April 22, 1941. A. V. ROWE ET AL 2,239,273

OVERHEAD DOOR STRUCTURE

Filed Sept. 16, 1938 3 Sheets-Sheet 1

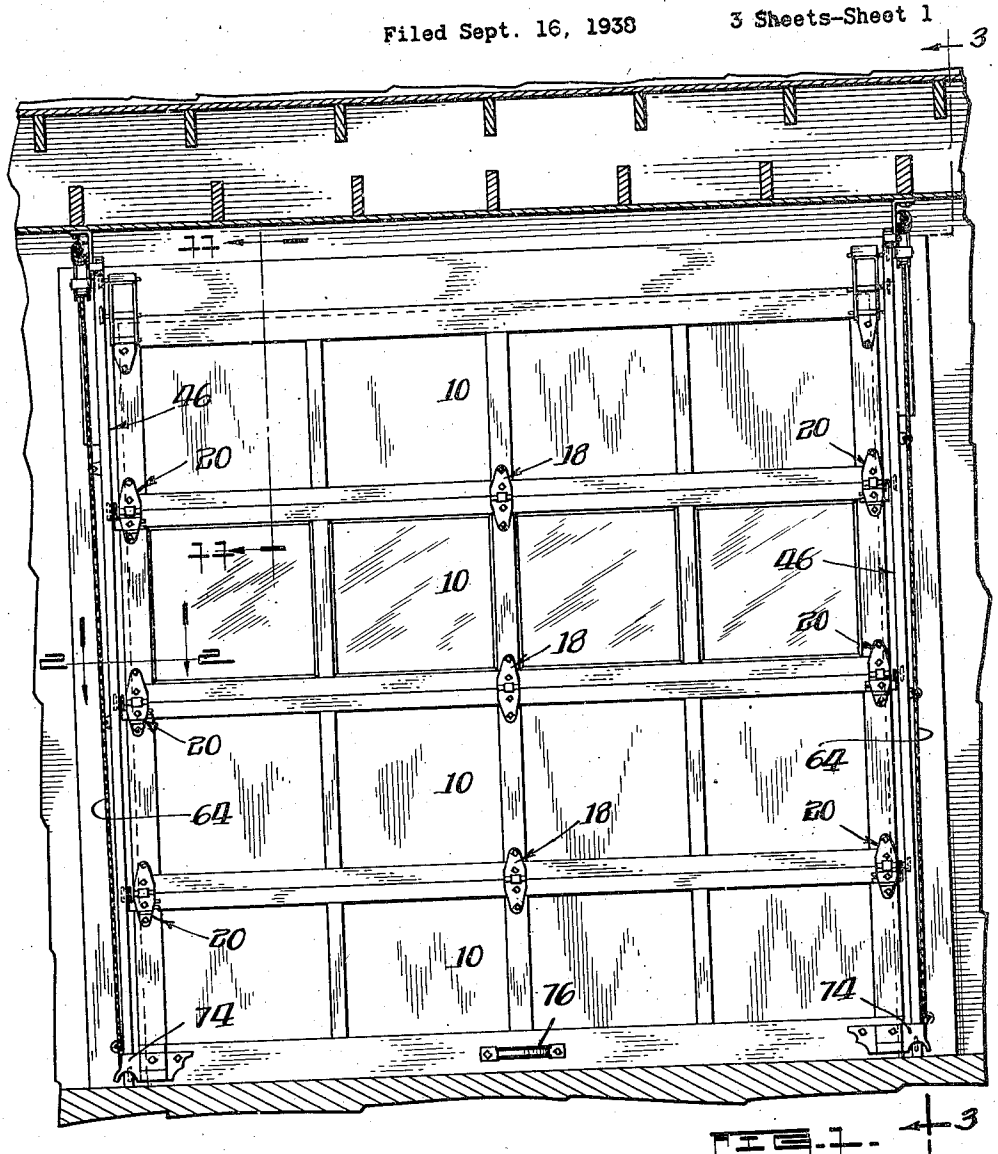


FIG. 1.

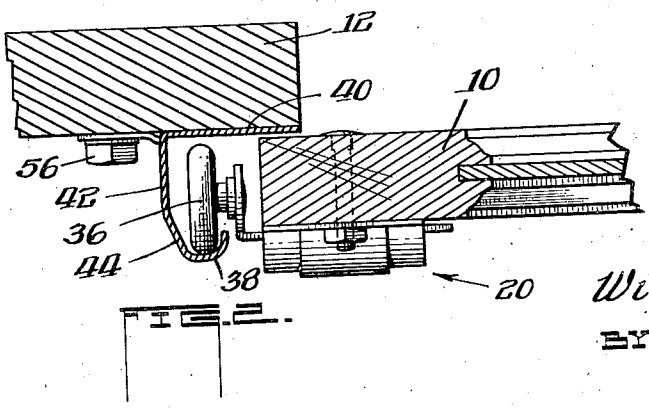


FIG. 2.

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OVERHEAD DOOR STRUCTURE

Filed Sept. 16, 1938 3 Sheets-Sheet 2

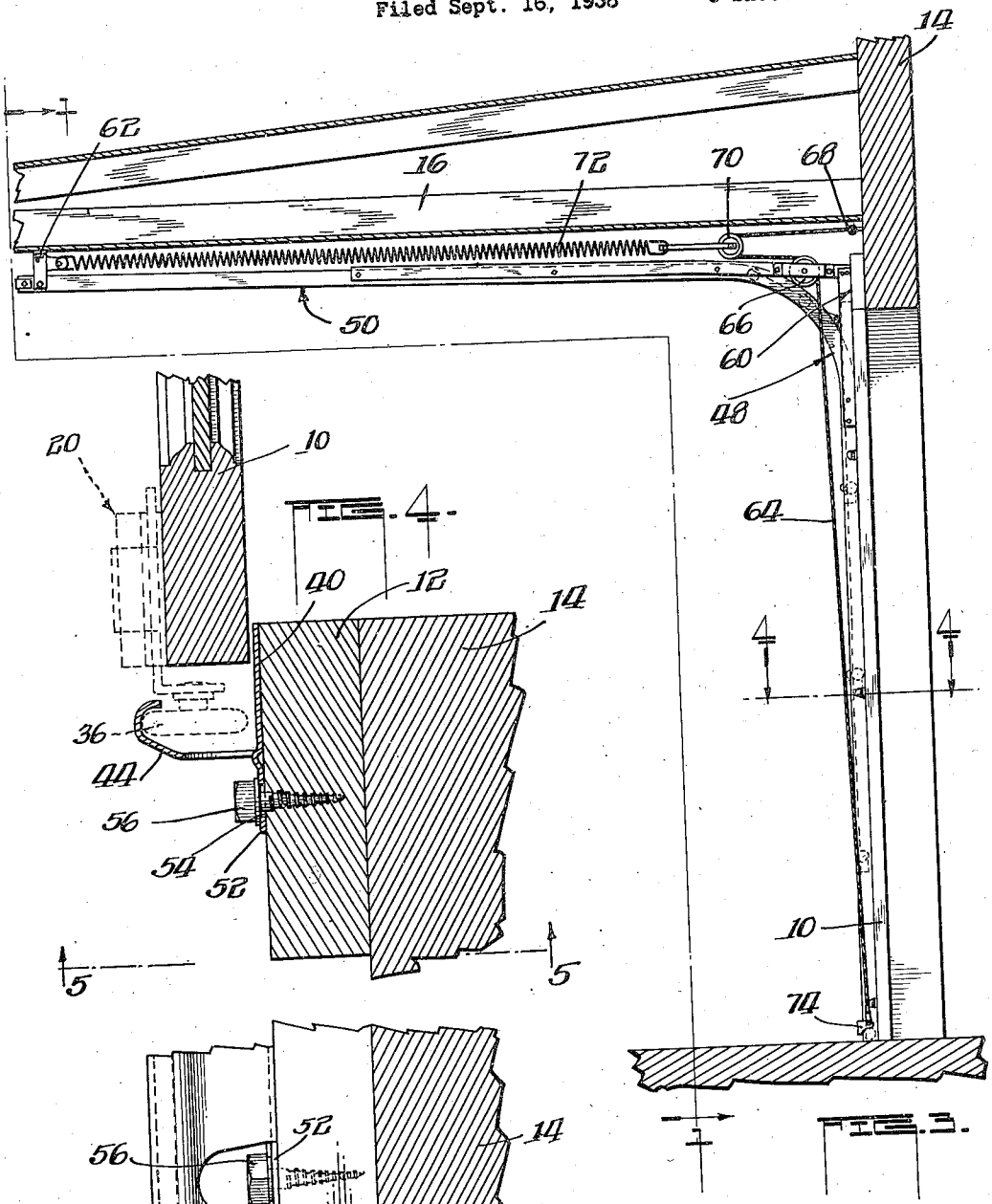


FIG. 3.

FIG. 4.

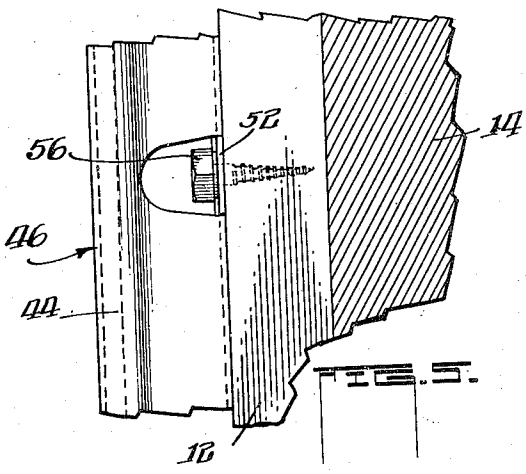


FIG. 5.

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OVERHEAD DOOR STRUCTURE

Filed Sept. 16, 1938 3 Sheets-Sheet 3

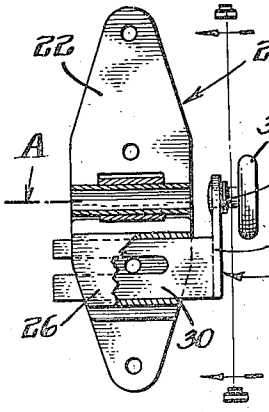


FIG. 7.

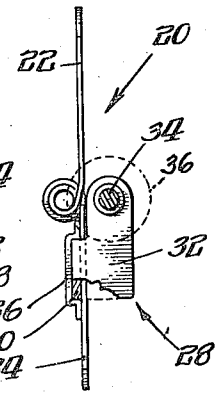


FIG. 8.

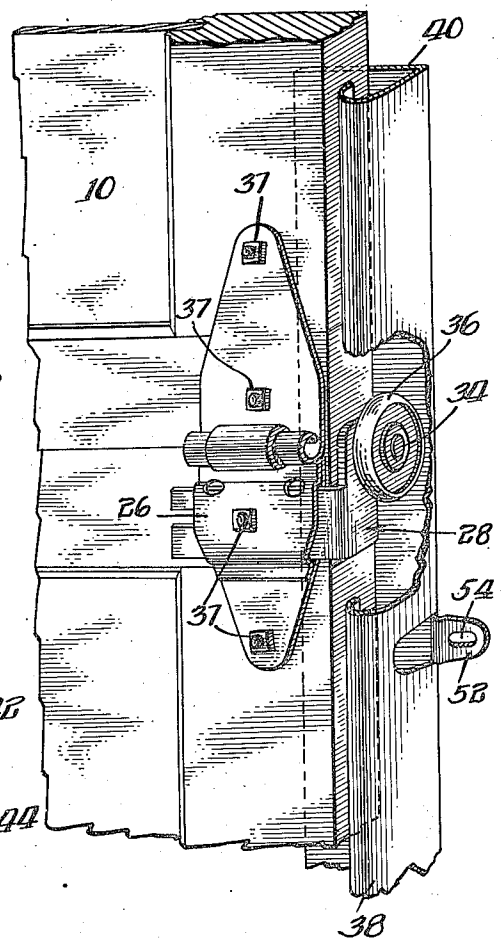


FIG. 6.

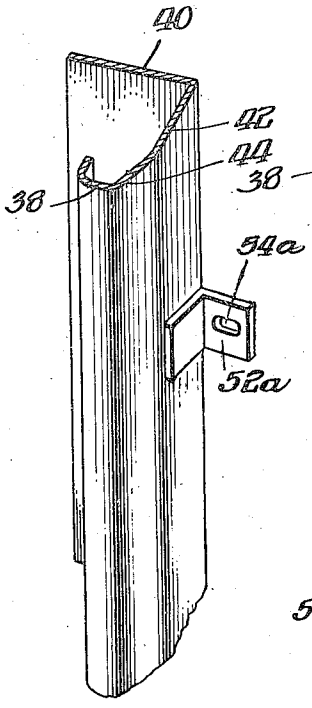


FIG. 9.

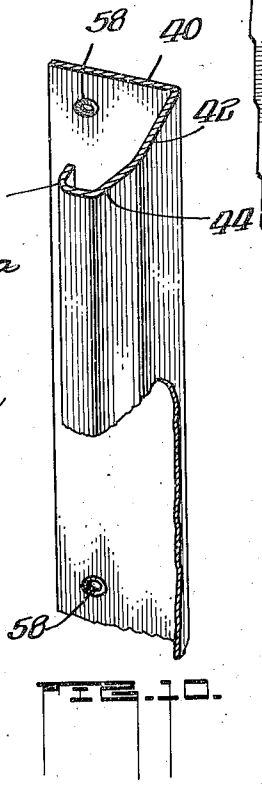


FIG. 10.

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2,239,273

UNITED STATES PATENT OFFICE

2,239,273

OVERHEAD DOOR STRUCTURE

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Application September 16, 1938, Serial No. 230,233

7 Claims. (Cl. 16—97)

The present invention relates to an overhead door of the type used on garages and warehouses, wherein the door comprises a plurality of panels shiftable from door covering position to an overhead, angularly displaced horizontal position.

The present invention more specifically relates to an overhead door supported and guided through the agency of rollers and tracks, and contemplates the provision of a self-adjusting pintle support capable of rendering the guide roller self-conformable to any irregularities in the track sections. It is important and desirable in structures of this type to provide door panels which in closed position reside in proper fitting relationship with the door jamb, but since sections of the guide track are curved or otherwise angularly offset, there is a tendency for binding of the door panels and/or the guide means when the door structure is shifted between open and closed position. So, also, allowance must necessarily be made for expansion and contraction of the door and the jamb since in most instances important parts thereof are formed of material susceptible to variation under the influence of weather conditions.

It is an object of the present invention to obviate the above difficulties by providing a door structure, as above, comprising hinged panels or sections, and wherein the pintle or roller axis is arranged in close proximity to the hinge axis.

A further object of the present invention is to provide a door structure, as above, having a roller supporting pintle freely shiftable axially of the hinge axis, but wherein the pintle is arranged substantially in the central plane of the adjacent panel or door section, whereby to promote freedom of operation of the door in the track while assuring perfect engagement with the door jambs in closed position.

The present invention, according to another specific aspect thereof, contemplates the provision of an integral or one-piece cooperative door supporting guideway or track which further presents an extended flat surface adapted for mounting directly upon the door frame.

According to one known construction method the guideways or trackways have been secured to the door frame or door jamb in such fashion that they are displaced relatively to the plane of the jamb. Such a spaced or offset mounting of a structural supporting member necessarily results in a sacrifice of rigidity, firmness, and strength. Such a result, for example, may occur when the track is spaced inwardly of the jamb by means of mounting brackets.

It is accordingly another object of the present invention to provide a door and track or rail structure, as above, wherein one section of the track is adapted to be engaged by a guide roller and an integral flange or track mounting section extending from the roller guiding portion facilitates mounting said track structure directly upon the door frame or flatwise against the supporting or jamb portions of the doorway for direct support thereby to provide a firm, compact door mounting which may be readily assembled.

An additional object of the present invention is to provide a door supporting track, as above, which may be formed of sheet metal for eliminating swelling or shrinkage of the door contacting portions of the jamb.

Yet another object of the present invention is to provide a door and guide track or rail, as above, wherein a roller guiding portion of the track, arranged in the plane of the door jamb, is extended for providing a track mounting, in which structure the roller pintles are shifted inwardly toward the central plane of the adjacent door panel to facilitate operation of the door panels.

Another object of the present invention is to provide a compact door guiding structure wherein guiding rollers and a guide track are alined along the central plane of the door panels and wherein door supporting means is cooperatively arranged so that its upward pull is exerted substantially in the same plane, whereby the normal holding and shifting stresses are generally resolved in the direction of the center line of the door section to obviate the creation of stresses tending to angularly shift the door into a position to create additional side friction.

Yet an additional object of the present invention is to provide a track, as above, having a roller engaging portion comprising an extended base portion, as above, in which struck-out sections are provided and formed into the plane of the base section for securement to a supporting frame.

Yet other and further objects and advantages of the invention will become apparent during the progress of the following specification, when taken in connection with the accompanying drawings, wherein:

Fig. 1 is a rear elevation of a garage door embodying the present invention, the door being shown in operative position with respect to a supporting wall;

Fig. 2 is a detail sectional view taken on the line 2—2 in Fig. 1;

Fig. 3 is a sectional view taken on the line 3—3 in Fig. 1;

Fig. 4 is a sectional detail view taken on the line 4—4 in Fig. 3;

Fig. 5 is a view taken on the line 5—5 of Fig. 4;

Fig. 6 is a perspective view showing the hinge roller and track structure adjacent one side of the door, portions of the track being broken away to show the internal roller structure;

Fig. 7 is a front elevation of the combined hinge and roller assembly used in accordance with the present invention, portions being broken away to show the interior structure;

Fig. 8 is a sectional view taken on the line 8—8 in Fig. 7;

Fig. 9 is a perspective view of a portion of the guideway or track, showing also an alternative mounting means;

Fig. 10 is a perspective view of an alternative preferred form of guideway or track.

Referring to the figures of the drawings, wherein the present invention is disclosed more in detail, Figs. 1 and 2 illustrate one preferred form of structure embodying the features of the present invention. The illustrated doorway comprises four panels 10 mounted in operative relationship to a doorway or door frame 12 formed in the front wall 14 of a garage or similar structure, and provided with a roof and ceiling structure 16. It is to be noted that each of the four door sections or panels 10 span the door opening and interiorly overlap the door frame 12 a short distance. The panels are, moreover, relatively pivoted or articulated by means of the plurality of hinges 18 and 20 on the interior surface thereof.

As shown more clearly in Figs. 2, 4 and 6 to 8, inclusive, the hinges adjacent the marginal side edges of the door are so constructed that they each mount a guide roller means for cooperating with the guideway or guide track. More specifically the hinges 20 comprise upper and lower sections 22 and 24, respectively, which are relatively pivotal about the central axis A. The lower portion 24 of the hinge is provided with a guideway 26, parallel with the axis of the hinge and slidably mounting a guide roller assembly 28. The portion of the guide roller assembly engaged by the guideway 26 comprises a bifurcated supporting plate 30 which at its right-hand end, as viewed in Fig. 7, is provided with an inwardly and upwardly extending flange 32, rigidly mounting adjacent its upper end a pintle 34 upon which is rotatably journalled a roller 36.

Attention is particularly directed to the fact that the axes of the hinge and the roller 36 are accordingly in the same horizontal plane when the parts are in normal, upright position, as shown. So, also, the combined hinge and roller assembly, when mounted in operative relationship upon the door panel by means of bolts 37, as shown in Figs. 1 and 6, provides an arrangement wherein this plane is substantially equal to the plane of the adjacent horizontal panel edges.

In accordance with this structure it will be obvious that the roller assembly is shiftable axially with respect to the hinge, to the end that the roller is self-conformable to abnormal irregularities in the adjacent track sections, and moreover, that the cooperative arrangement of the hinge and pintle at the corner of the panel reduces to a minimum any tendency of the door panels to become jammed or resist shifting between open and closed position.

The guideway or track sections shown in Figs. 1 to 6 comprise a curved, arcuate roller engaging portion 38 and a base portion 40, said portions being oppositely arranged to extend along either side of the rollers guided thereby, and being integrally joined by a web section 42. The web section 42 is generally flat, being provided adjacent the arcuate guide section 38 with a portion 44 which is slightly inclined when observed in cross-section (Figs. 2 and 4), so that the web 42 will at all times clear the roller and permit free anti-friction operation thereof in the guideway.

It is extremely important to note that the base portion 40 of the guideway is extended for a relatively great distance away from the web 42 and beyond the free end of the curved section 38 for the purpose of providing a track mounting section, as will hereinafter appear more in detail.

The guideway has sections 46 extending along adjacent sides of the doorway and joining at their upper ends with curved sections 48 which merge with the generally horizontal sections 50 adjacent the ceiling. It is the upstanding sections 46 with which the present invention is more particularly concerned, and these are provided with mounting or fastening tabs 52 which are bodily struck out of the web portion 42 of the guideways and formed into substantially the same plane as the base portions 40. The tabs are apertured as at 54 to receive lag bolts 56, or other suitable fastening means, engaging into the door frame 12.

In Figure 9 a modified mounting or fastening structure designated by the numeral 52*a* is shown. This constitutes an angle iron section, one flange of which is suitably secured as by means of welding to the outer surface of the web portion 42, the other flange being provided with an aperture 54*a* corresponding with the aperture 54 previously described.

It is contemplated, in accordance with the present invention, that the guide or track sections be formed of some suitable material such as sheet steel so as to be free from swelling, expansion, or distortion, such as eventually characterizes the wooden frames, jambs, and supporting members sometimes employed. That is to say, by virtue of the one-piece integral roller engaging and track supporting extension, all portions of the door contacting or supporting surfaces are constrained by a means which is insusceptible to deformation under the influence of seasonal or weather conditions. Moreover, it should be noted that the upstanding guide sections 46 are mounted flatwise against the door frame 12, wherefore they are firmly and rigidly secured in position and admit of securement in such a fashion that they will not become loosened or displaced in service.

An alternative preferred form of guide track is shown in Fig. 10, wherein the base portion 40 is provided with countersunk apertures 58 for receiving flat head fasteners, and it will be understood from this disclosure that the present invention contemplates the use of any suitable fasteners for mounting the guides, as shown, as well as any desired combination thereof. It will be apparent that a lag screw or any other suitable headed screw can be inserted in the apertures 58, in view of the fact that the presence of the screw head will not interfere with the movement of the rollers within the track struc-

ture. In other words, due to the integral extended track section, these apertures 58 are positioned to one side of the roller engaging portion of the track structure out of the path of movement of said rollers. Furthermore, by positioning the apertures 58, as shown, the screw heads may be readily reached by a turning tool such as a screw driver. This is a feature of construction which renders the improved track structure with its combined roller engaging and mounting sections extremely practical from the standpoint of installation, as well as utility.

The aforementioned curved and horizontal guide track sections 48 and 50 are secured to the upstanding sections 46 to provide a continuous guideway, and are mounted upon a supporting frame 60, as well as brackets 62 secured to the ceiling adjacent the rearward end of the track, as shown in Fig. 3. Means is provided for partially or fully counteracting the weight of the door and comprises a pair of supporting cables 64 passing over pulleys 66 mounted in the frame 60 and being secured at their upper ends to the wall 14, as at 68. Intermediate of the pulley 66 and the point of attachment 68, the cables pass about sheaves 70 engaged with the right-hand end of tension springs 72, the other ends of which are hooked about a suitable projection on the brackets 62. The lower ends of the cables extend to corner brackets 74 at the lower corners of the lowermost door sections 10. It should be noted that the corner brackets 74 comprise extensions flanged about the guides 46 and connected to the cables 64 at a point in vertical alinement with the several pintles 34.

It will be obvious from the above disclosure that the tension springs 72 normally exert a force upon the sheave 70 tending to draw it in the left-hand position, exerting a resultant upward force upon the cables 64. This force will be such as to counterbalance completely or partially the weight of the door, and greatly facilitates movement thereof to open and closed position. It will be further understood that when it is desired to open the door, a suitable handle, such as that indicated by the reference numeral 76, will be actuated upwardly to cause the door assembly to ride upwardly and rearwardly in the trackways provided therefor until in final open position the several door sections 10 will assume a position in substantial alinement with the generally horizontal track sections 50.

It is of great importance to note that in accordance with the present invention the counterbalancing forces exerted by the cables 64 are applied centrally with respect to the door panels and with the respective roller supporting pintles which are similarly mounted substantially in the central planes of their adjacent door panels. As a result of the cooperative arrangement of the aforementioned parts the counterbalancing forces applied to the door, as well as the incidental resisting and frictional forces, are all applied in substantially central alinement with the door when it is arranged across the doorway.

It has been found that the present improved structure results in elimination of unbalanced forces having a tendency to relatively cant or twist the door sections and frictionally resist or prevent ready movement of the door in its tracks.

The present invention, moreover, provides a door structure of the overhead type which may be readily applied to any door frame or jamb and requires no special equipment or ability to result in a smooth functioning door. The present invention eliminates the necessity for employing auxiliary track brackets, or specially configurated supporting means, while at the same time providing a novel and improved mounting for the track of great rigidity and permanence. So, also, warping or dimensional changes in the door jamb or frame necessarily are substantially completely eliminated with the use of an integral roller engaging and mounting section.

The present invention, moreover, provides a guiding structure which is of extreme compactness in that no portions thereof extend appreciably out of the bounding planes of the adjacent door sections, being all arranged so that it extends along the side edges of the door in closed position and not projecting rearwardly or forwardly thereof for any substantial distance. It is evident, therefore, that the present improved structure results in a door which may be equally efficiently and accurately fitted to the doorway to provide a free and smooth opening assembly which is permanent and reliable in operation.

The claims in the present application are directed more particularly to an overhead door structure. The subject matter of the track construction per se, as disclosed and claimed, forms the subject matter of the disclosure and claims of our copending application Serial No. 261,812, filed March 14, 1939, now Patent No. 2,196,903, Apr. 9, 1940, a division of the present application.

Changes may be made in the form, arrangement, and construction of the several parts without departing from the spirit or scope of the invention or sacrificing any of its attendant advantages, and the right is hereby reserved to make all such arrangements as fairly fall within the scope of the following claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A combined hinge and roller support device adapted to be used in an overhead door construction, including a plurality of door panels adapted to be hingedly connected along adjacent edges, a guide track for directing said panels between a substantially vertical door closing position and a substantially horizontal overhead open position, a pair of said combined hinge and roller support devices connecting adjacent panels on opposite sides thereof and carrying rollers adapted to roll in said guide track, said combined hinge and roller support device including a pair of hingedly connected plates secured to the rear surface of adjacent panels, and a roller supporting structure carried by one of said hinge plates, said roller supporting structure comprising a section traversing one of said hinge plates and a portion extending laterally with respect to the planes of the panels to provide a roller support for positioning the axis of the roller between the planes in which the front and rear door surfaces lie when said panels occupy their normal door closing position.

2. A combined hinge and roller support device adapted to be used in an overhead door construction, including a plurality of door panels adapted to be hingedly connected along adjacent edges, a guide track for directing said panels between a substantially vertical door closing position and a substantially horizontal overhead open position, a pair of said combined hinge and roller support devices connecting adjacent panels on opposite sides thereof and carrying roll-

ers adapted to roll in said guide track, said combined hinge and roller support device including a pair of hingedly connected plates secured to the rear surface of adjacent panels, and a roller supporting structure carried by one of said hinge plates, said roller supporting structure comprising a section traversing and slidably mounted upon one of said hinge plates and a portion extending laterally with respect to the planes of the panels to provide a roller support for positioning the axis of the roller between the planes in which the front and rear door surfaces lie when said panels occupy their normal door closing position.

3. A combined hinge and roller support device adapted to be used in an overhead door construction, including a plurality of door panels adapted to be hingedly connected along adjacent edges, a guide track for directing said panels between a substantially vertical door closing position and a substantially horizontal overhead open position, a pair of said combined hinge and roller support devices connecting adjacent panels on opposite sides thereof and carrying rollers adapted to roll in said guide track, said combined hinge and roller support device including a pair of hingedly connected plates secured to the rear surface of adjacent panels, and a roller supporting structure carried by one of said hinge plates, said roller supporting structure comprising a section traversing one of said hinge plates and a portion extending laterally with respect to the planes of the panels to provide a roller support for positioning the axis of the roller in substantial alignment with adjacent horizontal edges of said door panels and between the planes in which the front and rear door surfaces lie when said panels occupy their normal door closing position.

4. A combined hinge and roller support adapted for use in an overhead door construction including a pair of hingedly connected plates, each plate having one lateral side surface adapted to clampingly engage an adjacent side surface of a door panel for disposing a pair of door panels in adjacent hinged relationship, roller supporting means mounted on one of said plates at a point laterally spaced from the hinge axis and having a portion extending laterally therefrom and including means located outwardly beyond said clamping surface and supporting a roller in an axis laterally spaced from said hinge axis and approximately in a plane including said hinge axis and extending perpendicularly to said plate.

5. A combined hinge and roller support as defined in claim 4, wherein said roller supporting mounting means comprises means mounting said support on said one of said plates for movement relatively shiftably in an axial direction.

6. A combined hinge and roller supporting device as defined in claim 1, wherein said roller support is positioned substantially centrally between the planes in which the front and rear door surfaces lie when said panels occupy their normal door closing position.

7. A combined hinge and roller support as defined in claim 4 wherein said means located outwardly beyond the clamping surface supports said roller in an axis positioned between the planes in which the front and rear door surfaces lie when the door is in closed position.

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