Dec. 13, 1966 I. C. COURSON 3,290,719

DOOR STRUCTURE

Filed May 27, 1964 2 Sheets-Sheet 1

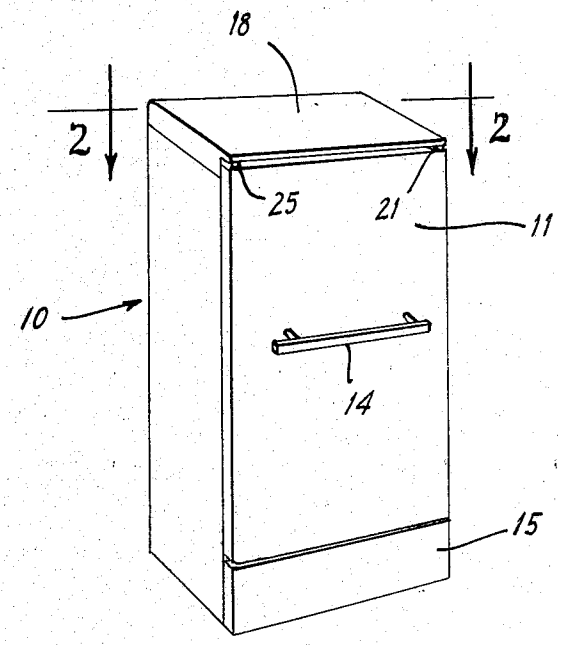


FIG. 1.

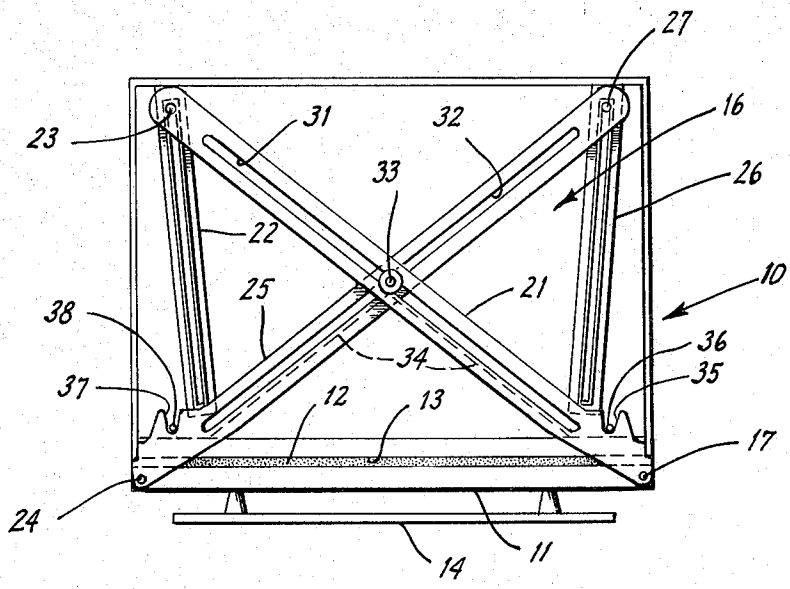


FIG. 2.

INVENTOR.
IBER C. COURSON

BY

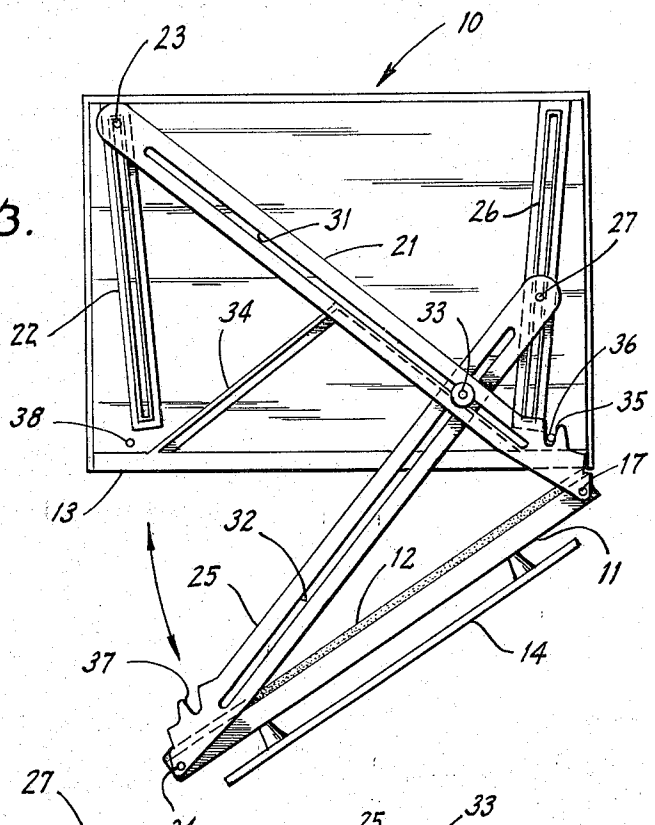
Harry W. Hargis III
AGENT

Dec. 13, 1966 I. C. COURSON 3,290,719

DOOR STRUCTURE

Filed May 27, 1964 2 Sheets-Sheet 2

FIG. 3.



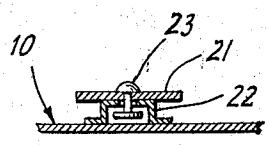


FIG. 5.

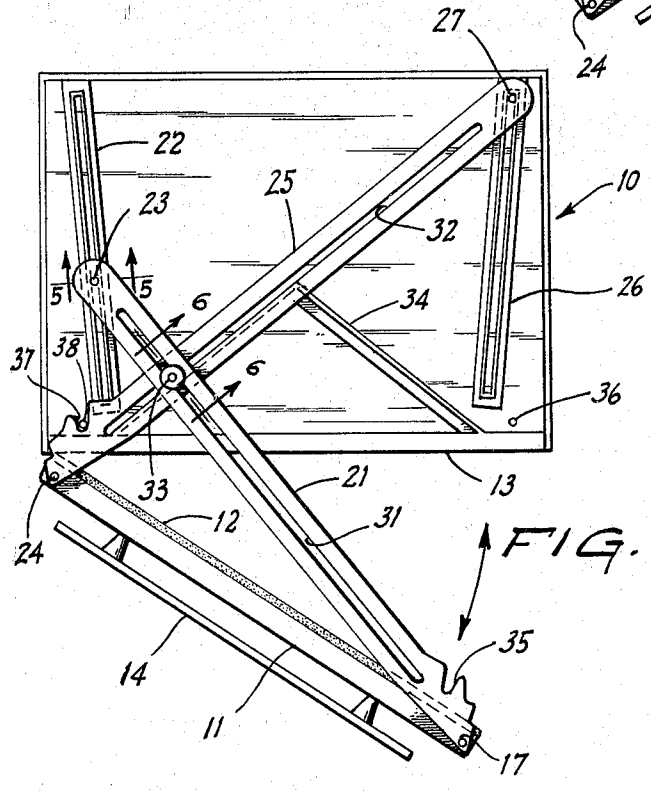


FIG. 4.

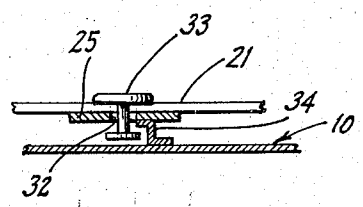


FIG. 6.

INVENTOR.
IBER C. COURSON
BY
Harry W. Hargis III
AGENT

United States Patent Office 3,290,719 Patented Dec. 13, 1966

3,290,719

DOOR STRUCTURE

Iber C. Courson, Glenside, Pa., assignor to Philco Corporation, Philadelphia, Pa., a corporation of Delaware

Filed May 27, 1964, Ser. No. 370,628
6 Claims. (Cl. 16—147)

This invention relates to door structure, and more particularly to hinge means for mounting a door in such manner as to accommodate hinged opening of the door from opposite sides thereof, selectively.

The invention has as its general objective the provision of simple and effective double-acting hinge construction which also serves a latching function.

It is a further objective of the invention to provide apparatus of the foregoing type which does not require manipulation of the latching apparatus as a separate operation prior to opening the door, but permits the door to be opened by a simple pulling motion.

The invention is featured by the fact that it may be embodied in apparatus which consists of simple pins and substantially flat stampings, and that such parts may occupy a minimum of cabinet space.

To the foregoing general ends, the invention comprises means for mounting a door comprising a first pair of links connected to fixed structure of a room or cabinet for sliding movement in a plane normal to the plane of the door opening. The links extend across one another into pivotal attachment with opposed edges, of one end of the door. A second pair of links is similarly mounted and connected at the other end of the door. Means is provided that is operable to lock one link of each pair to the fixed structure, and the door can then be moved about its pivotal connections to the mentioned locked links. Either crossed link of each pair can be so locked, and it is possible to open the door from either side. The locking means comprises means defining a first sliding connection between crossed links of a pair, said connection further having a sliding connection with fixed cabinet structure for movement along a path corresponding with retracted positions of said links of a pair.

The door may be hingedly opened or closed about one of its pivots by applying a relatively light force in the region of the opposite edge of the door. Also, the invention provides a novel double hinge and latch constructions that effectively latches the door yet permits opening by relatively light force exerted from inside the enclosure.

The foregoing as well as other objects and advantages of the invention will be more fully understood from a consideration of the following description, taken in light of the accompanying drawings in which:

FIGURE 1 is a perspective view of a refrigerator cabinet embodying apparatus in accordance with the principles of the invention;

FIGURE 2 is a plan view of the cabinet with a part removed, and looking in the direction of arrows 2—2 as applied to FIGURE 1;

FIGURE 3 is a view similar to FIGURE 2 and showing the door partly opened about its right side;

FIGURE 4 is a view similar to FIGURE 3 and showing the door partly opened about its left side;

FIGURE 5 is a view, partly in section, looking in the direction of arrows 5—5 applied to FIGURE 4; and

FIGURE 6 is a view, partly in section, looking in the direction of arrows 6—6 applied to FIGURE 4.

With more detailed reference to the drawings, and first to FIGURE 1, a domestic type refrigerator comprises a cabinet 10 and a door 11. As is clearly seen in FIGURES 2, 3 and 4, a conventional sealing gasket 12 extends along the periphery of door 11 and is presented for sealing engagement with the front face 13 of the cabinet. A handle 14 is provided in the central portion of door 11 and serves as means for grasping the door to open and close the same. A removable panel 15 is disposed below and in the general plane of door 11, and provides access to a machine compartment (not shown) in accordance with usual practice.

A portion of the hinge means embodying the invention is disposed within the upper horizontal wall of the cabinet, and is accessible upon removal of the cover 18 illustrated in FIGURE 1. Cover 18 has been removed in FIGURES 2, 3, and 4 in order better to illustrate the invention. A duplicate hinge means is provided for the lower portion of the door. In view of its identity with the upper hinge means 16, no illustration or description of the lower hinge means is necessary, other than to explain that it is inverted as respects the hinge means 16, and is conveniently mounted upon an upper wall portion of the machine compartment (not shown). The lower hinge means is accessible through the removable panel 15 that overlies the machine compartment.

It is of course to be understood that the disclosed hinge means is not limited to use in refrigerators, and may be used with enclosures and cabinets of a variety of types. In fact, the hinge means 16 may be used in combination with most door and jamb constructions, where it is desired to provide hinged mounting of a door so that it can be opened from either side.

Turning with more particularity to FIGURE 2, door hinge means 16 includes a pivot or pin 17 disposed at the right-hand upper edge portion of door 11 and having its axis lying generally in the plane of the door. A link 21 is connected to pin 17, extends transversely of the plane of door 11 and the axis of pin 17, and further extends generally diagonally of the cabinet top when the door is closed or is opened about its right-hand edge. Stationary guide track means 22 extend along the top and in the direction of depth of cabinet 10, and is generally coplanar with the link 21. As seen to advantage in FIGURE 5, pin 23 provides a sliding connection between link 21 and guide track means 22.

A pivot 24 at the opposite, left-hand edge of door 11 is generally parallel to the right-hand pivot 17. A link 25 connected to pivot 24 also extends transversely of the plane of door 11, link 21, and the axis of pivot 24. A stationary guide track 26, similar to and disposed opposite track 22, is generally coplanar with link 25, and a sliding connection is provided by pin 27 between link 25 and guide track 26.

In the fully retracted position of link 21 illustrated in FIGURES 2 and 3, a detent 35 formed in its forward portion receivably engages a pin 36 projecting upwardly from the cabinet as shown. Similarly, and with reference to FIGURES 2 and 4, a detent 37 formed in the forward portion of link 25 receivably engages a pin 38 similar to pin 36.

Link 21 extends across link 25, and each includes a central slot, seen at 31 and 32, respectively. Pin 33 extends through slots 31 and 32 to define a sliding connection between links 21 and 25. As seen in FIGURE 2, a guide track 34 is provided which includes angularly positioned leg portions underlying links 21 and 25 when the door is in its closed position, and intersecting in a region generally vertically aligned with the intersection of slots 31 and 32. As seen in FIGURE 6, pin 33 is confined within guide track 34 to establish—in combination with interengagement of the detents and pins 35, 36, or 37, 38 as illustrated—locked positions of links 21 and 25 as door 11 is moved between opened and closed position about one of its selected pivots.

As mentioned above, the lower assembly of links, pins,

and guide tracks is a substantial duplicate of the upper assembly.

Having considered the basic construction and arrangement of the various elements embodying the invention, a still better understanding of the invention will be had from a consideration of the operation of the door as it is hingedly moved about either its left-hand or right-hand pivot. Considering first that door **11** is closed as seen in FIGURE 2, gasket **12** sealingly engages face **13** of the cabinet, detent **35** engages pin **36**, detent **37** engages pin **38**, and pin **33** is disposed at the vertex of the angularly disposed legs of guide track **34**. Also, pins **23** and **27** are disposed at their rearmost positions within respective guide track means **22** and **26**. In this arrangement, the door **11** is effectively latched in its closed position by virtue of disposition of pin **33** at the vertex of guide track **34** in combination with substantially equal forces exerted against both sides of the door by slightly compressed sealing gasket **12**. If desired, an indentation (not shown) may be provided in vertex portion of guide track **34**, within which indentation pin **33** would be received further to establish the closed latched position of the door.

To open the door about its right-hand pivot **17** (FIGURE 3), the handle **14** is grasped left of center and pulled. Continued application of force moves detent **37** from pin **38**, and substantially simultaneously pin **33** is caused to slide along slot **31** of link **21** and the portion of guide track **34** coextensive with the slot **31**. Detent **35** remains in engagement with pin **36**, and this engagement, in combination with confinement of the pin **33** within track **34** and slot **31**, establishes the locked position of link **21** and pivot **17** affixed thereto, engagement of pin **35** and detent **36** preventing counter clockwise rotation and engagement of pin **33** with guide track **34** preventing clockwise rotation of link **21**. Moreover, engagement of pin **36** with detent **35** prevents displacement of link **21** in the direction of its length away from the cabinet. It will be understood also that track **34** could take the form of track **22** by inclusion of double rails that would confine pin **33** so as further to assist in preventing counterclockwise rotation of link **21** in establishment of its locked position. As the door is pivoted, link **25** moves both translationally and rotationally with pin **27** sliding within guide track **26** as pin **33** permits movement of link **25** by sliding freely relative to slot **32**.

To close the door, the linkages are moved in directions opposite to those just described.

To open the door about its left-hand pivot **24** (FIGURE 4) handle **14** is grasped right of center and pulled. Continued application of force releases detent **35** from pin **36**, and pin **33** slides along the portion of guide track **34** coextensive with slot **32** of link **25**. Engagement of pin **38** by detent **37** in combination with retention of pin **33** within track **34** and slot **32** establishes the locked position of link **25** and its pivot **24**. Also as door **11** is opened about pivot **24**, link **21** moves translationally and rotationally with pin **23** sliding within track **22** and pin **33** permitting movement of link **21** by sliding freely relative to slot **31**. To close the door, the linkages are moved in the opposite direction to the positions illustrated in FIGURE 2.

From the foregoing description it will be appreciated that the invention affords simple and effective double-hinge construction for a door. Moreover, the hinge construction lends itself readily to disposition within relatively flat enclosures at opposite sides or ends of a door, and in cabinet structure of the type disclosed, overall dimensions of the cabinet are held to a minimum in achievement of a double-hinged door mounting.

I claim:

1. In combination with fixed structure defining an enclosure, means for hingedly mounting a door upon said structure comprising: a first pair of links lying in a plane extending transversely of said door in the region of one end of the latter, means slidably connecting one end of said links to said fixed structure, means securing the opposite end of said links into pivotal connection with opposed edges of said one end of said door; said links extending across one another, and means intermediate the ends of said links slidably connecting said links to each other; a second pair of links lying in a plane extending transversely of said door in the region of the other end of the latter, means slidably connecting one end of said second pair of links, to said fixed structure, means securing the opposite end of said second links into pivotal connection with opposed edges of said other end of the door; said second links extending across one another and means intermediate the ends of said second links slidably connecting said second links to each other and means operable to lock corresponding links of said first and second pair to said fixed structure as said door is hingedly moved about its pivotal connections to the mentioned corresponding links, the construction and arrangement being such that the remaining links of said first and second pair slide with respect to the fixed structure during such movements of the door.

2. The combination according to claim **1** and characterized in that said last recited means comprises: means defining a first sliding connection between the links of one of said pairs; track means carried by said fixed structure; and means defining a second sliding connection between said track means and each said means defining the first sliding connection between the links of one of said pairs.

3. In combination with fixed structure, hinge means for mounting a door upon said structure comprising: a pair of crossed links disposed in a plane extending transversely of the door, each link pivotally connected to the door at one end, slidably connected to said fixed structure at the other end, and including longitudinal guide means; track means carried by said fixed structure, coextensive with each of said guide means in said links, and extending substantially in the plane of said links; and pin means engaged with each of said longitudinal guide means and extending into sliding engagement with said track means.

4. Structure according to claim **3** and further characterized in that each said link includes detent elements operably associated with detent elements provided on said fixed structure, said detent elements cooperating with said pin and track engagement to provide for locking a link as the door is pivoted about the pivotal connection to such link.

5. In combination with a door and support structure, means for providing selective opening of a door from one or the other side, comprising: a pair of crossed links each including a longitudinal slot; means defining pivotal connections of end portions of said links to spaced portions of said door; means defining a sliding connection for opposite end portions of said links to said support structure; guide track means including portions coextensive with said longitudinal slots of said crossed links; and a pin means extending with clearance through each said slot and retained for sliding engagement within said guide track means, said pin means upon opening of said door about one of said pivotal connections being slidable within said slots and along said guide track means thereby operable to establish locked position of the link about the pivotal connection of which said door is opened while permitting movement of the other of said links in its sliding connection to said support structure.

6. Door supporting apparatus including at least a pair of hinge means each disposed at opposite ends of a door and comprising: a first pivot disposed at one edge of the door and having its axis generally coextensive with the plane of said door; a first link connected to said first pivot and extending transversely of the plane of the door and the axis of said pivot; stationary first guide track means generally coplanar with the first link; a first

sliding connection between said first link and said first guide track means; a second pivot at the opposite edge of said door and generally parallel to the first pivot; a second link connected to the second pivot and also extending transversely of the plane of said door said first link and the axis of said second pivot; a stationary guide track means generally coplanar with said second link; a second sliding connection between the second link and the second guide track means; means including a pin defining a sliding connection between said first and second links; and guide track means for confining said pin to establish a locked position of one of said first or

second links as said door is pivoted between opened and closed position.

References Cited by the Examiner

UNITED STATES PATENTS

2,885,723	5/1959	Altmann	16—147
3,030,717	4/1962	Lewis	16—147

EDWARD C. ALLEN, *Primary Examiner.*

D. L. TROUTMAN, *Assistant Examiner.*