Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2487580 C 2012/04/03

(11)(21) 2 487 580

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 2004/11/12

(41) Mise à la disp. pub./Open to Public Insp.: 2005/05/13

(45) Date de délivrance/Issue Date: 2012/04/03

(30) Priorité/Priority: 2003/11/13 (EP03 405807.3)

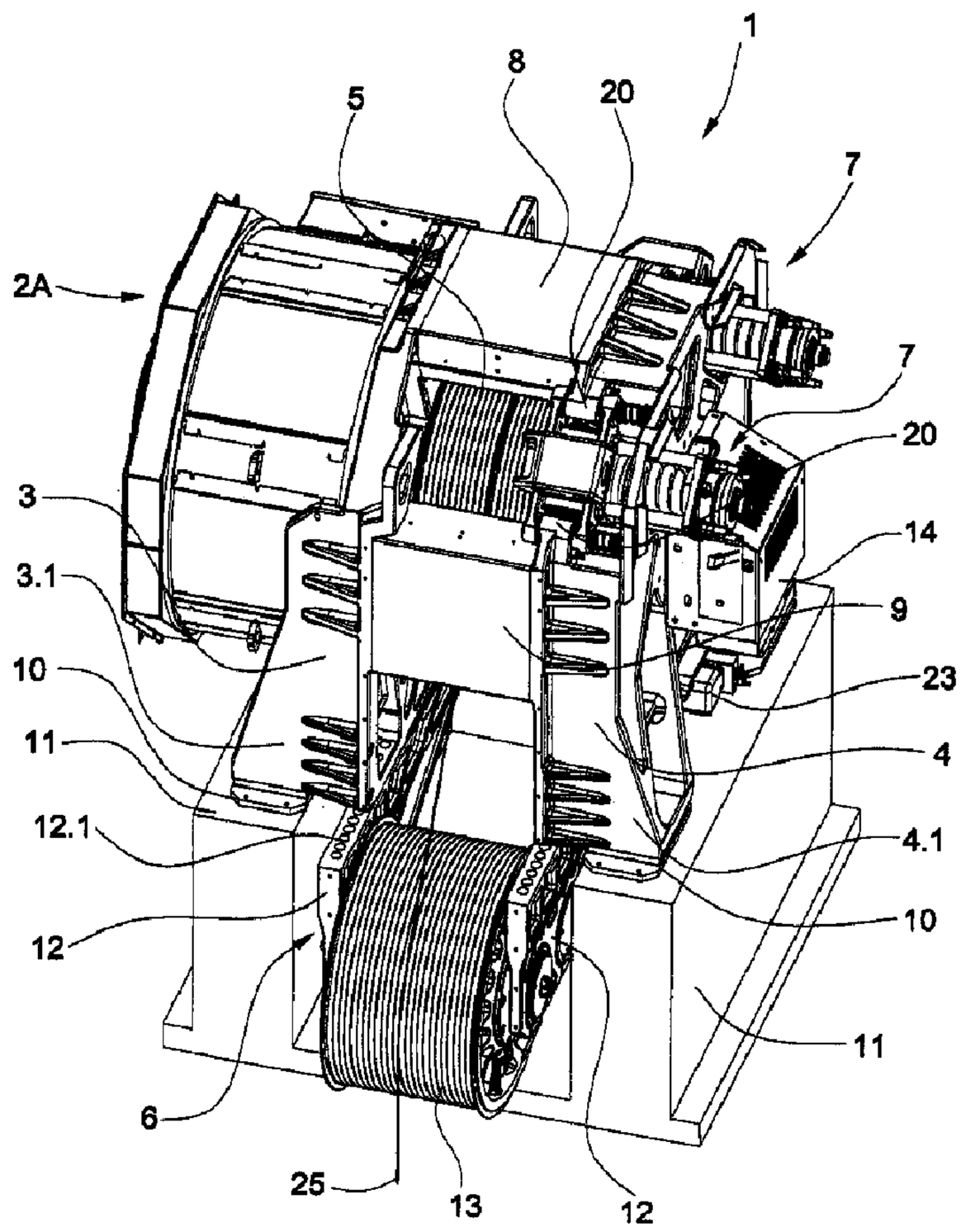
(51) Cl.Int./Int.Cl. *B66B 11/00* (2006.01), *B66B 11/04* (2006.01), *B66B 11/08* (2006.01), *H02K 7/10* (2006.01), *H02K 7/102* (2006.01), *H02K 7/116* (2006.01)

(72) Inventeurs/Inventors:
CHOLINSKI, ANDRZEJ, CH;
KUETTEL, HEINRICH, CH

(73) Propriétaire/Owner:
INVENTIO AG, CH

(74) Agent: RICHES, MCKENZIE & HERBERT LLP

(54) Titre : MECANISME D'ENTRAINEMENT SANS BATI-MOTEUR POUR ELEVATEUR
(54) Title: DRIVE UNIT, WITHOUT ENGINE FRAME, FOR A LIFT



(57) Abrégé/Abstract:
This drive unit (1) consists substantially of at least one motor (2A), a motor stand (3), a bearing block (4), a drive pulley (5) and a counter-roller attachment (6). The drive pulley (5) is mounted at the motor stand (3) and at the bearing block (4) by means of a

CA 2487580 C 2012/04/03

(11)(21) 2 487 580

(13) C

(57) Abrégé(suite)/Abstract(continued):
shaft (15). A respective brake (7) is arranged at the bearing block (4) at each side. Webs (8, 9) connect the motor stand (3) with the bearing block (4). Motor stand (3), bearing block (4) and the webs (8, 9) form a stable structure without an engine frame carrying motor stand (3) and bearing block (4) being necessary. The counter-roller attachment (6) consisting of side plates (12) and counter-roller (13) is arranged directly at the motor stand (3) and the bearing block (4).

Abstract:

This drive unit (1) consists substantially of at least one motor (2A), a motor stand (3), a bearing block (4), a drive pulley (5) and a counter-roller attachment (6). The drive pulley (5) is mounted at the motor stand (3) and at the bearing block (4) by means of a shaft (15). A respective brake (7) is arranged at the bearing block (4) at each side. Webs (8, 9) connect the motor stand (3) with the bearing block (4). Motor stand (3), bearing block (4) and the webs (8, 9) form a stable structure without an engine frame carrying motor stand (3) and bearing block (4) being necessary. The counter-roller attachment (6) consisting of side plates (12) and counter-roller (13) is arranged directly at the motor stand (3) and the bearing block (4).

(Fig. 1)

Description:

Drive unit, without engine frame, for a lift

Field of the Invention

The invention relates to a drive unit, without engine frame, for a lift, consisting of at least one motor, at least one brake and a drive pulley arranged between end plates, wherein the motor is arranged at one end plate.

Background of the Invention

A drive unit consisting essentially of a electric motor, a motor stand, a bearing block, a drive pulley and an engine frame with counter-roller attachment has become known from EP 03002866.6. The stator of the electric motor is screw-connected with the motor stand by means of a flange. The rotor of the electric motor is seated on a free end of a shaft which carries the drive pulley and which is mounted at the bearing block and at the motor stand. The drive pulley is mounted at the motor stand and the bearing block by means of the shaft. A brake is arranged in the inner region of the motor stand and covered by a casing.

A disadvantage of the known equipment resides in the fact that the brake is arranged to be disposed internally. Access to the brake parts for maintenance is difficult. The engine frame, which carries the bearing block and the motor stand and which makes construction inconvenient and increases the cost of the entire drive unit, is also disadvantageous.

Summary of the Invention

Here the invention will provide a remedy. The invention, meets the object of avoiding the disadvantages of the known equipment and of creating a lift drive with a brake which operates reliably in every case and is of simple construction.

In one aspect, the present invention resides in frameless drive unit for a lift, consisting of at least one motor, at least one brake, a drive pulley arranged between end plates and a brake disc with rim gear, in which a gear pinion of an evacuating motor engages in evacuating

operation, is arranged at the drive pulley, and wherein the motor is arranged at one end plate and each end plate is carried by a pedestal.

In another aspect, the present invention resides in a frameless drive unit for an elevator, comprising: at least one motor; a drive pulley driven by said at least one motor; at least one brake for braking said drive pulley including a brake disc with a rim gear for engaging a gear pinion of an evacuating motor arranged at said drive pulley, said at least one brake acting by means of a brake shoe on said brake disc; said at least one brake having a brake caliper mounted to be floating and carrying said brake shoe and at which a carrier plate carrying an actuator is supported, wherein compression springs are supported at one end at said carrier plate and at another end at a pressure plate, wherein said pressure plate transmits a spring force of said compression springs to another brake shoe by pins guided by said brake caliper and for release of said at least one brake said actuator is activated to act by means of a pull rod on said pressure plate and relieves the spring force on said another brake shoe; a pair of spaced end plates, said at least one motor being arranged at one of said end plates and said at least one brake being arranged at one of said end plates; and a pair of pedestals, each said pedestal carrying one of said end plates.

In another aspect, the present invention resides in a frameless drive unit for an elevator, comprising: at least one motor; a drive pulley driven by said at least one motor; at least one brake for braking said drive pulley; a pair of spaced end plates, said at least one motor being arranged at one of said end plates, said end plates being connected together to form a stable structure without being supported by an engine frame; a pair of pedestals, each said pedestal carrying a respective one of said end plates; and a brake disc with a rim gear for engaging a gear pinion of an evacuating motor arranged at said drive pulley, wherein said at least one brake acts by means of a brake shoe on said brake disc arranged at one of said end plates, and wherein said at least one brake has a brake caliper mounted to be floating and carries said brake shoe and at which a carrier plate carrying an actuator is supported, wherein compression springs are supported at one end at said carrier plate and at another end at a pressure plate, wherein said pressure plate transmits a spring force of said compression springs to another brake shoe by pins guided by said brake caliper and for release of said brake said actuator is activated to act by means of a pull rod on said pressure plate and relieves the spring force on said another brake shoe.

In another aspect, the present invention resides in a frameless drive unit for an elevator, comprising: at least one motor; a drive pulley driven by said at least one motor; at least one brake for braking said drive pulley; a brake disc with a rim gear for engaging a gear pinion of an evacuating motor arranged at said drive pulley; and a pair of spaced end plates, said end plates being connected together to form a stable structure, said at least one motor and said at least one brake each being arranged at either of said end plates, wherein said at least one brake acts by a brake shoe on said brake disc arranged at one of said end plates, wherein said at least one brake has a brake caliper mounted to be floating and carries said brake shoe and at which a carrier plate carrying an actuator is supported, wherein compression springs are supported at one end at said carrier plate and at another end at a pressure plate, wherein said pressure plate transmits a spring force of said compression springs to another brake shoe by pins guided by said brake caliper and for release of said brake said actuator is activated to act by means of a pull rod on said pressure plate and relieves the spring force on said another brake shoe, whereby said at least one motor, said at least one brake and said end plates form a standalone structure that operates with said drive pulley as the elevator drive unit.

The advantages achieved by the invention are substantially to be seen in that a drive unit with a short shaft and thus a small constructional length of the drive unit can be realised. It is additionally advantageous that the brake air cylinder and feed lines are arranged separately from the brake disc. In the case of leakage or line rupture the brake surfaces cannot be contaminated with oil. Brake operational readiness remains guaranteed. It is further of advantageous that with the construction of the drive unit without an engine frame more freedom exists for cable guidance between the drive pulley and the counter-roller. Larger cable run spacings are thereby made possible. The drive unit conceived for large lift cages and for large transport heights and high travel speeds has, for example, a constructional height of more than two metres and a total weight of more than ten tonnes, wherein weight and costs can be saved by the construction without engine frame.

Brief Description of the Drawings

The present invention is explained in more detail on the basis of the accompanying figures, in which:

Fig. 1 and Fig. 1a show a drive unit according to the invention with a motor,

Fig. 2 shows a motor stand with drive pulley and webs,

Fig. 3 shows a bearing block with bearing housing and drive pulley,

Fig. 4 shows an upper web,

Fig. 5 shows a lateral web,

Fig. 6 and Fig. 7 show details of a brake and

Fig. 8 shows a drive unit according to the invention with two motors.

Detailed Description of the Preferred Embodiments

Fig. 1 shows the drive unit 1 assembled to finished state and substantially consisting of a motor 2A, a motor stand 3 serving as an end plate, a bearing block 4 serving as an end plate, a drive pulley 5 and a counter-roller attachment 6. The stator 2.1 of the electric motor 2A is arranged at the motor stand 3. The rotor 2.2 of the electric motor 2A is seated on a free end of a shaft 15 which carries the drive pulley 5 and which is mounted at the bearing block 4 and the motor stand 3. The free shaft end projects beyond the motor stand 3. The drive pulley 5 is mounted at the motor stand 3 and the bearing block 4 by means of the shaft. A brake 7 is arranged at the bearing block 4 at each side.

Webs 8, 9 connect the motor stand 3 with the bearing block 4, wherein, for example, an upper web 8 and a respective lateral *web* 9 per side are provided. Motor stand 3, bearing block 4 and the webs 8, 9 form a stable structure without a machine frame carrying motor stand 3 and bearing block 4 being necessary. Motor stand 3 and bearing block 4 are carried by means of support elements 10 respectively at an arm 3.1 and an arm 4.1, without engine frame, on a respective pedestal 11 or support. The counter-roller

attachment 6 consisting of side plates 12 and counter-roller 12 is arranged directly at the motor stator 3 and bearing block 4. A hydraulic unit 14 serves for supply of the actuator of the brake 7. The actuator can also be electrically operated.

Support cables 25 form the cable run and are led on the one hand from the drive pulley 5 over the counter-roller 13 and on the other hand from the drive pulley 5 directly into the lift shaft. The cable run spacing is settable by means of the counter-roller attachment 6, wherein the side panels 12 are screw-connected at bores 12.1 with the motor stand 3 and with the bearing block 4, respectively.

Fig. 2 shows the motor stand 3 with drive pulley 5, the lateral webs 9 and the upper web 8. The bearing block 4 is shown in Fig. 3. A shaft 15 carrying the drive pulley 5 is mounted at one end at the motor stand 3 and at the other end at the bearing block 4. The bearing at the bearing block side is denoted by 16. A brake disc 17 with rim gear 18, by way of which the drive pulley 5 is drivable in evacuating operation, is arranged at the drive pulley 5.

Fig. 3 shows an internal view of the bearing block 4 with bearing housing 19 for reception of the bearing 16. Moreover, eyes 20 at which the brake 7 is mounted are visible. The support surface for the upper web 8 is denoted by 21 and the support surfaces for the lateral webs 9 by 22, wherein the webs 8, 9 are, for example, screw-connected with the bearing block 4 and the motor stand 3.

The evacuating drive consists of a motor 23 with pinion 24, wherein for the evacuating operation the pinion 24 engages in the rim gear 18 and sets the drive pulley 5 in motion.

Fig. 4 shows the upper web 8, which is constructed to be box-shaped and the support surface 8.1 fits on the support surface 21.

Fig. 5 shows the lateral web 9, which is constructed to be wedge-shaped and the support surface 9.1 fits on the support surface 22.

Fig. 6 and Fig. 7 show the brake 7, which is arranged at the bearing block 4 at each side, of the drive unit 1, wherein a brake calliper 30 is mounted in floating manner at axles 31 penetrating the eyes 20. The brake calliper 30 can move through at most the distance d adjustable by means of setting screws 32, wherein a spring 33, which loads the brake

calliper 30 in the direction of the drive pulley 5, is provided for each axle 31. The axles 31 are fixed to a support bracket 34 disposed in connection with the bearing block 4. The brake calliper 30 carries the inner brake shoe 40 at the drive pulley side and serves as a support for spacer tubes 35 and threaded rods 36, which fix a carrier plate 37 for a, for example, hydraulic actuator 38. Compression springs 39 are supported at one end at the carrier plate 37 and at the other end at a pressure plate 41, which transmits the spring force of the compression springs 39 to the outer brake shoe 43 by means of pins 42 guided by the brake calliper 30. For release of the brake 7 the activated actuator 38 acts by means of a pull rod 44 on the pressure plate 41 and relieves the spring force of the compression springs 39, which are arranged coaxially with the pull rod 44, on the outer brake shoe 43. In that case the brake calliper 30 moves, due to the spring force of the springs 33, in the direction of the brake pulley 5, wherein the inner brake shoe 40 moves away from the brake disc 17. A sensor 45 is provided for monitoring the state of the brake.

Fig. 8 shows the drive unit 1, assembled to finished state, with two motors, substantially consisting of a motor 2A and a motor 2B, a motor stand 3 serving as an end plate, a bearing block 4 serving as an end plate, a drive pulley 5 and a counter-roller attachment 6. The shaft 15 carrying the drive pulley 5 and mounted at the end plates 3, 4 has two free ends, wherein the rotor of one motor 2A is arranged at one free end and the rotor of the other motor 2B is arranged at the other free end.

Webs 8, 9 connect the motor stator 3 with the bearing block 4, wherein, for example, an upper web 8 and a respective lateral web 9 per side are provided. Motor stand 3, bearing block 4 and the webs 8, 9 form a stable structure without an engine frame carrying motor stand 3 and support block 4 being necessary.

Patent Claims:

1. Frameless drive unit for a lift, consisting of at least one motor, at least one brake, a drive pulley arranged between end plates and a brake disc with rim gear, in which a gear pinion of an evacuating motor engages in evacuating operation, is arranged at the drive pulley, and wherein the motor is arranged at one end plate and each end plate is carried by a pedestal.

2. Frameless drive unit according to claim 1, characterised in that the end plates are connected by means of webs.

3. Frameless drive unit according to one of claims 1 and 2, characterised in that the drive pulley is carried by a shaft which is mounted at a motor stand serving as end plate and at a bearing block serving as end plate, wherein the motor is arranged at the motor stand or at the bearing block and the rotor of the motor is carried by a free end of the shaft.

4. Frameless drive unit according to claim 1, characterised in that a counter-roller attachment, which enables different cable run spacings, is mountable at the end plates.

5. Frameless drive unit according to any one of claims 1 to 4, characterised in that the at least one brake which acts by means of a corresponding brake shoe on the brake disc is arranged at least at one end plate.

6. Frameless drive unit according to claim 5, characterised in that each of the at least one brake has a brake calliper which is mounted to be floating and carries the corresponding brake shoe and at which a carrier plate carrying an actuator is supported, wherein compression springs are supported at one end at the carrier plate and at the other end at a pressure plate, wherein the pressure plate transmits the spring force of the compression springs to another brake shoe by means of pins guided by the brake calliper and for release of the brake the activated actuator acts by means of a pull rod on the pressure plate and relieves the spring force on said another brake shoe.

7. A frameless drive unit for an elevator, comprising:

at least one motor;

a drive pulley driven by said at least one motor;

at least one brake for braking said drive pulley including a brake disc with a rim gear for engaging a gear pinion of an evacuating motor arranged at said drive pulley, said at least one brake acting by means of a brake shoe on said brake disc;
said at least one brake having a brake caliper mounted to be floating and carrying said brake shoe and at which a carrier plate carrying an actuator is supported, wherein compression springs are supported at one end at said carrier plate and at another end at a pressure plate, wherein said pressure plate transmits a spring force of said compression springs to another brake shoe by pins guided by said brake caliper and for release of said at least one brake said actuator is activated to act by means of a pull rod on said pressure plate and relieves the spring force on said another brake shoe;
a pair of spaced end plates, said at least one motor being arranged at one of said end plates and said at least one brake being arranged at one of said end plates; and
a pair of pedestals, each said pedestal carrying one of said end plates.

8. A frameless drive unit for an elevator, comprising:
at least one motor;
a drive pulley driven by said at least one motor;
at least one brake for braking said drive pulley;
a pair of spaced end plates, said at least one motor being arranged at one of said end plates, said end plates being connected together to form a stable structure without being supported by an engine frame;
a pair of pedestals, each said pedestal carrying a respective one of said end plates; and
a brake disc with a rim gear for engaging a gear pinion of an evacuating motor arranged at said drive pulley,
wherein said at least one brake acts by means of a brake shoe on said brake disc arranged at one of said end plates, and
wherein said at least one brake has a brake caliper mounted to be floating and carries said brake shoe and at which a carrier plate carrying an actuator is supported, wherein compression springs are supported at one end at said carrier plate and at another end at a pressure plate, wherein said pressure plate transmits a spring force of said compression springs to another brake shoe by pins guided by said brake caliper and for release of said brake said actuator is activated to act by means of a pull rod on said pressure plate and relieves the spring force on said another brake shoe.

9. A frameless drive unit for an elevator, comprising:

at least one motor;

a drive pulley driven by said at least one motor;

at least one brake for braking said drive pulley;

a brake disc with a rim gear for engaging a gear pinion of an evacuating motor arranged at said drive pulley; and

a pair of spaced end plates, said end plates being connected together to form a stable structure, said at least one motor and said at least one brake each being arranged at either of said end plates, wherein said at least one brake acts by a brake shoe on said brake disc arranged at one of said end plates, wherein said at least one brake has a brake caliper mounted to be floating and carries said brake shoe and at which a carrier plate carrying an actuator is supported, wherein compression springs are supported at one end at said carrier plate and at another end at a pressure plate, wherein said pressure plate transmits a spring force of said compression springs to another brake shoe by pins guided by said brake caliper and for release of said brake said actuator is activated to act by means of a pull rod on said pressure plate and relieves the spring force on said another brake shoe, whereby said at least one motor, said at least one brake and said end plates form a standalone structure that operates with said drive pulley as the elevator drive unit.

10. The frameless drive unit according to claim 9 wherein said end plates are connected by webs to form the stable structure without being supported.

11. The frameless drive unit according to claim 9 wherein said drive pulley is carried by a shaft mounted at a motor stand being one of said end plates and mounted at a bearing block being another of said end plates, wherein said at least one motor is arranged at said motor stand or at said bearing block and a rotor of said at least one motor is carried by a free end of said shaft.

12. The frameless drive unit according to claim 9 including a counter-roller attachment for enabling different cable run spacings mounted directly at said end plates.

13. The frameless drive unit according to claim 9 comprising: a pair of motors; said drive

pulley driven by said motors; a pair of brakes for braking said drive pulley; and said motors being arranged at associated ones of said end plates and said drive pulley and said brakes being arranged between said end plates.

14. The frameless drive unit according to claim 13 wherein said end plates are connected by webs.

15. The frameless drive unit according to claim 9 wherein said end plates are connected by webs to form the stable structure without being supported and said webs include an upper web and at least one lateral web spaced from said upper web.

16. The frameless drive unit according to claim 9 wherein said end plates are connected by webs to form the stable structure without being supported and said webs include a box-shaped upper web.

17. The frameless drive unit according to claim 9 wherein said end plates are connected by webs to form the stable structure without being supported and said webs include at least one wedge-shaped lateral web.

FIG. 1

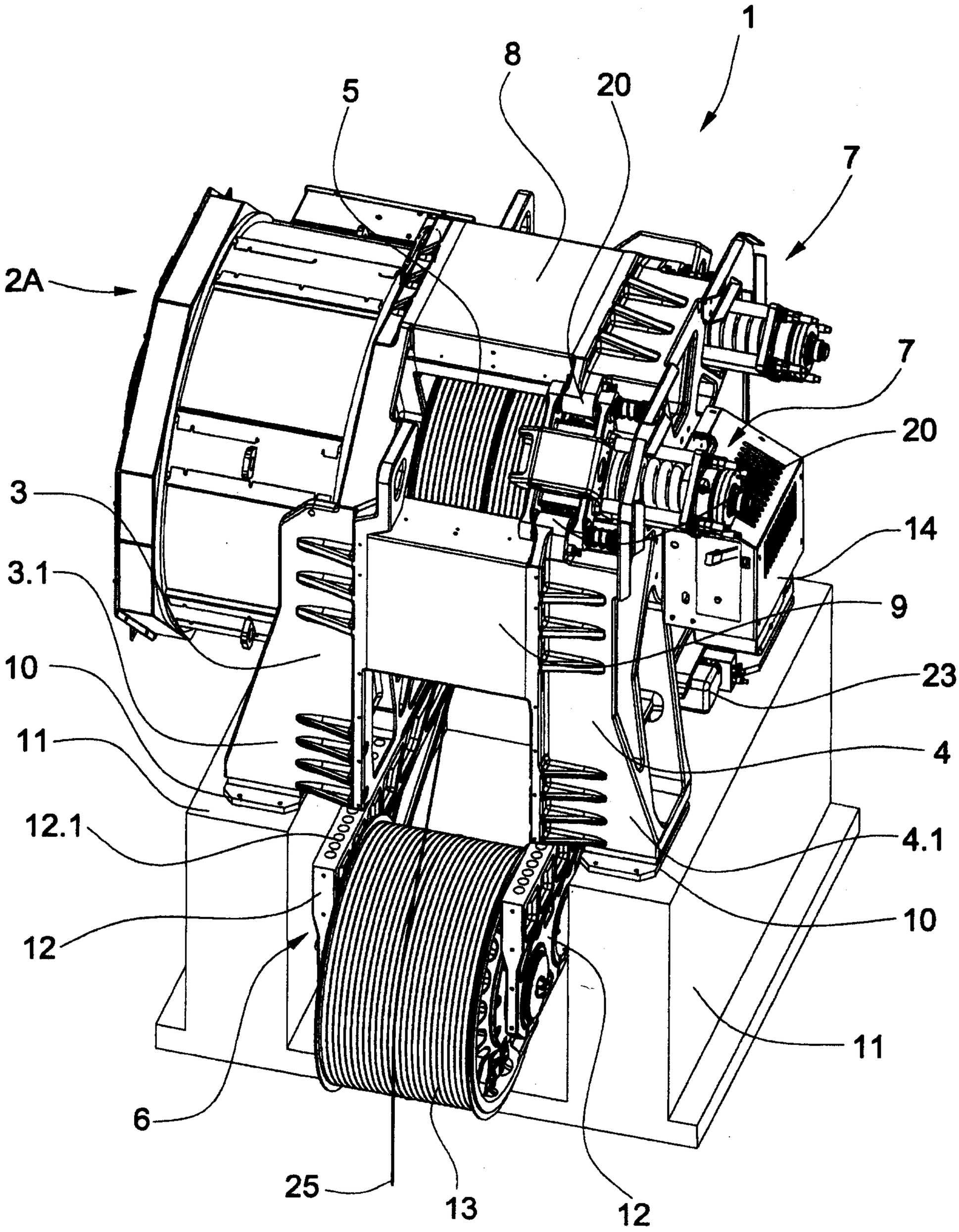


FIG. 1a

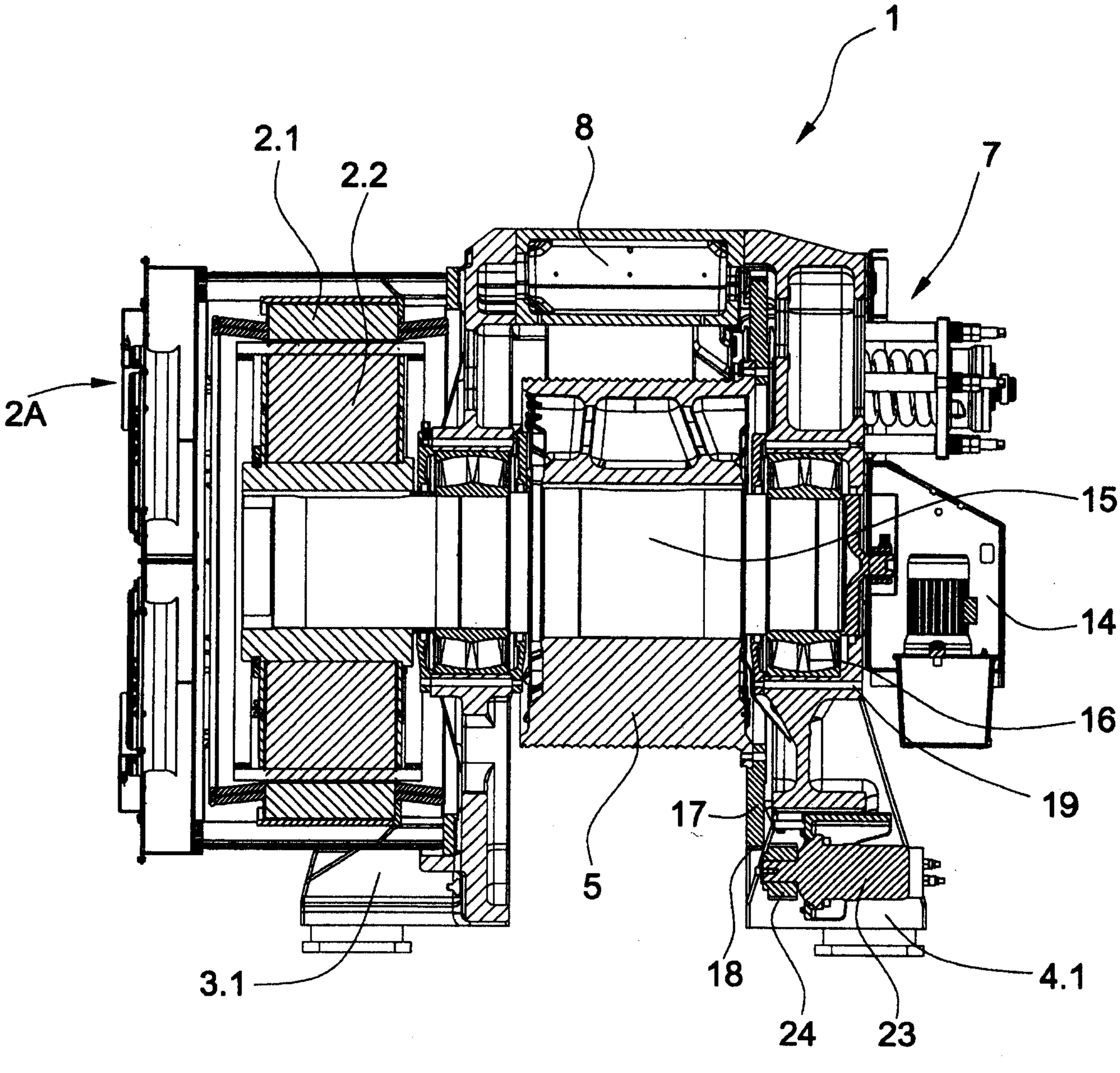


FIG. 2

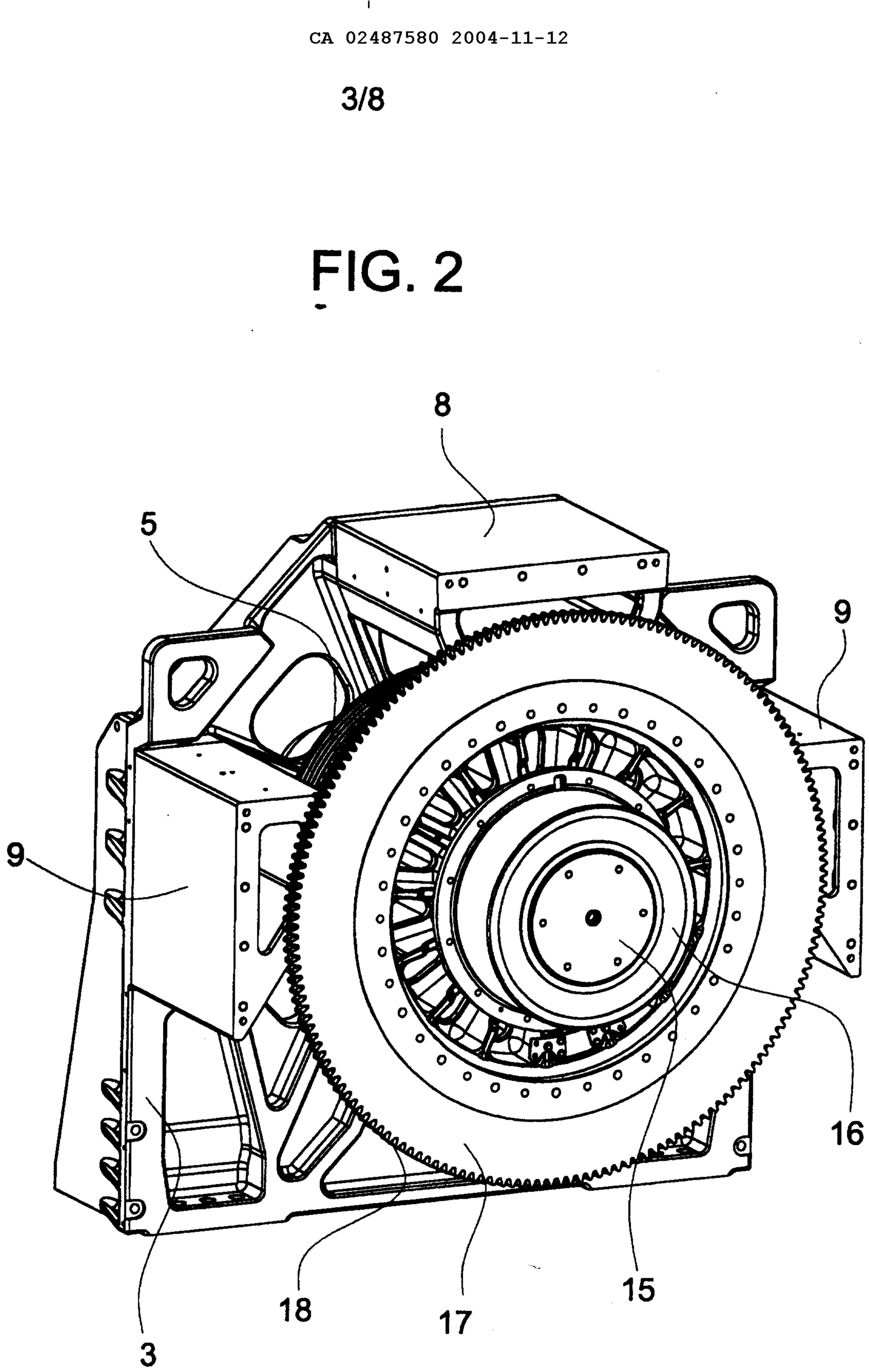


FIG. 3

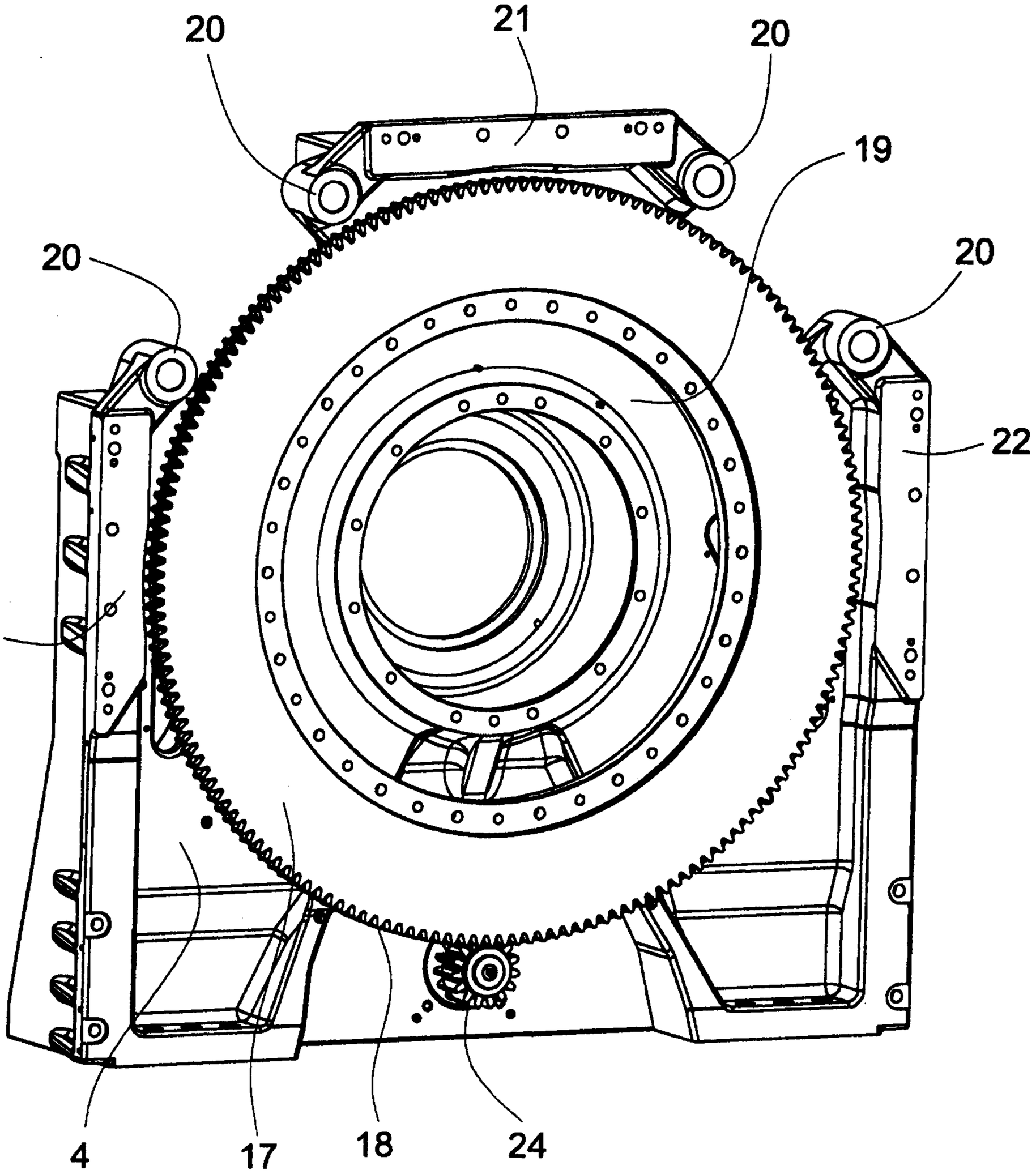


FIG. 4

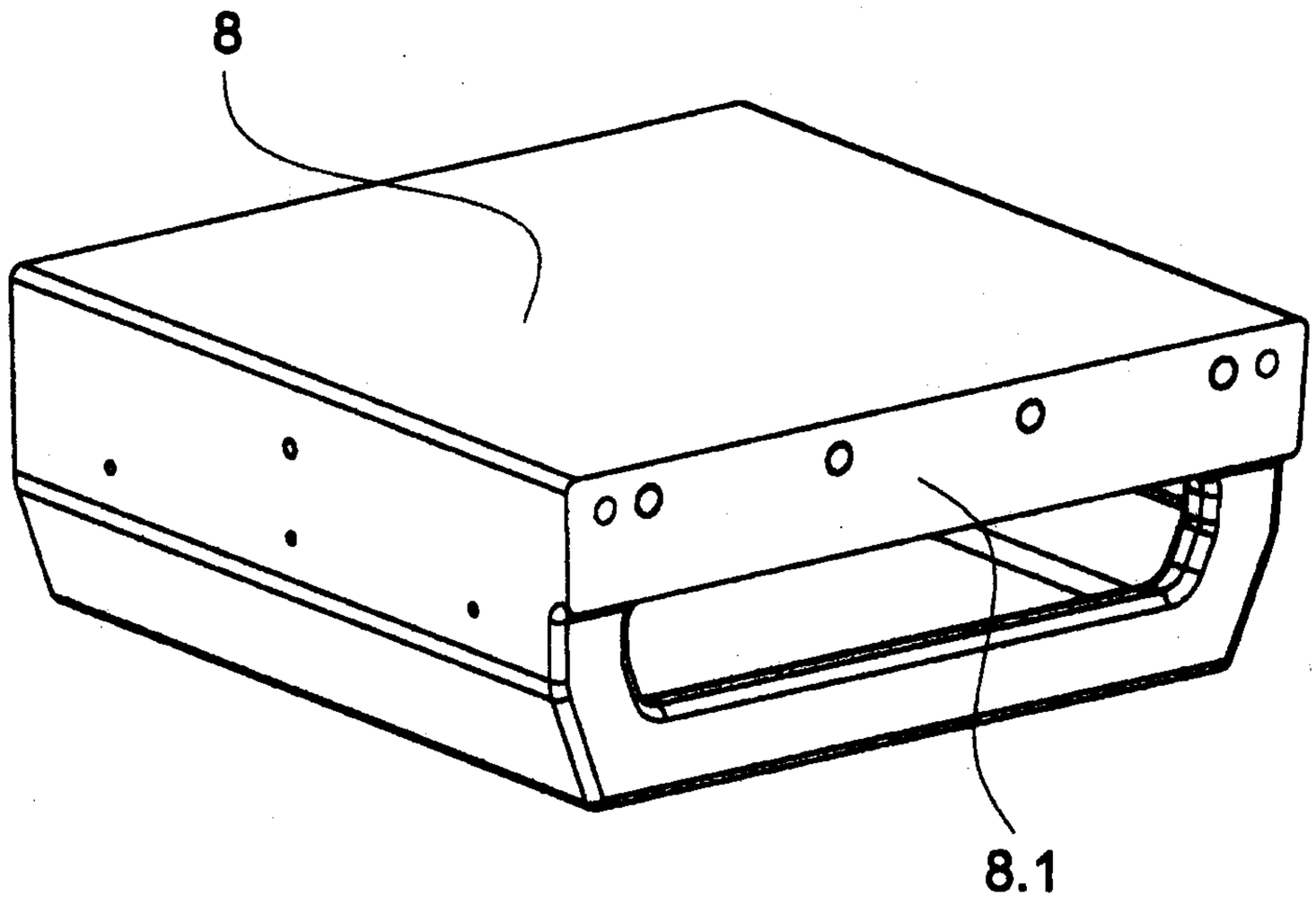


FIG. 5

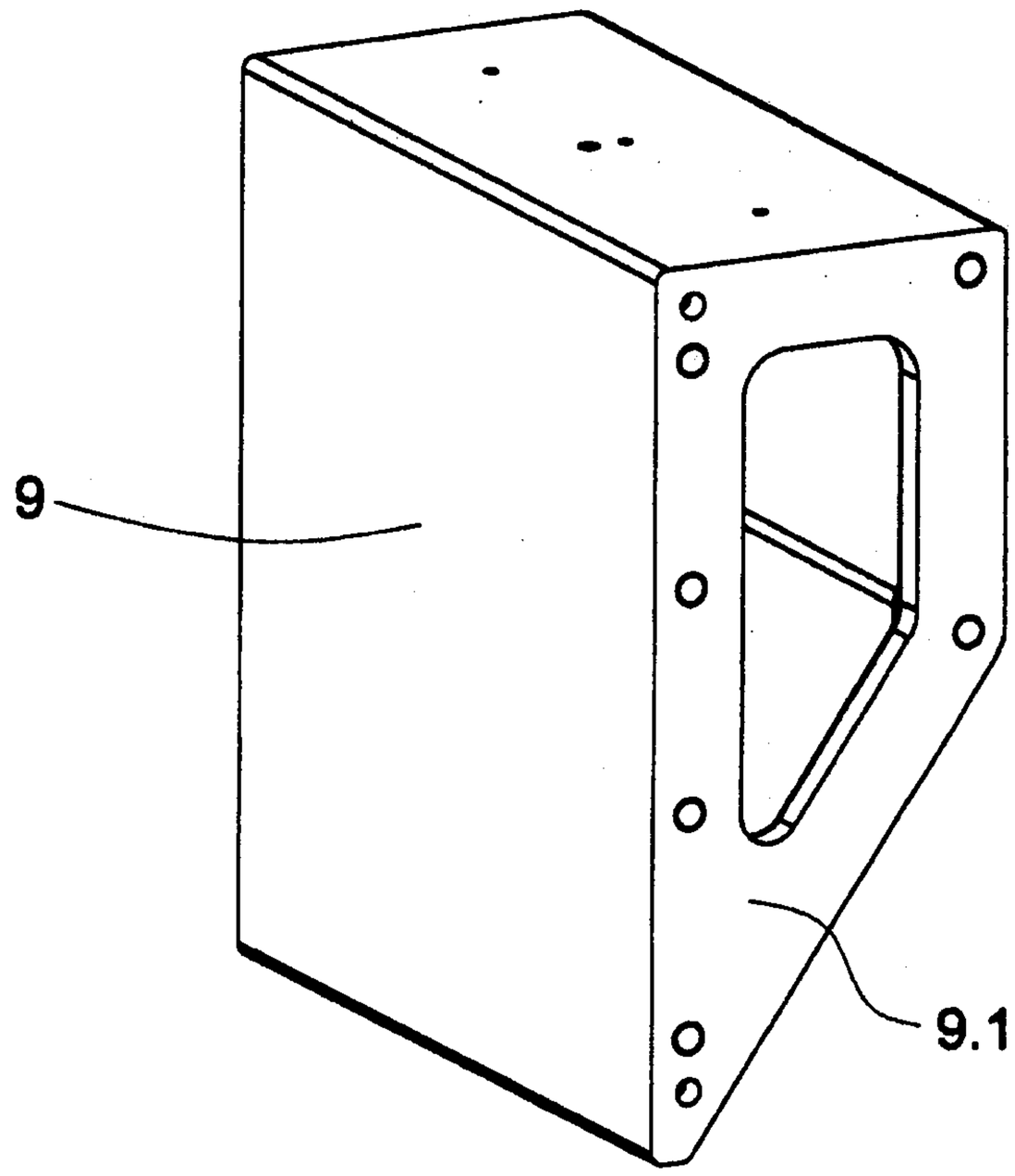


FIG. 6

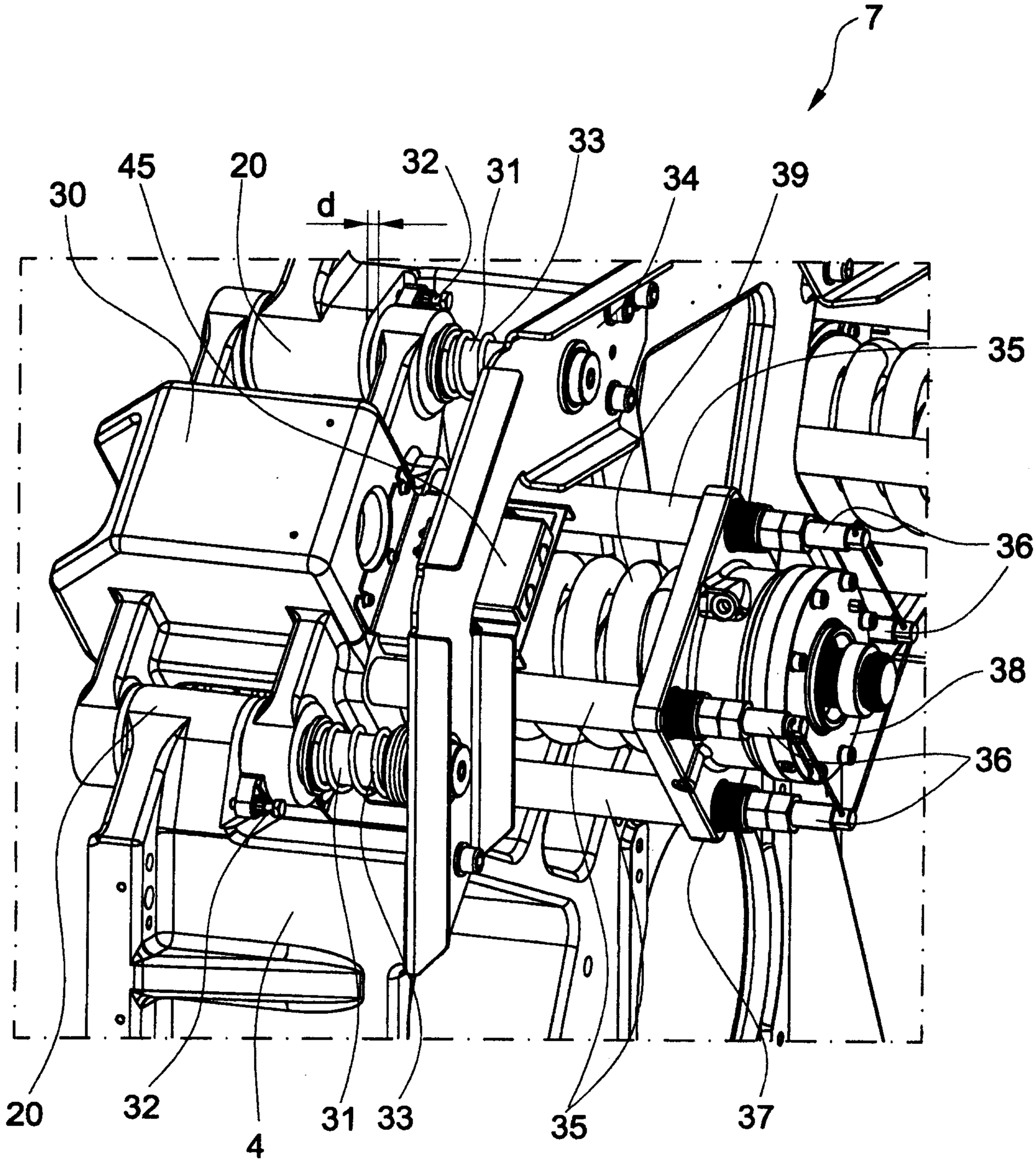


FIG. 7

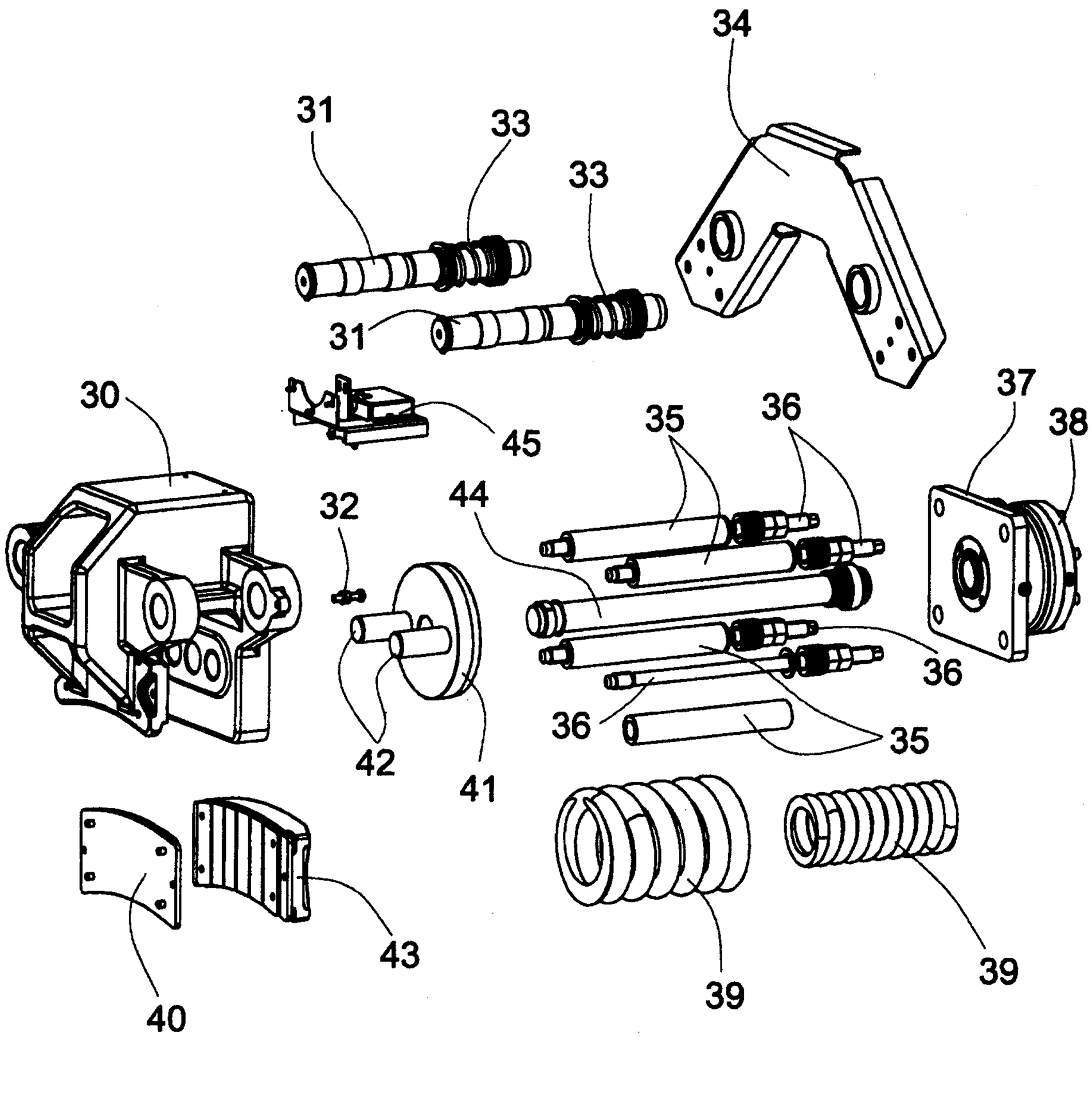
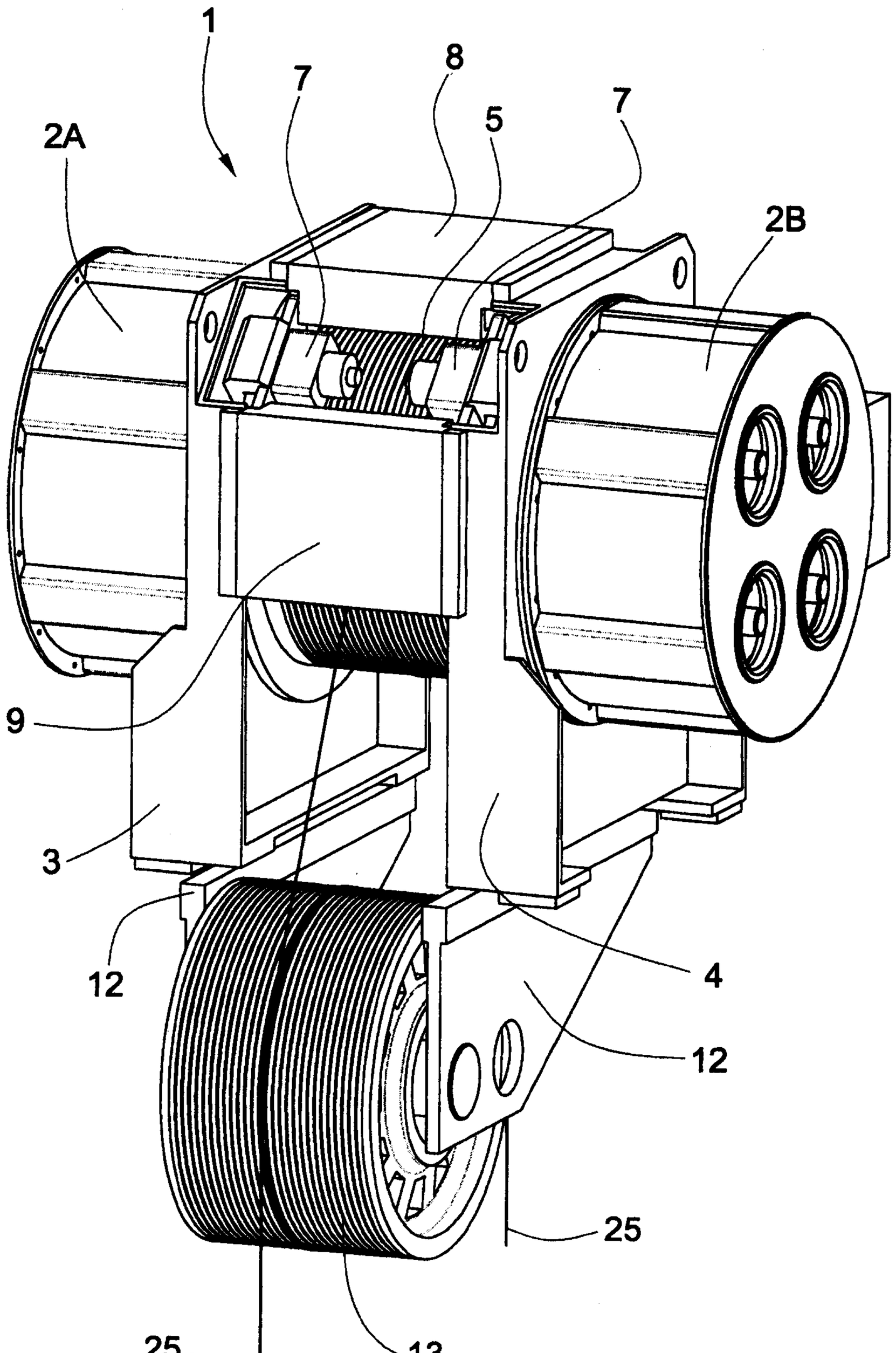
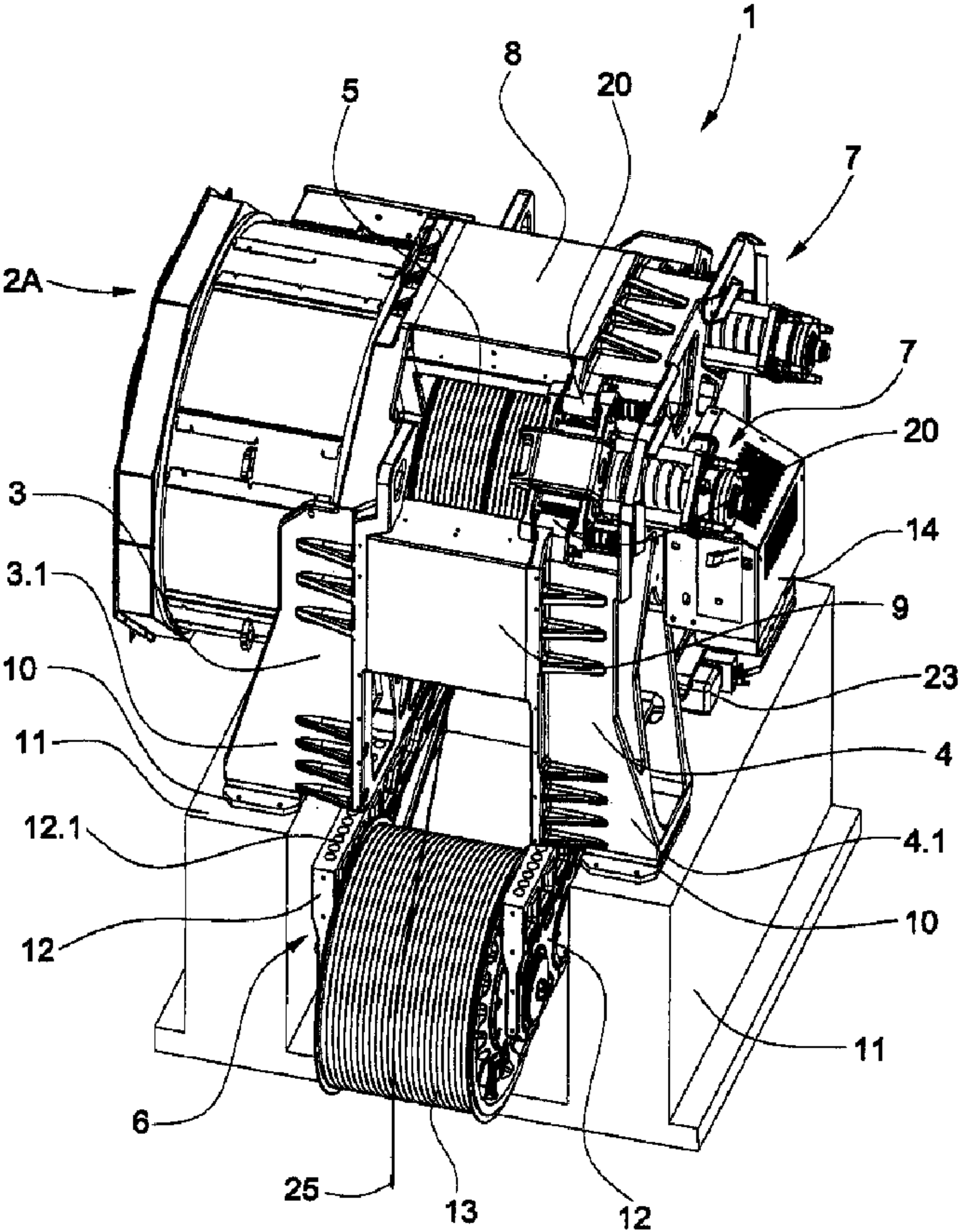


FIG. 8




1
8
5
20
7
2A
7
20
3
14
3.1
9
10
23
11
4
12.1
4.1
12
10
11
6
25
13
12