

May 7, 1935.

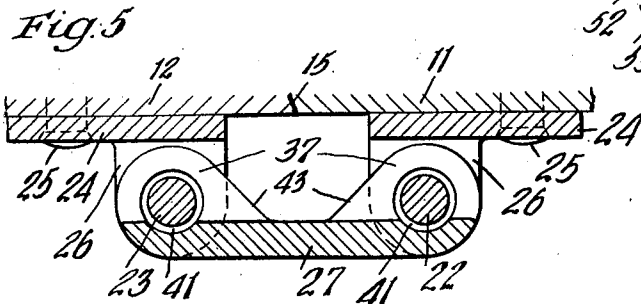
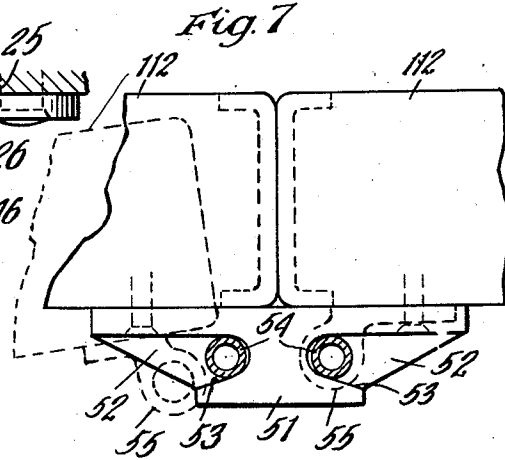
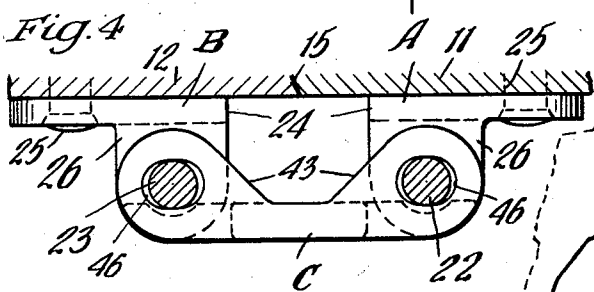
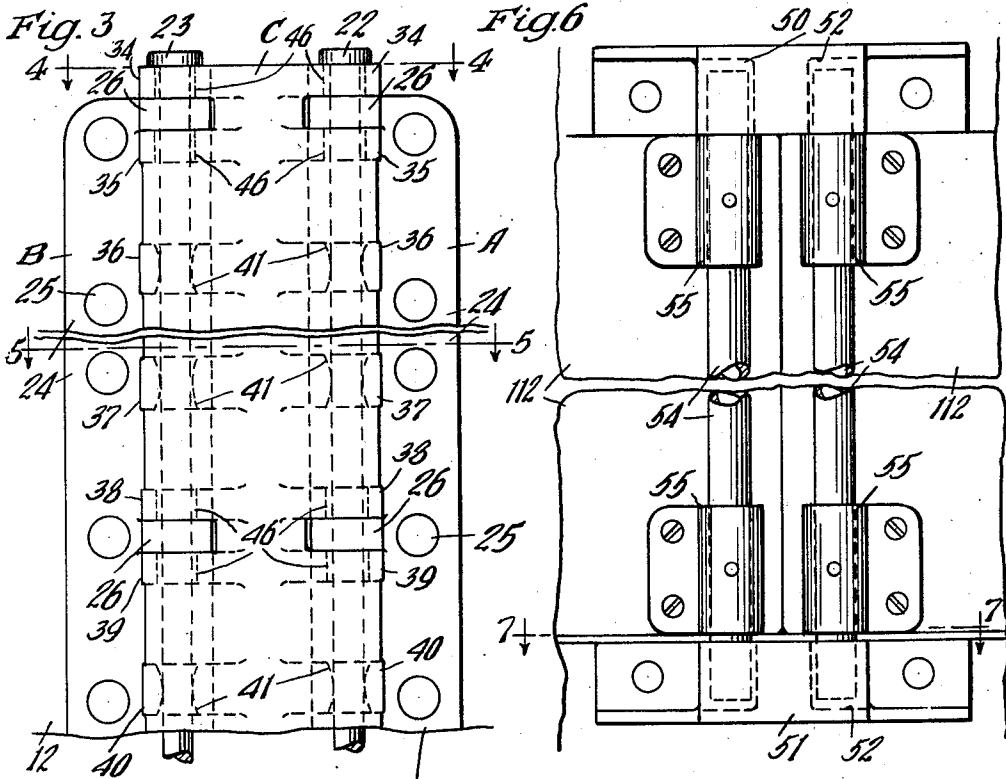
J. F. O'CONNOR

2,000,474

DOOR MOUNTING AND OPERATING MECHANISM

Filed May 5, 1933

3 Sheets-Sheet 2



Inventor
John F. O'Connor
By Joseph Harris
His Atty

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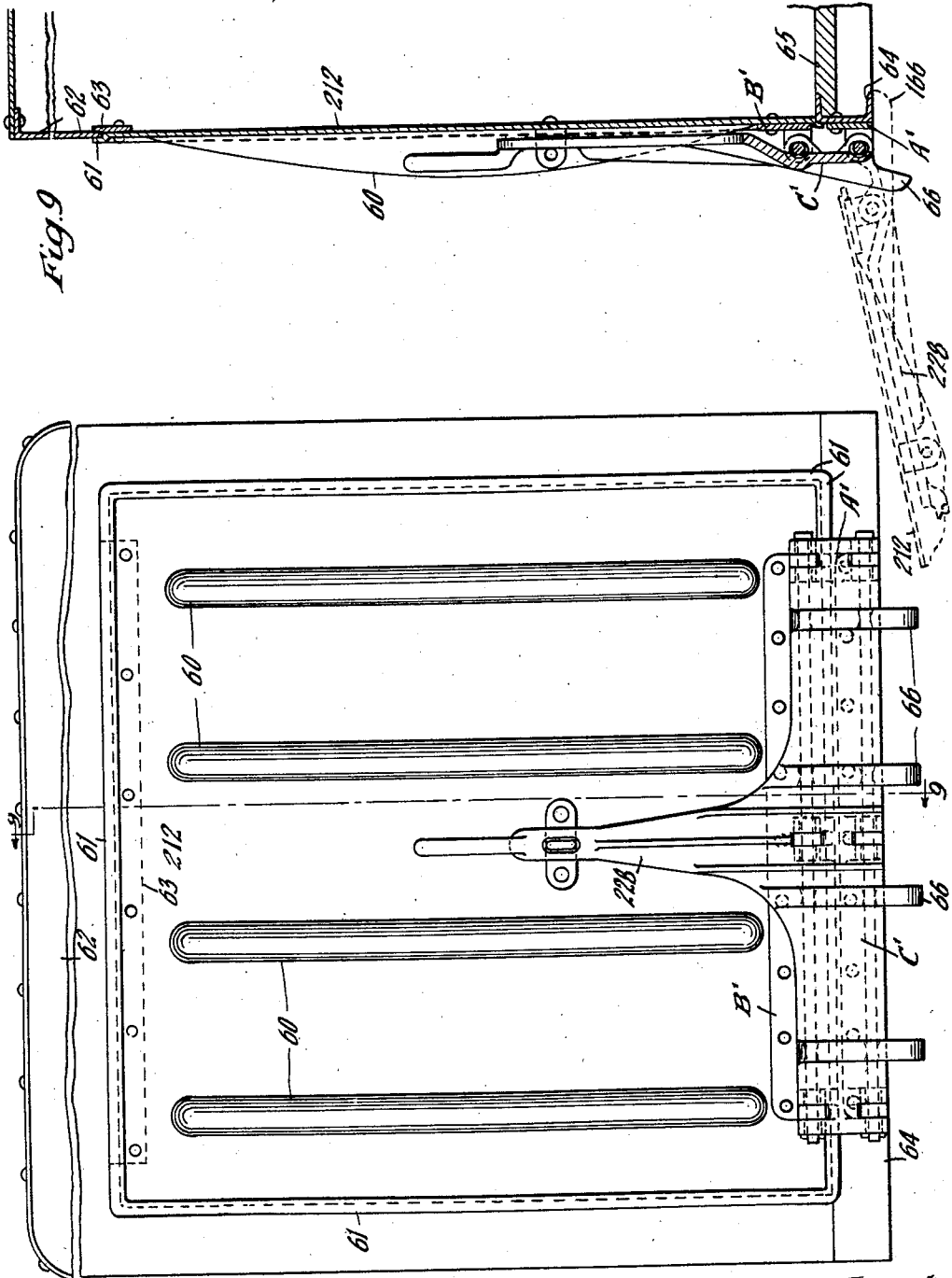


Fig. 9

Fig. 8

Inventor
John F. O'Connor
By Joseph Harris
his Atty

UNITED STATES PATENT OFFICE

2,000,474

DOOR MOUNTING AND OPERATING MECHANISM

John F. O'Connor, Chicago, Ill.

Application May 5, 1933, Serial No. 669,466

10 Claims. (Cl. 20-16)

This invention relates to improvements in door mounting and operating mechanism and more particularly to a combined hinge and operator for pivoted doors such as used on refrigerator cars, trucks and the like, although obviously adapted for use with pivoted doors in many other situations.

One object of the invention is to provide a mounting and operator of simple and rugged construction for that type of pivoted door which combines with the pivotal movement thereof a movement of bodily translation when forced to closed position such as to interlock the free edge of the door with the door framework to prevent opening of the door, except upon proper manipulation of the operating means provided therefor.

Another object of the invention is to provide a combined pivotal mounting and operator for a door wherein provision is made to compensate for such variations that may arise in service due to shrinkage or swelling or weaving of the structure to the end that accurate and complete closing and seating of the door will always be attained.

Still another object of the invention is to provide a combined hinge mounting and operator for a door such that the same may be utilized as an adequate support for the hinged edge of the door when the latter is pivoted to swing about a horizontal axis along its lower edge and the door used as a loading or unloading platform, as for instance on the rear ends of trucks, vans or the like.

A further object of the invention is to provide a mounting and operator of the character hereinbefore indicated which is comprised of minimum number of parts of such design as to be easily and economically manufactured, the same being of staunch construction and also readily applied in place.

Other objects of the invention will more clearly appear from the description and claims hereinafter following.

In the drawings forming a part of this specification, Figure 1 is a side elevational view of a door with the improvements applied thereto, parts being broken out to better accommodate the figure on the sheet. Figure 2 is a horizontal, sectional view corresponding to the line 2-2 of Figure 1, the dotted lines indicating the position of the door hinge mounting and operator when the door is near closed position. Figure 3 is an elevational view of the hinge mounting shown in Figure 1 but upon an en-

larged scale to better illustrate certain details of construction, parts being broken out to better accommodate the figure on the sheet. Figures 4 and 5 are horizontal sectional views corresponding to the section lines 4-4 and 5-5 respectively of Figure 3. Figure 6 is a broken, elevational view illustrating a different embodiment from that shown in Figure 1 and wherein two doors are employed to close the door opening. Figure 7 is a horizontal sectional view, corresponding to the section line 7-7 of Figure 6, one of the doors being shown partially open in dotted lines. Figure 8 is an elevational view showing another embodiment of the invention as applied to the door on the rear of a truck or van. And Figure 9 is a vertical sectional view corresponding to the line 9-9 of Figure 8, the dotted lines in this figure indicating the position of the door and associated parts when employed for loading or unloading.

Referring first to the construction illustrated in Figures 1 to 5 inclusive, the invention is there indicated as applied to a refrigerator car wherein the usual side door opening in the wall of the car is defined, in part, by stiles 10 and 11 and a single door 12 is employed to close the opening. As there shown, the stile 10 has its door engaging face 13 undercut or inclined inwardly of the car so as to provide an acute angle with the outer plane or surface 14 of the car side wall. The stile 11 has its door engaging face 15 arranged parallel, or substantially parallel to the opposed face 13 of the other stile, that is, the face 15 forms an obtuse angle with the plane or outer surface 14 of the car side wall. As customary in refrigerator cars, a flexible backing or seal will be provided at the door joints, the backing shown being of well known form and comprising, in each instance, a strip of canvas 16 applied to the stile beneath which is a pressure bar or strip 17 working in a slot or rabbet 18, the pressure bar 17 being supported on a plurality of springs 19 so as to afford a yielding surface for engagement with the adjacent vertical edges of the door 12, which edges, as apparent from the drawings, are parallel to each other and slotted or inclined to correspond with the respective adjacent faces of the stiles. A similar backing will ordinarily be employed along the top edge of the door, although it is deemed unnecessary to illustrate the same for the purposes of the present invention. Ordinarily, the tread of the door opening will be solid and both it and the lintel will be beveled or inclined inwardly of the car so as

to provide a wedging joint when the door is forced home. At the upper and lower corners on the free edge of the door, the latter is preferably provided with triangular plates 20—20 which are extended above and below the top and bottom edges of the door and cooperate with a guide plate 21 secured to the lintel and with the threshold of the door opening to insure proper positioning of the free edge of the door when forced to closed position.

The improved mounting and operator comprises, broadly, two hinge members designated generally as A and B, secured respectively to the fixed wall structure and door, a combined hinge link and operator C; and pivot pins 22 and 23.

The two hinge members A and B, as shown, are applied to the adjacent edges of the wall structure or stile and the door and the same are of complementary construction so that a detailed description of one will suffice. Each of said members consists of a main plate or web 24 extending vertically and preferably of a height corresponding to two thirds or three quarters the height of the door with which employed. The same is secured to its support by a plurality of heavy carriage bolts 25—25 applied throughout the length thereof at suitable intervals. Formed integrally with each plate 24 is a plurality of hinge lugs or hubs 26—26, three of the same being shown on each of the members A and B in the particular construction illustrated, one each at the top and bottom and the other at the center. As will be understood, these hinge hubs or lugs of the two plates A and B will be horizontally aligned, as clearly shown. All of said hubs or lugs 26 are provided with vertically aligned apertures for the snug reception of the two elongated hinge pins 22 and 23, the latter being headed at their upper ends as shown, to prevent loss thereof.

The combined link or yoke and operator C comprises a main plate or web section 27 and an operating arm 28 integrally formed, the arm 28 being extended in a direction so as to overlap the door when the latter is in closed position and as shown in the drawings. Said arm 28 is preferably utilized also as a hasp, the same having an opening 29 therein near its outer end adapted to take over a staple 30 secured to the door, the staple being apertured as indicated at 31 to receive a suitable pin with usual lead seal or lock to prevent tampering. To provide the requisite strength, the arm 28 is preferably ribbed as indicated at 32—33 and the width of the web section of the arm is increased suitably where the junction is made with the main plate or web section 27, as shown in Figure 1.

On its inner side, the plate section 27 of the link C is provided with a plurality of integrally formed hinged hubs or lugs arranged in three sets. The upper set comprises hubs 34—35 and 36; the central or intermediate set comprises hubs 37—38—39 and 40; and the lower set duplicates the upper set. Said sets of hubs 34—40 are in duplicate sets horizontally opposite each other so as to cooperate with the two hinge members A and B and pins 22—23. Each pair of hubs 34 and 35 is spaced so as to receive therebetween the corresponding upper hub 26 of one of the members A or B and the same is likewise true at the bottom of the mounting. Each of said hinge hubs 34 and 35 at both the top and the bottom is provided with a hinge pin opening 46 elongated in a direction parallel to the wall, for

the purpose hereinafter described. The central pairs of hubs 38 and 39 on the member C which are so located as to receive therebetween the center hinge hubs 26 of the members A and B are similarly apertured so as to provide clearance or play for the hinge pins. Each of the remaining hinge hubs or lugs 36—37 and 40 of the member C is centrally apertured for the reception of the hinge pin but the aperture thereof is made flaring both upwardly and downwardly as indicated at 41, the flaring surfaces being rounded and, at the smallest diameter, corresponding to the diameter of the hinge pins so that each of the hinge hubs 36—37 and 40 is adapted function as a fulcrum upon flexing of the hinge pins between the sets of hinge hubs 26 on the members A and B and within which the pins 22 and 23 are snugly received, as previously set forth.

From the preceding description, it will be seen that the axis of the pivotal connection between the combined link and operator C and the hinge member A is at one side of the door joint and the pivotal axis of the connection between said member C and the door hinge member B is at the opposite side of the door joint, said axes being parallel. With this construction, provision is obviously made for pivotal movement of the door 12 not only with reference to the supporting wall structure or stile 11, but also a supplemental pivotal action with reference to the combined link and operator C. With this construction and assuming the door in closed position as shown best in Figure 2, the operation in an opening movement is as follows. As the operating handle 28 is swung outwardly about the pivot pin 22, the initial action on the door 12 will be an outward movement of the hinge edge of the door due to the hinge pin 23 being swung outwardly by the operating handle 28 about the hinge pin 22 as an axis. Said initial outward movement of the door edge is relatively rapid and serves to initially release the hinge edge of the door from the stile 11. As the swinging movement of the handle continues, said outward movement assumes more of a movement of translation of the door toward the right, thus pulling the free edge of the door away from and releasing it from the stile 10, the movement of translation finally being sufficient, as shown by the dotted line position in Figure 2, to entirely disengage the free edge of the door from the stile 10 and clear the door entirely from the door opening. Thereafter, the door may be swung freely by the grab handle 42 and the door finally positioned back against the wall of the car, as will be understood. In this connection, attention is directed to the particular formation of all of the hinge lugs on the member C, as best shown in Figures 2, 4 and 5, the same being suitably cut away, as indicated at 43—43 so as to allow ample clearance for the vertical edge of the door when it is swung with reference to the operating handle 28 as illustrated in Figure 2, thus preventing any fouling of the parts during the operation. In effecting closure of the door, the parts are brought back to the dotted line position shown in Figure 2. The free edge of the door is then guided into the door opening while the handle 28 is being swung inwardly until the free edge of the door is moved inwardly as far as possible, being limited by the plates 20. As the handle 28 is then moved still further inwardly into parallelism

with the door, the movement of translation toward the left as viewed in Figure 2, will be completed and also the hinge edge of the door will be forced firmly into its fully seated position. When closed, it is obvious that the door cannot be opened except upon manipulation of the operator in the intended manner.

By providing the slightly enlarged apertures in the hinge hubs of the members C and the fulcrum-forming openings 41 in others, as previously described, it is evident that provision is thereby made for a reasonable amount of adjustment, horizontally, of the door with reference to the stile 11, this adjustment being accommodated by slight flexing of the hinge pins 22 and 23 between the fixed hinge hubs 26. In this manner, shrinkage or swelling or weaving within reasonable amounts may be readily accommodated without in any wise impairing the efficiency or staunchness of the mounting as an entirety.

With the construction illustrated and described, it is evident that a minimum number of parts are required to provide both for the actual mounting of the door and for its operation. Furthermore, ample area is provided for attaching the hinge members A and B to the door and wall structure and a powerful leverage may be exerted both in releasing the door and in forcing it home.

Referring next to the construction illustrated in Figures 6 and 7, two refrigerator car doors are there illustrated, it being understood that the mounting and operator for each door 112—112 will be the same as that previously described. Where two doors are employed for closing the opening, complementary keepers 50—51 will be applied to the lintel and threshold of the door, as shown, each of said keepers being provided with two oppositely arranged, laterally flaring recesses 52, each having a camming surface 53. Each door leaf 112 will be provided adjacent its free vertical edge with a rod 54 mounted in suitable brackets 55—55, the rod having its upper and lower ends extended so as to be received in the respective openings 52 of the keepers when the door leaves are moved to closed position. As will be clear from Figure 7, referring to the dotted line position of the lefthand door leaf 112, the rod ends will be entered into the keeper slots 52 so as to engage behind the camming surfaces 53 and, as each door leaf is then forced home, the rod ends will ride down the camming surfaces 53 and force the free edge of the door inwardly to its proper final position, while the hinge edge of the door is being simultaneously forced home. In opening the doors, the same combined pivotal movement and movement of translation will take place as previously described for the construction shown in Figures 1 to 5. The rods 54 may obviously be used as handles or grips when swinging the doors.

Referring next to the construction illustrated in Figures 8 and 9, the door 212 is there shown as made of sheet metal with suitable rigidifying corrugations 60 formed therein. The edges of the door are also preferably reinforced by an integral offset flange 61, the latter also serving to provide a weather joint where it overlaps the fixed wall structure 62 of the rear end of the truck or van. At its upper free edge, the door 212 is provided with a locking cleat or plate 63 riveted thereto on its inner side in such manner that when the door is in closed position as shown

in Figure 9, the free edge of the door will be interlocked with the lintel section of the wall 62.

The end sill of the truck, which also provides the threshold of the door opening, is preferably in the form of a channel as indicated at 64, the flooring being indicated at 65. In this arrangement, the hinge members A' and B' are or may be the same as those of the first described construction and secured respectively to the sill of the truck and lower edge of the door. The combined link and operator C' is substantially the same as that previously described except that the operating handle 228 thereof is preferably centrally located and in addition, said member C' is provided with a plurality of integrally formed stop lugs 66—66 arranged at suitable intervals therealong and rigidly braced, said lugs 66 being extended downwardly below the bottom edge of the main plate of the member C' and adapted, when the door is swung open and inclined downwardly into platform position, to engage the bottom of the sill 64 as indicated at 166. In this manner, the hinge edge of the door is rigidly supported and independent pivotal movement between the door and the member C' prevented, inasmuch as the arm 228 of the member C' will bear against the underside of the door when in the dotted line position shown. As will be obvious, the opening and closing of the door will be effected in the same manner as previously described and in addition, the mounting and operator provides an adequate support for the door, adapting the latter to be utilized when loading or unloading.

Although the preferred manner of carrying out the invention has herein been shown and described, the same is by way of illustration only and all changes and modifications are contemplated that come within the scope of the claims appended hereto.

What is claimed is:

1. In a structure having a frame defining a door opening and a pivoted door therefor and wherein the pivoted edge of the door engages the adjacent edge of the door frame when in closed position, the combination with two relatively elongated hinge members secured respectively to the pivoted edge of the door and adjacent door frame structure; of a combined operating arm and integrally formed correspondingly elongated link pivotally connected to both of said hinge members and bridging the joint between the door and door frame, the arm being extended so as to overlie the door when the latter is in closed position.

2. In a structure having a frame defining a door opening and a pivoted door wherein the pivoted edge of the door engages the adjacent edge of the door frame when the door is in closed position, the combination with hinge members secured respectively to the door and structure along the pivoted edge of the door and adjacent door frame, each of the hinge members having a plurality of hinge hubs and apertured for the reception of a hinge pin; of hinge link means bridging the joint between the door and door frame and having also correspondingly apertured sets of hinge hubs; hinge pins extending through the respective sets of hubs to thereby provide pivotal connection between said link means and the door frame structure and between said link means and the door, the axes of the two sets of pivotal connections being parallel with but on opposite sides of the joint at

the door edge; and an operating lever for moving said link means.

3. In a structure having a door opening and a door therefor, the combination with hinge members secured respectively to the door and structure along adjacent edges thereof, said hinge members having hinge hubs and apertured for the reception of a hinge pin and at least one of said members having a plurality of hubs; of hinge link means having also correspondingly apertured sets of hinge hubs; hinge pins extending through the respective sets of hubs to thereby provide pivotal connection between said link means and the structure and between said link means and the door, alternate ones of the hinge lugs having the apertures thereof larger than the diameter of the corresponding pin to thereby allow for relative bodily adjustment between the door and the adjacent hinge edge of the structure upon flexing of the pins; and operating means for the link means.

4. In a structure having a door opening and a door therefor, the combination with hinge members secured respectively to the door and structure along adjacent edges thereof; of hinge link means, said means and the hinge members having cooperating sets of adjacently located apertured hinge hubs, the apertures of the hubs of the hinge members being smaller than those of the link means, said link means being provided with additional apertured hinge hubs intermediate the first named sets of hinge hubs, said additional hinge hubs being provided with flared openings of minimum diameter corresponding to the diameter of the apertures of the hinge hubs on said members; hinge pins extending through all of said apertured hubs; and means for actuating said link means.

5. In a structure having a door opening and a door therefor, the combination with relatively elongated hinge members respectively secured to adjacent engageable edges of the door and structure on the outer faces thereof; of a link plate corresponding approximately in length to said hinge members, said members and plate having cooperating sets of apertured hinge hubs, all the hubs on the link plate being on the side thereof adjacent the door and so spaced as to provide clearance for the adjacent edge of the door when the latter swings with respect to the plate, the link plate extending across the joint between the door and structure when the door is in closed position; and an operating handle formed integrally with the hinge plate.

6. In a structure having a door opening and a door therefor, a link plate having an integrally formed operating handle adapted to function also as a hasp; cooperable hasp means on the door; means pivotally connecting one edge of said plate to said structure adjacent a door edge; and means pivotally connecting said edge of the door to the plate, said means being located inwardly of the door edge and the axes of the pivotal connections between the plate and structure and between the plate and door being dis-

posed on opposite sides of the joint between the door and structure.

7. In a walled structure having a door opening therein, the combination with a pivoted door for closing said opening the pivoted edge of the door engaging the wall structure when in closed position; cooperating means on the upper edge of the door and adjacent part of the wall for locking said edge in closed position; and means pivotally connecting and supporting the bottom edge of the door, said means comprising hinge members secured respectively to the bottom portion of the door above its lower edge and the threshold and a link pivotally connected to said hinge members and bridging the joint between the door and threshold, said link having an operating arm overlying the door when in closed position and underlying the door when the latter is swung downwardly.

8. In a walled structure having a door opening therein, the combination with a door for closing said opening; cooperating means on the upper edge of the door and adjacent part of the wall for locking said edge in closed position; and means pivotally connecting and supporting the bottom edge of the door, said means comprising hinged members secured respectively to the bottom edge of the door and the threshold and a link pivotally connected to said hinge members, said link having an operating arm overlying the door when in closed position and underlying the door when the latter is swung downwardly, said link being provided also with integral lugs engageable with the threshold when the door is swung downwardly to thereby rigidify the hinge support for the door.

9. In a structure having a door opening, and a pair of oppositely disposed doors for closing said opening, the combination with hinge members secured to each door and the respective adjacent edges of the structure; of a combined operating arm and link means associated with and pivotally connected to each set of said hinge members for effecting both pivotal and translating movement of each door; keepers secured to the structure above and below the door opening; and means carried by each door adjacent its free edge cooperable with said keepers to provide a sliding interlock therewith when the doors are moved to closed position.

10. In a structure having a door opening and a door therefor wherein the edges of the door engage the structure when the door is in closed position, the combination with elongated hinge members secured respectively to the door and structure along adjacent edges thereof and on opposite sides of the joint formed between the door and structure; of a correspondingly elongated plate link; and means for pivotally connecting said link to each of the hinge members, said means including hinge pins and apertured hinge lugs for the reception thereof, certain of said lugs being separated lengthwise of the hinge pin and adapted, upon flexing of the hinge pins, to allow bodily shift of the door relative to the structure.

JOHN F. O'CONNOR.