June 20, 1944. C. I. AUTEN 2,351,656

FOLDING DOOR AND SUPPORT THEREFOR

Filed Jan. 28, 1944

FIG. 1.

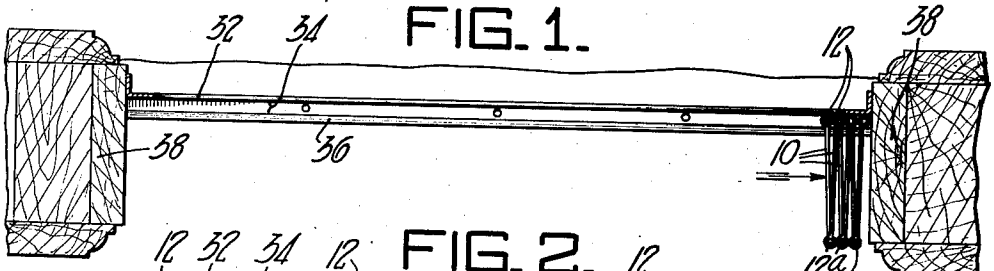


FIG. 2.

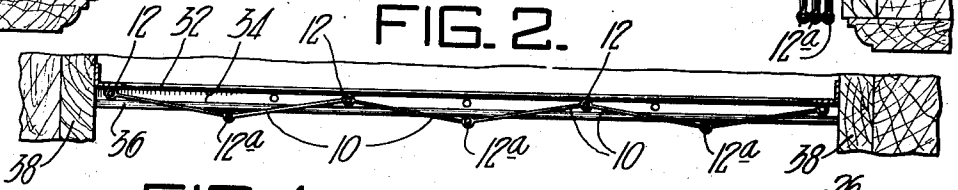


FIG. 4.

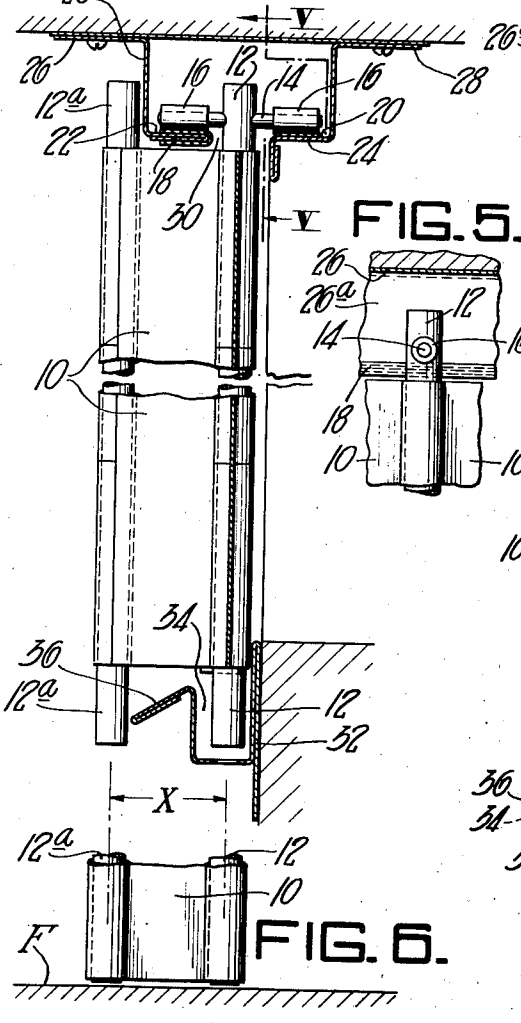


FIG. 5.

FIG. 3.

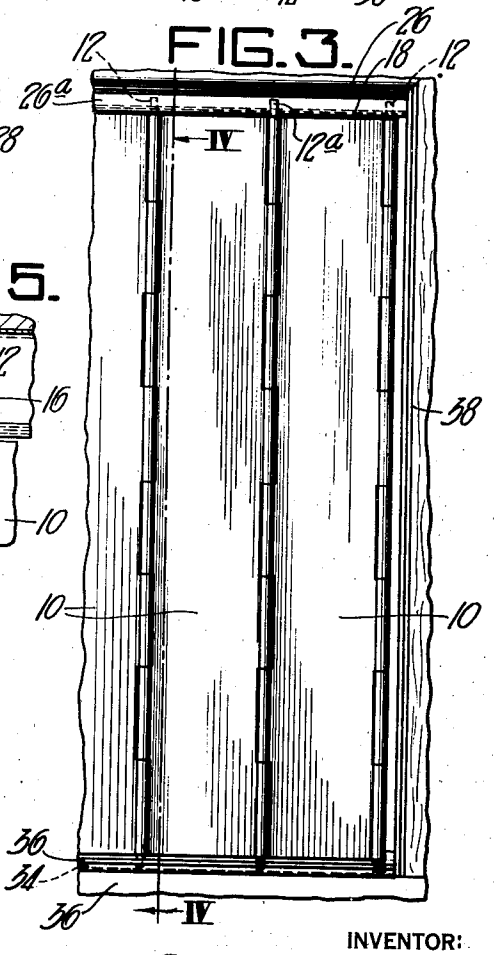


FIG. 6.

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FOLDING DOOR AND SUPPORT THEREFOR

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6 Claims. (Cl. 160—199)

The present invention relates to improvements in folding doors and supports therefor, and aims to provide a door construction requiring a minimum amount of floor area. A further aim of the invention is to provide a folding door comprised of a plurality of leaves connected to one another by alternate and intermediate hinge pintles, and means for maintaining the alternate pintles laterally offset from the intermediate pintles so as to prevent the pivotal connections from assuming dead center alignment, whereby an endwise force on the door when in closed position will collapse or fold the several leaves to an open position.

The above and related features of the invention will be more fully apparent from a consideration of the following specification and appended claims when read in connection with the accompanying drawing.

In the drawing:

Figure 1 is a horizontal section illustrating one door construction embodying the present invention, wherein the leaves of the door are in collapsed or open position.

Figure 2 is a similar horizontal section showing the leaves in expanded or closed position.

Figure 3 is a fragmentary front elevation of Figure 2.

Figure 4 is an enlarged vertical section on line IV—IV of Figure 3.

Figure 5 is a fragmentary detail section on line V—V of Figure 4.

Figure 6 is a view of a modified detail of construction for the lower portion of the door.

Referring more particularly to the drawing, the improved door of the present invention comprises a plurality of leaves or panels 10 which may conveniently be made of sheet metal or wood. The several leaves are hingedly connected to one another along their adjacent upright edges, and the hinge pintles are arranged in combination with guiding and supporting elements hereinafter more fully described, in such a way that the several hinge pintles are prevented from being brought into dead center alignment so that when an endwise force is applied to one end of the closed door, the hinged leaves will be collapsed from the position shown in Figure 2, to that shown in Figure 1.

In the construction illustrated, the plurality of alternate pintles 12 are supported by overhead hanger members 14 carrying rollers 16 which traverse guide tracks 18 and 20 supported by flanges 22 and 24 of overhead brackets 26 and 28. The inner edges of the flanges 22 and 24 define a straight guide groove 30 which compels the alternate pintles 12, when moved, to travel in a substantially straight line. Located between adjacent pairs of the alternate pintles 12 are intermediate pintles 12a. These intermediate pintles at their upper ends are disposed outside or beyond the upright wall 26a of the supporting bracket 26. In some cases the door will be solely supported and guided from overhead. In such cases the bottom of the door will just about clear the floor line F, as indicated in Figure 6. This is a desirable arrangement when the door is used between rooms. In other instances, a lower guide bracket 32 will be provided, formed with a groove 34, for receiving and guiding the lower extremities of the alternate hinge pintles 12. This guide bracket will be formed with an outwardly and downwardly beveled lip 36, for guiding engagement with the lower extremities of the pintles 12a. With the parts constructed and arranged as described, it will be apparent that either extreme pintle 12 may be permanently pivoted to a suitable stationary bracket or the like, and that when an endwise force is applied to the opposite edge of the door, the pintles 12 traveling with the hangers 14 will move in a straight line along the guide groove 30. Thus the plurality of individual leaves will partake of a swinging movement about said pintles 12, the leaves also pivoting about the intermediate pintles 12a, with the result that the door will be thus collapsed to the position of Figure 1, in which the entire door occupies a very small area between the door framing members or jambs 38—38.

In the construction illustrated and described, it will be apparent that the cooperative relation between the hinge pintles 12 and 12a and their supporting and guiding means, is such that said pintles cannot be moved to a dead center position wherein they are all in a straight line. In other words, the arrangement is such that the pintles 12 and 12a, when the door is in closed position, are separated laterally, for example, for a distance equal to that shown at X in Figure 4. Thus an endwise push on the door will be resolved in forces which will collapse the door to the position of Figure 1.

It will be rearily understood that the widths of the individual leaves 10 of the door may be of desired dimensions. Thus various combinations and numbers of leaves can be used to provide closures for a large variety of door openings, and any size opening may be closed with a single door of the character described or with a multiple

combination of such doors. One edge of the door may be either temporarily or permanently attached to one jamb of the opening, and if two doors are used, the opposite edges thereof may be temporarily or permanently attached to the jambs of the opening. When the two doors are in closed position, their abutting edges may be temporarily secured together with various known types of commercial hardware.

The door of the present invention is an improvement over conventional swinging doors, since it requires less space for operation, it being apparent that the improved door will occupy a floor area or width dimension equal to the maximum width of one of the leaves D, and the widths of a leaf can be so chosen that it will be no greater, and in many cases, less, than the width of the door jamb, this minimum width being pictorially illustrated in Figure 1. Common swinging doors heretofore generally used between rooms and in closets, etc., usually require an unobstructed floor area in their complete arc of movement equal to 1.57 times the square of the width of the door, to permit proper swinging thereof. For example, a common door whose width is 2′ 8″, eliminates for useful purposes approximately 11.2 square feet of floor area. In contradistinction, the improved door herein disclosed and claimed occupies no useful floor area when open, closed, or being operated, and the maximum width that the door will occupy is equal to the width of the door opening times the width of one of the leaves of the door. Thus the invention makes available appreciable floor area for useful purposes, which is not normally usable in the case of conventional swinging doors. The described door is adapted for use in place of conventional doors between rooms in buildings, and is also well suited for use in kitchen cabinets, lockers, and the like. The door construction is of particular advantage when used in kitchen cabinets placed above kitchen sinks and working shelves, since it eliminates the danger of bumping heads on projecting doors of the common swinging type.

Various modifications in the structure and arrangement herein illustrated, may be made without departure from the invention as defined in the appended claims.

I claim:

1. A folding door comprising a plurality of leaves serially connected to one another by alternate and intermediate hinge pintles, and means for maintaining the alternate pintles in line and laterally offset from the intermediate pintles so that an endwise force on the closed door will fold the several leaves to the collapsed open position.

2. A folding door comprising a plurality of leaves serially connected to one another along their upright edges by alternate and intermediate hinge pintles, overhead movable members supporting said alternate pintles, a guide traversed by the movable members, and means for maintaining the alternate pintles laterally offset from the intermediate pintles so that an endwise force on the closed door will fold the several leaves to the collapsed open position.

3. A folding door comprising a plurality of leaves serially and pivotally connected with one another along their adjacent edges, means preventing the pivotal connections from assuming dead center alignment, and means supporting said leaves with freedom for collapsing, closing, and expanding opening movement.

4. A folding door comprising a plurality of leaves serially and pivotally connected with one another along their adjacent edges, means preventing the pivotal connections from assuming dead center alignment, overhead supporting means comprising movable hanger elements for said leaves, and overhead guide tracks traversed by said elements.

5. A folding door comprising a plurality of leaves serially and pivotally connected with one another along their adjacent edges, means preventing the pivotal connections from assuming dead center alignment so that an endwise force on the closed door will fold the several leaves to collapsed open position, rolling hangers from which said leaves are suspended, and an overhead guideway supporting said rolling hangers.

6. A folding door comprising a plurality of leaves serially and pivotally connected with one another along their adjacent edges, means preventing the pivotal connections from assuming dead center alignment, overhead supporting means comprising movable hanger elements for said leaves, overhead guide tracks traversed by said elements, the pivotal connections being extended below the bottoms of said leaves, and a bottom guide for coaction with said extended connections.

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