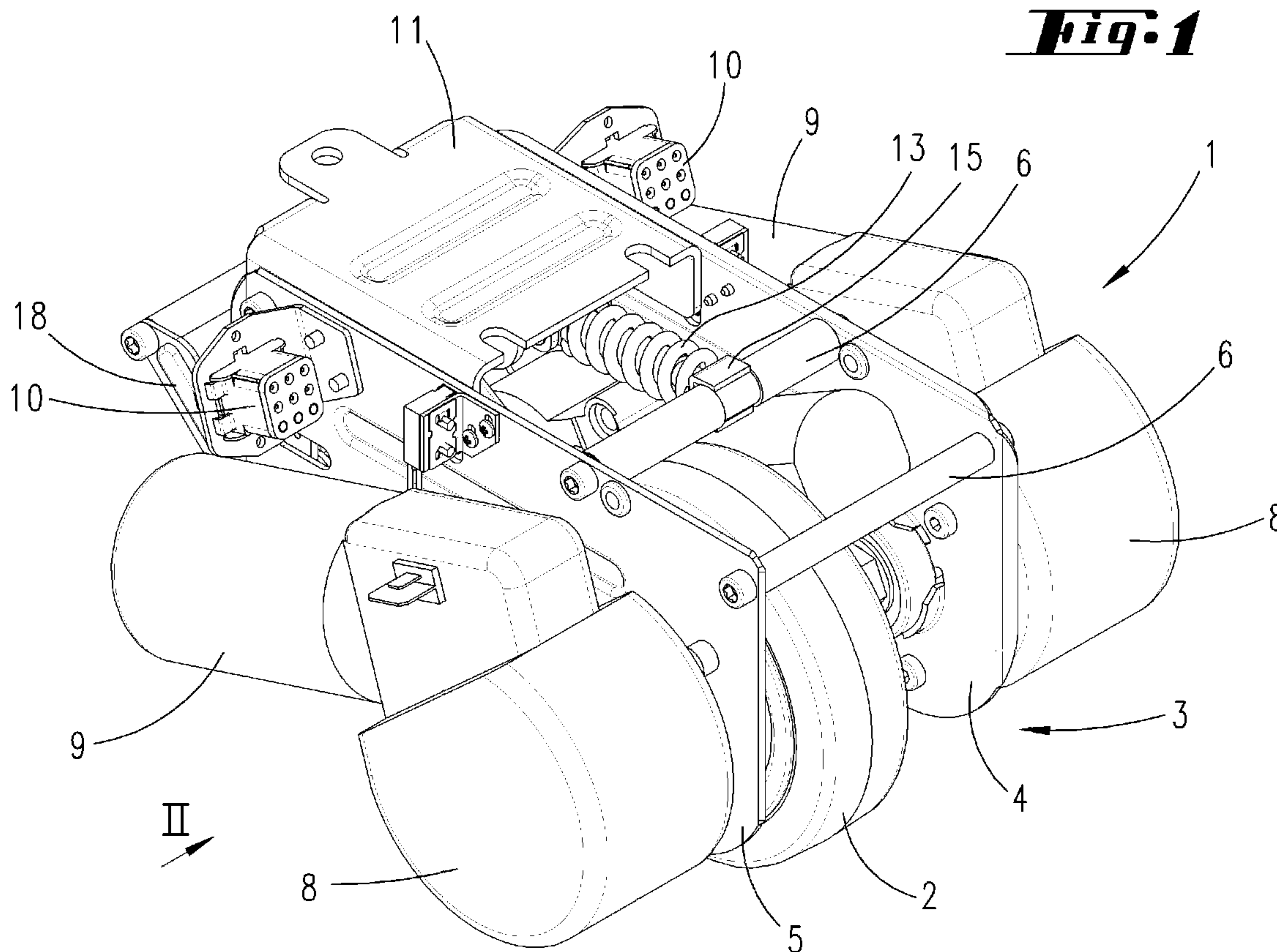




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 (71) Demandeur/Applicant:
TENTE GMBH & CO. KG, DE
 (72) Inventeurs/Inventors:
BLOCK, WOLFGANG, DE;
HOFRICHTER, GUNTHER, DE
 (74) Agent: BLAKE, CASSELS & GRAYDON LLP

(54) Titre : ROULETTE SUPPLEMENTAIRE
 (54) Title: ADDITIONAL ROLLER



(57) Abrégé/Abstract:

The invention relates to an additional roller having a rigid frame (3), with a drivable wheel (2) which is mounted in the frame (3) and has an axle (12), wherein the wheel (2) together with the frame (3) can be raised or lowered by pivoting relative to a chassis, on



(57) **Abrégé(suite)/Abstract(continued):**

which the additional roller is to be mounted, and a compression spring (13) which is coupled rotatably at one end to the chassis is provided, in order, in the lowered position, to load the wheel (2) in respect of ground contact. In order to provide a simple and effective arrangement of the compression spring with regard to the wheel and the frame accommodating the wheel, it is proposed that a transverse connection (6) connecting two frame parts (4, 5) in the direction of an axle (12) of the wheel (2) is provided, that the compression spring (13) is coupled at the other end to the transverse connection (6), and that the compression spring (13) together with the frame (3) pivots about the chassis-mounted pivot point during raising and lowering of the wheel (2).

1 ABSTRACT

2 The invention relates to an additional roller having a rigid frame (3), with a drivable wheel
3 (2) which is mounted in the frame (3) and has an axle (12), wherein the wheel (2) together with the
4 frame (3) can be raised or lowered by pivoting relative to a chassis, on which the additional roller is
5 to be mounted, and a compression spring (13) which is coupled rotatably at one end to the chassis
6 is provided, in order, in the lowered position, to load the wheel (2) in respect of ground contact. In
7 order to provide a simple and effective arrangement of the compression spring with regard to the
8 wheel and the frame accommodating the wheel, it is proposed that a transverse connection (6)
9 connecting two frame parts (4, 5) in the direction of an axle (12) of the wheel (2) is provided, that
10 the compression spring (13) is coupled at the other end to the transverse connection (6), and that
11 the compression spring (13) together with the frame (3) pivots about the chassis-mounted pivot
12 point during raising and lowering of the wheel (2).

1 compression spring is directly integrated into the structure of the frame. A transverse connection,
2 which moves with the frame, for connecting two oppositely situated frame parts between which the
3 auxiliary roller is preferably accommodated, pivots together with the frame and the end of the
4 compression spring which acts on the auxiliary roller. Deflection of a lever is not necessary. In
5 addition, the frame is acted on directly by the compression spring. The selected arrangement
6 results in practically the same pressing force by which the wheel is pressed onto the ground, even
7 for a different lowering of the wheel, for example in the case of a bump.

8
9 Further features of the invention are described or illustrated, also in the description of the figures
10 and the drawings, often in their preferred association with the concept explained above, but may
11 also be of importance in an association with only one or more individual features that are described
12 here or illustrated in the drawings, or independently or in some other overall concept.

13
14 Thus, it is preferred that the compression spring presses the wheel in the raised position, also into
15 this raised position. For this purpose, the linking point of the compression spring to the frame in the
16 raised state of the wheel may be situated above the linking point of the compression spring to the
17 chassis. In addition, in this regard no leverage is necessary. The desired pressing state in the
18 raised position is directly achieved due to the provided linkage points. For this purpose, it may be
19 practical to provide a projecting arm at a vertical distance beneath the chassis, on the chassis or
20 on the portion of the overall arrangement of the auxiliary roller that is to be secured to the chassis,
21 to which the compression spring is linked on the chassis side or fixed relative to the chassis. Thus,
22 the desired pressing state in the raised state may be achieved without the need for raising the
23 frame beyond a substantially horizontal orientation and/or beyond a connecting plane of the
24 auxiliary roller or of the frame to the chassis.

25
26 It is further preferred that a guide rod passes through the compression spring. The guide rod is
27 suitably directly linked to the chassis or to the associated part of the overall structure of the
28 auxiliary roller, and to the frame, preferably acting on the transverse connection. The guide rod
29 prevents the compression spring, which is preferably formed as a helical spring, from deflecting. In
30 particular, it is also preferred that the guide rod has a telescoping capability. Since the
31 compression spring is preferably secured to the chassis outside a rotating configuration of the
32 frame relative to the chassis, this results in a change in length between the linking point to the

1 chassis and that to the frame in the course of the pivoting. This change in length may be
2 accommodated by the mentioned telescoping capability.

3
4 It is also preferred that the compression spring is situated in a vertical projection within the frame
5 which accommodates the wheel. In a horizontal projection, i.e., in a projection in the direction of
6 the axle of the wheel, it is further preferred that the compression spring is at least partially situated
7 within the frame. In an upwardly pivoted position of the frame, the compression spring is preferably
8 also accommodated in the frame in the horizontal projection. A compact structural unit is provided
9 which may be mounted on various objects without the need for the significant interventions on a
10 chassis to which the structural unit is to be attached.

11
12 A further part of the object, which, however, is also an independent, stand-alone object, is to
13 provide an advantageous configuration with regard to a possible failure of the drive or with regard
14 to a situation in which a lowered wheel is to be brought out of the active state as quickly as
15 possible.

16
17 With regard to an auxiliary roller having a rigid frame in which a drivable wheel is mounted, the
18 wheel, together with the frame, by pivoting, being raisable or lowerable relative to the chassis to
19 which the wheel is to be attached, the aim is that an outwardly-protruding activating lever is linked
20 to the frame for pivoting the wheel into the raised position without motorized assistance.

21
22 As a result of the wheel being alternatively raisable, even without motorized assistance, in
23 exceptional situations such as in an emergency involving, for example, an auxiliary roller that is
24 mounted on a hospital bed, in which the wheel is in the lowered position, the wheel may be brought
25 out of the active state very quickly solely by bodily power. The lever may be configured in such a
26 way that sufficient leverage is provided with regard to the required forces.

27
28 Also in this regard, further features are described or illustrated below, also in the description of the
29 figures and the drawings, often in their preferred association with this concept. However, features
30 of the concept described above or of the concepts described below may also be of importance.

31
32 It is preferred that the lever is pivotable relative to the frame and also relative to a mounting plate
33 or to the chassis to which the wheel or the frame which supports the wheel is to be attached. A

1 favorable starting position of the lever may thus be achieved. With regard to the pivotability, the
2 lever may also be pushed into a preferred position relative to the frame by means of a spring.

3
4 It is particularly preferred that the lever is biased into its position which enables the lowered
5 position of the wheel.

6
7 In addition, it is preferred that the lever allows the wheel to be raised into the nonactivated position,
8 i.e., a position in which there is no contact with the ground, only until there is no longer any contact
9 of the wheel with the ground, but on the other hand the raised position which usually is achievable
10 by motor is also not assumed.

11
12 Furthermore, it is preferred that the raised position that is achievable by the lever is lockable.
13 Lowering again is not possible unless this lock is released by means of special measures.

14
15 In particular, however, it is also preferred that the lock may be released by a simple customary
16 motorized activation, namely, when customary motorized raising of the wheel is initiated, starting
17 from the raised position achieved by use of the lever, so that a detent lock which accommodates
18 the lever is moved relative to the lever until the lever, due to its spring bias, pivots back into its
19 original position which does not hinder the raising and lowering.

20
21 For an auxiliary roller having a motor-driven wheel, as is the case here, in which the wheel is
22 raisable or lowerable relative to a chassis to which the wheel is to be attached, this also results in
23 the object of providing or achieving the strongest possible traveling drive.

24
25 This object is achieved according to another inventive concept, in that two electric motors are
26 provided for the traveling drive of the wheel, and that the electric motors are situated on opposite
27 sides relative to the wheel. This makes it possible for one or two electric motors to selectively act
28 on the wheel in terms of the drive. Since these types of wheels are often operated by a battery or a
29 rechargeable battery, an energy-saving operating method is thus made possible. As the result of
30 providing two electric motors, which are also situated on opposite sides relative to the wheel, both
31 electric motors may act directly on the same axle or shaft of the wheel. The oppositely situated
32 configuration also results in a favorable distribution in terms of weight. However, it may also be
33 provided that both electric motors continuously drive the wheel in unison.

1
2 It is preferably also provided that one or both electric motors is/are selectively drivable forwards or
3 backwards to allow two opposite directions of travel of the object on which the wheel is mounted.
4

5 Furthermore, it is also preferably provided that one or both electric motors is/are drivable as a
6 generator. This may be utilized, for example, for braking the device on which the auxiliary roller is
7 mounted, such as when an auxiliary roller in operation is switched to "halt" or "stop." It may also be
8 provided that the auxiliary wheel can be braked only by switching to a generator mode. A
9 mechanical brake, in particular one which acts in a frictional manner, may then be dispensed with
10 entirely. Since the object on which the auxiliary roller is mounted still has additional rollers, of which
11 one or more is/are blockable, such an object is fixed via these rollers, particularly since the wheel
12 of the auxiliary roller is generally in the raised position when the object is stationary.
13

14 In this regard, it is also preferably provided that this generator mode is continued only over a
15 certain time period which is preferably selected not to be too long. In the course of switching off the
16 traveling drive by means of the wheel, it is further preferably provided that the wheel is
17 automatically raised into the inactive position, i.e., the position without ground contact, after a
18 certain period of time. In the absence of action on the wheel, generator mode is then no longer
19 possible, and accordingly is also not provided. This time period may be selected to be between 1
20 and 20 seconds, for example, wherein all intermediate values, in particular in $\frac{1}{10}$ second
21 increments, for example 1.1 or 19.9, etc., seconds, are hereby included in the disclosure, also for
22 delimiting the selected time period from above and/or below, but also for the disclosure of
23 individual values in the mentioned range.
24

25 The invention is explained in greater detail below with reference to the accompanying drawings,
26 which however illustrate only one exemplary embodiment. The drawings show the following:
27

28 Figure 1 shows a perspective view of the auxiliary roller structural unit, obliquely from above;

29
30 Figure 2 shows a side view of the object according to Figure 1;
31

32 Figure 3 shows a bottom view of the object according to Figure 1;
33

- 1 Figure 4 shows a cross-section of the object according to Figure 1, sectioned along the line
2 IV-IV in Figure 3;
3
4 Figure 5 shows another cross-section, sectioned along the line V-V in Figure 3;
5
6 Figure 6 shows a cross-section of the object according to Figure 2, sectioned along the line
7 VI-VI;
8
9 Figure 7 shows an illustration corresponding to Figure 4, but in the lowered state of the
10 wheel;
11
12 Figure 8 shows an illustration corresponding to Figure 5, but in the lowered state of the
13 wheel;
14
15 Figure 9 shows an illustration corresponding to Figure 7, but in an even further lowered state;
16
17 Figure 10 shows an illustration in a view in the direction of the arrow X in Figure 9;
18
19 Figure 11 shows an illustration corresponding to Figure 8, but at the start of lifting the wheel by
20 means of the lever;
21
22 Figure 12 shows the wheel in the raised position which is effected by means of the lever, in an
23 illustration corresponding to Figure 7; and
24
25 Figure 13 shows an illustration corresponding to Figure 12, but in a section corresponding to
26 Figure 11.
27

28 A structural unit 1 which represents an auxiliary roller is illustrated and described, having a wheel
29 2, the structural unit 1 as a whole being mountable on a chassis. The wheel 2 is accommodated in
30 a frame 3, which in the exemplary embodiment is composed of two frame parts 4, 5 that are
31 connected to one another, for example via a transverse connection 6, to form a frame 3 that is
32 movable as a unit.
33

1 Such a structural unit 1 may be mounted on a hospital bed, for example. However, the structural
2 unit may also be mounted on transport devices such as a container or a shopping cart or the like.
3 The structural unit is used for the traveling drive of such an object.

4
5 In addition, a battery and various control elements, which are then suitably electrically connected to
6 the structural unit 1, are provided on the chassis, i.e., on the hospital bed, for example.

7
8 The frame parts 4, 5 preferably extend parallel to one another. As is apparent in particular from
9 Figure 3, the wheel 2 is situated off-center with respect to the frame parts 4, 5 namely, situated
10 closer to the frame part 5. For example, an advantageous enclosure within the units described
11 below is thus achieved.

12
13 The running direction of the wheel 2 is parallel to the frame parts 4, 5. The shaft 7 (also see Figure
14 4) of the wheel 2 is accommodated in the frame parts 4, 5 by bearings.

15
16 In the exemplary embodiment, with regard to the version with two electric drives, the shaft 7
17 protrudes beyond the frame parts 4, 5 on both sides, and in each case is connected there to
18 gearing 8 and an electric motor 9. The gearing 8 and the electric motor 9 are secured to each of
19 the frame parts 4 and 5 from the outside. The gearing 8 is preferably formed in such a way that it is
20 not self-locking and has the lowest possible internal friction. A free-wheeling effect, for example,
21 may also be achieved in this way.

22
23 With regard to the above-mentioned suitable electrical connection, connecting plugs 10 are also
24 provided on the frame, for example, for supplying power to an electric motor 9, but also for the
25 control system.

26
27 A mounting plate 11 is provided in addition to the frame parts 4, 5. In the exemplary embodiment,
28 the mounting plate 11 is situated between the frame parts 4, 5, regions of the plate being
29 associated with the underside of, for example, a chassis of a hospital bed. The frame 3 is pivotably
30 connected via a pin 12 to the mounting plate 11, which in the installed state is fixedly connected to
31 the chassis of the object in question. In the exemplary embodiment, the pin 12 is connected by
32 screws to the frame parts 4, 5, which are formed as frame walls. The frame parts 4, 5 are

1 preferably connected not only via the pin 12, but also via the mentioned shaft 7 of the wheel 2 and
2 transverse connections 6.

3
4 In addition, in the embodiment, a compression spring 13 is provided which is connected at one end
5 to the chassis or to the mounting plate 11 (see Figure 4), and at the other end is connected to the
6 frame 3.

7
8 The compression spring 13 is situated on a telescoping tube 14 which in particular also hinders
9 buckling of the helical spring, in the exemplary embodiment the telescoping tube 14 cooperating on
10 the one hand with a pivot pin 16 of the mounting plate 11 and on the other hand with a transverse
11 connection 6, via clip ends 15. The compression spring could also act, for example, on only one of
12 the frame parts 4, 5.

13
14 In the raised position according to Figure 4, the compression spring 13 acts in such a way that it
15 presses the frame 3 into this raised position. In the lowered position (see Figure 7, for example) the
16 compression spring generates the primary force which presses the wheel 2 onto the ground. In
17 addition, however, a lowering spring 25 which is preferably formed as a leg spring is also provided.
18 The lowering spring 25 is also important in particular in that it allows the force component of the
19 compression spring 13, which in the position corresponding to Figure 4 acts in the raised position,
20 to be overcome in the course of a lowering operation.

21
22 The compression spring 13 preferably exerts a force which is approximately 3 to 5 times, more
23 preferably approximately 4 times, greater than that of the lowering spring 25.

24
25 The compression spring 13 moves together with the frame 3 about the pivot point which is fixed
26 relative to the chassis, provided in the present case by the pivot pin 16, when the wheel 2 is raised
27 and lowered.

28
29 As is apparent, the linking point of the compression spring 13 to the frame 3, in the present case by
30 means of the transverse connection 6, is situated above the linking point 16 to the chassis in the
31 raised position according to Figure 4, even though the vertical distance is comparatively small. The
32 distance is less than the distance that corresponds to a diameter of the compression spring 13,
33 formed in the present case as a coil spring.

1
2 In a vertical projection as shown in the illustration in Figure 1, for example, the compression spring
3 13 is located between the frame parts 4 and 5. In the raised state according to Figure 4, the
4 compression spring is also accommodated within the frame parts 4 and 5 in a horizontal projection.
5 In the lowered state (see Figure 7, for example) the compression spring may protrude from the
6 frame over a portion of the length of the compression spring.

7
8 A downwardly projecting linkage formation 17 which accommodates the pivot pin 16 is provided on
9 the mounting plate 11. A desired position of the pivot pin 16, which is lowered with respect to the
10 transverse connection 6, is achieved in the raised state according to Figure 4, for example.

11
12 In addition, an activating lever 18 is provided by means of which the wheel 2 together with the
13 frame 3 is displaceable from a lowered position according to Figure 7 or Figure 8 into an at least
14 partially raised position according to Figure 12, solely by bodily power, for example.

15
16 The lever 18 on the one hand is pivotably situated via a further transverse connection 29 which,
17 with respect to the illustration in Figure 4, for example, is associated with a lower edge of the frame
18 parts 4, 5. On the other hand, the activating lever 18 is also biased into a position according to
19 Figure 5 by means of a spring 19.

20
21 The activating lever 18, of which preferably two are provided, as is apparent, extends
22 approximately parallel to the frame parts 4, 5. The activating lever has an angled portion 20 which
23 likewise extends approximately parallel to the frame parts 4, 5. This angled portion 20 also has a
24 detent formation 21 which, in the activated state (see Figure 11 or Figure 13, for example),
25 cooperates with a detent receptacle 22 or 23 formed on the mounting plate 11.

26
27 As is apparent, the mounting plate 11 extends at an angle in the cross-section. The detent
28 receptacles 22, 23 are formed on a vertical portion of this angled mounting plate. In any case, the
29 detent receptacles are fixed relative to the chassis.

30
31 A position corresponding to Figure 13, for example, results after an action of force on the free end
32 24 of the activating levers 18. Due to the linkage of the frame parts 4, 5 to the pin 12, the angled
33 portion 21 [sic; 20] collides with the stepped surface 26 of the mounting plate 11, so that without

1 further intervention it is not possible for the wheel 2 to move back into the lowered position from the
2 position corresponding to Figure 13.

3
4 However, as the result of a motorized activation of the shaft 27 in a customary manner, (further)
5 raising may take place via the eccentric 28 — in this regard also see the disclosure content of
6 above-cited WO 2007/093549 A1 — which raising, due to the action of the spring 19 allows the
7 activating lever 18 to pivot back into the position corresponding to Figure 5, after which a
8 customary motorized activation of the wheel 2 is once again possible.

9
10 All features disclosed are (in themselves) pertinent to the invention. The disclosure content of the
11 associated/accompanying priority documents (copy of the prior application) is also hereby included
12 in full in the disclosure of the application, including for the purpose of incorporating features of
13 these documents in claims of the present application. The subsidiary claims in their optional
14 subordinated formulation characterize independent inventive refinement of the prior art, in
15 particular to undertake divisional applications based on these claims.

16

1 **List of reference numerals**

2				
3	1	Structural unit	25	Lowering spring
4	2	Auxiliary roller	26	Stepped surface
5	3	Frame	27	Shaft
6	4	Frame part	28	Eccentric
7	5	Frame part	29	Transverse connection
8	6	Transverse connections		
9	7	Shaft		
10	8	Gearing		
11	9	Electric motor		
12	10	Connecting plug		
13	11	Mounting plate		
14	12	Pin		
15	13	Compression spring		
16	14	Telescoping tube		
17	15	Clip ends		
18	16	Pivot pin		
19	17	Linkage formation		
20	18	Activating lever		
21	19	Spring		
22	20	Angled portion		
23	21	Detent formation		
24	22	Detent receptacle		
25	23	Detent receptacle		
26	24	Free end		

CLAIMS

1. Auxiliary roller having a rigid frame (3), with a drivable wheel (2) which is mounted in the frame (3) and which has an axle (12 [sic; 7]), the wheel (2) together with the frame (3), by pivoting, being raisable or lowerable relative to a chassis to which the auxiliary roller is to be attached, and a compression spring (13) which is rotatably linked at one end to the chassis being provided in order to load the wheel (2) with regard to ground contact in the lowered position, characterized in that a transverse connection (6) connecting two frame parts (4, 5) in the direction of an axle (12 [sic; 7]) of the wheel (2) is provided, that the compression spring (13) is linked at the other end to the transverse connection (6), and that the compression spring (13) together with the frame (3) pivots about the pivot point which is fixed to the chassis, when the wheel (2) is raised and lowered.
2. Auxiliary roller according to Claim 1 or in particular according thereto, characterized in that the linking point of the compression spring (13) to the frame (3) in the raised state of the wheel (2) is situated above the linking point of the wheel (2) to the chassis.
3. Auxiliary roller according to one or more of the preceding claims or in particular according thereto, characterized in that a guide rod (14) passes through the compression spring (13).
4. Auxiliary roller according to one or more of the preceding claims or in particular according thereto, characterized in that the guide rod (14) has a telescoping capability.
5. Auxiliary roller according to one or more of the preceding claims or in particular according thereto, characterized in that the compression spring (13) is situated in a vertical projection within the frame (3).
6. Auxiliary roller having a rigid frame (3) with a drivable wheel (2) which is mounted in the frame, the wheel (2), together with the frame (3), by pivoting, being raisable or lowerable relative to a chassis to which the auxiliary roller is to be attached, characterized in that an outwardly protruding activating lever (18) is linked to the frame (3) for pivoting the wheel (2) into the raised position without motorized assistance.

7. Auxiliary roller according to Claim 6 or in particular according thereto, characterized in that the lever (18) is pivotable relative to the frame (3) and also relative to a mounting plate (11) or to the chassis.
8. Auxiliary roller according to Claim 6 or 7 or in particular according thereto, characterized in that the lever (18) is biased into its position which enables the lowered position of the wheel (2).
9. Auxiliary roller having a motor-driven wheel (2) which is raisable or lowerable relative to a chassis to which the wheel is to be attached, characterized in that two electric motors (9) are provided for the drive of the wheel (2), and that the electric motors (9) are situated on opposite sides relative to the wheel (2).
10. Auxiliary roller having a motor-driven wheel (2) which is raisable or lowerable relative to a chassis to which the wheel is to be attached, the wheel (2) being drivable by at least one electric motor (9), characterized in that the electric motor (9) is switchable as a generator, and/or that the electric motor (9) is drivable in two directions.

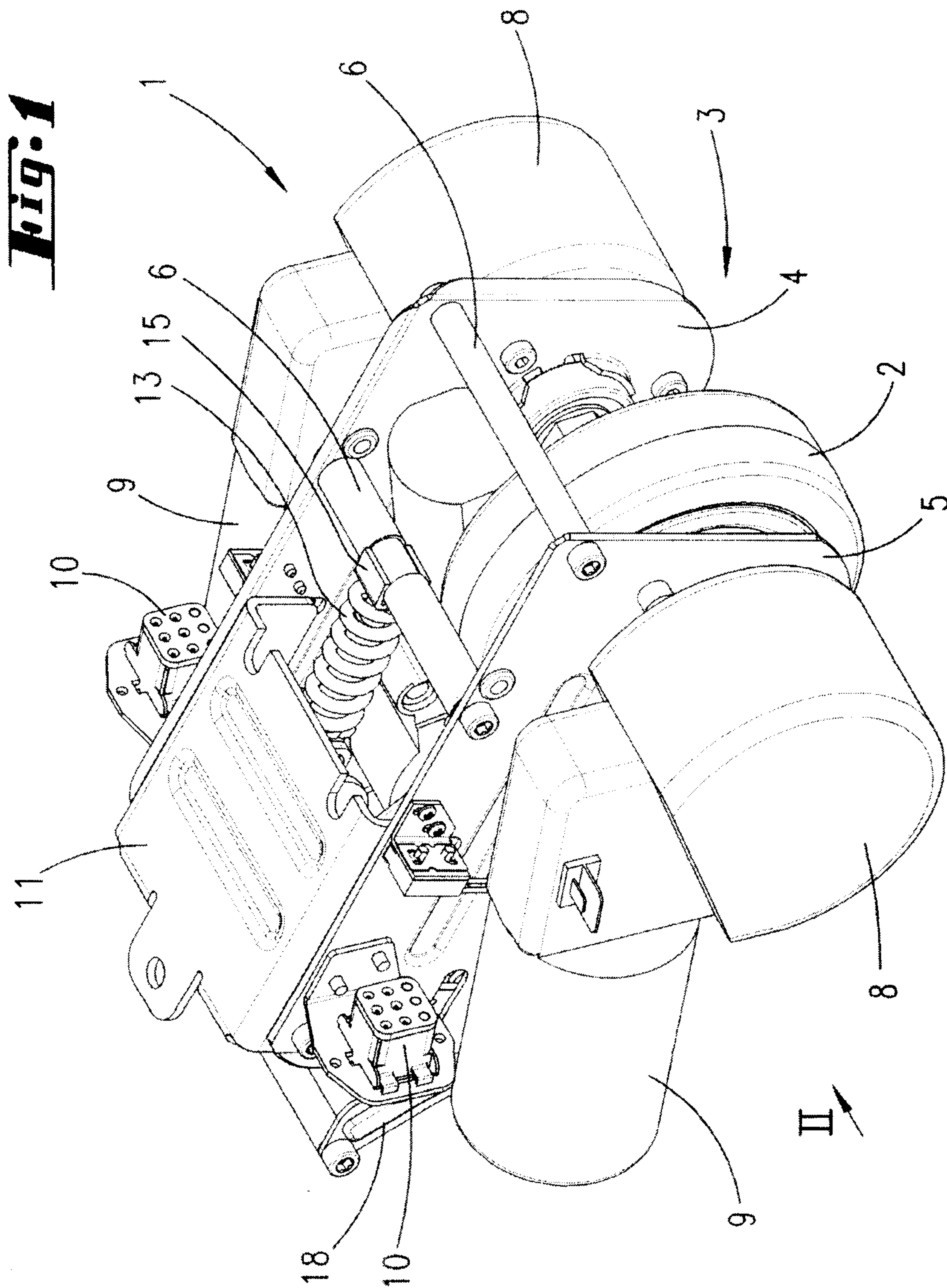
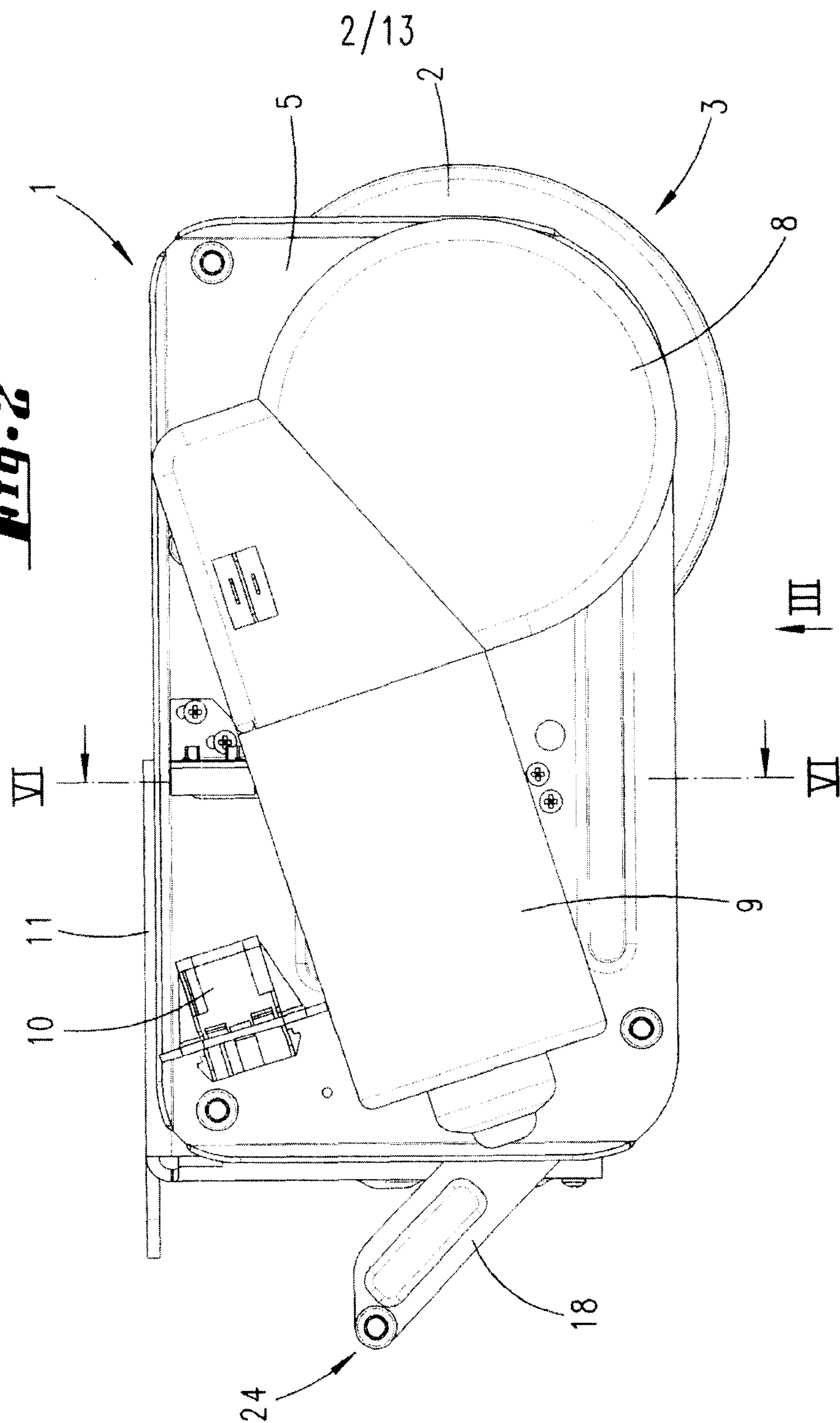


Fig. 2



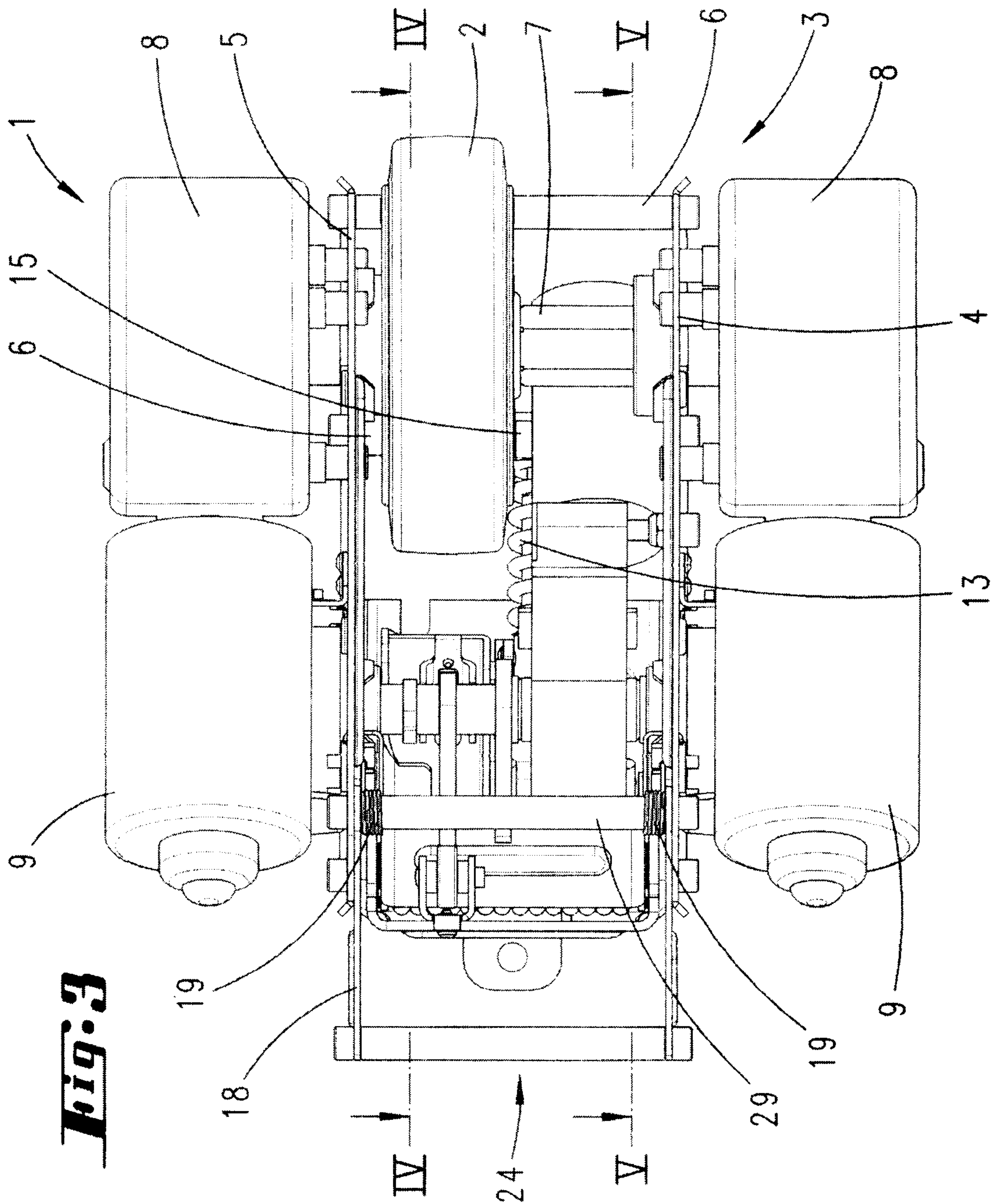


Fig. 3

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Fig. 4

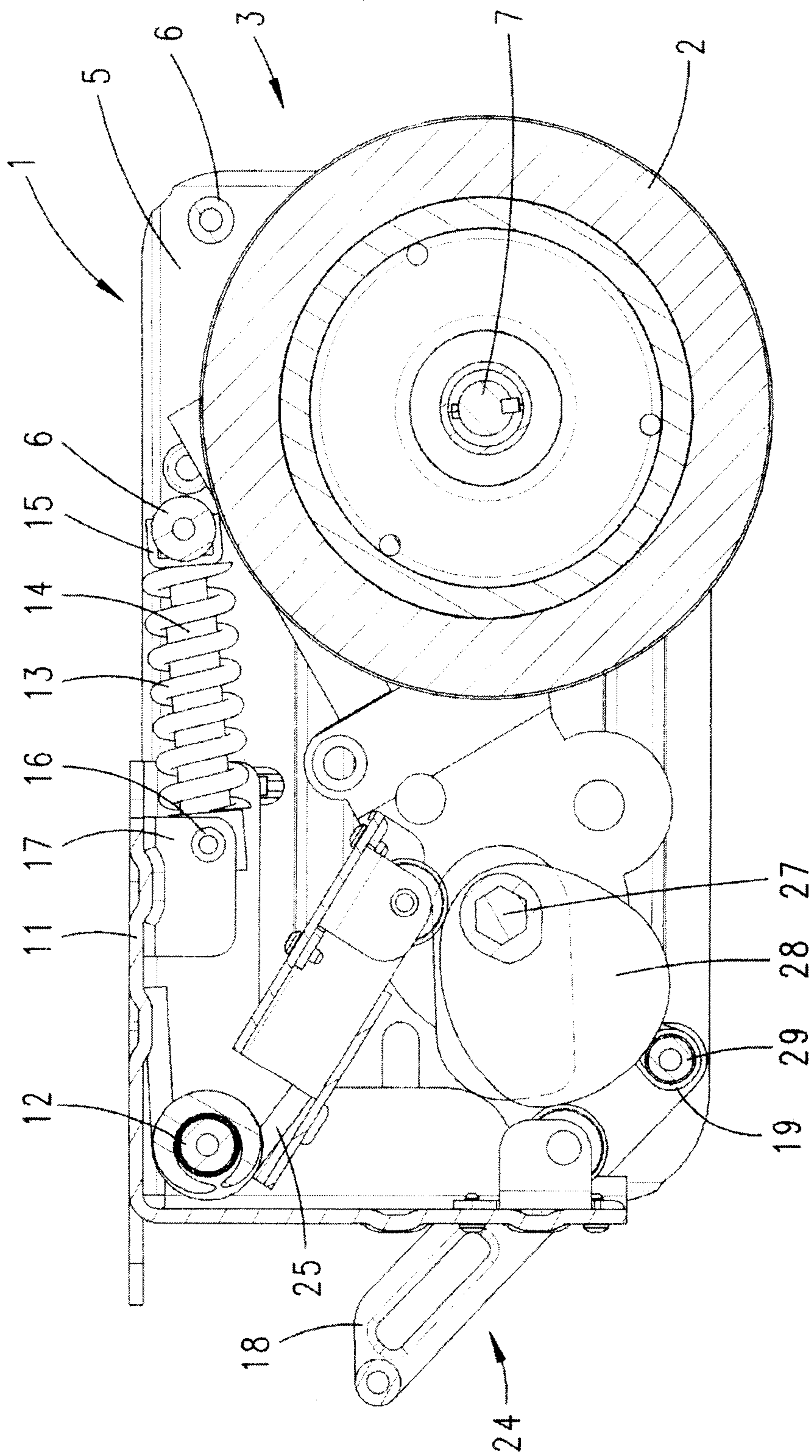


Fig. 5

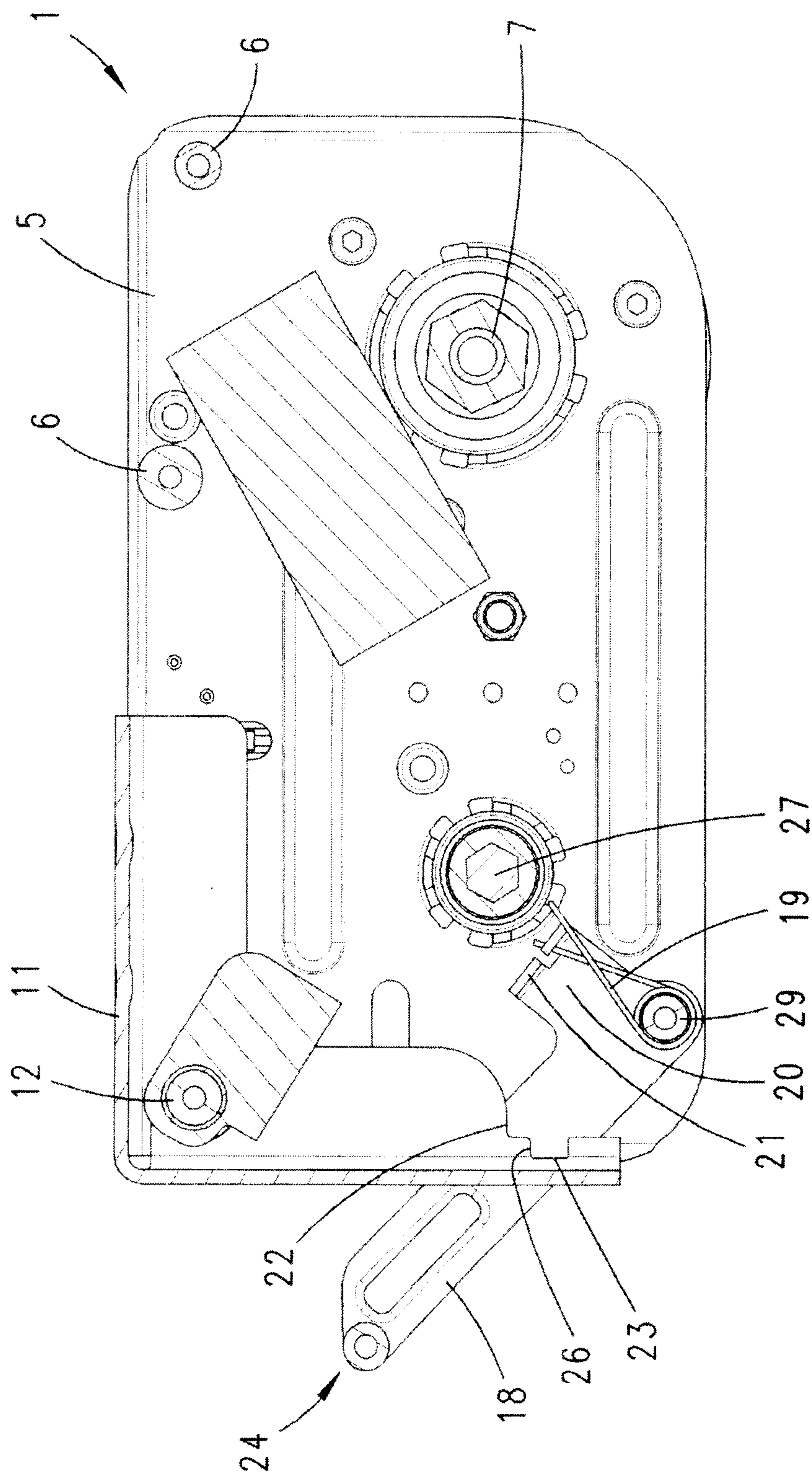
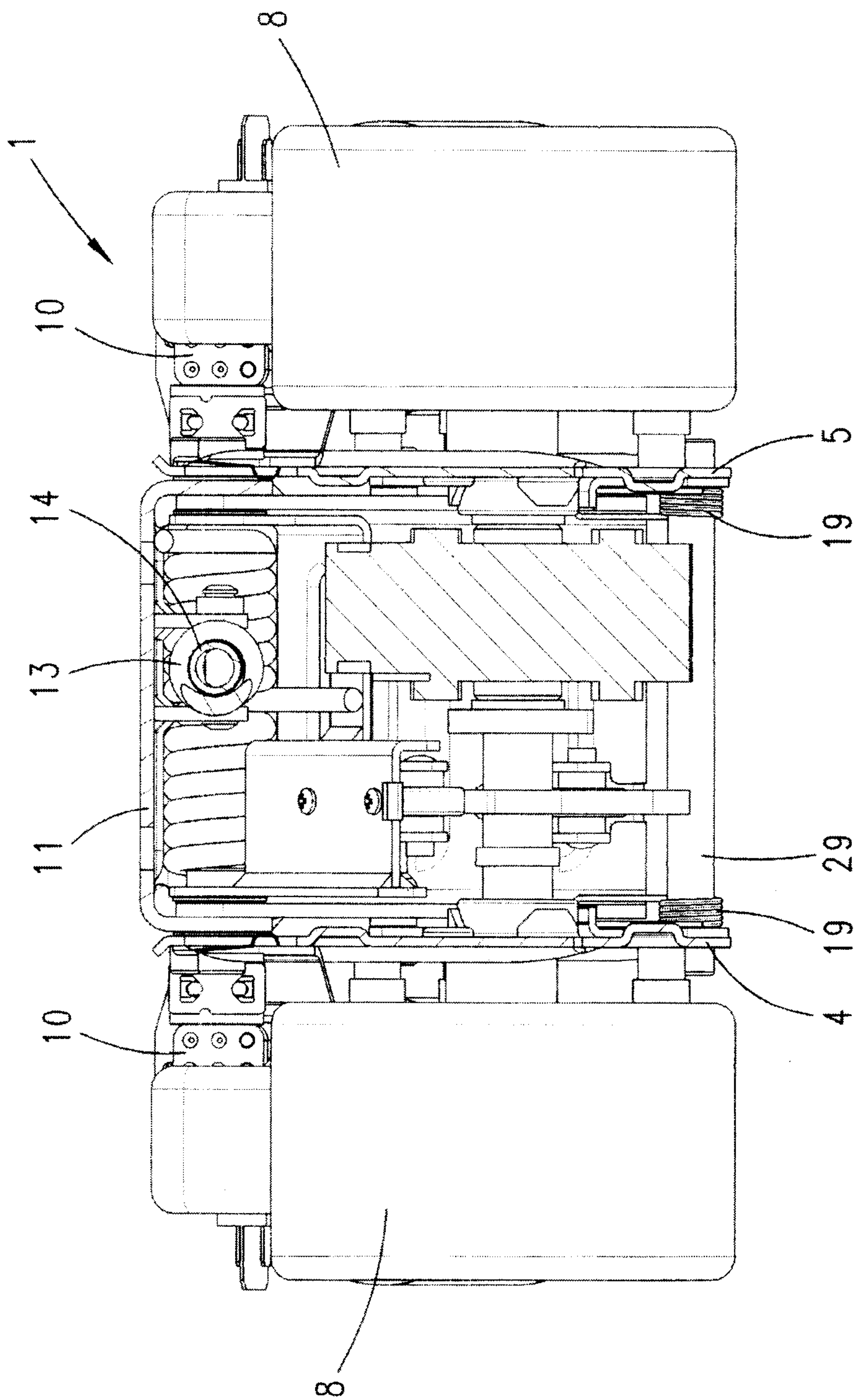
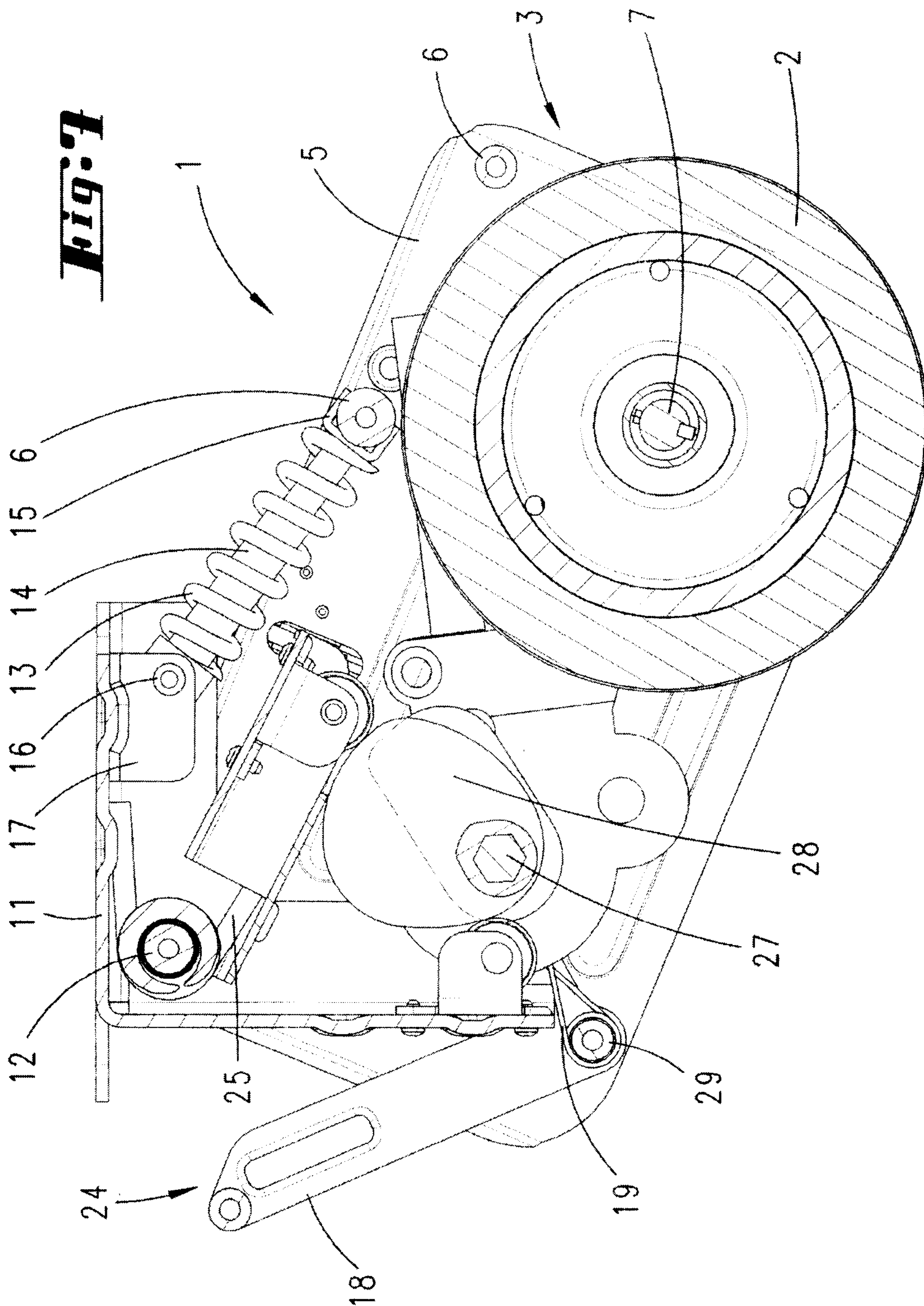
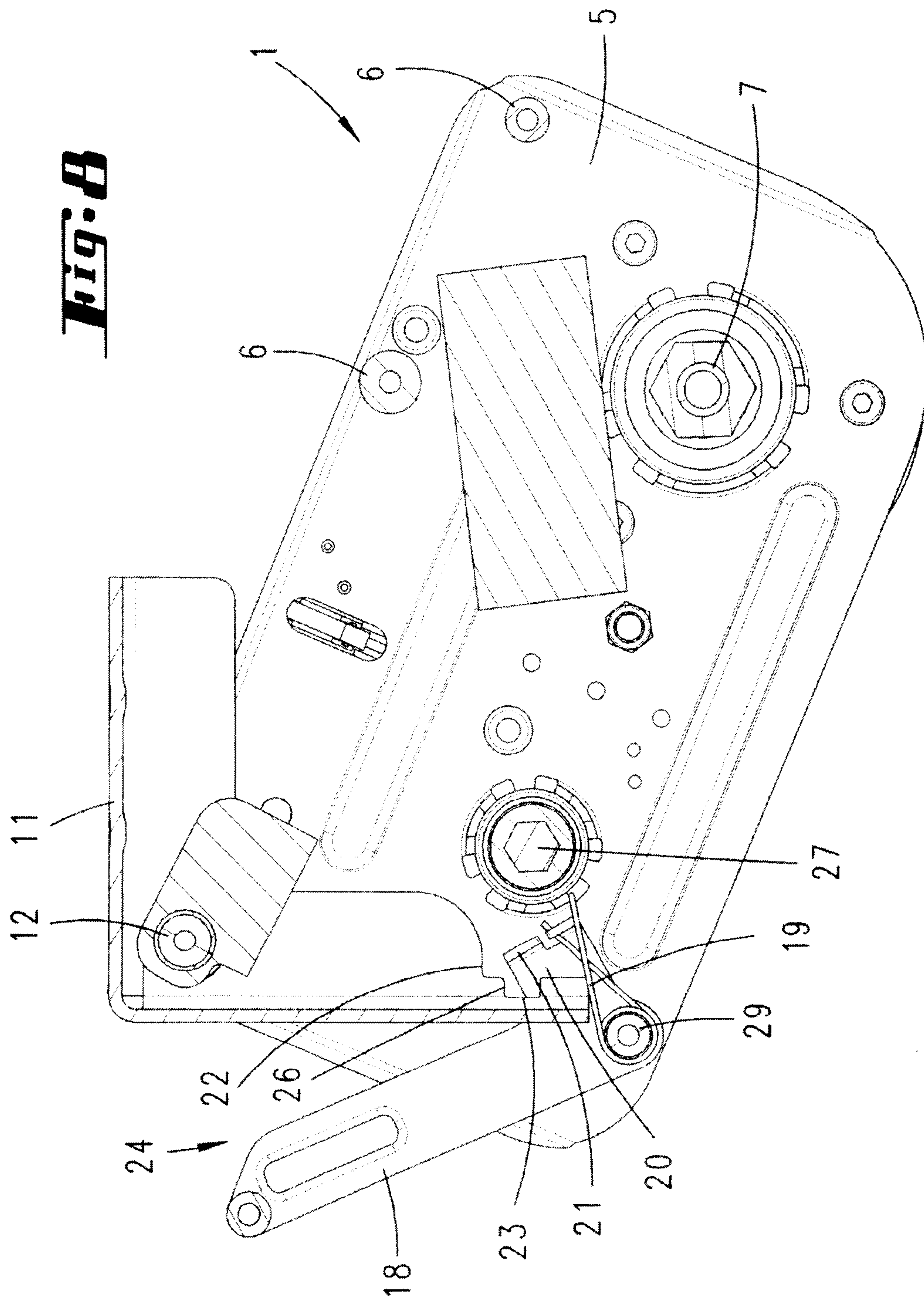


Fig. 6



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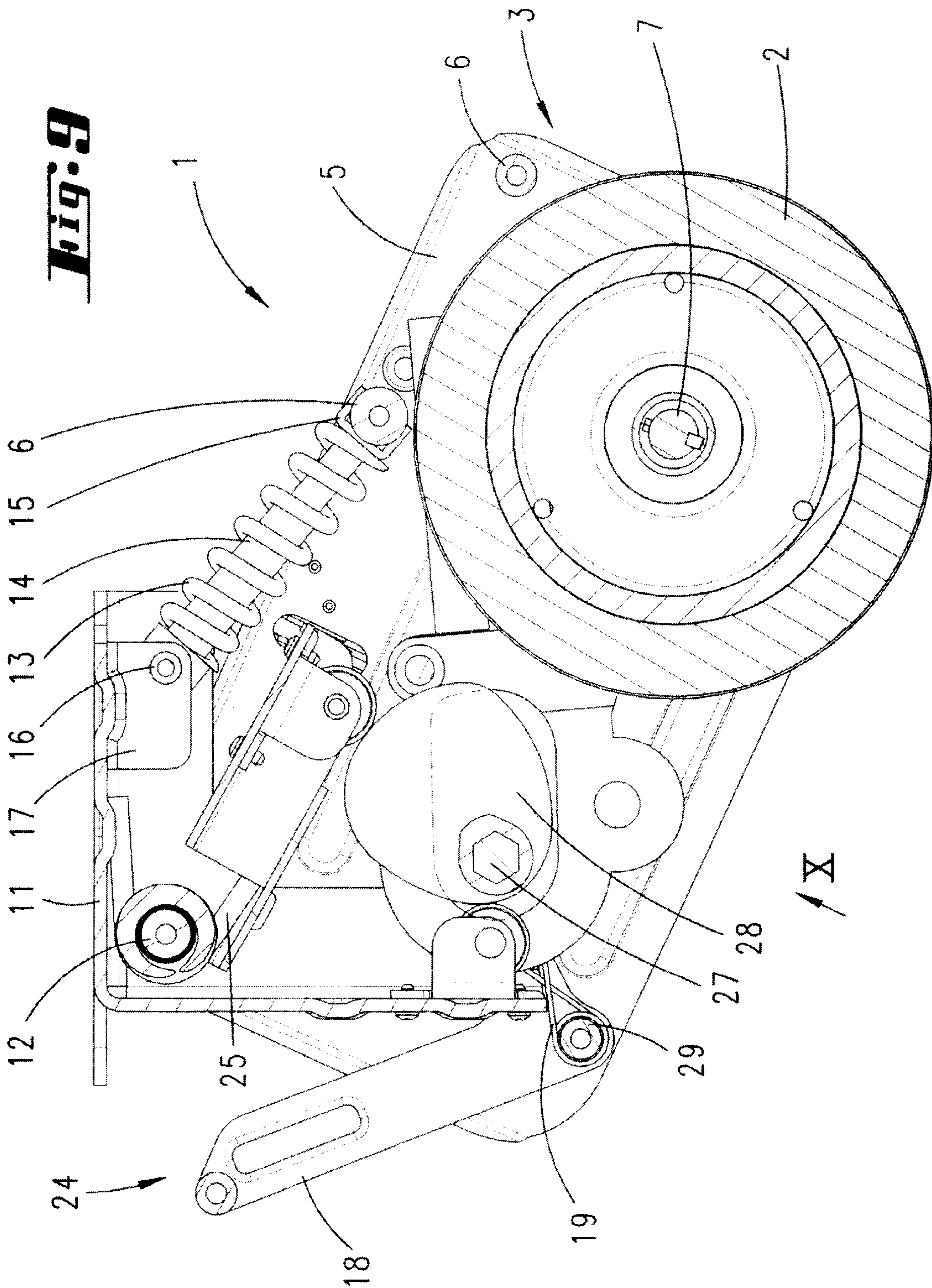


Fig. 11

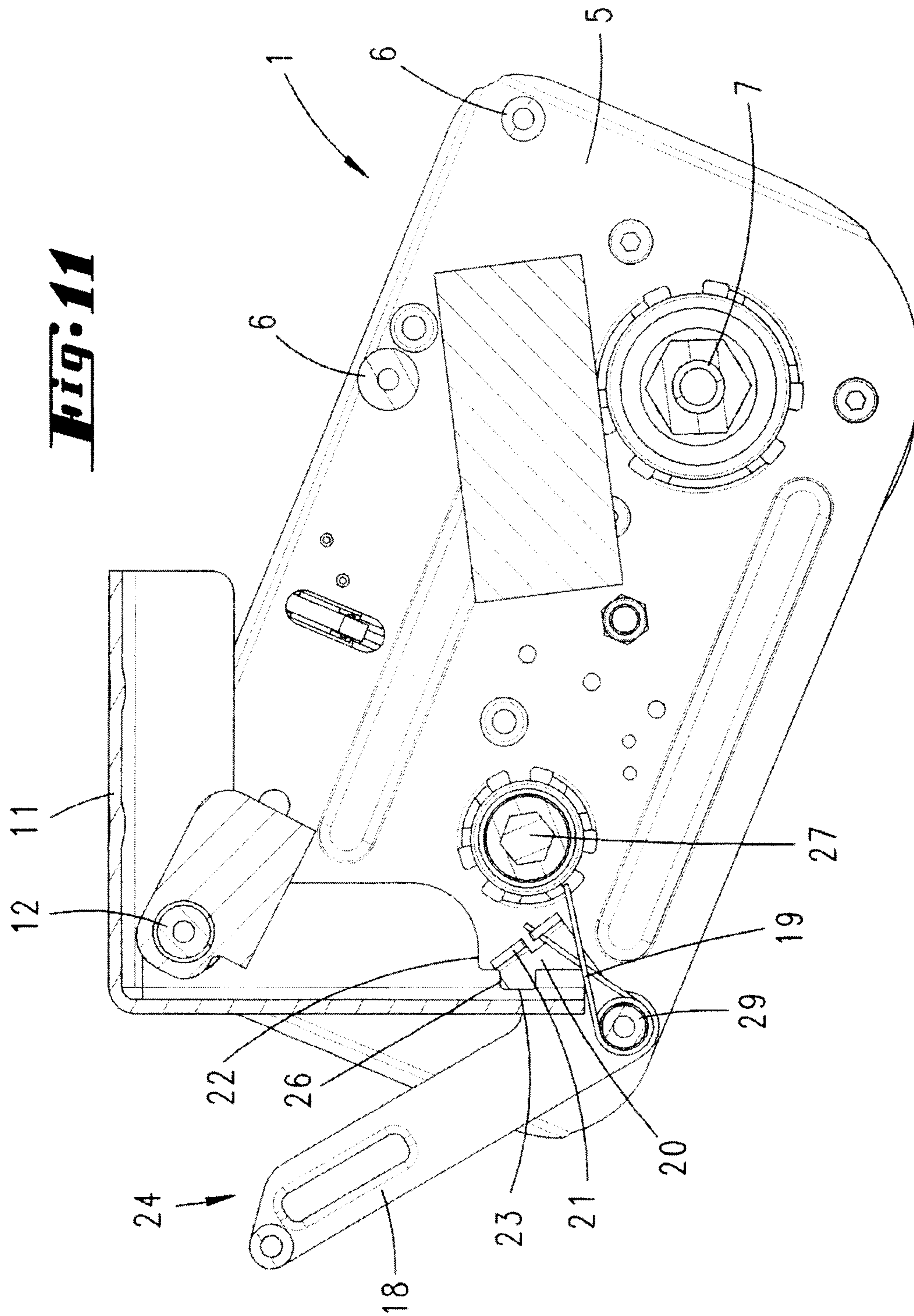


Fig. 12

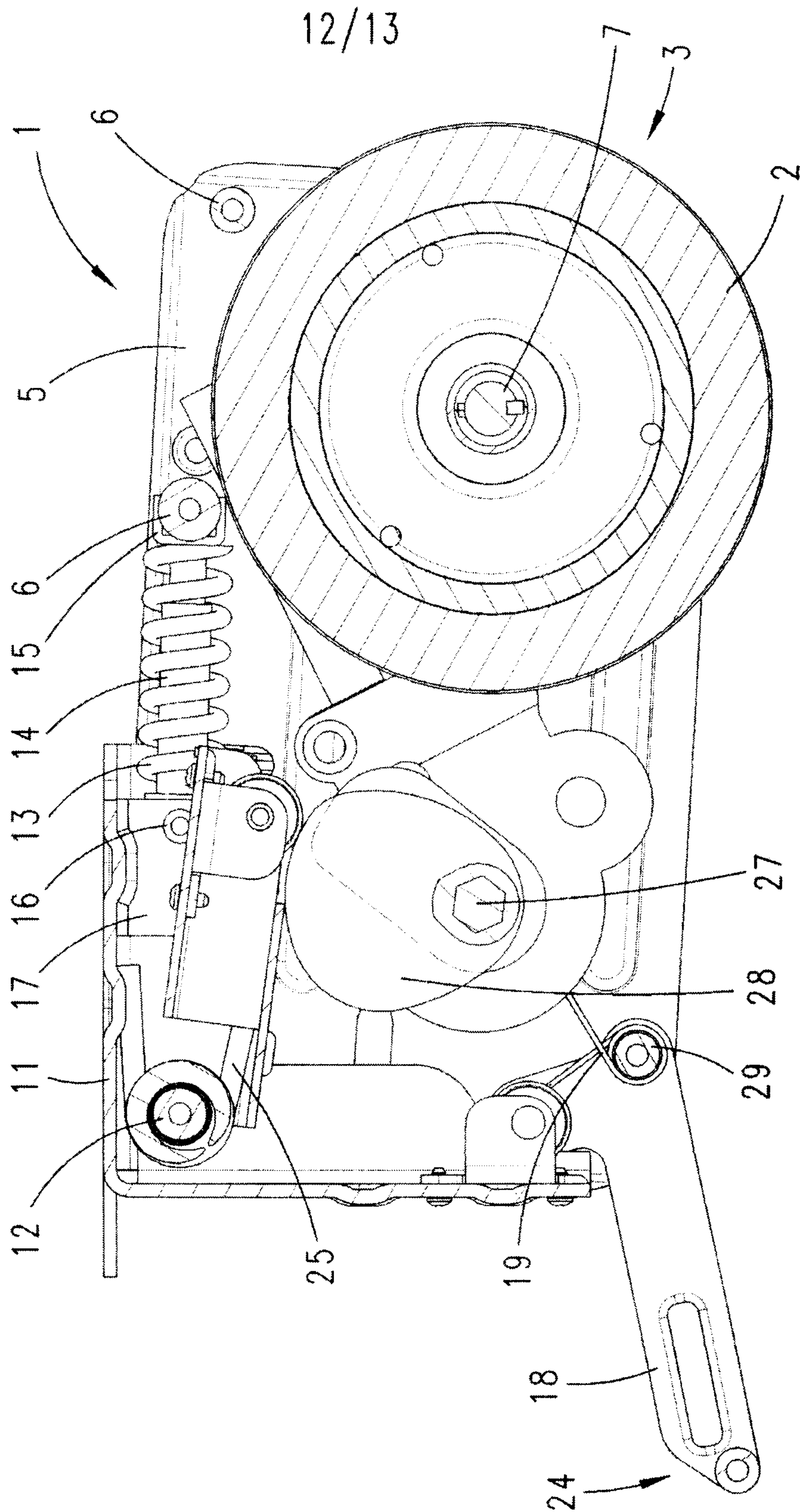


Fig. 13

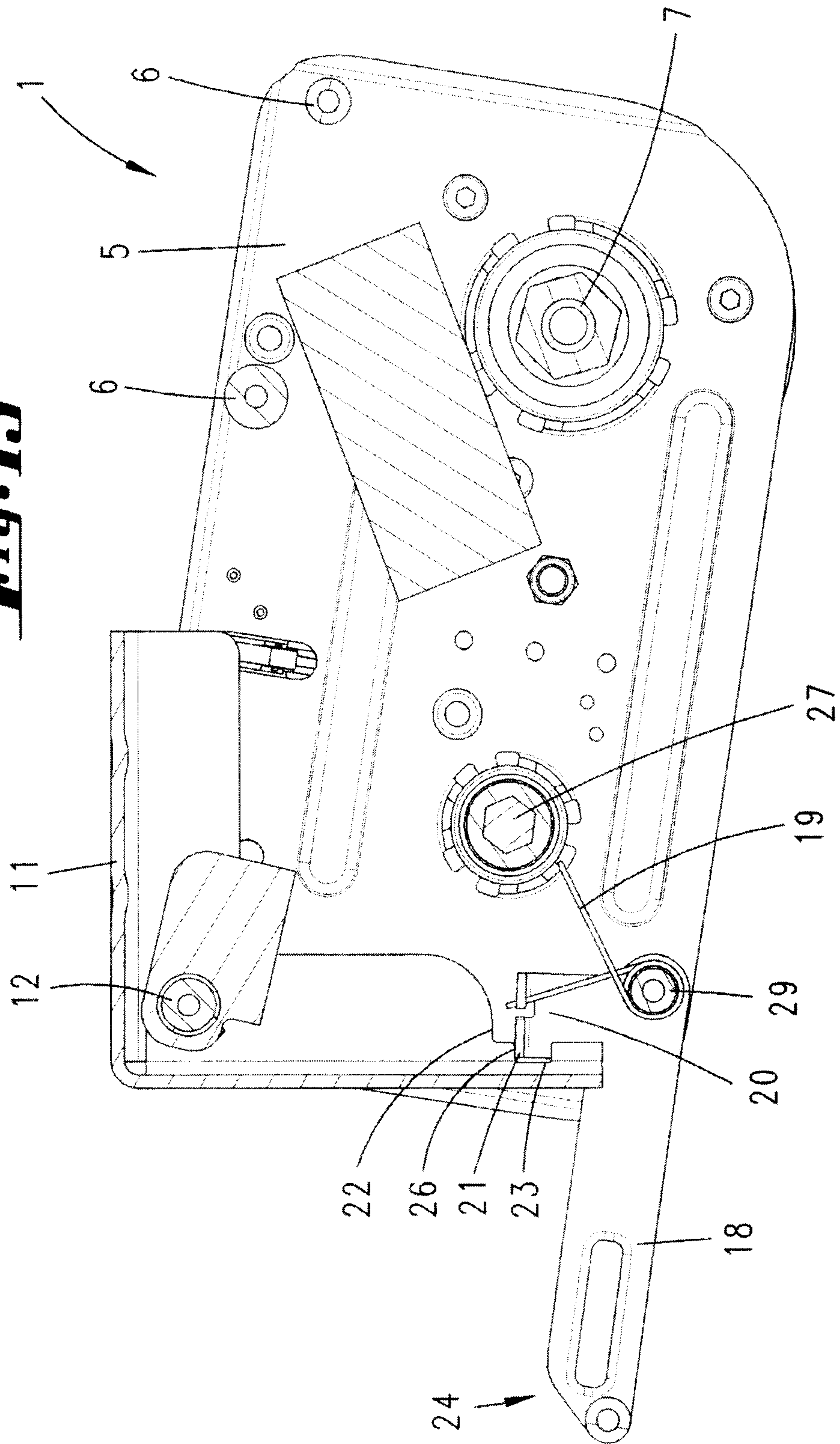


Fig. 1

