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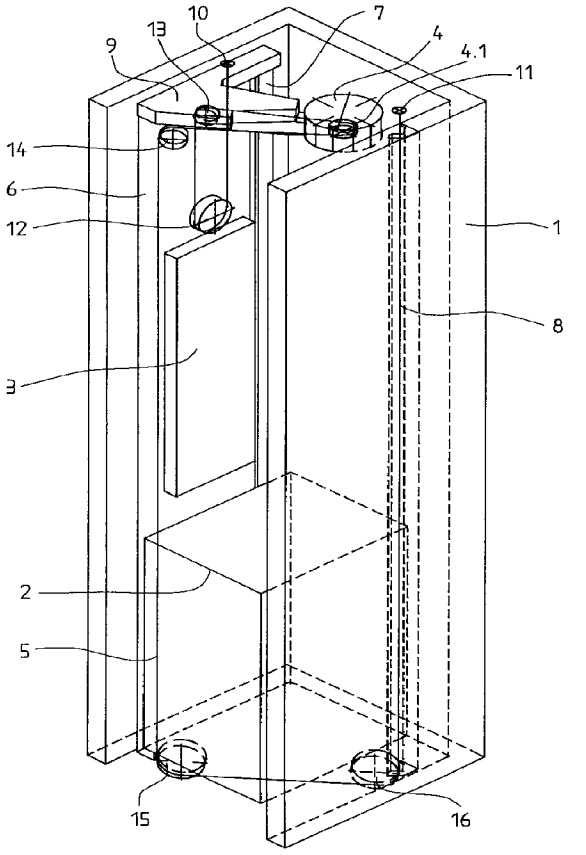
(54) **ASCENSEUR AVEC UNITE D'ENTRAINEMENT INSTALLEE EN PUITS**

(54) **LIFT INSTALLATION WITH DRIVE UNIT ARRANGED IN THE LIFT SHAFT**



(57) Dans cette installation d'ascenseur, une cabine d'ascenseur (2) et un contrepoids (3) sont entraînés par une unité d'entraînement (4) qui est installée dans un puits d'ascenseur (1), au moyen de câbles. Un étrier porteur (9) est arrangé aux extrémités supérieures d'un premier élément de guidage (6) et d'un deuxième

(57) In this lift installation, lift cage (2) and counterweight (3) are driven by a drive unit (4), which is arranged in a lift shaft (1), by means of cables (5). A carrier yoke (9) is arranged at the upper ends of a first guide element (6) and a second guide element (7). The cables (5) end on the one hand at a first fixed point (10)

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élément de guidage (7). Les câbles (5) sont fixés d'une part à un premier point fixe (10) de l'étrier porteur (9) et, d'autre part, à un deuxième point fixe (10) d'un troisième élément de guidage (8). Les câbles (5) vont du premier point fixe (10) par un premier galet (12) installé au contrepoids (3), puis par un deuxième galet (13) installé à l'étrier porteur (9), puis par une poulie d'entraînement (4.1) de l'unité d'entraînement (4), par un troisième galet (14) dans l'étrier porteur (9), par un quatrième galet (15) et par un cinquième galet (16) sur la paroi inférieure de la cabine d'ascenseur (2) et de là jusqu'au deuxième point fixe (11). Pour les fins du montage, de l'entretien et de la réparation, l'unité d'entraînement (4) peut être pilotée dans le puits d'ascenseur (1) au moyen d'un mécanisme tournant installé à l'étrier de levage (9).

of the carrier yoke (9) and on the other hand at a second fixed point (11) of a third guide element (8). The cables (5) run from the first fixed point (10) by way of a first roller (12) arranged at the counterweight (3), then by way of a second roller (13) arranged at the carrier yoke (9), then by way of a drive pulley (4.1) of the drive unit (4), then by way of a third roller (14) arranged at the carrier yoke (9), then by way of a fourth roller (15) and fifth roller (16) arranged at the underside of the lift cage (2) and from these to the second fixed point (11). For mounting, maintenance and repair operations the drive unit (4) can be pivoted into the lift shaft (1) by means of a rotary mechanism arranged at the carrier yoke (9).

Summary:

In this lift installation, lift cage (2) and counterweight (3) are driven by a drive unit (4), which is arranged in a lift shaft (1), by means of cables (5). A carrier yoke (9) is arranged at the upper ends of a first guide element (6) and a second guide element (7). The cables (5) end on the one hand at a first fixed point (10) of the carrier yoke (9) and on the other hand at a second fixed point (11) of a third guide element (8). The cables (5) run from the first fixed point (10) by way of a first roller (12) arranged at the counterweight (3), then by way of a second roller (13) arranged at the carrier yoke (9), then by way of a drive pulley (4.1) of the drive unit (4), then by way of a third roller (14) arranged at the carrier yoke (9), then by way of a fourth roller (15) and fifth roller (16) arranged at the underside of the lift cage (2) and from these to the second fixed point (11). For mounting, maintenance and repair operations the drive unit (4) can be pivoted into the lift shaft (1) by means of a rotary mechanism arranged at the carrier yoke (9).

(Fig. 1)

DESCRIPTION

Lift Installation with Drive Unit Arranged in the Lift Shaft

The invention relates to a lift installation with a drive unit, which is arranged at the upper end of a lift shaft, with a drive pulley for the drive by means of cables of a lift cage, which is guided in the lift shaft at guide elements, with a counterweight.

From Utility Model DE-GM 88 07 219 there has become known a lift installation with a frame, which reaches from the floor of the lower storey up to the ceiling of the upper storey, as guide element of a lift cage. The frame has, below the ceiling of the upper storey, a platform, which consists of crossbeams, for electric motor, lift hoisting winch and switching installation. The lift cage slides on rollers at the inner sides of angle irons of the frame. The lift cables are fed to a cable drum and wound on and unwound in opposite sense by way of two deflecting rollers disposed at the height of the platform.

A disadvantage of the known equipment consists in that the arrangement of the drive unit and the cable guide is not suitable for a lift installation with a counterweight. It is further disadvantageous that the drive unit, which is arranged below the ceiling, with motor and lift hoisting winch as well as switching installation is reachable only with difficulty for servicing operations.

Here the invention will provide a remedy. The invention, as it is characterised in claim 1, meets the object of avoiding the disadvantages of the known equipment and of creating a lift installation with a drive unit which can be arranged in the lift shaft in space-saving manner and is easily accessible.

The advantages achieved by the invention are essentially to be seen in that the lift installation does not need an engine room, whereby the usually required and expensive roof superstructures or cellar spaces for the engine room are redundant. It is further advantageous that minimum shaft dimensions are possible, especially in the over-travel region. A further decisive advantage is that the lift installation is independent of the building material and of the load-bearing capability of the shaft roof, because the lift installation according to the invention merely needs a self-supporting lift shaft.

The invention is more closely explained in the following by reference to drawings, which illustrate merely one embodiment route and in which:

Fig. 1 shows a three-dimensional illustration of a self-supporting shaft with the lift installation according to the invention,

Fig. 2 shows a side view of a rotary mechanism carrying a drive unit,

Fig. 3 shows a plan view of the rotary mechanism according to Fig. 2,

Fig. 4 shows a cable guide between deflecting rollers and a drive pulley of the drive unit,

Fig. 5 shows details of the rotary mechanism,

Fig. 6 shows an elevation of the drive unit consisting of motor, brake unit, drive pulley and transmitter,

Fig. 7 shows a section of the drive unit along the line A-A of Fig. 6, and

Fig. 8 shows a section of the drive unit along the line B-B of Fig. 6.

In Fig. 1 a self-supporting shaft 1 is denoted by 1, in which a lift cage 2 and a counterweight 3 are movable. Lift cage 2 and counterweight 3 are driven by a drive unit 4 by means of cables 5 and guided in the lift shaft 1 by guide elements 6, 7, 8, wherein one limb of a guide element serves for the guidance of the lift cage 2 and the other limb of a guide element serves for the guidance of the counterweight 3. A carrier yoke 9 is arranged at the upper ends of a first guide element 6 and a second guide element 7. The carrier yoke 9 can also be arranged at the shaft head. The cables 5 end on the one hand at a first fixed point 10 of the carrier yoke 9 and on the other hand at a second fixed point 11 of a third guide element 8. The cables 5, which for example consist of synthetic threads or steel threads, run from the first fixed point 10 by way of a first roller 12 arranged at the counterweight 3, then by way of a second roller 13 arranged at the carrier yoke 9, then by way of a drive pulley 4.1 of the drive unit 4, then by way of a third roller 14 arranged at the carrier yoke 9, then by way of a fourth roller 15 and a fifth roller 16 arranged at the underside of the lift cage 2 and from these to the second fixed point 11.

Fig. 2 and Fig. 3 show a frame 18, which stands in connection with a pivot arm 17 and at which the drive unit 4 is arranged. The pivot arm 17 is arranged at a pivot axle 20 drivable by means of a gear 19 and in the operational state is connected and secured with the carrier yoke 9 by means of a securing element 21, for example a screw coupling, wherein the drive unit 4 is below a shaft head ceiling, which is not illustrated, in horizontal position with the drive pulley 4.1 downwards. For pivotation of the drive unit 4 the gear 19 is driven by means of, for example, a crank placeable on a crankpin 22. The gear can also be driven by motor. The pivot axle 20 driven by means of the gear 19 pivots the pivot arm 17 and thus the frame 18 with the drive unit 4 into the lift shaft 1. In the position shown by broken lines, mounting, maintenance and repair operations can be carried out easily and with good access. A cable deflection 23 is loosely connected with the pivot axle 20 and prevents any excess cable diagonal pull on the drive pulley 4.1 from being able to arise.

Fig. 4 shows the guidance of the cables 5 from the second roller 13 to the drive pulley 4.1 and from this to the third roller 14. In that case, the cable plane is rotated from horizontal to vertical and back to horizontal. In the case of sufficient distance between rollers 13, 14 and drive pulley 4.1 the cable diagonal pull can be disregarded.

Fig. 5 shows the pivot axle 20 held by means of bearing block 24 and bearing 25 at the carrier yoke 9. The one end of the pivot axle 20 is fixedly connected with the pivot arm 17. A worm wheel 27 driven by means of a worm 26 is arranged at the other end of the pivot axle 20. The worm 26 stands in connection with the crankpin 22. In the case of a pivot process, the cable deflection 23 mounted loosely at the pivot axle 20 remains in position and prevents excess cable diagonal pull on the drive pulley 4.1.

Figs. 6, 7 and 8 show the drive unit consisting of an annular motor 30, for example a synchronous motor with a high number of poles, a brake unit 31, a tachometer 32 and the frame 18, wherein, as evident from Fig. 7, the frame 18 has the form of a key with a central hollow axle 33 and is connected at the foot with the pivot arm 17. An annular stator 34 of the motor 30 is arranged at the inner wall of the frame 18. The rotor 35 and drive pulley 4.1 form a rotating unit, which is rotatably supported at the hollow axle 33 by means of bearings 36. The bearings 36 accept the forces of the drive pulley 4.1 and guide the rotor 35 and drive pulley 4.1. The tachometer 32 is arranged in the hollow axle 33 at the drive pulley side and is driven by means of a shaft 37 extending in the hollow axle 33, wherein the shaft 37 is connected with the rotating unit by means of a plate 38.

Lamination stacks with permanent magnets 35.1 of the rotor 35 are clamped by retainers 39 and thus so formed that they can accept, at the inner side, friction forces of internal brake shoes 40 of the brake unit 31. The internal brake shoes 40 are arranged at brake shoe levers 41. The brake shoe levers 41 are at one end rotatably mounted at a pin 42 fixedly connected with the frame 18 and at the other end each connected with a respective actuating element 43 of an electromagnet 44. The electromagnet 44 relieves the internal brake shoes 40 against spring forces produced by means of springs 45. Electromagnet 44 and springs 45 are attached symmetrically and connected with the frames 18, so that the brake unit 31 remains functionally capable even in the case of failure of one brake half.

The opening of the key is closed by means of a cover 46. Under the cover 46 is a space 47 for electronic and regulating components of the drive unit 4.

PATENT CLAIMS

1. Lift installation with a drive unit (4), which is arranged at the upper end of a lift shaft (1), with a drive pulley (4.1) for the drive by means of cables (5) of a lift cage (2), which is guided in the lift shaft (1) at guide elements (6), with a counterweight (3), characterised in that the drive unit (4) is pivotably arranged in the lift shaft (1) at a rotary mechanism (9, 17, 18, 19, 20).

2. Lift installation according to claim 1, characterised in that a carrier yoke (9) with a pivot arm (17) is arranged at the upper end of the guide elements (6) or of the lift shaft (1), which arm is movably connected at one end with the carrier yoke (9) and at the other end carries a frame (18) with the drive unit (4).

3. Lift installation according to claim 2, characterised in that a pivot axle (20), which is drivable by means of a gear (19) and drives the pivot arm (17), is arranged at the carrier yoke (9).

4. Lift installation according to claim 3, characterised in that in the operational state the pivot arm (17) is fixedly connected and secured with the carrier yoke (9) by means of a securing element (21), wherein the drive unit (4) is in horizontal position with the drive pulley (4.1) downwards.

5. Lift installation according to claim 3, characterised in that the gear (19) is drivable by means of hand crank or motor.

6. Lift installation according to one of the preceding claims, characterised in that the drive unit (4) comprises an annular motor (30), a brake unit (31) and a tachometer (32), wherein the frame (18) has the form of a key with a central hollow axle (33) and is connected at the foot with the pivot arm (17).

7. Lift installation according to claim 6, characterised in that an annular stator (34) of the motor (30) is arranged at the inner wall of the frame (18) and that a rotor (35) of the motor (30) and the drive pulley (4.1) form a rotating unit, which is rotatably supported at the hollow axle (33) by means of bearings (36).

8. Lift installation according to claims 6 and 7, characterised in that the rotor (35) is provided with retainers (39) and that the brake unit (31) comprises internal brake shoes (40) engaging at the retainers (39) at the inner side.

9. Lift installation according to claim 6, characterised in that the tachometer (32) is arranged in the hollow axle (33) and is driven by means of a shaft (37) which extends in the hollow axle (33) and is connected with the rotor (35).

10. Lift installation according to claims 6 to 9, characterised in that the motor (30) is a synchronous motor with a high number of poles.

Fig. 1

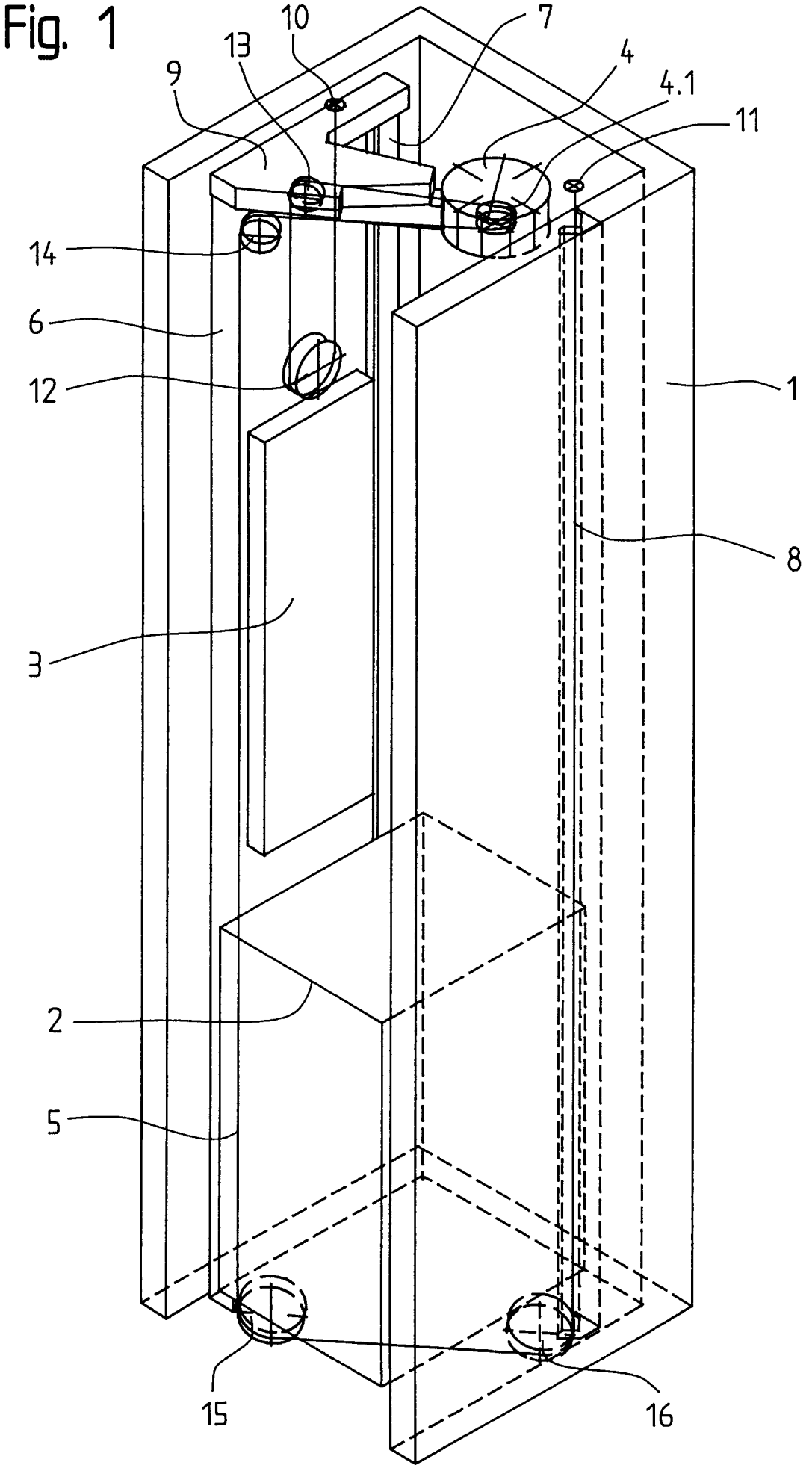


Fig. 2

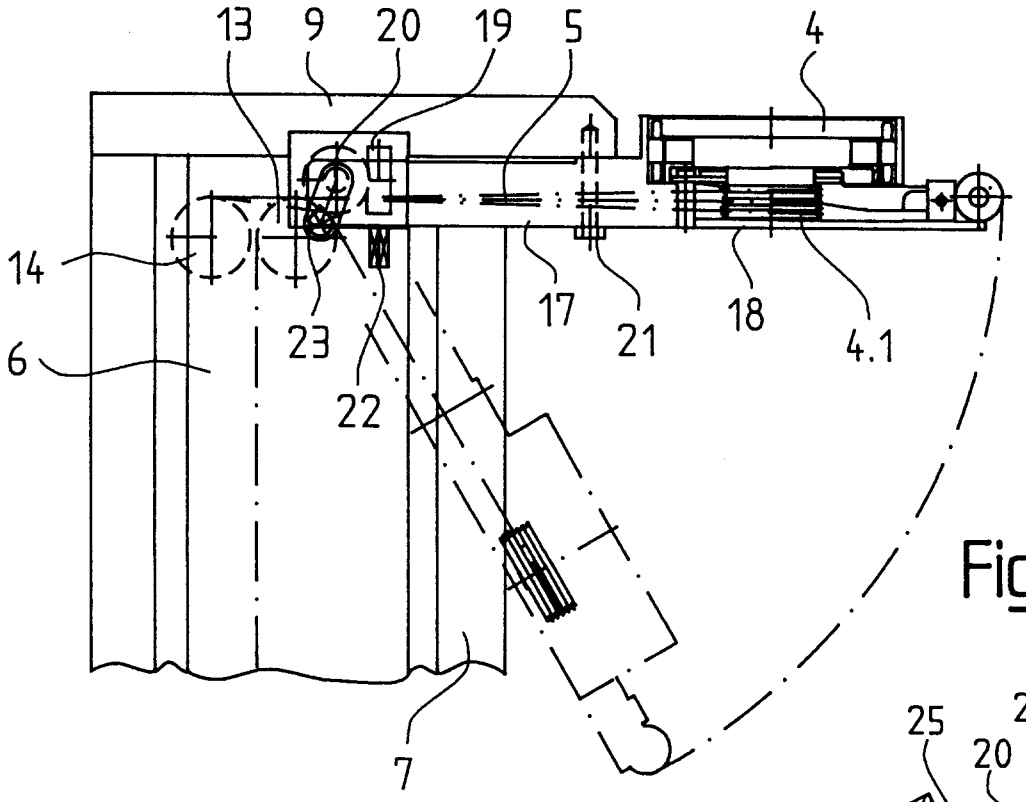


Fig. 5

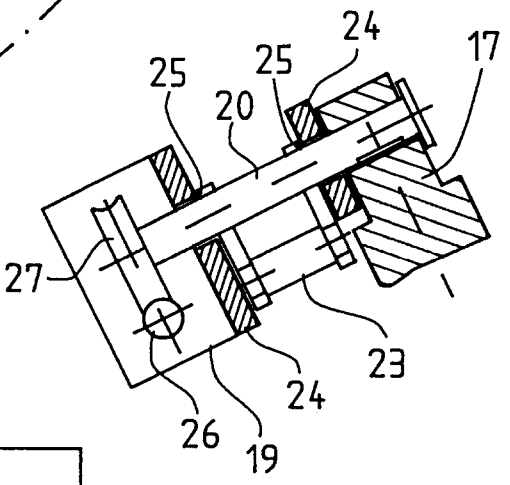


Fig. 3

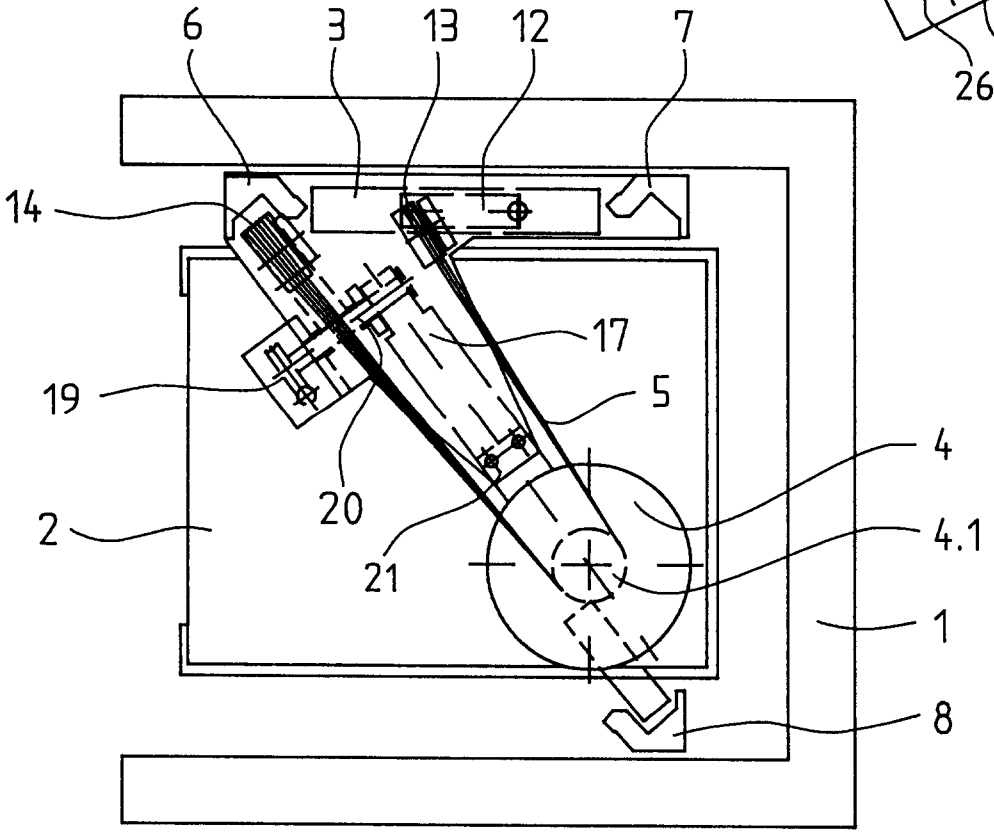


Fig. 4

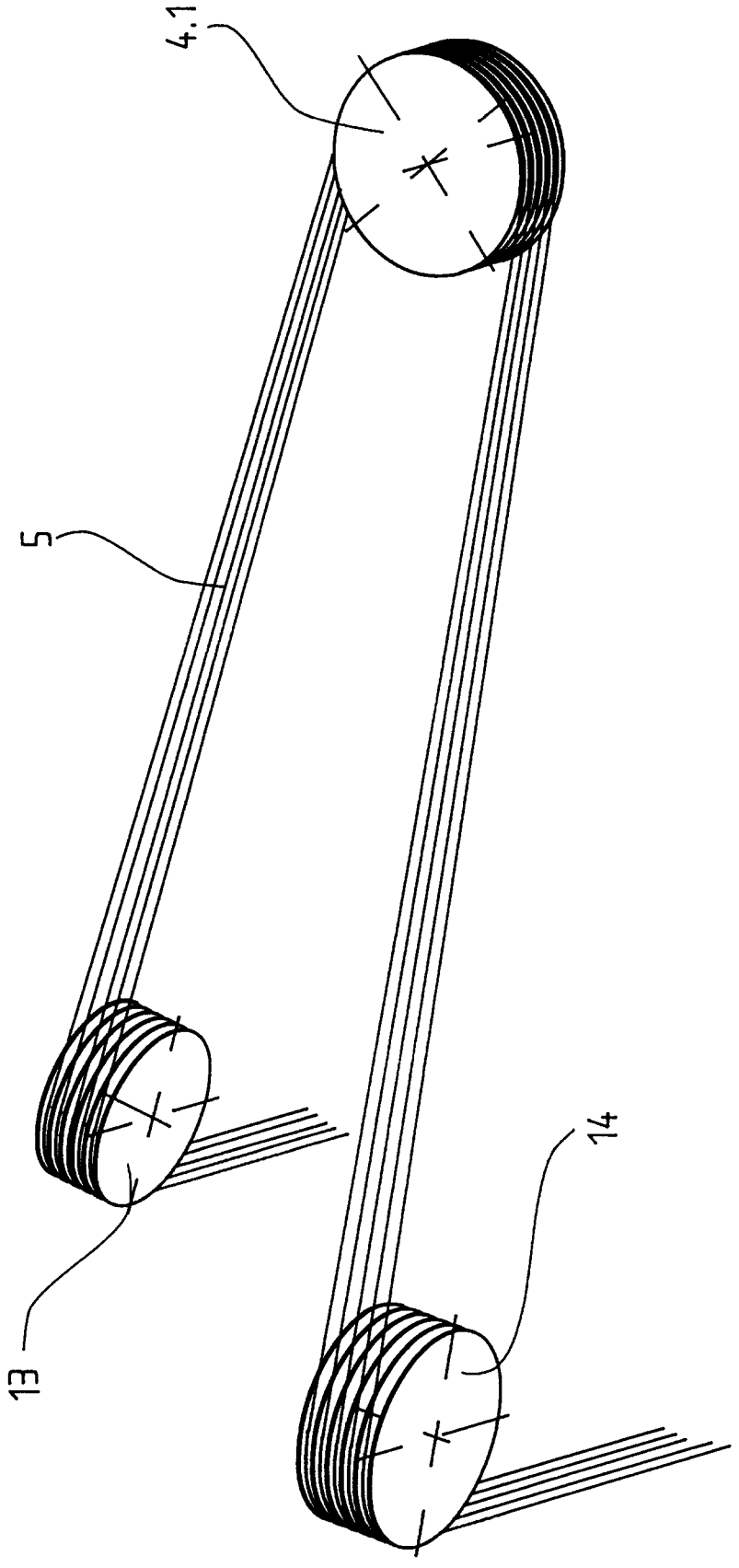


Fig. 6

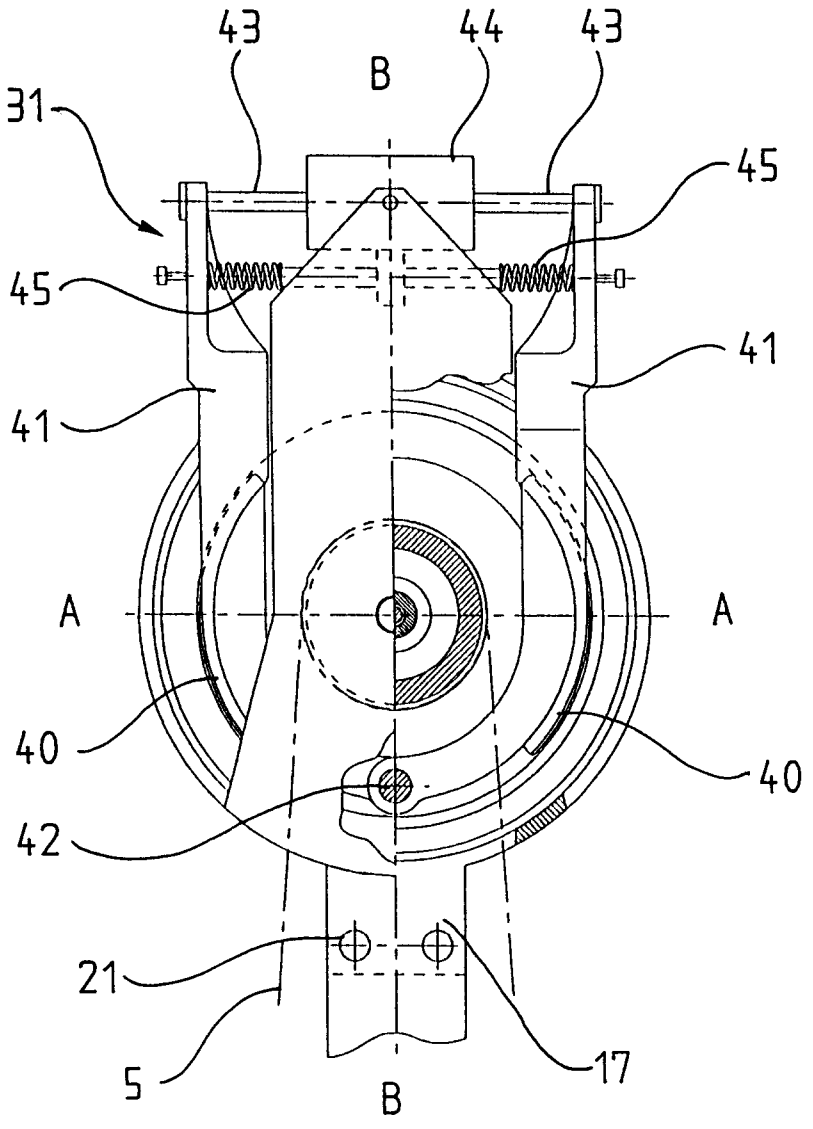


Fig. 8

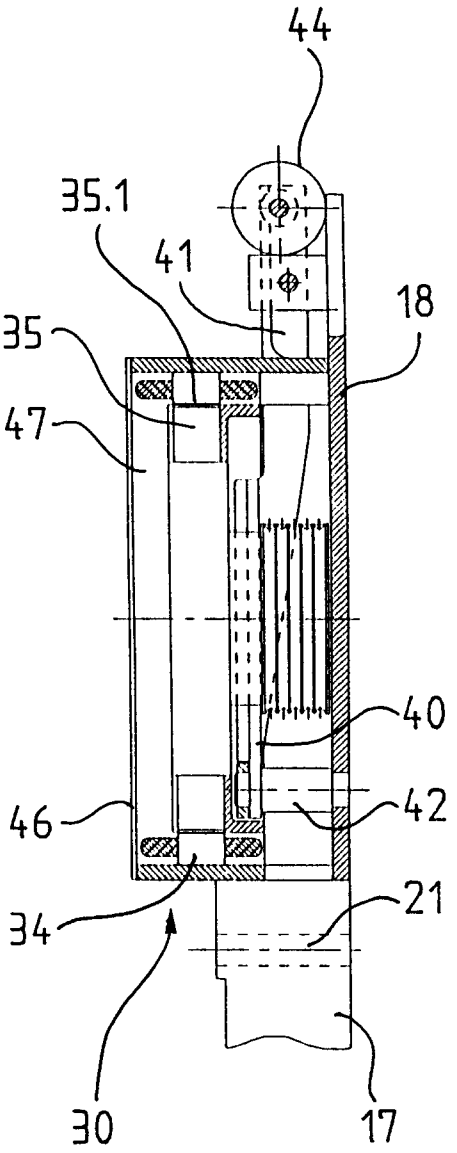
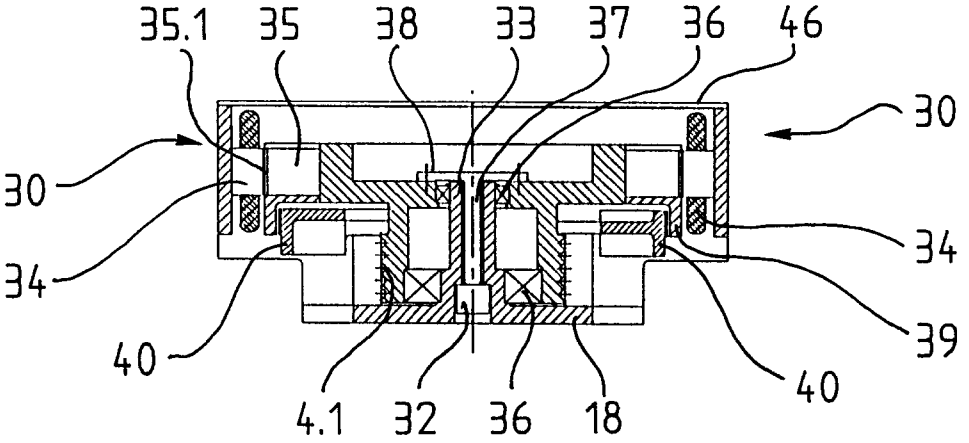
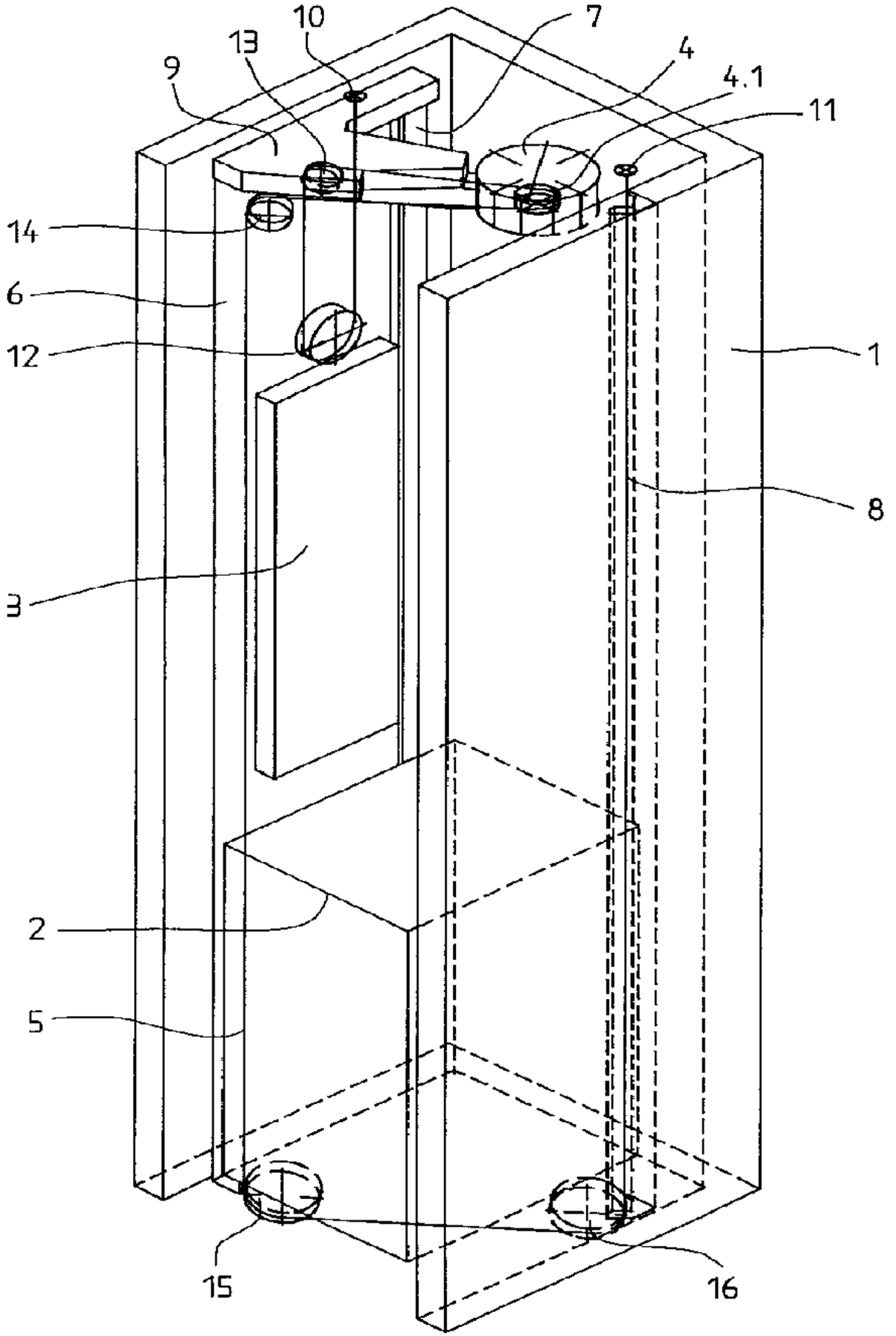


Fig. 7

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