

Description:

Drive unit with brake for an elevator

The invention concerns a drive unit for elevators consisting of an engine, a brake and a traction sheave arranged between
5 end shields, whereby the engine is arranged on an end shield and an engine frame carries the end shields.

A gearless drive machine for elevators is known from the patent document EP 0 468 168 B1. With this gearless drive machine for elevators, a machine frame carries a bearing
10 block and a shield block. A main shaft is mounted at two points on the output side, by means of a free bearing arranged on the bearing block and by means of a fixed bearing arranged on the shield block. A traction sheave with brake disc is provided between the bearing points. The traction
15 sheave is firmly connected to the main shaft, by means of a first clamping device. The bearing arrangement of the traction sheave on both sides permits large radial loads by small deformations of the main shaft. A hoist motor fed with alternating-current voltage essentially consists of a stator
20 and of a rotor with a rotor hub, which can be pushed onto the main shaft. At the drive-side end of the main shaft, a second clamping device provides a fixed connection between the main shaft and the rotor hub.

A disadvantage of the well-known installation lies in this
25 respect in the fact that the brake is externally arranged. The brake parts can easily get dirty or can be mechanically damaged.

Here the invention wants to create remedy. The invention, as characterised in claim 1, responds to the objective of avoiding the disadvantages of the well-known installation and to create an elevator drive with brake, which works in a reliable manner in each case.

The advantages reached by the invention are to be seen essentially in the fact that a drive unit with short shaft is realisable and, as a consequence, a small overall length of the drive unit. Further favourable is the fact that the brake air cylinder and feeding lines from the brake drum are separately arranged. If the brake air cylinder is hydraulically operable, the active break surface cannot get fouled by oil in the case of leakage or conductor break. The brake operating ability remains further ensured.

With the help of the enclosed figures, the invention will be described more in detail.

They show:

Fig. 1

a drive unit according to the invention,

Fig. 2a

an engine stand with integrated brake and traction sheave,

Fig. 2b and 2c

an exploded view of the engine stand and

Fig. 2d

details to the ventilation of the brake.

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Fig. 1 shows the finished assembled drive unit, essentially consisting of an engine 1, an engine stand 2 serving as end shield, a bearing block 5 serving as end shield, a traction sheave 15 and a machine frame 7 with counter-roller base 9.

5 The stator of the electric drive 1 is bolted, by means of a flange, with the engine stand 2. The rotor of the electric drive 1 is mounted on a free end of a non-represented shaft, bearing the traction sheave 15; the shaft is mounted on the bearing block 5 and on the engine stand 2. The free shaft end

10 rises above the engine stand 2. The traction sheave 15, which is visible through an open space in a cable protection casing 3, is mounted at the engine stand 2 and at the bearing block 5, by means of the shaft. A brake 6 is arranged onto the inside range of the engine stand 2 and protected with the

15 casing 3. Depending upon the structure of the drive unit, the brake 6 can be arranged also onto the inside range of the bearing block 5.

The engine stand 2 and the bearing block 5 are arranged at the machine frame 7, which exhibits at each of its corners an

20 adjustable supporting element 8. The counter-roller base 9 is arranged on the lower side of the machine frame 7. All electrical connections of the drive unit are in a terminal box 10.

The constructive structure of the brake 6 and the engine

25 stand 2 is more near described in the Fig. 2a to 2d, whereby in Fig. 2a is to be seen an assembled view of the subassembly and in Fig. 2b and 2c is to be seen a exploded view of the subassembly.

The engine stand 2 consists of an approximately rectangular

30 plate 2.1, which together with two vertical walls 2.3 as well as each a horizontal wall 2.4 and 2.5, forms a flat box-type

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engine stand 2. The plate 2.1 exhibits at the center a bearing seat 2.2 for bearing on the engine side the shaft as well as some openings 2.6 for the penetration of cooling air for cooling of the engine 1. The bore holes 2.7 within the
5 lower range of the engine stand 2 are provided for the acceptance of brake bolt 11.

The lateral walls 2.3 have within the upper range openings 2.8 for flat spiral springs 16 and openings 2.9 for connecting rod 24 of the hydraulic cylinders 23. Ribs 2.10,
10 on the external side of the wall 2.3, together with ribs 2.11 arranged on the inside, serve as structure reinforcement and permit the taking-up of the forces, which, by opening the brake 6, act through the hydraulic cylinders 23 on the ribs 2.10.

15 An U-shaped wall 2.12 on the inside of the wall 2.4 forms together with the reinforcing ribs 2.13 a rigid structure, which takes over the spring resistance from the threaded rods 19 passed through the holes 2.14. Ears 2.15 serve for hanging up the engine stand 2 or the assembled drive unit according
20 to Fig. 1.

The brake 6 consists of two air brake levers 12 located on the brake bolt 11; the air brake levers act on the drum 15.1 of the traction sheave 15, over the brake shoes 14 located on a bolts 13. The braking force is generated by springs 16,
25 which press to an end on the air brake levers 12 and which on the other transfer the force on the threaded rods 19 over the pressure plate 17 and nuts 18. The threaded rods 19 are passed into the air brake levers 12 through the holes 12.1 and in the engine stand 2 through the holes 2.14 and fixed
30 with split-pin by means of castle nuts 21. Thus, the spring

resistance can be triggered over the swing bearings 22 on the inside of the wall 2.12 of the engine stand 2.

The holes 2.14 and 12.1 are accordingly larger than the threaded rod 19 and permit thus a rotational motion of the
5 brake levers 12 around the axle of the bolts 11; the rotational motion is necessary for ventilating the brake 6. The swing bearings 22 provide for a vertical supply of the forces onto the wall 2.12 of the engine stand 2.

An angle 20, which is movable and fastened to the brake lever
10 12, limits the freedom of movement in the downward direction of the brake shoe 14 and prevents, by an open brake 6, the contact of the brake shoes 14 with the brake drum 15.1 of the traction sheave 15.

Fig. 2d shows details of the hydraulic cylinder 23 working
15 against the spring resistance of the springs 16. The hydraulic cylinders 23, arranged on the ribs 2.10 on the exterior of the walls 2.3 of the engine stand 2, permit the ventilation of the brake 6. So, the agent of pressure imparted on the hydraulic cylinders 23 acts on the shifting
20 of the hollow piston 23.1 outwards. The movement of the piston 23.1 is transferred to the brake levers 12 through the connecting rod 24. The cylinder cap 23.2 limits the movement of the piston 23.1. The connecting rod 24 exhibits at both ends each a slot 24.1, into which each two half rings 25 are
25 inserted. A retaining ring 26 holds the half rings 25 in position and is itself fixed on the connecting rod 24 with the shaft safety ring 27. The axial swing bearings 28 and the accordingly large dimensioned holes 12.2 in the air brake levers 12 ensure that the connecting rod 24 is, in each
30 operating condition, only axially loaded. The close tolerance

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spacers 29 permit the adjustment of the ventilating way of the air brake levers 12.

Patent claims:

1. Drive unit for elevators consisting of an engine, a brake and a traction sheave, arranged between end shields, whereby the engine is arranged on an end shield and the
5 end shields are carried by an engine frame, characterised by the fact that the brake(6) is integrated into an end shield (2,5) and acts on a side of the traction sheave (15) and that the engine stand (2) is developed as a flat box consisting of a plate (2.1) with bearing seat (2.2)
10 and lateral walls (2.3,2.4,2.5), whereby walls lying onto the inside (of 2.12) transfer spring resistance to the engine stand (2).
2. Drive unit according to claim 1, characterised by the fact that the brake (6) is arranged within the inside
15 range of an engine stand(2) serving as end shield.
3. Drive unit according to one of the preceding claims, characterised by the fact that a spring-activated block brake(6) is provided with brake shoes (14), which
transfer the brake force to a drum (15.1) of the traction
20 sheave(15), whereby for brake ventilation, cylinders (23), arranged on the outside of the engine stand (2), are provided.