Aug. 21, 1951 F. E. LINEBAUGH 2,565,383

OVERHEAD TRACK SLIDING DOOR WITH SWINGING ACTION

Filed June 23, 1947 5 Sheets-Sheet 1

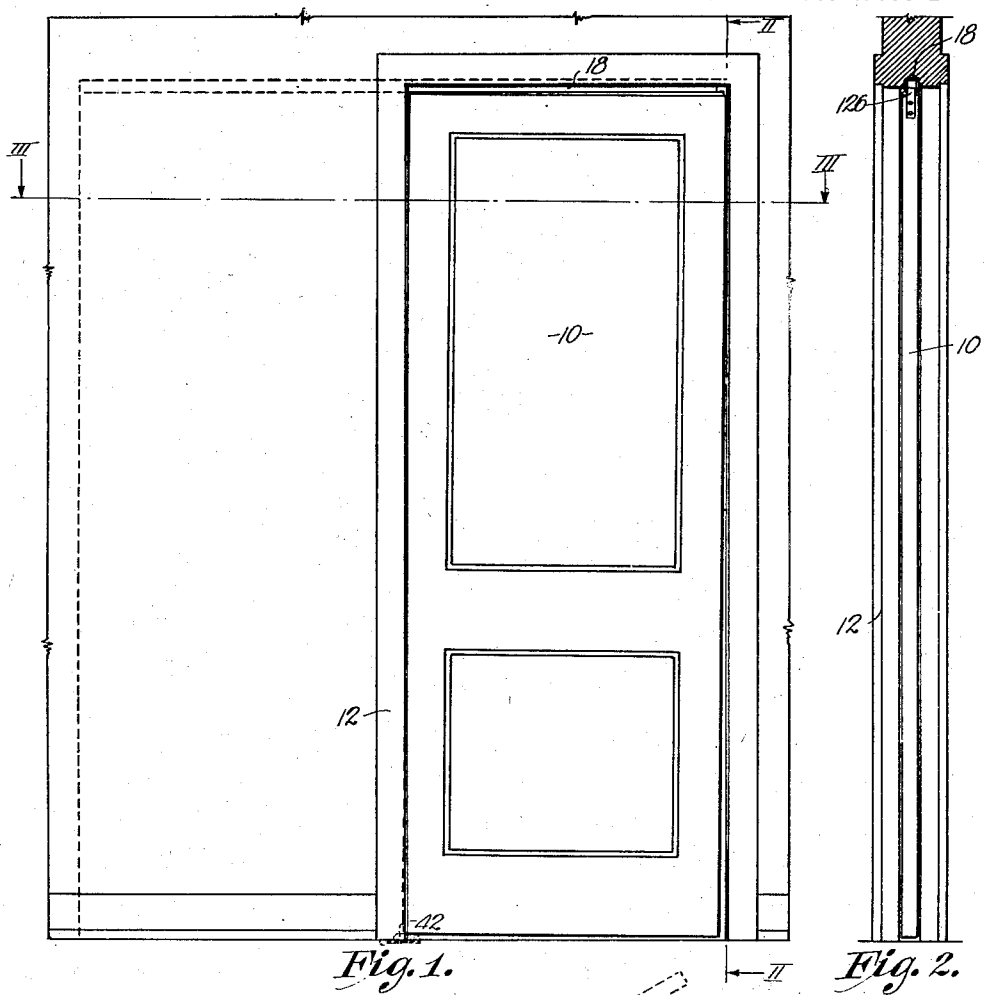


Fig. 1.

Fig. 2.

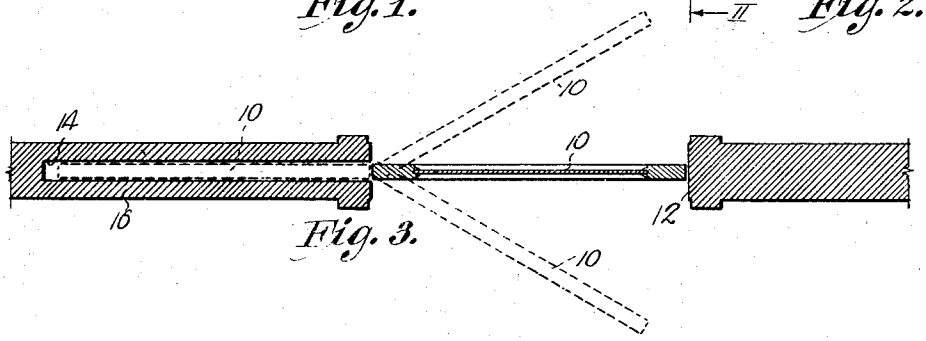


Fig. 3.

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OVERHEAD TRACK SLIDING DOOR WITH SWINGING ACTION

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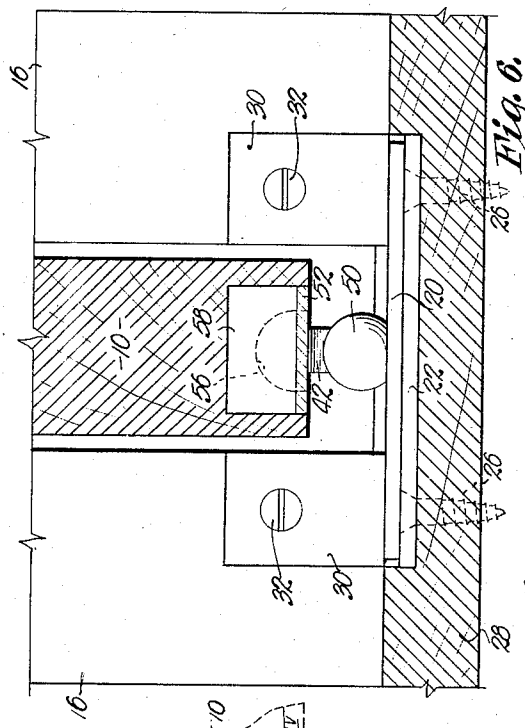


Fig. 6.

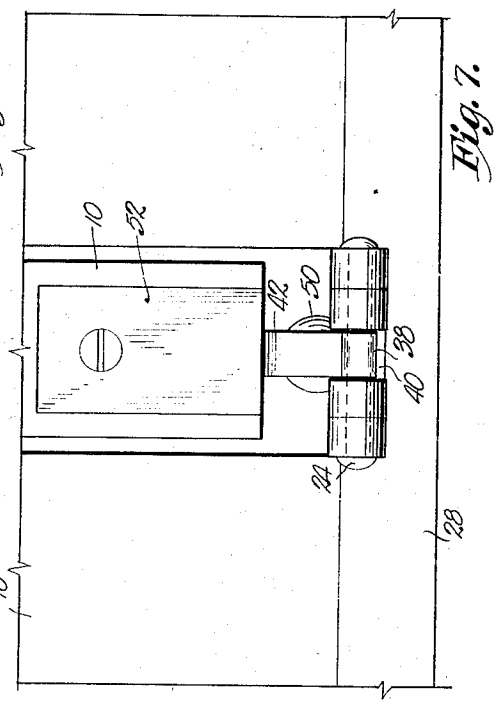


Fig. 7.

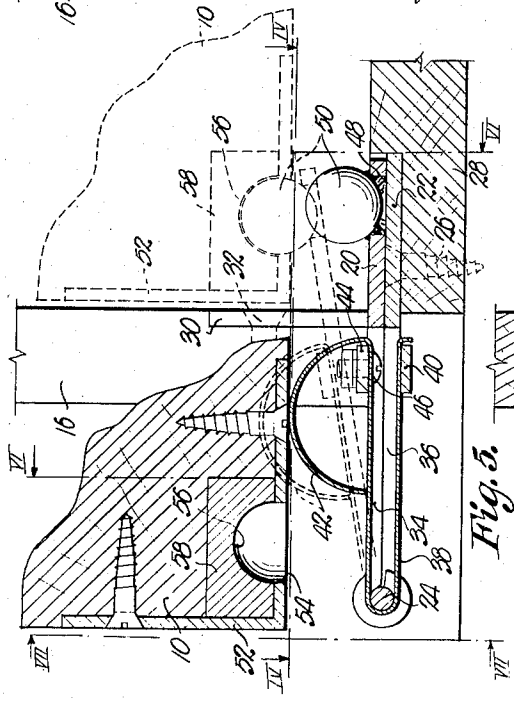


Fig. 5.

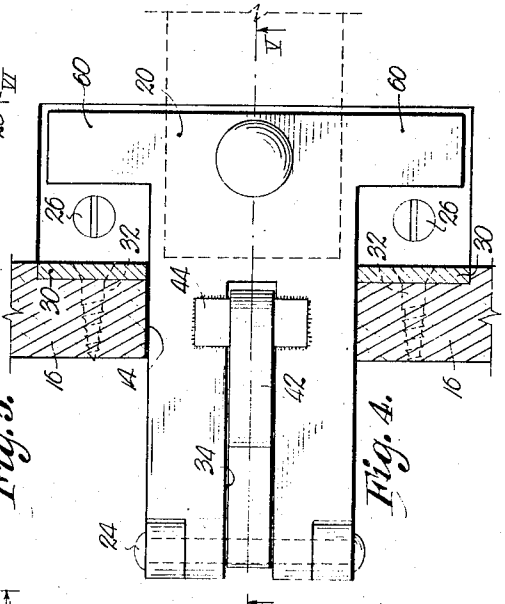


Fig. 4.

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OVERHEAD TRACK SLIDING DOOR WITH SWINGING ACTION

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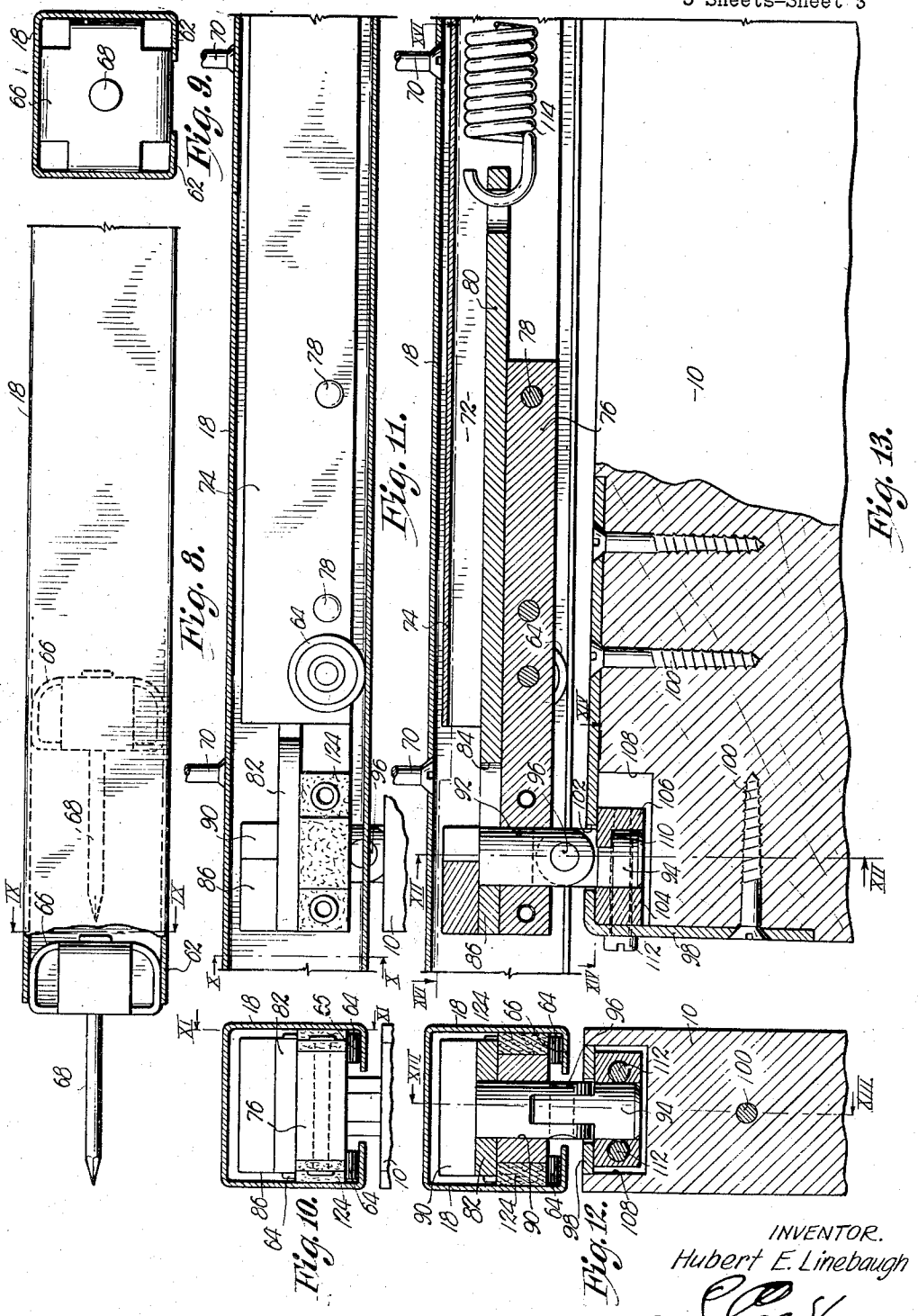


Fig. 9.

Fig. 8.

Fig. 11.

Fig. 13.

Fig. 10.

Fig. 12.

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OVERHEAD TRACK SLIDING DOOR WITH SWINGING ACTION

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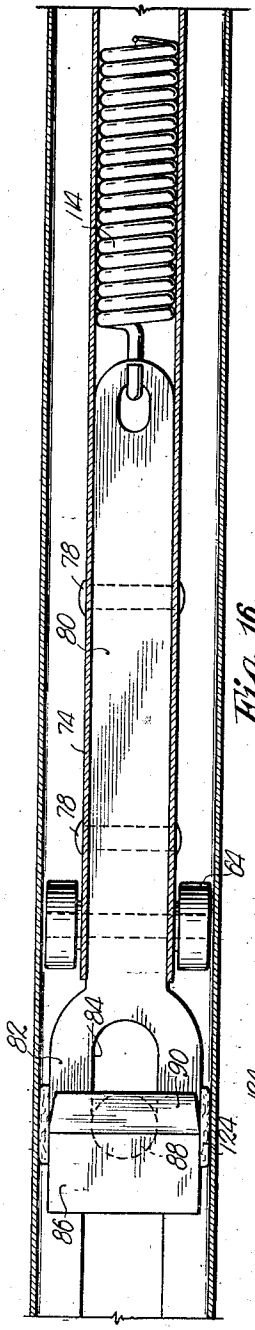


Fig. 16.

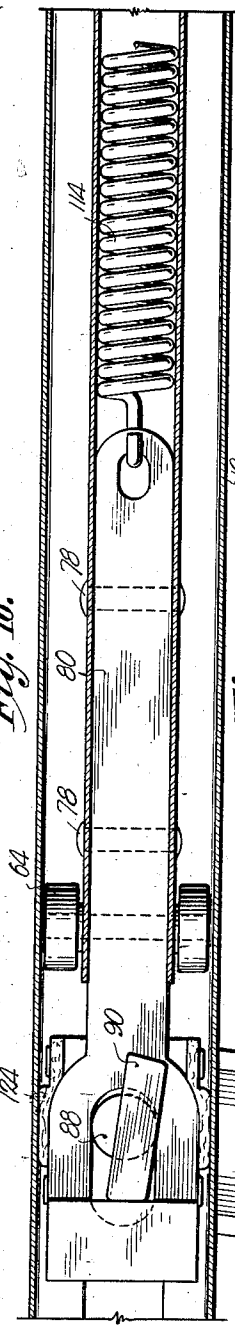


Fig. 17.

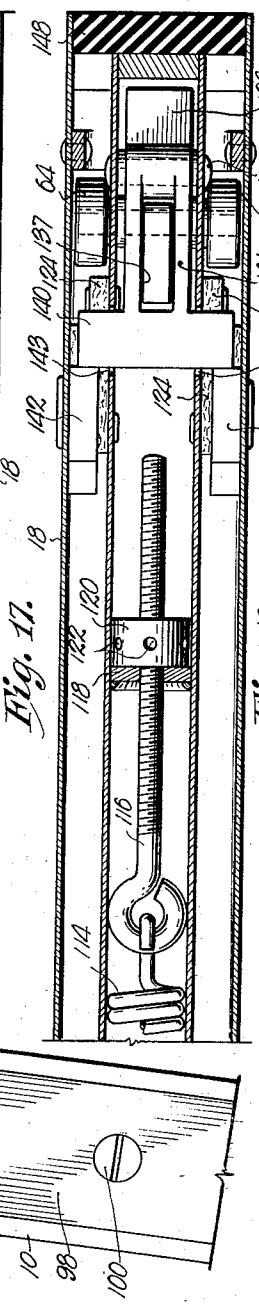


Fig. 18.

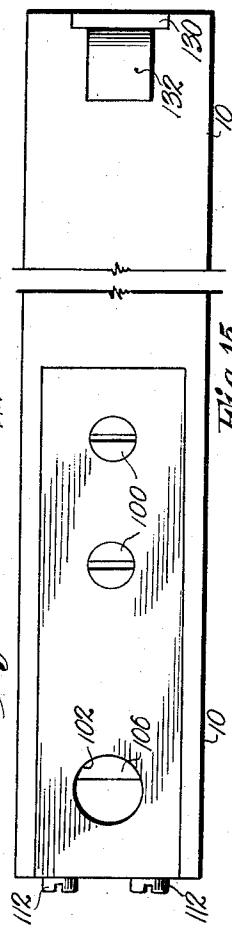


Fig. 15.

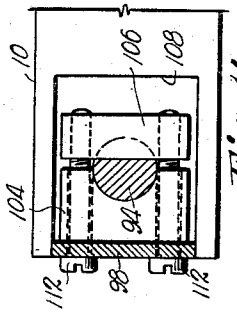


Fig. 14.

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OVERHEAD TRACK SLIDING DOOR WITH SWINGING ACTION

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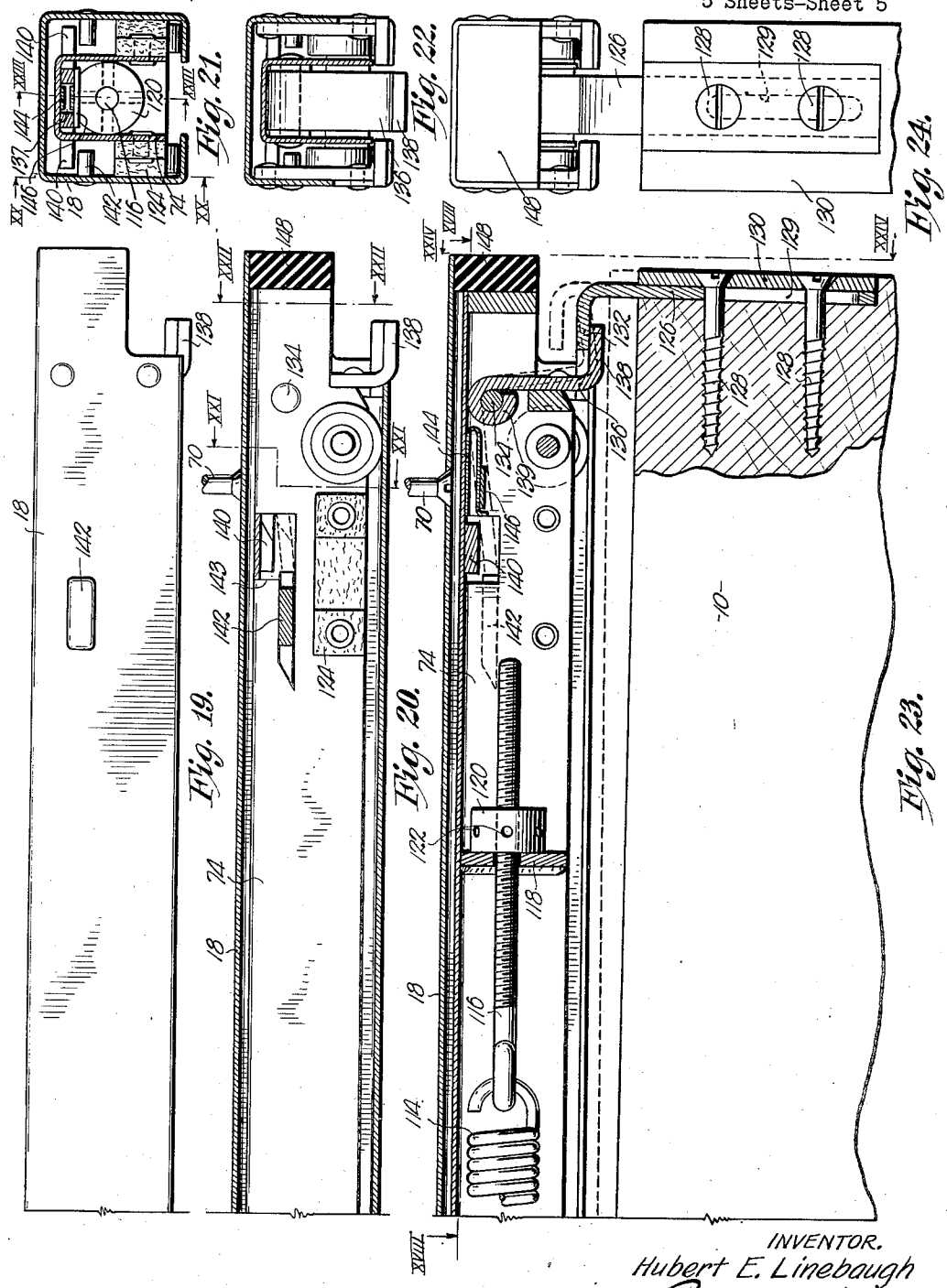


Fig. 21.
Fig. 22.
Fig. 24.
Fig. 19.
Fig. 20.
Fig. 23.

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Patented Aug. 21, 1951

2,565,383

UNITED STATES PATENT OFFICE

2,565,383

OVERHEAD TRACK SLIDING DOOR WITH SWINGING ACTION

Hubert E. Linebaugh, Kansas City, Mo.

Application June 23, 1947, Serial No. 756,521

8 Claims. (Cl. 20—19)

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This invention relates to structure for hanging doors or other closures and has for its primary aim provision of mounting means adaptable to permit a door to swing to an open position on either side of the opening which it closes or to slide rectilinearly if desired.

The most important object of this invention is to provide door hanging structure having a carriage reciprocable longitudinally on rollers within a hollow elongated track and provided with pivotal means interconnecting the door and the carriage, permitting swinging movement of the door when the carriage and door carried thereby are at one end of their paths of travel.

An important object of this invention is the provision of door hanging structure having means for automatically locking the aforesaid reciprocable carriage against movement when at its one end of its path of travel, and when it is desired to swing the door on its pivotal axis.

Another important object of this invention is provision of pivotal means underlying the door yieldably held in operable position when the door is in a position to be swung open and closed and shiftable manually out of engagement with the door when it is desired to open the door by moving the same through a rectilinear path of travel.

A further object of this invention is the provision of door hanging structure having means forming a part of the aforesaid carriage and pivotal connection of the door thereto for yieldably holding the door in a number of selected swinging positions and automatically closing the door from certain swinging positions.

A still further object of this invention is to provide door hanging structure having means for pivotally connecting the door to the aforesaid carriage adaptable to permit raising and lowering of the door and thereby controlling the operation of the above mentioned carriage locking mechanism.

Many additional objects relating particularly to details of construction, will be made clear or become apparent during the course of the following specification, reference being had to the accompanying drawing, wherein:

Fig. 1 is a side elevational view of a door having the hanging structure forming the subject matter of my present invention associated therewith.

Fig. 2 is a vertical sectional view, taken on line II—II of Fig. 1.

Fig. 3 is a cross sectional view, taken on line III—III of Fig. 1.

Fig. 4 is a top plan view of the pivotal support for the door, taken on line IV—IV of Fig. 5, looking in the direction of the arrows.

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Fig. 5 is a fragmentary cross sectional view, taken on line V—V of Fig. 4.

Fig. 6 is an inside end view of the outermost pivotal mechanism, taken on line VI—VI of Fig. 5.

Fig. 7 is an innermost end elevational view thereof, taken on line VII—VII of Fig. 5.

Fig. 8 is a fragmentary side elevational view of one end of the supporting track, parts being broken away for clearness.

Fig. 9 is a cross sectional view, taken on line IX—IX of Fig. 8.

Fig. 10 is a cross sectional view of the track and carriage mounted therein, taken on line X—X of Fig. 11.

Fig. 11 is a cross sectional view, taken on line XI—XI of Fig. 10.

Fig. 12 is a fragmentary cross sectional view, taken on line XII—XII of Fig. 13, looking in the direction of the arrows.

Fig. 13 is a fragmentary substantially central longitudinal cross sectional view, taken on line XIII—XIII of Fig. 12.

Fig. 14 is a fragmentary detailed cross sectional view, taken on line XIV—XIV of Fig. 13.

Fig. 15 is a plan view of the uppermost edge of the door per se, showing the same entirely removed from association with the handing structure.

Fig. 16 is a fragmentary sectional view of the track showing one end of the carriage, taken on line XVI—XVI of Fig. 13, showing position of parts when the door is completely closed.

Fig. 17 is a view similar to that shown in Fig. 16, with the parts illustrated in the position when the door is swung open to one side of its opening.

Fig. 18 is a fragmentary longitudinal cross sectional view of the opposite end of the supporting structure taken on line XVIII—XVIII of Fig. 23.

Fig. 19 is a fragmentary side elevational view of the track and at said opposite end thereof.

Fig. 20 is a fragmentary longitudinal cross sectional view, taken on line XX—XX of Fig. 21.

Fig. 21 is a cross sectional view, taken on line XXI—XXI of Fig. 20.

Fig. 22 is a cross sectional view taken on line XXII—XXII of Fig. 20.

Fig. 23 is a longitudinal fragmentary cross sectional view, taken on line XXIII—XXIII of Fig. 21, and

Fig. 24 is a fragmentary end elevational view of the door and supporting structure, taken on line XXIV—XXIV of Fig. 23.

It has been found desirable in homes, restaurants and other public buildings to provide a door that will not only swing in either direction but which will reciprocate in a straight line of travel, if such is desired. In the home, for instance, a swinging door shutting off the kitchen from other rooms is quite advantageous to eliminate the necessity of hand action in locking and unlocking the same while carrying articles from and to the kitchen. Many times, however, such a swinging door, when open either into the kitchen or adjacent rooms, is in the way or unsightly. Since such a door may be used only infrequently, it is an object of this invention to make it possible to slide such swinging door out of the way when the same is not being used. Many other adaptations will become apparent to those skilled in the art.

Reference to Figs. 1 to 3 inclusive will show generally the way in which the door, broadly designed by the number 10, is designed to operate. This door 10 is formed to fit within the framework 12 in the usual manner and through use of the mechanism about to be described, will either swing in two directions, as shown in Fig. 3, or slide rectiilinearly into a pocket 14 formed within wall 16.

Fig. 2 illustrates the way in which an elongated track 18, co-extensive in length with the distance door 10 will travel, is mounted within a framework 12 above door 10 and extends into pocket 14. The lowermost edge of the door 10 is releasably held in place adjacent the pocket 14 by mechanism illustrated in Figs. 4 to 7 inclusive. This mechanism includes a T-shaped plate or strip 20, pivotally mounted upon a lowermost plate 22 by a pin 24. These plates 20 and 22 extend into the pocket 14 formed in wall 16 and are held in place by a pair of screws 26 or the like, extending through plate 22 and into floor 28 underlying the door 10.

Fig. 6 also illustrates the manner in which the plate 22 extends upwardly into a pair of flanges 30, also held in place by a pair of screws or the like 32 passing into wall 16.

The plates 20 and 22 have longitudinal slots 34 and 36 respectively formed therein and extending inwardly from pin 24. A spring 38 has one leg thereof disposed within the slot 36 of plate 22. The free end of this leg of spring 38 is held in place by a cross bar 40 underlying plate 22 across slot 36 and secured to plate 22 by welding or the like. From this leg of spring 38 the same is looped about the pin 24 and rebent upon itself, terminating near the innermost end of slot 34. This leg of the spring 38 within slot 34 is then again rebent upon itself into a loop 42.

A second cross bar 44 disposed and formed similarly to cross bar 40 is secured to plate 20 on the uppermost face thereof and to the spring 38 by a bolt or the like 46, all as clearly illustrated in Fig. 5. That end of the plate 20 opposite to slot 34 has a depression 48 formed therein for receiving a ball 50. This ball 50 is rigidly secured to plate 20 by welding or the like. The door 10 is provided with a bracket 52 having an opening 54 therein registering with a cavity or socket 56 formed in a block 58 set into door 10. This socket 56 receives the spherical member 50 when the plate 20 is swung to the uppermost end of its path of travel, as shown by dotted lines in Fig. 5.

It is clear from the foregoing that the spring 38 yieldably maintains the plate 20 separated from the lowermost plate 22 where the ball 50 is

within socket 56 and when door 10 is without the pocket 14 formed in the wall 16. The width of the plates 20 and 22, throughout the greater portion of their lengths, is substantially the same as the width of pocket 14 and the width of door 10. That plate 20, however, being T-shaped, has a pair of projecting tabs 60, extending to each side of the door 10. The operator may disengage the ball 50 within socket 56 by merely stepping upon either of the tabs 60, thereby moving plate 20 downwardly against plate 22, against the action of spring 38. When the door 10 is then moved into the pocket 14, the lowermost edge thereof rides along and engages the uppermost surface of the looped portion 42 of spring 38. This relationship between the door 10 and the loop 42 is shown by full lines in Fig. 5.

As door 10 is moved to the fully open position within pocket 14, the ball 50 will be held entirely out of engagement with any portion of the lowermost edge of door 10. When the door 10 is returned to the closed position without the pocket 14, the ball 50 will automatically spring into position within socket 56, as soon as the lowermost edge of the door 10 passes beyond loop 42 and to a position where socket 56 is in alignment with ball 50.

Figs. 10 to 18 inclusive illustrate the hanging structure for door 10 at one end thereof, namely that end directly above the pivotal mechanism just above described and shown in Figs. 4 to 7 inclusive. The track 18, shown in cross section by Fig. 9, is channel-like and open at its bottom end throughout its entire length, to present a pair of opposed rails 62, upon which a plurality of rollers 64 ride when the door 10 is moved into and out of the pocket 14.

Figs. 8 and 9 illustrate means for mounting one end of the channel 18 within the pocket 14 of wall 16. This mounting means includes a resilient member 66 designed to conform to the sizes and shape of the innermost surface of channel 18 and maintainable therein through frictional engagement with all four walls of channel 18. A nail 68 passes through this member 66 and extends outwardly beyond the innermost end of channel 18. During installation of channel 18 within the pocket 14, the member 66 is placed in the position shown by dotted lines in Fig. 8. When channel 18 is in the desired position, it is secured to the framework 10 by means of a plurality of screws or the like 70. By means of a long pin or rod, the nail 68 may be easily driven into the proximal studding of wall 16. When it becomes necessary to remove the channel 18 and parts associated therewith for repair or replacements, this channel 18 will easily slip from its frictional engagement with member 66 after removement of screws 70. Replacement of channel 18 may thereupon be accomplished without necessity of removing member 66 or removing any part of the wall 16.

A carriage broadly designated by the numeral 72, is mounted within the channel 18. This carriage 72 includes a hollow channel-like member 74, open at its bottom and having a length substantially the same as the width of door 10. There is upon the outer-most surface of side walls of this member 74 a point where rollers 64 are mounted and journalled for rotation.

The hollow member 74 has a block or plate 76 rigidly mounted therein through the medium of a plurality of transverse pins 78. This plate 76 slidably supports a bar 80 upon the uppermost face thereof. This bar 80 is formed, as

clearly illustrated in Figs. 16 and 17, and is provided with a head 82 at one end thereof, disposed exteriorly at one end of the hollow member 74. This head 82 is provided with an elongated slot 84 and a cam shoe 86, which extends slightly above the normally uppermost face of bar 80. A pin 88, having a cross head 90 upon the upper-most end thereof, passes through the slot 84 in bar 80 and thence downwardly through an opening 92 formed in the plate 76. The lowermost end of this pin 88 is bifurcated as clearly shown in Fig. 12 to hingedly receive a link 94 that is pivoted to the pin 88 by a shaft 96. This shaft 96 is disposed in transverse relationship to the door 10. An L-shaped bracket 98 is mounted upon the uppermost edge and proximal side edge of the door 10, through the medium of a plurality of screws 100.

This bracket 98 has an opening 102 formed therein for receiving the pin 88 and the link 94. A connector for mounting the link 94 to the door 10 consists of a pair of segments 104 and 106, disposed within a cutout portion 108 within door 10, immediately underlying the bracket 98. The link 94 has a slot 110 formed therein and the segment 106 is L-shaped, one leg thereof extending into the slot 110 of link 94. A pair of bolts 112 passes through aligned openings in bracket 98, segment 104 and segment 106. The openings within segment 106 are internally threaded to the end that when torque is applied to the bolts 112, the link 94 is tightly clamped between the segments 105 and 106. The provision of the slot 110 in link 94 presents a positive prevention of door 10 sliding from link 94. This means of attachment makes it possible to remove door 10 as desired with ease without the necessity of first removing the track 18 and its associated parts. Furthermore, adjustment of bolts 112 makes it possible to attain perfect alignment of door 10 with respect to aforesaid structure from which it hangs.

It is readily understood that the weight of door 10 is supported by the cross bar 90, resting upon the uppermost surface of the bar 80. The cam shoe 86 is yieldably maintained against the cross bar 90 by a spring 114, having one end thereof connected to that end of bar 80 opposite to cam shoe 86 and the opposite end thereof secured to the member 74 by a screw 116. A partition 118 is welded or otherwise fixed within the member 74 intermediate the ends thereof and a nut 120 threaded upon the screw 116 serves as a means for adjusting the tension of spring 114 as desired. Adjustment of the nut 120 may be accomplished through the medium of a plurality of holes 122 formed therein, the tool used passing through the channel 18 between the rails 62 thereof, and through the open bottom of member 74. Thus it is seen that the shoe 86 will be held tightly against one longitudinal edge of cross bar 90 by spring 114 and will close the door automatically when swung manually to either side of the opening and released at any angle of less than 90° with the closed position. By the same token the door 10 will be held in either of the open positions by spring 114 holding shoe 86 tightly against the end of cross member 90, thereby yieldably maintaining door 10 open. A number of guide shoes made from fiber or other resilient material are interposed between the member 74 and the channel 18 to prevent lateral movement of the member 74, as the same travels longitudinally

within channel 18 and to resist shocks caused by movement of the door 10. In lieu of the type of shoes 124 shown it is contemplated that various types of leaf springs properly corrugated or otherwise contoured may be utilized.

The construction of carriage 72, as well as door 10 at that end thereof opposite to the pivotal connection established by pin 88, is shown clearly in Figs. 19 to 24 inclusive. Door 10 has an L-shaped hook 126 slotted as at 129 and secured to one edge thereof opposite to bracket 98 by screws 128 and plate 130. Screws 128 pass through slot 129 to permit adjustability of the hook 126. This hook 126 extends upwardly above the uppermost edge of door 10 and is inturned as at 132. A pin 134 passes transversely through the member 74 and journals a hook 136. This hook 136 extends downwardly from the pin 134 and terminates in a flap 138 normally underlying the flap 132 of hook 126.

The hook member 136 is cut away upon a substantially central line therethrough as at 137, shown in Fig. 18, to present a portion 139 coiled about the shaft 134, as clearly shown in Fig. 23. The remaining portion of hook 136 projects laterally from shaft 134 and inwardly into the channel 18. This projecting portion 141 of hook 136 presents an arm 140 extending transversely across member 74 through openings 143 formed therein. This arm 140 is designed to engage with a pair of stops 142 mounted upon the channel 18 and extending inwardly from the innermost surface of the opposed side walls thereof. It is clear that when the arm 140 of hook 136 is swung downwardly from that position shown in Fig. 21, to the position shown in Fig. 23, the same will engage the stops 142 and prevent movement of member 74 within the track 18. When the door 10 is hanging upon the hook 136 by means of its hook 126, as shown in full lines by Fig. 23, the arm 140 of hook 136 will be swung upwardly toward the top of member 74 and out of engagement with the stops 142. By the same token when door 10 is raised to the dotted line position shown in Fig. 23, the flap 132 and the flap 138 will both raise to the dotted line position shown. The flap 138 will be caused to so move because of a spring 144. This spring 144 is U-shaped and interposed between the uppermost wall of member 74 and a cross bar 146 fixed to the legs 141 and in underlying relationship therewith.

A portion of one end of channel 18 is closed by a bumper 148 made from any suitable resilient material such as rubber. When the door 10 is moved to the closed position by shifting the carriage 72 toward the bumper 148, the member 74 will strike this bumper 148 and a positive stop thereby provided. The momentum caused by sliding the door 10 to the closed position will cause door 10 to swing upon the pin 96. As the member 74 strikes bumper 148, the door 10 will automatically raise to the dotted line position shown in Fig. 23. The hook 126 will thereby raise and the carriage 72 will be locked against further movement by arm 140 and stops 142.

At the same time the ball 50 will automatically seat itself in socket 56 and the door 10 is then in position to have swinging movement imparted thereto since the flaps 132 and 138 are out of engagement. If instead of opening the door by swinging movement, the operator desires to move the same into the pocket 14, the ball 50 is released from socket 56, by means previously described, which will permit door 10 to be lowered by swinging on shaft 96, and a release of the

locking mechanism just described for the carriage 72 will be effected.

Manifestly the hanging structure forming the subject matter of this application may be used with many different types of closures other than that chosen for illustration and many changes and modifications made therein to permit adaptation in addition to those herein contemplated, without departing from the spirit of this invention or scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In combination with a door frame, a door for said frame, and a wall having a chamber adjacent the frame for receiving said door, of an elongated track in the frame and the chamber; a carriage reciprocably mounted in said track for movement longitudinally therealong; a pivot member depending from said carriage and pivotally connected thereto for swingably hanging said door on the carriage; a pivotal support for the door exteriorly of said chamber, said support being movable to and from a position engaging the door; a yieldable device for holding said support biased toward the door; and parts on the support disposed for engagement by the door as the latter reciprocates with said carriage for holding the support out of engagement with the door.

2. Door structure comprising an elongated track; a carriage reciprocable longitudinally on said track; a door depending from said carriage; a pivot member joining the carriage and the door for swingably mounting the door; a hook on the door and on the carriage respectively, spaced from said member, said hooks being in overlapped interengagement when the door is at one position along its swinging path of travel whereby to support the door for reciprocable movement with the carriage; and a lock for interconnecting the track and the carriage when the latter is at one end of its path of travel to hold the same against reciprocation, said lock having a movable element, said hook on the carriage being swingable thereon and operably connected with said element for controlling the lock as the hook on the carriage is swung.

3. Door structure as set forth in claim 2 wherein said movable element constitutes an arm connected directly with said hook on the carriage for swinging movement therewith.

4. Door structure as set forth in claim 2 wherein said movable element constitutes an arm connected directly with said hook on the carriage for swinging movement therewith, and wherein said hook is provided with a yieldable device arranged to hold the same biased toward one end of its swinging path of travel with said arm in a locked position.

5. In door structure, a door; an elongated track; a carriage reciprocable longitudinally along said track; a pivot member interconnecting the carriage and the door at the upper end thereof for swingably suspending the door from the carriage; a pivot device underlying the door and normally engaging the latter to cooperate with the pivot member in supporting the door for swinging movement with respect to the carriage, said pivot device being shiftable out of engagement with the door whereby to render the latter reciprocable with the carriage; and a yieldable element on the pivot device for holding the same biased toward the door.

6. In door structure as set forth in claim 5 wherein is provided an extension on the pivot device, disposed for engagement by the door as the same is reciprocated for holding the pivot device out of engagement with the door against the action of said yieldable element.

7. In door structure as set forth in claim 5 wherein said door has a socket formed therein and said pivot device is provided with a spherical member fittable into the socket when in a position pivotally supporting the door.

8. In door structure as set forth in claim 5 wherein said door has a socket formed therein and said pivot device includes a plate swingable toward and away from the door, there being a spherical member fittable in said socket when the plate is swung toward the door.

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Certificate of Correction

Patent No. 2,565,383 August 21, 1951

HUBERT E. LINEBAUGH

It is hereby certified that error appears in the above numbered patent requiring correction as follows:

In the heading to the drawings, Sheets 1 to 5 inclusive, line 1, for "F. E. Linebaugh" read *H. E. Linebaugh*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of November, A. D. 1951.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.