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

(11) EP 1 524 367 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.04.2005 Bulletin 2005/16

(51) Int Cl.[7]: **E01C 19/28**

(21) Application number: **04104908.1**

(22) Date of filing: **07.10.2004**

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

(30) Priority: **15.10.2003 IT VI20030047 U**

(71) Applicant: **Veneta Tecnologie SRL**
36075 Montecchio Maggiore (VI) (IT)

(72) Inventor: **Gelai, Luciano**
36073, CORNEDO VICENTINO (VI) (IT)

(74) Representative: **Bonini, Ercole et al**
Corso Fogazzaro, 8
36100 Vicenza (IT)

(54) Soil compactor.

(57) A soil compactor (1), comprising: a frame (2) which supports at least a front cylindrical roller (3, 4) and at least a rear cylindrical roller (5) with horizontal axes (X; Y), able to be disposed resting on the soil (S) to be compacted; a driving group (6) for one or more of the rollers; a steering group (7) of the compactor. The driving group (6) comprises one or more electric motors (8, 9) mechanically coupled with at least one of the rollers (5) and electrically connected to electric feeding means (40).

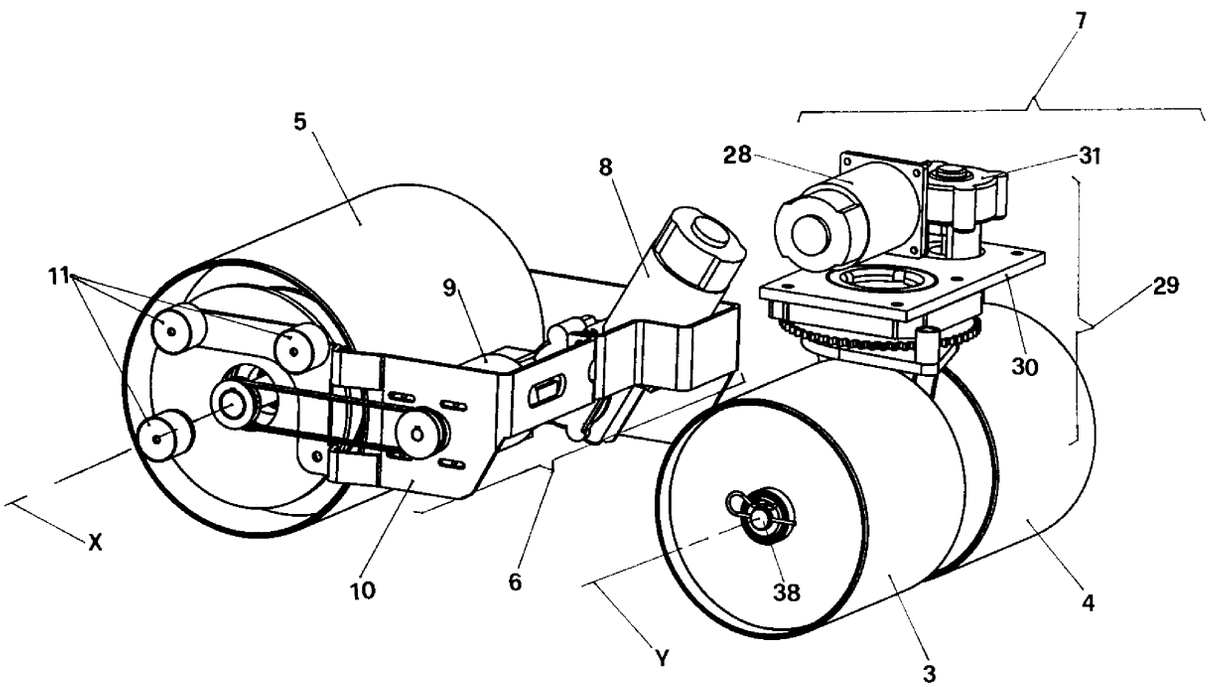

FIG. 5

EP 1 524 367 A2

Description

[0001] The invention is about a soil compactor of cylindrical drum type, suitable in particular to be used to perform compaction, levelling and flattening works on surfaces with limited extension.

[0002] It is known that, to perform works on small surfaces like for instance the flattening and the levelling of lay-byes, or bituminized or tiled sidewalks, vibrating plates activated by thermal engines and driven by an operator are currently used.

[0003] In particular, the vibrating plates of known type are carried out with different size according to the extension of the surface to be worked, but they all essentially consist of a frame provided with a handling drawbar, supporting a plane surface plate which is put in contact with the surface to be compacted.

[0004] The plate is connected to a thermal engine by means of a shaft with eccentric masses which, by rotating, makes the plate to vibrate obtaining the soil compaction.

[0005] The inertia that the vibration gives to the plate also causes at the same time the advancement of the whole compactor, guided by the operator in the desired direction by manoeuvring the shaft.

[0006] However, the vibrating plates of known type have some acknowledged inconveniences.

[0007] A first inconvenience is due to the fact that they are not provided with steering devices so that, to change the advancement direction and/or sense when they arrive at the limit of the working area or at a corner, the operator manually acts on the drawbar, causing the plate to graze the finished surface.

[0008] This evidently involves a considerably effort for the operator, with the possibility that the just flattened surface is damaged during the manoeuvre.

[0009] Another inconvenience is due to the fact that the advancement and the vibration, being produced by the same engine, cannot be separated and consequently it is not possible to perform the soil compaction without the vibrating plate also performs a contemporary vibrating action.

[0010] Therefore, the levelling operation of surfaces covered with tiles or bricks could involve the breaking of said tiles or said bricks, especially if the underlying soil is stony.

[0011] Not the least inconvenience is due to the fact that, being the vibrating plate activated by a thermal engine, this one pollutes the environment with exhaust emissions and noise.

[0012] To at least partially overcome the aforesaid inconveniences, small size roller compactors which, being provided with steering wheels and roller rotation devices, makes easier the flattening and compaction operation, are used instead of the vibrating plates.

[0013] In particular, the roller compactors move back and forth on the surface to be worked by rollers rotation, independently from the fact that vibrating devices are applied on them or not.

[0014] The roller compactors can thus compact the ground with or without making use of vibrations, reducing the breaking risk when surfaces covered with bricks or tiles leaning on stony soils are compacted and flattened.

[0015] However, even roller compactors have the inconvenience to be pollutant for the environment in which they operate, since they are activated by thermal engines of the same kind of those used for vibrating plates.

[0016] Moreover, the activation with a thermal engine also involves the need to provide for at least a speed gear, a brake, a clutch and connection joints to put in rotation the rollers and move forward the compactor.

[0017] All these things increase the roller compactors productive costs with respect to the correspondent vibrating plates.

[0018] Furthermore, the need to provide for a fuel tank does not allow to obtain roller compactors with thermal engines of reduced size and overall dimensions, comparable to those of the vibrating plates.

[0019] The present invention intends to overcome the aforesaid inconveniences and limitations.

[0020] In particular, it is an object of the invention to provide for a roller compactor which is less pollutant for the environment in which operates with respect to roller compactors of known type.

[0021] It is another object that the roller compactor of the invention has lower productive costs with respect to equivalent roller compactors of known type.

[0022] It is a further object that the roller compactor of the invention has lower size, weights and overall dimensions with respect to the roller compactors available on the market.

[0023] Not the least object is that the compactor of the invention has comparable size and weights with those of the vibrating plates.

[0024] The above mentioned objects are attained by a soil roller compactor which, according to the main claim, comprises:

- a frame which supports at least a front cylindrical roller and at least a rear cylindrical roller with horizontal axes, able to be disposed resting on the soil to be compacted;
- at least a driving group for one or more of said rollers;
- a steering group of said compactor,

and it is characterized in that said driving group comprises one or more electric motors mechanically coupled with at least one of said rollers and electrically connected to electric feeding means.

[0025] According to the invention, the compactor comprises a single rear roller and a pair of front rollers, coaxially disposed side by side.

[0026] The rear roller receives from the driving group:

- the rotation which moves back and forth the compactor;
- the vibration which enhances the soil compaction.

[0027] The vibration and the rotation are generated by mutually independent electric motors, so that the roller vibration and rotation can be mutually independent or concurrent according to the choice of the operator who manoeuvres the control means.

[0028] The steering means comprise a steering group interposed between the front rollers and a push and/or traction structure connected to the frame and provided with a handle to which control push buttons manoeuvrable by the operator are fixed.

[0029] According to a different executive embodiment, the steering means also comprise a remote control.

[0030] Advantageously, the roller compactor of the invention, being activated by electric motors, is less pollutant with respect to both the vibrating plates and the known roller compactors activated by thermal engines.

[0031] More advantageously, the elimination of some mechanical components, like for instance the speed gear and the clutch, required in case of a thermal engine, reduces the productive cost and thus the selling price of the compactor.

[0032] At last, still advantageously, the elimination of the fuel tank allows to reduce weights and overall dimensions.

[0033] The aforesaid objects and advantages will be better highlighted in the description of a preferred embodiment of the compactor of the invention, given in an explanatory but not limiting way, with reference to the figures of the annexed drawings, wherein:

- Figure 1 is an axonometric view of the compactor of the invention;
- Figure 2 is another axonometric view of the compactor of Figure 1, shown with the hood opened;
- Figure 3 is a bottom axonometric view of the compactor of Figure 1, without the hood;
- Figure 4 is a side view of the compactor of Figure 1;
- Figures 5 to 8 are different axonometric views of the compactor of the invention, which is shown without frame and hood; and
- Figure 9 is an axonometric view of a detail of any of the Figures 5 to 8.

[0034] The soil compactor of the invention is shown in Figures 1 to 4, where it is generally indicated with numeral **1.**

[0035] One can see that it comprises a frame **2** which supports a pair of front cylindrical rollers **3, 4** and a rear cylindrical roller **5,** which are disposed resting on the soil to be compacted, generally indicated with **S.**

[0036] A driving group, generally indicated with numeral **6** and shown in detail in Figures 5 to 9, forces the rotation and the vibration of the rear cylinder **5,** while a steering group, generally indicated with numeral **7** and particularly visible in greater detail in Figure 9, allows the steering of the front cylindrical rollers **3, 4.**

[0037] According to the invention, the driving group **6** comprises one or more electric motors, mechanically coupled with at least one of said rollers and electrically connected to electric feeding means.

[0038] In particular, the driving group **6** comprises a traction electric motor **8** and a vibration electric motor **9,** which are both connected to the rear cylindrical roller **5.**

[0039] In the executive embodiment described hereby there is a single rear roller **5**, but in different executive embodiments, similarly to the aforementioned front rollers **3, 4,** said roller can be formed by one or more mutually coaxial rollers disposed side by side.

[0040] The rear cylindrical roller **5,** the traction electric motor **8** and the vibration electric motor **9** are supported by a single counter-frame **10** provided with elastic means **11,** which are housed inside holes **2a** of the frame **2,** as one can see in Figures 1 to 4, to provide for a dampened connection between the frame **2** and the counter-frame **10**.

[0041] More particularly, the rear cylindrical roller **5,** as one can see in greater detail in Figures 7 and 8, is supported by a rear rotation shaft, generally indicated with numeral **12,** which defines the rear longitudinal rotation axis **X** of the rear cylindrical roller **5.**

[0042] The rotation shaft **12** is composed by a traction half-shaft **13** mechanically connected to the traction electric motor **8** and by a vibration half-shaft **14,** coaxial with the traction half-shaft **13,** mechanically connected to the vibration electric motor **9.**

[0043] In particular, the traction electric motor **8** is mechanically connected to the traction half shaft **13** by the interposition of a traction kinematic group, generally indicated with numeral **15,** which comprises a speed reducer **16** having the inlet shaft **17** coupled with the shaft of the traction motor **8** and the outlet shaft **18** provided with a first toothed pinion **19** which engages with a chain **20** wound as a loop ring on a second pinion **21** coaxial with the traction half-shaft **13.**

[0044] The latter is also provided with a coupling flange **22** to the rear drum **5.**

[0045] With regard instead to the vibration electric motor **9,** it is mechanically connected to the vibration half-shaft **14** by means of a vibration kinematic group, generally indicated with numeral **23,** comprising a first toothed pulley **24** coupled with the shaft of the vibration motor **9,** which engages with a toothed belt **25** wound as a loop ring on a second toothed pulley **26** coaxial with the vibration half-shaft **14** that externally comprises an eccentric mass **27.**

[0046] It is evident that, also for transmitting the vibration, the kinematic mechanism could provide for the utilization of chains and pinions, and the rotation transmission could similarly provide for the utilization of pulleys and toothed belts.

[0047] As far as the steering group, generally indicat-

ed with numeral **7,** is concerned, it comprises a steering electric motor **28** coupled with a steering kinematic mechanism, generally indicated with numeral **29,** which is mechanically connected to the pair of front cylindrical rollers **3, 4.**

[0048] The steering kinematic mechanism **29** and the steering electric motor **28** are both supported by a plate **30** which is connected to the frame **2** through fastening means.

[0049] Concerning in particular the steering kinematic mechanism **29**, it comprises a speed reducer **31** having the inlet shaft **32** coupled with the shaft of said steering electric motor **28,** and the outlet shaft **33** provided with a pinion **34** which, by means of a chain not shown in the drawings for sake of simplicity, engages with a crown gear **35,** coaxially to which a fork **36** is disposed.

[0050] The end of the fork **36** supports a sleeve **37,** to which the front rotation shaft **38** which supports the front cylinders **3, 4,** defining their front longitudinal rotation axis **Y,** is centrally connected.

[0051] The traction **8,** vibration **9** and steering **28** electric motors are electrically connected to electric feeding means, consisting of a battery of accumulators, generally indicated with numeral **40,** shown in detail in Figures 2 and 3.

[0052] The steering group, generally indicated with numeral **7,** also comprises a push and/or traction structure **41**, as one can see in Figures 1 to 4, provided with a grasping handle **42** to be held by the operator and with control means **43** operable by said operator through push buttons **44** or manipulators **45.**

[0053] An electric wire **46** connects, through plug and outlet **47,** the control means to a control and adjustment unit, not shown in the drawings, which is electrically connected to the battery of accumulators **40** and to the electric motors.

[0054] Although it is not shown in the drawings, the steering group can also comprise radio communication means in order to allow to drive the compactor from a remote place.

[0055] A container **50**, supported by the frame **2** and provided with a loading mouth **51,** serves to contain a liquid, preferably water, which is conveyed at the cylindrical rollers through conduits, not shown in the drawings, in order to enhance the compaction and smoothing operation, especially when asphalt is worked.

[0056] Operatively the user, by acting on the control means **43,** makes the compactor to advance or to move back and at the same time to steer it, taking it to work in the desired places in a very easy way and without needing to apply any effort to steer or to reverse the motion.

[0057] Moreover, as preferred by the user, the compactor could be made to advance or to move back with or without vibration.

[0058] Therefore, it should be understood that the compactor of the invention achieves all the intended objects.

[0059] In particular, the use of electric motors reduces the pollution due both to the noise and to the exhaust emissions which instead are discharged in the environment by the thermal engines equipping the vibrating plates and the compactors of known type.

[0060] Moreover, the greater constructional simplicity of the compactor makes easier and cheaper its manufacture and also improves its sales, which can be made at a lower price with respect to the equivalent compactors of known type.

[0061] At last, the operator works in lesser weariness and greater safety conditions and in a less polluted environment.

[0062] Furthermore, using the wireless remote control, the compactor could operate in uncomfortable situations for a person and in hardly accessible places.

[0063] Modifications to the shape and size, and eventually also to the kinematic mechanisms for transmitting and generating the motions could be introduced to the compactor of the invention in the productive stage.

[0064] In particular, such devices could be modified even in their position with respect to what illustrated and described.

[0065] However, it is intended that said executive embodiments, and any not described and not cited others, when they should be introduced to the compactor of the invention and fall within the scope of protection of the following claims, should be considered protected by the present patent.

Claims

1. A soil compactor (1), comprising:

- a frame (2) which supports at least a front cylindrical roller (3, 4) and at least a rear cylindrical roller (5) with horizontal axes (X; Y), able to be disposed resting on the soil (S) to be compacted;
- at least a driving group (6) for one or more of said rollers;
- a steering group (7) of said compactor,

characterized in that said driving group (6) comprises one or more electric motors (8, 9) mechanically coupled with at least one of said rollers (5) and electrically connected to electric feeding means (40).

2. The compactor (1) according to claim 1), **characterized in that** said driving group (6) comprises at least a traction electric motor (8) and at least a vibration electric motor (9), which are both mechanically connected to at least one of said cylindrical rollers (5).

3. The compactor (1) according to claim 2), **charac-**

terized in that it comprises a single rear cylindrical roller (5), with which said traction electric motor (8) and said vibration electric motor (9) are mechanically coupled.

4. The compactor (1) according to claim 3), **characterized in that** said rear cylindrical roller (5), said traction electric motor (8) and said vibration electric motor (9) are supported by a single counter-frame (10), provided with elastic means (11) for its connection to said frame (2).

5. The compactor (1) according to claim 1), **characterized in that** said steering group (7) comprises at least a steering electric motor (28), coupled with a steering kinematic mechanism (29) mechanically connected to at least one of said cylindrical rollers (3, 4).

6. The compactor (1) according to claim 5), **characterized in that** it comprises a pair of mutually coaxial front rollers (3, 4) disposed side by side, both supported by a single front rotation shaft (38) connected in a central position to said steering kinematic mechanism (29).

7. The compactor (1) according to claim 6), **characterized in that** said steering motor (28) and said steering kinematic mechanism (29) are supported by a plate (30) fixed to said frame (2).

8. The compactor (1) according to claim 5), **characterized in that** said steering group (7) also comprises a push and/or traction structure (41) fixed to said frame (2), provided with a grasping handle (42) to be held by the operator and with control means (43) operable by said operator.

9. The compactor (1) according to claim 4), **characterized in that** said rear cylindrical roller (5) is supported by a rear rotation shaft (12) able to define the rear longitudinal rotation axis (X) of said rear cylindrical roller (5), said rear rotation shaft (12) being composed by a traction half-shaft (13) mechanically connected to said traction electric motor (8) and by a vibration half-shaft (14), coaxial with said traction half-shaft (13), mechanically connected to said vibration electric motor (9).

10. The compactor (1) according to claim 9), **characterized in that** said traction electric motor (8) is mechanically connected to said traction half-shaft (13) through a traction kinematic group (15).

11. The compactor (1) according to claim 10), **characterized in that** said traction kinematic group (15) comprises a speed reducer (16), having the inlet shaft (17) coupled with the shaft of said traction motor (8) and the outlet shaft (18) provided with a first pinion (19) which engages with a chain (20) wound as a loop ring on a second pinion (21) coaxial with said traction half-shaft (13), said traction half-shaft (13) being provided with a coupling flange (22) to said rear drum (5).

12. The compactor (1) according to claim 9), **characterized in that** said vibration electric motor (9) is mechanically connected to said vibration half-shaft (14) through a vibration kinematic group (23).

13. The compactor (1) according to claim 12), **characterized in that** said vibration kinematic group (23) comprises a first toothed pulley (24), coupled with the shaft of said vibration motor (9), which engages with a toothed belt (25) wound as a loop ring on a second toothed pulley (26) coaxial with said vibration half-shaft (14), said vibration half-shaft (14) being externally provided with at least an eccentric mass (27).

14. The compactor (1) according to claim 6), **characterized in that** said steering kinematic mechanism (29) comprises a speed reducer (31) having the inlet shaft (32) coupled with the shaft of said steering electric motor (28), and the outlet shaft (33) provided with a pinion (34) which engages with a chain wound as a loop ring on a crown gear (35), coaxially to which a fork (36), having a sleeve (37) coupled in central position with said front rotation shaft (38) of said front cylindrical rollers (3, 4), is present.

15. The compactor (1) according to claim 1), **characterized in that** said electric feeding means consist of a battery of accumulators (40).

16. The compactor (1) according to claim 1), **characterized in that** it comprises a liquid container (50) supported by said frame (2) and provided with conduits able to convey said liquid at one or more of said cylindrical rollers (3, 4, 5).

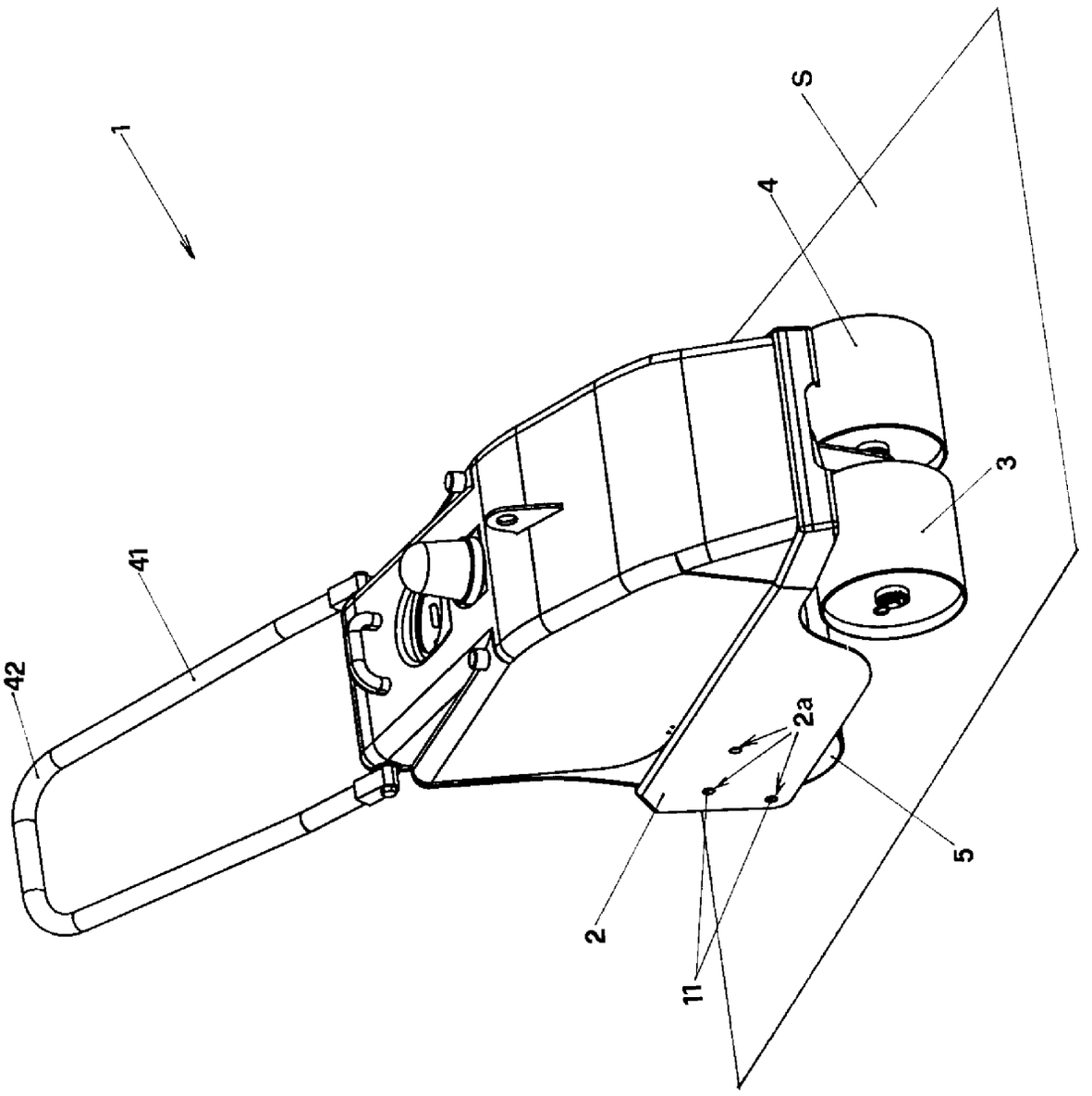

FIG.1

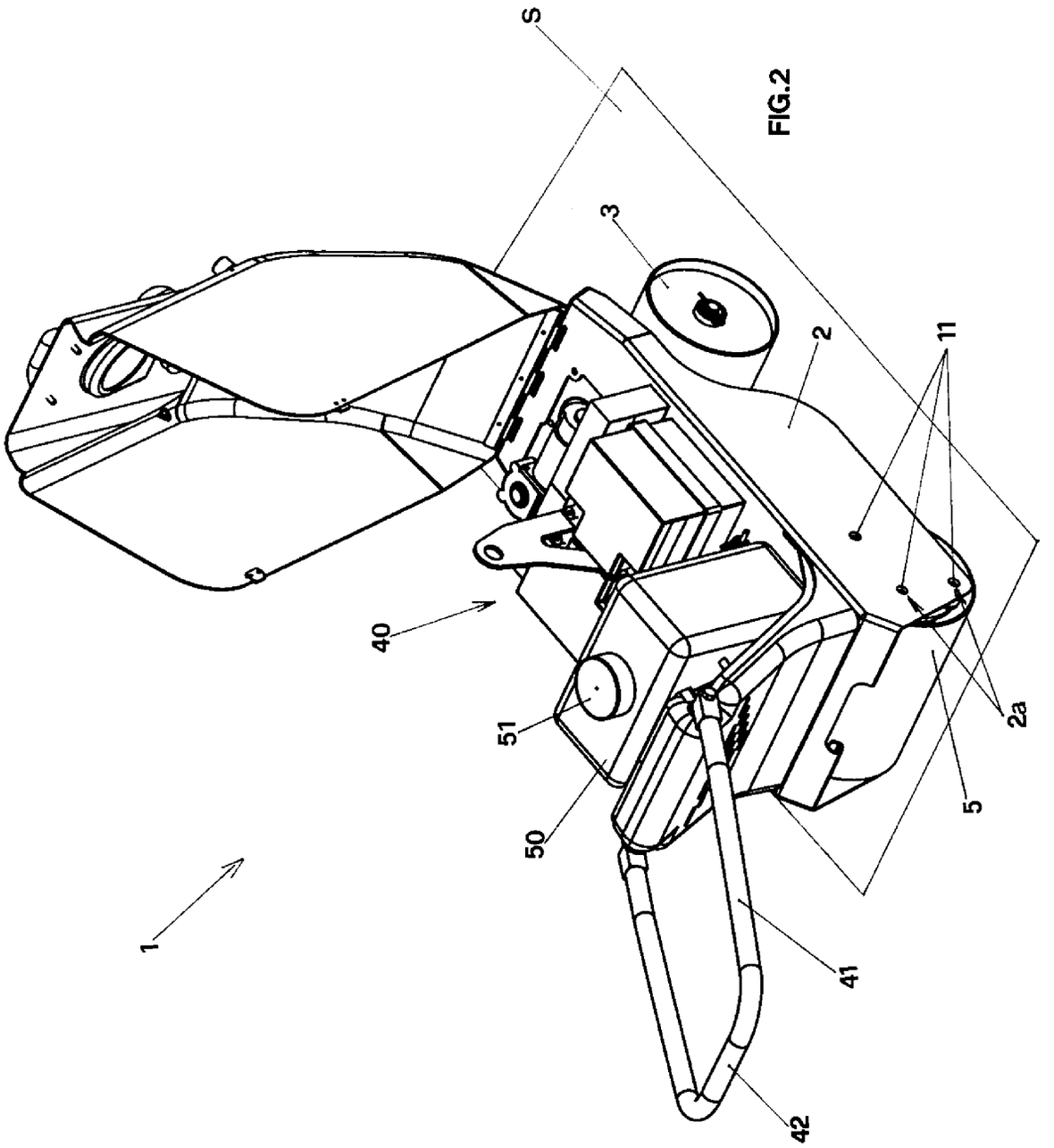

FIG.2

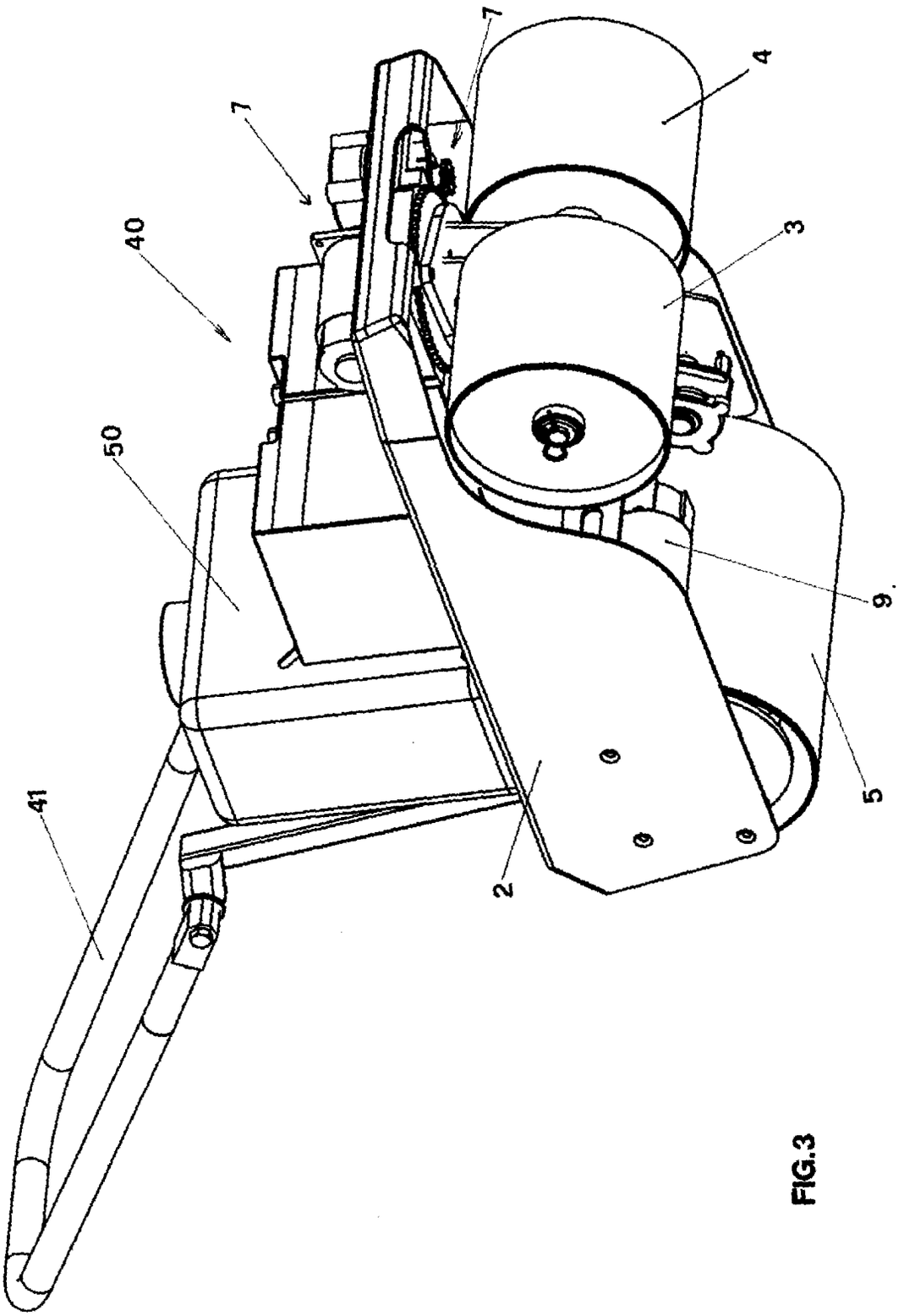

FIG.3

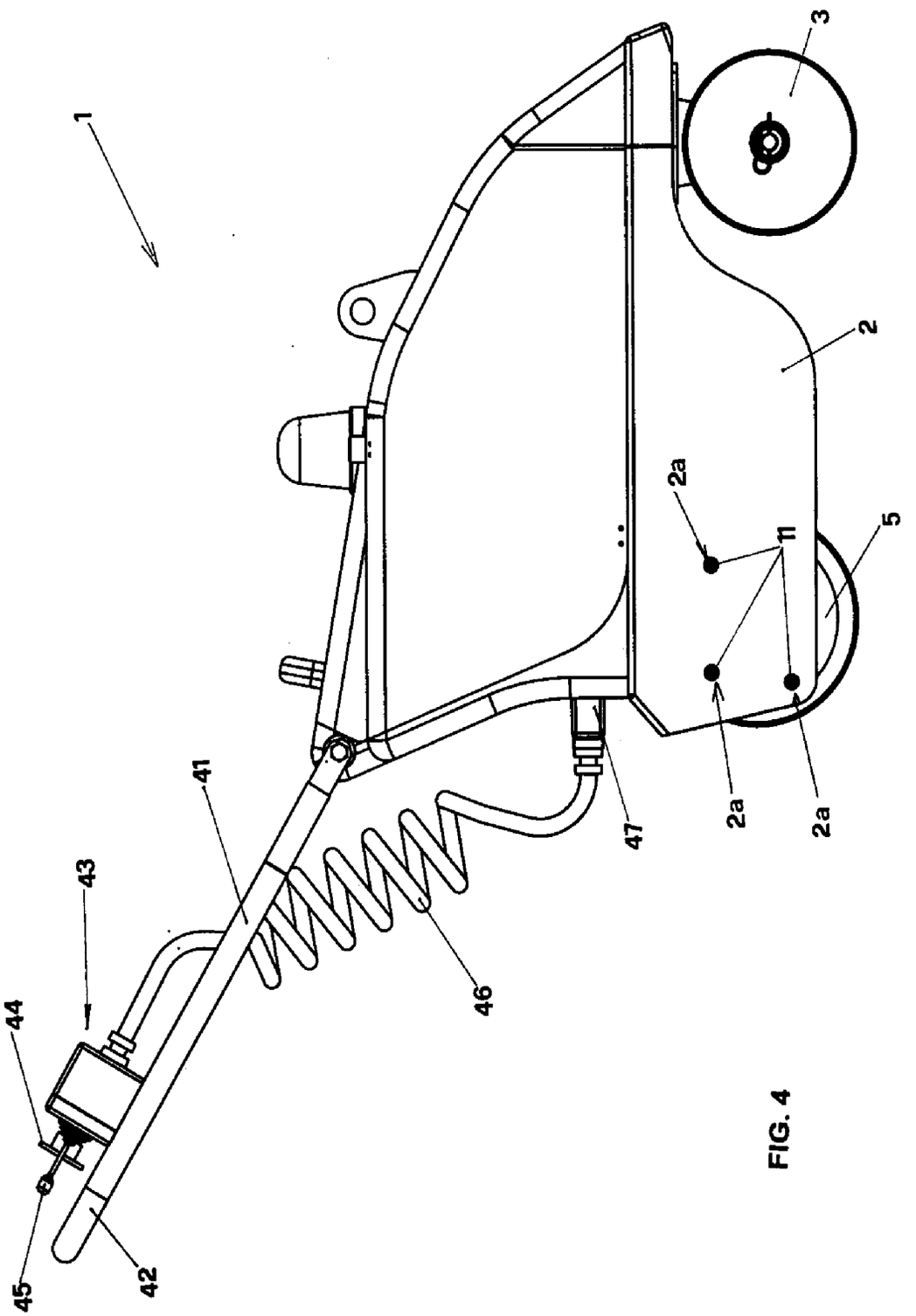

FIG. 4

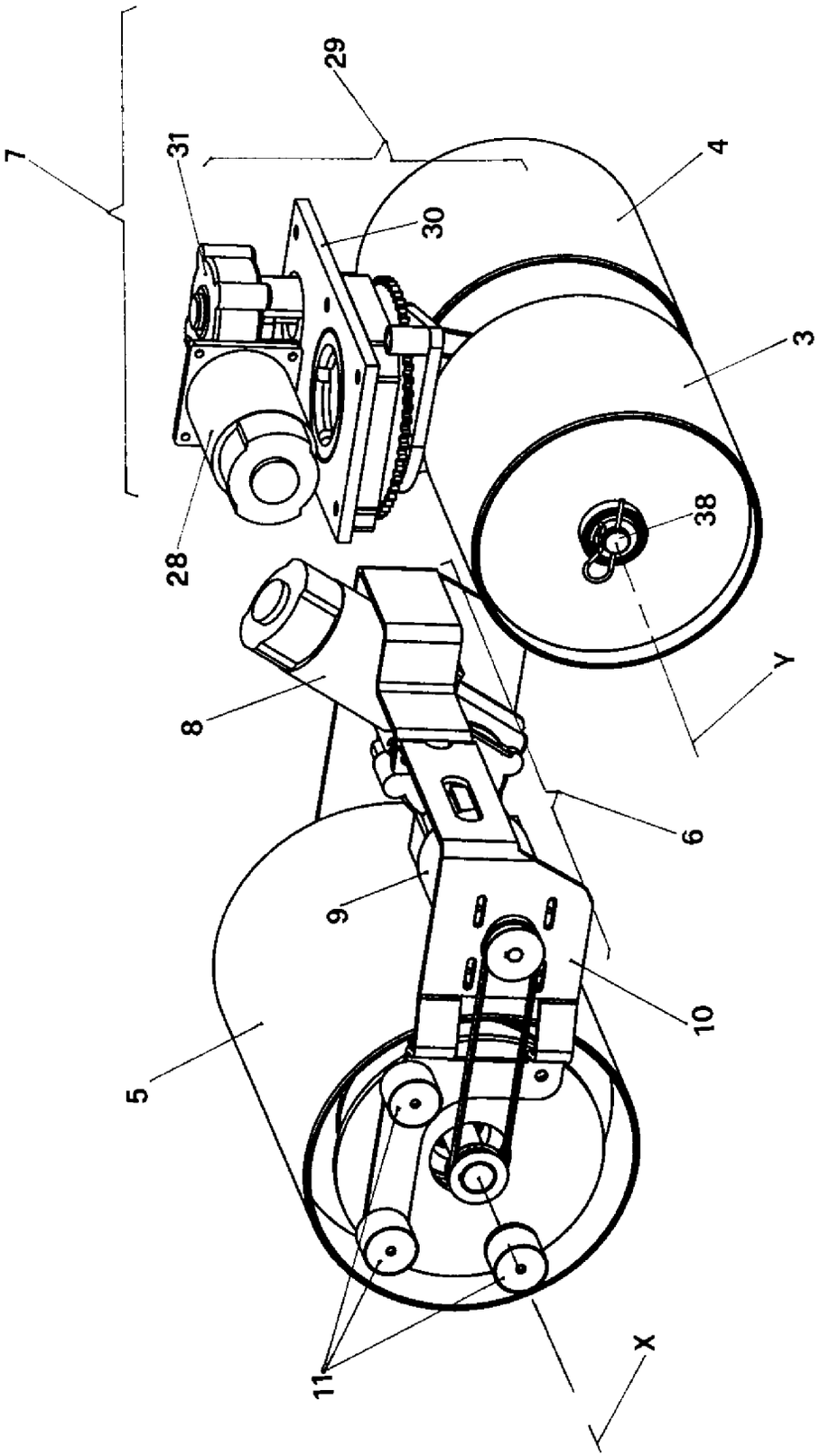

FIG. 5

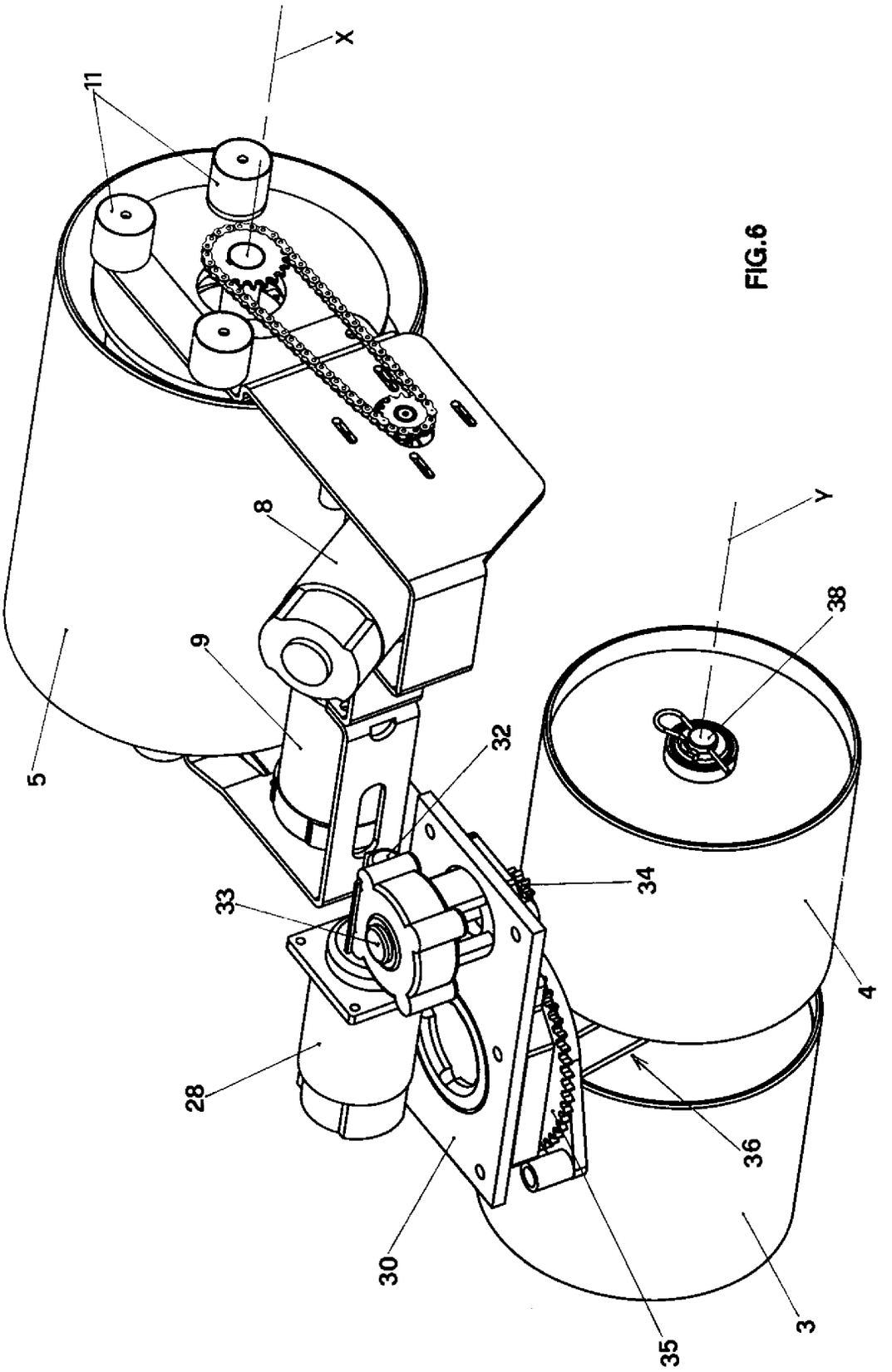

FIG.6

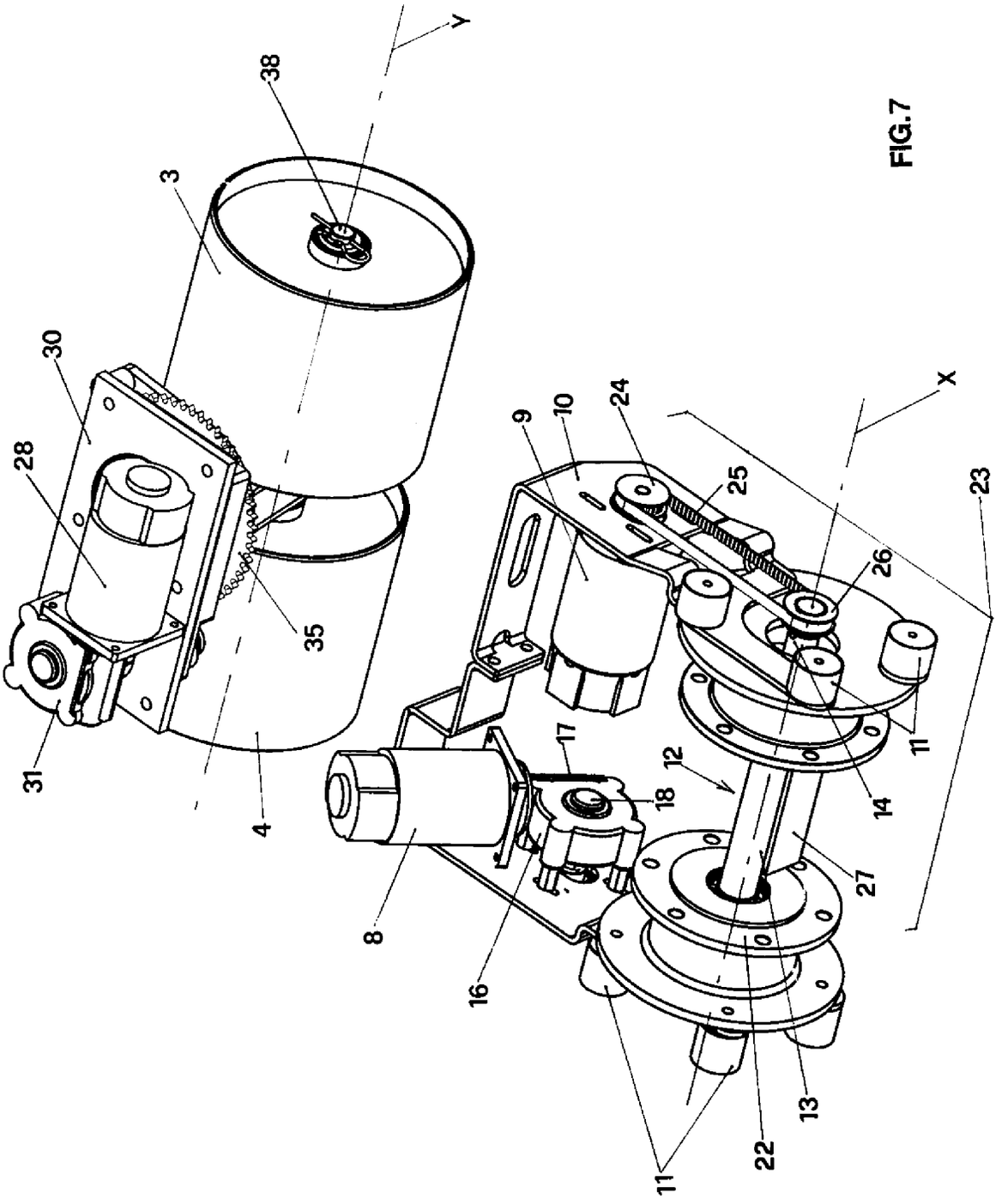

FIG.7

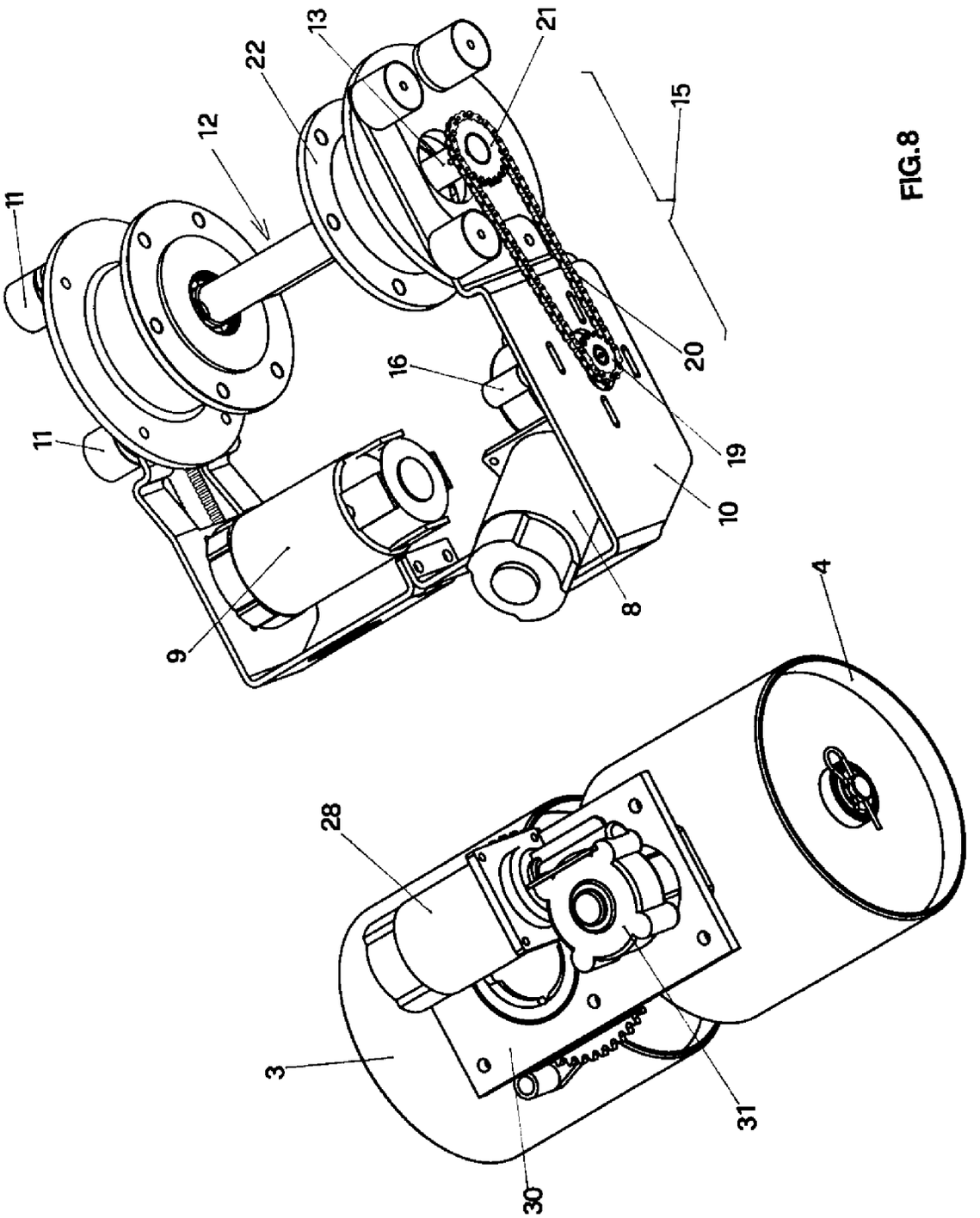

FIG.8

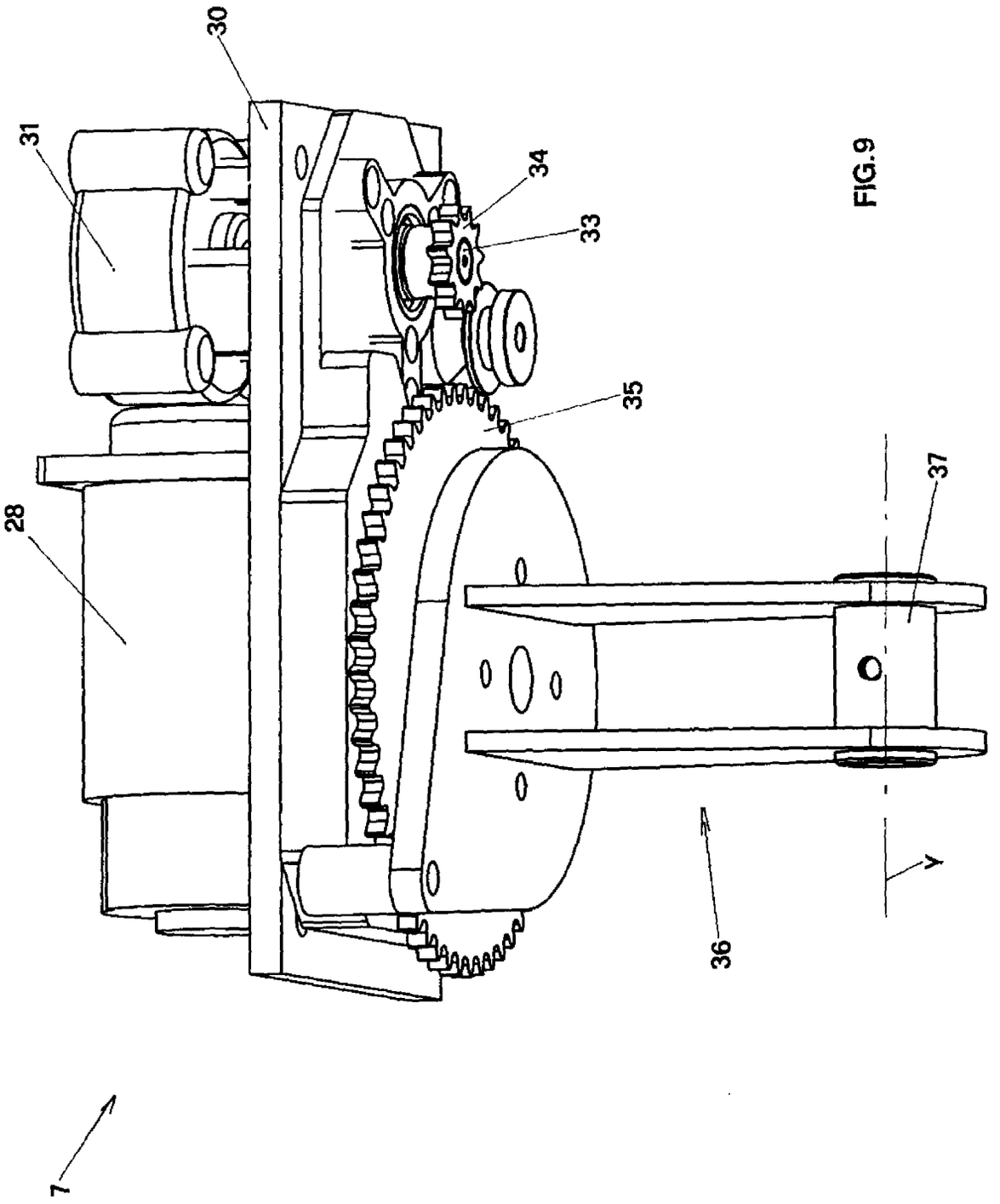

FIG.9