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(54) **A DEVICE FOR THE SELF-LEVELLING AND THE ADJUSTMENT OF THE PRESSURE OF THE FLOOR ROLLER IN INDUSTRIAL SWEEPING MACHINES**

VORRICHTUNG ZUR NIVEAUREGULIERUNG UND DRUCKANPASSUNG EINER KEHRWALZE IN EINER INDUSTRIELLEN KEHRMASCHINE

DISPOSITIF AUTORISANT LA MISE A NIVEAU AUTOMATIQUE DU ROULEAU-BROSSE SUR UNE BALAYEUSE INDUSTRIELLE ET LE REGLAGE DE LA PRESSION QU'IL EXERCE SUR LE SOL

(84) Designated Contracting States:
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(73) Proprietor: **Ecologica S.P.A.**
43012 Fontanellato (IT)

(72) Inventor: **CATTANI, Endi**
I-43048 Sant'Andrea Bagni (IT)

(74) Representative: **Gotra, Stefano**
Bugnion S.p.A.
Via Garibaldi 22
43100 Parma (IT)

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- **PATENT ABSTRACTS OF JAPAN vol. 018 no. 431 (M-1653) ,11 August 1994 & JP,A,06 128918 (HOWA MACH LTD) 10 May 1994,**
- **PATENT ABSTRACTS OF JAPAN vol. 018 no. 338 (M-1628) ,27 June 1994 & JP,A,06 081324 (HOWA MACH LTD) 22 March 1994,**

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Description

The present invention relates to a device for the self-levelling and the adjustment of the pressure of the floor roller in industrial sweeping machines as set out in the first part of each Claim 1 of the appended sets of claims; such a device is known from JP-A-06 128918 and JP-A-06 081324.

Prior art industrial sweeping machines foresee the use of rotating rollers which are provided with brushes for the cleaning of floors or general wide surfaces.

Generally a sweeping machine includes, a frame to which is fixed the brush roller in an oscillating way about a horizontal axis in such a way that during the cleaning operations, the roller is kept in contact with the surfaces to be cleaned as a result of its own weight-force and so the roller can adapt to the surface to be cleaned and any possible irregularities of the said surfaces by oscillating about its own suspension axis.

In other sweeping machines it is foreseen, in addition to a pneumatic cylinder which is used for the lifting of the roller during the transporting of the machine, the use of a nut screw device manually adjustable and capable of modifying the working position of the roller and the pressure of the roller exerted on the surface to be cleaned.

The principal drawback of this type of sweeper is represented by the fact that despite the possibility to vary the pressure which is exerted by the roller on the surface to be cleaned, such adjustment causes the roller to be rigidly positioned with respect to the surface to be cleaned, thus becoming no longer capable of oscillating about its own suspension axis.

From JP-A-06 128918 is known a road sweeper in which a spring energizes the sweeping brush in the direction separating from a road, and a hydraulic cylinder energizes the sweeping brush in the ground direction, opposite to the spring's action.

The cylinder must be activated by a source of energy and if this source breaks down the sweeping brush remains in a rest inactive position.

Furthermore the Japanese road sweeper makes necessary to have not only the hydraulic cylinder but also a pump, a distributor a valve, i.e. a whole hydraulic circuit for operating the cylinder.

From JP-A-06 081324 is known another device wherein a pressing cylinder presses the sweeping brush in the ground direction as in the previous document and is subject to the same drawbacks.

EP-A-0705557, which is a 54(3)(4) EPC document designating DE, FR, GB, IT, NL, SE, relates to a scrubbing machine having offset cylindrical brushes.

The scrub head is mounted to the chassis by an articulated linkage which includes a pair of spaced links, each of which is pivotally mounted to the chassis at a pivot point and is pivotally mounted at the opposite end to the scrub head.

A pair of coil springs bias the scrub head in a upward direction, with the weight of the scrub head maintaining it on the floor.

The articulated linkage together with the springs have the purpose of minimizing damage to the scrub head when it should contact an obstruction such as a wall, permitting a rising of the scrub head.

However, the spring arrangement serves only to substain and support the scrub head and the springs are fixed lightening springs, which can not be adjusted and so the weight of the scrub head can not be changed.

The aim of the present invention is to eliminate the above mentioned drawbacks by making available a device for the adjustment of the pressure exerted by the brush roller on the surfaces to be cleaned, allowing the brush roller to maintain the possibility to carry out oscillations about its own support axis so as to ensure the maximum adhesion of the roller to the structure of the surfaces to be cleaned.

A further aim of the present invention is to allow the brush roller to be kept elastically pressed against the surface to be cleaned with an adjustable force with respect to the weight-force.

The said aims are fully attained by the device in the present invention, as characterised in the appended claims.

The said elastic means are preferably constituted by a spring which is fixed at one extremity to one fixed frame of the machine, having the other extremity working on a lever which is kinematically connected, by means of transmissions, to the roller so as to vary the pressure exerted onto the surfaces to be swept.

These and other characteristics will better emerge from the following description of a preferred embodiment, which is shown as a non-limiting example in the attached drawings, in which:

- Figure 1) shows a vertical median section of a particular of the sweeping machine;
- Figure 2) shows a lateral view of the particular of the sweeper;
- Figure 3) shows the particular according to a section I-I of figure 2).

With reference to the figures, 1 denotes a frame, of an industrial sweeping machine, only partially shown, which supports a substantially horizontal axis 3 whose extremities are inserted into seats 4.

The seats 4 are fixed onto a couple of opposed plate shaped flanges 5 which support a brush roller in the lower area, said brush roller being denoted with 2 as a whole.

The brush roller 2 includes an internal drum 2a to which are fixed the proper brushes 2b, which is made to rotate by a motorisation 6 which is connected to the said internal drum 2a in a known way.

The embodiments described above permit the brush roller 2 to oscillate about its own suspension axis

3.

The possibility of oscillation of the roller about its own suspension axis is adjusted by an original adjusting device, denoted with 7 as a whole and shown in figures 2) and 3).

The device 7 includes a first lever 8 fixed onto the axis 3 and operated by an arm 9, of an adjustable length, which in turn is motioned by a second lever 10 splined on a pivot 20 which is held up by two supports 22 constrained to the frame 1 of the sweeper.

Also splined on the pivot 20 is an arm 10a which is fork shaped and supports a stop plate 23.

On the arm 10a acts a spring 11 having one extremity constrained to the frame of the sweeper and the other extremity is fixed to the arm 10a.

By means of an adjusting nut 12 it is possible to adjust the returning force of the spring 11 on the arm 10a and as a consequence it is possible to adjust the pressure exerted by the brush roller 2 on the surface to be swept.

The spring 11, with the nut 12 and the transmissions 8,9 and 10, constitute elastic means to control and adjust the oscillations of the roller 2 about the suspension axis 3.

In this way, during the cleaning phases, according to the moving direction indicated by the arrow 19 in figure 2), if it is desired that the roller exerts a force which is higher than that of its own weight on the surface to be cleaned it is sufficient to act on the adjusting nut 12 to ensure that the roller 2 is pressed harder against the surface to be cleaned.

In the case in which the roller needs to be completely lifted when transporting the sweeping machine (where it is advisable that the roller itself is not kept in contact with the floor), provision is made for a lifting device 13 which is capable of pushing on a lever 21 after a free stroke corresponding to an adjusting stroke of the spring 11.

The lever 21 is inserted in a neutral position on the pivot 20 and after a free stroke strikes against the stop plate 23.

The device 13 is made of a nut screw device operated by an electric actuator 14.

The lifting device 13 can also be made by means of a pneumatic cylinder or other suitable equivalents.

The adjusting device 7 enables the roller 2 to be kept elastically pressed against the surface to be cleaned, during the sweeping phases, with a force which is different from its own weight-force.

Claims

Claims for the following Contracting States : CH, LI, ES

1. A device for the self-levelling and the adjustment of the pressure of the floor roller, in industrial sweeping machines, of types including a brush roller (2) freely rotating to oscillate about a first axis (3) different from its own rotating axis, means (11) for controlling and adjusting the oscillation of the roller (2) about said first axis (3) in such a way that the brush roller (2) exerts a determined pressure on the surface to be swept, which is normally different from that due to the weight-force thereof characterised in that said means (11) is strictly mechanical means acting elastically on the brush roller (2).

2. A device for the self-levelling and the adjustment as in claim 1, characterised in that the said means include a spring (11), constrained to an extremity of the fixed frame (1) of the machine having the other extremity operating on a lever (10) which is connected, by means of transmission (8,9), to the roller (2) so as to vary the pressure exerted onto the surface to be swept.

3. A device for the self-levelling and the adjustment as in claim 2, characterised in that the said device includes an adjusting nut (12) of the returning action exerted by the spring (11) on the lever (10).

4. A device for the self-levelling and the adjustment as in claim 1, characterised in that the said device includes a pivot (20) supported by the frame of the sweeping machine to which is splined the lever (10), on said pivot being splined to one arm (10a) onto which acts the spring (11).

5. A device for the self-levelling and the adjustment as in claim 1, characterised in that the said device includes a lifting device (13) for the roller, said lifting device (13) acting on a lever (21), which is idle on the pivot (20), and moves against an arm (10a) after an idle stroke.

6. A device for the self-levelling and the adjustment as in claim 2, wherein the means of transmission (8, 9) comprise an arm (9) of an adjustable length and a further lever (8).

7. A device for the self-levelling and the adjustment as in claim 5, wherein the lever (21), free of rotating around the pivot (20), pushes a stop plate (23) of the arm (10a) when the lifting device (13) is activated.

Claims for the following Contracting States : DE, FR, GB, IT, NL

1. A device for the self-levelling and the adjustment of the pressure of the floor roller, in industrial sweeping machines, of types including a brush roller (2) freely rotating to oscillate about a first axis (3) different from its own rotating axis, means for controlling and adjusting the oscillation of the roller (2) about

said first axis (3) in such a way that the brush roller (2) exerts a determined pressure on the surface to be swept, which is normally different from that due to the weight-force thereof, characterised in that said means is strictly mechanical and acts elastically on the brush roller (2) and comprises a spring (11), constrained to an extremity of the fixed frame (1) of the machine having the other extremity operating on the roller (2) through connecting means, and the device comprises adjusting means which regulate the action exerted by the spring (11) on the roller (2).

2. A device as in claim 1, wherein the connecting means comprise a first lever (8), applied to the first axis (3), an arm (9) of an adjustable length, and a second lever (10).

3. A device for the self-levelling and the adjustment as in claim 2, characterised in that the said device includes an adjusting nut (12) of the returning action exerted by the spring (11) on the lever (10).

4. A device for the self-levelling and the adjustment as in claim 1, characterised in that the said device includes a pivot (20) supported by the frame of the sweeping machine to which is splined the lever (10), on said pivot being splined to one arm (10a) onto which acts the spring (11).

5. A device for the self-levelling and the adjustment as in claim 1, characterised in that the said device includes a lifting device (13) for the roller, said lifting device (13) acting on a lever (21) which is idle on the pivot (20) and moves against an arm (10a) after an idle stroke.

6. A device for the self-levelling and the adjustment as in claim 5, wherein the lever (21), free of rotating around the pivot (20), pushes a stop plate (23) of the arm (10a) when the lifting device (13) is activated.

Patentansprüche

Patentansprüche für folgende Vertragsstaaten : CH, LI, ES

1. Vorrichtung zur Niveauregulierung und Druckanpassung einer Kehrwalze in einer industriellen Kehrmaschine der Art umfassend eine frei drehbare Kehrwalze (2), die um eine erste sich von ihrer Drehachse unterscheidenende Achse (3) schwenkt, sowie Mittel (11) zur Kontrolle und Einstellung der Schwenkung der Walze (2) um diese erste Achse (3) derart, dass die Kehrwalze (2) auf die zu kehrende Fläche einen bestimmten Druck ausübt, der sich normalerweise von dem aus ihrer Gewichtskraft resultierenden Druck unterscheidet, dadurch gekennzeichnet, dass die Mittel (11) rein mechanischer Natur sind und elastisch auf die Kehrwalze (2) einwirken.

2. Vorrichtung zur Niveauregulierung und Druckanpassung nach Anspruch 1), dadurch gekennzeichnet, dass die Mittel eine an einem Ende an dem festen Rahmen (1) der Maschine verankerte und mit dem anderen Ende aufeinen Hebel (10) einwirkende Feder (11) umfassen, welcher Hebel zur Veränderung des auf die zu kehrende Fläche einwirkenden Drucks über Umlemkungen (8,9) mit der Walze (2) verbunden ist.

3. Vorrichtung zur Niveauregulierung und Druckanpassung nach Anspruch 2), dadurch gekennzeichnet, dass sie eine Mutter (12) zur Einstellung der von der Feder (11) auf den Hebel (10) ausgewirkte Rückholkraft umfasst.

4. Vorrichtung zur Niveauregulierung und Druckanpassung nach Anspruch 1), dadurch gekennzeichnet, dass sie einen von dem Rahmen der Kehrmaschine getragenen Zapfen (20) umfasst, an dem der Hebel (10) angebracht ist, wobei an diesem Zapfen ein Arm (10a) angebracht ist, auf den die Feder (11) einwirkt.

5. Vorrichtung zur Niveauregulierung und Druckanpassung nach Anspruch 1), dadurch gekennzeichnet, dass sie eine auf einen Hebel (21) einwirkende Walzenhebevorrichtung (13) umfasst, welcher Hebel sich in loser Stellung an dem Zapfen (20) befindet und sieh nach einem Freihub gegen einen Arm (10a) bewegt.

6. Vorrichtung zur Niveauregulierung und Druckanpassung nach Anspruch 2), bei der die Umlenkungen (8,9) einen längenverstellbaren Arm (9) sowie einen weiteren Hebel (8) umfassen.

7. Vorrichtung zur Niveauregulierung und Druckanpassung nach Anspruch 5), bei der der frei um den Zapfen drehbare Hebel (21) auf eine Endbegrenzungsplatte (23) des Arms (10a) drückt wenn die Hebevorrichtung (13) in Betrieb ist.

Patentansprüche für folgende Vertragsstaaten : DE, FR, GB, IT, NL

1. Vorrichtung zur Niveauregulierung und Druckanpassung einer Kehrwalze in einer industriellen Kehrmaschine der Art umfassend eine frei drehbare Kehrwalze (2), die um eine erste sich von ihrer Drehachse unterscheidenende Achse (3) schwenkt,
Mittel zur Kontrolle und Einstellung der Schwen-

kung der Walze (2) um diese erste Achse (3) derart, dass die Kehrwalze (2) auf die zu kehrende Fläche einen bestimmten Druck ausübt, der sich normalerweise von dem aus ihrer Gewichtskraft resultierenden Druck unterscheidet,
dadurch gekennzeichnet, dass die Mittel rein mechanischer Natur sind und elastisch auf die Kehrwalze (2) einwirken und eine an einem Ende an dem festen Rahmen (1) der Maschine verankerte und mit dem anderen Ende über Verbindungsmittel auf die Walze (2) einwirkende Feder (11) umfassen, und die Vorrichtung Mittel zur Einstellung der von der Feder (11) auf die Walze (2) ausgeübten Kraft umfasst.

2. Vorrichtung nach Anspruch 1, bei der die Verbindungsmittel einen ersten an der ersten Achse (3) angebrachten Hebel (8), einen längenverstellbaren Arm (9) und einen zweiten Hebel (10) umfassen.

3. Vorrichtung zur Niveauregulierung und Druckanpassung nach Anspruch 2), dadurch gekennzeichnet, dass sie eine Mutter (12) zur Einstellung der von der Feder (11) auf den Hebel (10) ausgewirkten Rückholkraft umfasst.

4. Vorrichtung zur Niveauregulierung und Druckanpassung nach Anspruch 1), dadurch gekennzeichnet, dass sie einen von dem Rahmen der Kehrmaschine getragenen Zapfen (20) umfasst, an dem der Hebel (10) angebracht ist, wobei an diesem Zapfen ein Arm (10a) angebracht ist, auf den die Feder (11) einwirkt.

5. Vorrichtung zur Niveauregulierung und Druckanpassung nach Anspruch 1), dadurch gekennzeichnet, dass sie eine auf einen Hebel (21) einwirkende Walzenhebevorrichtung (13) umfasst, welcher Hebel sich in loser Stellung an dem Zapfen (20) befindet und sich nach einem Freihub gegen einen Arm (10a) bewegt.

6. Vorrichtung zur Niveauregulierung und Druckanpassung nach Anspruch 5), bei der der frei um den Zapfen (20) drehbare Hebel (21) auf eine Endbegrenzungsplatte (23) des Arms (10a) drückt wenn die Hebevorrichtung (13) in Betrieb ist.

Revendications

Revendications pour les Etats contractants suivants : CH, LI, ES

1. Dispositif de mise à niveau automatique et de réglage de la pression du rouleau sur le sol, sur des balayeuses industrielles, du type comprenant un rouleau-brosse (2) libre de pivoter pour osciller autour d'un premier axe (3) différent de son propre axe de rotation, des moyens (11) pour contrôler et régler l'oscillation du rouleau (2) autour dudit premier axe (3) de telle manière que le rouleau-brosse (2) exerce sur la surface à balayer une pression définie, normalement différente de celle dûe à sa propre force de pesanteur, caractérisé en ce que lesdits moyens (11) sont des moyens de type strictement mécaniques agissant élastiquement sur le rouleau-brosse (2).

2. Dispositif de mise à niveau automatique et de réglage selon la revendication 1), caractérisé par le fait que lesdits moyens comprennent un ressort (11), ancré en une extrémité au châssis (1) fixe de la machine et dont l'autre extrémité agit sur un levier (10) relié par l'intermédiaire de renvois (8,9) au rouleau (2) pour varier la pression exercée sur la superficie à balayer.

3. Dispositif de mise à niveau automatique et de réglage selon la revendication 2), caractérisé par le fait qu'il comprend un écrou (12) de réglage de l'action de rappel exercée par le ressort (11) sur le levier (10).

4. Dispositif de mise à niveau automatique et de réglage selon la revendication 1), caractérisé par le fait qu'il comprend un pivot (20) supporté par le châssis de la machine balayeuse, sur lequel est claveté le levier (10) ainsi qu'un bras (10a) sur lequel va agir le ressort (11).

5. Dispositif de mise à niveau automatique et de réglage selon la revendication 1), caractérisé par le fait qu'il comprend un dispositif de soulèvement (13) du rouleau qui agit sur un levier (21) libre en rotation sur le pivot (20) et se déplaçant contre un bras (10a) après un course libre.

6. Dispositif de mise à niveau automatique et de réglage selon la revendication 2), dans lequel les renvois (8,9) comprennent un bras (9) de longueur réglable et un autre levier (8).

7. Dispositif de mise à niveau automatique et de réglage selon la revendication 5), dans lequel le levier (21), libre de pivoter autour du pivot (20), pousse une plaque de fin de course (23) du bras (10a) lorsque le dispositif de soulèvement (13) est activé.

Revendications pour les Etats contractants suivants : DE, FR, GB, IT, NL

1. Dispositif de mise à niveau automatique et de réglage de la pression du rouleau sur le sol, sur des balayeuses industrielles, du type comprenant un rouleau-brosse (2) libre de pivoter pour osciller

autour d'un premier axe (3) différent de son propre axe de rotation,
des moyens (11) pour contrôler et régler l'oscillation du rouleau (2) autour dudit premier axe (3) de telle manière que le rouleau-brosse (2) exerce sur la surface à balayer une pression définie, normalement différente de celle dûe à sa propre force de pesanteur,
caractérisé en ce que lesdits moyens (11) sont des moyens de type strictement mécaniques agissant élastiquement sur le rouleau-brosse (2) et comprennent un ressort (11), ancré en une extrémité au châssis (1) fixe de la machine et dont l'autre extrémité agit sur le rouleau (2) par l'intermédiaire de moyens de liaison, et en ce que le dispositif comprend des moyens de réglage qui règlent l'action exercée par le ressort (11) sur le rouleau (2).

2. Dispositif selon la revendication 1, dans lequel les moyens de liaison comprennent un premier levier (8), appliqué au premier axe (3), un bras (9) de longueur réglable, et un second levier (10).

3. Dispositif de mise à niveau automatique et de réglage selon la revendication 2, caractérisé par le fait qu'il comprend un écrou (12) de réglage de l'action de rappel exercée par le ressort (11) sur le levier (10).

4. Dispositif de mise à niveau automatique et de réglage selon la revendication 1, caractérisé par le fait qu'il comprend un pivot (20) supporté par le châssis de la machine balayeuse, sur lequel est claveté le levier (10) ainsi qu'un bras (10a) sur lequel va agir le ressort (11).

5. Dispositif de mise à niveau automatique et de réglage selon la revendication 1, caractérisé par le fait qu'il comprend un dispositif de soulèvement (13) du rouleau qui agit sur un levier (21) libre en rotation sur le pivot (20) et se déplaçant contre un bras (10a) après un course libre.

6. Dispositif de mise à niveau automatique et de réglage selon la revendication 5, dans lequel le levier (21), libre de pivoter autour du pivot (20), pousse une plaque de fin de course (23) du bras (10a) lorsque le dispositif de soulèvement (13) est activé.

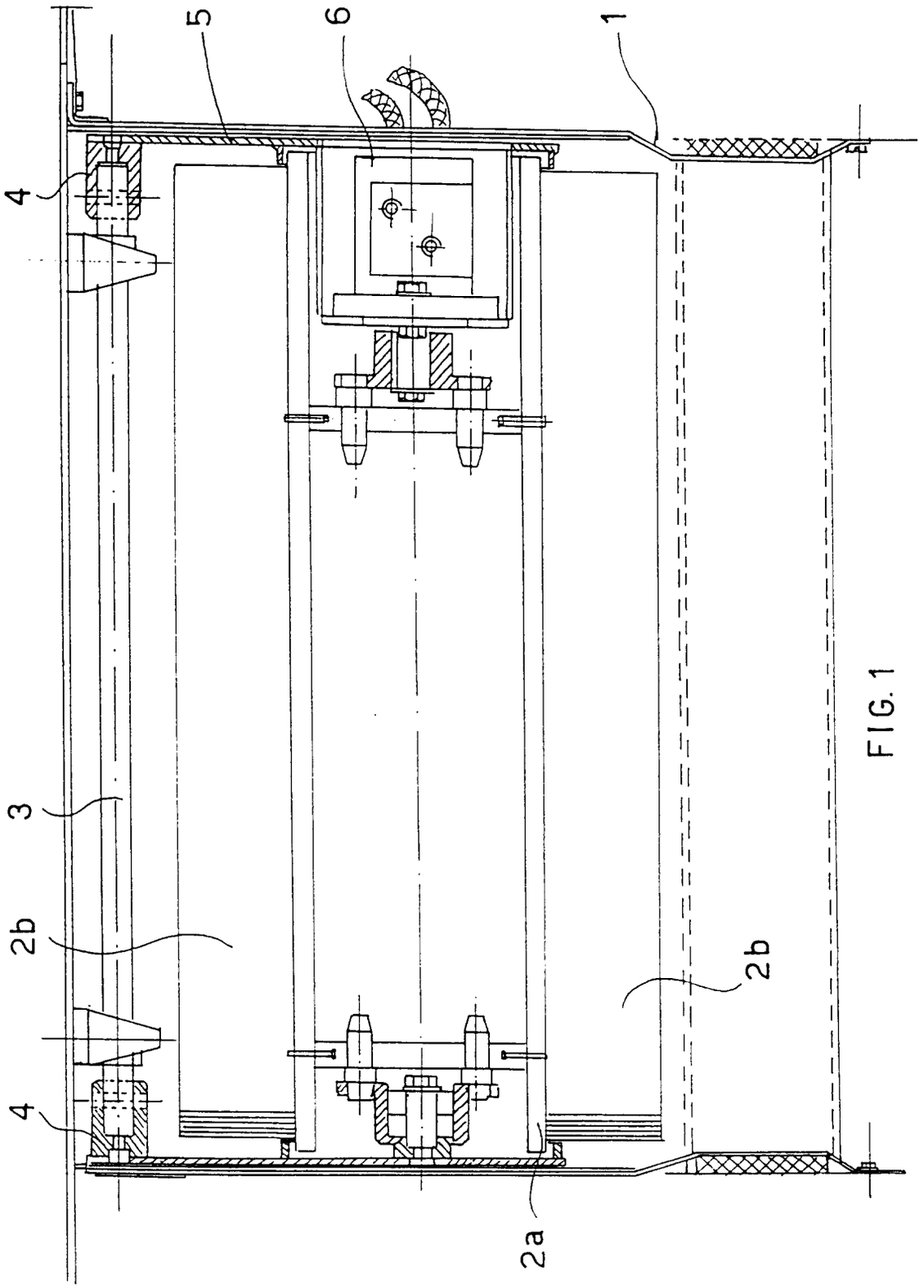

FIG. 1

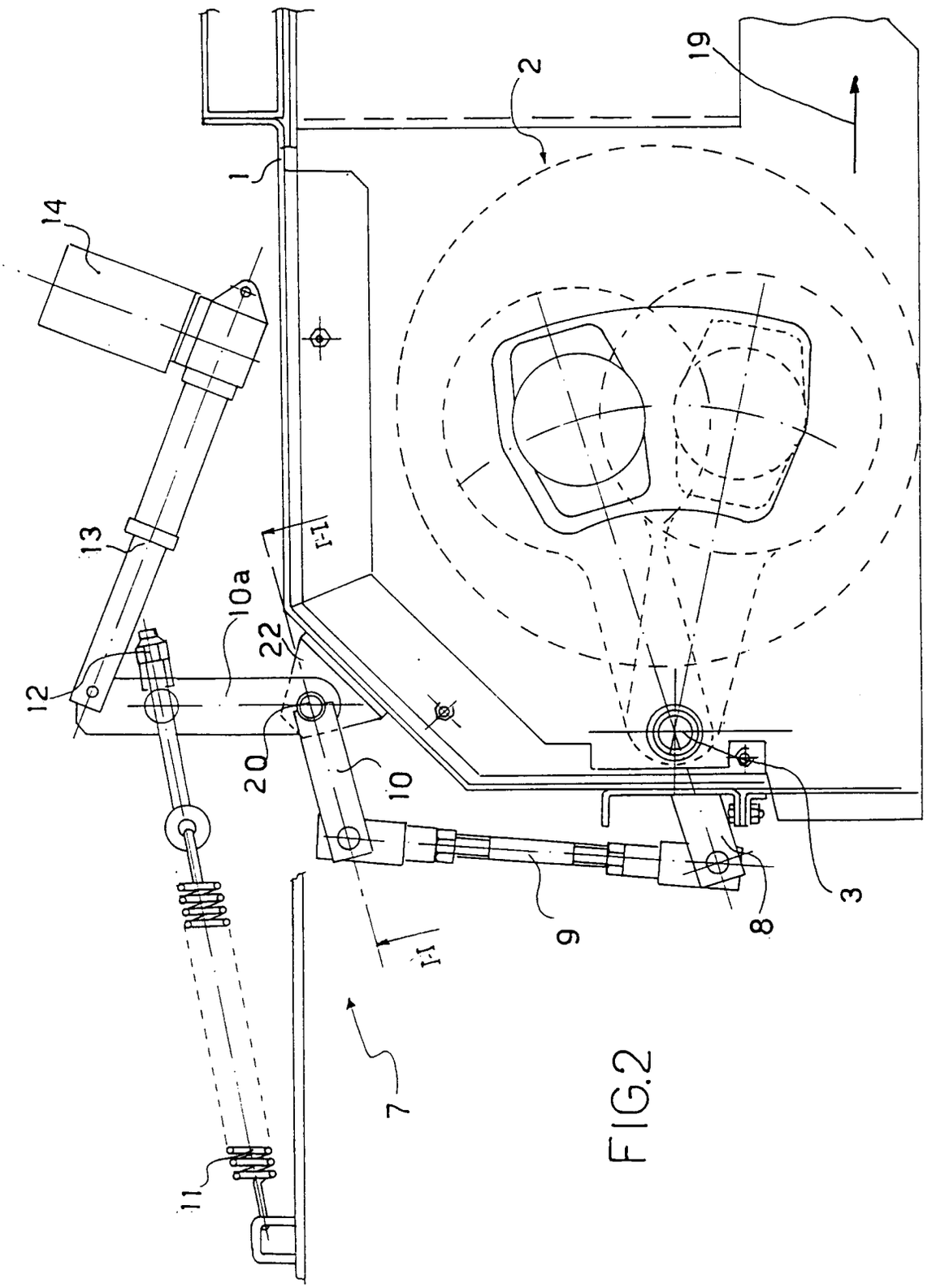

FIG.2

FIG. 3