J. P. GALLAGHER.

FLUSH CAR DOOR.

APPLICATION FILED AUG. 17, 1917. RENEWED OCT. 22, 1920.

1,375,689.

Patented Apr. 26, 1921.

3 SHEETS—SHEET 1.

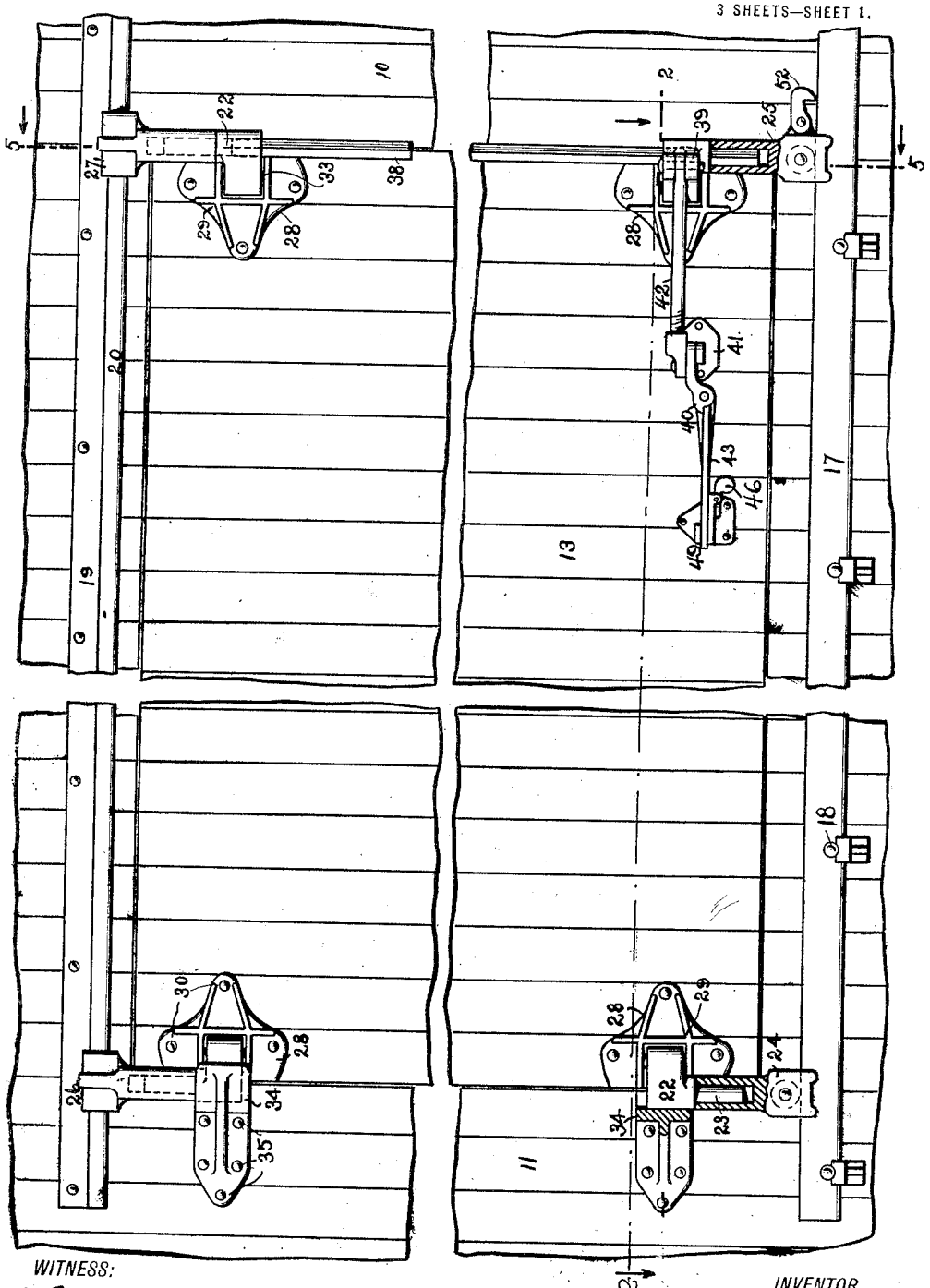


Fig. 1.

WITNESS:

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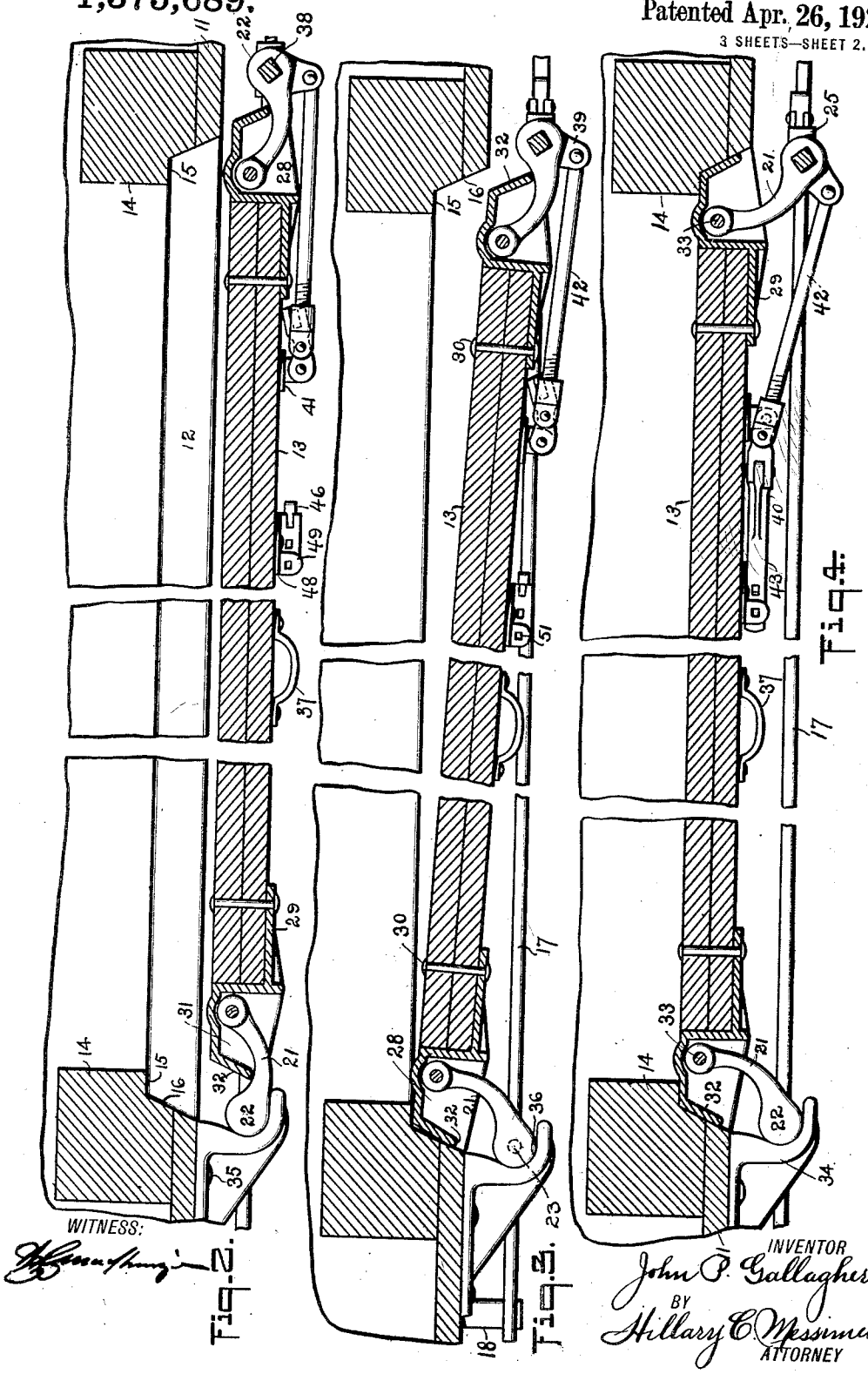
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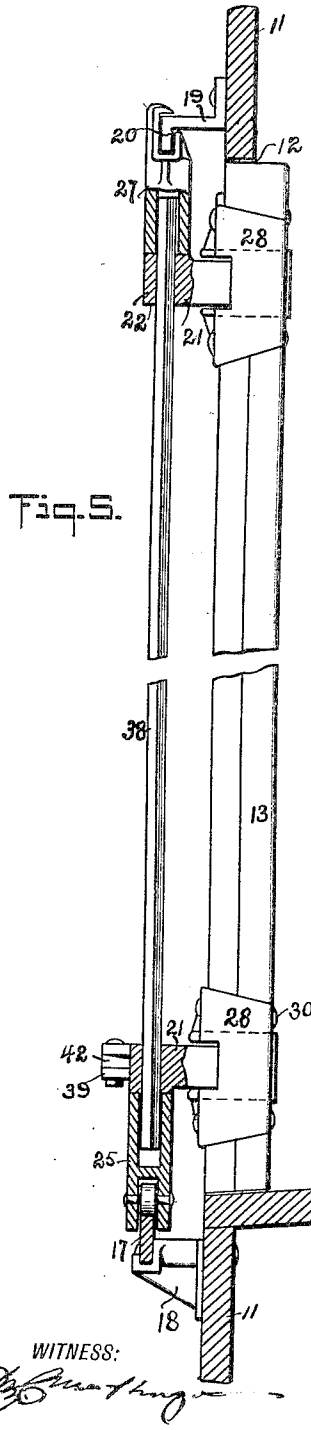


Fig. 5.

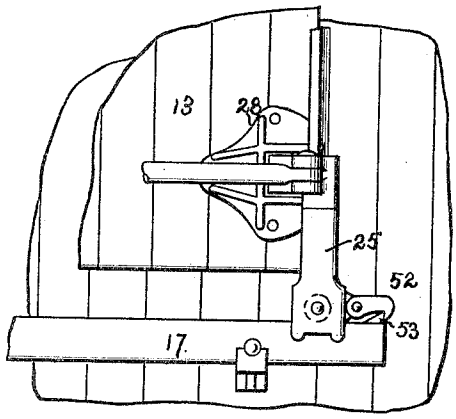


Fig. 6.

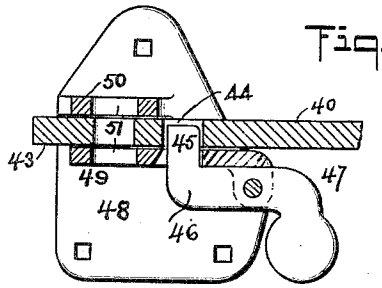


Fig. 2.

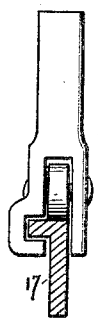


Fig. 8.

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UNITED STATES PATENT OFFICE.

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FLUSH CAR-DOOR.

1,375,689. Specification of Letters Patent. Patented Apr. 26, 1921.

Application filed August 17, 1917, Serial No. 186,678. Renewed October 22, 1920. Serial No. 418,772.

To all whom it may concern:

Be it known that I, JOHN P. GALLAGHER, a citizen of the United States, and resident of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Flush Car-Doors, of which the following is a specification.

My invention relates in general to an improvement in sliding door constructions and particularly relates to a mechanism for operating sliding car doors of the class in which the door is moved along a track from an inoperative position into position facing the door opening and is then swung transversely of the track and in a direction perpendicular to the plane of the opening, so as to position the door firmly within the door opening.

It is of primary importance with devices of this character that the door be moved into a firmly seated position in the opening and that this result be attained with the least possible effort on the part of the operator and with the least number of movements of the actuating mechanism and at the same time so that there will be insured an easy manipulation of the necessarily heavy door used in some form of heavy freight cars.

Accordingly, the primary object of the invention is to provide an improved type of door actuating mechanism of the class suggested which mechanism will insure a positive, secure and rapid closing of the door opening with the least expenditure of energy to effect such closing.

Incidental to this general object, further desideratums are to provide such a mechanism which, when applied to a railroad car, will fulfil the requirements of the Master Car Builders Association relative to safety features, which may be locked with any of the seals now in general use, and which will facilitate the application of manual power to the device in such a way that a high leverage effect can be utilized to insure the final forcing of the door onto its seat.

Another object of the invention, when the physical embodiment of the invention is considered structurally, is to form the several parts of the least possible amount of material necessary to take up the strains to which such a device is subjected, and at the same time to apportion this material so as to obtain the most effective distribution of the working strains.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawings and in part will be more fully set forth in the following particular description of one form of mechanism embodying my invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

Referring to the accompanying drawings:

Figure 1 is a side elevation of part of a box car side at the door opening showing a preferred embodiment of my invention with the door controlled thereby in closed position and with certain parts broken away to show the mounting of the lower hinge links;

Figs. 2, 3 and 4 are each horizontal, longitudinal sections taken on the line 2—2 of Fig. 1; Fig. 2 showing the door in the first of its closing positions with the forward trucks just touching the stops; Figs. 3 and 4 are succeeding positions; Fig. 3 showing the forward edge of the door in engagement with the post and Fig. 4 showing the door in its final, closed position;

Fig. 5 is a vertical sectional view taken on the line 5—5 of Fig. 1;

Fig. 6 is a detailed view in elevation of the rear end of the track showing a latch means for holding the door in open position;

Fig. 7 is an enlarged view partly in vertical section of a door fastening means shown in side elevation in Fig. 1; and

Fig. 8 is a detailed view showing a modified form of track and truck carried thereby.

In the following description and in the claims, parts will be identified by specific names for convenience of expression but they are intended to be as generic in their application to similar parts as the art will permit.

In the drawings there is shown a freight car side 10 including side sheathing 11 and provided with a door opening 12. There is also shown a sliding door 13 for closing the opening. This door is of conventional design but for the purpose of this disclosure is considered as of the heavy type usual on some form of grain freight cars. Opposite sides of the door opening are defined by heavy posts 14, the sides of which adjacent the door are recessed to provide outwardly

facing shoulders 15 coactively constituting a seat for the door when in closed position. Each post in advance of the shoulder is cut away to provide a door engaging beveled surface 16 inclined from the outer face of the post inwardly toward the shoulder. This beveled surface is continued in the device disclosed to include the front sheathing 11 as more particularly shown in Figs. 2 to 4 inclusive.

The door is proportioned and designed to be inset with a snug fit in the door opening and in engagement with its seat. For this purpose the opposite vertical edges of the door are beveled and the door is so designed that when the beveled edges are in engagement with the inclined surfaces 16 the door is contained entirely within the door opening with its outer face substantially flush with the outer face of the car side as shown in Figs. 4 and 5.

A supporting bottom rail 17 constitutes a track for the door while sliding from its inoperative position uncovering the door opening into its door closing position. The rail is mounted in spaced relation from the car side by means of rail rests 18 so that the deep door may be positioned the required distance in advance of the car side as shown in Fig. 2, so that it may move freely to and from its closed position. A top guiding rail 19 in the form of a Z-bar has one flange fixed to the car side and includes a vertically disposed depending flange 20 which is spaced from the car side and extends parallel to the bottom rail and across and above the door opening.

The door is swung between double hinged pivoting devices so arranged that the door may be moved transversely of the plane of the door opening so as to move the door from its sliding path defined by the track into the door opening. The pivoting devices are arranged one adjacent each corner of the door and vertically disposed in pairs adjacent opposite sides. As these pivoting devices are similar in construction, a detailed description of the common features of any one will be sufficient for all four of the devices.

Each of these pivoting devices includes a horizontally disposed hinge link 21, the forward end of which is enlarged to form a massive knuckle 22 which is pivotally mounted, by means of a vertically extending pin 23 in a journaling casting. The lower pairs of these castings 24 and 25 constitute roller trucks slidably mounted upon and straddling the bottom rail. The upper pair of these castings 26 and 27 constitute hangers slidably mounted upon the top rail 19, inclosing the flange 20 and depending therefrom, as shown in Fig. 5. The inner end of each of the links is pivoted to the door by means of a door engaging element 28 which includes a socketed member recessed into the door adjacent the top and bottom of each vertical edge. These members are similar in form and are preferably hollow castings having a three-eared webbed front face plate 29 extending across the face of the door from the adjacent edge and fastened to the door by means of through bolts 30 passed through the plate at the ears. The parts set into the door include a hollow box-like member 31 closed on all sides except the front side which opens through the front plate. The member 31 is of a depth to extend through the door and even a material distance beyond the rear face of the door. The outer side 32 outlining the free edge of the box is inclined to aline flush with the beveled side of the door and is designed to constitute a continuous surface and guard for the door edge. The side 32 coacts with the beveled edge of the door to constitute a pivotal bearing for engaging with the post in the final closing movement of the door, hereinafter more fully described. The link 21 is angled or rather curved about the side 32 so that, when the door is swung outward over the bottom rail, the bent portion of the link engages the stop formed by the forward edge of the side 32 as shown in Figs. 2 and 3 and this limits the outward or unseating movement of the door. The rear end of the link is enlarged to form a hub containing a pivot pin 33 journaled in the member 31 adjacent its rear wall. It is noted from this construction that a line connecting the two pivotal axes of the link engagement at opposite sides of the door is always positioned closer to the door opening than the similar line connecting the pivotal axis of the outer ends of these links. A pair of guiding stops 34 one for each of the castings 24 and 26 is fixed to the car side at the forward side of the opening. As these stops must withstand the impact of the heavy door when engaged thereby, they are formed of heavy ribbed castings extending lengthwise of the car for some material distance and fastened thereby by numerous bolts 35. These stops project across the path of movement of the forward castings and their active faces 36 are shaped to form a reëntrant curve which faces the line of movement of the castings impinged thereon and are designed to coact with the rounded sides of the castings to guide the adjacent edge of the door into engagement with its seat as shown in Fig. 3. The lengths of the links are so proportioned that when the outer ends are sealed in the sockets provided by the stop faces 36 then the adjacent side of the door is in tight engagement with the post 14.

The door is provided with a conveniently disposed operating handle 37 designed to

be engaged to move the door along the track and to force the door outwardly from its seated position, shown in Fig. 4, should such an operation become necessary, due to the sticking of the door on its seat or due to other causes.

For the purpose of shifting the right hand side of the door to and from its seating position, the pivot pins of the right hand set of pivoting devices are connected to a manually actuated leverage device. For this purpose the pivot pins are integrally connected to form an actuating rod 38 which, for convenience of construction, is shown to be non-circular in cross-section and passed through the hubs 22 of the right hand links. The lower right hand link is provided with a relatively short bifurcated arm 39 extending laterally therefrom and projecting substantially at right angles to the line connecting the axes of rotation at opposite ends of the link. A hand lever 40 is pivotally mounted on a supporting plate 41 fixed to the front of the door adjacent its lower end and spaced from the lower right hand casting 28. The lever is pivoted adjacent its inner end so that the pull on the free end will be over an arch horizontally disposed so that the operator may brace his feet against the ground and exert a powerful leverage effect upon the device controlled thereby. A reach rod 42 constitutes a connecting link between the arm 39 and the lever adjacent the pivotal connection of the latter thereby to increase the leverage effect of the device. The lever is made in sections pivotally connected so that the major portion 43 of the lever may hang down out of the way when the device is not in use.

In order to hold the lever in door closing position, the same is provided adjacent its free end with an opening 44 into which is designed to project the reduced finger 45 of a gravity lever catch 46 which is pivotally supported on a pin 47 projecting from a face plate 48 fastened to the door.

A locking device 49 for sealing the lever in door closing position is provided and includes a bifurcated staple 50 projecting forwardly from the plate 48 and designed to receive the lever between the bifurcations when in door closing position as shown in Figs. 1 and 4. Both of the bifurcated parts of the staple and the lever are provided with openings 51, which, when alined, permit the passage of some suitable sealing means such as is customarily used for sealing freight car doors. The lower truck 25 is provided with a latch 52 which normally rides on top of the lower rail during the sliding movement of the door and which is designed to ride over and fall back of an inclined catch 53 positioned at the end of the rail and preferably constituting a separate casting fixed to the rail in position to hold the door when it is moved to open position.

In operation, it is understood that the door may be considered as a slide door movable along the bottom rail from an inoperative position, entirely uncovering the door opening, into a position opposite the door opening. Ordinarily the operator will grasp the handle 37 and push the door along the track projecting the same forcefully into contact with the fixed guiding stops. As the heavy knuckles 22 carried by the forward trucks 24 and 26 strike these stops and are held thereby, the momentum of the door will cause it to continue its motion. The forward edge of the door will swing about the trucks as pivots and will be forced by the momentum inherent in the moving door from the position shown in Fig. 2 into the position shown in Fig. 3, with the inner side of the forward edge of the door jammed against the adjacent sill in which position it will be held by the toggle arrangement of the forward links. During this movement the rear truck 25 will be merely dragged along the lower track and the door will assume the angular position shown in Fig. 3, with the rear edge of the door positioned slightly offset from its pocket at the right hand side of the door opening.

It is understood that these doors are usually quite heavy but in sliding them along the track the constantly applied power from the operator generates a relatively high momentum which is finally spent in firmly jamming the forward edge of the door into engagement with its seat. As the result of this action it merely remains to supply sufficient power to swing the rear edge of the door into position. With the device disclosed the full effective strength of one man can be utilized solely in jamming the rear edge of the door into position. To effect this final seating the operator raises the depending outer section of the lever into a horizontal position and by bracing himself in place swings the lever about the arch of the circle and over approximately 180°, from the position shown in Figs. 2 and 3 into the position shown in Figs. 1 and 4. The multiplying lever construction illustrated acts through the lever and connecting rod, and through the short arm 39 to rotate the rod 38 which in turn acts simultaneously upon both sets of pivoting devices to move the right hand or rear edge of the door from the position shown in Fig. 3 into the position shown in Fig. 4.

In the final closing movement, the lever is forced into the opening between the bifurcations of the staple and passes over the catch 46 which automatically fastens the lever in position.

If desired the car may be sealed by passing a conventional form of sealing member

through the openings 51 provided therefor in the staple 50.

To open the door the closing operation described is in substance, reversed. The operator first releases the fastening devices and moves the lever from the locked position shown in Fig. 4 into the unlocked position shown in Figs. 2 and 3. This will release the right hand or rear side of the door and at the same time tend to move the same out of its pocket. The operator then grasps the handle and draws the door to the right along the track preceding this movement, if necessary, by a straight outward pull on the door to break the same away from its pocket. The door is then moved along the track and as it reaches the end of the same, the catch 52 automatically drops into position, thus holding the door against any accidental closing movement.

There is a material economy in energy necessary to actuate the door, for it is merely necessary to swing the free or rear end of the door into position about the far end as a pivot. Any such pivoting movement of the door is more easily effected than a bodily movement of the door as a whole.

It is necessary in order to slide doors to exert a material amount of energy in moving the same along the track from its inoperative position into position facing the door opening. In this device, however, the surplus energy not utilized in sliding the door is available in forcing the door at least partly into its closed position in the door opening so that all of the surplus force imposed on the door to effect the sliding movement may be utilized in jamming the forward end of the door onto its seat. The swinging mechanism at the right of the door is particularly designed as a leverage multiplying device, so that one man may swing the heavy door into its closed position, without using any of his strength to effect a bodily movement of the door.

The engaged face of the stop member is so curved that it can coact with the correspondingly curved face of its coacting knuckle, so that the final movement of the door into closed position will tend to firmly wedge the forward edge of the door into engagement both with its seat and with the bevel stop edge 16.

There is really but one closing movement in addition to the usual movement of sliding the door forcefully along the track.

While I have shown and described, and have pointed out in the annexed claims, certain novel features of my invention, it will be understood that various omissions, substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

Having thus described my invention, I claim:—

1. In a sliding door construction, the combination of a member provided with an opening, a track spaced out from said opening, a door guided to slide parallel to said track, a sliding journaling casing guided by said track, a horizontally disposed link having one end enlarged to form a knuckle, a vertically extending pin constituting a pivotal connection between the knuckle and the casing, pivotal means for connecting the opposite end of the link to said door, a stop spaced vertically from the casing so as not to be engaged by the same, said stop disposed to be engaged by the knuckle thereby to constitute a bearing for the advanced end of the link during the swinging movement of the door into the opening when the door is moved forcefully along the track to cause the link to engage the stop, said stop being positioned in line with the pivotal means at the door engaging end of the link.

2. In a sliding door construction, the combination of a member provided with an opening, a track spaced out from said opening, a door guided to slide parallel to said track, a sliding journaling casing guided by said track, a horizontally disposed link having one end enlarged to form a knuckle with a rounded portion, a vertically extending pin constituting a pivotal connection between the knuckle and the casing, pivotal means for connecting the opposite end of the link to said door adjacent one edge thereof, a stop disposed in the path of movement of said link and having a curved inner face adapted to coact with the rounded portion of the knuckle to form a rotary bearing for one end of the link during the swinging movement of the adjacent edge of the door into said opening.

3. In a sliding door construction, the combination of a member provided with an opening, a track spaced out from said opening, a door guided to slide parallel to said track, a sliding journaling casing guided by said track, a horizontally disposed link having one end enlarged to form a knuckle with a rounded portion, a vertically extending pin constituting a pivotal connection between the knuckle and the casing, pivotal means for connecting the opposite end of the link to said door adjacent one edge thereof, a stop disposed in the path of movement of said link and having a curved inner face adapted to coact with the rounded portion of the knuckles to form a rotary bearing for one end of the link during the swinging movement of the adjacent edge of the door into said opening and manually actuated means engaging said door for swinging the opposite edge thereof into the opening and about the first named edge held by said stop and link, said means coacting with the link

and stop to lock the door in closed position in the opening.

4. In a sliding door construction, the combination of a member having an opening, an upper and a lower track, spaced out from said opening, a pair of trucks slidably mounted on the lower track and a pair of casings hung from the upper track, a door, a pair of links having one end of each pivoted to the truck and the other end of each link pivoted to the door, a pair of links similarly connecting the door and casings with one of said links having an exposed knuckle, a casting fixed to the member, offset vertically from the truck and disposed in the path of movement of the said exposed knuckle for swinging the adjacent edge of the door into said opening, a rod connecting the links at the opposite edge of the door to turn the same in unison thereby to swing said opposite edge about the stopped edge and a single lever mechanism connected to said rod to turn the same.

Signed at New York city in the county of New York and State of New York this 15th day of August A. D. 1917.

JOHN P. GALLAGHER.