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(54) **Telescopic elevator door assembly.**

(57) An elevator door assembly in which the doors (1, 2) run along a single track (5) by means of rolling assemblies. The rolling assemblies comprise rolling means (which may be a roller (10) and counterroller (11)) mounted within a housing (9) which substantially completely covers them. The housing (9) is mounted to the door by pins (12) which may also serve as axles for roller (10) and counterroller (11). Such a rolling device provides protection against dust and dirt and also improves the stiffness of the connection between the rolling assemblies and the doors. Moreover, as the rolling assemblies are mounted in the housing, they are automatically kept in an aligned state and do not need to be adjusted when the door assembly is being assembled.

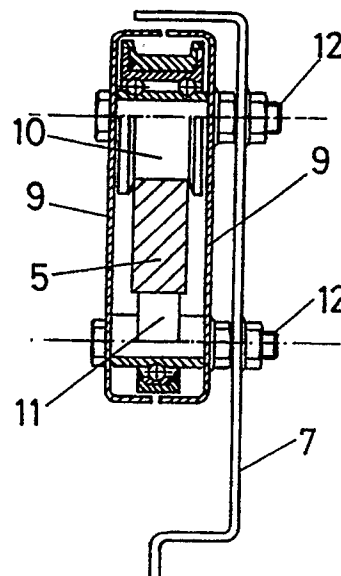


FIG-2

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TELESCOPIC ELEVATOR DOOR ASSEMBLY

The present invention relates to a telescopic elevator door assembly.

Conventional elevator telescopic two-speed doors use two panels, two tracks, four rollers and four counterrollers. In the case of four panel two-speed centre opening door, the situation is the same but with double the elements.

These systems which use two tracks have various inconveniences among which the following can be cited:

It is difficult to accurately position both tracks; special fastenings for connecting each track to the door frame are necessary; high costs are involved; the tracks normally require special machining, welding and special fasteners; the rollers and counterrollers are mounted on overhanging supporting shafts with poor stiffness due to space and cost constraints, and the perpendicularity and accurate positioning of the supporting shafts are very difficult to achieve and adjustments are always needed.

Also, these systems lead to jerk and can cause distortion in the perpendicularity of the roller and counterroller shafts.

Though a large number of solutions have been proposed, most existing telescopic doors use two parallel tracks or at best a single profile extruded with two parallel tracks in the same piece.

In any case the prior art systems are very complex, heavy and voluminous, creating problems of misalignment and requiring unstable adjustments and have, in general terms, extremely weak connections between the overhanging roller shafts and the hanging support of the door.

Each one of these factors contributes to producing jerks and noise during movement of the door panels, finally giving rise to deterioration of the rollers and even the tracks.

Further, the door lintel on which the tracks have to be fastened must have flat support points to form exact reference points for the tracks, in at least three points. Also, it is necessary to use separators to fasten and install the two tracks in their position.

Moreover, the rolling parts are not protected against dust and dirt which is a major problem in elevators, as the environment is very dirty and difficult to clean, and the repair and cleaning of rollers damaged by dust is very hard to effect due to their inaccessibility.

The assembly of conventional rolling parts is very difficult, requiring in general terms an adjustment by means of eccentric shafts of the upthrust rollers (counterrollers).

All of the above leads to problems of quality, to the need to make adjustments, and to overdimensioning, causing the cost of manufacturing and installation of the system to be very high.

The present invention aims to overcome the above problems by providing a telescopic elevator door assembly in which both the high and low speed doors are mounted on a single common track, the doors sliding along said track by means of roller assemblies, wherein said roller assemblies each comprise a housing connected to one of said doors and rolling means mounted within and surrounded by said housing, said track extending through said housing, and said rolling means running on said track.

Thus, as the rolling means are mounted in the housing, they are protected from dirt and dust, and are also held in a set position so that when the whole assembly is connected to a door the rolling means automatically take up their correct position which means that no adjustments are required. Moreover, by using such rolling means with a single track, a sub-assembly can be formed of the roller assemblies and track, which can be placed in the door lintel without the need for complicated alignment procedures.

The rolling assembly can have many different embodiments compatible with the type of track chosen, each of which provide stiff shafts or supports for rolling elements of the rolling means.

The rolling elements themselves may comprise a roller and counterroller mounted in said housing and having guide flanges which engage the track over which they roll or slide. The housing may be formed by two cups facing each other and fastened to one another by means of transversal pins, which may be threaded and may not only form the fastening means of both cups, but also the fastening means of the device to the hanger support of the door, as well as the axles for the rolling elements themselves which roll along the track.

On the other hand, the rolling elements could consist of a non-flanged roller guided and supported at the top on the track, a bottom counterroller, and a set of side rollers, or even convex contact surfaces running along both sides of the track.

Another alternative rolling element for use with a track of circular cross-section consists of a set of ball bearings mounted circumferentially around the track.

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which;

Figure 1 shows a front view of the top part of

the two doors of an elevator, which hang from corresponding hanging supports.

Figures 2, 3, 4 and 5 show various embodiments in cross-section of the rolling device itself, but with the common feature that the track is formed by a single piece lodged, along with the rest of the rolling elements, in a box or housing duly fastened to the hanging support of the door.

As shown in Figure 1, high and low speed doors 1 and 2 respectively, are connected to a corresponding hauling cable 3 from which a counterweight 4 hangs.

The sliding track of both doors 1 and 2 is made up of a single common element 5, which may have different forms as far as its cross-section is concerned. The rolling elements of both the high-speed panel 2 and low-speed panel 1 slide over this track 5.

The hanging support 6 of the slow-speed panel or door 2 is longer than the hanging support 7 of the high-speed panel or door 1, making it possible to leave a free area in the central part of the track 5 to situate said hanging support 7 therein. Thus, the two high speed rolling elements are positioned on the track between the two low speed door rolling elements. In order to allow the two doors to telescope into the space to the right of Figure 1 such that the doorway is fully open without an edge of the high speed door projecting out further than the low speed door 2, the distance D between the two right-hand rolling elements must be longer than half the total opening width of the door. Such a single track system is disclosed in our co-pending application, of even date herewith, entitled "A Telescopic Door Assembly".

On the basis of this concept of a sole track 5, all the separators and fastening means which are typical in two-speed doors are eliminated, with the particular feature that the track 5 need only be supported by its end parts in a very simple friction device, which completely avoids any mechanization of the same.

The rolling unit itself, may use linear ball bearings 8 for a circular section track 5' shown in Figure 4, while for a rectangular section track 5 further constructions as shown in Figures 2, 3 and 5, can be used.

The rectangular section track 5 is specifically shown in Figure 2, as well as the corresponding hanger support 7 of the door. The rolling unit is made up of a housing formed by two halves or cups 9 facing each other, inside of which are a top roller 10 that rests on the longitudinal top edge of the track 5 and a bottom counterroller 11 which lies below the longitudinal bottom edge of the track 5. Thus the traditional overhanging shape of a conventional rolling assembly can be eliminated. Also

the stiffness of the connections between the rolling assembly and the hanger support are increased and, at the same time, the depositing of dust and dirt, etc. on the movable elements is avoided.

Moreover, the roller and counterroller are held in position by the housing and so there is no need to make any adjustments to them when the housing is attached to the door as they will automatically be in their correct alignment.

The two cups or halves 9 which form the housing of the rolling unit remain fastened to each other by screws 12 which, aside from being the fastening means of the roller 10 and counterroller 11, form the fastening means of the rolling unit to the hanger support 7.

An alternative embodiment of the rolling unit is shown in Figure 3, where the case is again formed by opposing semi-enveloping cases or cups 9' fastened together, and to the hanger support 7, by means of screws 12'. However, in this case the profiled rollers have been replaced by side friction rollers or wheels 13, which collaborate in the guiding of the non-profiled roller 10' in its sliding over the top edge of the track 5.

A similar embodiment to the one shown in Figure 3 is shown in Figure 5, but the particular feature in this case is that the side friction wheels 13 of Figure 3 have been replaced by some curvo-convex surface pieces 13' which are inexpensive to manufacture, easy to replace, and offer reduced friction over the side rollers 13.

In all of the embodiments, the housing may have additional protection for fireproof doors without complicating the structure of the unit.

Finally, as has been mentioned already, when the track 5' has a circular section, as shown in Figure 4, the rolling elements may be made up of linear ball bearings 8 protected by a case 9" which likewise fastens to the hanger support 7 by means of corresponding screws 12".

According to what has been described it is possible to substantially reduce the number of pieces of the door unit, given that it is possible to prepare a special sub-unit comprising the track, the rolling units and the hanger supports. It being possible to assemble the same together at the factory without having to worry about any alignment problems.

Claims

1. A telescopic elevator door assembly in which high and low speed doors are mounted on a single common track, the doors sliding along said track by means of roller assemblies, wherein said roller assemblies comprise a housing connected to one of said doors, and rolling means mounted within

said housing, said rolling means running along said track which extends through said housing, said housing surrounding said rolling means.

2. An elevator door assembly according to claim 1, wherein said rolling means comprises a roller which runs along the top edge of said track, and a counterroller positioned below said track. 5

3. An elevator door assembly according to claim 2, wherein said rolling assemblies are connected to said doors by means of the axles of said roller and counterroller. 10

4. An elevator door assembly according to claim 3, wherein said roller has profiled edges which engage with the sides of said track to guide said assemblies therealong. 15

5. An elevator door assembly according to claim 3, wherein guide rollers are provided within said housing, each side of said track, for guiding said assemblies therealong.

6. An elevator door assembly according to claim 3, wherein guide surfaces are provided within said housings, said surfaces being convex to the sides of said track and contacting therewith to guide said assemblies therealong. 20

7. An elevator door assembly according to any of claims 3 to 6, wherein said housing comprises a pair of opposed substantially U-shaped cup members, said cup members being held together by said axles. 25

8. An elevator door assembly according to claim 5 or 6, wherein said housing comprises two sets of substantially U-shaped cup members, one set enclosing said roller and being held together by the roller axle and the other set enclosing said counterroller and being held together by the counterroller axle. 30 35

9. An elevator door assembly according to claim 1, wherein said track is substantially circular in cross-section and said rolling means comprises a set of ball bearings encircling said track. 40

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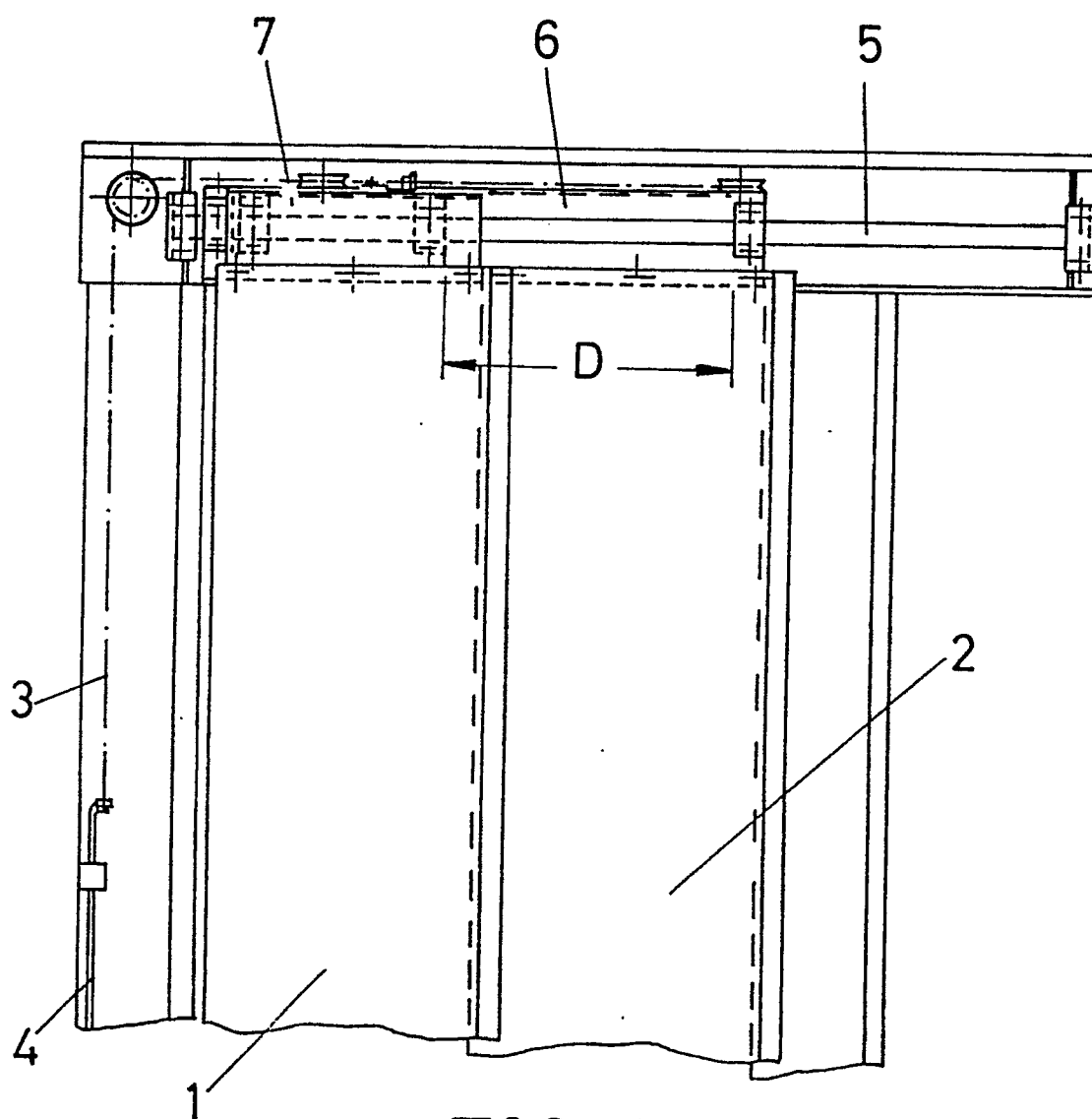


FIG-1

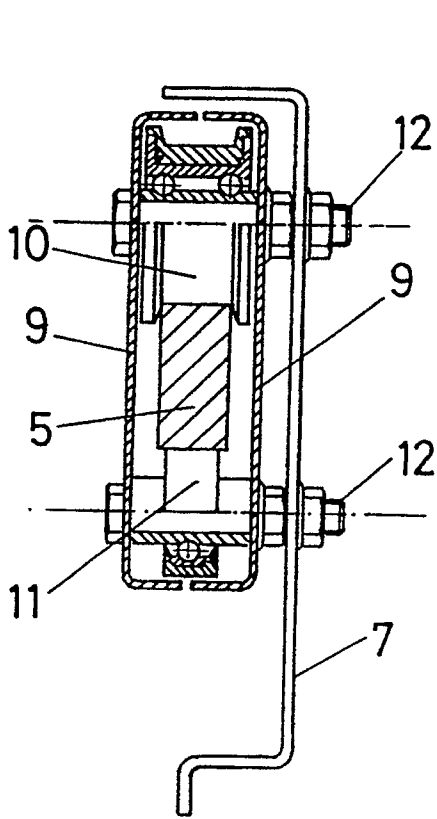


FIG-2

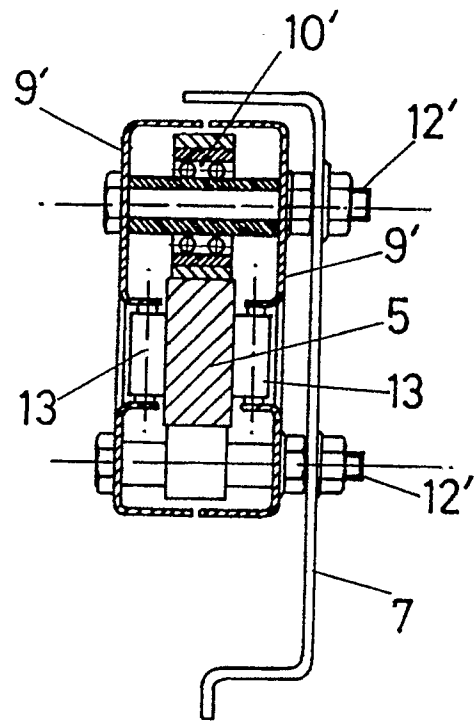


FIG-3

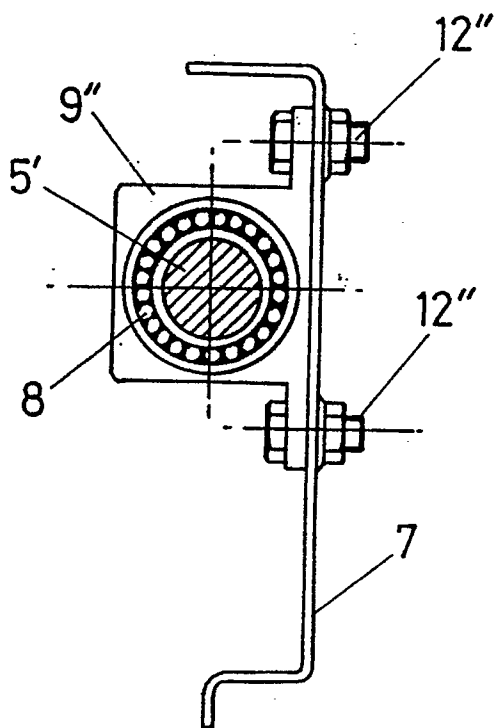


FIG-4

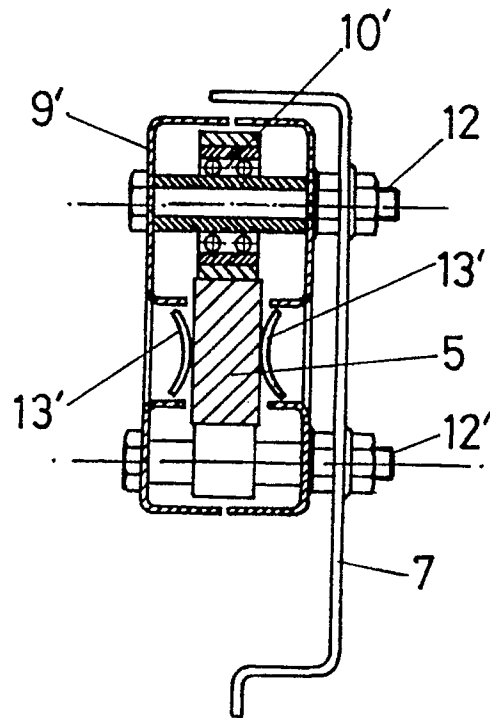


FIG-5