

Aug. 14, 1962

W. A. DAVIS
DOOR ASSEMBLY

3,048,898

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2 Sheets-Sheet 1

Fig. 3

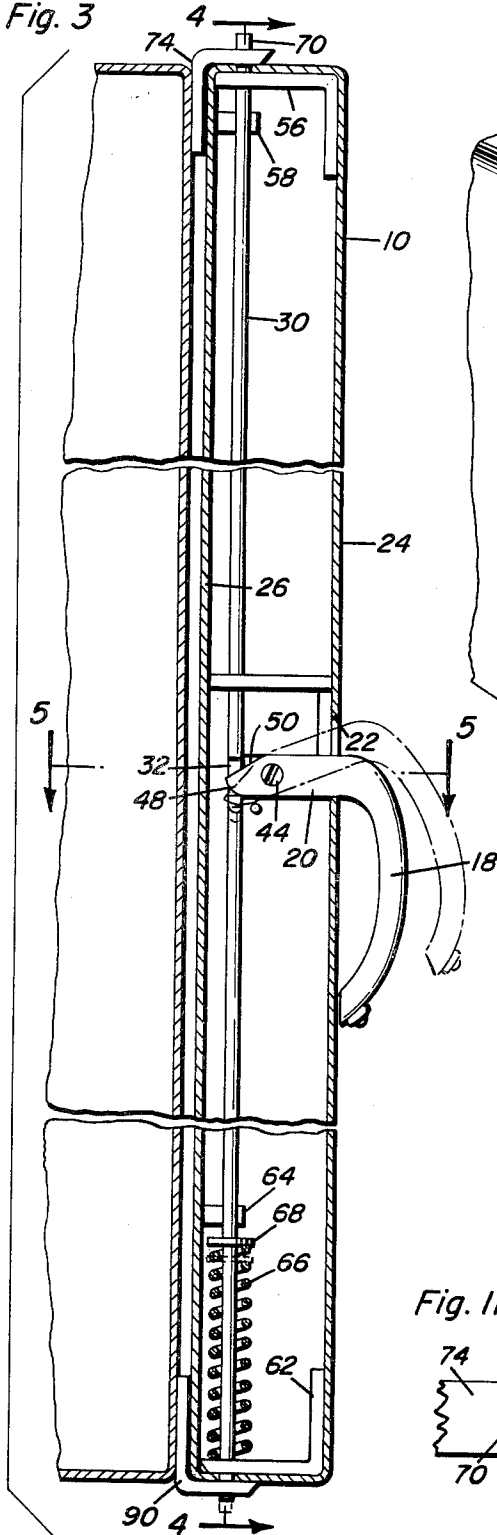


Fig. 1

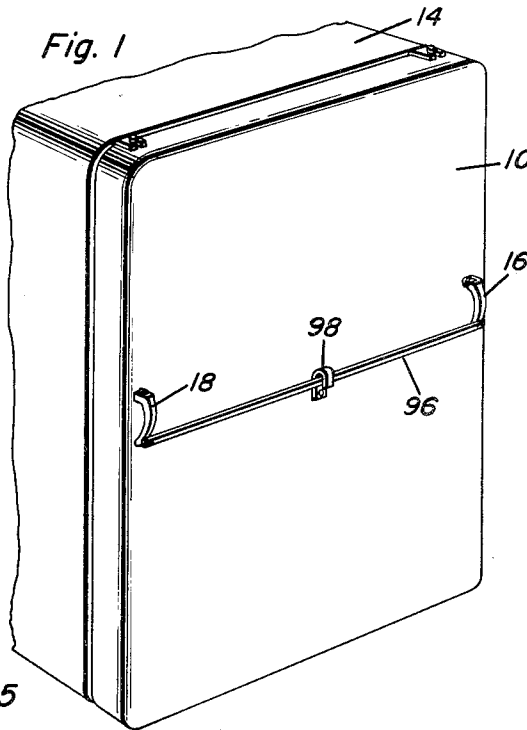


Fig. 6

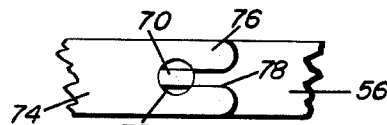


Fig. 7

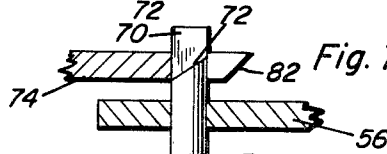


Fig. 8

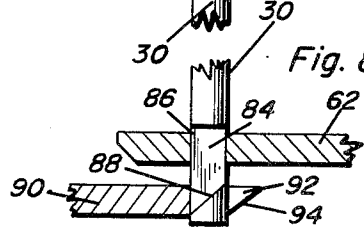
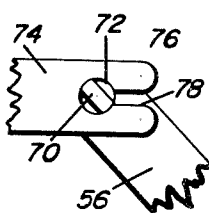


Fig. 11



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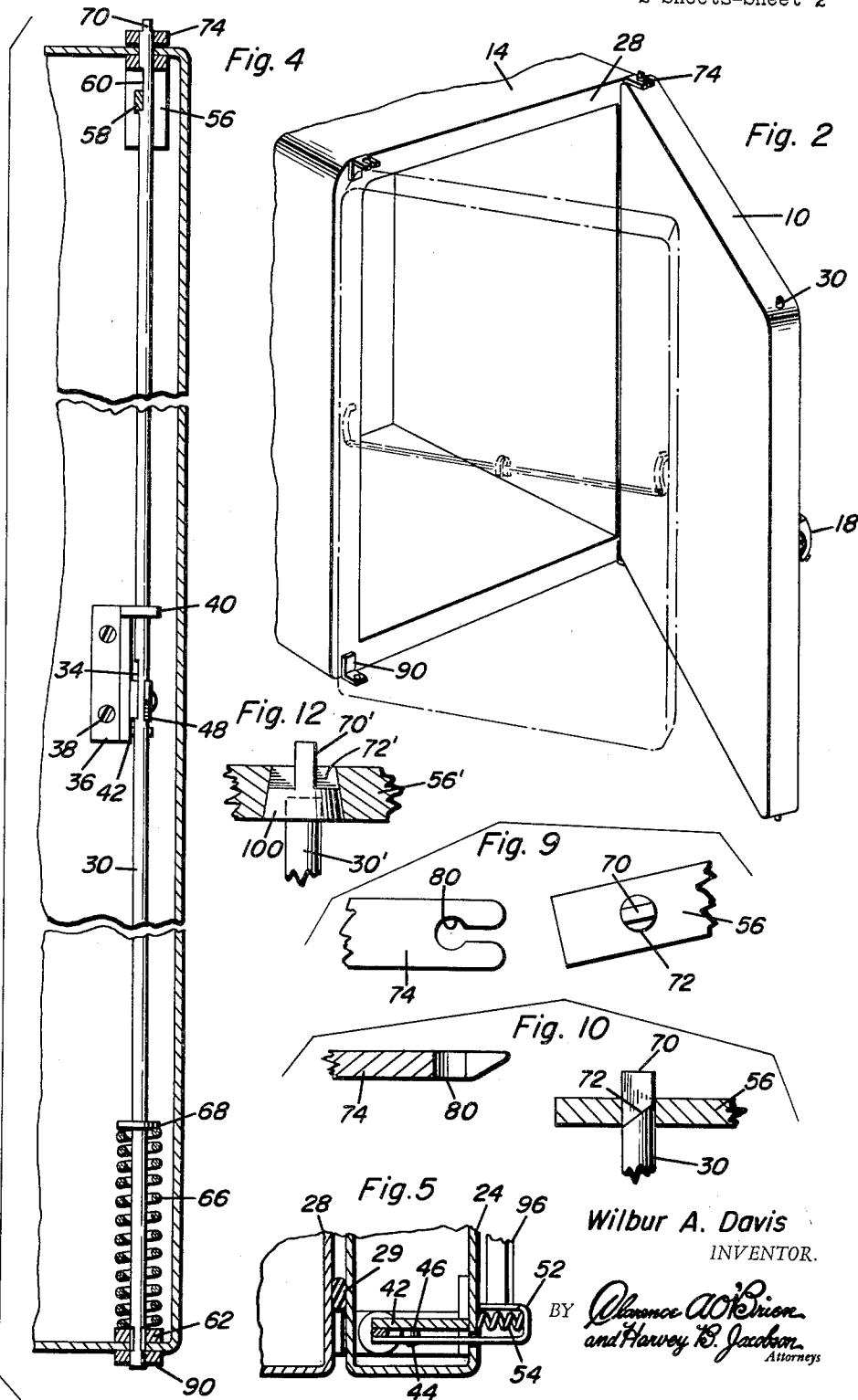
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DOOR ASSEMBLY

Wilbur A. Davis, Mahomet, Ill., assignor of ten percent to Rivard Brothers Inc., Glenview, Ill., a corporation of Illinois, and assignor of five percent to Harley W. Trinkle and Margaret B. Trinkle, jointly, Rantoul, Ill.
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4 Claims. (Cl. 20—16)

The present invention generally relates to the door assembly and more particularly to an arrangement having a combination latch and hinge structure at each edge thereof which will enable the door to be opened from either the left or right hand edge by releasing the combination latch and hinge structure at one edge for releasing said edge of the door for swinging about a vertical axis formed by the combination hinge and latch structure at the other edge of the door.

The primary object of the present invention is to provide a door assembly having many utilities but disclosed in combination with a refrigerator cabinet whereby such a door may be pivoted about a vertical axis at the either side of the door for ease of installation of the refrigerator and providing benefit derived from such an arrangement as to flexibility of installation.

A further important object of the present invention is to provide a door assembly in accordance with the preceding object in which the door is provided with a novel combination hinge and latch structure at each edge thereof which includes structural means for preventing accidental release of both edges of the door unless the door is in a closed position thereby eliminating the possibility of removing the door after one edge has been disconnected and swung outwardly towards an open position.

Yet another important feature of the present invention is to provide a door assembly openable from either edge thereof with the combination latch and hinge structure being easily operated, easy to install, efficient, well adapted for its purposes and generally inexpensive to manufacture.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view of a refrigerator cabinet employing the door assembly of the present invention thereon;

FIGURE 2 is a perspective view similar to FIGURE 1 illustrating the door in open position and in dotted line position when opened from the left hand edge;

FIGURE 3 is a longitudinal, vertical sectional view of the door and cabinet illustrating the structure of the combined hinge and latch assembly at one edge of the door;

FIGURE 4 is a longitudinal, vertical sectional view taken substantially upon a plane passing along section line 4—4 of FIGURE 3 illustrating further structural details of the combined hinge and latch structure;

FIGURE 5 is a plan sectional view taken substantially upon a plane passing along section line 5—5 of FIGURE 3 illustrating further structural details of the combined hinge and latch structure;

FIGURE 6 is a top plan view of the hinge and latch structure when in closed condition;

FIGURE 7 is a side elevational view of the present invention with the latching elements being shown in section;

FIGURE 8 is a view similar to FIGURE 7 but illustrating the bottom structure of the hinge rod;

FIGURE 9 is a plan view of the structure when the elements are separated;

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FIGURE 10 is a longitudinal sectional view of the construction of FIGURE 9;

FIGURE 11 is a plan view of the combined latch and hinge when in interlocked condition;

FIGURE 12 is a detailed sectional view of a slightly modified form of the invention including a tapered construction on the combined hinge and latch element.

Referring now specifically to the drawings, the present invention is illustrated in use in conjunction with a closure door 10 for a cabinet 14 which may conveniently be in the form of a refrigerator but which may be employed in various structural arrangements in which it is desirable to have the door 10 openable from either the left or the right side. Inasmuch as the structure of the present invention is duplicated on both side edges of the door, the disclosure of the invention is limited to a single side of the door with it being understood that the structure is duplicated on the opposite side. As illustrated, there is a handle 16 adjacent the right hand side and a handle 18 adjacent the left hand side which handles are of the pull type and which have an inwardly extending end portion 20 extending through an aperture 22 in the outside panel 24 of the door 10. The door 10 is also provided with an inside panel 26 and the cabinet 14 is provided with a door opening facing 28 or the like and a suitable seal 29 may be provided between the door 10 and the cabinet face 28 for sealing the door 10 in the desired manner.

The combined hinge and latch structure at each edge of the door includes an elongated vertically disposed rod 30 mounted for vertical sliding movement within the door 10 intermediate the panels 24 and 26 but closer to the panel 26. At the center of the rod 30, the inwardly extending end of the handle 18 is connected by virtue of a flattened area 32 on the rod 30 which is actually in the form of a longitudinal notch disposed on one side of the rod 30. Disposed on the other side of the rod 30 is a similar flattened area or notch 34 which is longer than the notch 32.

A bracket 36 is supported on the panel 24 with screw-threaded members 38 and includes a projecting part at the upper edge thereof guiding the movement of the rod 30 and also a bracket portion 42 at the lower end thereof which is received in the notch 34 for limiting the vertical sliding movement of the rod 30. The inwardly extending portion 20 of the handle 18 is pivotally supported from the bracket 42 by a pivot bolt or pin 44 and a spacer 46. The outer end of the inwardly extending portion 20 of the handle 18 is rounded as indicated by numeral 48 on the lower end thereof and inclined as indicated by numeral 50 on the upper corner thereof whereby swinging movement of the handle 18 about the axis of the pivot pin 44 will cause the rod 30 to reciprocate in an obvious manner within the limits defined by the notch 34 which receives the bracket 42. The handle 18 is also provided with a laterally extending portion 52 receiving a coil spring 54 which also engages the panel 24 and which urges the handle downwardly about the pivot pin 44 to a normal position with the rod 30 in elevated or raised position.

The upper end of the rod 30 is slidably received in an angle iron reinforcing bracket 56 and there is also provided a projecting support bracket 58 received in a notch 60 in the rod 30 for further guiding and limiting the movement thereof. This structure is also provided near the lower end of the rod 30 in that there is a supporting or reinforcing angle iron bracket or clip 62 supporting the rod 30 and the rod 30 is also provided with a notch and supporting guide and bracket 64 similar to the structure 60 and 58.

In encircling relation to the lower end of the rod 30 is a longitudinally disposed coil spring 66 having the lower end engaging against the upper surface of the reinforcing angle iron 62 and having the upper end thereof engaging

a flange 68 rigid with the rod 30 thus normally urging the rod upwardly.

The upper end of the rod 30 is provided with a reduced longitudinal extension 70 having flat parallel surfaces with the reduced thickness being defined by cutting away opposed side edges or portions of the rod 30. Thus, in effect, two recesses or notches are disposed on the upper end of the rod 30 and the bottoms of the recesses or notches are defined by inclined cam surfaces 72. This is for effecting latching engagement with an angle iron latch member 74 rigidly secured to the door face 28 in any suitable manner and having bifurcated end portions 76 defined by a notch or slot 78 extending inwardly from the inner end thereof with the inner end of the notch 78 being enlarged into circular form designated by numeral 80. The outer edge of the furcations 76 are inclined as designated by numeral 82 for engagement with the corresponding inclined surfaces 72 for forcing the rod 30 downwardly and permitting the rod 30 to be aligned with the circular opening 80 after which the spring 66 will urge the rod 30 upwardly into the circular opening 80 thus latching the rod 30 to the latch member 74. The thickness of the extension 70 is slightly less than the width of the slot or notch 78 permitting removal and insertion thereof. However, when the shaft or rod 30 is rotated about the longitudinal axis out of alignment with the slot 78, then the rod 30 cannot be removed or detached from the latch member 74.

The lower end of the rod 30 is provided with a notch area 84 having a horizontal top edge 86 and an inclined lower edge 88 for engagement with an L-shaped latch member 90 secured to the lower portion of the door facing 28. The outer end of the latch member 90 is bifurcated as indicated by numeral 92 and provided with an inclined surface 94 for permitting latching of the rod 30 in relation to the latches 90. Downward movement of the rod 30 will effect disconnection between the rod 30 and the latch 90 due to alignment of the notches 84 with the slot or notch defined by the bifurcated end 92.

With the rod 30 in normal condition as urged by the spring 66, the cylindrical part of the rod 30 is engaged with the circular opening 80 in the upper bracket or latch member 74 and a circular part of the lower end of the rod 30 is received within the bifurcated end of the lower latch member 90. In this condition, the rod 30 will act as a hinge structure but when the handle 18 is elevated, the rod 30 will be lowered. This brings into engagement the reduced extension 70 with the slot or notch 78 and correspondingly brings into alignment the recesses 84 with the passageway defined by the bifurcated end of the lower latch member 92 whereby the rod 30 may be moved laterally outwardly from the outer end of the latch elements 74 and 90 so that the door 10 may be opened in the usual manner. When the door is closed, the normal closing or swinging movement of the door will be sufficient to urge the rod back into engagement with the latch members.

With both of the rods 30 in elevated position, the door will be locked in closed position. When either one of the rods is depressed, this rod is disconnected and the door swung about the opposite rod. As soon as the door starts swinging outwardly about one edge, the opposite rod 30 cannot be operated to effect disconnection between the rod 30 and the corresponding latch members since the greatest dimension of the extension 40 or that portion of the rod having the recesses 84 therein is greater than the width of the entrance slot or notch forming the furcations thereby precluding disengagement of the vertical rod 30 if the door has been swung outwardly from the opposite edge thereof. In order to further assure that both handles 16 and 18 are not operated simultaneously, a rod 96 connects the handles 16 and 18 and extends under a clip 98 whereby pivotal movement of one handle in one direction will prevent movement of the other handle in the same direction. Without the rod 96, both handles 16 and 18 could be

operated when the door was closed thereby permitting complete removal of the door if this is desirable.

FIGURE 12 illustrates an arrangement in which the upper end of the rod 30' is provided with an enlargement 100 having a tapered outer surface for engagement with the surface of the bore through the reinforcing member 56'.

In using the door, the door may be opened from either one side edge or the other by operating the proper handle so that the door may be used to the best advantage and otherwise providing an assembly which is quite easily operated for use thereof with the door being hinged from either side.

Also, this method of engagement and disengagement is capable of singular use, for example, one side of entire mechanism may be incorporated into sectional garage doors. This requires installation of the device horizontally and becomes means for latching the door which would be far superior to present latch structures. The latch assembly would be installed at a convenient height on a door section, for instance, belt high or the like.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A door assembly comprising an enclosure with an opening defined by a peripheral edge, a pair of vertically spaced and aligned latch elements mounted adjacent each edge of the opening, a closure door panel, a combined hinge and latch rod mounted vertically adjacent each edge of the door for detachable and hinged engagement with the latch elements, and a handle connected to each rod for vertically moving the rod for enabling detachment of the rod from the latch elements when the door is in closed position, said rods and latch elements including structural means interconnecting the rods and the latch elements to prevent detachment of the rod from the latch elements when such rod is forming a hinge when the door is opened from the opposite edge, said means including a slot-like notch in the outer end of each latch element, the inner end of the notch including an opening circular in configuration for hingedly receiving the rod, said rod including reduced areas defined by parallel side walls adapted to be slidably received in the notch only when the door is closing said opening and rotatably received within the opening at the inner end of the notch whereby the rod may be disconnected from the latch elements when the side walls of the rod are parallel with the side edges of the notch for movement there-through and prevented from being disconnected from the latch elements when the side walls of the rod are misaligned with the side walls of the notch whereby the circular opening at the inner end of the notch will rotatably receive the rod, means interconnecting the rod and the door for permitting axial sliding movement of the rod in relation to the door and preventing rotation thereof in relation to the door.

2. The structure as defined in claim 1 wherein said handles are interconnected by means on the door for preventing both handles from being moved outwardly to an unlatched position at the same time, said means including a bar pivoted at its center and having ends overlapping the handles, the pivot axes of both said handles and said bar all being parallel.

3. The structure as defined in claim 1 wherein the parallel side walls of said reduced areas terminate in cam surfaces adapted to engage the outer ends of the latch elements when the door is closed whereby the rod elements are moved axially for aligning the notches and reduced portions of the rods.

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4. A closure latching assembly comprising a first pair of vertically aligned and spaced latch elements, a second pair of vertically aligned and spaced latch elements, said first and second pair of latch elements being horizontally spaced and aligned and adapted to be mounted at opposite edges of an opening, a closure panel adapted to close the opening, a vertically disposed hinge rod adjacent each side edge of the closure panel for pivotal and detachable engagement with each pair of said latch elements for opening the closure panel from either side while the opposite side is pivotally supported from the latch elements, said rods being axially slidably mounted on said closure panel, a handle for each of said rods for moving the rods longitudinally, means movably mounting said handles on said closure panel, means connecting said handles to said rods for independent operation of the rods, each of said latch elements having a notch extending inwardly from the outer end thereof, said notch terminating in a circular opening at the inner end thereof for slidably and rotatably receiving the rod, each of said rods having flattened side surfaces adjacent each end thereof for sliding movement in the notch when in regis-

try and alignment therewith for enabling disengagement of the rods from the latch elements, spring means connected to each of said rods for urging the flattened surfaces out of registry with the notch, and means interconnecting each of said rods and the closure panel for preventing relative rotation between the rods and the closure panel thereby misaligning the flattened surfaces in relation to the notches at one side edge of the closure panel when the other edge of the closure panel is swung outwardly to an open position.

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