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PATENTED MAR. 19, 1907.

C. METTERHAUSEN.
MECHANISM FOR OPERATING DOUBLE SLIDING DOORS.

APPLICATION FILED JULY 2, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

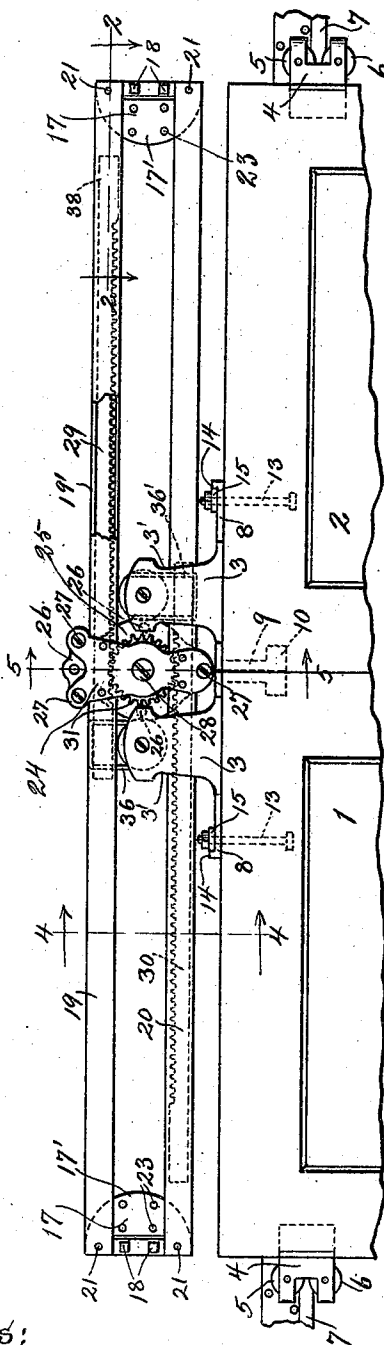
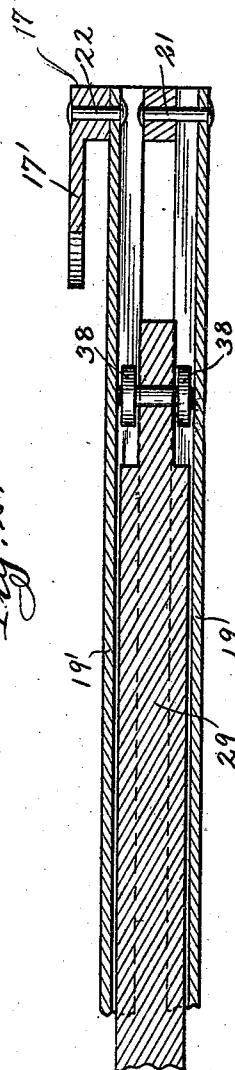


Fig. 2.



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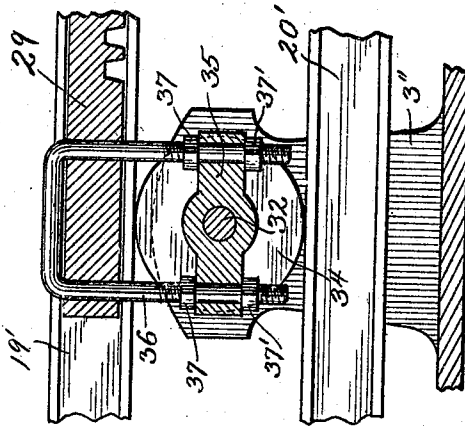


Fig. 6.

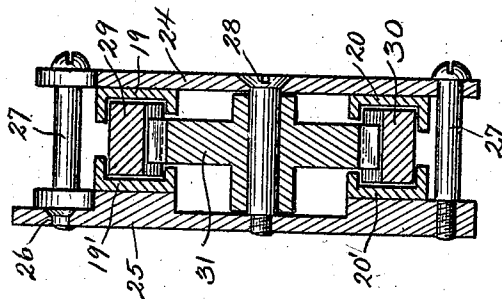


Fig. 5.

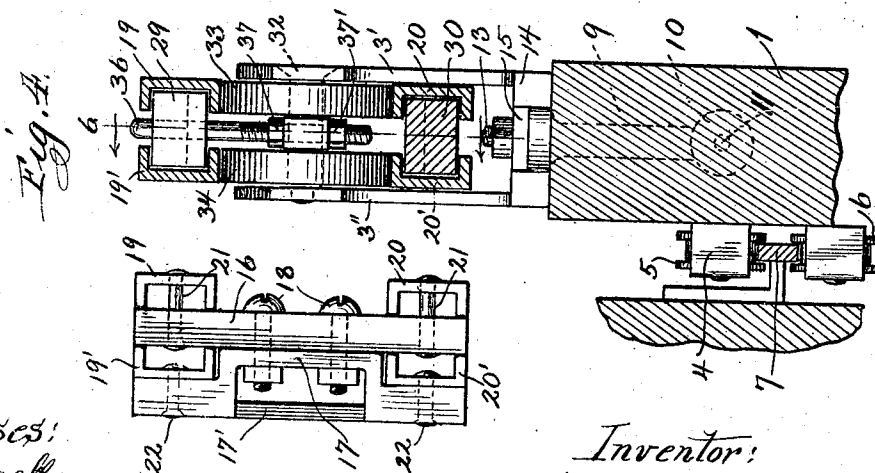


Fig. 4.

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Fig. 3.

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UNITED STATES PATENT OFFICE.

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MECHANISM FOR OPERATING DOUBLE SLIDING DOORS.

No. 847,488.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed July 2, 1906. Serial No. 324,318.

To all whom it may concern.

Be it known that I, CARL METTERHAUSEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Mechanism for Operating Double Sliding Doors, of which the following is a specification.

This invention relates to improvements in mechanism for operating double sliding doors, and relates more specifically to improvements in mechanism of that type in which the doors are operated reciprocally, a movement of either door serving to compel a corresponding movement of the other.

Among the salient objects of the present invention are to provide a mechanism characterized by simplicity of construction and corresponding economy of manufacture, to provide at the same time a mechanism in which the moving parts are movable upon each other with a minimum amount of friction, to provide a construction in which oscillatory movements of the doors in the direction of their own plane do not bring binding stresses upon the operating mechanism, in which the parts are so devised that after installation a part of the frame structure may be removed with great convenience, and thus afford access to the entire operating mechanism and allow removal of the same if necessary, in which structural-iron members of standard form may be used for tracks and guides, and in general to provide an improved construction of the character referred to.

To the above ends the invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims.

The invention will be readily understood from the following description, reference being had to the accompanying drawings, in which—

Figure 1 is a view showing in front elevation the upper portions of a pair of sliding doors equipped with my invention. Fig. 2 is a horizontal sectional view taken on line 2 2 of Fig. 1 and looking downwardly. Fig. 3 is an end elevation of the assembled mechanism. Fig. 4 is a transverse vertical sectional view taken on line 4 4 of Fig. 1 and looking in the direction of the arrows. Fig. 5 is a similar transverse vertical sectional view taken on line 5 5 of Fig. 1. Fig. 6 is a

longitudinal vertical sectional view taken on line 6 6 of Fig. 4 and looking in the direction of the arrows.

Referring to the drawings, 1 and 2, respectively, designate the doors, each of which has permanently secured thereto a bracket 3 at its inner upper corner, whereby it is connected with the overhead suspending and operating mechanism. Each door is also provided at its outer edge with a second rigidly-attached bracket 4, carrying a pair of guide-rollers, as 5 and 6, which cooperate with extension track-sections 7. Each bracket 3 comprises a strap-like base portion 8, which overlies the upper edge of the door, and a vertical portion 9, which terminates in an apertured stud 10, the parts 9 and 10 being mortised into the edge of the door, so as to lie flush with the edge surface of the latter. A securing-screw 11, inserted through the stud 10, holds this end of the bracket in position. The end of the base portion 8 remote from the edge of the door is bifurcated and a bolt 13 extended therethrough and through the end rail of the door, its head end terminating in the panel-groove of the rail. Upstanding shoulders 14 are provided on the end of the member 8, and a washer-plate 15 overlies said member and engages these shoulders, thus locking the bracket rigidly to the door.

Describing now the overhead frame and track structure, which, it will be understood, is mounted fixedly upon the car-framing above the doors, and referring more particularly to Fig. 3, 16 designates an end frame-bar, and 17 a supplementary frame bar or plate bolted to the member 16, as indicated at 18. The frame construction is alike at each end. To the outer or front faces of the end bars 16 are secured upper and lower inwardly-facing channel members 19 and 20, constituting guide-frame members, these being conveniently riveted to said end bars, as indicated at 21, and the channel-bars being arranged parallel with each other. The members 17 are at their upper and lower ends offset away from the bars 16, to which they are attached, and within the recesses formed by these offsets are secured inwardly-facing upper and lower channel-bars 19' and 20', respectively, constituting guide-frame members, these latter channels being arranged in horizontal register with the opposed channels 19 and 20, respectively. The part of the construction described is to make

the frame structure separable into front and back halves, the channels 19' and 20' being secured to the members 17, as indicated at 22, and the channels 19 and 20 secured to the members 16, as hereinbefore described.

In order to mount the structure upon the car-framing, the members 17 (see Fig. 1) are made wide in the direction of the length of the frame, the central web-like portions 17' thereof lying in the same plane as the upper and lower ends, so as to rest flat against the car-frame structure, to which they are secured by means of screws inserted through the apertures 23 thereof. At a point mid-length of the frame structure a pair of vertically-disposed front and back plate members is provided, designated 24 and 25, respectively, (see Figs. 1 and 5,) the back plate being provided with a series of apertures 26, whereby it may be secured to the car-frame, and the front and back plates being detachably united with each other by a plurality of screw-bolts 27 and an axis screw-bolt 28. The two front channels 19 and 20 and the two rear channels 19' and 20' are respectively riveted to the front and back plates 24 and 25. In each of the two ways thus formed between the upper pair of channels and lower pair of channels is mounted an operating rack, as 29 and 30, the upper rack being provided in its under face with rack-teeth and the lower rack in its upper face with corresponding teeth. Upon the journal-bolt 28 is mounted a gear 31, the periphery of which engages with the respective upper and lower racks in the usual manner.

An important feature of the present construction resides in the peculiar manner in which the respective racks 29 and 30 are connected with the corresponding upstanding arms 3' of the brackets 3. Describing this mechanism, and referring more particularly to Figs. 4 and 6, it will be seen that each bracket is provided with two integral upstanding arms—one at the front and one at the back—and through each pair of arms is extended a journal-screw 32, upon which are journaled rollers, as 33 and 34, which respectively traverse the upper edges of the lower channels 20 and 20' and are confined against substantial upward movement by the lower edges of the upper channels 19 and 19', respectively. Between each pair of supporting-rollers, upon the journal-bolt 32, is journaled a yoke-bar 35, to the ends of which are adjustably secured the corresponding ends of a U-bolt, as 36 and 36'. The adjustability mentioned is secured by passing the ends of each U-bolt through apertures in the yoke-bar and securing these ends in adjusted position by means of upper and lower lock-nuts, as 37 and 37'. The U-bolt 36 extends upwardly from the yoke-bar to which it is attached through the vertical openings between the upper pair of channels (see Fig. 4)

and through the corresponding end of the rack 29. In a similar manner the U-bolt 36' extends downwardly between the lower pair of channels and through the corresponding end of the lower rack 30. Obviously by means of the mechanism described the respective rack-bars are operatively connected with the bracket-arms and supporting-rollers in such manner as to provide perfect freedom of movement both vertically and endwise within their respective ways, notwithstanding the doors may be tilted or oscillated in their own planes out of parallelism with the racks. The pair of front and back arms 3' and 3'' of each bracket member are made to closely approach the outer face of the lower pair of channels and in this manner confine the respective brackets against substantial oscillation in a direction transverse to the plane of the doors, and therefore prevent the bringing of binding stresses upon the rack-bars. In order to still further facilitate the freedom of movement of the respective rack-bars, each is provided at its unattached end with a pair of antifriction-rollers 38, (see Fig. 2,) these rollers being mounted in rabbets formed in the end of each rack and journaled upon through-pins 38, with their lower peripheries extending slightly below the lower edges of their respective racks.

The operation of the apparatus constructed as described is entirely obvious and needs no description. To detach the doors from the overhead operating mechanism, it is only necessary to remove the screw-bolts 32. If then it is desired to remove the operating mechanism bodily, this can be done by simply removing the securing-screws 23 and 26, whereupon it can be bodily lifted up from between the pair of bracket-arms. In case it be only desired to obtain access to the mechanism without removing the frame structure this may be accomplished by removing the bolts 18 at each end, the screw-bolts 27, and the journal-bolt 28, whereupon the front half of the frame structure may be disengaged from the rear half, which is secured to the car-frame structure. It will be noted that in thus detaching the front half from the back part the channel members remain rigidly connected with the end bars and with the respective front and back center-plates, so that the frame structure is in no wise gotten out of adjustment by thus removing it and then replacing it.

It will be obvious that the details of construction may be modified without departing from the spirit of the invention.

I claim as my invention—

1. In a double-door-actuating mechanism, the combination with suitable transversely-disposed spacing-frame members, of a pair of channel-guide members spaced apart, arranged parallel, having their channels opposed or facing each other and their corre-

sponding edge faces in the same plane, a rack-bar confined and guided between said channel members, an operating-arm, one or more supporting-wheels mounted on said arm to traverse the edges of said channel members, operative connections between said rack and said wheel-supported operating-arm, and a transmission-gear operatively geared with said rack.

2. In a double-door-actuating mechanism, the combination with suitable transversely-disposed spacing-frame members, of two pairs of channel-guide members, the members of each pair being spaced apart, arranged parallel and with their channels facing each other and with their corresponding edge faces in the same plane, one pair of channels being spaced away from and substantially parallel with the other pair or channels, a rack-bar confined and guided between each of said pairs of channel members, operating-arms adapted to be connected with the respective doors and each carrying one or more supporting-wheels arranged to traverse the edge faces of one of said pairs of channels, operative connections between the respective operating-arms and corresponding rack-bars, and a transmission-gear intergeared with both of said rack-bars.

3. In a double-door-actuating mechanism, the combination of a front upper and front lower guide-frame member, a back upper and back lower guide-frame member, said upper and lower members being respectively arranged to register with each other, transverse spacing-frame members connecting said front members, other transverse spacing-frame members connecting said back members, means detachably connecting the front and rear halves of said frame structure, rack-bars mounted one upon the upper and another upon the lower pairs of frame members, an interposed transmission-gear intergeared with said rack members, and operative connections between the respective rack members and corresponding doors.

4. In a double-door-actuating mechanism, the combination with a pair of doors and an operating-arm connected with each, of a pair of parallel guide-frame members mounted to extend horizontally above the doors and having registering channels in their opposed faces and their proximate edges spaced uniformly apart, a rack-bar guided to reciprocate endwise between said guide-frame members, a supporting-roller operatively connected with one of said operating-arms and arranged to traverse said guide-frame members, and a connecting member pivotally mounted concentrically with the journal of said supporting-roller, extending thence through the slot-like opening between the proximate edges of the guide-frame members and operatively connected with said rack.

5. In a double-door-actuating mechanism,

the combination with a pair of doors and an operating-arm connected with each, of a pair of upper parallel guide-frame members mounted to extend horizontally above the doors and having registering channels in their opposed faces and their proximate edges spaced uniformly apart, a lower pair of parallel guide-frame members parallel with the upper pair of members and also having registering channels in their opposed faces and their proximate edges spaced uniformly apart, a rack-bar mounted to reciprocate endwise between each pair of guide-frame members, a supporting-roller journaled upon each of said operating-arms and arranged to traverse the upper edges of the lower pair of guide-frame members, a yoke connection pivoted upon each of said operating-arms, one of said yoke connections extending downwardly through the slot-like space between the lower pair of guide-frame members and operatively connected with the rack therein and the other yoke connection extending upwardly through the slot-like space between the upper pair of guide-frame members and operatively connected with the rack therein, and a transmission-gear journaled between the upper and lower pairs of guide-frame members and intergeared with the respective racks therein.

6. In a double-door-actuating mechanism, the combination with a pair of doors and an operating-arm connected with each, of a pair of upper parallel guide-frame members mounted to extend horizontally above the doors and having registering channels in their opposed faces and their proximate edges spaced uniformly apart, a lower pair of parallel guide-frame members parallel with the upper pair of members and also having registering channels in their opposed faces and their proximate edges spaced uniformly apart, a rack-bar mounted to reciprocate endwise between each pair of guide-frame members, a supporting-roller journaled upon each of said operating-arms and arranged to traverse the upper edges of the lower pair of guide-frame members, a yoke connection pivoted upon each of said operating-arms, said yoke connections each comprising a yoke-bar mounted upon the journal member of the supporting-arm, and a U-bolt adjustably connected with said yoke-bar and extending thence through the slot-like space between one pair of the guide-frame members and through apertures in the corresponding rack-bar, substantially as described.

7. In a mechanism of the character described, the combination with a guide-frame arranged to extend horizontally above the door and a reciprocatory rack-bar mounted to move endwise upon said frame, of an operating-arm connected with the upper part of the door and provided with duplex arms extending respectively in front and in rear

of said guide-frame, a journal-pin extending through said duplex arms, a pair of rollers journaled upon said pin and adapted to traverse the guide-frame, and a yoke connection mounted upon said pin between said rollers extending thence to and operatively connected with said rack-bar by means affording vertical movement of the rack-bar relatively to the yoke connection.

8. In a double-door-actuating mechanism, the combination of a front upper and front lower guide-frame member, a back upper and back lower guide-frame member, said upper and lower guide-frame members being respectively arranged to register with each other, transverse spacing-frame members connecting said several guide-frame members rigidly with each other, a rack-bar mounted to reciprocate upon said upper pair of guide-frame members, a rack-bar mounted to reciprocate upon said lower pair of guide-frame members, an interposed transmission-gear intergeared with both said rack-bars, and operative connections between the respective rack members and corresponding doors comprising actuating members extending vertically through the slot-like spaces between the respective opposed pair of guide-frame members, engaging the racks therein, and connected with the corresponding doors.

9. In a double-door-actuating mechanism, the combination of a front upper and front lower guide-frame member, a back upper and back lower guide-frame member, said upper and lower guide-frame members being respectively arranged to register with each other, transverse spacing-frame members connecting said several guide-frame members rigidly with each other, a rack-bar mounted to reciprocate upon said upper pair of guide-frame members, a rack-bar mounted to reciprocate upon said lower pair of guide-frame members, an interposed transmission-gear intergeared with both said rack-bars, and operative connections between the respective rack members and corresponding doors comprising operating-arms mounted upon the respective doors, rollers mounted upon said operating-arms and arranged to traverse the upper edges of the lower pair of guide-frame members and connecting members extending from said operating-arms vertically through the slot-like openings between the respective upper and lower pairs of guide-frame members and engaging the respective rack members therein.

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