Oct. 4, 1932. G. B. AYERS 1,881,015

SUPPORTING AND OPERATING MEANS FOR DOORS

Filed May 27, 1931 2 Sheets-Sheet 1

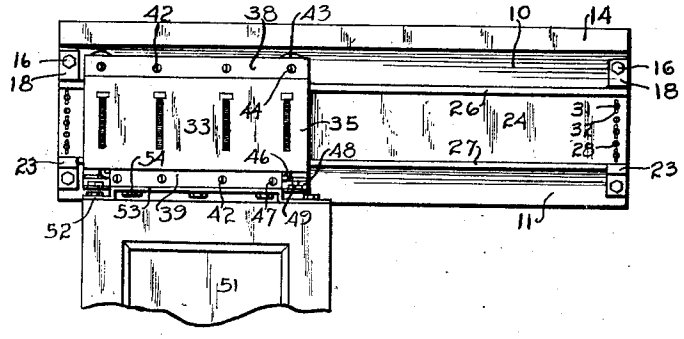


FIG 1

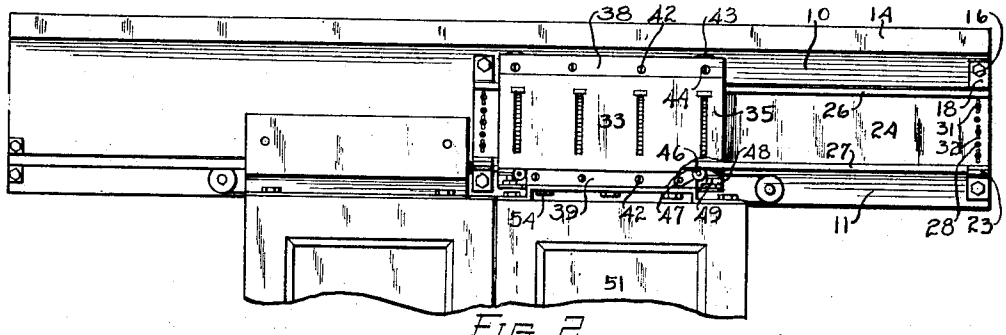


FIG 2

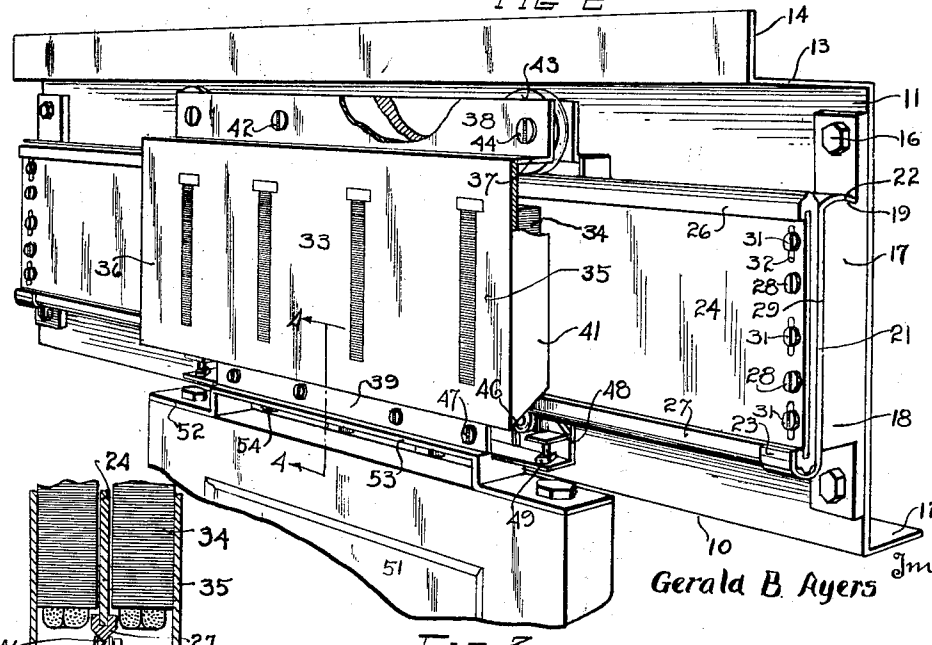


FIG 3

FIG 4

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SUPPORTING AND OPERATING MEANS FOR DOORS

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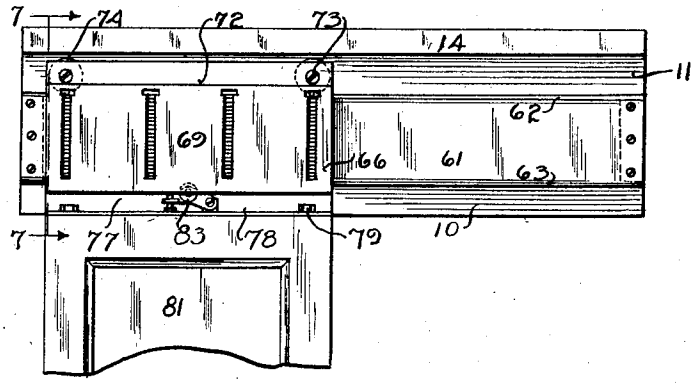


FIG 5

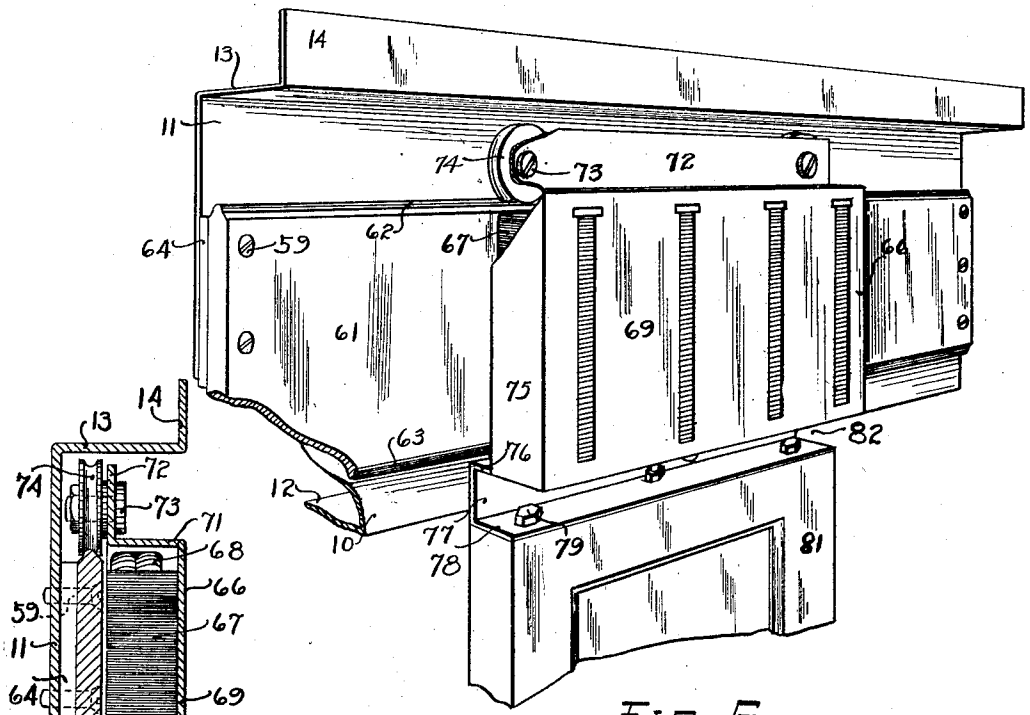


FIG 6

FIG 7

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UNITED STATES PATENT OFFICE

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SUPPORTING AND OPERATING MEANS FOR DOORS

Application filed May 27, 1931. Serial No. 540,368.

This invention relates to an improvement in door supporting and operating means and more particularly to such means applied to sliding doors.

Entrance enclosures, as the present building requirements indicate, are undergoing a great change. Heretofore an enclosure was of a size convenient for installation of the proper door or doors. Now, however, the enclosure must conform to given height, width and depth. Inasmuch as the door size has changed little or none at all, it is evident that the enclosures are being greatly reduced in all their proportions. This indicates that where ample space once existed between the top of a door and the top of an enclosure, this space is now greatly reduced necessitating a reconstruction of door hangers, door operator, etc.

The present invention is therefore primarily directed to the provision of an enclosure in which the door operator or motor is directly joined to the door, thus eliminating the use of separate pendent plates or hangers. The motor, as shown in the drawings, comprises one or more field elements mounted in a housing. A door is joined to and supported by the housing. The upper portion of the housing is fitted with supporting rollers which engage a track formed on the stationary armature. It is thus evident that the motor height only need be considered in connection with problems of providing door operating means in the limited enclosure space, since the pendent plate or hanger is formed by and constitutes a part of said motor.

Another object of the invention is to provide a rectilinear induction motor, the field structure of which is supported on the armature and movable relative thereto.

A further object of the invention is to provide in a rectilinear induction motor the combination of a field structure and hanger.

A still further object of the invention is to provide in a rectilinear induction motor the combination of an armature with a track.

Other and further objects of the invention may be more clearly understood from a consideration of the following specification which is taken in conjunction with the accompanying drawings, and in which

Fig. 1 shows a rear elevation of an entrance enclosure with the motor adapted to operate a single sliding door;

Fig. 2 is a rear elevation of a bi-parting entrance enclosure with the motor adapted to operate one of the doors and coordinating means connected to the other door;

Fig. 3 is an enlarged perspective view of the structure shown in Figure 1, parts being broken away to show certain details of construction;

Fig. 4 is a fragmentary vertical sectional view taken substantially on the line 4—4 of Figure 3;

Fig. 5 is a rear elevation of a modification of the structure shown in Figure 3;

Fig. 6 is an enlarged perspective view, showing details of field and armature construction; and

Fig. 7 is a vertical sectional view, taken substantially on the line 7—7 of Figure 5.

Referring to the drawings and particularly to Figure 3, this motor is shown mounted upon an entrance enclosure header, generally indicated by the reference numeral 10. The header is comprised of a vertical wall 11 and horizontal flange or lintel 12 on the lower edge of said wall. An oppositely directed horizontal flange 13, along the upper edge of said wall, terminates in a short vertical flange 14. Mounted on the extreme ends of the wall 11, by screws 16, are brackets 17, said brackets having horizontal projections 18. The upper shoulders 19 of the projections 18 engage and support strap hangers 21 through flanges 22 on said hangers. The lower part of the strap hangers form hooks 23.

An armature 24, having upper and lower tracks 26 and 27 forming a part of or secured in any convenient manner to the horizontal edges thereof, is secured at its ends, by screws 28, to the strap hangers 21. Hooks 23 engage and support the armature through the track 27. A shim 29 occupies the space between adjacent faces of the armature and the strap hanger. The armature 24 is supported through screws 31 to the horizontal

projections 18 of the brackets 17. Slots 32, through which screws 31 project, permit vertical adjustment of the armature relative to the bracket.

The field structure 33 comprises substantially duplicate core and coil groups 34. Each group is mounted in spaced, oppositely disposed elements 35 which together form a housing 36. An inturned flange 37, along the top of each element 35, terminates in an upwardly projecting flange 38. Similar flanges 39 terminate the bottom of each element. Inwardly projecting flanges 41 on the end of the housing serve as a reinforcement against lateral twisting or vibration. The housing elements 35 are secured to each other along flanges 38 and 39 by screws 42. Rollers 43, mounted in the space between flanges 38, supported by screws 44, are mounted on the track 26. Adjustable locking rollers 46, mounted between flanges 39 and supported by screws 47, engage the track 27. The flanges 39 stop short of the end of the housing elements 35 to provide space for angle plates 48 within the end limits of the field structure. The locking rollers 46 are movable into or out of engagement with the track 27 by means of the adjusting screw 49. Inasmuch as this locking roller forms no part of the present invention, being covered in the pending application Serial No. 314,928, invented by Ludwig G. Jacobson, further description thereof is believed to be unnecessary. Between the vertical flanges 39 of each of the housing elements 35 is located spacer blocks 50 which are engaged with said flanges by the two inner-most screws 47. The end screws 47 secure the angle plate 48, upon which is mounted the roller 46, to the housing.

Joined to the upper horizontal edge of a door 51 is a bracket 52 having a central raised portion 53. Screws 54 engage the portion 53 of the door bracket with the spacer block 50 of the field structure. In this manner the door is suspended directly from the field structure.

The assembly and operation of the above described invention is as follows. Each core and coil group 34 is mounted in and secured to one of the housing elements 35. These elements are spacedly joined together by screws 42, rollers 43 being mounted between the flanges 38 and acting as spacers to said elements. The field structure now being assembled, the armature 24, having previously been provided with upper and lower tracks 26 and 27, is projected through the opening in said field structure, the upper track 26 contacting with the rollers 43. The motor may now be mounted upon the enclosure by engaging the ends of the armature, through screws 28 and 31, with the strap hangers 21. The locking rollers 46, through adjusting screws 49, are moved upwardly into engagement with the lower track 27. When the armature has been properly leveled, the door 51 is attached to the housing 36 by the bracket 52.

It will be understood that the field structure 33, in which are mounted the track rollers 43, takes the place of a pendent plate or hanger from which to suspend the door. The armature 24, is likewise caused to serve a double usefulness by being made sufficiently rugged to constitute a track from which to suspend the field structure and door. When the coils of the field structure are properly energized from a suitable source of current supply, an electro magnetic force is set up which causes translation of said field structure and said door in one direction or the other.

Another modification of this type of motor, as shown in Figures 5, 6 and 7 of the drawings, discloses a heavy armature which, for the purpose of illustration, is secured to an enclosure header. The field structure is mounted in a housing or casing on one side of the armature. Rollers attached to the upper flange of the casing engage the top edge of the armature and support the field structure. A return flange is provided along the lower edge of the casing which may be attached to a door or any other movable object.

Since the header, shown in this modification, is identical with that represented in Figures 1, 2 and 3, further description is unnecessary since like reference numerals refer to like parts.

Secured to the wall 11 of the enclosure 10, by screws 59, is an armature 61, the upper and lower edges of which form tracks 62 and 63. Shims 64, located at extreme ends of the header 10 and interposed between adjacent faces of the wall 11 and the armature 61, space said armature from said header. A field structure 66 comprising a core 67 and coils 68 is supported in a substantially channel-shaped housing 69. The upper horizontal wall 71 of the housing terminates in a perpendicular flange 72. Spacedly mounted on the flange 72, by bolts 73, are grooved or otherwise suitably flanged rollers 74 which engage the track 62 and provide a slidable means of support for the field structure. Extreme ends of the housing are terminated by inturned flanges 75 which provide reinforcement against transverse vibrations. The lower horizontal wall 76 of the housing 69 extends to a position substantially midway between flange 72 and wall 11 of the header. Downwardly and outwardly projecting flanges 77 and 78 terminate the wall 76. Screws 79 are projected through the flange 78 to engage the top edge of a door 81. The pocket 82, which is beneath the field structure and defined by the wall 76 and flanges 77 and 78, provides convenient access to the

screws 79 and an adjustable locking roller 83. Since the locking roller 83 is similar in construction and serves the same purpose as the one indicated by the reference numeral 46 in the previous modification, further description is unnecessary.

While applicant has shown and described but two modifications of his invention, he does not intend to be limited thereto since it is obvious to those skilled in the art that other modifications or adaptations may be made without departing from the spirit and scope of the invention as set forth in the hereunto annexed claims.

Having thus set forth my invention what I claim as new and for which I desire protection by Letters Patent is:

1. In an entrance enclosure structure having a door, a rectilinear induction motor for operating said door, a movable field structure and stationary armature, means supporting said armature on said enclosure, a door supporting bracket joined to said field structure, and antifriction means supporting said field structure and said door on said armature, said antifriction means facilitating translation of said structure relative to said armature.

2. In an entrance enclosure structure having a door, a rectilinear induction motor for operating said door, a movable field structure and stationary armature, means supporting said armature on said enclosure, a housing enclosing said field structure, means securing said door to said housing, and antifriction means on said housing, said antifriction means supporting said field structure on said armature and facilitating translation of said door relative to said armature when said field structure is energized from a suitable source of current supply.

3. In an entrance enclosure structure having a door, a self-contained door supporting and operating unit comprising a header, an electric motor for operating said door, a combined armature and track fastened to said header, a door supporting pendant plate, the field structure of said motor being secured to said pendant plate, and anti-friction means mounting said pendant plate on said track whereby to properly locate said field structure with respect to said armature.

4. In an entrance enclosure structure having a door, a self-contained door supporting and operating unit comprising a header, an electric motor for operating said door, a combined armature and track fastened to said header, a door supporting pendant plate, the field structure of said motor being secured to said pendant plate, anti-friction means mounting said pendant plate on said track and further means for maintaining said pendant plate and said field structure in proper spaced relationship to said combined armature and track.

5. In an entrance enclosure structure having a door, a self-contained door supporting and operating unit comprising a header, an electric motor for operating said door, a combined armature and track, means adjustably securing said armature and track to said header, a door supporting pendant plate, the field structure of said motor being secured to said pendant plate, and anti-friction means mounting said pendant plate on said track whereby to properly locate said field structure with respect to said armature.

6. In an entrance enclosure structure having a door, a self-contained door supporting and operating unit comprising a header, an electric motor for operating said door, an armature, means securing said armature to said header, tracks secured to opposite edges of said armature, a door supporting pendant plate, the field structure of said motor being secured to said pendant plate, anti-friction means on said pendant plate engaged with one of said tracks, and further means for maintaining said pendant plate and said field structure in proper spaced relationship to said armature, said further means being secured to said pendant plate and engaged with the other of said tracks.

7. In an entrance enclosure structure having a door, a self-contained door supporting and operating unit comprising a header, an electric motor for operating said door, a combined pendant plate and housing, the field structure of said motor being mounted in said housing, means securing said door to said housing, a combined armature and track, means securing said armature and track to said header, and anti-friction means mounting said housing on said track whereby to properly locate said field structure with respect to said armature.

8. In an entrance enclosure structure having a door, a self-contained door supporting and operating unit comprising a header, an electric motor for operating said door, a combined pendant plate and housing, a field structure for said motor, means securing said field structure in said housing, means securing said door to said housing, a combined armature and track, means securing said armature and track to said header, and anti-friction means mounting said housing on said track whereby to properly locate said field structure with respect to said armature.

9. In a self-contained door operating unit, a supporting member, a rectilinear induction motor having a stationary armature and a movable field structure, said armature being secured to said supporting member and constituting a track, means for supporting said field structure on said track for movement along said armature, and further means for connecting said field structure to a door.

10. In a self-contained door operating unit, a supporting member, a rectilinear in-

duction motor having a stationary armature and a movable field structure, said armature being secured to said member, means supporting said field structure for movement along said armature, and further means connecting said field structure to a door.

11. In a self-contained door supporting and operating unit, a supporting member, a rectilinear induction motor having a stationary armature and a movable field structure, a housing enclosing and supporting said field structure, means supporting said housing for movement along said armature, said housing constituting a door supporting element.

12. In an entrance enclosure structure having a door, a self-contained door supporting and operating unit comprising a header, an electric motor for operating said door, a combined pendant plate and housing, said housing including spaced elements, the field structure of said motor comprising coil and core groups, said groups being secured one to each of said housing elements to provide an opening through said field structure, a combined track and armature, means securing said track and armature to said header, and anti-friction means for mounting said housing on said track with said armature projecting through said field structure.

In testimony whereof I have affixed my signature.

GERALD B. AYERS.