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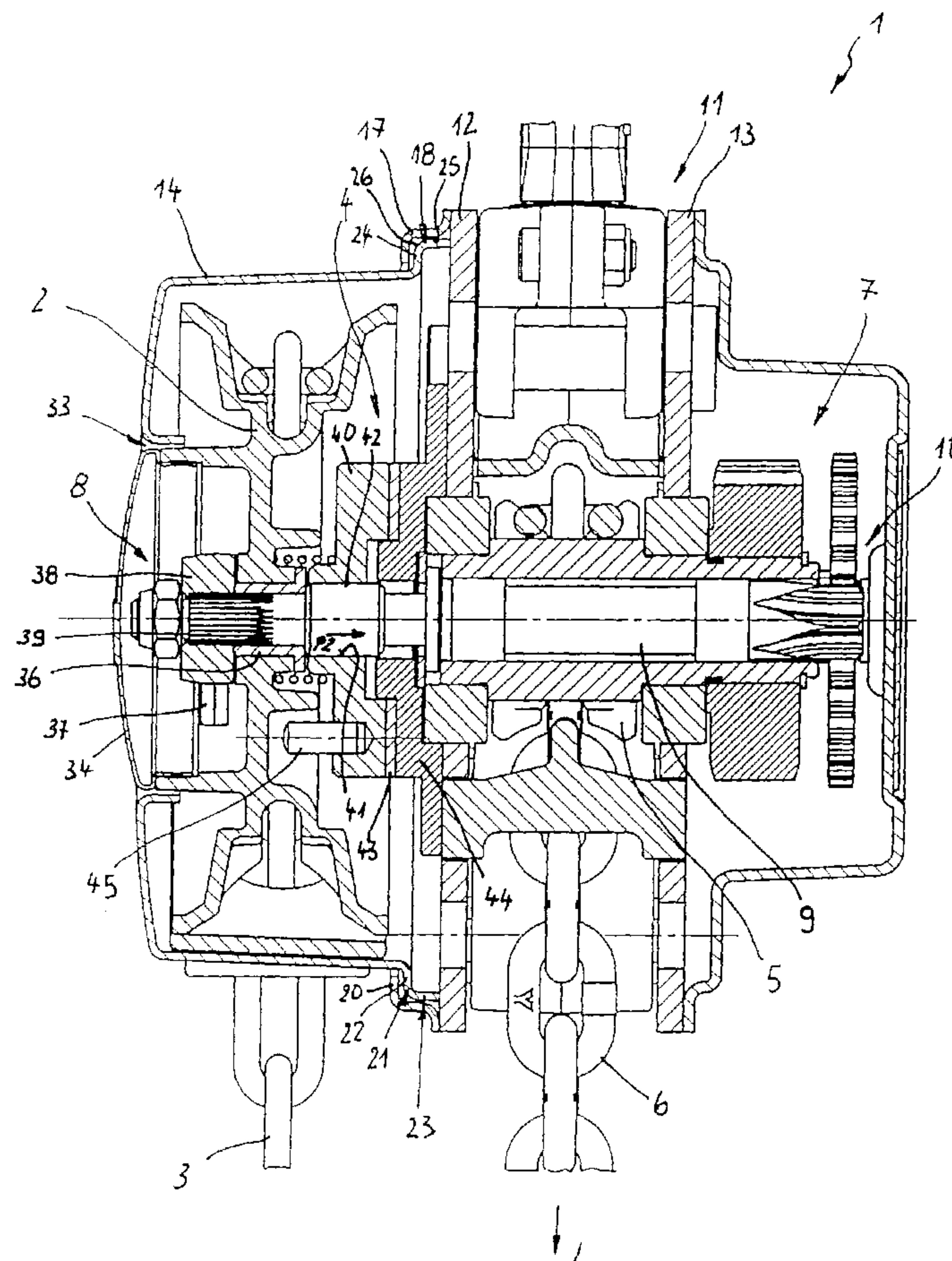
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(54) Title: LIFTING DEVICE



(57) Abrégé/Abstract:

The invention relates to a lifting device for raising, lowering and putting loads. The lifting device includes a hand chain wheel (2)

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

which can be turned in both directions by a hand chain (3). The hand chain wheel (2) is coupled to a load wheel (5), which moves a load chain (6) and a load suspended thereon. The hand chain wheel (2) is covered by a rotatably supported cover (14) with chain guide openings (15, 16). The cover (14) is rotatably secured by a supporting metal sheet (17) which is located on a side plate (12) of the housing (11) that accommodates the load chain wheel (5). The cover (14) engages in a slide ring (20) of the supporting metal sheet (17) with a guide (18) that is oriented radially outwardly, wherein the slide ring has a central recess (19) for the cover (14).

ABSTRACT

The invention relates to a lifting device for raising, lowering and pulling loads. The lifting device includes a hand chain wheel (2) which can be turned in both
s directions by a hand chain (3). The hand chain wheel (2) is coupled to a load wheel (5), which moves a load chain (6) and a load suspended thereon. The hand chain wheel (2) is covered by a rotatably supported cover (14) with chain guide openings (15, 16). The cover (14) is rotatably secured by a supporting metal sheet (17) which is located on a side plate (12) of the housing (11) that
10 accommodates the load chain wheel (5). The cover (14) engages in a slide ring (20) of the supporting metal sheet (17) with a guide (18) that is oriented radially outwardly, wherein the slide ring has a central recess (19) for the cover (14).

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LIFTING DEVICE

The invention relates to a lifting device, which includes a load wheel with a load chain and a hand chain wheel with a hand chain, wherein the hand chain wheel is
5 covered with a cover which is supported for rotation about the hand chain wheel and has chain guide openings.

US-A-3,030,076 discloses a lifting device in form of a pulley block with a separately guided load and a hand chain, wherein the hand chain wheel is covered with a one-
10 piece hand chain wheel housing which surrounds the hand chain wheel. That hand chain wheel housing is supported for rotation about the hand chain wheel and has chain guide openings for feeding and withdrawing the hand chain.

The rotatable arrangement of the hand chain wheel
15 housing is intended to enable the chain guide openings to follow the pulling forces that act on the hand chain, so that the chain guide openings are approximately perpendicular to the pulling direction. The hand chain has then sufficient clearance for passing through the chain
20 guide openings without friction. This arrangement advantageously reduces the friction losses and the pulling forces required for lifting a load.

However, the known lifting device has a relatively complex design, in particular the cover for the hand chain
25 wheel. In practice, the chain can jam or jump in spite of the fact that the hand chain wheel housing is able to rotate. This causes the hand chain wheel to jerk or slip and thereby also bangs in the hand chain and the load chain. Moreover, during operation of the hand chain wheel in
30 certain applications, the chain can produce annoying noise.

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It is therefore an object of the invention to improve, based on the state of the art, the design and functionality of a lifting device with a rotatably supported cover for the hand chain wheel.

5 According to the invention there is provided a lifting device, which includes a load wheel with a load chain and a hand chain wheel with a hand chain, wherein the hand chain wheel is covered with a cover which is supported for rotation about the hand chain wheel and has chain guide
10 openings characterized in that the cover is rotatably supported by a supporting metal sheet which is attached to a side plate of a housing receiving the load wheel, wherein an outwardly oriented guide of the cover engages with a slide ring of the supporting metal sheet, with the slide ring
15 having a central recess for the cover.

The guide on the cover is preferably formed as a circumferential collar, which can be formed by an S-shaped edge of a cover edge facing the side plate.

Alternatively, the guide can be formed by an edge
20 seam of the cover edge.

The lifting device according to the invention is characterized by a functional cover for covering the hand chain wheel, wherein the cover is simple and reliably supported for rotation. The cover can be rotated by 360°
25 about the hand chain wheel and follows the pulling forces that act on the hand chain, so that the hand chain is always oriented along the pulling direction. The cover adjusts automatically according to the pulling direction of the hand chain. The lifting device of the invention can be operated
30 from all directions, and the hand chain is no longer deflected on the chain guide openings. The hand chain can

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run smoothly and with only small friction losses perpendicular through the chain guide openings. The applied pulling force is thereby transferred to the hand chain wheel via the hand chain with low losses.

5 Advantageously, the cover can also be assembled in a simple manner. The hand chain wheel can be covered using only a few lightweight components. The cover together with the supporting metal sheet is adjusted and secured on the side plate of the housing, preferably with screws.

10 In a particular embodiment, the slide ring is formed by an annular stamped portion of the supporting metal sheet, making production simple and economical.

 The passage of the hand chain through the chain guide opening can be supported by sliding blocks. In a
15 particularly preferred embodiment of the lifting device of the invention, the sliding blocks are made of plastic and form a part of a one-piece shell body incorporated in the cover. The shell body is preferably made of polyamide.

 The shell body is placed in the cover and
20 installed together with the cover. The shell body moves with the cover when the cover rotates. The sliding blocks reliably guide the hand chain through the chain guide openings. In addition, the sliding blocks also reduce noise. The rattling noise frequently observed during
25 operation of the hand chain is strongly attenuated.

 According to another advantageous embodiment, one end face of the cover has an opening which is closed with a cover plate that is coupled with the hand chain wheel. The cover plate rotates with the hand chain wheel. The hand
30 chain wheel and the load wheel are mounted on the drive

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shaft, wherein the end of the drive shaft facing the hand chain wheel is accessible via the cover plate.

The invention will be described hereinafter in more detail with reference to the accompanying drawings in
5 which:

FIG. 1a top view of a lifting device;

FIG. 2a vertical longitudinal section along the line II-II of the diagram of FIG. 1;

FIG. 3a vertical longitudinal section along the
10 line III-III of the diagram of FIG. 1;

and

FIG. 4a detail of a guide on a cover in an alternative embodiment.

- 5 FIGS. 1 to 3 to show a lifting device indicated by reference numeral 1 which can be used in different applications for raising, lowering, and pulling loads L or for assembling parts.

Lifting device 1 includes a hand chain wheel 2 with hand chain 3, a friction disc
10 brake 4, a load wheel 5 with load chain 6 and a gear 7, which are arranged sequentially in the axial direction. The hand chain wheel 2 is located at one end 8 of a drive shaft 9. For transmitting torque, the friction disc brake 4 can be coupled with the gear 7 which is located at the other end 10 of the drive shaft 9 and drives the load wheel 5, via the drive shaft 9 which extends through the
15 friction disc brake 4 and the load wheel 5. The load wheel 5 is supported inside a housing 11 between side plates 12 and 13.

The hand chain wheel 2 is rotated by pulling the hand chain 3, thereby transmitting the torque via the drive shaft 9 and the gear 7 to the load wheel 5 for
20 raising and lowering a load. It can be seen that the hand chain wheel 2 is covered by a cover 14 supported for rotation and having two chain guide openings 15, 16. The cover 14 is rotatably supported by a supporting metal sheet 17 which is attached to the side plate 12. A radially outwardly oriented

guide 18 of the cover 14 engages with a slide ring 20 of the supporting metal sheet 17. The slide ring 20 is provided with a center recess 19 for the cover 14. The guide 18 is implemented as a circumferential guide collar 21 formed by an S-shaped edge 22 of the cover edge 23 that faces the side plate 12. The edge 22
5 includes a radial segment 24 and an axial segment 25, with a rounded arcuate section 26 forming a transition between the radial and axial segments. The slide ring 20 is formed by an annular stamped portion 27 on the supporting metal sheet 17. The slide ring 20 has an approximately opposite shape so as to formfittingly engage with the edge 22.

10

The cover 14 together with the supporting metal sheet 17 is attached to the side plate 12 with screws 28. The cover 14 is reliably guided and rotatably supported through cooperation between the guide 8 and the guide 18 and the slide ring 20.

15 As seen in particular from FIG. 3, the sliding blocks 29, 30 are associated with the chain guide openings 15, 16. The sliding blocks 29,30 are a component of a shell body 31 that is made of polyamide and incorporated in the cover 14. The sliding blocks 29, 30 include bead-shaped lips 32, allowing a smooth and quiet passage of the hand chain 3.

20

The end face of the cover 14 has an opening which is closed by a cover plate 34 that is coupled with the hand chain wheel 2. The cover plate 34 hence rotates with the hand chain wheel 2.

The rotatable arrangement of the cover 14 about the hand chain wheel 2 allows operation of the lifting device 1 from any direction. The cover tips with the hand chain 3 depending on the applied pulling forces. As a result, the hand chain 3 is
5 always fed and withdrawn through the chain guide openings 15,16 in the direction of the applied pulling force, so that the lifting device can operate quietly and with low friction.

FIG. 4 shows an alternative embodiment of the guide 18' of a cover 14'. The
10 guide 18' is formed by an annular edge seam 35 of the cover edge 23' facing the side plate 12'. In all other aspects, this embodiment operates in the same manner as the aforescribed design.

To raise a load L, the hand chain wheel 2 is rotated clockwise in the direction of
15 the arrow P1 of FIG. 1. The hand chain wheel 2 can initially rotate freely relative to the drive shaft on a bushing 36 (see FIG. 2), so that the hand chain wheel 2 moves relative to the drive shaft 9, until projections (not shown) of the hand chain wheel 2 make contact with wings 37 of a wing disc 38. The wing disc 38 is secured against rotation on the drive shaft 9 through a serration 39, so that the
20 drive shaft 9 also rotates clockwise. Accordingly, torque is transferred directly from the hand chain wheel 2 via the drive shaft 9 and the gear 7 to the load wheel 5. The friction disc brake 4 disengages by lifting the brake disc 40 from the brake. The brake disc 40 sits on a section 42 of the drive shaft 9 provided

with a right hand motion thread 41 and operates through a friction disc 43 on a pressure disc 44 that is coupled to the load wheel 5. The load L can then be raised without a braking action.

- 5 When the hand chain wheel 2 is stopped, the suspended load L causes the load wheel 5 to rotate in the opposite direction, i.e., counterclockwise and in the same sense as the drive shaft 9. As a result, the brake disc 40 is pulled in the direction of arrow P2 against the friction disc 43 which is in turn pulled against the pressure disc 44. The load L is pinned at this height.

10

- To lower the load L, the hand chain wheel 2 is rotated counterclockwise in the direction of arrow P3. After a predetermined rotation angle, a driving pin 45 disposed on the backside of the brake disc 40 comes into contact with a rib 46 of the hand chain wheel 2. The brake disc 40 is hereby moved on the motion thread
15 41 of the drive shaft and lifted from the friction disc 43 which is in turn lifted from the pressure disc 44. The load L then causes the drive shaft 7 to rotate relative to the hand chain wheel 2, so that the brake disc 40 is pulled against the friction disc 43, braking the load. The load wheel 5 coasts, depending on the degree to which the friction disc brake 4 opens during rotation of the hand chain wheel 2,
20 thereby controllably lowering and braking the load.

List of reference numerals

- | | | |
|----|-----|------------------------|
| | 1 | lifting device |
| | 2 | hand chain wheel |
| | 3 | hand chain |
| 5 | 4 | friction disc brake |
| | 5 | load wheel |
| | 6 | load chain |
| | 7 | gear |
| | 8 | end of 9 |
| 10 | 10 | end of 9 |
| | 11 | housing |
| | 12 | side plate |
| | 12' | side plate |
| | 13 | side plate |
| 15 | 14 | cover |
| | 15 | chain guide opening |
| | 16 | chain guide opening |
| | 17 | supporting metal sheet |
| | 18 | guide |
| 20 | 18' | guide |
| | 19 | recess |
| | 20 | slide ring |
| | 21 | guide ring |

	22	edge
	23	cover edge
	23'	cover edge
	24	radial segment
5	25	axial segment
	26	section of arc
	27	stamped portion
	28	screws
	29	sliding block
10	30	sliding block
	31	shell body
	32	lip
	33	opening
	34	cover plate
15	35	edge seam
	36	bushing
	37	wing
	38	wing disc
	39	serration
20	40	brake disc
	41	motion thread
	42	section
	43	friction disc

- 44 pressure disc
- 45 driving pin
- 46 rib
- P1 arrow
- s P2 arrow
- P3 arrow
- L load

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CLAIMS:

1. A lifting device, which includes a load wheel with a load chain and a hand chain wheel with a hand chain, wherein the hand chain wheel is covered with a cover which
5 is supported for rotation about the hand chain wheel and has chain guide openings characterized in that the cover is rotatably supported by a supporting metal sheet which is attached to a side plate of a housing receiving the load wheel, wherein an outwardly oriented guide of the cover
10 engages with a slide ring of the supporting metal sheet, with the slide ring having a central recess for the cover.
2. A lifting device according to claim 1, characterized in that the guide is formed by an S-shaped edge of a cover edge facing the side plate.
- 15 3. A lifting device according to claim 1, characterized in that the guide is formed by an edge seam of a cover edge facing the side plate.
4. A lifting device according to any one of claims 1 to 3, characterized in that the slide ring is
20 formed by an annular stamped portion of the supporting metal sheet.
5. A lifting device according to any one of claims 1 to 4, characterized in that sliding blocks are associated with the chain guide openings.
- 25 6. A lifting device according to claim 5, characterized in that the sliding blocks are a component of a one-piece shell body which is incorporated in the cover and made of plastic.

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7. A lifting device according to any one of claims 1 to 6, characterized in that an end face of the cover has an opening which is closed by a cover plate that is coupled with the hand chain wheel.

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PATENT AGENTS

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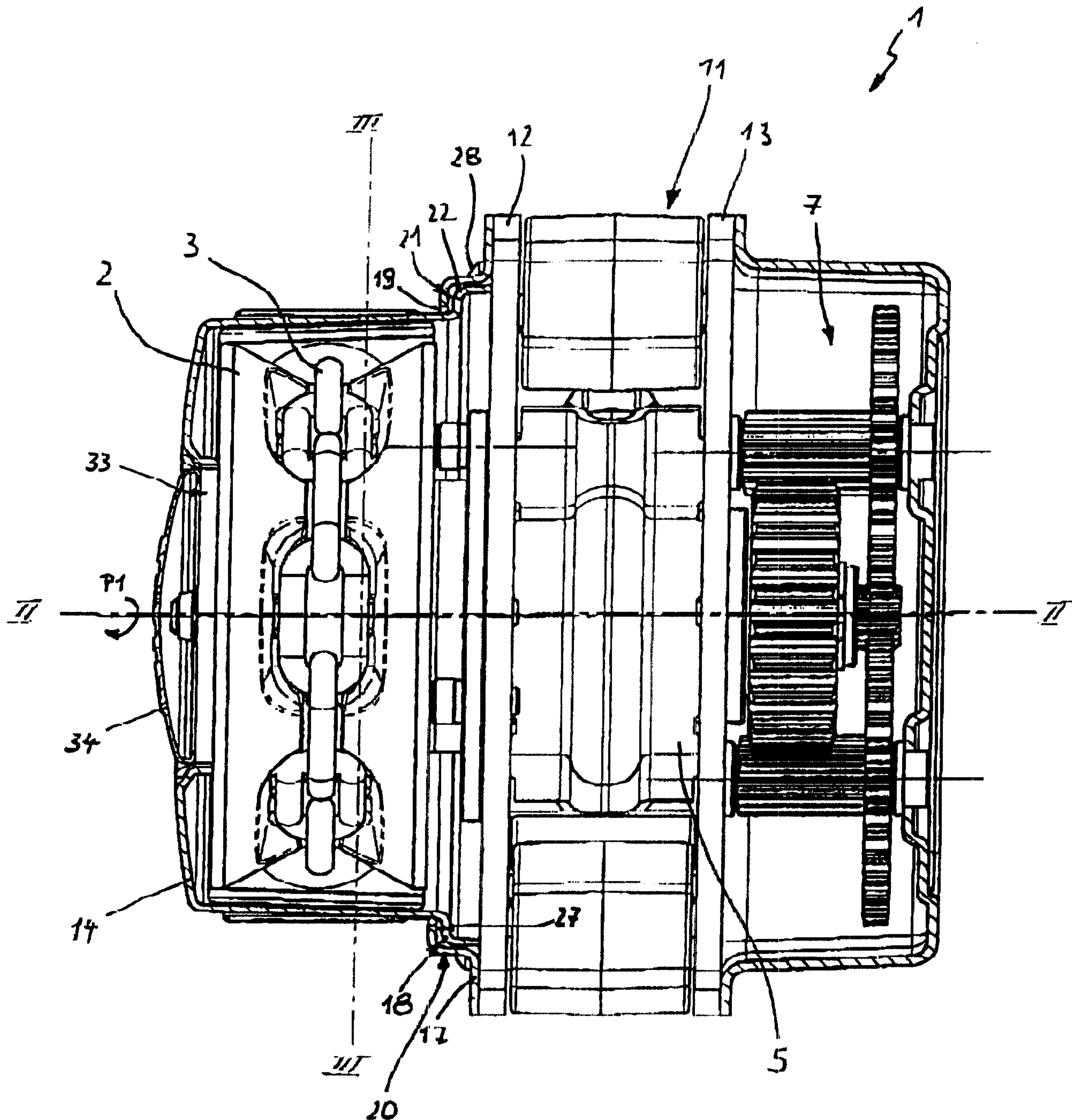
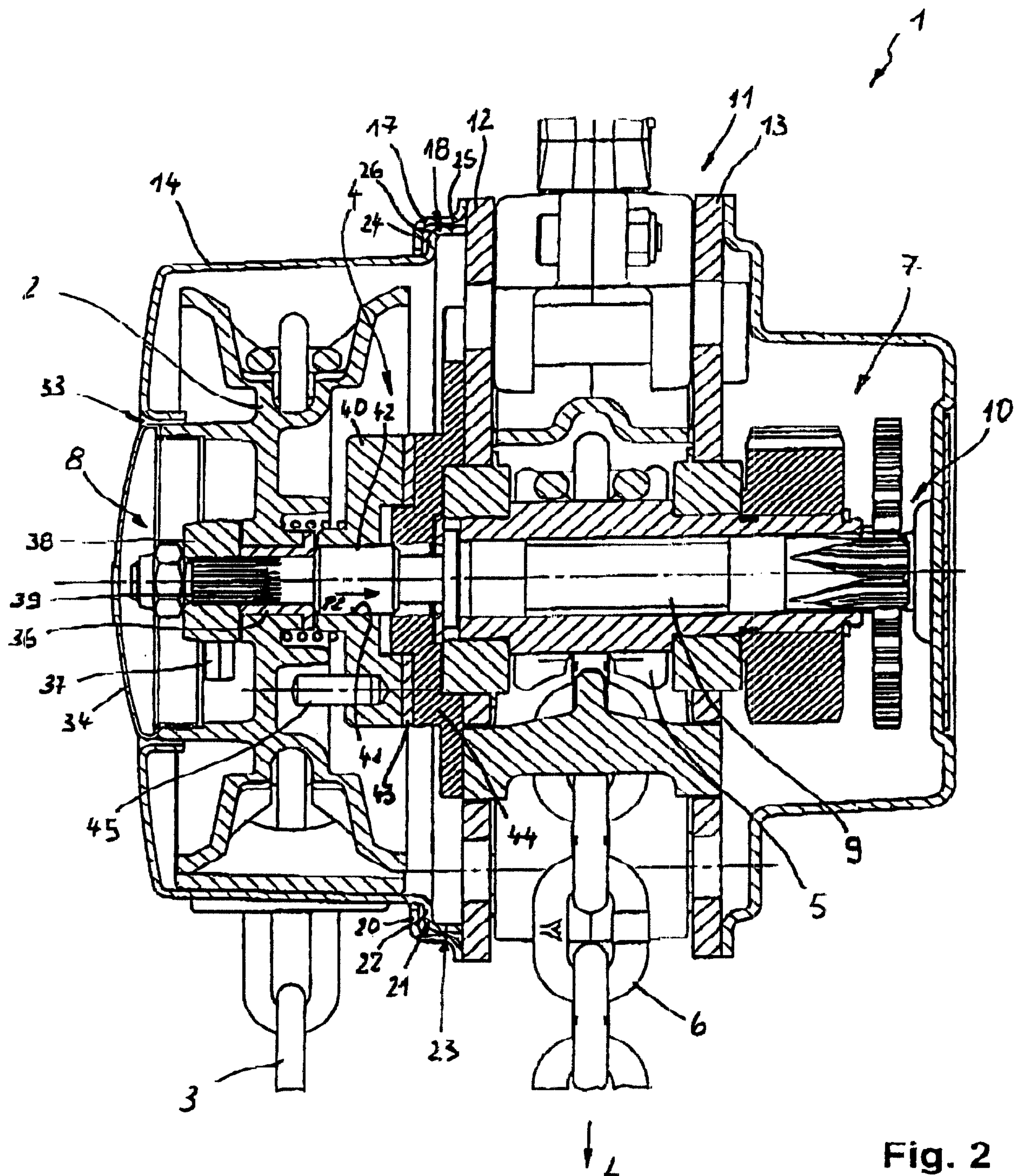


Fig. 1

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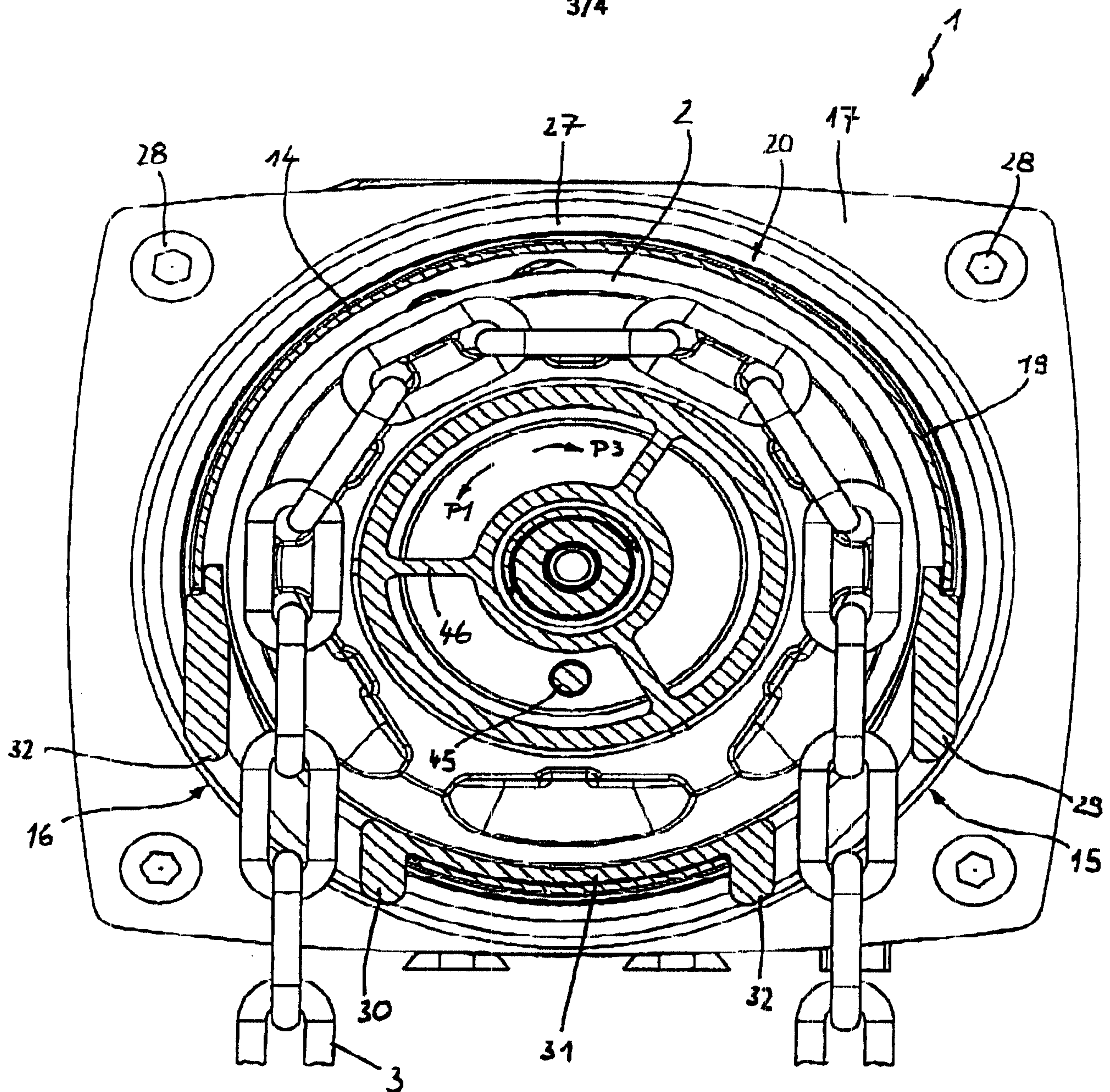


Fig. 3

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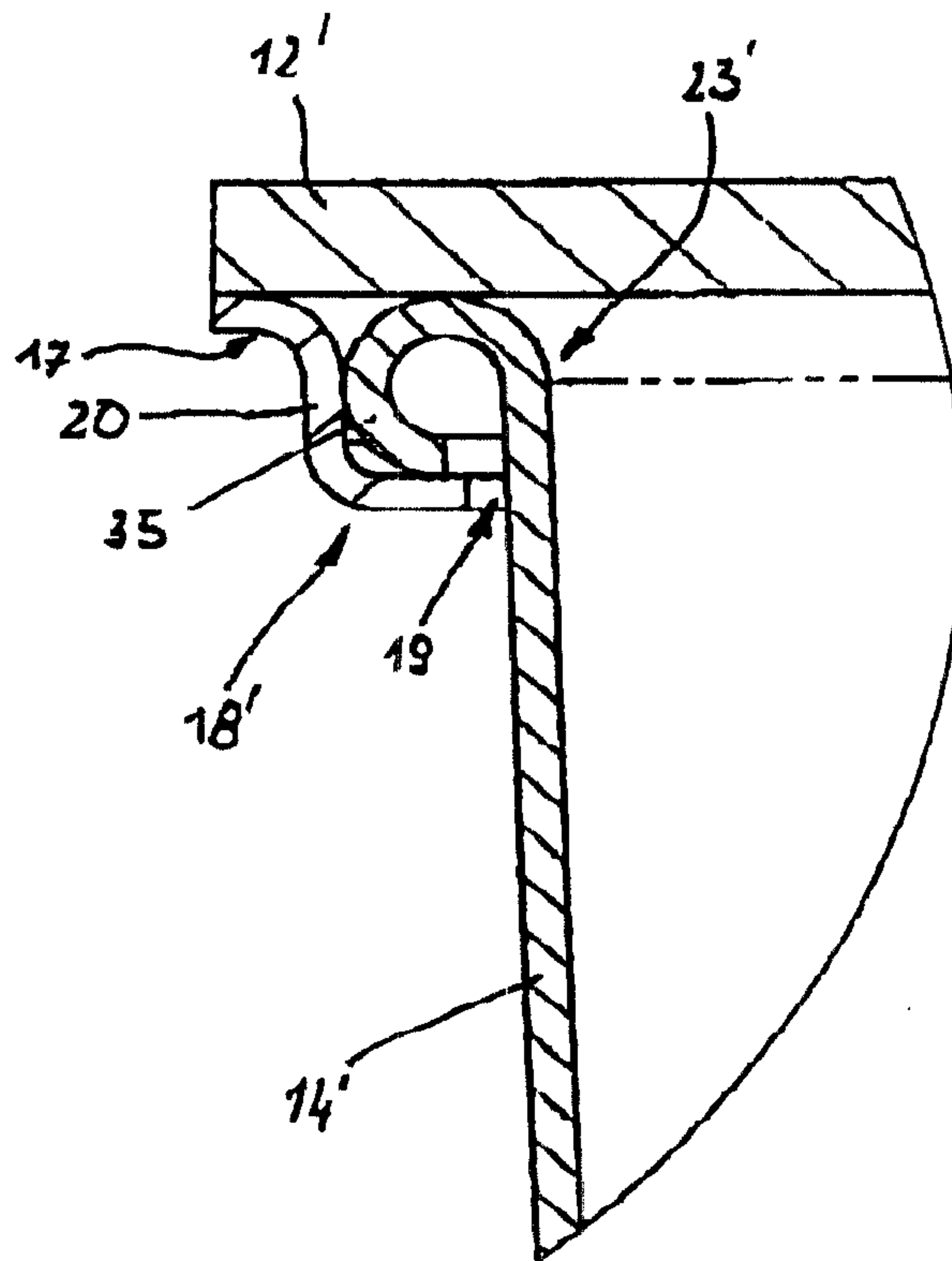


Fig. 4

