

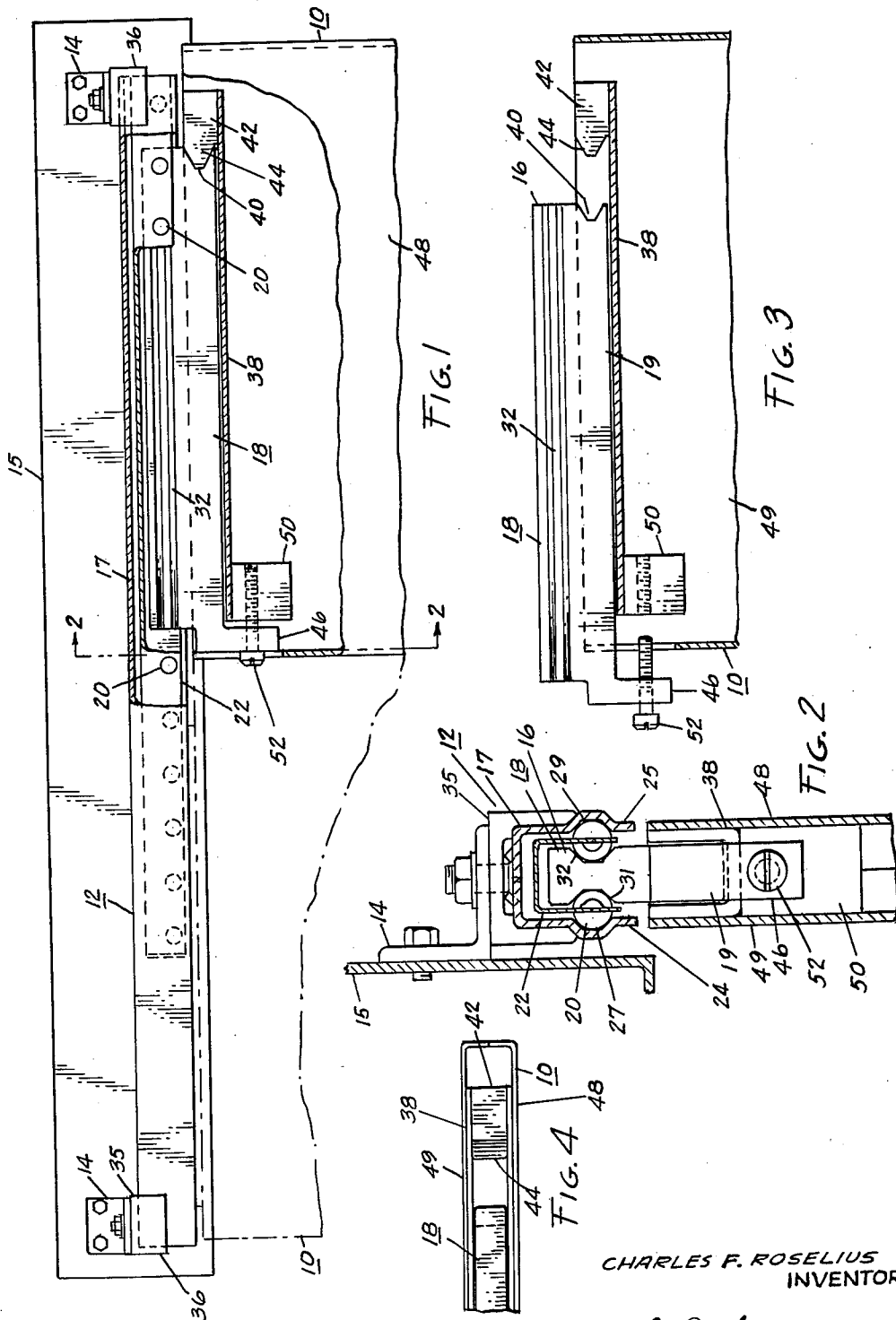
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C. F. ROSELIUS

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SLIDING DOOR HANGERS AND DOOR

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CHARLES F. ROSELIUS
INVENTOR

BY *J. J. De Angelis* ATTORNEY

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SLIDING DOOR HANGERS AND DOOR

Charles F. Roselius, Oyster Bay, N.Y., assignor to Otis Elevator Company, New York, N.Y., a corporation of New Jersey

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4 Claims. (Cl. 20—19)

This invention relates to linear type door hangers and doors supported therefrom for sidewise movement to control access to the entranceways of railway cars, elevator cars and like apparatus. More particularly, this invention is directed to an arrangement which facilitates the assembly and disassembly of doors from such hangers.

Generally speaking, such cars are used in locations in which considerable dust of various types is present. This is particularly true of railway cars used in metropolitan subway systems where they operate within confining tunnels.

One popular linear type of hanger used in subway cars is the "diamond" ball bearing type having an outer or tube track affixed to the structure above the entranceway and an inner or center track arranged for linear movement relative to the tube track. The tube track has roughly an inverted U-shaped cross-section. The center track is of substantially rectangular cross-section and is movably supported within the depending sides of the tube track by two sets of ball bearings, operating in channeled raceways provided in contiguous surfaces of the tracks. Stops close the ends of the tube track to prevent the center track, ball bearings and their retainer from sliding out of the ends of the tube track.

The lowermost portion of the center track extends downwardly below the depending sides of the tube track and is disposed snugly within a metal reinforcing channel of substantially U-shaped cross-section, which channel forms the top edge of the metal car door. Several barrel bolts extend through spaced, bolt receiving apertures formed in the reinforcing channel and the lowermost portion of the center track disposed therein to suspend the door from the center track, thereby permitting the door to be moved sidewise with the center track to open and close the entranceway.

Since in such a hanger the ball bearings support the full weight of the center track and door, they have in the past been made of metal and are undesirably noisy in operation. In order to minimize such noisy operation and also to reduce further the frictional engagement between relatively moving parts, it has been the practice periodically to lubricate the bearings in their raceways. This lubrication has in turn acted to collect or trap an undesirable amount of surrounding dust, some of which is from the metal brake shoes which engage the wheels of the car. As the entrapped dust, adhering to the lubricant accumulates, a thick abrasive compound is formed which acts to impede operation and to damage the tracks and movable bearings.

To prevent the accumulation of this abrasive dust and to impede its abrasive action, it is customary routinely to remove the cars from service for inspection of the hangers, for removal of the abrasive materials and for re-lubrication. In performing this routine inspection and maintenance, because of space limitations, it is necessary first to remove the door by unscrewing the several barrel bolts securing it to the center track and then dismantle the hanger to gain access to its moving parts. This involves considerable labor effort in addition to decreasing the number of cars that are available for service at any given time.

Since the cars normally are also subject to considerable moisture, it often happens that rust forms on the U-shaped

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reinforcing channel of the door and the center track portion disposed therein; the rust acting to bond the door to the center track and making removal of the door extremely difficult and time-consuming. This, in turn, undesirably increases the number of cars which are unavailable for service at any given time.

It is therefore an object of this invention to provide a linear type hanger and sliding door arrangement in which the door is easily and quickly attachable to and detachable from the hanger assembly.

In carrying out the invention, the center track of the hanger assembly is provided with a lower portion dimensioned so as to fit relatively loosely within the U-shaped reinforcing channel, forming the top surface of the door. The door is suspended by connections made to both ends of the lower portion of the center track. One such end connection is accomplished by means of a pair of cooperating key and keyway members. The other end of the center track has secured thereto a depending lug member, having a horizontally disposed bolt receiving aperture formed therein. A bolt extends through such aperture and is threaded into a fastening block rigidly secured to the door.

Features and advantages of the invention will be seen from the above and from the following description when considered in conjunction with the drawings and appended claims.

In the drawing:

FIGURE 1 is a front, fragmentary, elevational view of a linear hanger, supporting a sliding door (only the top portion of the door being shown) in its closed position;

FIGURE 2 is an enlarged cross-sectional view taken along line 2—2 of FIGURE 1;

FIGURE 3 is a partial front elevational view of the arrangement of FIGURE 1, showing the door disengaged from the center track; and

FIGURE 4 is a partial plan view of the right-hand portion of the door and center track of FIGURE 3.

Referring to FIGURES 1 and 2, sliding door 10 is suspended from an overhead horizontally disposed linear hanger, generally designated 12. Overhead hanger 12 is in turn suspended at its ends from L-shaped mounting brackets 14 bolted to structure 15 which is part of the car body. The hanger is approximately twice the width of the door 10 and extends from one side to approximately the door's width beyond the other side of the entranceway. Essentially, hanger 12 comprises a stationary tube track 17 approximately twice the width of the door; a movable center track 18 held in rolling suspension in tube track 17 by means of ball bearings 20, and a ball retainer 22 adapted to fit within tube track 17 and maintain ball bearings 20 in spaced relationship with each other. Center track 18, to which sliding door 10 is attached, extends longitudinally, preferably, slightly less than the door width, while retainer 22 extends longitudinally approximately one and a half times the width of the door.

Tube track 17 is of substantially inverted U cross-sectional shape, having two depending flanges 24, 25, each of which is expanded outwardly to form on the inside surfaces of the flanges two horizontally parallel and oppositely disposed ball races 27, 29 which extend the full length of the tube track.

Center track 18 has a substantially rectangular cross-sectional shape with the widest side of the rectangle disposed vertically. It has an upper portion 16 positioned within tube track 17 and a lower portion 19 extending below the tube track. Horizontal ball races 31, 32 are formed in the upper portion of the center track, one in each of the oppositely disposed vertical sides of the track, and extend along its entire length. These races 31, 32

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co-operate with races 27, 29 to form raceways on either side of center track 18 for ball bearings 20. The ball bearings hold the center track firmly in rolling suspension with tube track 17.

Channels 35 reinforce tube track 17 at the suspension points located at both ends of the track, and each has a depending portion 36 which acts as a stop to prevent ball retainer 22, balls 20 and center track 18 from rolling out of the ends of tube track 17.

It is to be understood from the foregoing that with the hanger parts assembled as described, the tube track and center track are in rolling engagement with the ball bearings in the retainer, which retainer is also free to move sidewise with respect to both tracks. As the door is moved sidewise, the center track from which it is suspended moves twice the distance at twice the speed that the retainer moves.

Next the manner in which the door is suspended from the hanger will be described. Door 10 is of conventional hollow construction and includes front and back panels 48, 49 with their vertical side edges bent over and in butted relationship to form the vertical side edges of the door. In the preferred embodiment illustrated, the lower portion 19 of center track 18 of hanger assembly 12 is positioned within U-shaped reinforcing channel 38 which forms the top edge of door 10; the dimensions of lower portion 19 being such so as to fit relatively loosely within the U-shaped reinforcing channel. The right-hand ends of track portion 19 and reinforcing channel 38 are formed with complementary mating surfaces which may have any of several well-known geometrical configurations. In this preferred embodiment they will be described as a matching key and keyway. They could equally well be matching concave and convex surfaces or other suitable arrangement. Formed in the right-hand end of lower portion 19 is a keyway or wedge receiving recess 40 (FIGURES 1 and 3). A metal end block 42 is fitted within and rigidly secured to reinforcing channel 38 at a point adjacent to the right vertical side edge of door 10. Formed on and protruding from the inside end of metal end block 42 is a horizontally disposed key or wedge 44 adapted for mating engagement with its receiving recess 40 formed in the right-hand end of lower portion 19 of the center track. The left or opposite end of lower portion 19 has secured thereto, as by welding, a downwardly depending lug or tail member 46, having a horizontally disposed bolt receiving aperture formed therein. Secured, as by welding, to the bottom surface of reinforcing channel 38 between front and back panels 48, 49 is a fastening block 50, having a threaded bolt receiving aperture formed therein. With the door in position for assembly, this aperture is in alignment with the aperture formed in tail member 46. The uppermost portion of the left door edge is preferably recessed for receiving tail member 46. Door 10 is secured to center track 18 by means of a single bolt 52, passing through the aperture formed in tail member 46 and threaded into fastening block 50. Taking up on bolt 52 moves center track 18 sidewise toward the right relative to door 10, thereby forcing recess 40 formed on the center track 18 into mating engagement with key or wedge 44 of end block 42. With wedge 44 in mating engagement with recess 40 and bolt 52 tightened, door 10 is suspended from both ends of center track for good weight distribution.

Door 10 may be easily removed from the hanger by unscrewing the single bolt 52 and moving center track 18 sidewise to the left a small amount relative to door 10, until wedge 44 moves out of engagement with recess 40 of the center track. At this point the door, under the influence of its own weight, drops free of the hanger.

Once the door is removed, the hanger components may be dismantled easily for inspection, cleaning and re-lubrication by merely unscrewing the bolt securing end stop 36 to tube track 17 and removing the stop. The

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center track 18, ball retainer 22 and ball bearings 20 may then be slid sidewise out of tube track 17.

As changes can be made in the above described construction and many apparently different embodiments of this invention can be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown on the accompanying drawings be interpreted as illustrative only and not in a limiting sense.

What is claimed is:

1. In combination, an overhead linear type door hanger horizontally suspended in an entranceway, said hanger including a moveable longitudinal track of rectangular cross-section adapted for sidewise movement in said hanger and having a lower portion depending from said hanger, said lower portion having two end portions for attachment to a vertically disposed door, one of said attaching end portions being in the form of a depending tail block having a bolt receiving aperture formed horizontally therein, the other of said attaching end portions having formed therein a recess of predetermined internal configuration adapted for receiving a horizontally disposed member of cooperating external configuration in male and female mating engagement, a vertically disposed door having a U-shaped channel forming its top edge surface, a mating member rigidly secured in said U-shaped channel adjacent a vertical side edge of said door, said member having a horizontally disposed portion of external configuration adapted for mating fit in said recess, a fastening block secured to said door adjacent the other vertical side edge of said door, said fastening block having a horizontally disposed and threaded bolt receiving aperture formed therein, said lower portion of said movable track being disposed relatively loosely in said U-shaped channel of said door with said tail block aperture in alignment with said fastening block aperture, and a bolt extending through said tail block aperture and threaded into said fastening block to secure said door to said tail block and force the recess formed end of said lower center track portion into frictional engagement with said mating member, thereby suspending said door from said movable track for sidewise movement therewith.

2. In combination, a vertically disposed door having front and back panels with their vertical side edges bent over into butted relationship to form the vertical side edges of said door, said door having a substantially U-shaped reinforcing channel forming its top edge surface; an end block disposed within said reinforcing channel adjacent one of said vertical side edges of said door, said end block having a horizontally disposed projection of predetermined external configuration extending toward the opposite vertical side edge of said door; a fastening block having a threaded bolt receiving aperture horizontally formed therein, said fastening block being rigidly secured to said door contiguous to the bottom surface of said U-shaped reinforcing channel at a point adjacent said opposite vertical side edge of said door; an overhead linear type door hanger horizontally suspended in an entranceway, said hanger including a movable center track of substantially rectangular cross-section having a lower portion disposed relatively loosely within said U-shaped channel of said door, said lower portion having formed at one of its ends a recess adapted for co-operating frictional engagement with said projection of said end block to support the door from said center track, a tail block rigidly secured to the other end of said lower portion of said center track and depending therefrom below the bottom surface of said reinforcing channel, said tail block having formed therein a bolt receiving aperture in alignment with said threaded aperture in said fastening block, and a bolt extending through said bolt receiving aperture and threaded into said fastening block securing the door to the tail block and locking said one end of

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said lower portion to said horizontal projection fitted therein.

3. An overhead door hanger and a vertically disposed sliding door movably suspended therefrom in an entranceway, said arrangement comprising, a longitudinal tube track member and a longitudinal center track member longitudinally slidable relative thereto, said track members having opposed ball receiving races forming a longitudinal ball raceway on each side of said center track member between it and said tube track member; a plurality of ball bearings positioned in said raceways and co-operating with said track members in supporting one by means of the other and facilitating longitudinal travel of one relative to the other; a ball retaining member having a ball carrying portion extending into each of said raceways and adapted for maintaining adjacent ones of said balls separated from each other; said center track member having a lower portion extending below said tube track for movably suspending said door from said hanger for sidewise movement, said lower portion having formed at one of its ends a wedge-shaped cavity adapted for receiving a horizontally disposed wedge, and at its opposite end a depending tail block having a horizontally disposed bolt receiving aperture formed therein; a horizontally disposed wedge rigidly secured to said door and extending into said cavity for mating frictional engagement with said formed end of said center track lower portion, and a bolt extending through said aperture in said tail block and threaded into said door for securing said door to said tail block end of said center track and

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for forcing said center track sidewise relative to said door for locking said wedge in said cavity, thereby suspending said door from said center track.

4. In an overhead door hanger and sliding door assembly in which an inner movable track is supported by a plurality of ball bearings within an outer tubular supporting track and in which the top surface of the sliding door is recessed below the level of the door's front, back and one end surface and in which said inner movable track fits within said recess, the improvement constituting a rigid abutment terminating said recess at its extremity near said end surface, a protruding key on the vertical face of said recess-terminating abutment, a complementary keyway formed in one end of said inner track and in engagement with said key, a bolt receiving dependent lug formed on the opposite end of said inner track and overhanging the other edge surface of said door opposite said abutment when said inner track is in said recess, a threaded bolt receiving block immovably affixed within said door at a position contiguous to and in registration with said bolt receiving dependent lug, a threaded bolt passing through said lug and engaging said threads in said block, the length of said inner track being proportioned such that the weight of said door is carried by said bolt and said mated key and keyway surfaces which are forced into cooperating immovable engagement.

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