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(54) GROUND CLEARANCE ADJUSTING SYSTEM FOR A FLOOR POLISHER

SYSTEM ZUR EINSTELLUNG DES BODENABSTANDES FÜR EINE BOHNERMASCHINE

SYSTÈME D'AJUSTEMENT DE GARDE AU SOL POUR UNE CIREUSE

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Description

[0001] The present invention relates to a floor polisher, in particular to a system for adjusting the ground clearance of the operating member of said polisher.

[0002] The polisher of the present invention allows for carrying out cleaning, at home or in an industrial environment, floors by applying thereon specific products known in the art with the terms: "not waxing spray" and "waxing spray", respectively. The use of such products permits a dry cleaning of the desired surfaces and, therefore, it does not have the drawback of leaving marks of the polisher passing on the same surfaces. The aforementioned products, then, contain substances that, once applied on the surfaces, turn into films protecting the same surfaces, said films containing or not metalized wax depending on the fact that a waxing spray or a not waxing spray, respectively, is contained.. During time and, above all, under the action due to the passing of people and things on the surfaces said protective film wears out and, therefore, has to be restored. The application of waxing spray and not waxing spray products has to be performed by a buffing which is able to generate enough heat to let the film contained in the cleaning products melt and be, suitably, spread over the portion the machine is operating on. Moreover, a so accentuated buffing allows the removal of marks and traces left on film the already present on the floor. Reaching a buffing level such as the one just disclosed means certainly adopting an operating member, that is a member spreading the cleaning product, having a wide surface contacting floor, or in general the surfaces to be polished, and in addition having a noticeable speed relative to the same floor: it is therefore common knowledge adopting for the operating member in said polishers a single pad driven by a motor having high revolving speed, in almost all the cases 1 500 rpm. The aforementioned pad is generally made with micro-fiber, or however a material which during the cleaning operation tends to wear out, by seeing its thickness definitively decreasing. It is immediately observed that during the continuous decrease of the thickness the pressure the pad is able to exercise on the portion to be cleaned continuously decreases, with the subsequent and unavoidable loss of the efficiency in the cleaning action and film restoring (eventually by metalized wax).

[0003] A floor polisher comprising the features recited in the preamble of independent claim 1, is disclosed in document US-A-5608939.

[0004] Main object of the present invention is therefore to provide a floor polisher provided with a ground clearance adjusting system for the operating member.

[0005] Secondary object of the present invention is then to provide a floor polisher in which the operating member is balancing in respect of its drive, so as to compensate for cocking between floors and the same operating member.

[0006] Further object of the present invention is to provide a floor polisher provided with a control system of the

right ground clearance of the operating member.

[0007] These and other features of the floor polisher provided with the ground clearance adjusting system of the operating member according to the present invention will be dear from the following detailed description of a preferred embodiment thereof taken with reference to the drawings in which:

fig. 1 is a perspective view of a preferred embodiment of the polisher provided with the ground clearance adjusting system of the operating member according to the present invention,
fig. 2 is a perspective view of the drive housing and the supporting wheels of the polisher in fig. 1,
fig. 2A is a cross sectional perspective view of the frame of the polisher in fig. 1, and
fig. 3 is a cross sectional view of the assembly of said housing, drive and operating member.

With reference now to fig. 1, a polisher 100 comprising a handlebar 10 for dragging by operator assigned to floor cleaning, command levers. 11 for the polisher operation, a rod 12 connecting, through a joint 13, said handlebar 10 to the frame 20 of said polisher. Said frame 20 is substantially constituted by a cross member 21, supporting the pair of supporting wheels 23, and a body pillar 22 rigidly constrained to said cross member 21 and placed in the middle thereof. Always with reference to fig. 1, the body 30 of the polisher 100 can be seen, said body 30 being coupled by means of a prismatic joint to said body pillar 22. Finally, there is shown the drive motor housing 40, in the shown embodiment an induction motor rating of which can likely be the one listed above:

- Power supply voltage: 230 V;
- Power supply: 1'300 W;
- Revolving speed: 1'500 rpm.

[0008] Turning now to figs. 2 and 2A, it is possible to disclose in greater detail the prismatic joint between said frame 20 and said body 30: the latter is constituted by a main body 31 having a circular plan integral with a radial protrusion 32 thereof provided with a rectangular hole 33. Said hole 33 is dimensioned so as to allow its clearance fit to the body pillar 22 of the frame 20, which it is also bolted on. At position diametrically opposed to said protrusion 32, the main body 31 is fixed to an extensible leg 50 connected, in turn, with a caster 51. Therefore the main body 31 is supported by the frame 20, through the pair of wheels 23, and by the extensible leg 50, through the caster 51, at a given ground clearance. Particularly said extensible leg 50 comprises a part 52 fixed to the main body 31 and a part 53 slidable in said part 52. The relative position of the part 53 in respect of the part 52 is adjustable by means of a control wheel 54, in the shown embodiment, placed at the top of said part 53. Moreover, there is advantageously arranged, next to each end of the cross member 21, an extensible system 24 on the

whole like said leg 50 and acting on the axle 26 of the rear wheels 23. Further each of said extensible systems 24 is controlled by a toothed pulley 25, connected by a toothed belt 37 with a second toothed pulley 55 coaxial with said control wheel 54 and rotatably integral therewith. Suitable snub pulleys 35 and 36 toothed and smooth, respectively, allow for fit the path of each belt 37 to the shape of the main body 31. Therefore a rotation of the control wheel 54, by means of its coupling - for example threaded - with said slidable part 53, corresponds to a given vertical shift of said part 52 and so, due to the disclosed structure, a vertical translation of the whole main body 31. Indeed the adjustment selected by the control wheel 54 is automatically transferred and set also to the pair of extensible systems 24: the translations of the cross member 21, the body 30 is integral with, and the part 52 are equal and synchronous, so that during translation the body 30 is always parallel to itself.

[0009] Turning now to fig. 3, for sake of disclosure simplicity inside the induction motor housing 40 there is shown only the propeller shaft 41 which, as it is possible to quickly verify, is connected with operating member 60 without interposition of any gearbox, in other words it is a direct gear transmission: in such manner the operating member 60, that is a microfiber pad having a diameter of about 500 mm, rotates at the same speed of the motor which, as just been said, imposes a revolving speed of 1'500 rpm, like many polishers currently available on the market. Always from fig. 3 it can be noticed that the operating pad 60 is not directly connected to the propeller shaft 41. Between them, indeed a hub 42 rigidly connected with the propeller shaft 41 and a balancing pad holder 43 rigidly connected with the operating pad 60. Finally, balancing pad holder 43 and hub 42 are connected with each other by a spring 45 coaxial to both and by a set of four flexible couplings 44 symmetrically arranged at a given radial distance from said spring 45.

[0010] From the detailed description just provided it is possible to notice that a rotation of the control wheel 54 results in a synchronous translation of the extensible leg 50 and the pair of pulleys 25, that is a translation of the whole body 30. The degree of the load applied on the operating pad 60 on which the elastic load of the spring 45 further acts, is, for the above reasons, proportional to this translation.

[0011] In order to help the operator in adjusting suitably the abovementioned translation, that is the ground clearance of the operating pad 60, a sensor which measures as input the current taken up by the motor - directly proportional to the braking torque acting against it - and sends the measure to a suitably calibrated electronic board (not shown) which generates as output a corresponding signal, for example a lighting signal, by a set of LEDs (not shown) the lighting of which corresponds to the right pressure to be applied on the operating pad 60. The output generated signal from said board can also be used for controlling a servomotor (not shown) operating said control wheel 54: in such manner the ground

clearance adjustment occurs in real time and fully automated and programmable by said board.

[0012] The polisher 100 according to the preferred embodiment of the present invention allows therefore not only for using microfiber pads with different thickness (and therefore from different manufacturers) but also making the most of each of said pads which in their service life could see their thickness reduced up to 50%. Moreover the kind of connection between the propeller shaft 41 and the operating pad 60 allows for keeping the whole surface of the same pad always in contact with the floor, the cocking between it and the shaft 41 being compensated by the movement of the balancing pad holder 43.

[0013] Those skilled in the art, the polisher according to the present invention belongs to, will quickly notice the opportunity to add several modifications or changes that for example could involve the mechanism for adjusting the disclosed extensible systems, or replacement of the toothed belt with equivalent transmission systems, or use of a control system alternative in respect of the disclosed pressure governor as well as many other changes all falling in the scope of the invention defined by the annexed claims.

Claims

1. A floor polisher (100) comprising:

- (i) a frame (20) movable by means of at least a pair of wheels (23) attached to an axle (26),
- (ii) a body (30) integral with said frame (20),
- (iii) a motor housing (40), integral with said body (30),
- (iv) at least an operating member (60) driven by said motor, and
- (v) at least a third wheel (51) coupled to said body (30),

the coupling of said at least third wheel (51) and said body (30) being achieved by an adjustable mechanism (52; 53; 54), **characterized by** the fact that the adjustment of said mechanism (52; 53; 54) is automatically set on analogous adjustable mechanisms (24) forming the coupling of said frame (20) and said axle (26).

2. The polisher (100) according to claim 1, wherein the adjustment of said mechanism (52; 53; 54) is automatically set on said analogous mechanisms (24) by toothed belt (37) transmission systems (55; 35; 36; 25).

3. The polisher (100) according to claim 2, wherein said mechanism (52; 53; 54), adjusts the vertical distance between said at least third wheel (51) and said body (30) and in which said mechanisms (24) adjust the

vertical distance between said frame (20) and said axle (26).

4. The polisher (100) according to claim 1, wherein said at least one operating member (60) is a pad, eventually formed with microfiber.
5. The polisher (100) according to one or more of the preceding claims, wherein the gear ratio between said motor and said at least one operating member (60) is 1:1.
6. The polisher (100) according to one or more of the preceding claims, wherein said at least one operating member (60) is connected with propeller shaft (41) of said motor by interposing a pad holder (43) directly connected with said at least one operating member (60) and a hub (42) directly connected with said propeller shaft (41), said pad holder (43) and said hub (42) being connected with each other by an adjustable spring (45) and a plurality of flexible couplings (44).
7. The polisher (100) according to the preceding claim, in which said spring (45) is coaxial to said propeller shaft (41) and said plurality of flexible couplings (44) is displaced symmetrically in respect of said spring (45).
8. The polisher (100) according to one or more preceding claims, wherein a current sensor measures the current taken up by said motor and sends it to an electronic governor generating lighting signals corresponding to optimum value of the measured current.
9. The polisher (100) according to one or more of the preceding claims, wherein a current sensor measures the current taken up by said motor and sends it to an electronic governor which on the basis of said measured current controls a motor interlocked with one of said mechanisms (52; 53; 54, 24).

Patentansprüche

1. Bohnermaschine (100) mit den folgenden Merkmalen:
 - (i) ein Gestell (20), das durch mindestens ein Paar von an einer Achse (26) befestigten Rädern (23) bewegbar ist,
 - (ii) ein mit dem Gestell (20) verbundener Körper (30),
 - (iii) ein fest am Körper (30) Motorraum (40),
 - (iv) mindestens ein vom Motor angetriebenes Arbeitselement (60), und
 - (v) mindestens ein drittes mit dem Körper (30)

verbundenes Rad (51),

wobei die Verbindung des mindestens dritten Rads (51) mit dem Körper (30) durch eine Einstelleinrichtung (52; 53; 54) ausgebildet wird, **dadurch gekennzeichnet, dass** die Einstellung der Einstelleinrichtung (52;53;54) an entsprechende das Gestell (20) mit der Achse (26) verbindende Einstellenrichtungen (24) selbsttätig aufgebracht wird.

2. Bohnermaschine (100) nach Anspruch 1, wobei die Einstellung der Einstelleinrichtung (52;53;54) an die entsprechenden Einstelleinrichtungen (24) durch ein mit einem Zahnriemen (37) versehenes Getriebe (55;35;36;25) selbsttätig aufgebracht wird.
3. Bohnermaschine (100) nach Anspruch 2, wobei die Einstelleinrichtung (52;53;54) den senkrechten Abstand zwischen dem mindestens dritten Rad (51) und dem Körper (30) einstellt und die Einstelleinrichtungen (24) den senkrechten Abstand zwischen dem Gestell (20) und der Achse (26) einstellen.
4. Bohnermaschine (100) nach Anspruch 1, wobei das mindestens ein Arbeitselement (60) eine Scheibe gegebenenfalls aus Mikrofasern aufweist.
5. Bohnermaschine (100) nach den vorhergehenden Ansprüchen, wobei das Übersetzungsverhältnis zwischen Motor und dem mindestens einem Arbeitselement (60) 1:1 beträgt.
6. Bohnermaschine (100) nach den vorhergehenden Ansprüchen, wobei das mindestens ein Arbeitselement (60) mit der Motortriebwelle (41) verbunden wird, indem ein unmittelbar mit dem mindestens einem Arbeitselement (60) verbundener Scheibenhalter (43) und eine unmittelbar mit der Triebwelle (41) verbundene Nabe (42) zwischengelegt werden wobei der Scheibenhalter (43) und die Nabe (42) mittels einer Stufenfeder (45) und einer Anzahl elastische Kupplungen (44) aneinander verbunden werden.
7. Bohnermaschine (100) nach Anspruch 6, wobei die Stufenfeder (45) coaxial mit der Triebwelle (41) und die Anzahl elastische Kupplungen (44) symmetrisch bezüglich der Stufenfeder (45) angeordnet sind.
8. Bohnermaschine (100) nach den vorhergehenden Ansprüchen, wobei ein Fühler die Stromaufnahme des Motors misst und die Abmessung an einem elektronischen Regler sendet, wobei dieser Regler dem optimalen Wert des gemessenen Stroms entsprechende Lichtsignale erzeugt.
9. Bohnermaschine (100) nach den vorhergehenden Ansprüchen, wobei ein Fühler die Stromaufnahme des Motors misst und die Abmessung an einen elek-

tronischen Regler sendet, wobei der Regler anhand des gemessenen Stroms einen mit einem der besagten Einstelleinrichtungen (52;53;54;24) verriegelten Motor steuert.

Revendications

1. Cireuse (100) comprenant:

- (i) un châssis mobile sur au moins une paire des roues (23) attachées à un essieu (26),
- (ii) un corps (30) connecté au dit châssis (20),
- (iii) un logement (40) du moteur, solidaire avec le dit corps (30),
- (iv) au moins un élément de travail (60) actionné par le dit moteur, et
- (v) au moins une troisième roue (51) connectée au dit corps (30),

dont l'accouplement entre la dite au moins troisième roue et le dit corps (30) est réalisé par un mécanisme réglable (52; 53; 54), **caractérisée en ce que** le réglage du dit mécanisme est appliqué automatiquement aux mécanismes réglables pareils (22; 24; 33) réalisant l'accouplement entre le dit châssis (20) et le dit essieu (26).

2. Cireuse (100) selon la revendication 1, dont le réglage du dit mécanisme (52; 53; 54) est appliqué aux mécanismes pareils susdits (22; 24; 33) par un système (55; 35; 36; 25) de transmission par courroie dentée (37).

3. Cireuse (100) selon la revendication 2, dont le dit mécanisme (52; 53; 54) règle la distance vertical entre le dit châssis (20) et le dit essieu (26).

4. Cireuse (100) selon la revendication 1, dont le dit au moins un élément de travail (60) est un disque, éventuellement en microfibre.

5. Cireuse (100) selon les revendications précédentes, dont le rapport de transmission entre le moteur et le dit au moins un élément de travail (60) est de 1:1.

6. Cireuse (100) selon les revendications précédentes, dont le dit au moins un élément de travail (60) est connecté à la transmission (41) du dit moteur par interposition d'un organe d'entraînement (43) connecté directement au dit au moins un élément de travail (60), et d'un moyeu (42) directement connecté à la dite transmission (41), l'organe d'entraînement (43) et le moyeu (42) étant connectés entre eux-mêmes par un ressort (45) à charge réglable et une pluralité d'accouplements flexibles (44).

7. Cireuse (100) selon la revendication 6, dont le dit

ressort (45) est coaxial avec la dite transmission (41), et la dite pluralité d'accouplements flexibles (44) est disposée symétriquement par rapport au dit ressort (45).

8. Cireuse (100) selon les revendications précédentes, dont un capteur du courant mesure le courant absorbé par le moteur et envoie cette mesure à un régulateur électronique activant des signaux lumineux correspondants à une valeur optimale du courant mesuré.

9. Cireuse (100) selon les revendications précédentes, dont un capteur du courant mesure le courant absorbé par le moteur et envoie cette mesure à un régulateur électronique lequel, sur la base du dit courant mesuré, pilote un moteur contrôlé par un des mécanismes susdits (52; 53; 54; 24).

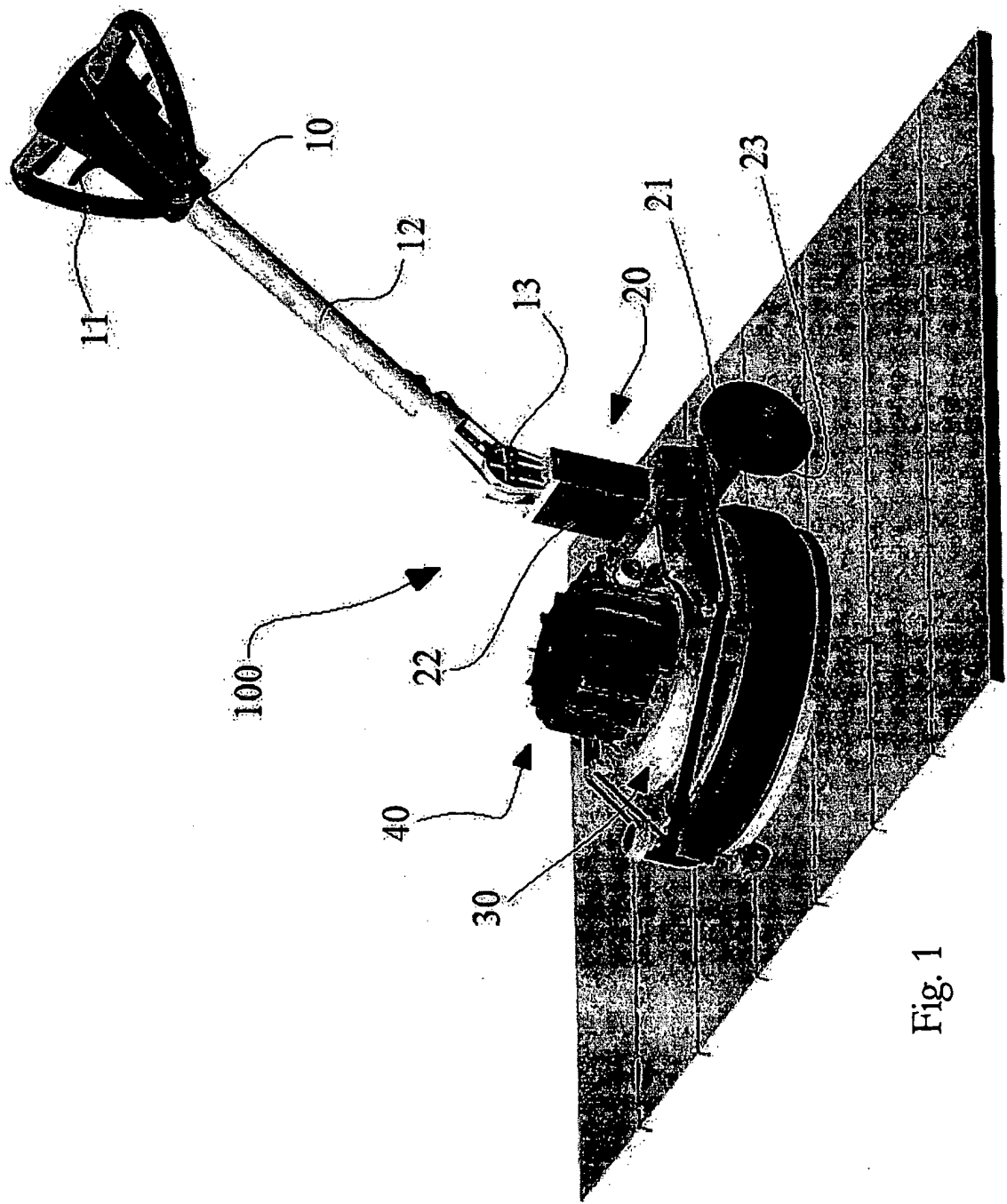


Fig. 1

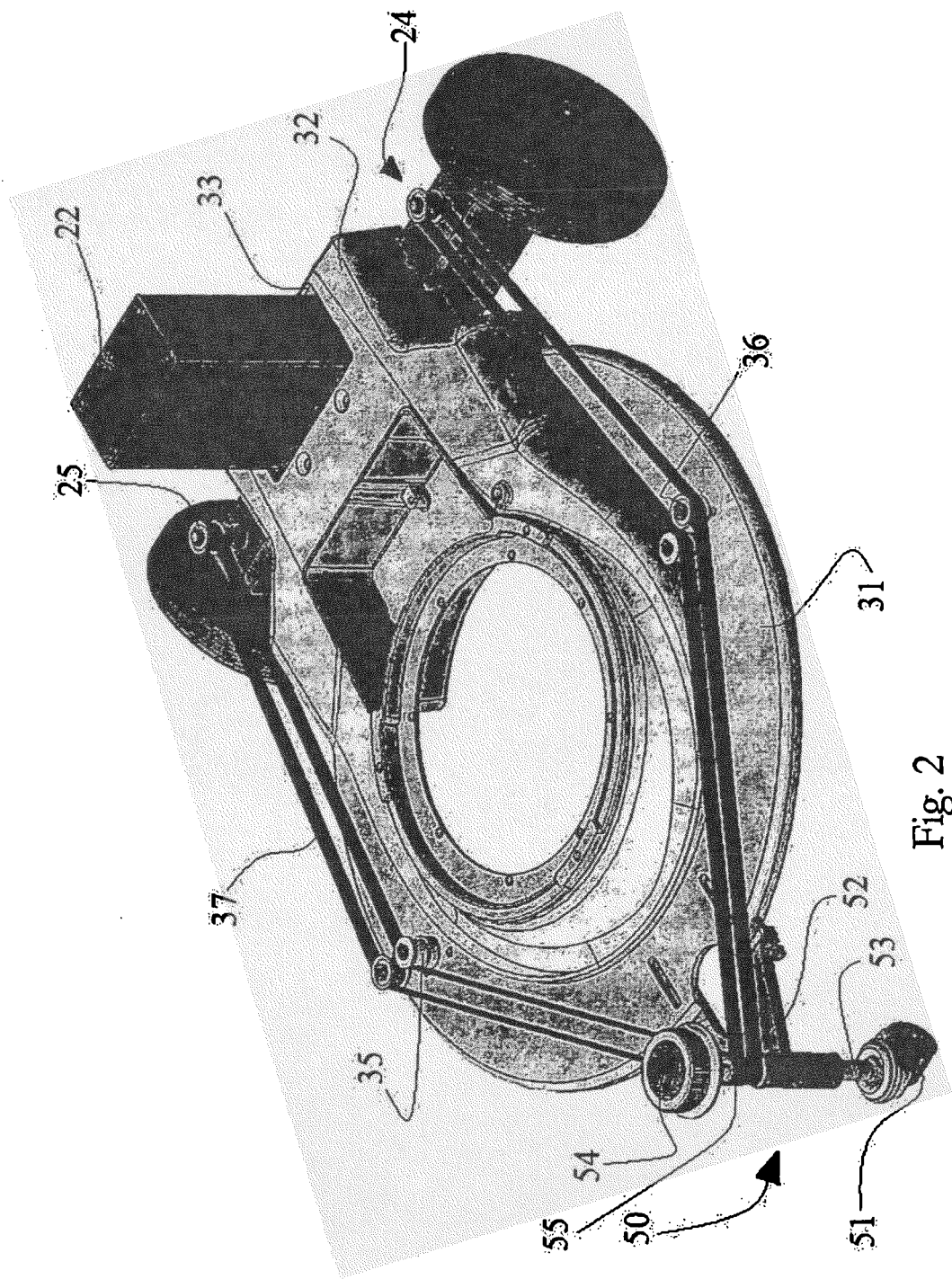


Fig. 2

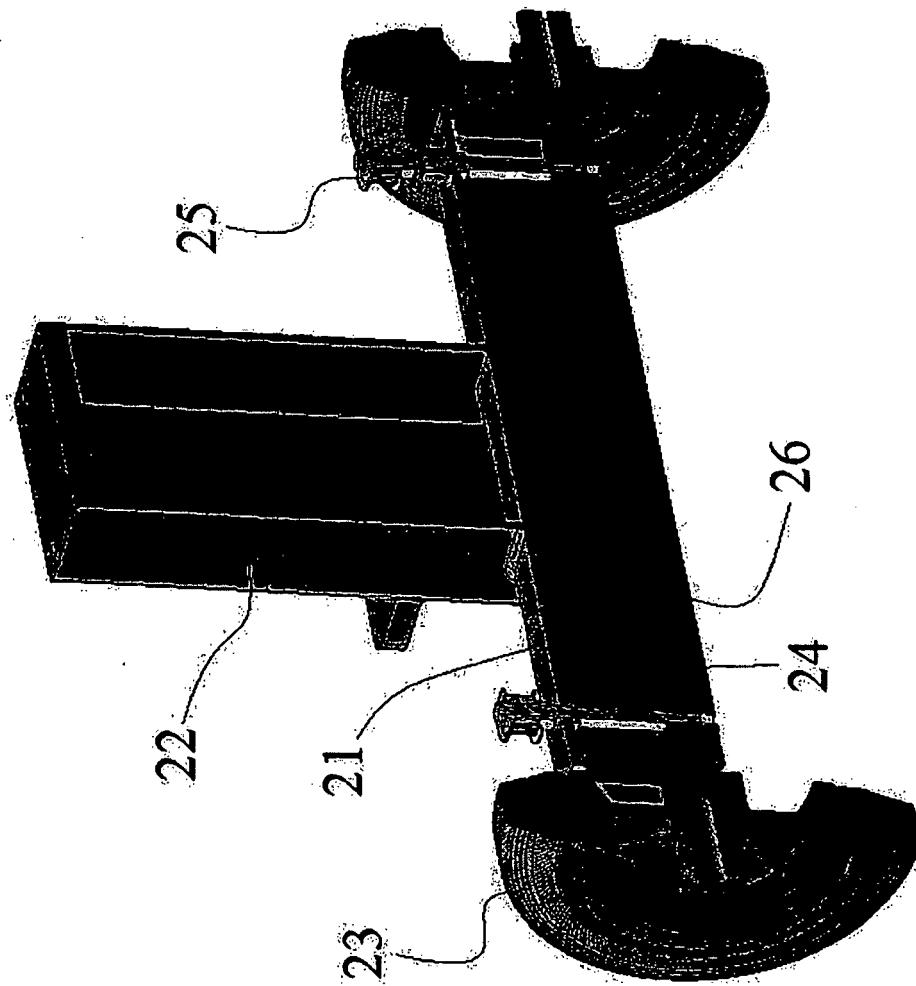


Fig. 2A

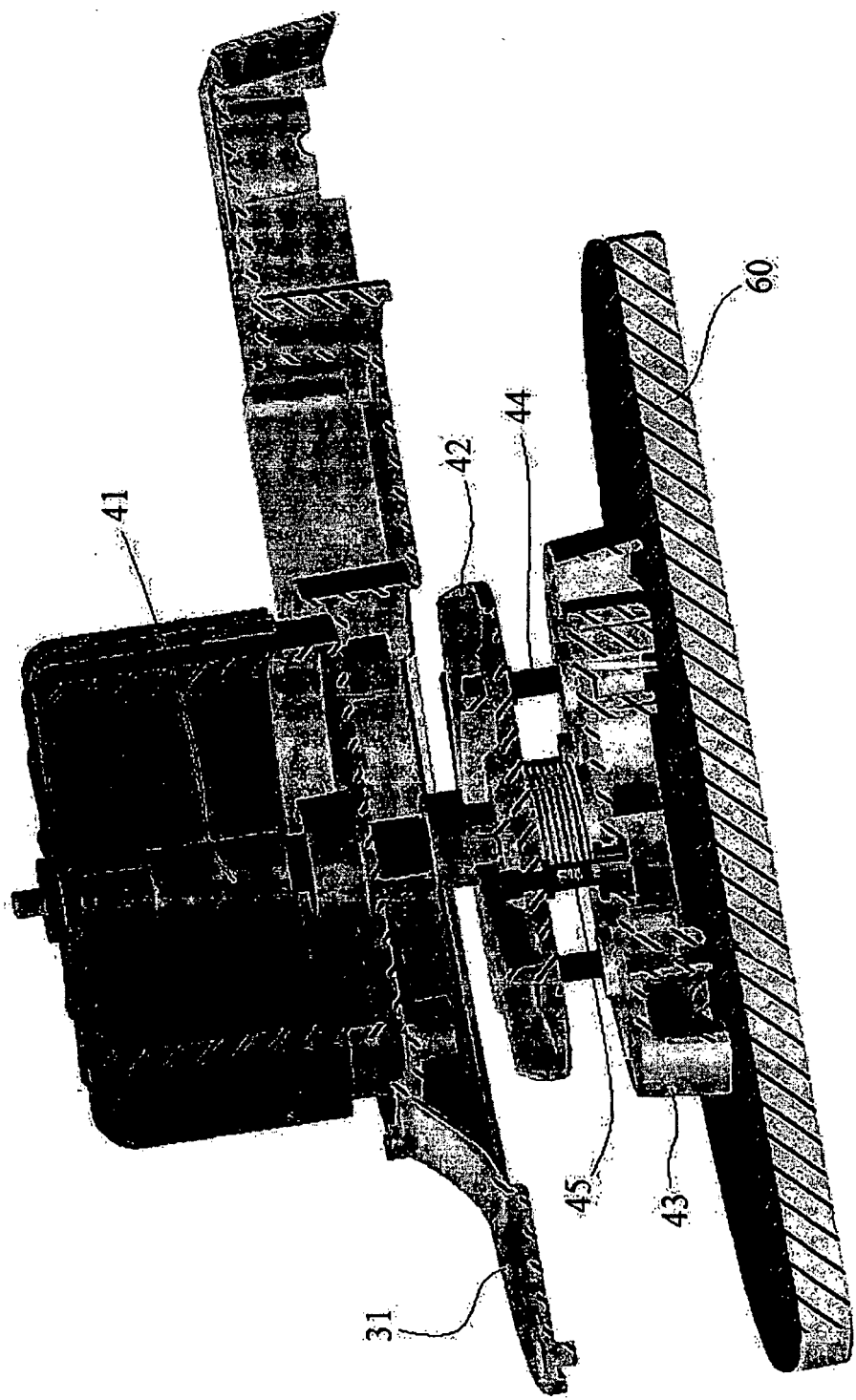


Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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