operating position;
figures 27 to 30 represent different operating positions of two different types of intermediate massage elements located as lateral extensions of both discs of each pair of discs;
figure 31 is a view in perspective of another example version in which the intermediate massage element is constituted by a plate provided with means of vibration;
figure 32 is a lower view of figure 31;
figure 33 shows a view in perspective of the version of the motor, which constitutes the means of vibration of the plate constituting the intermediate massage element;
figure 34 is a partial view of an example version in which means have been provided to allow the separation between the discs of each pair of discs to be adjusted.

[0035] These figures have numbers, and/or letters which identify the following elements:

A	first revolving shaft
A-1	first end of the first revolving shaft A
A-2	second end of the first revolving shaft A
B	second revolving shaft
B-1	first end of the second revolving shaft B
B-2	second end of the second revolving shaft B
1a, 1b	discs of the first pair of discs
2a, 2b	discs of the second pair of discs

3a	lower part of the user's first leg
3b	lower part of the user's second leg
4	actuation mechanism
5	clutch mechanism
5a	clutch housing
5b	internal cavity
5c	intermediate cavity
5d	first cylindrical lateral passage
5e	second cylindrical lateral passage
5f	access passage to the intermediate cavity
6	internal housing
6a	first stop element
6b	second stop element
6c	passage between the stop elements
6d	protrusion
7	first bushing
7a	gearing means in the first bushing
7b	first bushing tab
8	second bushing
8a	gearing means of the second bushing
8b	second bushing tab
9	complementary means of actuation
9a	drive shaft
10	additional internal housing
10a	first additional stop element
10b	second additional stop element
10c	additional passage between the additional stop elements
10d	additional protrusion
11	exterior bushing
12	chassis
13	stop
14	eccentric
15	intermediate massage element
16	cylindrical surface
17	second spring
18	first body
19	cylindrical long body
20	shaft
21	second body
22	semi cylindrical long body
23	third spring
24	first spring
25	pivot
26	fourth spring
27	plate
28	motor
29	motor shafts
30	housing
31	counterweights
32	Bolts

FORMS OF MAKING THE INVENTION

[0036] Figures 1 and 2 show a first version of the massage mechanism according to the present invention, which includes a first pair of massage discs 1a, 1b, which on revolving discs and connected permanently and eccentrically to a first revolving shaft A, separated to massage opposite sides of the lower part of the user's first leg 3a, and a second pair of massage discs 2a, 2b, which are also revolving discs and are connected permanently and eccentrically to a second revolving shaft B, separated to massage opposite sides of the lower part of the user's second leg 3b. The revolving discs 1a, 1b of the first pair of discs are set out in first rotation inclined planes with respect to the first revolving shaft A, whereas the revolving discs 2a, 2b of the second pair of discs are set out in second rotation inclined planes with respect to the second revolving shaft B.

[0037] Revolving shafts A, B are connected by their respective first ends A-1, B-1 to a clutch mechanism which connects the said shafts A, B together. The first shaft A is connected by its second end A-2 to a bearing, whereas the second end B-2 of the second shaft is connected conventionally to a conventional actuation mechanism 4, such as an electric motor with reducer unit, capable of giving rotating shafts A, B an anticlockwise rotation (fig. 1) and a clockwise rotation (fig.2).

[0038] The clutch mechanism connects shafts A, B so that when the shafts turn anticlockwise, as shown in figure 1, the pairs of massage discs 1a, 1b; 2a, 2b are aligned on their respective shafts A, B in identical inclined positions, so that they simultaneously press and release the same part of the user's legs 3a, 3b, whereas, when shafts A, B turn clockwise (fig. 2), the clutch mechanism causes a dysphase in the first shaft A with regard to its turning approximately 180° with regard to the second shaft B. When this dysphase occurs, the second rotating discs 2a, 2b take up positions in which their inclinations with respect to the second revolving shaft B are exactly opposite to the inclinations of the first massage discs 1a, 1b so that when the first massage discs 1a, 1b press a first part and release another part of the user's first leg 3a, the second massage discs 2a, 2b release the corresponding first part of the second leg 3b and press the corresponding second part of this second leg 3b.

[0039] Figures 3 to 8 show a first version of a clutch mechanism 5 which can be included in the massage mechanism of figures 1 and 2. This mechanism 5 includes a body 5a with a housing 10 to which end A-1 of the first revolving shaft A is connected, and another housing 6, formed in axial alignment with housing 10, to which the second revolving shaft B is connected. Body 5a is housed in an exterior bushing 11. The internal housing 6 includes a first stop element 6a and a second stop element 6b, a vertical section passage 6c arched between stop elements 6a, 6b, and a protrusion 6d in the form of an axial nerve, which moves through the said passage 6c between stops 6a, 6b depending on the turning direction of shafts A, B. In turn, the passage 6c and the stop elements 6a, 6b are set out on a plane perpendicular to the longitudinal axis of the revolving shafts A, B. In the version shown, the passage 6c is formed by an interior insert in a part of an internal wall of housing 6 to which end B-1 of the second revolving shaft B is con-

nected and moves in the interior insert or passage 6c. The housing 10 includes an insert in which a protrusion 10d is housed, which emerges from periphery of the first end A-1 of the first shaft A, so that the first shaft A is immobilised in the body 5a of the clutch mechanism 5. Figures 3 to 5 show the layout of insert 6d in passage 6c when shafts A, B turn anticlockwise, that is, in the position corresponding to figure 1. In this situation, the protrusion 6d comes up against the first stop element 6a when shafts A, B turn, and the respective massage discs 1a, 1b; 2a, 2b lie in the position shown in figure 1. As can be seen in figure 6, when the shafts A, B change direction, the protrusion 6d moves clockwise through the passage 6c until it reaches the position shown in figures 7 and 8, coming up against the second stop element 6b so that the above-mentioned dysphase of approximately 180° occurs between the shafts A, B and the massage discs 2a, 2b connected to the second shaft take up the position shown in figure 2.

[0040] The version of the clutch mechanism 5 shown in figures 9 to 14 is different from the version in figures 3 to 8 in that step 6c is an exterior insert formed on the external perimeter of end B-1 of the second revolving shaft B and protrusion 6d is an interior protrusion that emerges from the internal perimeter of housing 6, and the first shaft A is immobilised in body 5a of the clutch mechanism 5 by means of a protrusion that emerges from the interior wall of housing 10 which fits in a complementary insert in the first end A-1 of the first shaft A. In the position of massage discs 1a, 1b; 2a, 2b shown in figure 1, that is when the revolving shafts A, B turn anticlockwise, the protrusion 6d stops against the first stop element 6a as shown in figures 9 to 11. When the turning direction of shafts A, B changes, the protrusion 6d is no longer in contact with the stop element 6a at the first end A-1 of the revolving shaft A, passing through the position shown in figure 12 to the position shown in figures 13 and 14, in which the second stop element 6b comes into contact with the protrusion 6d, and the dysphase of approximately 180° occurs between the revolving shafts A, B so the massage discs 2a, 2b change their position as shown in figure 2.

[0041] In the version of the massage mechanism shown in figures 15 and 16, the actuation mechanism 4 is in contact with clutch mechanism 5, and in the remainder the operation of this mechanism is similar to that of the version of the mechanism in figures 1 and 2.

[0042] Figures 17 to 20 show a version of clutch mechanism 5 that can be included in the massage mechanism in figures 15 and 16. In this version, the clutch mechanism 5 includes a clutch body 5a with an internal cavity 5b which includes an intermediate cavity 5c which is connected to a first cylindrical lateral passage 5d, with a second cylindrical lateral passage 5e, and with an access passage 5f to the intermediate cavity 5c. The access passage 5f is between the said cylindrical lateral passages 5d, 5e. In the first lateral passage 5d a first bushing 7 is housed revolving, in which the first end A-1 of the first revolving shaft A is inserted. In the second lateral passage 5e a second bushing 8 is housed revolving, in which the first end B-1 of the second revolving shaft B is housed. Bushings 7, 8 enter intermediate cavity 5c through one of the ends. These ends are both provided with peripheral tabs 7b, 8b and gearings 7a, 8a which mesh with a gearwheel 9 connected by means of a drive shaft 9a to the actuation mechanism 4 which might be, for instance, an electric motor unit with reducer if it is conventional. The shaft 9a enters the intermediate cavity 5c through the access passage 5f.

[0043] Inside the first bushing 7 an internal housing 10 is formed in which the first end A-1 of the revolving shaft A is immobilised by means of a protrusion 10 in the form of a radial nerve, which emerges from the said first end A-1 and fits in a complementary insert in the interior wall of housing 10.

[0044] Inside the second bushing 8 an internal housing 6 is formed of the same characteristics as those of the housing 6 in the body 5a of the clutch mechanism shown in figures 3 to 8. Therefore, the internal housing 6 includes a first stop element 6a and a second stop element 6b, a passage 6c with a vertical cross section arched some 180° between the stop elements 6a, 6b and a protrusion 6d in the form of a radial nerve between the stops 6a, 6b totally dependent on the turning direction of shafts A, B. In turn, passage 6c and the stop elements 6a, 6b are set out on a plane perpendicular to the longitudinal shaft of the revolving shafts A, B. The passage 6c is formed by an interior insert in part of an internal wall of the housing 6, whereas the protrusion 6d emerges from the external perimeter of the said first end B-1 and moves in the interior insert 6c.

[0045] The operation of the clutch mechanism shown in figures 17 to 20 is the same as that of the clutch mechanism in figures 3 to 8, except that the actuation mechanisms 4 are not directly connected to one of the revolving shafts A, B, but turn some bushings 7, 8 which in turn drag the revolving shafts A, B in their revolving movement. Therefore, when the bushings 7, 8 turn clockwise, the stop element 6b in the housing 6 comes into contact with the radial protrusion 6d which emerges from the first part B-1 of the second revolving shaft B so that this shaft B turns along with the bushing 8 in the same direction, leaving the massage discs 1a, 1b; 2a, 2b in the positions shown in figure 15. Furthermore, when the bushings 7, 8 begin to turn anticlockwise, the protrusion 6d, no longer comes up against the stop element 6b, and after approximately half a turn of bushing 8, it comes into contact with the stop element 6a so that the shaft B begins to turn in the same direction as the bushing 8. Due to the dysphase of approximately 180° which has then been caused between shafts A, B, the massage discs 2a, 2b take up the position shown in figure 16.

[0046] Figures 20 to 23 show another version of a clutch mechanism 5 which may be included in the massage mechanism in figures 15 and 16. This version is different from the version in figures 17 to 20 in that the

passage 6c stretches 90° instead of 180° in the internal wall of the housing 6 of the second bushing 8, and in which the internal housing 10 in the first bushing has the same configuration as the internal housing 6 in the second bushing 8. Therefore, the additional internal housing 10 includes a first additional stop element 10a and a second additional stop element 10b, an additional passage 10c with an arched vertical section with an extension of approximately 90° between the said additional stop elements 10a, 10b, and an additional protrusion 10d between the said additional stops 10a, 10b depending on the turning direction of the revolving shafts A, B. The additional passage 10c and the additional stop elements 10a, 10b are laid out in a plane perpendicular to the longitudinal axis of revolving shafts A, B, the additional passage 10c being an internal insert in an internal wall of the additional housing 10 in which the said first end A-1 of the first revolving shaft A is coupled, whereas the additional protrusion 10d emerges from the external perimeter of the first end A-1 of the first revolving shaft A.

[0047] When the bushings 7, 8 turn clockwise, the stop element 6b in the housing 6 comes into contact with the radial protrusion 6d which emerges from the first part B-1 of the second revolving shaft B so that this shaft B turns along with bushing 8 in the same sense. In turn, in the internal housing 10 of the first bushing 7, the protrusion 10d comes into contact with the stop 10a, so that the shaft A turns along with the bushing 7 in the same direction. In this situation, the massage discs 1a, 1b; 2a, 2b are laid out in the positions shown in figure 15.

[0048] When the bushings 7, 8 begin to turn anticlockwise, in the first bushing 7 the protrusion 10d no longer comes up against the stop element 10a, and after approximately a quarter of a turn of bushing 7, it comes into contact with the second stop element 10b so that the shaft A begins to turn in the same direction as the bushing 7. At the same time, in the second bushing 8 the protrusion 6d no longer comes up against the stop element 6b, and also after approximately a quarter of a turn of the bushing 8, it comes into contact with the stop element 6a so that shaft B starts to turn in the same direction as the bushing 8. Due to the joint dysphase of approximately 180° which has then occurred between the shafts A, B, the massage discs 1a, 1b; 2a, 2b take up the position shown in 16.

[0049] In figures 24 to 33 the different versions are shown in which an intermediate massage element is included, as described in the following. These versions have been drawn in greater detail than the previous ones, and do not specify the clutch mechanism to make it easier to understand the intermediate massage element.

[0050] In these cases, the mechanism is supported on a chassis 12 in which it is fixed, allowing the first revolving shaft A, and the second revolving shaft B. to turn by means of a motor 4.

[0051] On the revolving shafts A, B the disc pairs 1a, 1b; 2a, 2b are mounted by means of an eccentric 14 so that they are supported on a plane inclined longitudinally towards opposite ends and are moved by changing the information with respect to the length of the leg, which is located on the discs 1a, 1b; 2a, 2b for massaging.

[0052] The different intermediate massage elements may be located indistinctly between the first discs 1a, 1b or between the second discs 2a, 2b and be the same or different.

[0053] The different massage elements have been represented in the figures depending on the different versions, but, as commented, they may be the same for each of the discs of each pair of discs.

[0054] Therefore, for example, between the second massage discs 2a, 2b there is an intermediate massage element which is also mounted by means of an eccentric 14 on the second revolving shaft B, and which equally changes the inclination with respect to the length of the leg 3b, and which is finished off at the top by means of a cylindrical surface 16 on which the user's leg 3b is supported longitudinally, so that when the revolving shaft B is activated, a transversal movement is caused on the cylindrical surface 16 with respect to the length of the leg 3b defining roughly a figure "eight", which causes a massage sensation very similar to the "kneading" provided by a masseur.

[0055] To keep the cylindrical surface 16 in contact with the lower part of the leg, the intermediate element 15 is fixed to the chassis, by means of a first elastic element constituted by the first spring 24. In this way, when the revolving shaft B turns, the intermediate massage element 15 is prevented from turning, to give the required effect.

[0056] Another of the possible versions of the invention provides for the intermediate massage element, instead of being on one of the revolving shafts A, B, being supported on one of the discs, for example on discs 1a, 1b, to which it is connected by means of a shaft 20 on which it can turn. In the example version, each of the discs 1a, 1b supports an intermediate massage element. Therefore, on one of the discs 1b, it includes a natural extension provided with a first body 18 which includes a cylindrical stretched body 19 inclined towards the first revolving shaft A.

[0057] In the other disc of the first pair of discs, a lateral extension has been provided, which includes a second body 21 with a semi cylindrical stretched body 22 inclined towards shaft A. For these cases, the discs 1a, 1b must not turn with shaft A, so they are fixed to the chassis 12 by means of two opposed second springs 17 which prevent discs 1a, 1b from turning and the first body 18 and the second body 21 remain in the required position. Moreover, these bodies 18 and 21 are also fixed by means of a third spring 23 to each of the discs 1a, 1b and these complementarily have a pivot 25 against which the bodies 18 and 21 stop, which, through the action of the third spring 23 are kept in contact with the said pivots 25, to keep them in the massage position and not allow them to turn on shaft 20. The body 18 includes a cylindrical stretched body 19 and the body 21 a semi cylindrical

stretched body 22, on which the leg to be massaged rests.

[0058] This setup determines that when revolving shaft A turns and movement is caused in discs 1a, 1b in which they modify their inclination with respect to the first revolving shaft A, sequentially approaching and moving away from each other due to their layout on the eccentric 14, the same movement is caused in bodies 19 and 22 the massage surfaces of which perform a transversal circular movement on the rear part of the leg, and in the space between the discs 1a, 1b, improving the massage effect, as shown in figures 27 to 30.

[0059] In the movement of the discs 1a, 1b, the bodies 18 and 21 must not touch each other but must remain at a safe distance between them to avoid pinching in the massaged area. In this way, the required massage is caused as described. The dimensions of the bodies 18 and 21 and the pivots 25 help to maintain this safety distance.

[0060] In another version of the invention, the intermediate massage element is constituted by a plate 27 in which the lower face includes a housing 30 on which a motor 28 has been fixed, provided with two opposed shafts 29 the end of which have been fixed with counterweights 31, so that the actuation of the motor 28 causes a vibrating movement in the plate 27, which is fixed by one of its ends with bolts 32 to the chassis 12 to enable its vibration, so that when the rear part of the leg is placed on the plate, this transmits the vibration to the leg, giving it a vibrating massage.

[0061] The invention also plans for the massaged area to be of different volumes, as, for example, the volume of the calf muscles of each user varies according to their constitution, which means that the calf muscles are placed differently with respect to the discs 1a, 1b; 2a, 2b. To resolve this problem, means are included for adjusting the separation between the massaging discs 1a, 1b; 2a, 2b, so that these means are constituted by a fourth elastic element, which might be a fourth spring 26, for example, one end of which comes up against the chassis 12 and the other end coming up against the corresponding discs, for example, disc 2b, which in turn is held by a stop 13 so that the action of the fourth spring 26 keeps the discs 2a, 2b as close together as possible. The structure means that when a more voluminous part to be massaged is placed, it presses against the discs 2a, 2b, so that disc 2a moves axially on the second revolving shaft B, overcoming the action of the spring 26 and thus at adjusting to the volume of the part to be massaged in each user. Once the massaged part is removed, the disc 2a returns to its position thanks to the fourth spring 26 meeting stop 13. This same structure may be applied in the two discs 2a and 2b simultaneously.

[0062] In the preferred version of the invention, all of the massage discs 1a, 1b; 2a, 2b are assisted by a fourth spring 26 to achieve a greater margin for adaptation to the different volumes of the parts to be massaged, so that the movement occurs overcoming the action of the fourth springs 26 of both discs 1a, 1b; 2a, 2b of each pair of discs.

Claims

1. A mechanism for massaging the lower part of a user's legs, which includes a first pair of massage discs (1a, 1b) connected eccentrically to a first revolving shaft (A), separated to massage opposite sides of the lower part of the user's leg (3a), the discs (1a, 1b) of the first pair of discs being laid out in first rotation inclined planes with respect to the first revolving shaft (A); and a second pair of massage discs (2a, 2b) connected permanently and eccentrically to a second revolving shaft (B), separated to massage opposite sides of the lower part of the user's second leg (3b), the discs (2a, 2b) of the second pair of discs being laid out on second rotation inclined planes with respect to the second revolving shaft (B); the revolving shafts (A, B) are connected to an actuation mechanism (4) capable of rotating the revolving shafts (A, B) in the first direction, and in the second direction opposite to the first; **characterised** because the mechanism also includes at least one clutch mechanism (5) with at least one internal housing (6) which includes a first stop element (6a) and a second stop element (6b), a vertical section passage (6c) arched between the said stop elements (6a, 6b), and a protrusion (6d) between the stops (6a, 6b);one first end (B-1) at least of the second revolving shaft (B) is coupled in the housing (6) of the clutch mechanism (5);the passage (6c) and the stop elements (6a, 6b) are set out on a plane perpendicular to the longitudinal axis of the revolving shafts (A, B);the passage (6c) is an insert selected between an exterior insert formed in one part of the external perimeter of the first end (B-1) of the second revolving shaft (B), and an interior insert in one part of an internal wall of the housing (6) in which the said first end (B-1) of the second revolving shaft is inserted (B); the protrusion (6d) is selected between an interior protrusion which emerges from the internal perimeter of the housing (6), and an exterior protrusion which emerges from the external perimeter of the first end (B-1) of the second revolving shaft (B);
and the stop elements (6a, 6b) and the protrusion (6d) are laid out in such a way that the protrusion (6d) comes into contact with one of the stop elements (6a, 6b) when the revolving shafts (A, B) turn in the first direction, and comes into contact with the opposite stop element (6a, 6b) when the revolving shafts (A, B) turn in the second direction.

2. A mechanism according to claim 1, **characterised** because the clutch mechanism (5) is connected to the first end (A-1) of the first revolving shaft (A).

3. A mechanism according to claim 1 or 2, **characterised** because the clutch mechanism (5) is set out between the said first revolving shaft (A) and the first end (B-1) of the said second revolving shaft (B), and the first end (B-1) of the second revolving shaft (B) is coupled in the said housing (6).

4. A mechanism according to claim 1, 2 or 3, **characterised** because the clutch mechanism (5) is set out between the said first revolving shaft (A) and the first end (B-1) of the said second revolving shaft (B), the first end (A-1) of the first revolving shaft (A) is permanently coupled to the clutch mechanism (5), and the first end (B-1) of the second revolving shaft (B) is coupled in the said housing (6).

5. A mechanism according to claim 3 or 4, **characterised** because the clutch mechanism (5) includes a clutch body (5a) which includes an internal cavity (5b) with an intermediate cavity (5c) connected with a first cylindrical lateral passage (5d), a second cylindrical lateral passage (5e) and an access passage (5f) to the intermediate cavity (5c) between the said cylindrical lateral passages (5d, 5e); a first bushing (7) revolvingly housed in the first lateral passage (5d), and a second bushing (8) revolvingly housed in the second lateral passage (5e), each bushing (7, 8) emerging from one of the ends of the intermediate cavity (5c);the first end (A-1) of the first revolving shaft (A) is coupled in the said first bushing (7) and the first end (B-1) of the second revolving shaft (b) is coupled in the said second bushing (8);the internal housing (6) for the first end (B-1) of the second revolving shaft (B) is formed inside the said second bushing (8).

6. A mechanism according to claim 5, **characterised** because the ends of the bushings (7, 8) which emerge in the intermediate cavity (5c), both present gearing means (7a, 8a) which mesh with complementary means of actuation (9) of the actuation mechanism (4).

7. A mechanism according to claim 6, **characterised** because the complementary means of actuation (9) include a helicoidal drive shaft that goes through the access passage (5f) to the intermediate cavity (5c) of the clutch body (5a).

8. A mechanism according to claim 6, **characterised** because the complementary means of actuation (9) include a gearwheel that gears with the said gearing means (7a, 8a) of each bushing (7, 8).

9. A mechanism according to any of the claims 3 to 5, **characterised** because the actuation mechanism (4) is connected to a second end (A-2, B-2) of one of the revolving shafts (A, B).

10. A mechanism according to claim 3, 5, 6, 7, 8 or 9, **characterised** because the clutch mechanism (5) includes an additional internal housing (10) which includes a first additional stop element (10a) and a second additional stop element (10b), an additional vertical section passage (10c) arched between the said additional stop elements (10a, 10b), and an additional protrusion (10d) between the said additional stops (10a, 10b) depending on the turning direction of the revolving shafts (A, B);a first end (A-1) of the first revolving shaft (A) is coupled in the additional housing (10) of the clutch mechanism (5);
the additional passage (10c) and the additional stop elements (10a, 10b) are set out on a plane perpendicular to the longitudinal axis of the revolving shafts (A, B); the additional passage (10c) is an insert selected between an additional exterior insert formed at a first end (A-1) of the external perimeter of the first revolving shaft (A) and an additional interior insert in an internal wall of the additional housing (10) to which the said first end (A-1) of the first revolving shaft (A) is connected; the additional protrusion (10d) is selected between an additional interior protrusion which emerges from the internal perimeter of the additional housing (10), and an additional exterior protrusion which emerges from the external perimeter of the first end (A-1) of the first revolving shaft (A); the additional stop elements (10a, 10b) and the additional protrusion (10d) are set out so that the additional protrusion (10d) comes into contact with one of the additional stop elements (10a, 10b) when the revolving shafts (A, B) turn in the first direction, and comes into contact with the other additional stop element (10a, 10b) when the revolving shafts (A, B) turn in the second opposed direction.

12. A mechanism according to claim 11, **characterised** because the additional internal housing (10) for the first end (A-1) of the first revolving shaft (A) is formed inside the said first revolving bushing (7).

13. A mechanism according to any of the claims 1 to 9, **characterised** because the arched vertical passage has an arc extension of between 40 and 270°.

14. A mechanism according to claim 13, **characterised** because the arched vertical section passage (6c) has an arc extension of between 160 and 200°.

15. A mechanism according to claim 14, **characterised** because the arched vertical section passage (6c) has an arc extension of between 170 and 190°.

16. A mechanism according to any of the claims 10 and 11, **characterised** because the arched vertical passage (6c) and the additional arched vertical section passage (10c) together have an arc extension of between 40 and 270°.

17. A mechanism according to claim 16, **characterised** because the arched vertical section passage (6c) and the additional arched vertical section passage (10c) together have an arc extension of between 160 and 200°.

18. A mechanism according to claim 17, **characterised** because the arched vertical section passage (6c) and the additional arched vertical section passage (10c) together have an arc extension of between 170 and 190°.

19. A mechanism according to claim 1, **characterised** because at least one of the pairs of the first pair of discs (1a, 1b) and the second pair of discs (2a, 2b), includes an intermediate massage element (15, 18, 21, 27).

20. A mechanism according to claim 19, **characterised** because the intermediate massage element includes at least one body (15, 18, 21) not perpendicular to the revolving shaft (A, B) during the massage process and is activated by performing a transversal movement on the part to be massaged.

21. A mechanism according to claim 20 **characterised** because the intermediate massage element includes a body (15) supported on a revolving shaft (A, B) with a massage surface (16) that is stretched and longitudinal with respect to the part to be massaged, on which the transversal movement roughly defines an "eight".

22. A mechanism according to claim 21 **characterised** because the intermediate massage element (15, 16) is connected to a fixed point by means of a first elastic element (24) to keep the massage surface (16) in contact with the part to be massaged.

23. A mechanism according to claim 20 **characterised** because the intermediate massage element is supported on the discs (1a, 1b; 2a, 2b) of the pairs of discs.

24. A mechanism according to claim 23 **characterised** because the intermediate massage element is selected between a lateral extension (18, 21) connected to one of the discs (1a, 1b; 2a, 2b) of the pairs of discs and a lateral extension (18 and 21) supported by means of a shaft (20) on one of the discs (1a, 1b; 2a, 2b) which allows it to turn.

25. A mechanism according to claim 24, **characterised** because the lateral extension (18, 21) of the intermediate massage element includes a stretched body (19, 22) inclined towards the revolving shaft (A, B) which is set out longitudinally with respect to the part to be massaged and the massage surface of which corresponds to one of its ends.

26. A mechanism according to claim 24 or 25, **characterised** because the lateral extension (18, 21) is connected to the disc (1a, 1b; 2a, 2b) by means of a third elastic element (23) to keep the massage surface in contact with the part to be massaged.

27. A mechanism according to claim 26, **characterised** because the stretched body (19, 22) comes up against a pivot (17) to keep the massage surface in contact with the part to be massaged.

28. A mechanism according to any of the claims 24 to 27 **characterised** because the intermediate massage element includes two lateral extensions (18, 21).

29. A mechanism according to any of the claims 23 to 28, **characterised** because the discs (1a, 1b: 2a, 2b) are connected to a fixed point by means at least one second elastic element (17) to prevent them from turning with the revolving shaft (A, B) and to keep the massage surface of the intermediate massage element (18, 21) in contact with the part to be massaged.

30. A mechanism according to claim 29 **characterised** because the intermediate massage element (18, 21) performs a roughly circular movement on the part to be massaged.

31. A mechanism according to any of the claims 19 to 30 **characterised** because the massage surface of the intermediate massage element (15, 18, 21) is at least semicylindrical.

32. A mechanism according to claim 20 **characterised** because the intermediate massage element includes a plate (27) provided with vibration means to apply a vibrating movement and a massage of the same nature.

33. A mechanism according to claim 32 **characterised** because the plate (27) is fixed subjectively to a means selected between the chassis (12) and one of the discs (1a, 1b; 2a, 2b) of each pair of discs.

34. A mechanism according to claim 33 **characterised** because the plate (27) is fixed to the chassis (12) by one of its ends, leaving the other end free to facilitate the vibration.

35. A mechanism according to claim 32 **characterised** because the vibration means includes a motor (28) with two opposed shafts (29) provided at the ends with a counterweight (31) wich is housed in a housing (30) fixed to the lower face of the plate.

36. A mechanism according to claim 1 **characterised** because it includes means (26, 13) for adjusting the separation between the discs (1a, 1b; 2a, 2b) which allow the axial movement on the revolving shaft (A, B) of at least one of the said discs (1a, 1b; 2a, 2b) of each pair of discs.

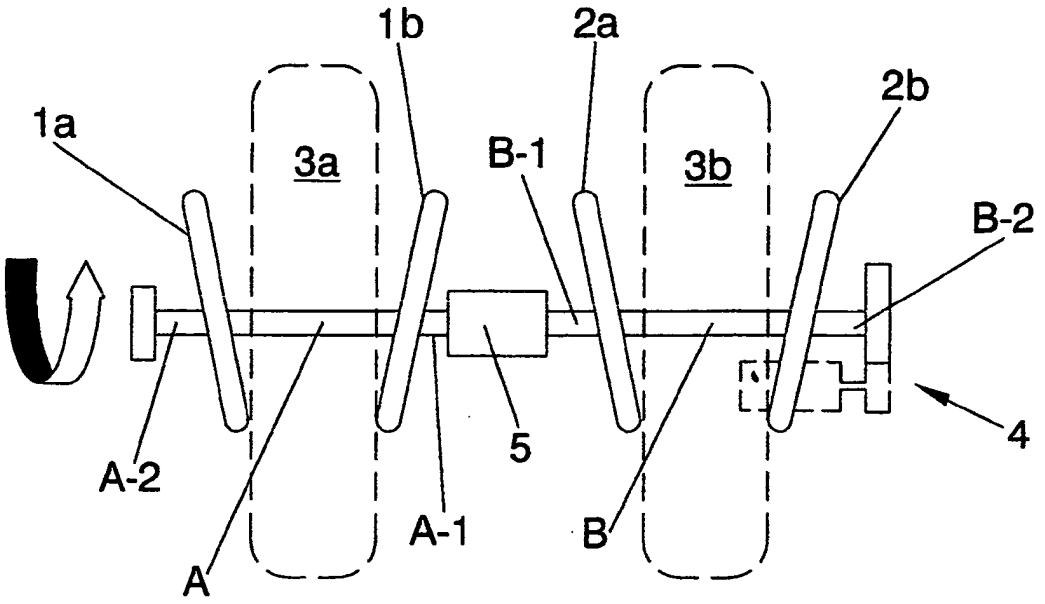

FIG. 1

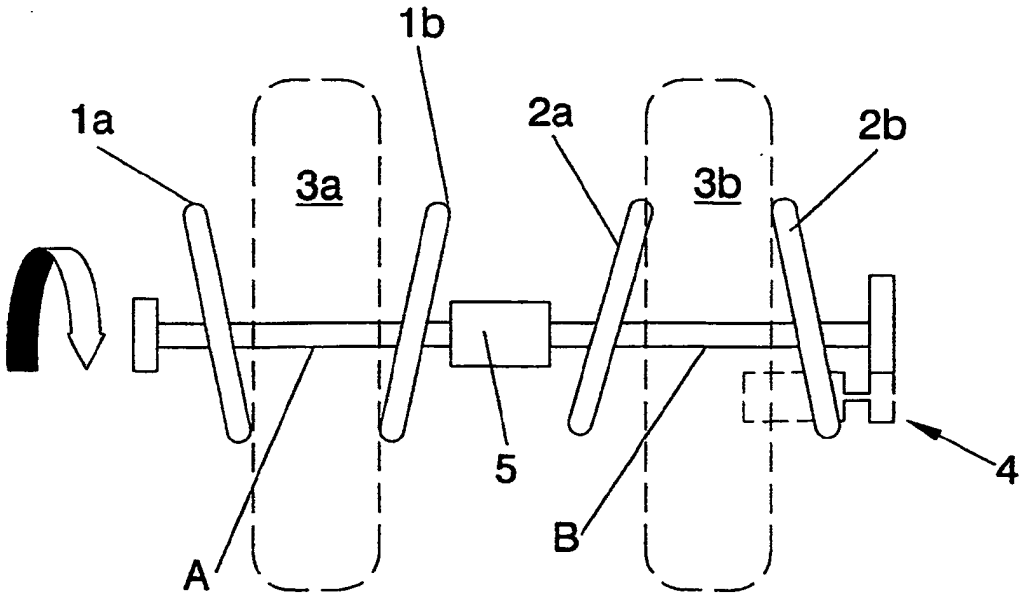

FIG. 2

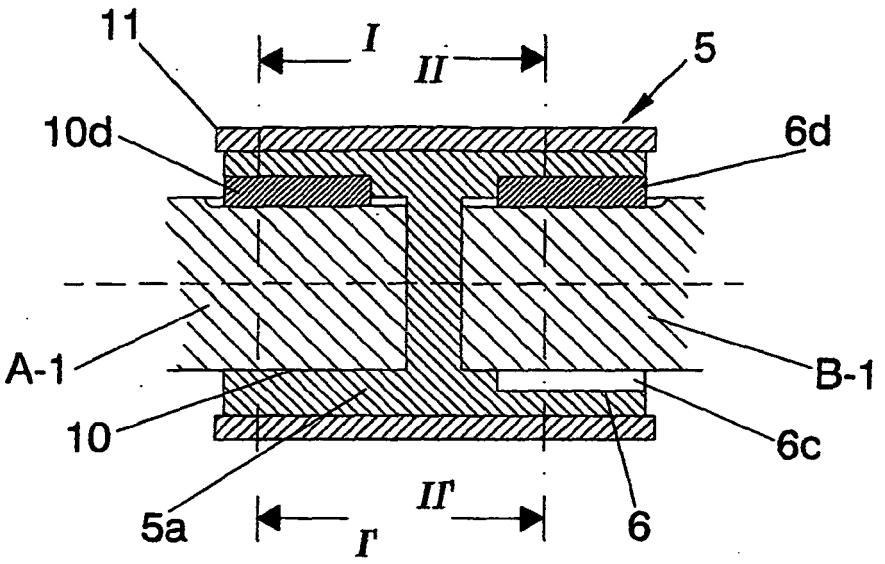

FIG. 3

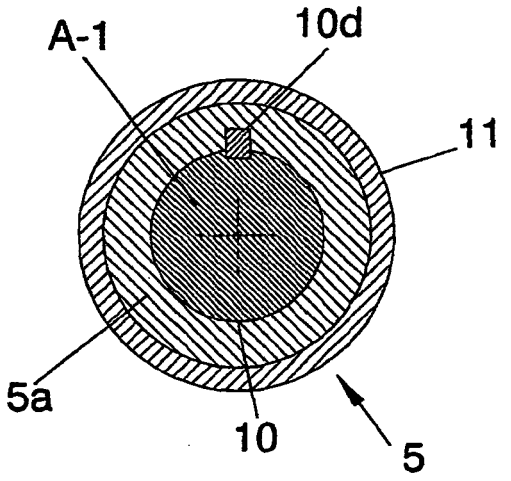

FIG. 4
(I-I')

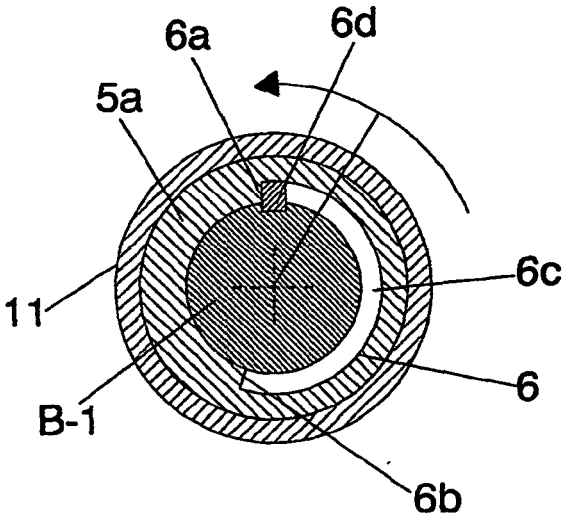

FIG. 5
(II-II')

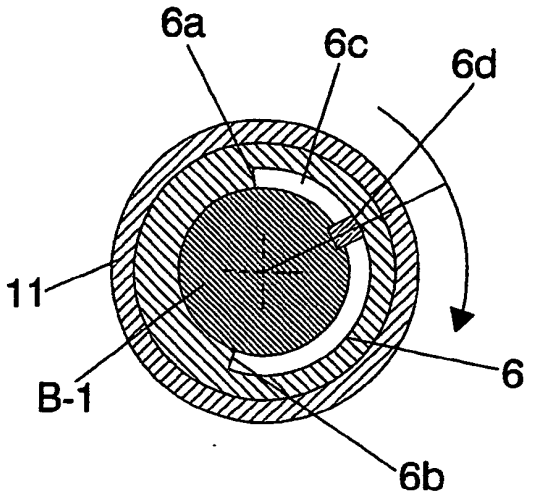

FIG. 6

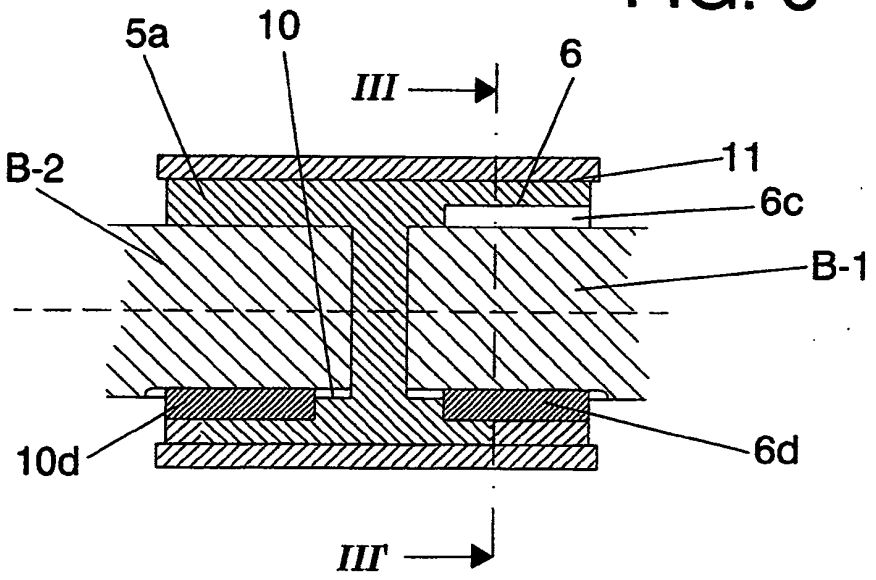

FIG. 7

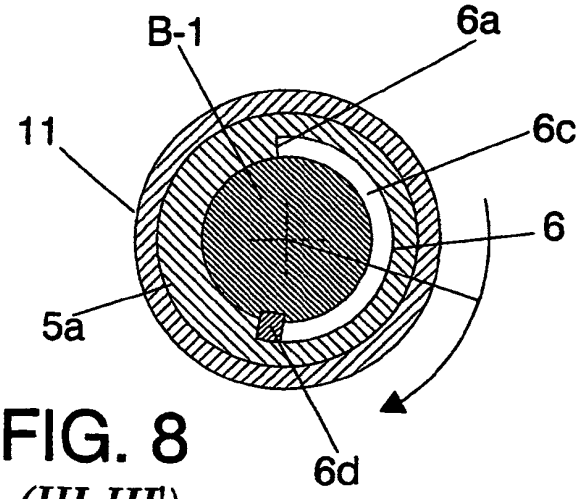

FIG. 8
(III-III')

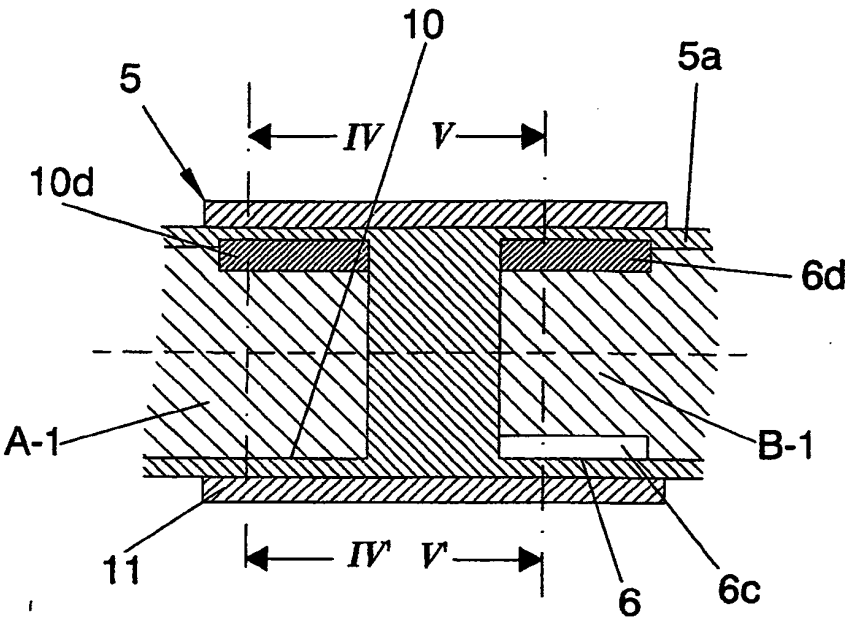

FIG. 9

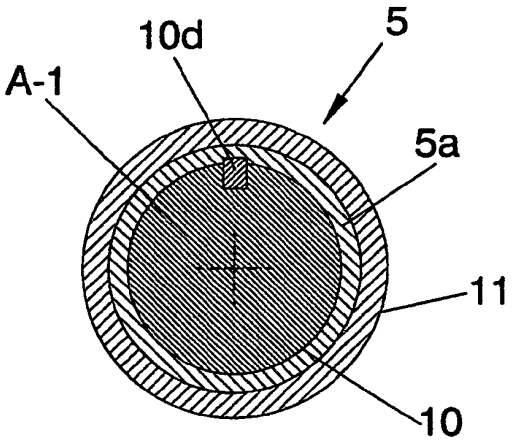

FIG. 10
(IV-IV')

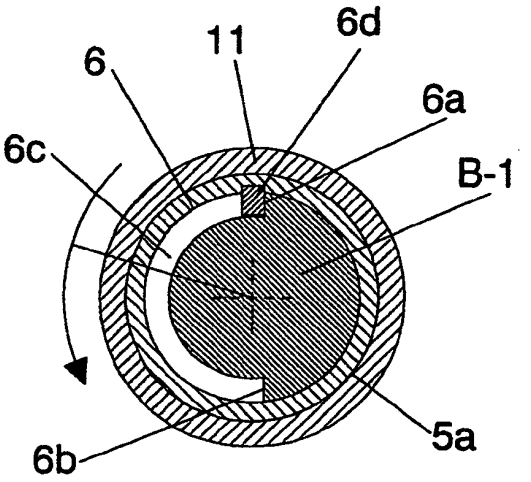

FIG. 11
(V-V')

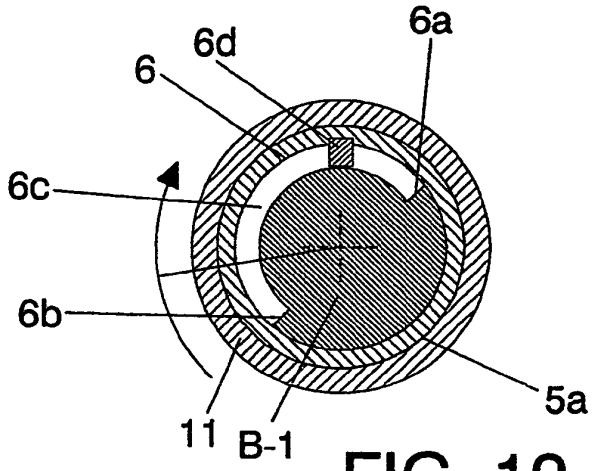

FIG. 12

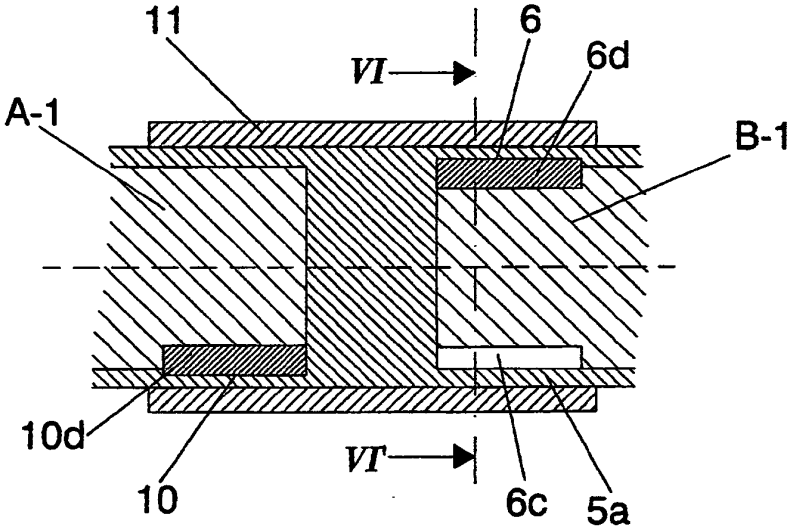

FIG. 13

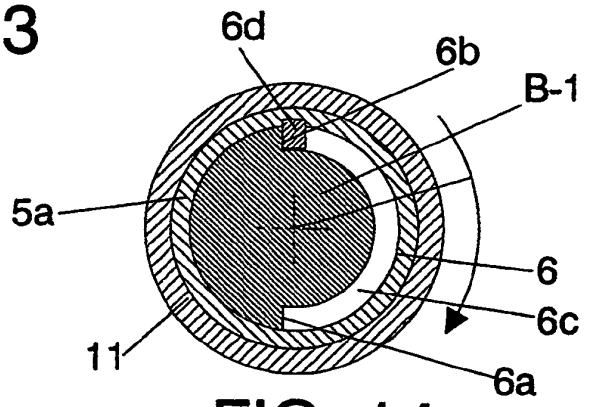

FIG. 14
(VI-VI)

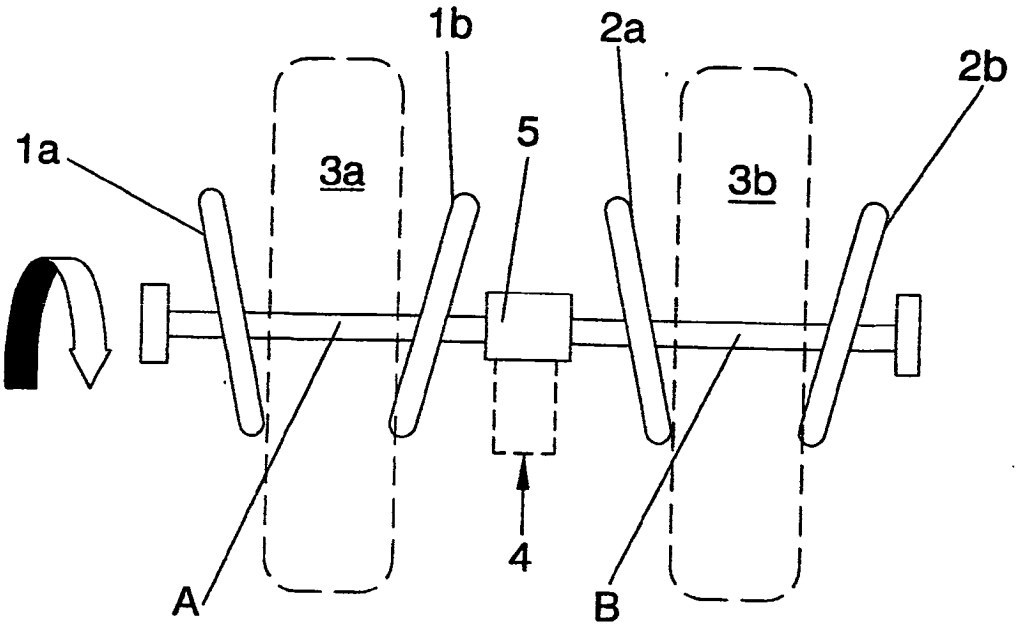

FIG. 15

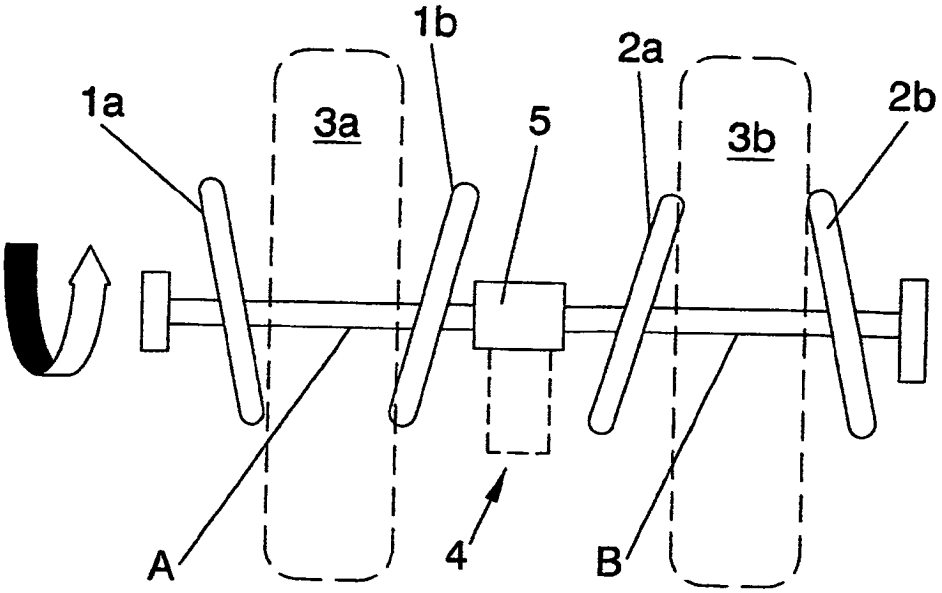

FIG. 16

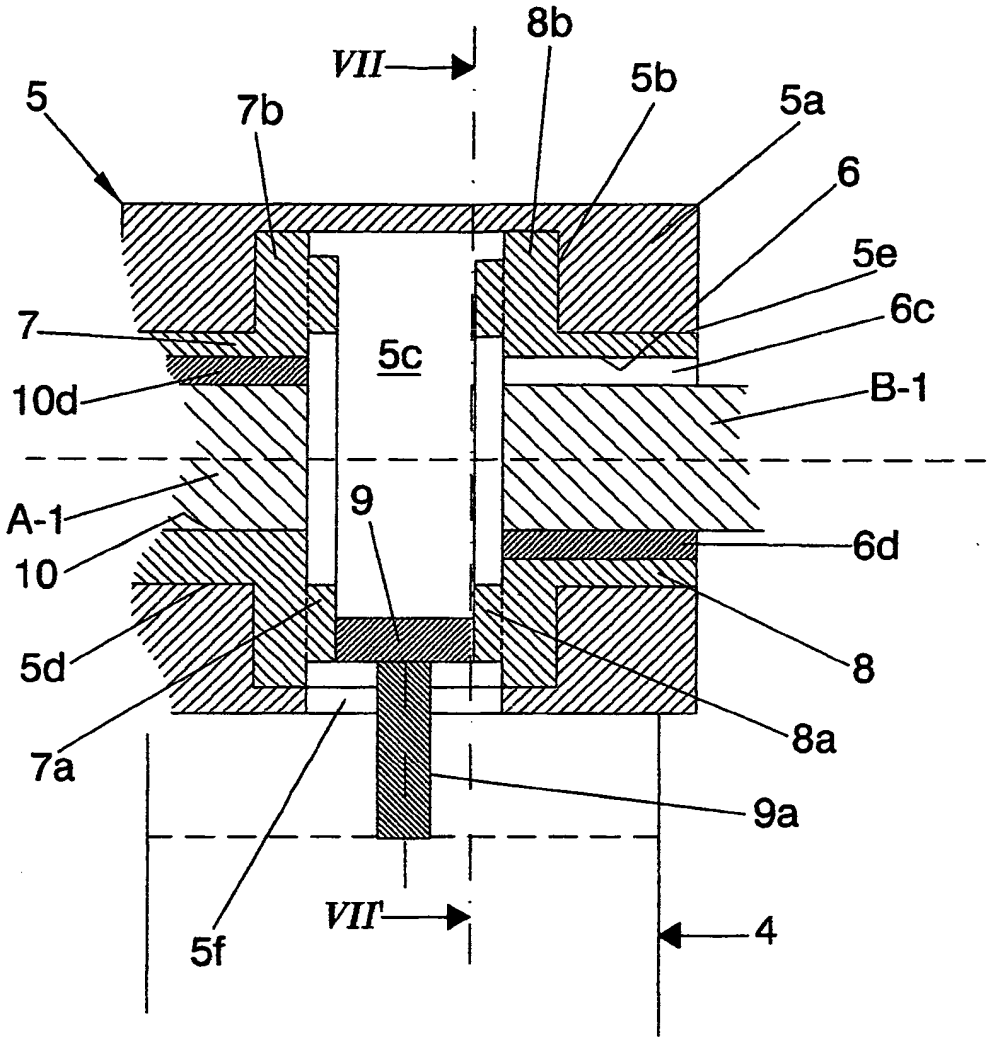
8b
VII
5b
5a
5
7b
6
5e
6c
7
5c
10d
B-1
A-1
9
6d
10
8
5d
8a
7a
9a
VII'
4
5f

FIG. 17

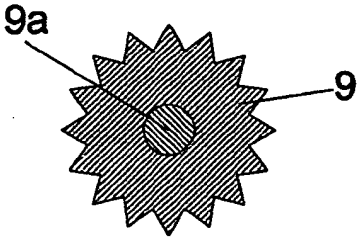
9a
9

FIG. 18

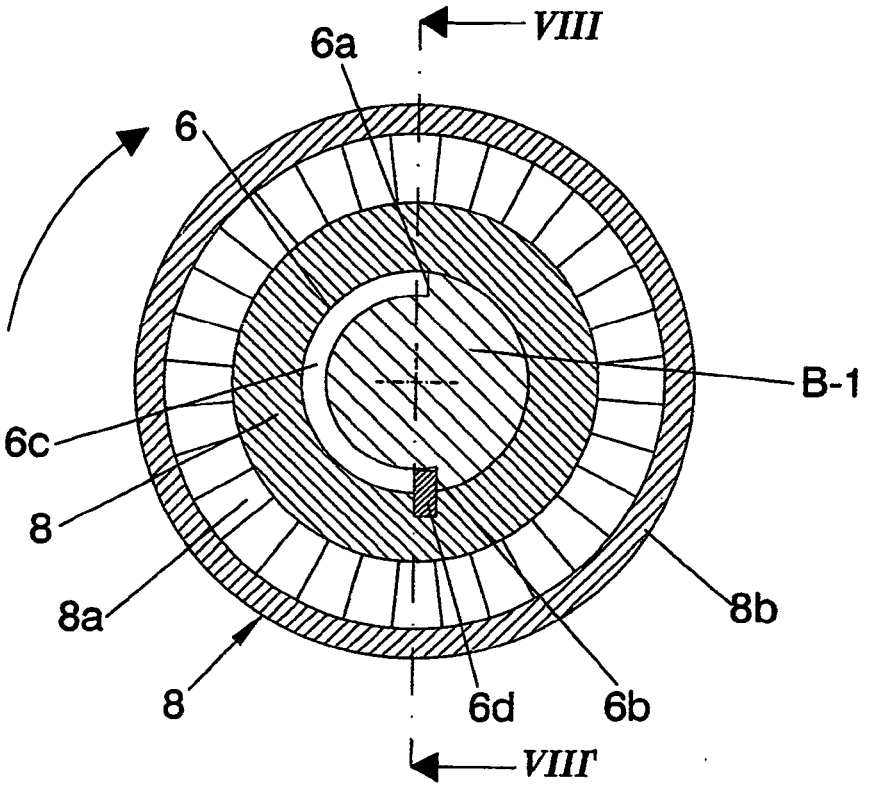

FIG. 19
(VII-VII')

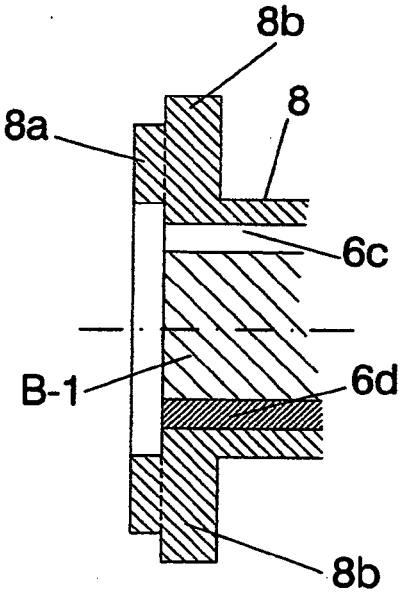

FIG. 20
(VIII-VIII')

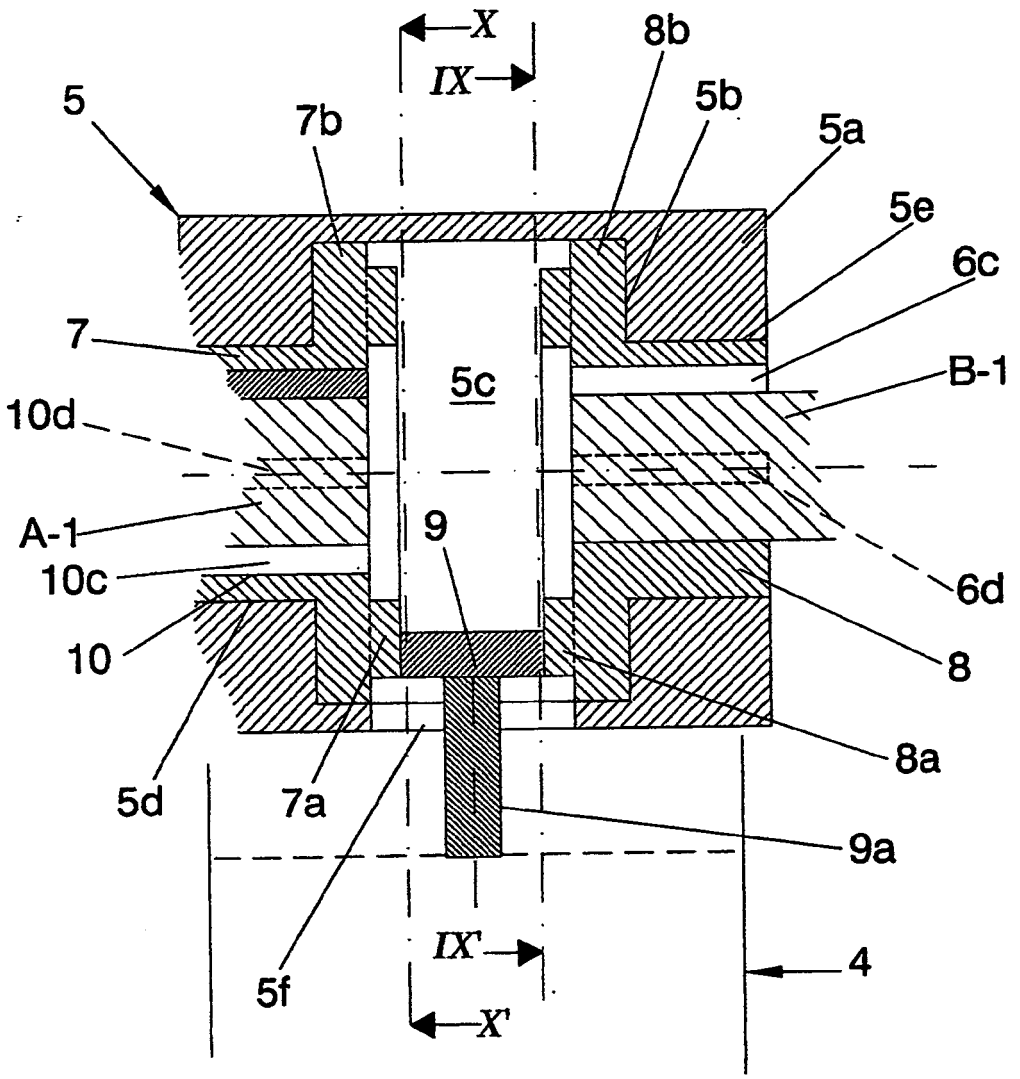

FIG. 21

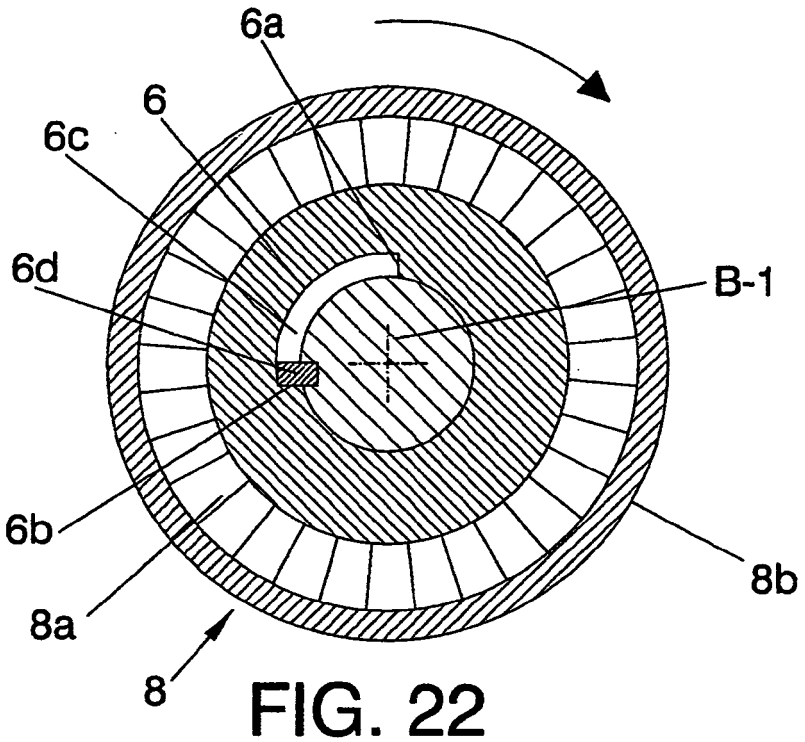

FIG. 22

(IX-IX')

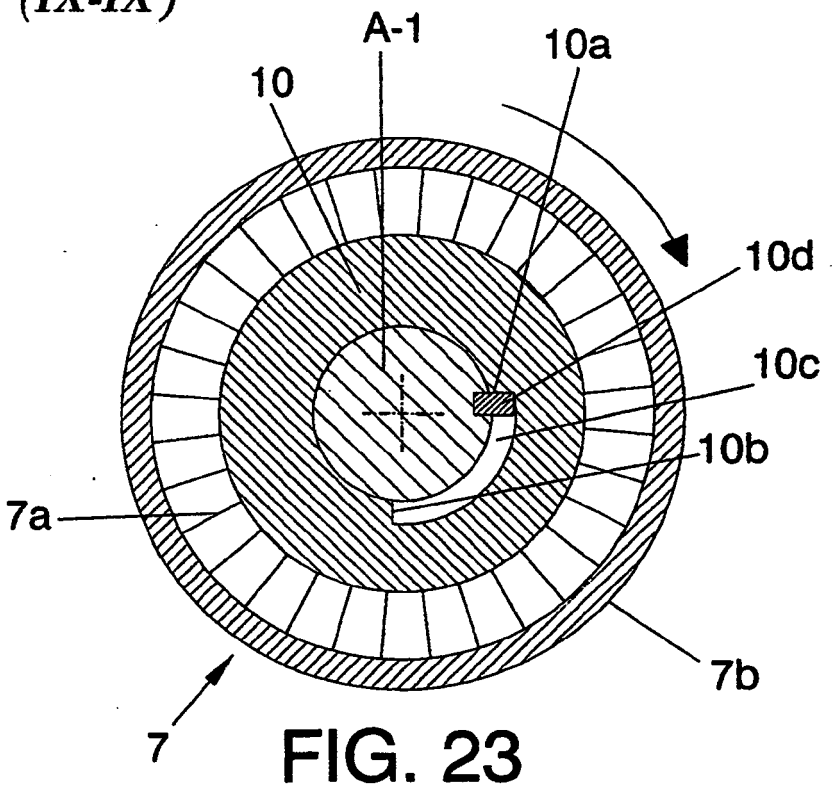

FIG. 23

(X-X')

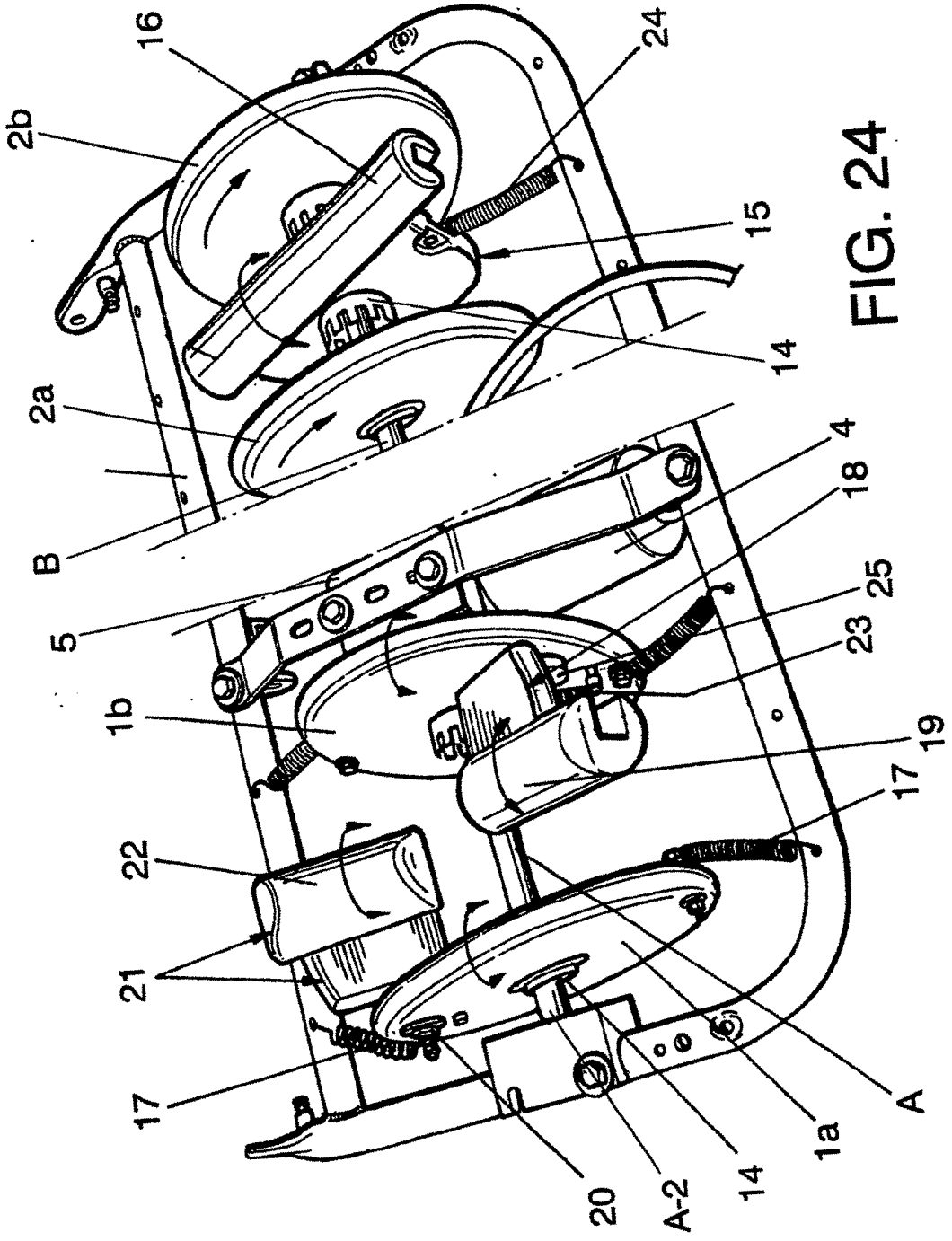

FIG. 24

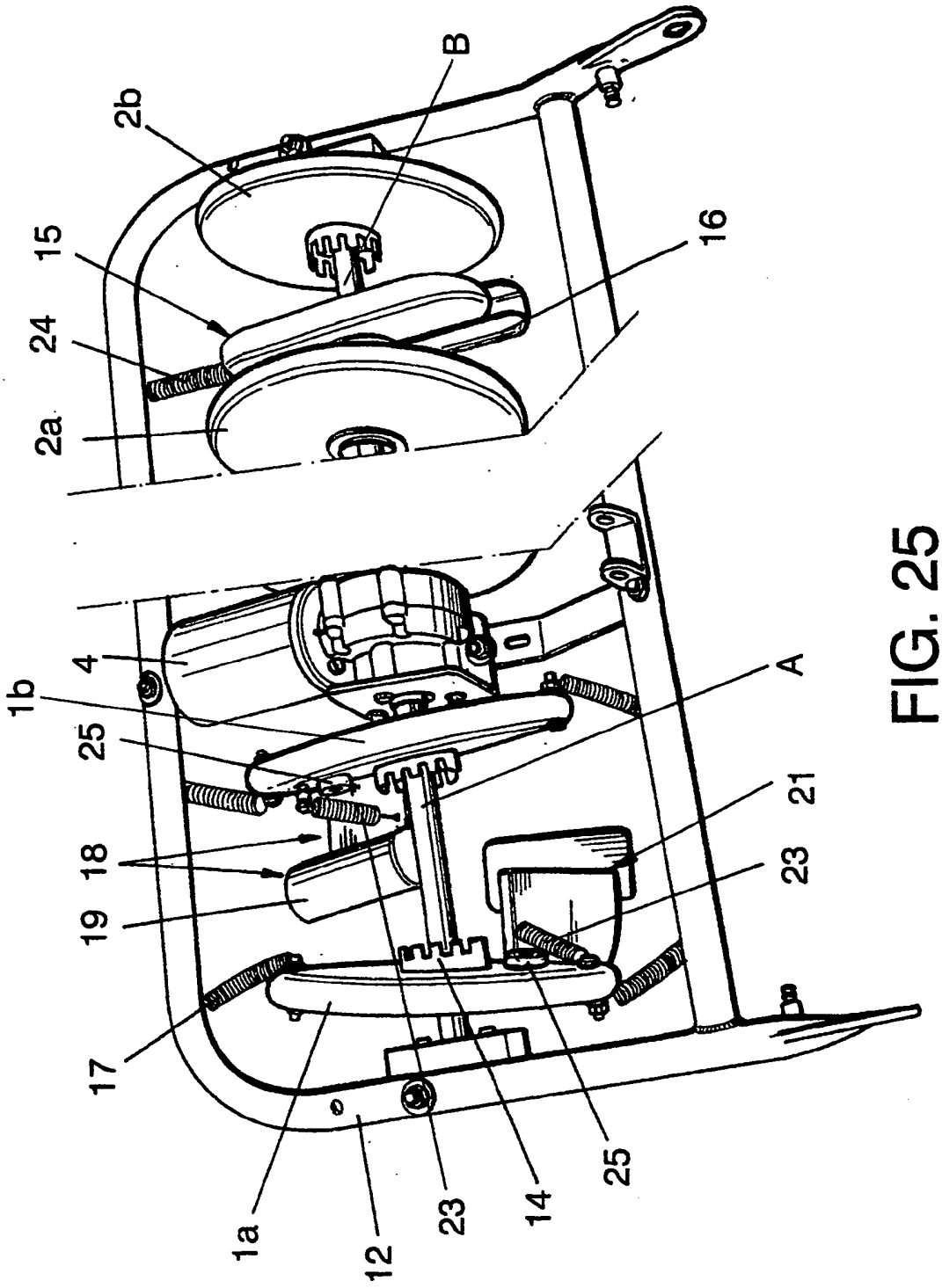

FIG. 25

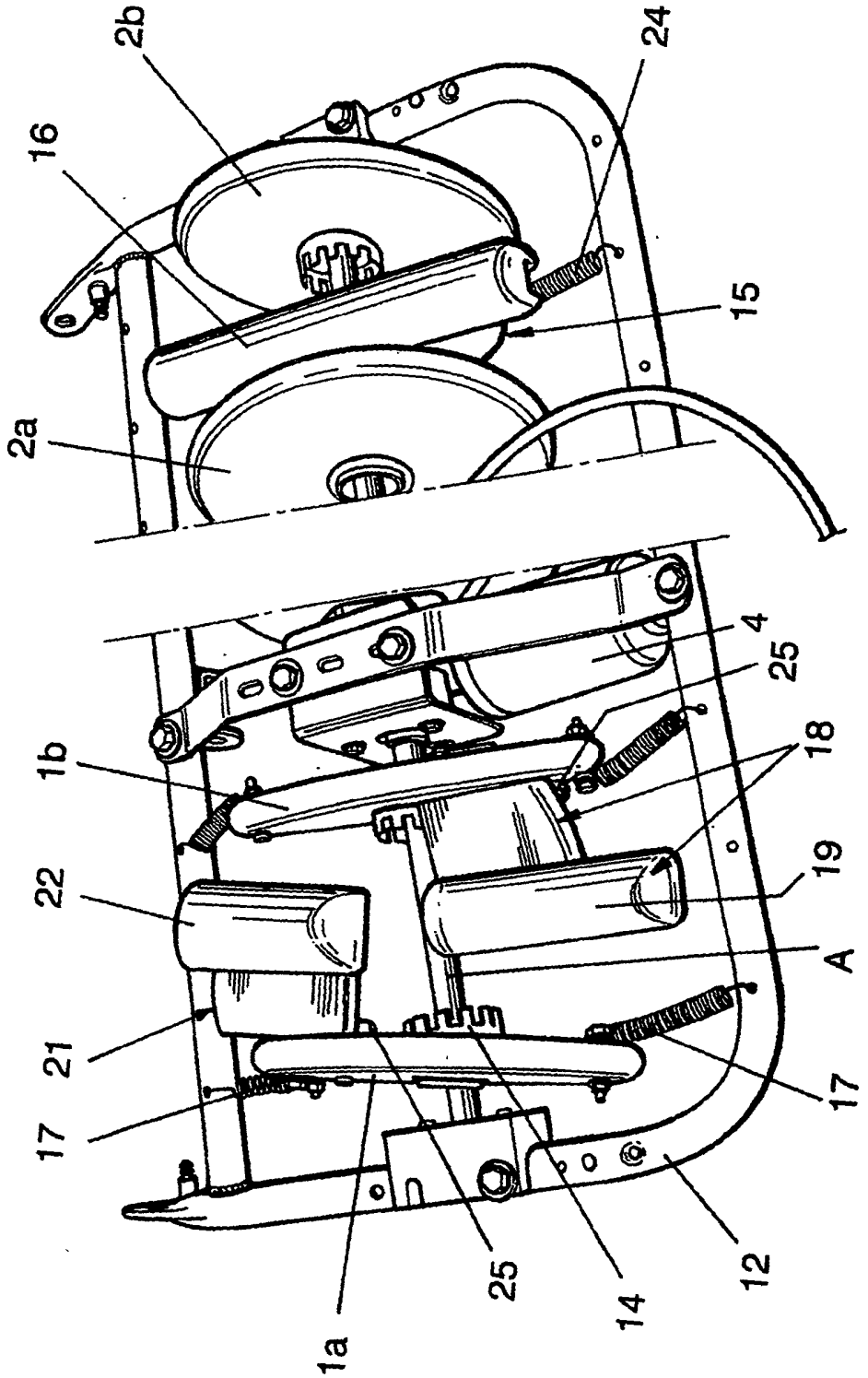

FIG. 26

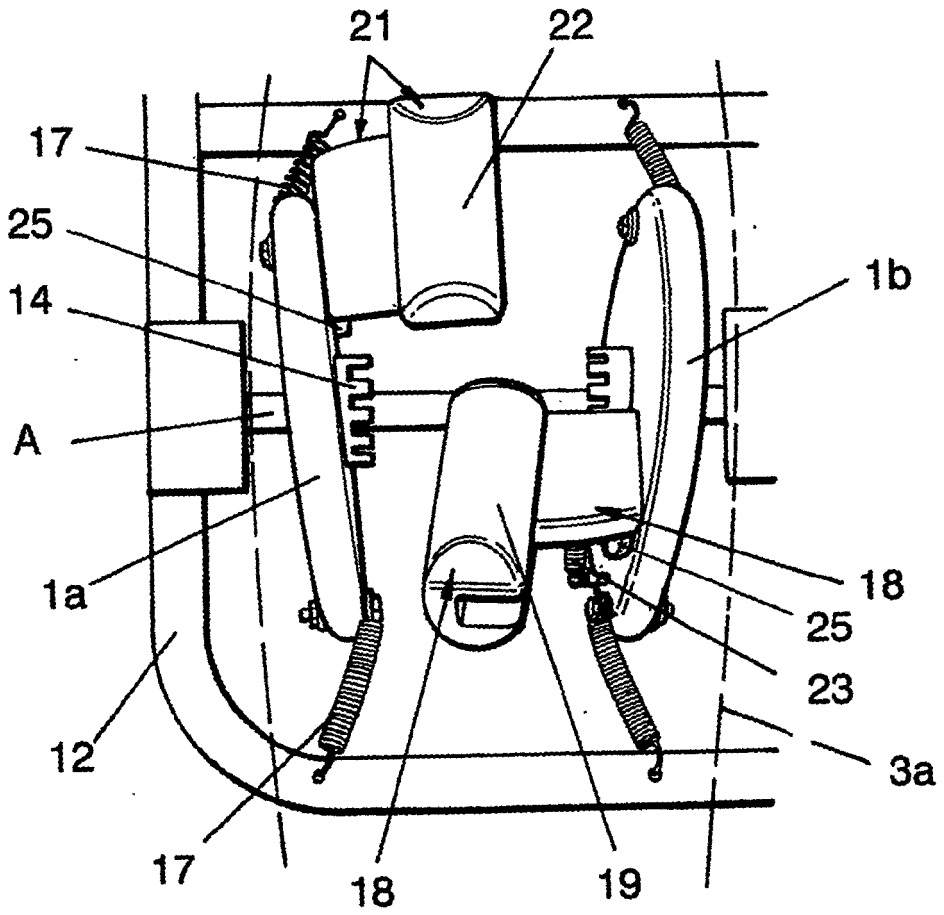

FIG. 27

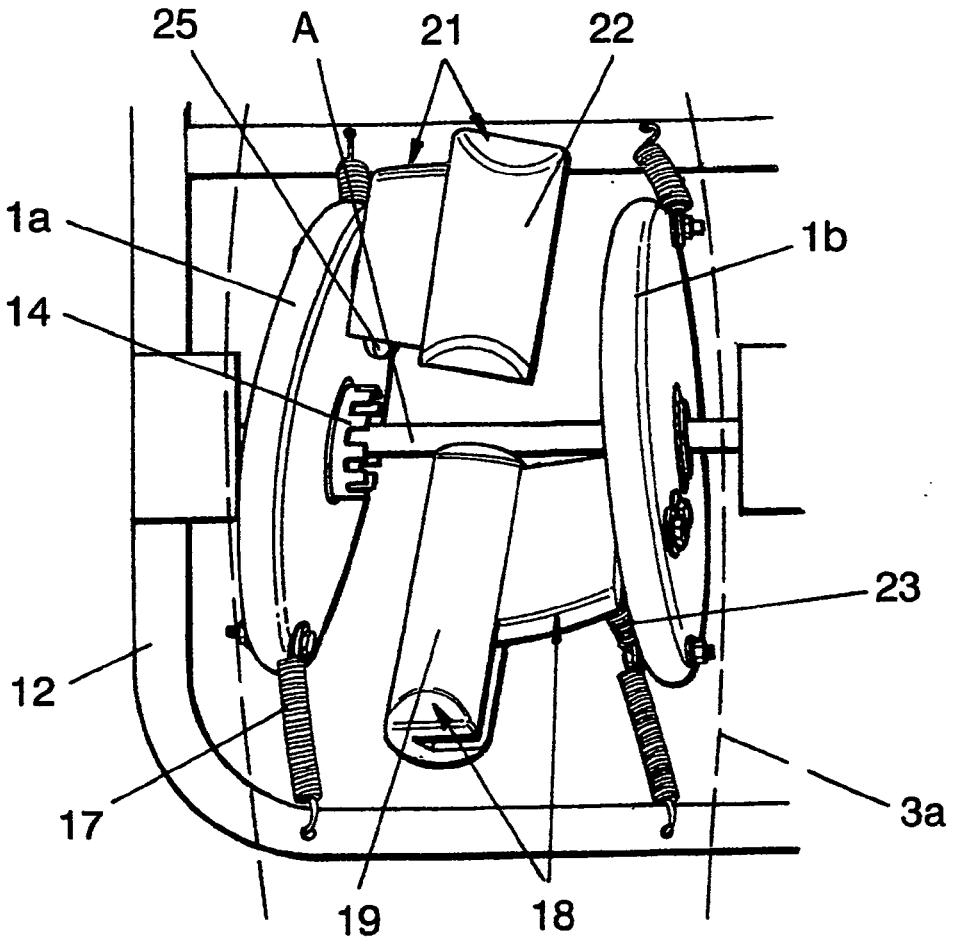

FIG. 28

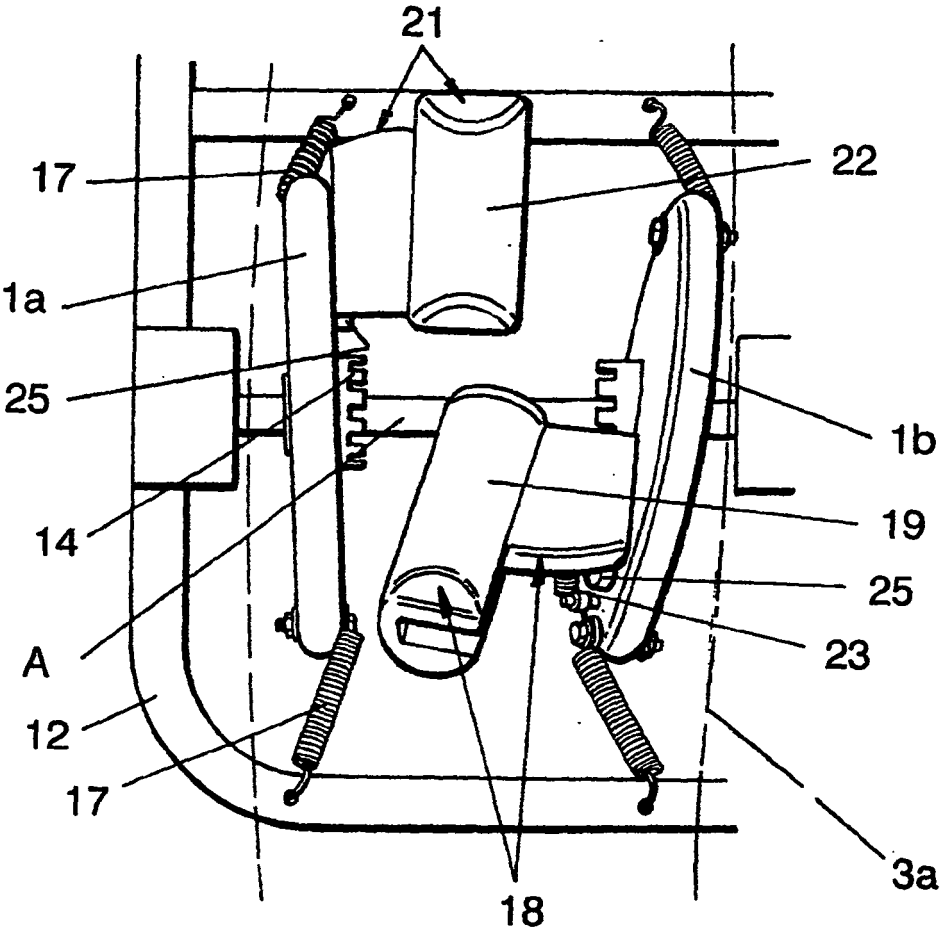

FIG. 29

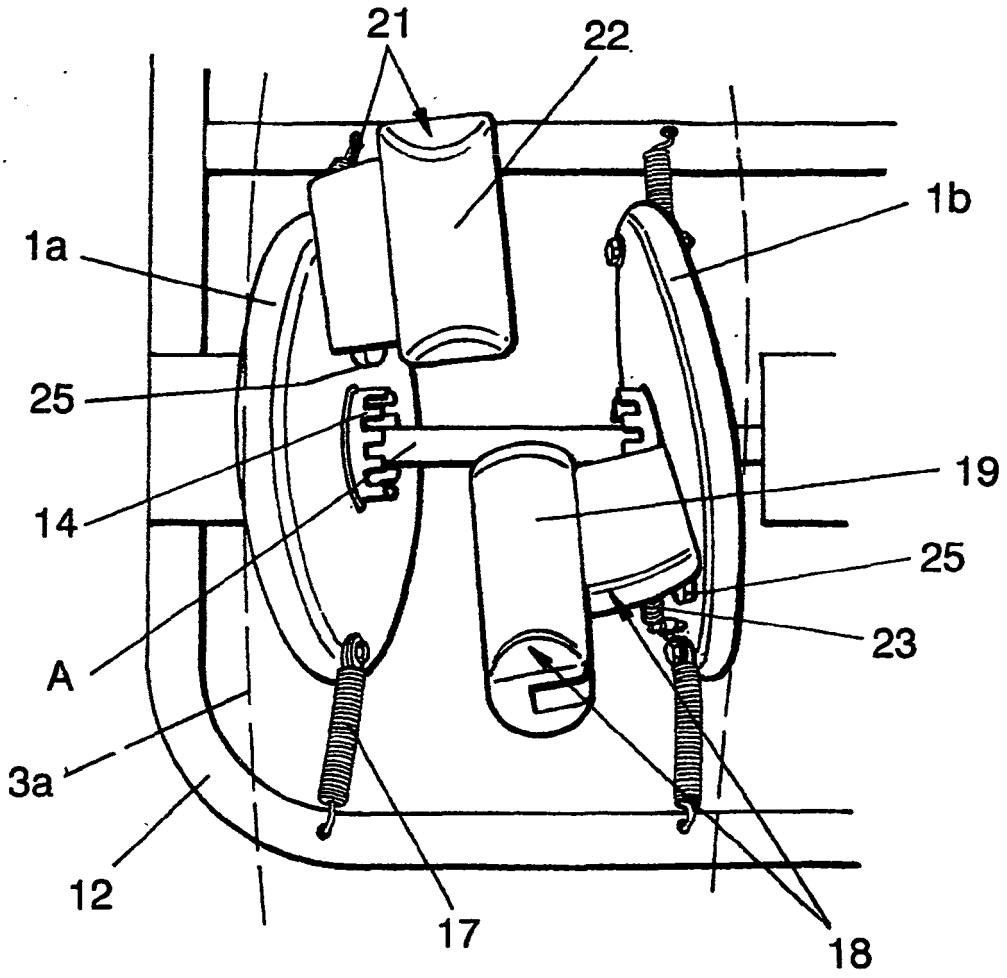

FIG. 30

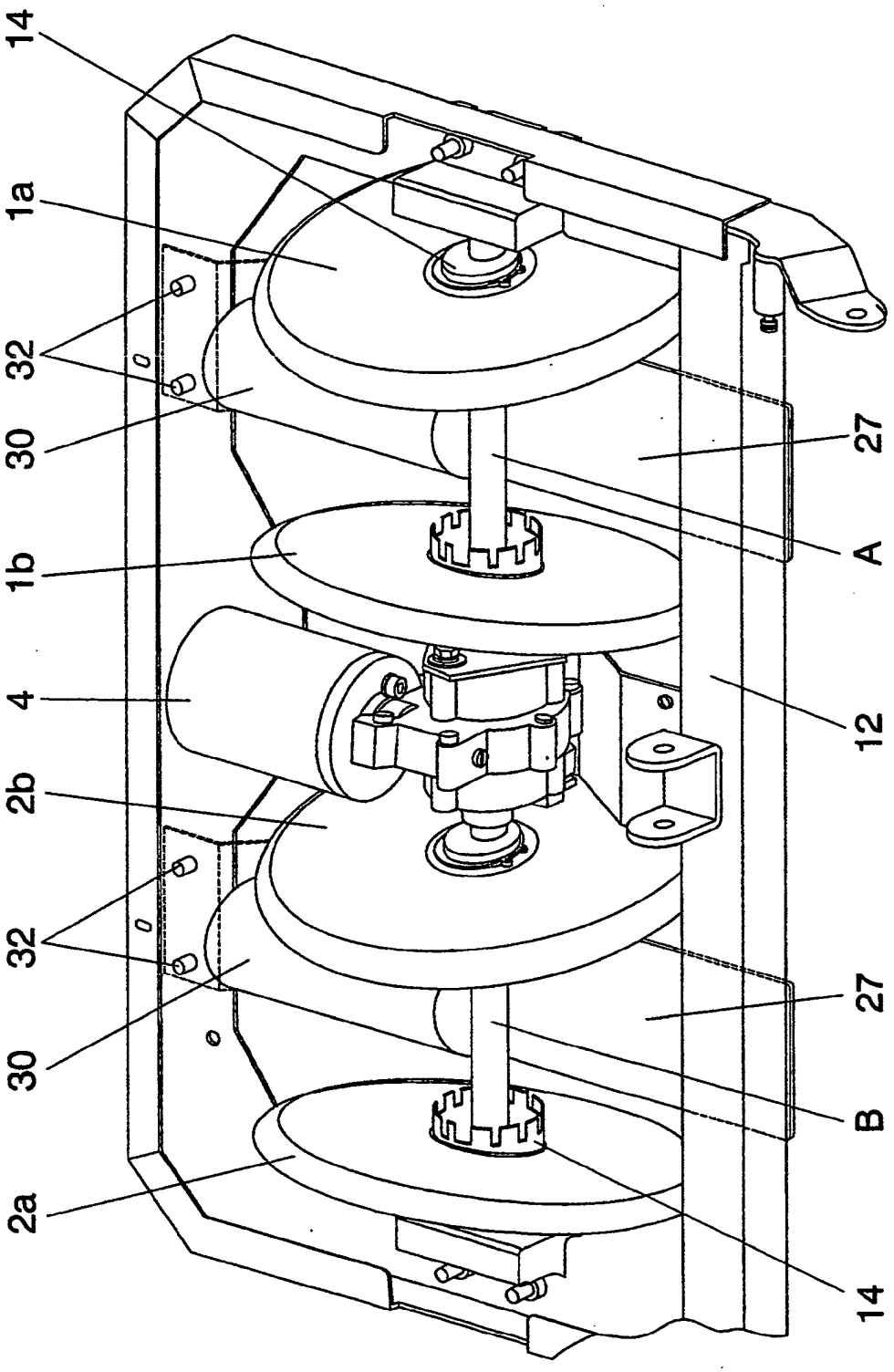

FIG. 31

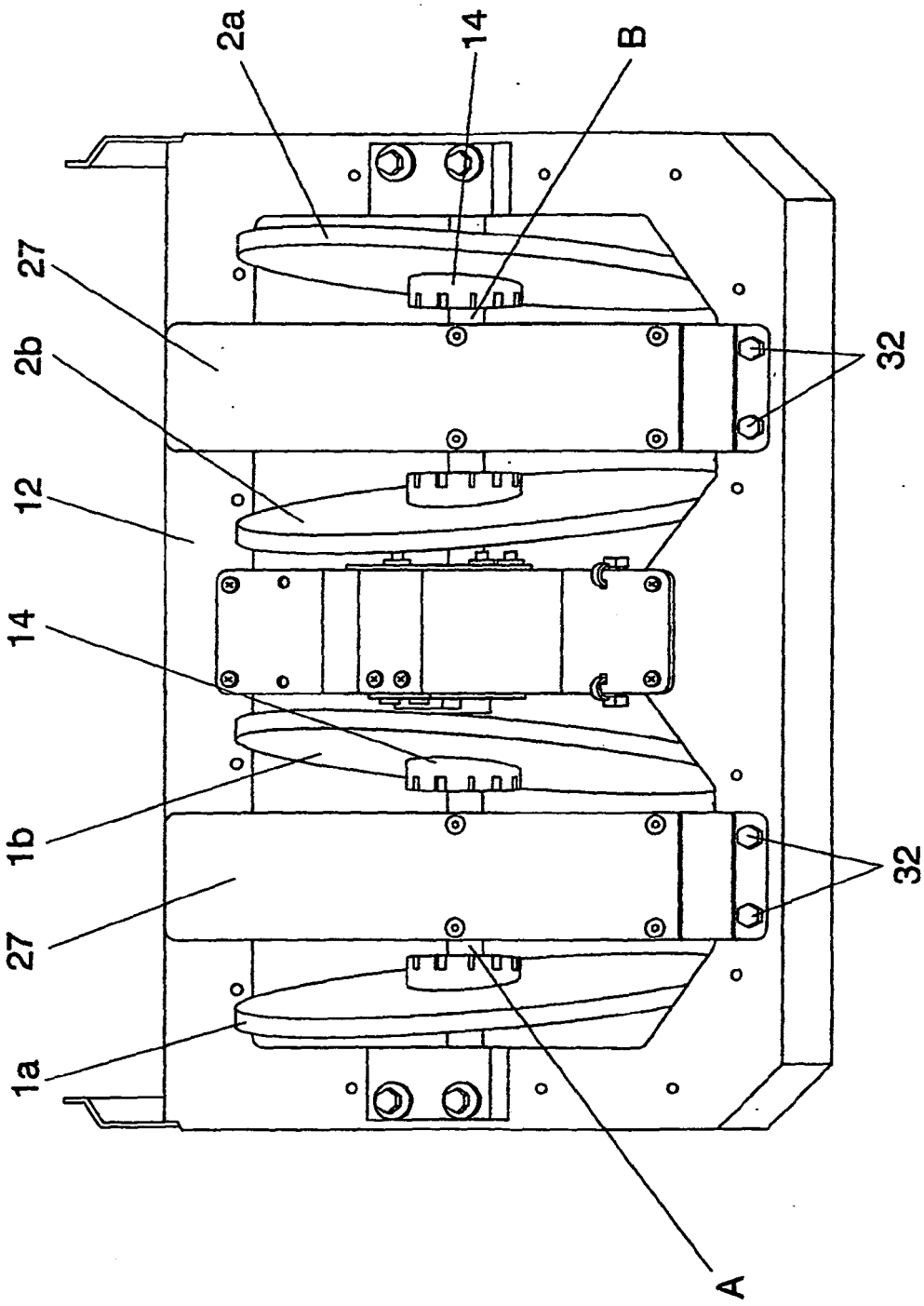

FIG. 32

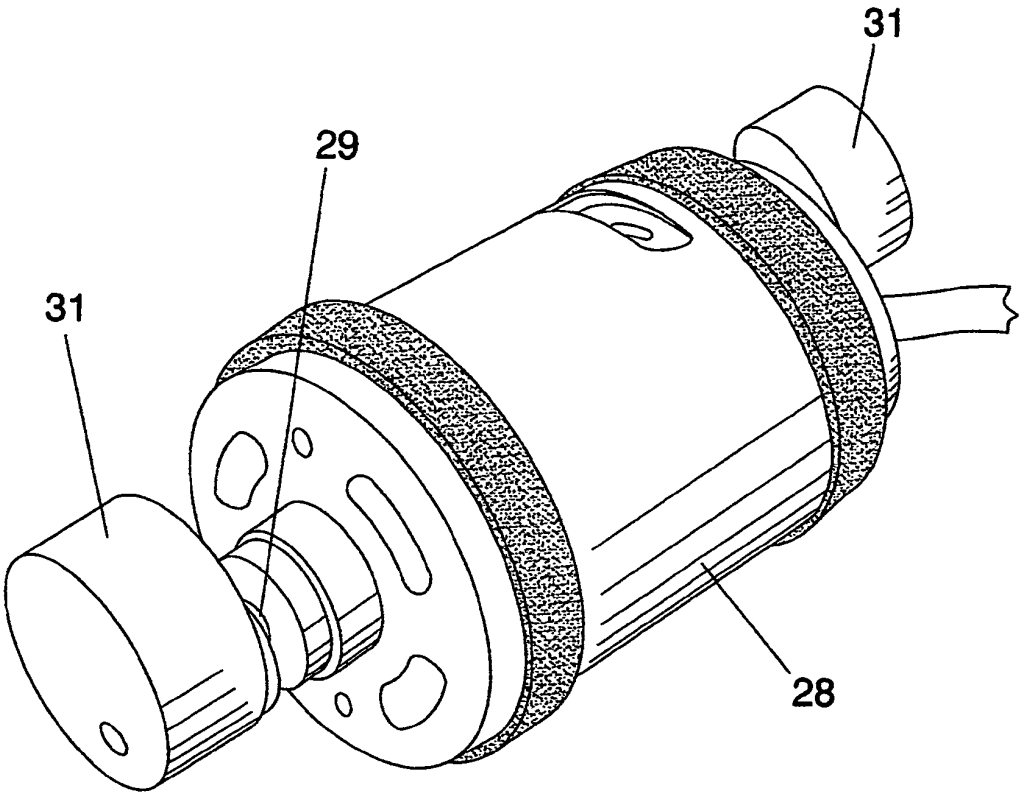

FIG. 33

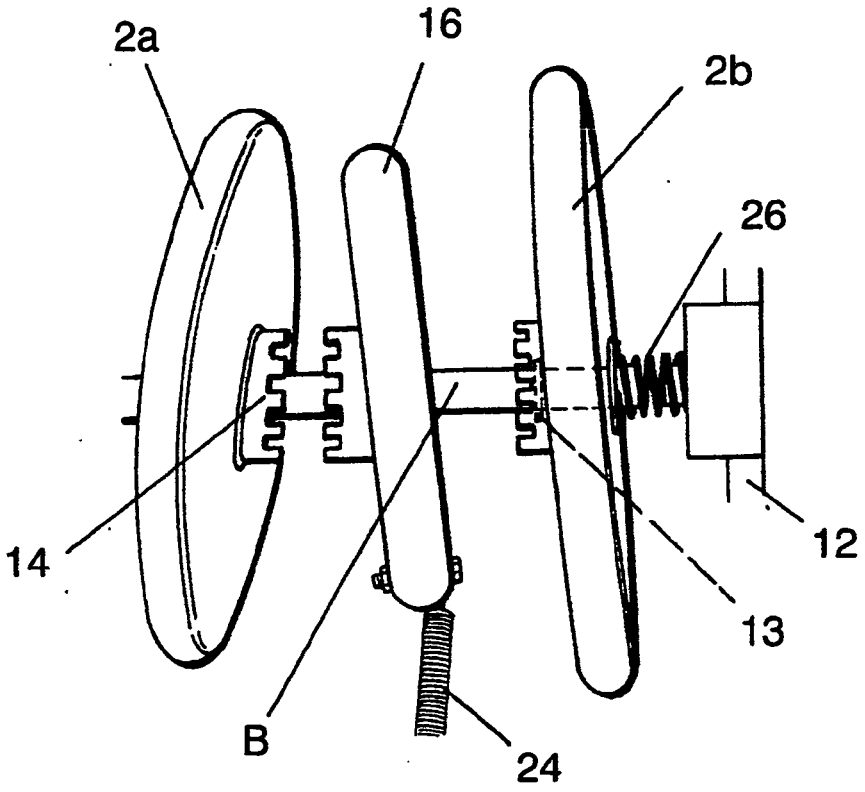

FIG. 34

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ ES 2007/000015

A. CLASSIFICATION OF SUBJECT MATTER

A61H 15/00 (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61H15+

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CIBEPAT,EPODOC,WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ES 2235651 A1 (EUROKEYTON SA) 01.07.2005, colu 1 lín 60-68, colu 2, colu 3 lín 1-53, colu 4 lín 15-68, colu 5 and 6; Reiv 1-14, figures 1-5	1-36
A	US 2006069332 A1 (HUANG et al.) 30.03.2006, Abstract, claims 1-8, figures 1-4	1-36
A	US 2006074359 A1 (y) 06.04.2006, Abstract, claims 1-4 , figures 1-2	1-36
A	US 2006069331 A1 (HUANG et al.) 30.03.2006, Abstract, claims 1-12 , figures 2-3	1-36
A	US 4016872 A (YAMAMURA et al.) 12.04.1977, Abstract, claims 1-12 , figures 2-10	1-36

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 May 2007 (25.05.2007)	(01/06/2007)
Name and mailing address of the ISA/ O.E.P.M. Paseo de la Castellana, 75 28071 Madrid, España. Facsimile No. 34 91 3495304	Authorized officer Mª R. Revuelta Pollán Telephone No. +34 91 3496824

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES 2007/000015

C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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A	WO 0176527 A1 (DAITO ELECTRIC MACHINE IND ; SHIMIZU NOBUZO) 18.10.2001, the whole the document	1
A	US 6599261 B1 (CHEN YUAN-CHUEN) 29.07.2003, the whole the document	1
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/ ES 2007/000015

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- JP HEI2109628 B **[0003]**
- EP 1000600 A **[0004]**
- EP 10000600 A **[0005]**
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