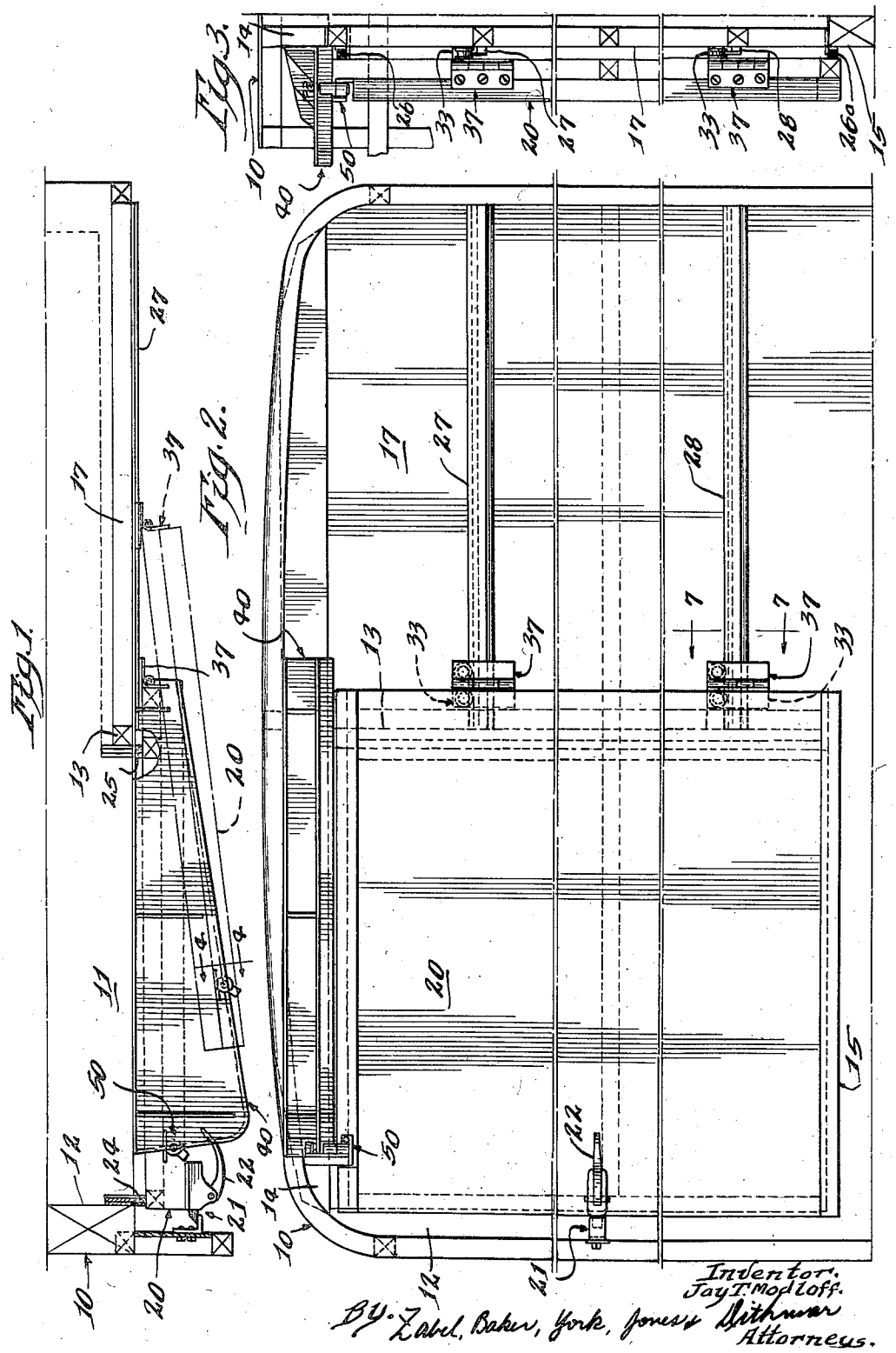
Feb. 11, 1958 J. T. MODLOFF 2,822,899

DOOR STRUCTURE

Filed Nov. 3, 1955 2 Sheets-Sheet 1



Inventor:
Jay T. Modloff.
By Zabel, Baker, York, Jones & Bithmar
Attorneys.

Feb. 11, 1958 J. T. MODLOFF 2,822,899

DOOR STRUCTURE

Filed Nov. 3, 1955 2 Sheets-Sheet 2

Fig. 4

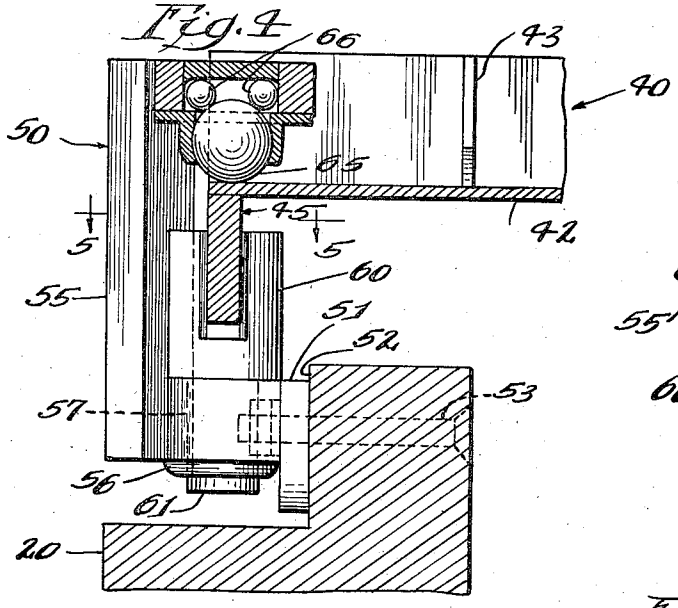


Fig. 5.

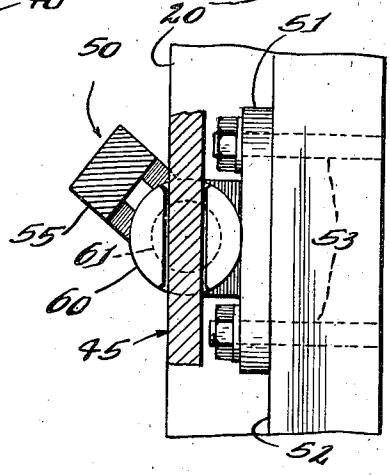


Fig. 6.

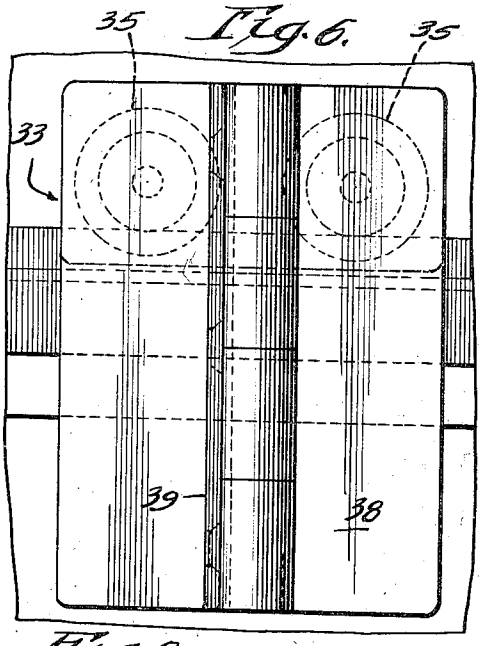


Fig. 7.

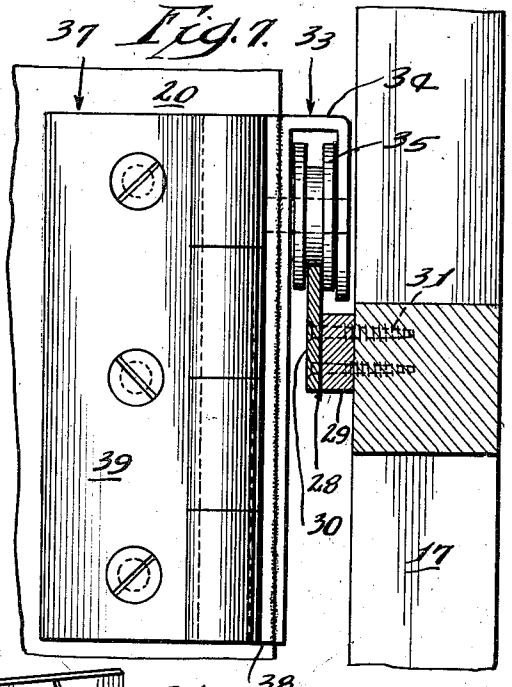
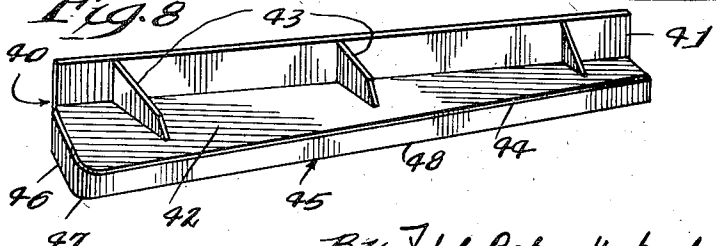


Fig. 8



Inventor:
Jay T. Modloff.

By Fabel, Baker, York, Jones & Hilliard
Attorneys.

United States Patent Office 2,822,899 Patented Feb. 11, 1958

2,822,899

DOOR STRUCTURE

Jay T. Modloff, De Kalb, Ill., assignor to De Kalb Commercial Body Corporation, De Kalb, Ill., a corporation of Illinois

Application November 3, 1955, Serial No. 544,750

4 Claims. (Cl. 189—46)

This invention relates to door structure wherein a door swings a slight amount on a hinge arrangement and then slides longitudinally in the manner of a sliding door to uncover a door opening. In other words, the action of a door embodying the invention combines to some extent the respective actions of hinged and sliding doors.

One object of the invention is to provide a hinged, sliding door which is particularly suitable for use in refrigerated vehicles. Such a door, for example, may be used advantageously in the limited space between the driver's compartment and the storage area of a refrigerated truck. The door of the invention, however, also may be used to advantage in other applications, such as the door of a walk-in cooler or as a fire door.

Another object of the invention is to provide such a door which may be opened and closed frequently without loss of appreciable time. This feature is of importance in the case of delivery vehicles wherein the door must be opened and closed many times during a work period.

Another object of the invention is to provide a door of this character which may be opened and closed easily, thereby conserving the energy of the operator. A door constructed in accordance with this invention is subject to operation by one hand and in effect by one movement of the hand and arm of an operator.

Still another object of the invention is to provide a door of this character which when closed has a pressure tight seal with the jambs, header and threshold of the doorway.

Another object of the invention is to provide a pressure sealed door wherein door opening and closing are accomplished without undue frictional wear on any of the door fixtures.

Still another object of the invention is to provide a door which for operation requires a minimum of door clearance space on the side of the doorway toward which the door opens.

Still another object of the invention is to provide a door of this character wherein there are no door fixtures on the floor leading to the doorway. As is well known, floor fixtures are subject to damage by cargo, mud, snow, ice or the like. To accomplish this object door fixtures are utilized which suspend the door from above.

Other objects, advantages and features of the invention will appear as the description proceeds, reference being had to the accompanying drawings wherein one form of the invention is shown. It is to be understood that the description and drawings are illustrative only and that the scope of the invention is measured by the appended claims.

In the drawings:

Fig. 1 is a somewhat diagrammatic top view of door structure embodying the invention, an intermediate position of the door being shown in dotted line;

Fig. 2 is a front elevational view of the door structure shown in Fig. 1;

Fig. 3 is an end elevational view of the door structure shown in Figs. 1 and 2;

Fig. 4 is an enlarged view, partly in section, of a fixture forming part of the invention, the view being taken generally on line 4—4 of Fig. 1;

Fig. 5 is a sectional view on line 5—5 of Fig. 4;

Fig. 6 is an enlarged elevational view of a sliding hinge fixture used in the invention;

Fig. 7 is an enlarged sectional view on line 7—7 of Fig. 2, and

Fig. 8 is a perspective view of another fixture, namely a guide track, which forms part of the invention.

Referring now to the drawings, door structure embodying the invention is shown installed in a refrigerator generally designated **10**. Refrigerator **10** may be the load portion of a refrigerated truck, and the door structure may lead into the driver's compartment of the truck at the forward end of the load portion. It will be understood that the space limitations in such location preclude the use of a conventional swinging door, particularly if a large doorway is required.

Doorway **11** (Fig. 1) is defined by a pair of spaced jambs **12** and **13**, a header **14** (Fig. 2) and a floor or threshold **15**. A wall **17** extends laterally away from jamb **13** in the plane of doorway **11**, as best shown in Fig. 1.

Doorway **11** normally is closed by a door **20** which has both hinged and sliding action, as will be seen.

Door **20** is closed in a pressure tight, sealed manner by means of more or less conventional latch structure **21**, the latch structure having an actuator **22** of the type commonly used on refrigerator doors. Such an actuator is operable by one hand. Latch structure **21**, as shown in Fig. 1 of the illustrated form of the invention, is associated with doorway jamb **12** and the left hand side of door **20**.

A resilient sealing element **24** extends along jamb **12** and a similar sealing element **25** extends along jamb **13**. Other sealing elements **26** and **26***a* extend along header **14** and threshold **15**, respectively (Fig. 3). Door **20**, when latched, bears in a pressurized manner against these resilient sealing elements.

Wall **17** is provided with track means such as a pair of vertically spaced, horizontal tracks **27** and **28**. The two tracks may have the same structure, and as best shown in Fig. 7, track **28** may comprise a strip **29** secured to wall **17** and a rail **30** secured to strip **29**. The upper edge of rail **30** extends somewhat above the upper edge of strip **29** and it is spaced from wall **17** by the thickness of strip **29**. Strip **29** and rail **30** are shown secured in position by means such as screws **31**.

Still referring to Fig. 7, a sliding member **33** cooperates with each of the horizontal tracks. As here shown, a sliding member **33** includes an inverted U-shape bracket **34** and a pair of grooved rollers **35** mounted for rotation in the bracket. The grooved rollers of course ride on a rail **30** and the member **33** is slidable along the rail.

A hinge **37** is secured to each sliding member **33** as best shown in Figs. 6 and 7. One hinge piece, namely plate **38**, is fastened as by welding to sliding member **33** and the other hinge piece, namely plate **39**, is connected to door **20**, as will be seen. Thus, sliding member **33** and hinge **37**, one on each horizontal track, comprise a sliding, hinge means which connects door **20** with wall **17**. The sliding, hinge means are adjacent doorway jamb **13** when the door is closed, as shown in Fig. 1.

Hinges **37** are secured to door **20** as shown in Figs. 1–3, thus enabling the door to swing outwardly on the hinges and slide longitudinally on the sliding means **33** which engage the tracks **27** and **28**.

A large part of the weight of door **20** is supported by a guide track **40** which is shown in perspective in Fig. 8. Guide track **40** is suitably mounted on doorway header **14**

as best shown in Figs. 2 and 3. The function of guide track 40 is two-fold. As previously mentioned, it supports a substantial part of the weight of door 20. In addition, it serves as a guide to limit the extent to which door 20 may be swung open on hinge means 37. This extent may be the minimum required for door 20 to clear its sealing elements and thus be free for sliding action.

Guide track 40 as here illustrated (Fig. 8) includes a plate 41 which is secured to header 14 and a generally triangular plate 42 secured at right angles to mounting plate 41. A plurality of braces 43 may reinforce the connection between plates 41 and 42, the braces terminating an appreciable distance within free elongated edge 44 of plate 42.

The track element of guide track 40 comprises a strip 45 extending continuously along the two major free edges of plate 42. The short dimension of strip 45 is generally vertical.

Strip 45 has a minor portion 46 which extends generally at right angles to plate 41 and header 14 on which plate 41 is mounted. Strip 45 curves through substantially a right angle at 47 and extends through major portion 48 in a direction which is generally parallel with plate 41 and header 14 on which the plate is mounted. As here shown, portions 46 and 48 deviate slightly from the right angle and parallel relationships mentioned above, and in fact portion 48 has a distinct inclination with respect to the direction of header 14. These directions are not critical and appreciable latitude can be tolerated in these respects. The inclination shown is such as to minimize the clearance required for door operation. If additional clearance is available, portion 48 can be more nearly parallel to header 14.

Referring now to Figs. 4 and 5, the remaining fixture forming part of the invention is a support and guided member generally designated 50. This member, as previously mentioned, supports from above a substantial part of the weight of door 20.

In the form illustrated, support and guided member 50 includes a plate 51 adapted to be mounted on door 20. As shown in Fig. 4, the top edge of door 20 is recessed in part to provide a vertical face 52 to which plate 51 is suitably secured as by bolts 53. Member 50 is mounted on face 52 near the side edge of door 20 which swings away from doorway jamb 12, as best shown in Fig. 1.

The body of support and guided member 50 comprises a generally C-shaped bracket 55 having its lower portion 56 secured to plate 51 as by welding. Lower portion 56 has a cylindrical bore which serves as a bearing 57, as will be seen.

A guided element 60 is carried by bracket 55 in such manner as to be guided by strip 45 of guide track 40. As here shown, guided element 60 is a two-pronged fork member which receives portion 45 between its two forks and thus is guided in movement by the directions of strip 45. Guided element 60 is upwardly facing so as to receive the downwardly extending strip 45, and it is mounted on bracket 55 in a swivel manner in bearing 57, element 60 having a reduced portion 61 which is received within bearing 57. The swivel characteristic of element 60 enables the element to rotate as is necessary to follow the directions of guide strip 45.

An anti-friction means such as a roller element is mounted in the upper portion of bracket 55, this means having the form of a rotatable ball 65 in the illustrated form of the invention. Rotatable ball 65 is backed up by cooperating ball bearings 66 which serve to minimize friction. Exposed portions of ball 65 bear on horizontal plate 42 of guide track 40 and serve to support member 50 and associated door 20 from guide track 40.

Referring to Fig. 1, when door 20 is latched in closed and sealed position as shown in full line, support and guided member 50 occupies a position near doorway jamb 12. In this position guided element 60 engages minor-length portion 46 of guide strip 45 and ball 65 rides on plate 42 directly above.

To open door 20, latch structure 21 is actuated and the door swung open a limited amount on hinge means 37. This amount is determined by the length of portion 46 of strip 45, the member 50 traveling along this strip portion. At the end of portion 46 the strip turns through curve 47 and at this point the sliding action of door 20 commences. The swivel mounting of guided element 60 permits the element to follow the curved strip 45. From this point on door 20 is opened in sliding manner, the sliding members 33 traveling along tracks 27 and 28. Because of the illustrated angulation of major-length portion 48 of strip 45 with respect to the plane of wall 17, there is minor hinge action during the sliding portion of the door opening action.

The initial swing of door 20 on hinge means 37 is just sufficient to free door 20 from the various sealing elements. Following such clearance door 20 is free to slide easily to uncover the door opening. Inasmuch as both lateral sides of door 20 receive vertical support, the door is well balanced and subject to being opened and closed with a minimum of effort on the part of the operator. The various coordinated tracks and anti-friction elements insure easy door operation.

From the above description it is thought that the construction and advantages of my invention will be readily apparent to those skilled in the art. Various changes in detail may be made without departing from the spirit or losing the advantages of the invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a door structure having a doorway header, a pair of spaced jambs, a wall extending from one of said jambs and a door pressure sealed to said header and jambs: the combination therewith of a pair of vertically spaced, horizontal tracks on said wall, a sliding member on each of said tracks, a hinge connecting each sliding member with said door adjacent said one jamb, a door latch connecting said door with the other jamb to establish the pressure seal, a continuous guide track on said doorway header, said guide track leading away from said header adjacent said other jamb and then curving through substantially a right angle and extending in an inclined direction on a straight line toward said wall, and a support and guided member mounted on said door, said member having a load supporting anti-friction element engaging said guide track and a swivel guided element cooperating with said guide track whereby said door swings outwardly a limited distance to clear said jambs and then slides longitudinally to open the doorway.

2. In a door structure having a doorway header, a pair of spaced jambs, a wall extending from one of said jambs and a door sealed to said header and jambs: the combination therewith of track means on said wall, sliding means on said track means, hinge means connecting said sliding means with said door adjacent said one jamb, a door latch connecting said door with said other jamb, and a continuous guide means on said doorway header, said guide means leading away from said header adjacent said other jamb and then curving through substantially a right angle and extending in an inclined direction toward said wall, and a support and guided member mounted on said door, said member having a load supporting means engaging said guide means and a guided element cooperating with said guide means whereby said door swings outwardly a limited distance to clear said jambs and then slides longitudinally to open said doorway.

3. Cooperative door fixtures comprising a guide track adapted to be mounted on a doorway header, said track having a first portion extending a minor distance at about right angles to the header and a second portion extending from said first portion in a direction toward the header, and a support and guided member adapted to be mounted on a door, said support and guided member including a C-shaped bracket, an upwardly facing guided

element mounted on said bracket and engaging said guide track and a downwardly facing anti-friction element mounted on said bracket and engaging said guide track.

4. Cooperative door fixtures comprising a guide track adapted to be mounted on a doorway header, said track having a first portion extending a minor distance at about right angles to the header and a second portion extending from said first portion in a direction toward the header, and a support and guided member adapted to be mounted on a door, said support and guided member including guided means engaging said guide track and anti-friction means engaging said guide track and serving to support said member.

References Cited in the file of this patent

UNITED STATES PATENTS

416,793	Manuel	Dec. 10, 1889
903,406	Rickabaugh	Nov. 10, 1908
1,442,942	Gullickson	Jan. 23, 1923
2,170,870	Nichols	Aug. 29, 1939