

Feb. 18, 1941.

C. L. DIERKER  
FOLDING GARAGE DOOR

2,232,372

Filed Aug. 3, 1938

2 Sheets-Sheet 1

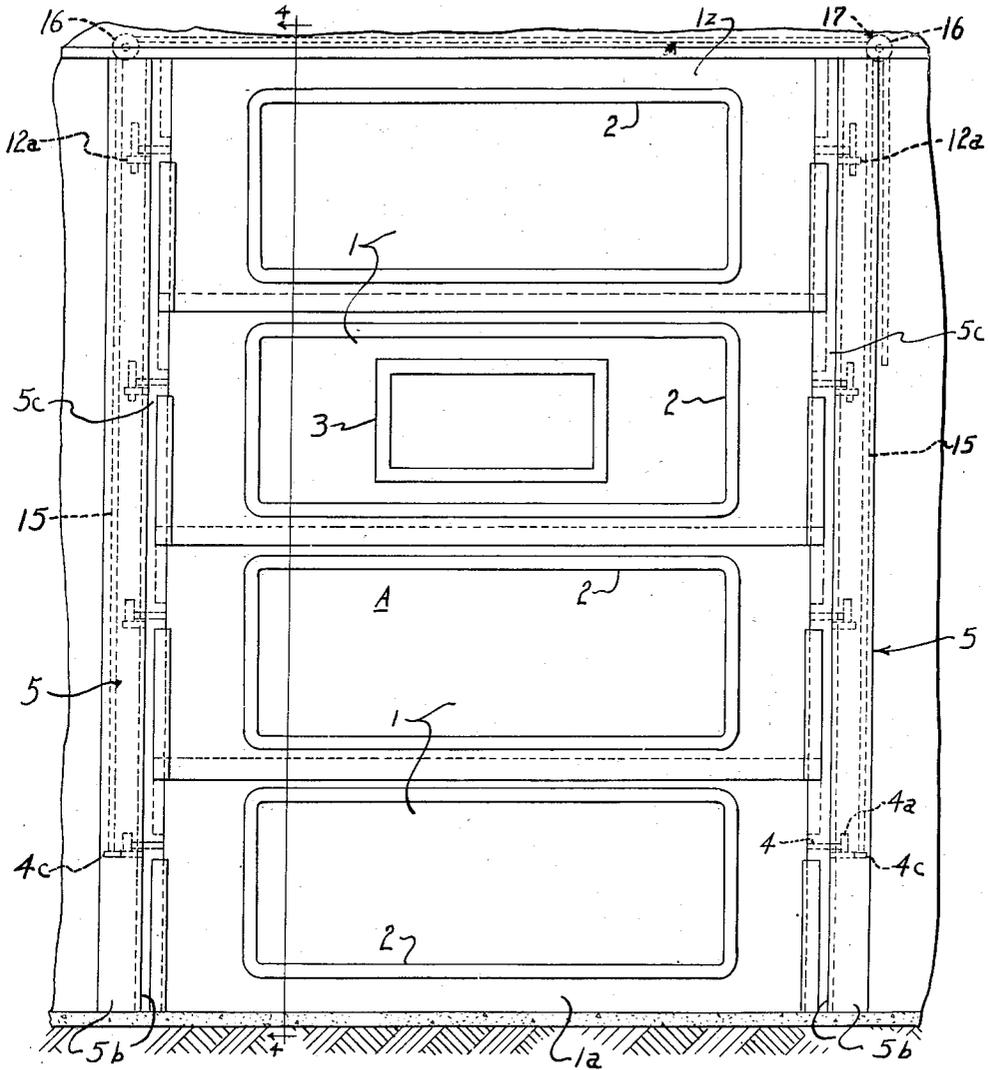


Fig. 1.

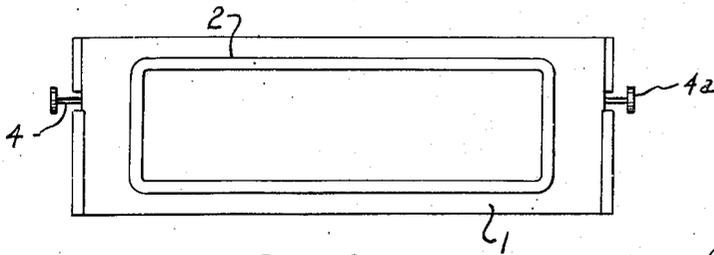


Fig. 2.

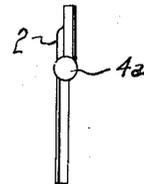


Fig. 3.

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2 Sheets-Sheet 2

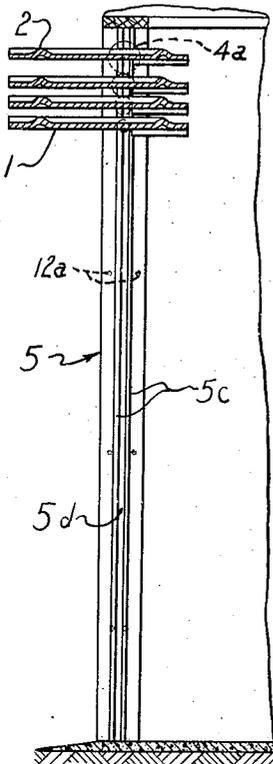


Fig. 4.

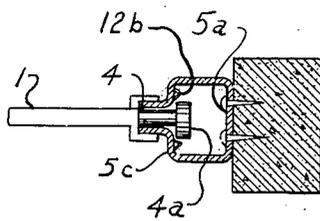


Fig. 5.

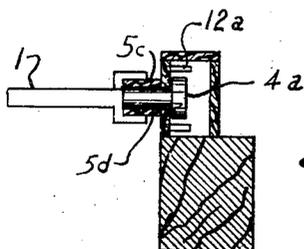


Fig. 6.

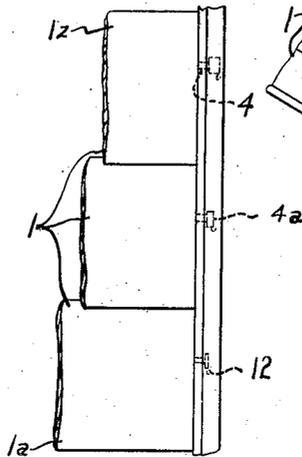


Fig. 7.

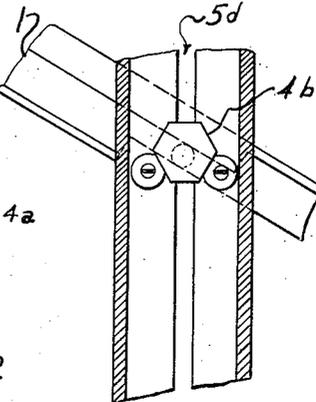


Fig. 8.

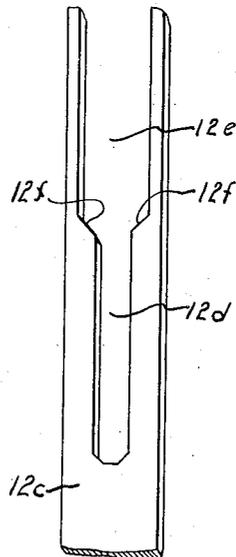


Fig. 9.

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# UNITED STATES PATENT OFFICE

2,232,372

## FOLDING GARAGE DOOR

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Application August 3, 1938, Serial No. 222,752

6 Claims. (Cl. 29—19)

This invention relates to improvements in folding or collapsible doors or partitions, such as employed upon garages or for the fire doors of buildings. One of the chief objects of the invention is to provide a folding or collapsible door made up of a plurality of panels or shutters horizontally arranged and mounted at their ends to slide within channels or run-ways formed in the upright side members of the door, and to expand vertically in an overlapping relation for closing the door opening, or to pivot to a horizontal position for collapsing to the top of the door frame, for the purpose of opening the door.

Another object of the invention is to provide a folding or collapsible door or partition, the same being made up of a plurality of narrow panels arranged in a horizontal overlapping relation, these panels being extended between channeled and vertically positioned side members of the door, the ends of the panels being provided with headed lugs extended into the channels of the side members and upon which lugs the panels may turn or pivot so that their planes are turned either vertically, as when the door is closed, or are turned horizontally and drawn together in a stack at the top of the door opening, as when the door is opened, the said channels of the side members of the door being increased in width from bottom to top of the door frame at distances substantially corresponding to the width of the panels, and the heads of the pivot lugs upon which the panels are suspended being also increased or enlarged from bottom to top, to the end that the several panels will automatically spread vertically for closing the door way with each panel pivotally supported in its required position as a partial closure by being stopped at the required vertical position in the door frame by virtue of its pivot lugs at either end contacting the relatively reduced shoulders of the next lower step or reach of the channel ways of the side members of the door frame.

Another object of the invention is to provide a vertically collapsible door or partition, comprising a plurality of narrow panels horizontally extended between the side members of a door frame the latter being channeled to engage lugs or pins extended medially from the ends of the panels, the said pins having heads of increasing thickness or diameter from the predetermined lower panel to the upper panel, with pins or stops mounted in the channel-ways of the side members of the door frame at regularly spaced distances one above the other, in such manner as to successively intercept and stop the several panels on their downward

movement in the process or operation of closing the door or of expanding the panels for that purpose, the said successive stopping of the several panels being due to the said successive enlargement of the heads of the pivot lugs or pins extended from the ends of the panels and contacting the said pins or stops of the channel-ways of the side members.

With the foregoing and such other objects and advantages in view as may appear from the following specification and drawings, attention is now directed to the drawings wherein

Figure 1 is a fragmentary view of a wall with a door-way formed therein, the door-way being provided with a collapsible closure or door composed of collapsible panels assembled and mounted in accordance with my invention.

Figure 2 is a frontal elevation of one of the panels or shutters, a plurality of which are assembled to complete a door in accordance with my invention.

Figure 3 is an end view of one of the panels or shutters.

Figure 4 is a section on the line 4—4 of Figure 1, the door panels however being shown collapsed to the top of the door, for opening the same.

Figure 5 is a fragmentary view showing how the panels of the door are pivotally hung within the channeled side members of the door frame and illustrating one means for stopping the panels at their required vertical positions, for the purpose of entirely closing the door opening.

Figure 6 is a detail showing one method or means of stopping the panels of the door at their required vertical locations, by means of pins or stops extended transversely of the channel-way or track of the side members of the door frame, these pins being adapted to intercept successively thicker heads of pivot lugs extended from the panel ends, from the bottom panel to the upper panel and whereby the panels are spread to close the door opening.

Figure 7 is a similar detail showing another method of stopping or spreading the door panels to close the door opening, by means of pins or stops mounted at either side of the heads of the pivot lugs supporting the panels, these heads being increased in diameter from bottom to top and the pins being spaced further and further apart to correspond, and whereby the same automatic spreading of the panels is secured as by the expedient shown in Figure 6.

Figure 8 is a similar detail showing still another method of providing stops in the tracks or channel ways of the door frame, for the heads of the

supporting lugs of the panels, the means here shown being the simple one of striking out angular tabs or points from the walls of the metal channel ways mounted vertically at the sides of the door ways.

Figure 9 is a detail in perspective, showing a means through the provision of hexagonal heads for the pivot lugs of the panels, co-operating with stops in the channel-ways having co-acting and angularly disposed margins, for setting the panels angularly from the vertical for providing ventilation as may be required.

Figure 10 is an enlarged detail of an inner, slotted stop plate, provided with longitudinally extended slots of increasing width from the predetermined lower to the upper end thereof, the same being designed for mounting within the channel-ways of the vertical side members of the door frame, upon the inner walls of the facing plates, to serve as stops for the successively diametrically enlarged heads of the supporting pivot lugs of the panels.

In practicing this invention I provide a plurality of relatively narrow panels or shutters 1, constructed of any suitable material such as thin wood or sheet metal, and which may include reinforcing ribs 2 if desired, and one of these panels being disposed at a suitable elevation in the complete door may be provided with a window 3, if wanted. Short bolt-like studs 4 having the outwardly disposed heads 4a are anchored in the ends of these panels in exact longitudinal alignment with each other but slightly to one side of the median line of each panel, so that as supported from these lugs the predetermined lower sides or margins of the panels will automatically turn downward through gravity. Channeled side members or bars 5 are vertically mounted at either side of the door A, the same being preferably of metal and including the backs 5a, sides 5b and facing plates or strips 5c the latter being spaced apart to provide the medial and longitudinal slots 5d which are of a width nicely and freely to pass the studs 4, whereby the panels are slidably mounted at their ends to the said channeled side bars.

The purpose of the invention is to provide means for spreading these panels one over the other from bottom to top in an overlapping relation as shown in Figure 1, so as to close the entire door opening. This object may be accomplished by any one of several methods. As represented in Figures 5 and 6 this is done by making the heads 4a of the lugs 4 of constantly and gradually increasing thickness from the predetermined bottom panel 1a to the top panel 1z, and then mounting pins or stops 12 transversely through the members 5 over the backs thereof, in such position and arrangement that each successive set of pins, one at either side of the door frame and in horizontal alignment, will function to permit one of the panels or shutters to slide down vertically and then to freely support that panel through the bearings which the heads 4a will have upon each successive set of the aligned pins, from bottom to top of the assembly.

In lieu of the foregoing method and as represented in Figure 7, the same result as to the spreading and locating of the panels may be brought about by a gradual increase in the diameter of the heads 4a from bottom to top of the assembly, and then locating stop pins 12a at either side of the slots 5d in the channeled tracks and in suitably vertically spaced relation to nicely intercept the bolt heads of successively in-

creased diameter, as extended from their respective panels, so as to properly spread and locate those panels over the door opening, to the same effect as the previously described arrangement. Or, in lieu of the pins 12a, and as shown in Figure 8, angular tabs or points 12b may be struck out of the frontal strips 5c at either side to serve the same purpose as the pins 12a. Or, as shown in Figure 10, an inner and slotted stop plate 12c may be employed for the purpose referred to, the same being formed with longitudinally extended slots 12d-12e from bottom to top of the strip, each slot being of slightly greater width than the one below it, and of a length substantially corresponding to the width of a panel, thereby providing stop shoulders 12f upon which the heads 4a of the lugs 4, of successively enlarged diameter from bottom to top of the assembly, may have a bearing at either side of the doorway, one of these said plates being mounted within the channel of the vertical side member at either side of the door frame upon the inner wall of the facing plates. As shown in Figure 9, the heads of the pivot lugs for supporting the panels, may be formed with angularly faced margins as shown at 4b, and thus adapted to co-act with the correspondingly angularly extended margins of the laterally positioned stops, as shown, for the purpose of setting and holding the panels or any desired panel angularly in open position and so as to facilitate ventilation within the building involved.

The panels may be pulled upwardly and collapsed horizontally together for opening or clearing the doorway, by means of ropes 15 secured at 4c to the extended ends of the lowermost lugs 4 and extended over pulleys 16, the ropes being joined at 17 and brought together down at one side of the structure. Obviously the invention might be used to cover horizontal openings as well as vertical openings, and the panels should be of a uniform width preferably, and assembled so as to slightly overlap one another at bottom and top margins, when the panels are expanded or spread over a door opening. Owing to the eccentric pivotal suspension of the panels at either end thereof, they fall automatically to their vertical positions and to their overlapping relation, in the operation of closing the door or other opening.

While I have herein shown and described certain structural features of the invention, I claim the right to vary the same in minor details, not departing however from the essence of the invention as defined in the appended claims.

I claim:

1. A collapsible closure for a door opening or the like, comprising channeled side bars mounted in parallel alignment at either side of the opening, a plurality of panels of a length to transversely span the opening and adapted to overlap one another in a spread or expanded relation for closing over the opening or to be pulled upwardly and collapsed flatly and horizontally together for clearing the opening; pivot lugs eccentrically extended in longitudinal alignment at either end of the panels and adapted to enter and slide within the channels of the side bars, the panels being suspended from these lugs and the eccentric mounting causing the panels to automatically turn vertically for closing the opening of the door when they are spread thereover from bottom to top, and complementary stop pins at different levels for the respective lugs of each panel adapted to automatically arrest the down-

ward movement of one of each of said panels at different levels in the door opening to spread the panels from top to bottom of the said door opening by gravity and hoist means for elevating said panels to horizontal stacked position to clear the door opening.

2. A collapsible closure for a door opening, comprising channeled side bars mounted in parallel alignment at either side of the opening, the bars having slotted facings, a plurality of relatively narrow panels of a length to transversely span the opening and of a width to close same from bottom to top when spread thereover in vertical overlapped relation, and adapted to be collapsed horizontally together at the top of the opening for clearing same, pivot lugs eccentrically extended in longitudinal alignment at the ends of the panels and adapted to freely slide within the slots of the facings of the side bars, the inner ends of the lugs being headed and these heads being progressively enlarged from the predetermined lowermost panel of the assembly to the uppermost panel thereof, and means within the channels of the side bars and arranged in spaced relation therein from bottom to top of the bars for successively abutting the progressively enlarged heads of the pivot lugs at the ends of the panels to limit movement of and thereby position the panels, whereby the panels as dropped downward from the top of the door opening will automatically spread over the door opening and close same, the panels turning vertically in overlapping relation due to the eccentric mounting thereof as aforesaid, and means for raising and horizontally collapsing the panels together at the top of the door opening.

3. In a closure construction, a plurality of panels movable to and from a position in stacked relation to approximately a position in a common plane, projections on said panels, guide means in which said projections are slidable and rotatable to and from said positions, stop members on said guide means at different elevations each engageable by and adapted to support a different projection when the panels are disposed in the said approximately common plane, said stop members being at progressively increasing distances laterally of the path of movement of the projections in the direction away from said first mentioned position and said projections on each lower panel being narrower than the projections of each adjacent upper panel to thereby enable the projections to be retracted past and between the said laterally spaced stop members from said first mentioned position.

4. A collapsible closure for a door opening or the like comprising channeled side bars with slotted facings mounted in parallel alignment at either side of the opening, a plurality of panels of a length to transversely span the opening

mounted and adapted to drop vertically in overlapped relation to close the same, and to be pulled up and collapsed horizontally together for clearing the opening, the said mounting means including pivot lugs eccentrically extended in longitudinal alignment at either end of the panels and adapted to pass through the slotted facings of the side bars and freely slide therein and coacting stop pins on the inner walls of the channels of the side bars and at the ends of the pivot lugs, for automatically stopping and spreading the panels from bottom to top of the door opening through downward movement of the panels following their release from a relatively elevated position.

5. A collapsible closure for a door opening or the like, comprising channeled side bars mounted in parallel alignment at either side of the opening, a plurality of panels of a length to transversely span the opening and adapted to overlap one another in a spread or expanded relation for closing over the opening or to be pulled upwardly and collapsed flatly and horizontally together for clearing the opening, pivot lugs eccentrically extended in longitudinal alignment at either end of the panels and adapted to enter and slide within the channels of the side bars, the panels being suspended from these lugs and the eccentric mounting causing the panels to automatically turn vertically for closing the opening of the door when they are spread thereover from bottom to top, panel spreading means comprising successive enlargements of the pivot lugs from the lowermost to the uppermost of the panels, and complementary and co-acting elements in the channeled side bars to successively intercept the correspondingly successive enlargements of the pivot lugs of the panels and means for raising the panels to their horizontal stacked position for clearing the door opening.

6. A collapsible closure for a door opening or the like comprising channeled side bars with slotted facings mounted in parallel alignment at either side of the opening, a plurality of panels of a length to transversely span the opening mounted and adapted to drop vertically in overlapped relation to close the same, and to be pulled up and collapsed horizontally together for clearing the opening, the said mounting means including pivot lugs eccentrically extended in longitudinal alignment at either end of the panels and adapted to pass through the slotted facings of the side bars and freely slide therein and co-acting means for spreading the panels comprising successive enlargements on the pivot lugs from lowermost to uppermost and complementary stops within the channels of the side bars for successively intercepting the same.