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(54) A telescopic door assembly.

(57) A telescopic door assembly comprises a high speed door (2) and a low speed door (3) mounted on a single common track 1 by means of rolling assemblies (5L, 5R; 4L, 4R). The rolling assemblies (5L, 5R) of the high speed door (2) are positioned on the track 1 between the rolling assemblies (4L, 4R) of the low speed door (3).

By using only a single track 1 instead of two tracks, as is conventional, there are no alignment problems and the mounting of the track to the door lintel 18 can be simplified. Also, the need for spacer elements and the like are eliminated.

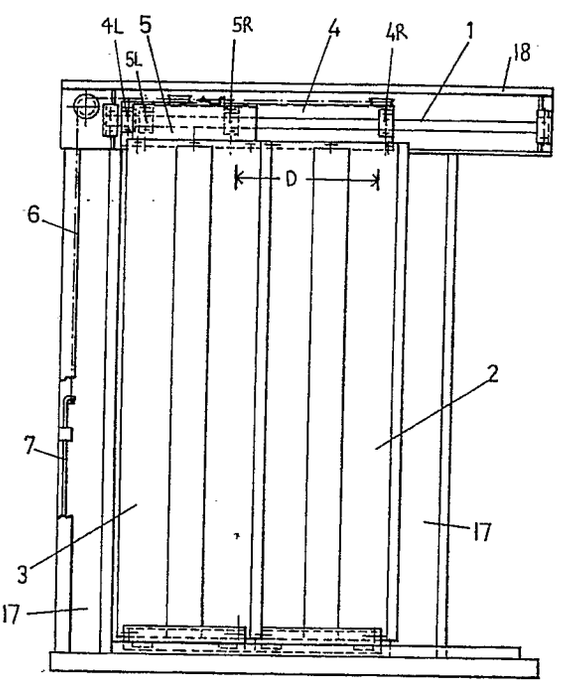

FIG-1

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A TELESCOPIC DOOR ASSEMBLY

The present invention relates to telescopic door assemblies, and particularly though not exclusively to automatic telescopic doors for elevators.

Conventional telescopic door assemblies for elevators are basically composed of a metal frame on which a series of main subassemblies are mounted. These sub-assemblies include;
more or less complex door profiles or panels for fire labyrinth needs,
door panel hanger supports equipped with rollers and counterrollers, and
two parallel tracks along which the rollers run.

Most of the conventional arrangements of this type of door use two individual tracks or sometimes a solid double track form, along each of which rollers and counterroller run, to form a complete unit. Adjustment of such door assemblies is difficult to attain because a large number of pieces have to be put in place and adjusted. Likewise, the structural lintel of the door unit has to be effected in such a way that it provides two or three different flat references in order to accurately fasten the two tracks in position, separators and screws also being needed to keep the tracks aligned.

This type of configuration likewise gives rise to problems of parallelism and straightness of the two tracks and the lintel.

Further, the operation of the door assembly is adversely affected by the cantilevered configuration of the rollers and counterrollers which require very strong shafts and hanger supports in order to overcome deformations produced by the overhanging doors when reopening after encountering an obstacle during closing.

It should also be taken into account that in conventional doors the panels always have a tendency to be noisy and resonant during movement of the door, and in most cases a welded sandwiched configuration is necessary to overcome this resonance, with special noise absorbing paint or materials sometimes having to be used.

Consequently, depending on the structure of the door assemblies of these conventional elevators, the main problems reside in cost and quality caused by the large number of separate elements used, as well as in the precision required to obtain parallel smooth movement of the telescopic elements, and in the noise produced during operation thereof.

Normally, if the assembly has to be competitive from the cost point of view, the elements are made too weak, giving rise to problems of noise, jerks, and wear and tear of the panel surfaces, with horizontal scratches being produced by undesired contacts between moving parts.

Finally, the assembly of this type of door, and the adjustment of the different elements, take a long time to complete, thus increasing the initial cost and also more importantly the cost of maintenance.

The present invention is applicable to the type of above cited telescopic door assemblies and provides a telescopic door assembly comprising a high speed door and a low speed door, each door being hung from a pair of spaced apart roller assemblies, said roller assemblies running along a single common track, the roller assemblies of the low speed door being spaced apart in the direction of the track a greater distance than the roller assemblies of the high speed door, and the roller assemblies of the high speed door being located on the track between the roller assemblies of the low speed door.

Thus, the invention provides a single sliding track common to both the high and low speed doors. This provides for an assembly having relatively few components, which is quick and easy to install. Also the track can be connected to the door lintel in a simple manner, as there is no need to accurately position it with respect to another track.

The door profiles may be identical to each other and be provided with suitable orthogonal foldings in their longitudinal edges to determine both a fire labyrinth configuration and a sealing between the profiles or doors.

Also, thin metallic sheets may be provided centrally and longitudinally on the surfaces of the panels to provide soundproofing.

The general door assembly may comprise suitable profiles which can be assembled together, so that they may be dismounted which makes it possible to effect the assembly or disassembly in situ.

The invention provides for an assembly having a dismountable frame with active elements preassembled for a compact and easy transport from factory to the field with minimum manufacturing and erection time.

Embodiments of the 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 an automatic two-leaf telescopic elevator door,

Figure 2 shows a sectional view of a rolling assembly for the doors,

Figure 3 shows an alternative or variant of the rolling assembly, and

Figure 4 shows a schematic plan view of a cross-section of the two profiles corresponding to the two doors shown in Figure 1, each including a soundproofing element. One can see that

the two door profiles are identical to each other even though they are connected to different hanger supports.

Referring to Fig. 1, an elevator door assembly is shown, in which a high speed door 2 and a low speed door 3 are hung from a single track 1 mounted in the door frame lintel 18.

The doors 2 and 3 are shown in their closed positions in which they close the door opening between the two door frame stiles 17.

When in their open position, they telescope, one behind the other, so as to lie to the far right of the track 1, such that their leading edges are flush with the door opening edge of the right hand stile 17.

The low speed door 3 is suspended from one end of a hanger support 4. The hanger support 4 has a length, along the track 1, substantially equal to that of the door opening, i.e. the distance between the two pillars 17, and is slidably mounted on the track 1 by rolling assemblies 4L and 4R, positioned at its left and right hand ends respectively.

The high speed door 2 is suspended from a second hanger support 5 which, in this case, is of slightly less extent than the high speed door 2 itself. This hanger support 5 is slidably mounted on track 1 by rolling assemblies 5L and 5R, positioned at each of its ends. These high speed door rolling assemblies 5L and 5R are positioned on the track 1 between the low speed door rolling assemblies 4L and 4R. The low speed door hanger 4 is of greater vertical extent than the high speed door hanger 5.

The doors 2 and 3 are opened and closed, as is conventional, by means of a hauling cable 6 which passes through corresponding pulley-wheels, and is connected to a counterweight 7.

Clearly, when the doors 2 and 3 are in their open position, rolling assembly 5R lies adjacent rolling assembly 4R but when the doors 2 and 3 are closed the high speed door 2 moves relative to the low speed door 3 so that, as seen in Fig. 1, the rolling assembly 5L lies adjacent rolling assembly 4L, with the distance between the two right hand rolling assemblies 5R and 4R being longer than half the door opening width. This is of course to allow the two doors 2 and 3 to telescope behind one another when open and lie behind the right hand stile 17 without the door 2 projecting out from the frame further than the low speed door 3.

So that the doors 2 and 3 are not prevented from fully opening or closing by abutment of their respective left or right hand rolling assemblies, the rolling assemblies 5L and 5R of the high speed door 2 are positioned inwardly from the ends of hanger 5, a distance corresponding to the width of the rolling assemblies 4L and 4R.

By using only a single track 1, all the separators and fastening means typical of a two track assembly are eliminated, and the track 1 need only be supported at its ends by a very simple friction device. Nor does the door lintel need to provide two or three flat references to accurately fasten two tracks in parallel.

The supports 4 and 5 may move along the single track I by means of a rolling assembly similar to the ones shown in Figures 2 and 3 which are more fully disclosed in our co-pending patent application, of even date herewith, entitled "Telescopic Elevator Door Assembly".

In Figure 2 one can see that the guide or sliding track 1 has a rectangular section. As said, the track 1 may be fastened to the general structural frame by friction and without the need for machining or additional operations of welding perforations. This avoids the problem of aligning the two parallel tracks which are used in conventional doors, as well as eliminating the use of separators, screws, welding, etc.

The rolling element or system shown in Figure 2 is made up of a box 8 which contains and protects all the rolling elements, thus avoiding the cantilever roller and counterroller configurations which are used in the conventional designs and which have an inherent flimsiness.

This rolling assembly comprises a single unit independent from the track 1 which includes all the elements for its fastening to the hanger support 5 of the door panel. The assembly is constructed so as to produce sidewards movement without the need for any adjustments and to provide automatic attainment of the desired clearance between the doors for movement.

Rollers 9 and 10 which rest precisely on the top and bottom edges of the track 1 are mounted inside the box 8. These rollers are fastened by through screws 11 and 12, respectively, which aside from serving as a support for the rollers fasten the unit, in other words, the box 8 and all its elements, to the respective hanger support 5 of the door.

The rigidity of this described configuration is advantageous in order to obtain smooth movement of the door panels without jerks and resistance when reopening the doors, in the event that they encounter obstacles during closing.

A variant of this type of rolling assembly is shown in Figure 3, where one can see that the track consists of a cylindrical bar I'. In this case, ball bearings 13 are used as the roller means and are provided in a corresponding box 14, which is, in turn, fastened to the hanger support 5 of the door by screws 15.

Both of these rolling or sliding systems allow a substantial reduction in assembly time and a total elimination of the adjustment time. The track unit,

rolling assemblies and hanger supports of the doors can be manufactured and installed in the door frame lintel so that the same can be assembled in the factory and easily transported to the field.

Finally Figure 4 shows a schematic cross section of the two doors 2 and 3, which are formed by sheet panels of identical profile with six orthogonal foldings in each, the foldings forming sealing means and fire labyrinth paths.

In Figure 4 one can clearly see how it is possible to obtain a reduced moment of inertia for the door but maintain its rigidity by providing folds in both edges of the panels 2 and 3, with the profiles being relatively thin. In the profile shape shown in Fig. 4, only six orthogonal foldings or curves are needed to provide the rigidity and also a fire protection labyrinth. Also, because extra weight is placed at the edges of the door, the door has a greater tendency to resist twisting and bending movements.

Each panel or profile of the doors 2 and 3 may include a soundproofing element which is of a simple form but which permits, nevertheless, the attainment of a very good capacity for noise absorption of the corresponding door panel. The soundproofing element consisting of a narrow metal panel 16 which is flat, very thin, and fastened centrally and longitudinally to each panel 2, so that it acts as a noise absorption resonant element. The fastening may be done with glue and the element may be kept in position in the top and bottom parts by screws which are used in turn to fasten the door panel to the hanger supports, as well as to the lower guide-shoe metallic support.

Overall, the described embodiment provides a telescopic door assembly including a frame which is easy to assemble and disassemble. It is easily transported to the field, and there may be a high degree of preassembly at the factory, all of which permits a considerable reduction in the installation and assembly time.

Although the present description has referred to telescopic doors for elevators which include two panels, the invention is also applicable to two speed, four panel doors which open in the centre, and which basically consist of a pair of the described two door systems, opposed to one another, to provide double the opening.

Likewise, the improvements are applicable to other door systems, such as of vehicles, and doors opening in the centre in which the described elements also make it possible to obtain most of said advantages.

Claims

1. A telescopic door assembly comprising a high speed door and a low speed door, each door being hung from a pair of spaced apart roller assemblies, said roller assemblies running along a single common track, the roller assemblies of the low speed door being spaced apart in the direction of the track a greater distance than the roller assemblies of the high speed door, and the roller assemblies of the high speed door being located on the track between the roller assemblies of the low speed door.

2. A telescopic door assembly according to claim 1, wherein said high and low speed doors are connected to their respective roller assemblies by respective hanger supports, the hanger support of the low speed door having a greater extent in the direction of the track than the hanger support of the high speed door.

3. A telescopic door assembly according to claim 2, wherein said low speed door hanger support has a greater vertical extent both above and below said track than said high speed door hanger support.

4. A telescopic door assembly according to any preceding claim, wherein said high and low speed doors are formed from identically shaped panels.

5. A telescopic door assembly according to claim 4, wherein each said door is formed from a panel having six orthogonal folds, two of said folds forming a vertical U-shaped channel extending along one side edge of the panel, and four of said folds forming a vertical column of rectangular cross-section along the opposite side edge of said panel, said column being open adjacent one corner such that said U-shaped channel of one door can interengage the column of another door.

6. A telescopic door assembly according to any preceding claim, wherein a thin metallic sheet is centrally and longitudinally attached to the surface of each said door to provide soundproofing.

7. A telescopic door assembly according to any preceding claim, wherein said assembly comprises a centrally opening door assembly having two sets of high and low speed doors arranged opposite one another in substantially the same plane.

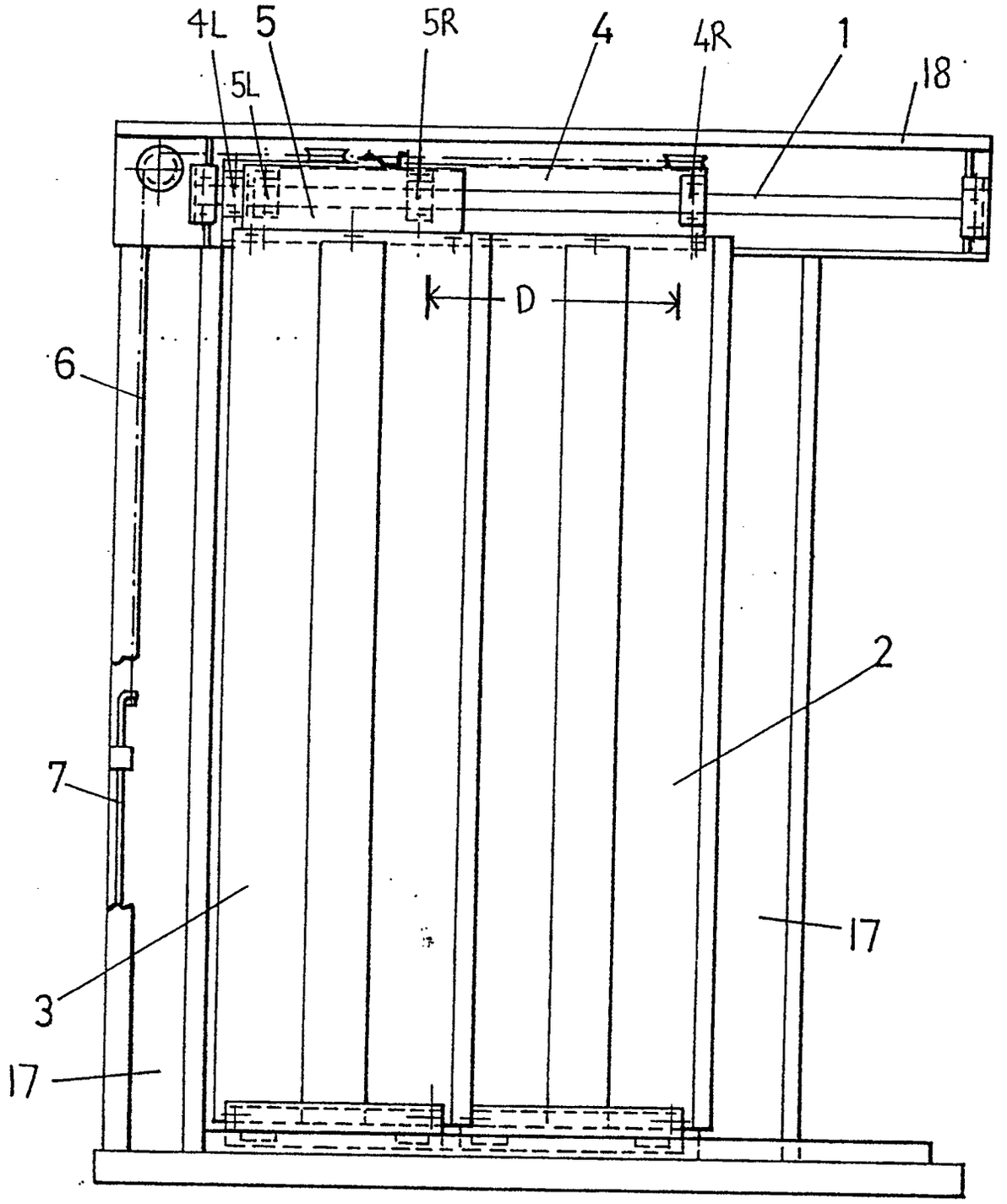

FIG-1

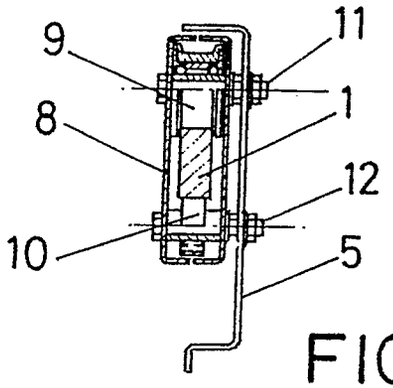

FIG-2

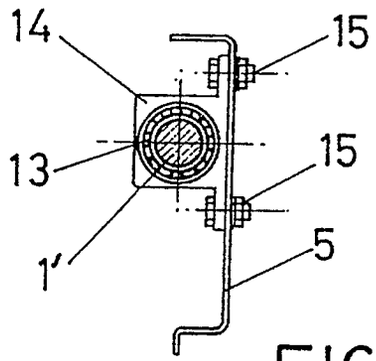

FIG-3

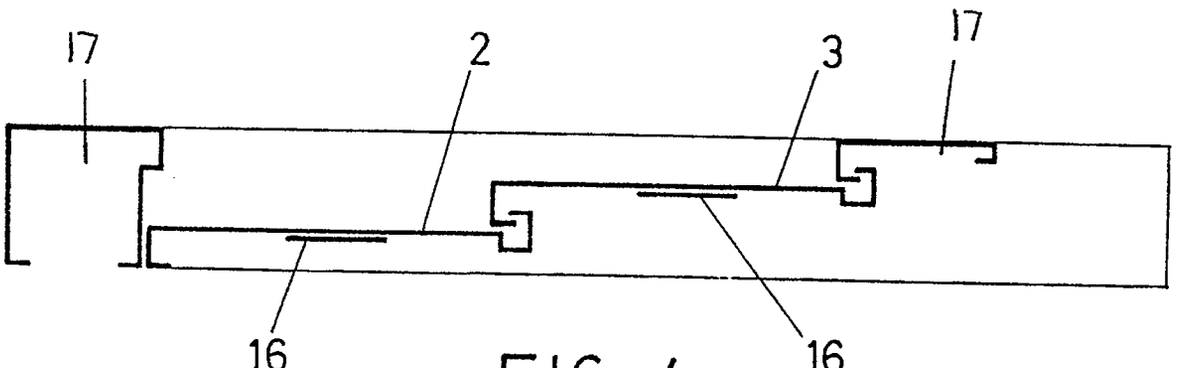

FIG-4