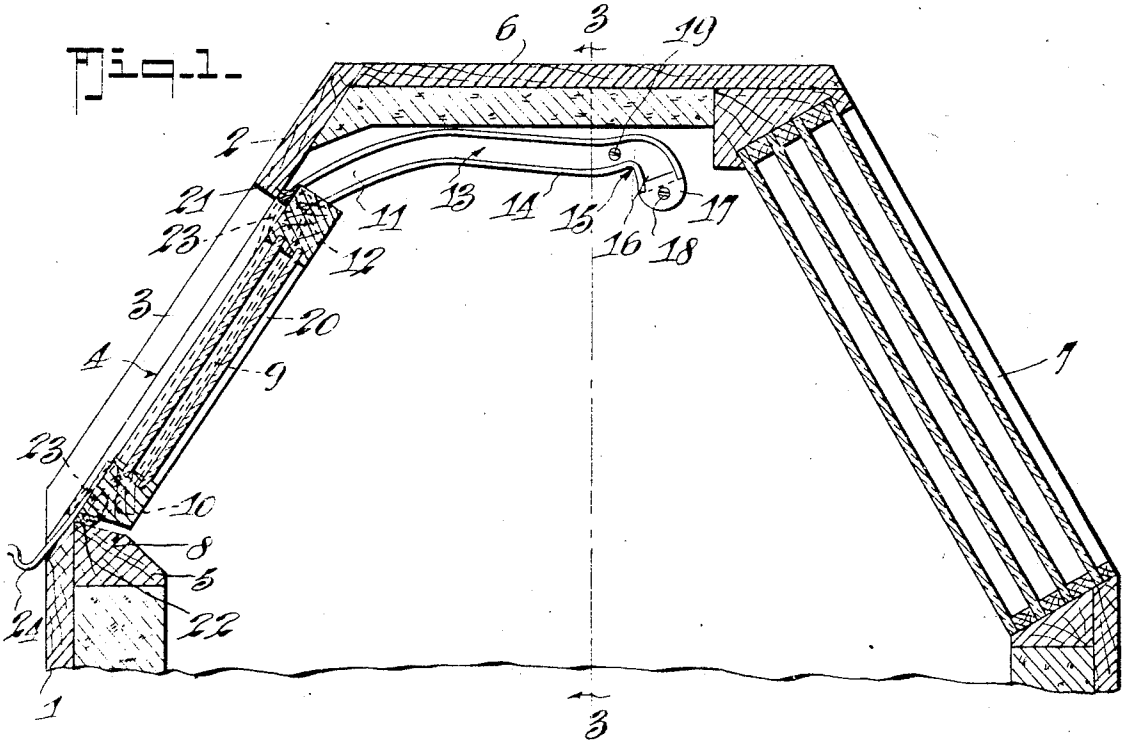
April 26, 1932. G. E. FRIEDRICH 1,855,953

REFRIGERATOR DOOR

Filed May 6, 1931 2 Sheets-Sheet 1

Fig. 1.



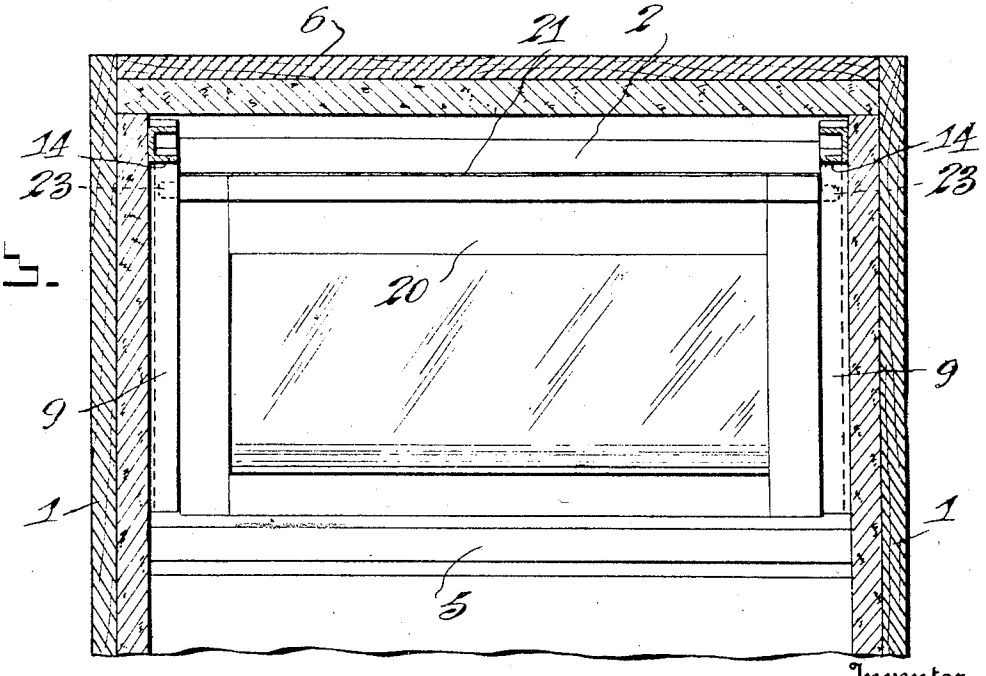
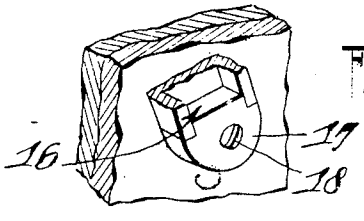


Fig. 5.



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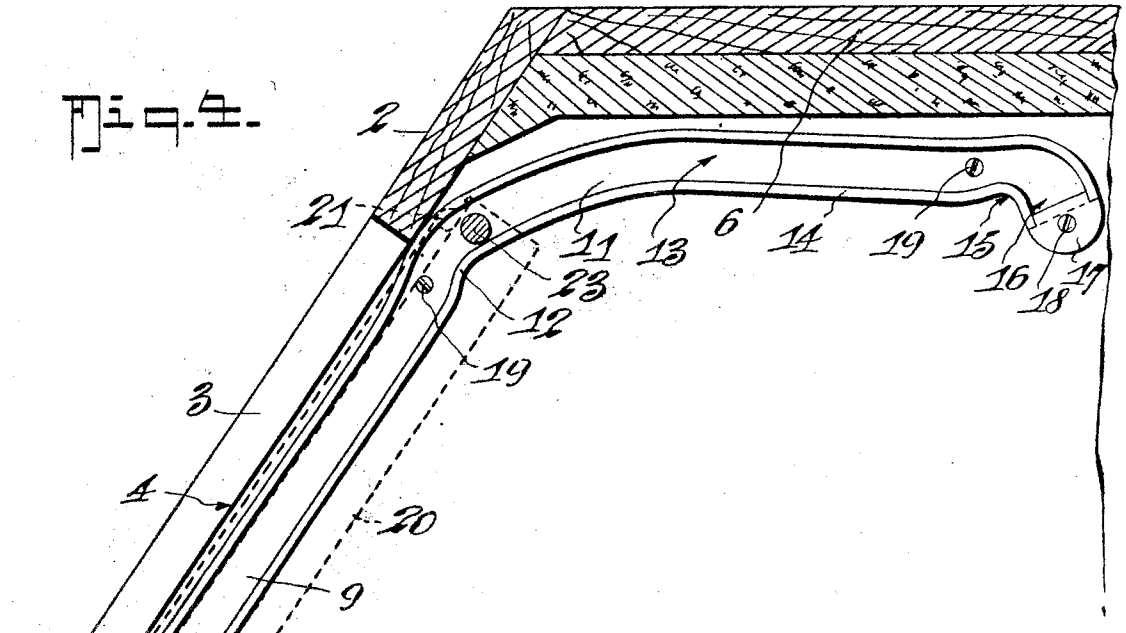
REFRIGERATOR DOOR

Filed May 6, 1931 2 Sheets-Sheet 2

Fig. 1.



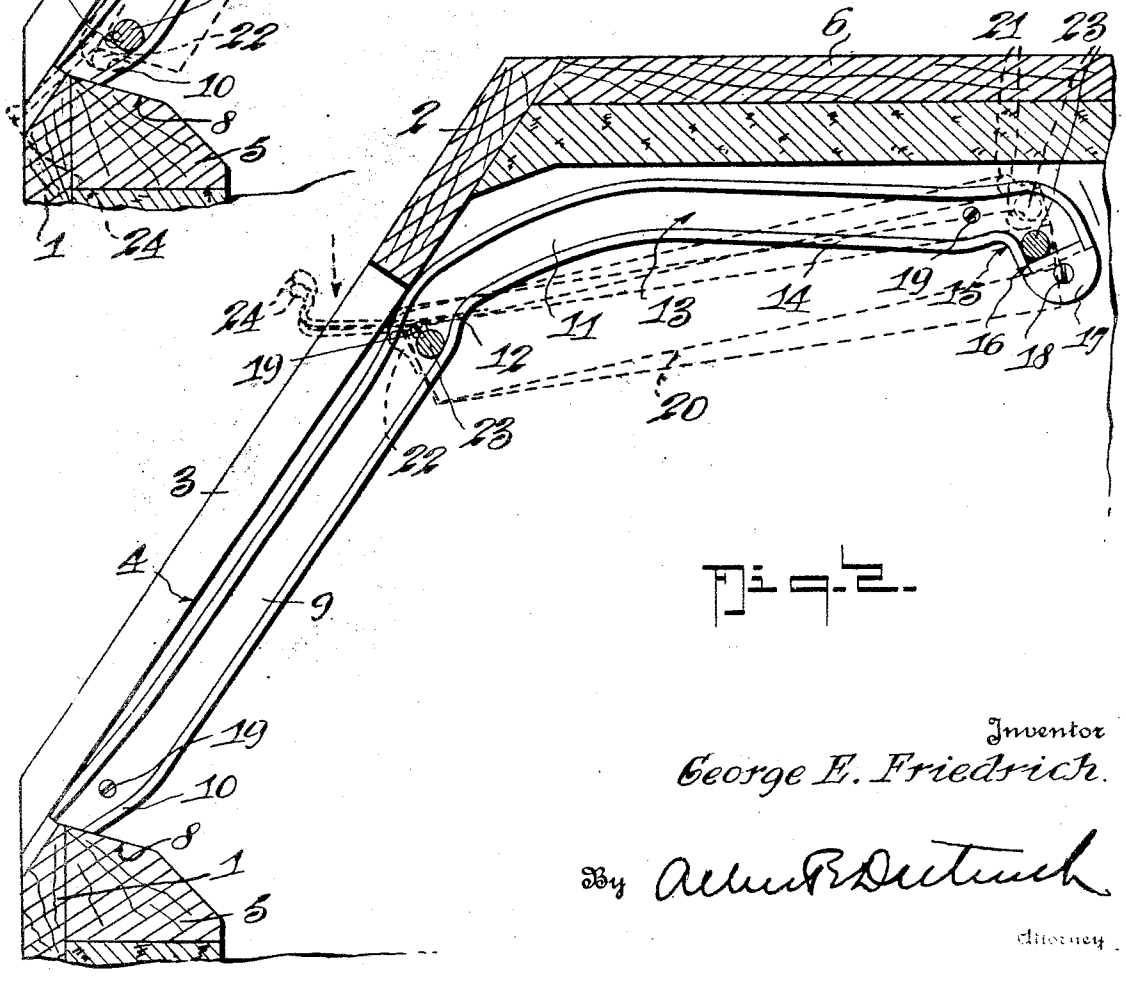


Fig. 2.

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UNITED STATES PATENT OFFICE

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REFRIGERATOR DOOR

Application filed May 6, 1931. Serial No. 535,524.

My invention relates to certain new and useful improvements in refrigerators and particularly in the construction and operation of the doors thereof. For many years past commercial refrigerator manufacturers in general have been continuously experimenting and trying to work out a refrigerator door which could not only be operated very easily and quickly but which, when being opened and closed, would not extend out and in the clerk's way. All attempts to solve this problem heretofore which have come to my attention have proven failures.

Several manufacturers finally have tried to adopt just plain sliding doors but they have proven unsatisfactory due to the fact that they cannot be successfully equipped with air-tight gaskets because the gaskets soon wear out due to friction between the gasket and the refrigerator body parts with which the gasket cooperates.

My invention primarily has for its object to solve the above problem in a simple, inexpensive and highly effective way.

Further, the invention has for an object to provide a door and a means to mount it in the refrigerator body so that it will be caused to engage the door jamb with its gasket by a movement bodily toward the jamb at right angles to its face thereby eliminating considerable friction between the gasket of the door and the jamb as the door is closed and opened.

Further, it is an object of the invention to provide a door that can be used in upright refrigerators as well as in refrigerator display counters.

Further, the invention has for an object to provide a refrigerator with a door of the sliding type so mounted that, at the beginning of its opening movement, it will move bodily away from the doorway in a direction substantially at right angles thereto for a sufficient distance completely to bring the door's gasket clear of the jamb, and then upon further movement move from the opening approximately in an arcuate path and will finally be held in its opened position by its own weight.

Further, the invention has for an object to provide means whereby the weight of the door is so disposed on its bearing lugs as to assist both in the opening act and in the closing act, the door acting somewhat as a cantilever.

Further, the invention has for its object to provide a refrigerator door of the sliding type in which the slideways and door bearing lugs are so designed and coordinated that when the door is brought to the closed position the door in its final movement will be caused to move bodily toward the doorway, thereby at once bringing all door gaskets on the face of the door into tight contact with the jamb without rubbing friction and without the use of hardware such as hinges and locks now so commonly employed on refrigerator doors.

Further, it is an object to provide a sliding door which slides upwardly and over under the top of the refrigerator, and has provisions for holding the door in its opened position beneath the top of the refrigerator cabinet with sufficient retention so as to prevent the door dropping accidentally and yet holding it so lightly that a light touch of the hand will be sufficient to free the door and enable it to gravitate to the closed position.

Other objects will in part be obvious and in part be pointed out hereinafter.

To the attainment of the aforesaid objects and ends, the invention still further resides in the novel details of construction, combination and arrangement of parts, all of which will be first fully described in the following detailed description, then be particularly pointed out in the appended claims, reference being had to the accompanying drawings, in which:—

Figure 1 is a vertical section of my invention, the door being closed.

Figure 2 is a view similar to Figure 1 with the door open the door being shown in dotted lines.

Figure 3 is a vertical longitudinal section on the line 3—3 of Figure 1.

Figure 4 is a vertical cross section on the line 4—4 of Figure 3 showing the door just freed from the jamb during the initial part

of its opening movement the door being shown in dotted lines.

Figure 5 is a perspective view of a portion of the track and abutment member.

In the drawings in which like numerals of reference indicate like parts in all of the figures, 1 is the cabinet which is provided on its back with a sloping wall 2 in which is the doorway 3, the jamb of which is indicated by 4. The cabinet is also provided with a sill 5 whose upper face 8 is downwardly and inwardly inclined as shown.

6 designates the top of the cabinet and 7 the transparent display front, all of which structure may be of the usual type.

Secured to the side walls of the cabinet at each side of the doorway are channel irons constituting trackways and consisting of the lower portions 9 which extend substantially parallel to the face of the door jamb 4, the upper arcuate portion 11 which extends upwardly and inwardly from the upper end of the inclined part of the trackways 9 to about a point 13 from which it slopes gradually downwardly and inwardly toward its end as at 14.

At its lower end the guideway has a forwardly projecting inclined portion 10 and where the straight trackway 9 merges with the arcuate section of the trackway it is also provided with a forwardly extended hump or cam-like portion 12, the purpose of which will presently appear. The cam-like portions 10 and 12 cooperate in unison as will later be more clearly understood.

Adjacent the rear end of the trackway it is provided with an upward hump 15 to leave a downwardly projecting portion 16 as a pocket, the end of the channel iron at 16 being open but normally closed by an abutment member 17 secured at 18 to the side wall of the cabinet.

19 designates the means for fastening guideways to the wall of the cabinet, such as screws for example.

The door 20 is of the usual construction and has a gasket 21 on its front face and a gasket 22 on its lower edge, the gasket 21 serving to lie against the door jamb while the gasket 22 lies on the inclined surface 8 of the sill 5 when the door is closed.

As each side the door is provided with pins or lugs 23, there being two sets of these pins or lugs on each side of the door, one being located adjacent the bottom of the door and the other adjacent the top of the door. The distance between the upper and lower pins 23 is such that when the door is in the closed position they will lie in contact with the cam portions 10 and 12 of the guideways and when the door is in the fully opened position the uppermost lugs or pins 23 will lie in the pocket 16 while the lowermost pins or lugs will lie on the curved portion forwardly of the point 12.

The cam portions 10 and 12 are so designed with relation to the lugs or pins 23 that as the door arrives at approximately its lowermost or most nearly closed position they will force the door bodily outward so as to bring the marginal gasket 21 into contact with the door jamb 4 throughout the entire length of the gasket practically at the same instant so that no rubbing or chafing between the gasket 21 and the door jamb takes place in either the final closing or sealing of the door or in the opening of the door.

It will be seen that because of the inclined portions 9 of the guideways it is only necessary to lift up on the handle 24 of the door which immediately causes the lugs 23 to ride off the cams 10 and 12 (the cams being quick acting cams), the weight of the door holding the lugs in contact with the innermost flange of each guideway. Hence, at the initial part of the opening movement of the door there will be a movement of the door bodily inward away from the door jamb in a direction approximately at right angles to the face of the door jamb so that the gasket 21 is immediately cleared of its contact with the door jamb before the door has been raised to any substantial amount. Further lifting of the handle 24 causes the upper set of pins or lugs 23 to ride over the arcuate portion 11 of the guideways, down the inclined portion 24, over the hump 25, into the pocket 16, the hump 25 serving as a holder against the door accidentally falling to the closed position.

The provision of suitable stops 17, which may be of the construction shown in the drawings or any other suitable construction, prevents the door from leaving the guides except when it is desired to remove the door. In that event the screws 18 are removed and the abutment 17 taken away,—after which the door can be drawn out of its guides through the open ends of the same.

From the foregoing description, taken in connection with the accompanying drawings, it will be seen that I have provided a simple and effective construction of refrigerator door which enables me to do away with all hinges and door locks such as are now used on refrigerators, and which enables me to obtain a tight sealing contact between the door gasket and the cabinet structure while the door is in the closed position and in which the construction is such that only when the door is in the closed position do the gaskets engage the cabinet structure. Hence, there is no rubbing friction on the gaskets which would tend to wear them and cause air leakage.

From the foregoing description, taken in connection with the accompanying drawings, it is thought the complete construction, operation and advantages of my invention will be clear to those skilled in the art to which it relates.

What I claim is:

1. A cabinet having a doorway, a door for closing said way, a gasket on the outer face and lower edge of said door, means operable upon applying a lifting force to the door for first moving the door bodily away from the doorway, and upon further lifting of the door to cause the door to move upwardly and backwardly in an arc to a place at the top of the refrigerator, said means comprising side channelled trackways, upper and lower sets of lugs on the sides of the door to work in said ways, said ways each including portions lying approximately parallel with the door jamb, and an arcuate portion extending from the upper ends of said parallel portions of the ways, said ways including forwardly curved cam-like portions cooperating with said lugs when the door approaches its completely closed position for giving the door a bodily movement toward the door opening, thereby applying the entire door gasket to the jamb at one time, said cabinet having a door sill, the lower ends of said guideways terminating at said sill, the upper ends of said guideways being open to permit withdrawal of the door, and means normally closing said open ends.

2. A cabinet having a doorway, a door for closing said way, a gasket on the outer face and lower edge of said door, means operable upon applying a lifting force to the door for first moving the door bodily away from the doorway, and upon further lifting of the door to cause the door to move upwardly and backwardly in an arc to a place at the top of the refrigerator, said means comprising side channelled trackways, upper and lower sets of lugs on the sides of the door to work in said ways, said ways each including portions lying approximately parallel with the door jamb, and an arcuate portion extending from the upper ends of said parallel portions of the ways, said ways including forwardly curved cam-like portions cooperating with said lugs when the door approaches its completely closed position for giving the door a bodily movement toward the door opening, thereby applying the entire door gasket to the jamb at one time, said parallel portions of the ways and said door opening being inclined to the horizontal whereby the weight of the door as it is being lifted will act to move the door away from the doorway, said cabinet having a door sill, the lower ends of said guideways terminating at said sill, the upper ends of said guideways being open to permit withdrawal of the door, and means normally closing said open ends.

3. In a cabinet having a doorway provided with a jamb, a plane of the face of which is inclined to the horizontal, a door in the cabinet to underlie said doorway as a closure, said door having a marginal gasket to lie against the doorway jamb, said cabinet having a door sill on which said door may rest in its closed position, a gasket on the lower edge of said door between it and the sill, channelled guideways mounted on the cabinet at each side of the doorway and having portions extending under the top of the cabinet away from the doorway, upper and lower lugs on the door ends to lie in said guideways, said guideways including camming elements to act on said lugs as they approach the limit of their movement to the door closing position to force the face of the door toward the jamb and apply the entire marginal gasket to the face of the jamb simultaneously, the upper extremities of said guideways having retaining recesses for the upper lugs of the door to hold the door against gravitating toward the closed position until said lugs are released from the recesses, said guideways having curved humps adjacent said recesses and said guideways having curved portions on which the lower lugs lie while the upper lugs are in said recesses, said last named curved portions tending to direct the door downwardly toward the doorway.

4. In a cabinet having a doorway provided with a jamb, a plane of the face of which is inclined to the horizontal, a door in the cabinet to underlie said doorway as a closure, said door having a marginal gasket to lie against the doorway jamb, said cabinet having a door sill on which said door may rest in its closed position, a gasket on the lower edge of said door between it and the sill, channelled guideways mounted on the cabinet at each side of the doorway and having portions extending under the top of the cabinet away from the doorway, upper and lower lugs on the door ends to lie in said guideways, said guideways including camming elements to act on said lugs as they approach the limit of their movement to the door closing position to force the face of the door toward the jamb and apply the entire marginal gasket to the face of the jamb simultaneously, the upper portions of said guideways each including an upwardly curved front part merging with a downwardly inclined rear part terminating in a pocket for the upper lugs to rest in when the door is opened, the guideways each also having an upwardly humped portion on the downwardly inclined rear part thereof adjacent but in front of said pocket.

5. In a cabinet having a doorway provided with a jamb, a plane of the face of which is inclined to the horizontal, a door in the cabinet to underlie said doorway as a closure, said door having a marginal gasket to lie against the doorway jamb, said cabinet having a door sill on which said door may rest in its closed position, a gasket on the lower edge of said door between it and the sill, channelled guideways mounted on the cabinet at each side of the doorway and having

portions extending under the top of the cabinet away from the doorway, upper and lower lugs on the door ends to lie in said guideways, said guideways including camming elements to act on said lugs as they approach the limit of their movement to the door closing position to force the face of the door toward the jamb and apply the entire marginal gasket to the face of the jamb simultaneously with the application of the lower edge gasket to the sill, the upper portions of said guideways each including an upwardly curved front part merging with a downwardly inclined rear part terminating in a pocket for the upper lugs to rest in when the door is opened, the guideways having an upwardly humped portion on the downwardly inclined rear part thereof adjacent but in front of said pocket.

6. A cabinet having a doorway provided with a jamb, the plane of the face of which is inclined to the horizontal, a door in the cabinet to underlie said doorway as a closure, said door having a marginal gasket to lie against the doorway jamb, said cabinet having a door sill on which said door may rest in its closed position, a gasket on the lower edge of said door between it and the sill, continuous channelled guideways mounted on the cabinet at each side of the doorway and having portions extending under the top of the cabinet away from the doorway, upper and lower lugs on the door ends to lie in said guideways, said guideways including camming elements to act on said lugs as they approach the limit of their movement to the door closing position to force the face of the door toward the jamb and apply the entire marginal gasket to the face of the jamb simultaneously with the application of the lower edge gasket to the sill.

7. The combination with a refrigerator body having an inclined doorway provided with a jamb and a sill portion, a slidable door, guideways on the walls of the body at each side of the doorway, upper and lower lugs on the sides of the door for operation in said guideways, said guideways each extending from the sill along the doorway and under the top of the cabinet toward the back of the cabinet, each of said guideways including a portion paralleling the inclined doorway, another portion curved upwardly and rearwardly from the upper extremity of the inclined doorway and merging with a rearwardly and downwardly inclined portion terminating in a recess, each of said guideways also having their ends which are adjacent the sill cammed outwardly toward the doorway and having similar outwardly cammed portions adjacent the top of the doorway, all being arranged whereby the lugs adjacent the upper ends of the door will lie in said recesses when the lugs adjacent the lower end of the door lie adjacent and just below the cammed portions which are located adjacent the upper end of the doorway to hold the door by its own weight in its open position as well as to cause the upper end of the door in moving to the open position to be moved in part by gravity to the open position during the latter part of the movement from the closed to the open position.

GEORGE E. FRIEDRICH.