



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 190 659 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
27.03.2002 Bulletin 2002/13

(51) Int Cl.7: **A47L 5/08**

(21) Application number: **01121784.1**

(22) Date of filing: **20.09.2001**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**
Designated Extension States:
AL LT LV MK RO SI

(72) Inventor: **Pineschi, Massimiliano**
41100 Modena (IT)

(74) Representative: **Reniero, Cirillo Silvano**
Reniero, Bergamini & Partners s.r.l.,
21, Via A. Sciesa
37122 Verona (IT)

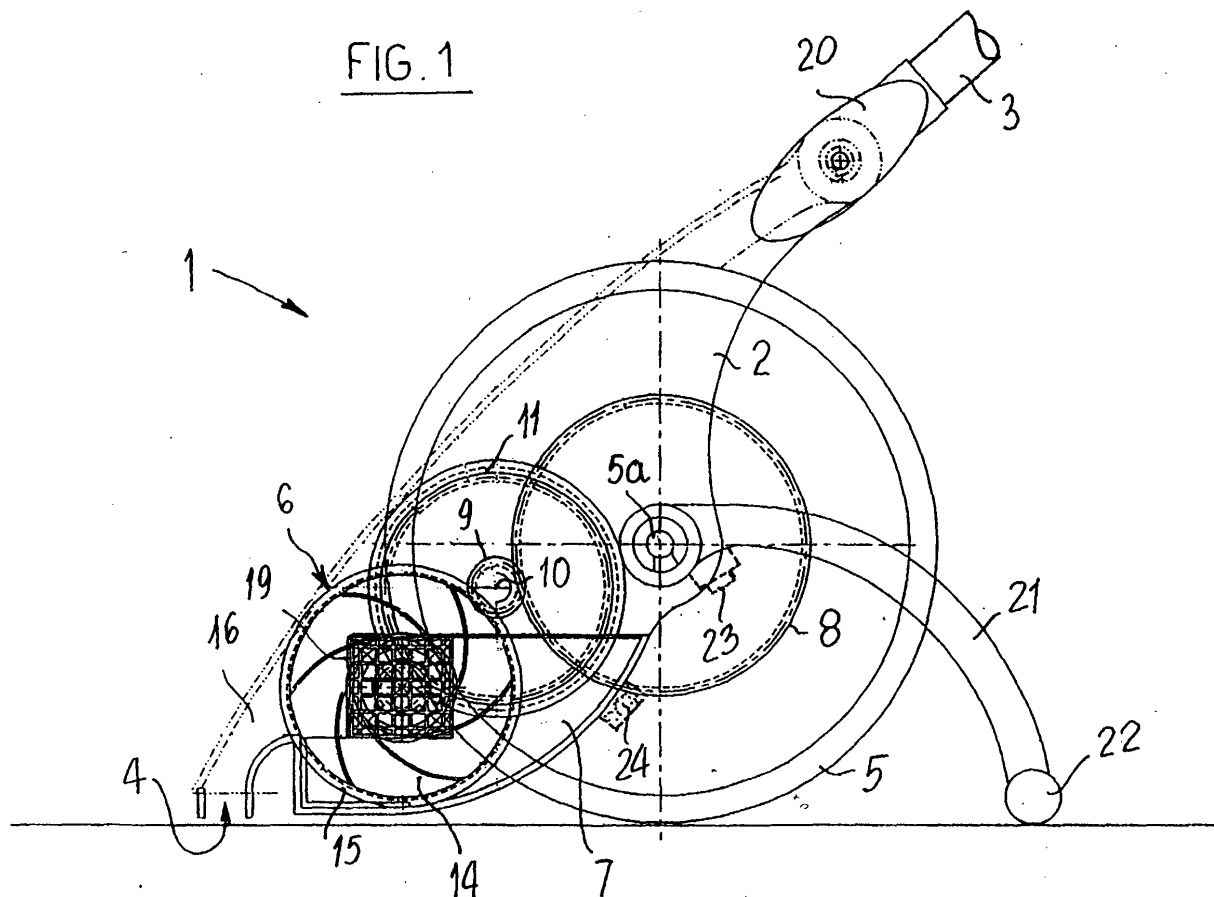
(30) Priority: **22.09.2000 IT MO000196**

(71) Applicant: **NEXT-AT s.r.l.**
41100 Modena (IT)

(54) **Kinetic broom**

(57) The kinetic broom (1) comprises a self-supporting box-like body (2) with a manoeuvring handle (3) at the top and a suction mouth (4) at the bottom as well as at least two wheels (5) on either side for its translation,

at least one of which drives an operating suction unit (6) connected to a dirt collection drawer (7), said operating suction unit (6) and collection drawer (7) being housed in said self-supporting box-like body (2).



EP 1 190 659 A2

Description

[0001] The present invention regards a kinetic broom.

[0002] For some time small electric brooms have been used generally in the home that perform well both in terms of their operating performance and their ease of handling for the people using them, usually women.

[0003] Such brooms essentially comprise an attractively designed and functional box-like body that permits access to the most awkward corners. Inside the box-like body there is housed a suitably powerful electric motor group arranged to drive an impeller that in turn sucks air from a dirt collection chamber. The dirt collection chamber is also in communication with an end opening facing towards, and designed to slide along, the surfaces that are being cleaned.

[0004] As stated above, the prior art electric brooms, although providing good general performance, do require a motor group that has to be connected either through a cable to the mains or supplied by a battery pack that can be recharged on the domestic mains supply by using recharge units supplied for that purpose.

[0005] It would be desirable to improve the state of the art both in terms of production costs, that reflect not only all the normal components but also the imperative need for a motor for it to work and possibly a battery pack and recharge unit, and in terms of environmental impact of the product. The disposal of exhausted batteries and motor metal parts when the broom has to be repaired or scrapped, involve additional costs that have to be added when determining the broom's selling price, bearing in mind that such components must be separated and sent to public disposal facilities in special containers for each type of material.

[0006] Moreover, though simple, the motor group and any battery pack are also quite heavy, and thus it can become tiring for the user to make use of such brooms frequently.

[0007] The main object of the present invention is to solve the above problems by providing a kinetic broom that does not require an electric motor or batteries or cables for connection to the mains supply, that is significantly lighter and easier to handle and whose production costs are competitive.

[0008] This and other objects are achieved by a kinetic broom characterised in that it comprises a self-supporting box-like body having a manoeuvring handle at the top, a suction opening at the bottom and at least one lateral translation wheel at each side thereof, at least one of said wheels is arranged to drive a suction unit in communication with a dirt collection container, the said suction unit and dirt collection container being housed in said self-supporting box-like body.

[0009] Advantageously, the said suction unit comprises a pair of toothed crown gears which are rigid in rotation with said translation wheels, a transmission shaft mounted for rotation in said box-like body, a first driven gear meshing with a respective crown gear and keyed

to said transmission shaft, at least one second driven gear keyed to said transmission shaft, an impeller shaft mounted for rotation in a respective seat, a third gear in cascade engagement with said second gear and keyed to said impeller shaft, and a dirt conveying duct extending between the said suction opening and the said dirt collection container.

[0010] Further aspects and advantages of the present invention will better appear from the following description of a preferred embodiment of a kinetic broom given merely by way of non-limiting example, with reference to the accompanying drawings, in which:

- Figure 1 shows a side and see-through view of a kinetic broom in accordance with the present invention;
- Figure 2 shows a top and see-through view of the kinetic broom of Fig. 1; and
- Figure 3 is a respective front view of the kinetic broom as illustrated in Figure 2.

[0011] With reference to the above Figures, a kinetic broom is indicated at 1 and comprises a box-like body 2, that is self-supporting and has a manoeuvring handle 3 at the top and a suction opening 4 at the bottom, as well as at least two side translation wheels 5, e.g. mounted for rotation about a shaft 5a.

[0012] At least one of the said wheels 5 drives a suction group 6, that communicates with a dirt collection drawer 7. Both the suction group 6 and the collection drawer 7 are housed inside the self-supporting box-like body 2.

[0013] More particularly, the suction group 6, that is operated by repeated pushing movements of the user, comprises a pair of toothed crown gears 8 each of which is coaxial and rigid with the inside face of a respective wheel 5 and engages with a respective first driven gear 9 that is keyed to an end of a transmission shaft 10 mounted for rotation inside the box-like body 2 and extending parallel to shaft 5a. To the transmission shaft 10 there is also keyed at least one second gear 11, which is in turn engaged in a cascade with a third gear 12 in its turn keyed to a rotary shaft 13 of an impeller 14, the rotary shaft 13 extending parallel to shafts 5a and 10.

[0014] The impeller 14 is mounted for rotation in a respective seat 15 preferably located at the end of a duct 16 through which dirt entering the suction opening 4 is conveyed to the dirt collection drawer 7 (Fig. 1).

[0015] On the same rotary shaft 13 of the impeller 14 a flywheel 17 is also keyed. Moreover, the rotary shaft 13 comprises two co-axial telescopic sections 13a and 13b of which the first section 13a is supported by a free-wheel device and the second section 13b is supported by the self-supporting box-like body 2. The sections 13a and 13b can be operatively connected to each other through a key system known per se, not shown in the drawings, so that they are rigidly coupled in one direction of rotation.

[0016] A filter element 19 is provided between the seat 15 of the impeller 14 and the suction duct 16. In addition, this said seat 15 has an outlet 15a for the discharge of purified air (Fig. 2).

[0017] The self-supporting box-like body 2 is essentially shaped as a pyramid with rounded edges. Through the base of the pyramid the lower suction opening 4 is formed, whereas at the top of the pyramid a coupling 20 is provided for connection to the manoeuvring handle 3 (Figs. 1 and 3).

[0018] One end of a foldaway foot extension 21 is suitably pivoted to the shaft 5a at the back of the box-like body 2 and its other end is provided with at least one ground wheel 22. The foot extension 21 can thus be manually moved, after the kinetic broom 1 has been lifted from the ground, between an extended position in which it is extended backwards away from the box-like body 2 so that the ground wheel 22 is in contact with the ground (Fig. 1) and a retracted position in which it is leant against and partly underneath the box-like body 2 by being rotated backwards and downwards about the shaft 5a.

[0019] The foldaway foot extension 21 also carries a block member 23 located at its end close to the shaft 5a and arranged to engage with and block the gear 11 against rotation when the foot extension 21 is in its retracted position (Fig. 1).

[0020] To keep the foldaway foot extension 21 in its retracted position, the box-like body 2 carries, at its rear area, one or more hooks 24 that can snap engage with the foot extension 21.

[0021] The operation of the above described kinetic broom according to the present invention is as follows: the user places the foot extension 21 in its extended position and then pushes the kinetic broom 1 by acting on the handle 3, thus causing the wheels 5 to translate along the floor (ground).

[0022] The wheels 5 are thus caused to rotate and while rotating transmit the motion to the kinetic suction motor group 6 and, consequently, also to the impeller 14, through the cascade engagement between crown gears 8 and gears 9, 11, 12, advantageously engaging with one another in pre-established transmission ratios, thereby obtaining a gearing-up in the speed of rotation of the impeller 14.

[0023] The latter creates a partial vacuum both in the drawer 7 and the duct 16 and thus at the suction opening 4.

[0024] The rotation of the impeller 14 can only occur in one direction because the two sections 13a and 13b forming the shaft 13 can be so engaged as explained above. In addition, the flywheel 17, keyed to the same shaft 13, or more precisely to its section 13b supported by the freewheel device 18, enables the impeller to maintain the impeller 14 in rotation by inertia also during the short idle times that may occur during manoeuvring and translation of the kinetic broom 1 along the floor.

[0025] Any dirt collected through the suction opening

4 is deposited in the drawer 7 that can be taken off when full, emptied and replaced in the box-like body 2.

[0026] To make manoeuvring the kinetic broom 1 easier and lighter, there the foot extension 21 is provided at the back part of the box-like body 2 with the wheel 22 for floor contact.

[0027] When the kinetic broom 1 is going to be put away after use, the foot extension 21 is folded back against and partly underneath the box-like body 2. In this configuration, the locking member 23 comes into contact with the gear 11 to block it against rotation and thus it blocks all moving components of the kinetic broom 1. The latter can then be put away like a conventional bristle broom.

[0028] When the kinetic broom is in use, suction takes place as a result of the partial vacuum generated by the translation of the kinetic broom 1 along the floor, with no need for an electric motor, battery or other means, but simply by using the power developed by the user's pushing action.

[0029] All the components in the kinetic broom 1 can be made with easily recyclable materials that reduce the cost of disposal to a minimum should the kinetic broom 1 get irreparably damaged.

[0030] It has been found that in practice the invention as described above effectively achieves the objects set out at the beginning of the present description.

[0031] The present invention is susceptible to numerous modifications and variations all falling within the scope of the defined by the claims.

[0032] Moreover, all the details can be replaced by other technically equivalent details.

Claims

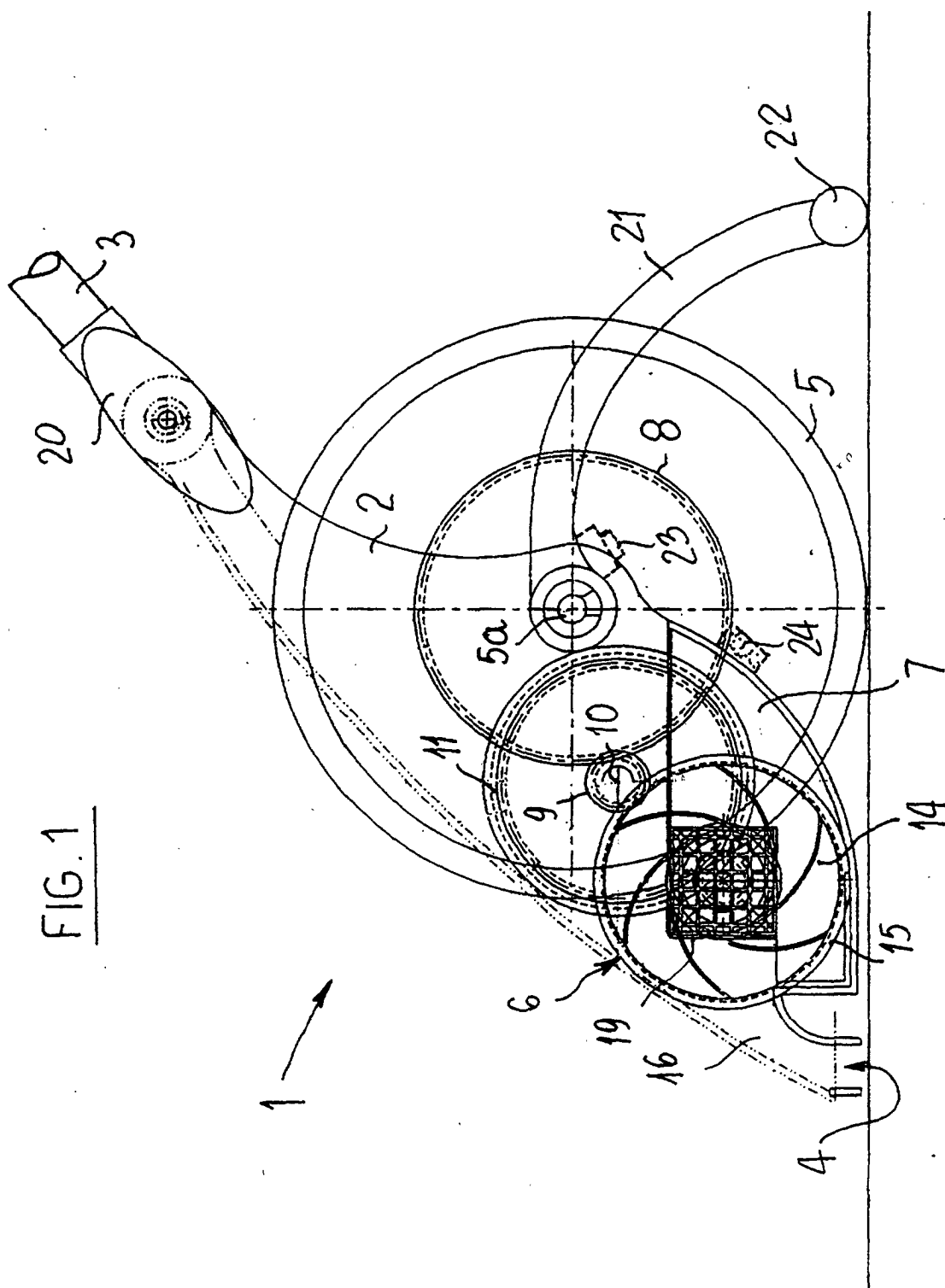
1. A kinetic broom **characterised in that** it comprises a self-supporting box-like body (2) having a manoeuvring handle (3) at the top thereof, a suction opening (4) at the bottom thereof, at least one lateral translation wheel (5) at each side thereof, a suction unit (6) located in said box-like body (2) in communication with said suction opening (4) and operatively connected to, and driven by, at least one of said wheels (5), and a dirt collection container (7) located in said box-like body (2) and in communication with said suction unit (6).
2. A kinetic broom according to claim 1, **characterised in that** the said suction unit (6) comprises a pair of toothed crown gears (8) which are rigid in rotation with said translation wheels (5), a transmission shaft (10) mounted for rotation in said box-like body (2), at least one first driven gear (9) meshing with a respective crown gear (8) and keyed to said transmission shaft (10), at least one second driven gear (11) keyed to said transmission shaft (10), an impeller shaft (13) parallel to said transmission

shaft (10) and mounted for rotation in said box-like body (2), at least one third gear (12) in cascade engagement with its respective second gear (11) and keyed to said impeller shaft (13), an impeller (14) located in a seat (15) and keyed to said impeller shaft (13), and a dirt conveying duct (16) extending between the said suction opening (4) and the said dirt collection container (7).

3. A kinetic broom according to claim 2, is **characterised in that** it comprises a flywheel keyed at least on the said impeller shaft (13). 5
4. A kinetic broom according to claim 2 or 3, **characterised in that** the said impeller shaft (13) comprises two coaxially telescoped sections, the first one (13a) of which is supported by a free-wheel device and the second one (13b) is supported by said self-supporting box-like body (2), the said sections (13a, 13b) being connectable to one another in one direction of rotation through a locking mechanism. 10 15 20
5. A kinetic broom according to any previous claim, **characterised in that** a filter element (19) is provided between said seat (15) for said impeller (14) and said conveying duct (16). 25
6. A kinetic broom according to any claim 2 to 5, **characterised in that** the said impeller seat (15) has an outlet (15a) for releasing filtered air. 30
7. A kinetic broom according to any previous claim, **characterised in that** the said self-supporting box-like body (2) is substantially pyramid-shaped with rounded edges, the base of the body (2) being formed with said suction opening (4) at the bottom thereof and its top with a coupling (20) for said handle (3). 35
8. A kinetic broom according to any previous claim, **characterised in that** it comprises a shaft (5a) on which said lateral translation wheels (5) are mounted free to rotate. 40
9. A kinetic broom according to any previous claim, **characterised in that** the said self-supporting box-like body (2) has at least one foldaway foot extension (21). 45
10. A kinetic broom according to claims 8 and 9, **characterised in that** the said foot extension (21) has one end thereof linked to the said shaft (5a), and its other end is provided with a freely rotating wheel (22) for contact with the ground, and a blocking member (23) carried thereon and arranged to block the rotation of said second gear (11), whereby said foot extension (21) can be folded back against and partly underneath said box-like body (2) to a folded 50 55

position where it comes into contact with said gear (11) to block it against rotation and folded forwards to an extended position in which said freely rotating wheel (22) is in contact with the ground.

11. A kinetic broom according to claim 10, **characterised in that** it comprises at least one hook member (24) carried by said self-supporting box-like body (2) and arranged to snap engage with said foot extension (21) when in its retracted position thereby keeping the same stably in the folded position thereof.



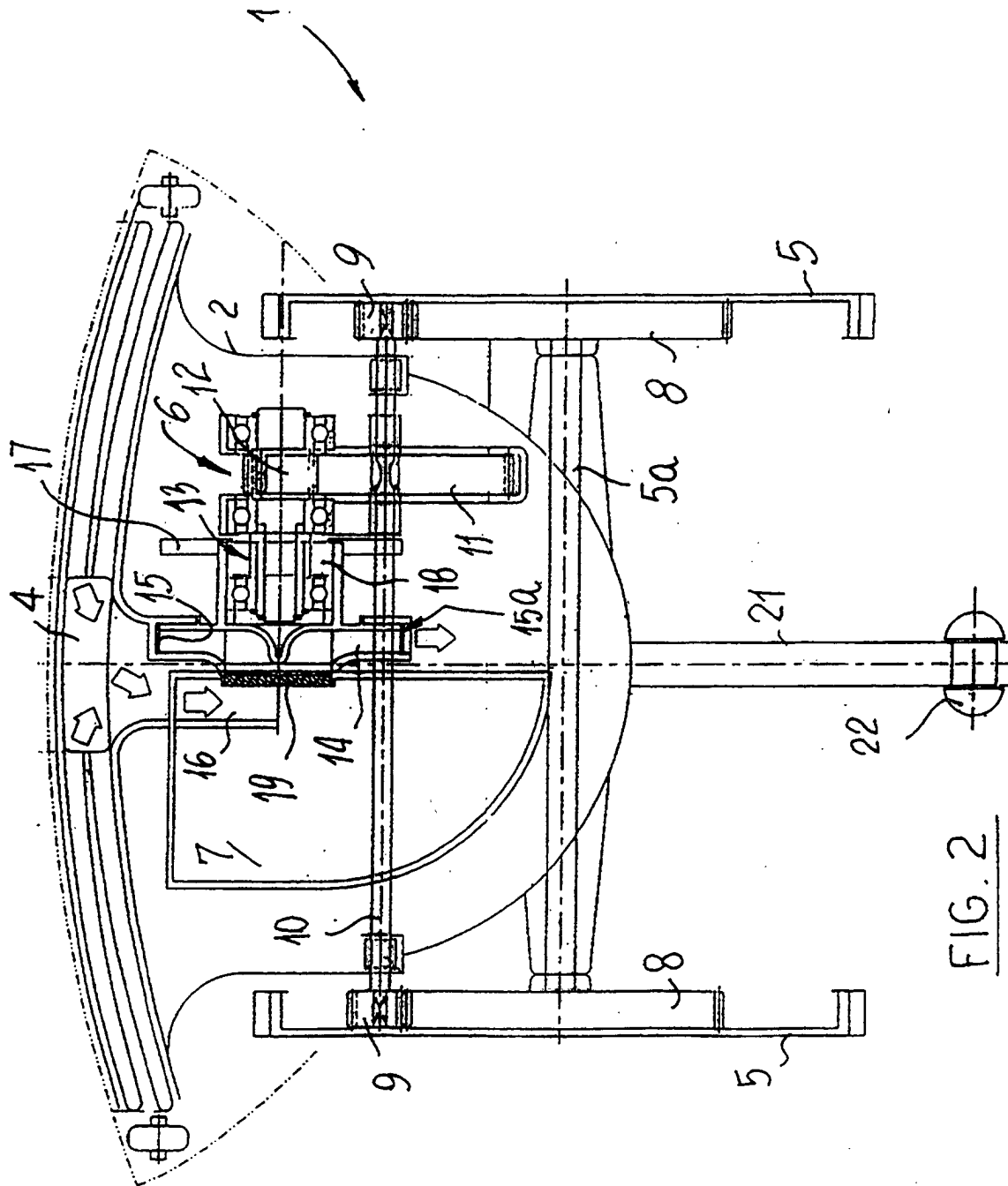


FIG. 2

