

March 26, 1968

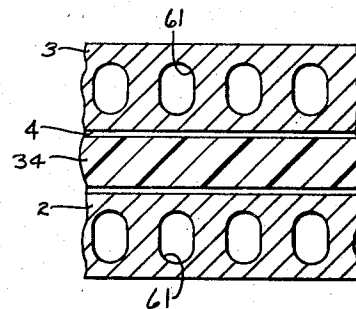
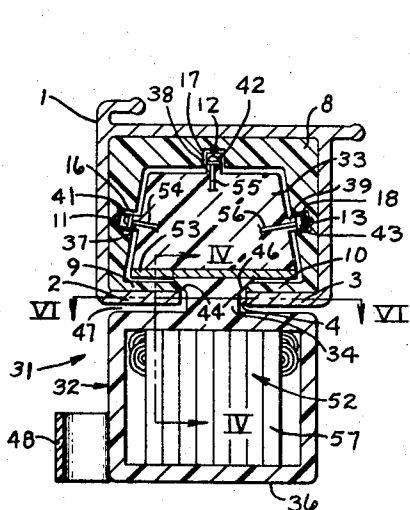
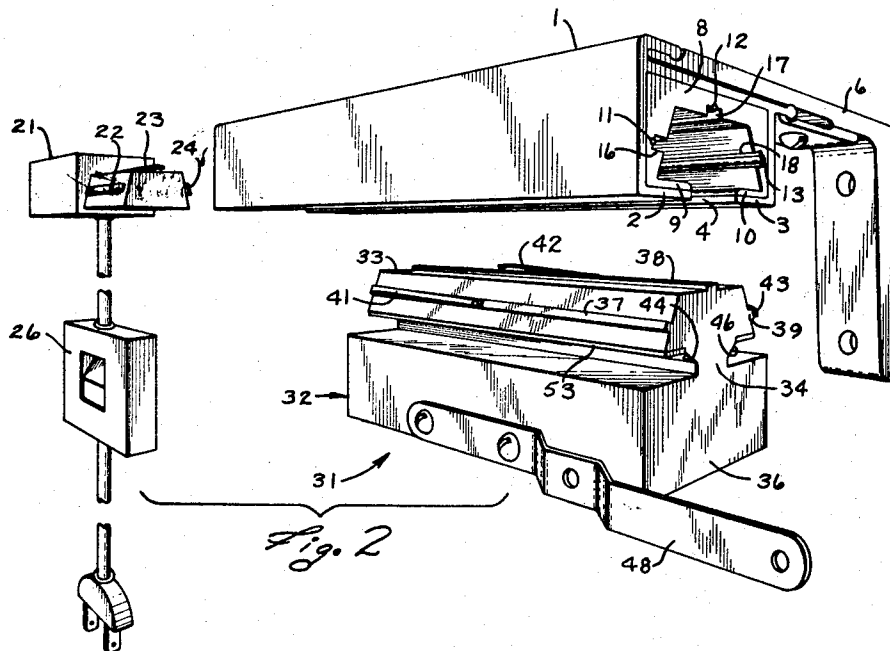
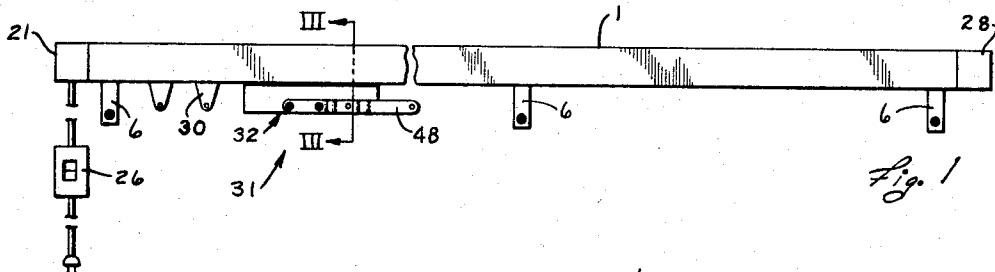
J. A. FORD

3,374,823

STRUCTURAL DEVICE

Filed Feb. 7, 1967

4 Sheets-Sheet 1



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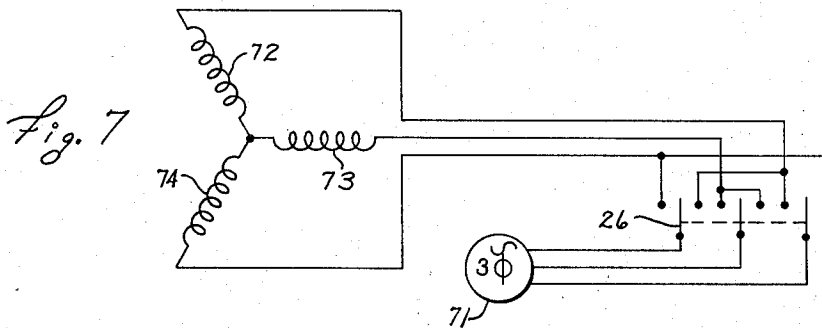
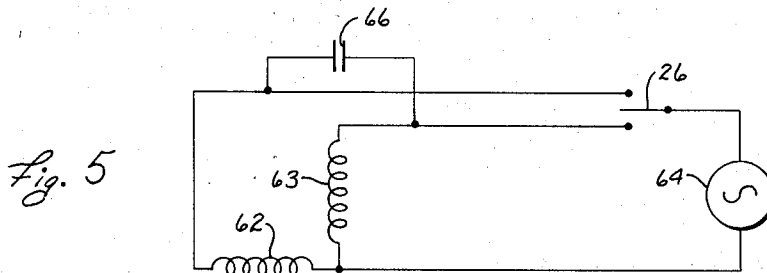
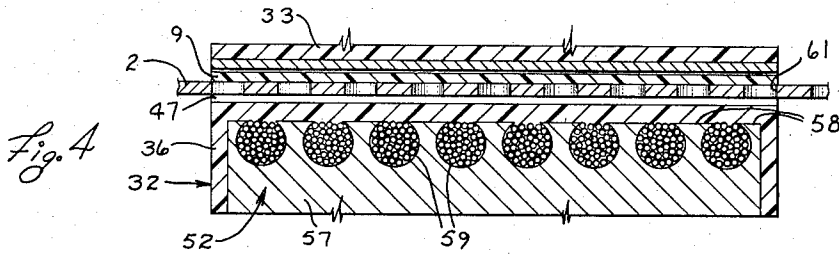
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4 Sheets-Sheet 2



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4 Sheets-Sheet 4

Fig. 12

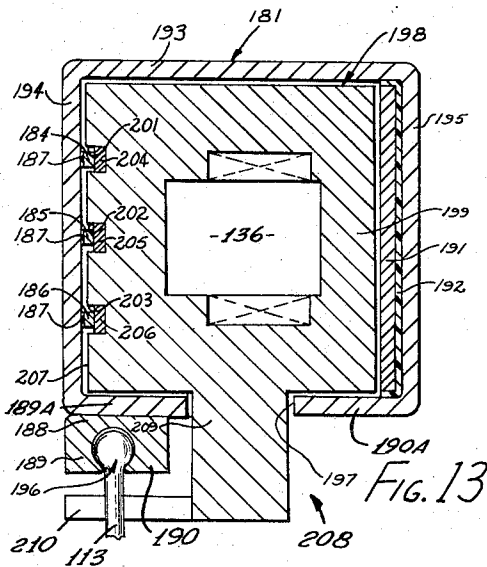
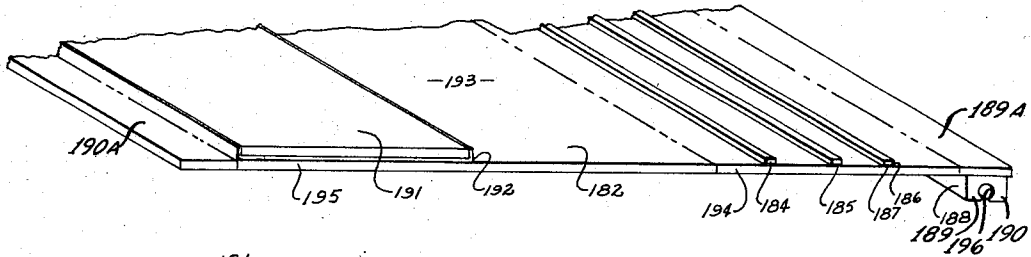


Fig. 13

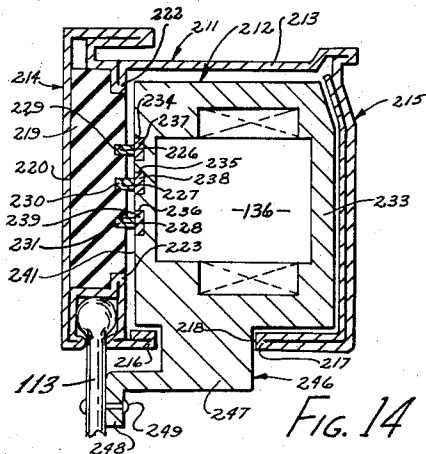


Fig. 14

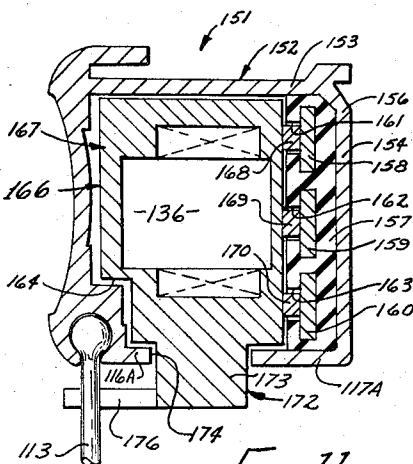


Fig. 11

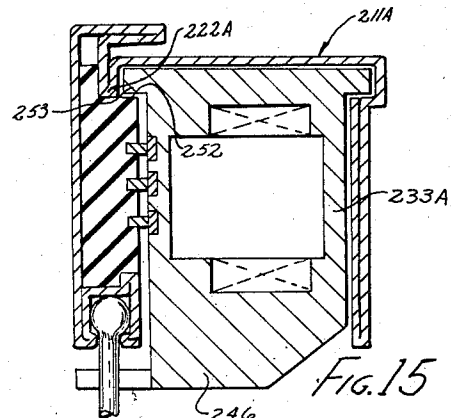


Fig. 15

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3,374,823

STRUCTURAL DEVICE

James A. Ford, Sturgis, Mich., assignor to Kirsch Company, Sturgis, Mich., a corporation of Michigan
Continuation-in-part of application Ser. No. 375,276,
June 15, 1964. This application Feb. 7, 1967, Ser.
No. 614,473

25 Claims. (Cl. 160—331)

ABSTRACT OF THE DISCLOSURE

An assembly for supporting a movable panel for longitudinal traversing movement which comprises elongated guide means guiding and supporting said panel. Reaction means extends along said guide means and is fixed with respect thereto so that a power unit, which is movable longitudinally with respect to said guide means and generates a moving magnetic field, will be reactive with said reaction means to cause a mechanical motion of said power unit with respect to said guide means.

This invention relates to traverse track and motor assemblies and particularly to an improved type of traverse rod construction actuated by a motor travelling on and supported by the traverse rod structure.

This is a continuation-in-part application of my co-pending application Ser. No. 375,276, filed June 15, 1964 now abandoned.

Inasmuch as the invention was developed primarily for the traversing support of draperies and other similar panels, the following description will proceed in terms of such application. However, it will be recognized that in its broader aspects, the invention is applicable to the traversing support of other types of panels, such as doors or screens of general applicability.

Turning now for illustrative purposes to the specific subject of traverse rods for use with draperies and similar decorative and/or light-excluding panels, the convenience of providing power-operated means, such as electric means, for actuating same has long been well recognized. Particularly, where very heavy draperies having long traverses are involved, such as in many institutional uses, or where, as is sometimes the case, the drapery is located in a position not readily accessible for manual operation, the use of power-operated means is desirable and is widely used. Further, it is frequently desired to open and close draperies automatically in response to ambient light intensity for which purpose light responsive photoelectric cells are used to cause operation of traversing motors. However, in those previously known systems adaptable to these purposes, with which I am acquainted other than that of my own previously filed application Ser. No. 374,371 the power-operated means merely serve to move the conventional draw cords in essentially the same manner as when they are manually operated. In other words, the traverse rod and its operating draw cords are essentially the same for either manual or power operation and the power means serve merely to move the draw cords in one direction or the other.

These previously known systems are reasonably satisfactory insofar as their operation is concerned but as recognized in connection with said application Ser. No. 374,371, they present serious maintenance problems in that the driving means have heavy frictional engagement with the draw cords so that severe wear problems are encountered. Replacement of the draw cord in a traverse rod is always a time-consuming matter and when there is also a driving motor involved, the replacement of such a cord is further complicated. Also, the motor must be

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relatively large to overcome the considerable frictional forces created by the draw cords passing over the end pulleys and tension pulleys in conventional traverse rods. In addition, the draw cords in a traverse rod will sometimes get out of place and bind on a pulley or become caught on a hanger or other parts of the apparatus. When this happens in a manually operated device, the operator manually senses the existence of a malfunction and can stop the operation. When the same thing occurs in a motor-driven unit, the apparatus is likely to become jammed or otherwise damaged before the malfunction is detected. While various types of safety devices, such as slip-type drives, can be provided, such are expensive and, hence, are undesirable. Further, many people consider draw cords of any kind to be unsightly and, therefore, undesirable.

In dealing with the problem above described, I have suggested in my above-mentioned application Ser. No. 374,371, a self-propelled device running along the traverse rod, energized therefrom and connected directly to the drapery. In the specific embodiment utilized in said application, said self-propelled device is provided with a rotating type of motor for driving the master carrier but this has presented certain difficulties which it is the objective of the present invention to eliminate. Particularly, the use of a rotating type of motor involves the use of many moving parts with attendant difficulties, both in the original assembly and more particularly in maintenance. It is to be especially noted that the circumstances of use of the majority of traverse rod units are such that normal motor maintenance will seldom be carried out so that the number of moving parts in traverse rod units should be minimized as much as possible.

While linear motors of various types have been known for many years, for example, as far back as Reissue Patent No. 12,700, issued October 1, 1907, there has been no attempt, insofar as I am aware, to apply such a motor to use in a traverse rod. Such adaptation presents certain problems which it is the purpose of the present invention to solve.

Therefore, the objects of the present invention include:

(1) To provide a motor for an electrically operated, cordless, traverse rod, which motor will be effective for traversing the panels suspended from said traverse rod but which will have only a single moving part.

(2) To provide a traverse rod and motor assembly, as aforesaid, which will be effective in operation but which can be manufactured and maintained in operating condition at a minimum of cost.

(3) To provide a traverse rod and motor unit assembly, as aforesaid, in which a linear motor of the induction type is used for actuating the master carrier.

(4) To provide a traverse rod and motor unit assembly, as aforesaid, which utilizes a portion of the traverse rod as a stationary armature for a linear motor of the induction type and utilizes movement of the field coils of said motor for effecting traversing movement of the panels supported by the traverse rod.

(5) To provide a traverse rod and motor assembly, as aforesaid, wherein the motor unit can be built as a single, compact and inexpensive unit and which can be assembled in operating position with its armature forming an integral part of the traverse rod unit merely by insertion of said motor unit in telescoping relationship with the traverse rod unit.

Other objects and purposes of the invention will become apparent to persons acquainted with apparatus of the general type upon reading the following disclosure and inspection of the accompanying drawings.

In the drawings:

FIGURE 1 is a front elevational view of a one-way draw type of traverse rod assembly embodying the invention.

FIGURE 2 is an exploded, perspective view of portions of the traverse rod assembly.

FIGURE 3 is a sectional view taken along the line III—III of FIGURE 1.

FIGURE 4 is a sectional view taken along the line IV—IV of FIGURE 3.

FIGURE 5 is a schematic wiring diagram of the electrical connections for a single-phase supply.

FIGURE 6 is a sectional view taken along the line VI—VI of FIGURE 3.

FIGURE 7 is a schematic wiring diagram showing an alternate circuit arrangement for a three-phase supply.

FIGURE 8 is an exploded, perspective view of a modified traverse rod assembly.

FIGURE 9 is a sectional view of the assembly traverse rod assembly illustrated in FIGURE 8.

FIGURE 10 is a sectional view of a traverse rod assembly having a modified master carrier.

FIGURE 11 is a sectional view of still another modified traverse rod assembly.

FIGURE 12 is a sectional view of a modified traverse rod in a disassembled condition.

FIGURE 13 is a sectional view of an assembled traverse rod illustrated in FIGURE 12 having therein a modified master carrier.

FIGURES 14, 15 and 16 are sectional views of still other modified traverse rod assemblies.

Certain terminology will be used in the following description for convenience in reference only and will not be limiting. The words "upwardly," "downwardly," "rightwardly" and "leftwardly" will designate directions in the drawings to which reference is made. The words "forwardly" and "rearwardly" will refer to directions to the left and right, respectively, in the drawings. The words "inwardly" and "outwardly" will refer to directions toward and away from, respectively, the geometric center of the device and designated parts thereof. Said terminology will include words above specifically mentioned, derivatives thereof and words of similar import.

General description

In general, the objects and purposes of the invention have been met by providing an assembly for supporting a movable panel for longitudinal traversing movement which comprises elongated guide means guiding and supporting said panel. Reaction means extends along said guide means and is fixed with respect thereto so that a power unit, which is movable longitudinally with respect to said guide means and generates a moving magnetic field, will be reactive with said reaction means to cause a mechanical motion of said power unit with respect to said guide means.

Detailed description

Referring now to the drawings, there is shown a traverse track 1 of an electrically conductive, preferably nonmagnetic material, such as aluminum. In this embodiment the track has a somewhat inverted U-shaped cross section having flanges 2 and 3 on the lower side thereof defining a downwardly opening slot 4. Said traverse track 1 is adapted for support by brackets of any convenient type, such as the bracket 6 which may be made as set forth in detail in my application Ser. No. 169,794.

A hollow block 8 of electrically nonconductive material, preferably a plastic such as nylon or polyethylene, is provided on the inside of the traverse track. The block 8 also is of somewhat inverted U-shaped cross section and it has flanges 9 and 10 on its lower side overlying the track flanges 2 and 3. Electrically conductive strips 11, 12 and 13 are recessed into channels 16, 17 and 18 in the

side and base walls of the block 8 for purposes appearing hereinafter.

An end cap 21 is provided at one end of the traverse track 1, the same having contact elements 22, 23 and 24 which are of any convenient type, such as resilient shoes, and which are arranged for contacting the electrical strips 11, 12 and 13, respectively, upon connection of said end cap to said traverse track 1. Said contact elements 22, 23 and 24 are connected through a three-position switch 26 to a suitable source of electrical potential usually single-phase A.C. although three-phase can also be used. Several possible connections can be provided but the preferred one is for one of the contact elements, here the element 23, to be connected to one side of said source and the contact elements 22 and 24 to be alternately connectible by the switch 26 to the other side of the source as described further hereinbelow. In addition to its two positions in which the contact elements 22 and 24 are energized, the switch 26 is positionable in a third position in which neither of said contact elements is energized.

A similar end cap 28 can be utilized at the other end of the traverse rod, opposite the end cap 21, but said last-named end cap 28 will normally omit the contacts 22, 23 and 24 and will at least omit any connection thereof to a source of power since there is no need for same.

In the illustrated embodiment of the invention, the traverse track has only one master carrier 31 slideably mounted thereon for a one-way draw operation. It will be apparent from the present disclosure as well as from Ser. No. 374,371, that two master carriers can be used for a two-way draw operation, or more than two master carriers can be mounted on the rod in various arrangements for other kinds of multiway draw operation, without changing appreciably either the motor or the traverse rod of the invention. It will also be understood that conventional slides 30 will be slideably mounted on the rod in a conventional fashion.

The master carriers 31 each consist of a block 32 of insulating material, preferably a plastic having low-friction characteristics with respect to the material of which the block 8 is made. The block 32 has an upper part 33 received within the track 1, a neck 34 extending through the slot 4, and a lower part 36 located below the track. The upper part has in a preferred embodiment lengthwise extending tongues 37, 38 and 39 on its side and upper walls, which tongues project into the channels 16, 17 and 18, respectively. Resilient contact shoes 41, 42 and 43 are mounted on the tongues 37, 38 and 39 and said shoes slideably engage the strips 11, 12 and 13. The block 32 has inclined surfaces 44 and 46 at the juncture of the upper part 33 and the neck 34 and said surfaces engage the rounded ends of the flanges 9 and 10 so that movement of the block is guided thereby. It will be observed that there is an air gap 47 between the lower side of the track and the upper side of the lower part 36 which gap is made as small as possible. Panel support arms 48 are secured to the blocks 32 for supporting the panels.

The operating parts of a linear motor are enclosed within the block 32 and same consist of travelling field coil means 52 in the lower part 36 of the block, a ferrous (or other conductor of magnetic flux) strip 53 on the underside of the upper part 33 and overlapping the flanges 2 and 3, and conductors 54, 55 and 56 connecting the shoes 41, 42 and 43 to the field coil means in any convenient conventional fashion.

The travelling field coil means 52 comprises a pole piece 57 of magnetizable material encapsulated within the block 32 and underlying the flanges 2 and 3. The pole piece 57 can be of one-piece construction or may be of laminated construction as shown. The pole piece 57 has a plurality of pole faces 58 (FIGURE 4) spaced apart therealong and separated by slots 59. The pole faces face toward the flanges 2 and 3, said flanges being received in the gap between the pole piece 57 and the ferrous strip 53. As shown in FIGURE 6 the flanges 2 and 3 can be

as provided with slits 61 to provide clearly defined flux paths therein.

The pole piece 57 (FIGURE 4) has conductors arranged in the slots 59 thereof to form windings arranged in a selected pattern so that energization thereof is effective to cause movement of the master carrier along the track in one direction or the other. While various types of conventional winding arrangements are possible, there are schematically disclosed two forms of winding arrangements which are suitable for the purposes of this invention. Referring to FIGURE 5, the conductors in slots 59 are arranged to form two motor windings 62 and 63.

The windings 62 and 63 are connected to a source 64 of single phase, alternating potential through the switch 26. One winding at a time is connected to one side of the source 64 through a capacitor 66 while the other winding is connected directly to said one side of said source. The switch 26 can be actuated to change the winding to which the capacitor 66 is connected. This arrangement is conventional with the field windings of single-phase rotative induction motors and, hence, does not require further description.

Referring to FIGURE 7, there is schematically shown an arrangement for energizing the linear motor from a three-phase source 71 for reversible operation. There are three windings 72, 73 and 74 provided and connected through the switch 26 to the source 71. This winding arrangement can be the same as that used for three-phase rotative induction motor and is not believed to require detailed description.

It will be understood that the specific arrangement of conductors in the slots to form the windings above referred to can follow the arrangements conventionally used in squirrel cage motors and, hence, is not believed to require detailed description.

Operation

In operation, when the switch 26 is actuated to energize the strips 22, 23 and 24, a moving magnetic field is produced in the gap between the field coil means 52 and the ferrous strip 53 and this produces eddy currents. The flanges 2 and 3 cut the flux in this gap so that there is produced a further magnetic field. The interaction of the two magnetic fields as set forth in said reissue patent above mentioned produces a force tending to move the master carrier with respect to the track, which force is reversible by actuation of the switch 26 described above, so that the master carrier alternatively can move in opposite directions along the track.

The anti-friction characteristics of the block 8 and the block 32 minimize friction therebetween. If desired, rollers can also be used for this purpose.

While the motor will operate successfully by reason of the eddy currents developed in the flanges 2 and 3, a stronger force is created if there are slots provided in the flanges 2 and 3. These may take any of many forms, such as slots 61 therein as shown in FIGURE 6, such slots also being conventional in the armatures of rotative induction motors.

It will be recognized that there are many ways in which the windings can be arranged with respect to the pole faces. Insofar as is now known, any field winding arrangement familiar and effective in connection with rotative induction motors is suitable. It will also be recognized that the strip 53 can be omitted if desired but that its use appreciably strengthens the motor by reducing the reluctance of the magnetic path.

Modified constructions of FIGURES 8-10

The embodiment shown in FIGURES 8 and 9 illustrates a modified traverse rod assembly 80 having a modified track 81 and a modified master carrier 82. The track 81 is similar in cross section to the track 1 shown in FIGURES 2 and 3 and can also be made by an extrusion process. That is, it is generally C-shaped having a down-

wardly opening slot 83. More particularly, the track 81 comprises a top wall 84 and a pair of depending side walls 86 and 87 which are parallel to the axis of said track. A rearwardly extending flange 88 at the junction of the front wall 86 and the top wall 84 extends above and parallel with the top wall 84. The rearward end of said flange is spaced forwardly of the rear end of said top wall. The rear edge of the top wall 84 is raised slightly above the plane of said top wall as indicated at 91. The rearward edge of the flange 91 lies approximately in the same plane as the rearward wall 87.

The junction of the rear wall 87 and the top wall 84 comprises a slot 89 extending the full length of the track as well as extending forwardly of said rear wall 87 parallel to the top wall 84 and spaced downwardly therefrom. The upper side of the slot 89 at the rearward end thereof comprises a notch 93, the purpose of which will be later explained. The inner end of the slot 89 comprises a channel 94 running parallel with the rear wall 87. The front wall 86 comprises a channel 96 extending the full length of the track and having a pair of spaced-apart flanges 97 and 98 extending inwardly toward each other defining an opening 99. A body of insulating material 101 is held in the channel 96 by the flanges 97 and 98. The insulation 101 comprises a plurality of grooves 105, 106 and 107. Each of the grooves houses an electrical conductor. That is, groove 105 houses conductor 108; groove 106 houses conductor 109; and groove 107 houses conductor 110. Each of the conductors is held in its respective groove by any convenient means such as epoxy or the like.

The lower end of the front wall 86 comprises an upwardly extending slot 112 having a generally cylindrical shape at its upper end. The slot 112 holds a plurality of curtain support carriers 113 which in this embodiment have a spherical upper end 114 which is received by the cylindrical upper end of said slot. The carriers 113 are preferably made of a self-lubricating plastic material, such as nylon, so that the spherical ends on the carriers 113 will permit said carriers to slide freely along said slot with a minimum of friction. The lower end of the curtain support carrier comprises a female portion of a snap fastener 111. A strip of tape 115 having male snap fasteners 118 spaced therealong is sewn to upper portion of the drapery fabric 125. The snap fasteners 111 and 118 are fastened to each other thereby supporting said drapery on said traverse rod.

The lower inner edge of the front wall 86 and the lower inner edge of the rear wall 87 comprises inwardly extending flanges 116 and 117 integrally connected thereto and which are parallel to the top wall 84 and spaced apart at their innermost ends to define the slot 83.

The master carrier 82 is designed so that the main body 121 thereof rides inside the track 81. The master carrier 82 is preferably made of a plastic having a low-friction characteristic so that it may slide relatively freely along the track. In the particular embodiment illustrated in FIGURES 8 and 9, an extension 122 comprises a neck 123 thereof extending downwardly through the slot 83. The lower end of the neck 123 has a flange 124 extending perpendicularly forwardly away therefrom. The forward end of the flange 124 is secured to a curtain support carrier 113 by a rivet 119, or the like, so that the curtain support carrier 113 will move with the master carrier. A flange 126 extends rearwardly from the lower end of the neck 123 and extends rearwardly beyond the rear wall 87. The rearwardmost edge of the flange 126 has an upwardly extending wall 127 extending perpendicularly away therefrom. The wall 127 has a recess 128 which has an iron core 129 secured therein by a rivet 131 or the like.

A flange 132 extends perpendicularly forwardly away from the upper end of the wall 127 and comprises a hook having a depending nose 133. The flange 132 extends into the slot 89 so that the nose 133 is engageable with the rearward wall of the channel 94.

The main body 121 of the master carrier 82 further comprises a linear motor 136 essentially identical to the linear motor shown in the previous embodiment and it is believed that no further discussion of the details is required. The linear motor 136 is encased in the plastic material of the main body in much the same manner as was disclosed in regard to the encasement in FIGURES 2 and 3. However, the main body has a plurality of grooves, here three grooves 137, 138 and 139 (FIGURE 9) which house conductors 141, 142 and 143, respectively. The conductors are connected to the windings of the travelling field coils 144 of the linear motor 136 in the same manner as discussed hereinabove with respect to the linear motor illustrated in FIGURES 2 and 3.

A further modified traverse rod assembly 145 is illustrated in FIGURE 10. It utilizes the same traverse track 81 as was described relating to FIGURES 8 and 9 and it is believed that no further discussion of the details of this is required. However, the master carrier is different. The main body 148 of the master carrier 146 generally has the same shape as the main body 121 of the master carrier 82. However, the linear motor 136 is encased in the upstanding wall 147 outside the track 81. The iron core 129A is encased within the main body 148 on the inside of the track 81 and adjacent the rear wall thereof. The conductors 141A, 142A, and 143A are connected to the travelling field coils 144A of the linear motor 136A in the same manner as disclosed hereinabove with respect to the linear motors illustrated in FIGURES 2 and 3 and FIGURES 8 and 9.

The forward end of the flange 124A, in this embodiment, is placed between adjacent curtain support carriers 113A or the carriers 113A are placed in slots 120 in the flange 124A as illustrated in FIGURE 8 by dotted lines. Thus, certain ones of the carriers 113A will be moved with the master carrier to open or close the drapes.

Operation

When the switch 26 is actuated to energize the conductors 141, 142 and 143 of FIGURES 8 and 9, a moving magnetic field is produced in the gap between the field coil means 144 and the iron core 129 to produce eddy currents in said rear wall. The rear wall 87 cuts the flux in this gap so that there is produced an interaction of the flux with the eddy currents to produce a force tending to move the master carrier with respect to the track, which force is reversible by actuation of the switch 26 described above, so that the master carrier alternatively can move in opposite directions along the track.

Essentially the same operation occurs in the device of FIGURE 10 and will be understood without further discussion.

Further modified constructions of FIGURES 11-16

Another modified traverse rod assembly 151 is illustrated in FIGURE 11. The track 152 is similar to the track 81 disclosed hereinabove with respect to FIGURES 8 and 9 except that the slots 89 has been omitted. That is, the intersection of the top wall 153 and the rear wall 154 comprises merely a downwardly inclined connecting member 156 interconnecting same.

A block of insulating material 157 is secured to the rear wall 154 and extends between the flange 117A and the top wall 153. The insulating material 157 houses a plurality of embedded conductors 158, 159 and 160. The insulating material 157 also contains a plurality of longitudinally extending slots 161, 162 and 163 which open to the embedded conductors 158, 159 and 160, respectively.

The master carrier 166, on the other hand, is constructed quite differently than the master carriers discussed hereinabove. The main body 167 comprises a linear motor 136 encased within a block of plastic material. The tongue-like power pick-up conductors 168, 169 and 170 are positioned on the rearward side of the carrier and are insertable into the grooves 161, 162 and 163, respectively.

and are engageable with the respective conductors 158, 159 and 160.

The extension 172 comprises a depending neck 173 extending down through the slot 174 and has at its lowermost end a forwardly extending flange 176 which is engageable with a curtain carrier 113.

The operation of this modified embodiment is similar to the embodiments discussed hereinabove. However, it has been found that by making the conductors 158, 159 and 160 wider than in the previous embodiments, they could be utilized also as forming the armature for the linear motor. Other than this basic difference, the operation of the traverse rod assembly 151 is the same as described hereinabove with respect to the other embodiments.

A further modified embodiment shown in FIGURES 12 and 13 illustrates a way in which a track 181 can be easily assembled. Generally, the track 181 is formed by placing the various parts on a flat sheet of metal 182, preferably steel, before bending the metal to form the structure illustrated in FIGURE 13. A plurality of conductors 184, 185 and 186 are secured to the sheet metal 182 and are insulated therefrom by insulation 187. The conductors are preferably equally spaced from each other and spaced from the right edge (FIGURE 12) of the sheet metal 182 a predesignated distance.

A strip of nonmagnetic sheet metal 191, preferably copper, is secured to the sheet metal 182 and is insulated therefrom by insulation 192. The metal strip 191 preferably has a width equal to the height or width of one of the walls on the track 181. That is, while it is recognized that the metal strip 191 can be secured to the sheet metal 182 on any wall, in this embodiment it is secured to the rear wall portion 195 of the track 181 and has a width equal to the height of said rear wall. A generally U-shaped strip 188 preferably made of a self-lubricating plastic material such as nylon, is secured by any convenient means such as epoxy or some welding to the underside of the metal sheet 182 adjacent one edge thereof. The strip 188 has a pair of depending walls 189 and 190 defining a downwardly opening slot 196 into which is received the upper ends of the curtain support carriers 113 when the track is assembled as discussed hereinbelow.

When the track 181 is assembled (FIGURE 13) it is generally C-shaped having a downwardly opening slot 197. More particularly, the track 181 comprises a top wall 193, a depending front wall 194 and a depending rear wall 195. The lower ends of the front wall 194 and rear wall 195 in this embodiment comprise flanges 198A and 190A which extend inwardly parallel to the top wall 193, the ends of which are spaced apart a distance defining the downwardly opening slot 197.

The master carrier 198 comprises a linear motor 136 (identical to the linear motor described hereinabove in connection with FIGURE 11) encased in a block of material 199 having low friction characteristics such as a self-lubricating plastic. One wall of the block 199 comprises a plurality of grooves 201, 202 and 203 which accommodate power pick-up conductors 204, 205 and 206, respectively. The grooves 201, 202 and 203 are spaced on the wall of the block 199 so that the conductors 184, 185 and 186 are received into said grooves and are engageable with said conductors therein. In this particular embodiment, the grooves 201, 202 and 203 are positioned on the front wall 207 of the block 199.

An extension 208, which is similar to the extension 172 illustrated in FIGURE 11, comprises a neck portion 209 depending from the main body through the slot 197. The lower end of the neck 209 has a forwardly extending flange 210 which is generally parallel to the top wall 193 of the track 181.

A further embodiment is illustrated in FIGURE 14 having a modified track 211 and master carrier 212 generally similar to that shown in FIGURE 13. The track 211 consists of sheet metal rolled into the shape illustrated.

The shape is generally similar to the track 152 described hereinabove with respect to FIGURE 11. More particularly, the track 211 comprises a top wall 213, a depending front wall 214 and a depending rear wall 215. The lower ends of the front and rear walls comprise inwardly extending flanges 216 and 217 which are spaced apart at their innermost ends to define a downwardly opening slot 218.

The front wall section 214 of the track 211 comprises a strip of insulating material 219 secured to the front wall by inwardly projecting flanges 222 and 223 to prevent relative movement of the insulating material 219. The insulating material 219 has a plurality of spaced-apart horizontal grooves 226, 227 and 228 therein adapted to receive conductors 229, 230 and 231 which are adhesively secured therein.

The master carrier 212 comprises a linear motor 136 (identical to the linear motor described hereinabove) enclosed in a block of material 233 having low friction characteristics, such as a self-lubricating plastic.

One wall of the block 233 comprises a plurality of grooves 234, 235 and 236 housing power pick-up conductors 237, 238 and 239, respectively. The grooves in this embodiment are positioned on the front wall 241 of the block 233 so that the conductors 229, 230 and 231 are engageable with the power pick-up conductors 237, 238 and 239.

The extension 246 comprises a depending neck portion 247 and frontwardly extending flange 248. The forwardmost end of the flange is secured to a curtain support carrier 113 by a rivet 249 to serve the same purpose as the securement shown in FIGURE 9.

FIGURE 15 is generally similar to FIGURE 14 excepting to indicate a manner in which the flange 216 may be omitted if such is desired for any reason, such as to shorten the span of arm 248. The numerals are the same as those in FIGURE 14 with the subscript "A" added to indicate identical parts as those of FIGURE 14 and need no further description. Here, however, flange 222A is moved leftwardly as compared to flange 222 to provide a channel 252. A flange 253 projects thereinto from the block 233A to support the leftward side of the block 233A, so that the flange 216 may be omitted and the arm 248 thereby shortened.

A similar arrangement of channel 252 and flange 253 may be provided on the other side of the rod 211A and block 233A if it is desired as to save material and to permit removal of the flange 217 of FIGURE 14. It is recognized that the two flanges may be replaced by a pair of rollers riding on a surface of each of the channels so as to eliminate sliding friction.

Similarly, the shoulder 164 of FIGURE 11 may be utilized to support the block 167 thereof so that the flange 116A may be omitted.

FIGURE 16 is generally similar to FIGURE 13 except that the slot 197A is moved leftwardly so that it is closer to the front of the traverse rod.

A curtain support carrier 254 is secured to one end of the master carrier 198A by an L-shaped bracket 256 and a rivet 257. The curtain support carrier 254 is rotatable about the axis of the rivet. The lower portion of the carrier is provided with an opening 258 into which is received a hook 259 fastened to the curtain 260 by any of a number of convenient ways.

Although it has been assumed in the above description that A.C. current is being used, it is fully realized that a D.C. source could be used by proper manipulation thereof to provide the desired moving magnetic field.

Although several embodiments of the invention have been disclosed above in detail for illustrative purposes, it will be recognized that still further variations or modifications of such disclosure, which lie within the scope of the appended claims, are fully contemplated.

The embodiments of the invention in which an exclu-

sive property or privilege is claimed are defined as follows:

1. A traverse rod assembly for supporting a movable window covering panel for longitudinal traversing movement, the combination comprising:

an elongated guide means guiding and supporting said panel;

reaction means extending along said guide means and fixed with respect thereto;

a power unit for moving said movable panel longitudinally with respect to said guide means, said unit having field means for generating a moving magnetic field reactive with respect to said reaction means for urging a mechanical motion of said unit with respect to said guide means.

2. The apparatus defined in claim 1, wherein said guide means includes a traverse rod provided with conductors for supplying electrical power to energize said power unit.

3. The apparatus defined in claim 2, wherein said conductors constitute said reaction means and are arranged in the flux path of said magnetic field generated by said power unit.

4. The device defined in claim 1, including a plurality of slideable hangers for supporting said panel and a slideway within said guide means for supporting said hangers; means projecting from said power unit and arranged for transmitting mechanical motion from said power unit to at least one of said hangers and said panels.

5. The device defined in claim 1, including also a plurality of slideable hangers for supporting said movable panel and a slideway adjacent the forward lower edge of said guide means for receiving said hangers slideably thereinto by which said hanger are slideably supported by and from said guide means;

means projecting from said power unit to a location rearwardly of said slideway; and further means projecting thence forwardly through the plane defined by said suspended hangers.

6. In a traverse rod assembly for supporting a movable window covering panel for longitudinally traversing movement on and with respect to said rod assembly, the combination comprising:

an electrically conductive traverse track;

a master carrier arranged for longitudinal movement with respect to said track and having field coil means disposed in inductive relationship with said track; conductors extending lengthwise of said rod and insulated therefrom; and

pick-up means on said master carrier slideably contacting said conductors for energizing said field coil means upon energizing of said conductors for traversing said master carrier along said track in response to said inductive relationship therebetween.

7. In a traverse rod assembly having at least one master carrier longitudinally traversable on and with respect to said rod assembly, the combination comprising:

an electrically conductive traverse track, the same having flange means defining a slot;

a master carrier arranged on said flange means for longitudinal sliding movement therealong with respect to said track and having field coil means disposed in inductive relationship with said flange means, said flange means constituting the armature of a linear motor including said field coil means;

conductors extending lengthwise of said rod and insulated therefrom; and

pick-up means on said master carrier slideably contacting said conductors for energizing said field coil means upon energizing of said conductors for traversing said master carrier along said track in response to said inductive relationship therebetween.

8. The apparatus defined in claim 6, including a layer of nonconductive material within said rod for supporting said conductors.

9. The apparatus defined in claim 8, in which said non-

conductive material has a plurality of longitudinally arranged recesses for the reception of said conductors.

10. An apparatus as defined in claim 6, wherein said rod has an upwardly facing support surface means for supporting said master carrier and an opening through which said master carrier extends outwardly from said rod, said master carrier being supported on said surface means for sliding movement therealong.

11. The device defined in claim 6, wherein said conductors are all arranged on one side of said master carrier and are of sufficient width to comprise also reactive means for cooperating with said field coil means.

12. The apparatus defined in claim 7, wherein said master carrier has a portion arranged below said flange means in which said field coil means are received, a portion arranged above said flange means for riding thereon and neck means extending through said slot and connecting said upper and lower portions.

13. The apparatus defined in claim 12, wherein said upper portion has a quantity of ferrous material arranged in the flux path of the field coil means in said lower portion.

14. An assembly for supporting a movable panel for longitudinal traversing movement, the combination comprising:

an elongated traverse track including guide means guiding and supporting said panel;

a plurality of reaction means extending along said guide means electrically insulated from each other and from said guide means and fixed with respect to said guide means;

a power unit for moving said movable panel longitudinally with respect to said guide means, said unit having means for generating a moving magnetic field reactive with respect to said reaction means for urging a mechanical motion of said unit with respect to said guide means;

means conducting electrical potential from at least two of said reaction means to said field means for energizing same when an electrical potential is applied across said two reaction means.

15. A traverse rod assembly having at least one power unit longitudinally traversable on and with respect to said rod assembly, the combination comprising:

a traverse track having first and second longitudinal walls and at least one upwardly facing surface for slideably supporting said power unit;

a plurality of electrical conductors carried by said first wall, said conductors being insulated from each other and from said wall;

a strip of nonmagnetic, electrically conductive, material fixed to and extending along such length of said second wall as is traversed by said power unit and constituting reaction means;

a power unit arranged for slideable reception within said traverse track and support therein on said upwardly facing surface, said power unit having field means therein for generating a moving magnetic field reactive with respect to said reaction means for urging a mechanical motion of said unit with respect to said traverse track; and

means operatively associating said power unit with said panels for effective movement thereof along said traverse track in response to movement of said power unit along said traverse track.

16. A device defined in claim 15, wherein said upwardly facing surface is provided by at least one flange extending from the lower end of one of said walls underneath said power unit for slideably supporting same.

17. A device defined in claim 15, wherein said upwardly facing surface is provided by a recess in a wall of said traverse track and said power unit includes a flange projecting into said recess.

18. In a traverse rod assembly for supporting a movable window covering panel for longitudinal traversing

movement on and with respect to said rod assembly, the combination comprising:

an elongated traverse track having nonmagnetic, electrically conductive wall means;

a power unit for said movable panel arranged for longitudinal movement with respect to said track and having linear motor stator means having gap means across which a moving magnetic field is created upon energization of said linear motor stator means, said wall means being disposed in said gap means and being responsive to said moving magnetic field for urging said power unit longitudinally of said track; conductive means for energizing said linear motor stator means for traversing said power unit along said track.

19. A traverse rod assembly according to claim 18, in which said linear motor stator means comprises field coil means on one side of said wall means and ferromagnetic material on the opposite side of said wall means.

20. An assembly for supporting a movable panel for longitudinal traversing movement, the combination comprising:

an elongated traverse track having nonmagnetic, electrically conductive, wall means, said track being hollow and having means defining a longitudinally extending slot;

a power unit for said movable panel arranged for longitudinal movement with respect to said track and having stator means for a linear motor including gap means across which a moving magnetic field is created upon energization of said stator means, said stator means including field coil means and a quantity of ferromagnetic material, one thereof being disposed within said track and the other thereof being disposed outside of said track and said stator means further including an insulating connection between said field coil means and said ferromagnetic material, said connection extending through said slot;

said wall means disposed in said gap means and providing reaction means for said moving magnetic field whereby same will urge said power unit longitudinally of said track;

conductive means for energizing said stator means for traversing said power unit along said track.

21. An assembly according to claim 20, in which said ferromagnetic material is located within said track.

22. A traverse rod assembly according to claim 19, in which said ferromagnetic material has a form of an elongated straight strip which is of substantially the same length as and is laterally aligned with said field coil means.

23. A traverse rod assembly according to claim 22, including means for insulating said ferromagnetic material and said field coil means from contact with said wall means.

24. An assembly according to claim 20, in which said conductive means includes a plurality of elongated spaced-apart conductor strips disposed within said track and insulated from said track, said ferromagnetic material and each other, said power unit having pick-up means for slideably engaging said strips and conductors connecting said pick-up means to said field coil means.

25. In a traverse rod assembly for supporting a movable window covering panel for longitudinal traversing movement on and with respect to said rod assembly, the combination comprising:

an elongated traverse track having nonmagnetic electrically conductive wall means;

a motor for said movable panel arranged for longitudinal movement with respect to said track, said motor having means for generating a moving magnetic field across an elongated air gap upon energization from an alternating current source, said wall means extending into said air gap for reacting with said magnetic field to move said motor along said track.

(References on following page)

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References Cited

UNITED STATES PATENTS

1,881,014	10/1932	Ayers	310—12
1,881,016	10/1932	Rose	49—358 X
1,950,611	3/1934	Hedley et al.	49—358 X

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3,003,552	10/1961	Eilenberger	160—331
3,136,358	6/1964	Madsen	160—331
3,204,170	8/1965	Monks	49—358

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