May 13, 1958 H. S. KUYPER 2,834,410

FOLDING DOOR

Filed Dec. 5, 1955 2 Sheets-Sheet 1

Fig. 1

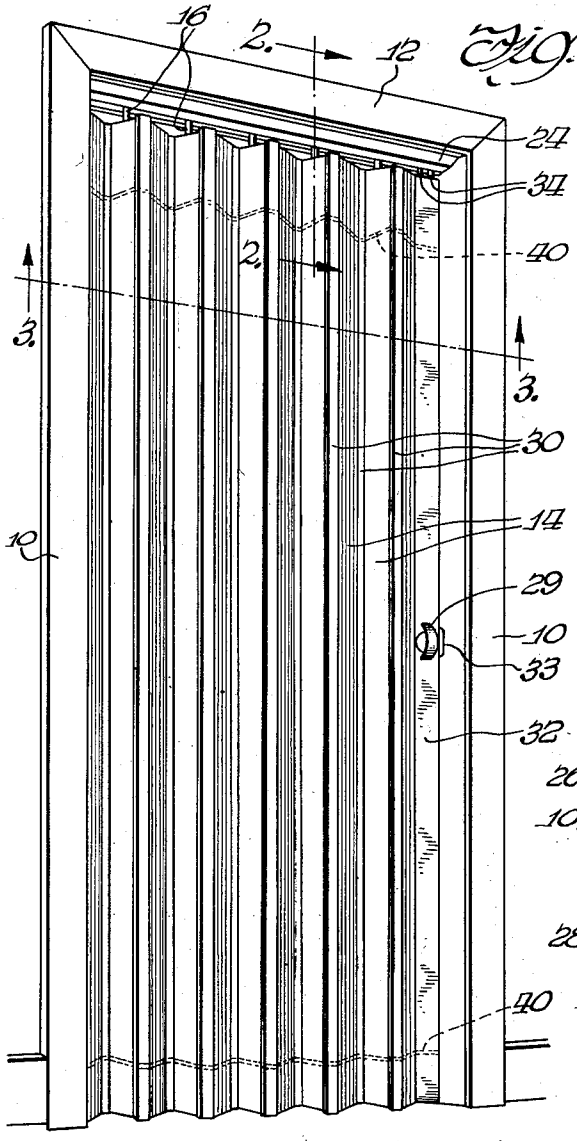


Fig. 2

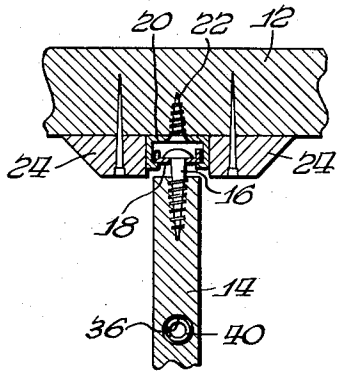


Fig. 4

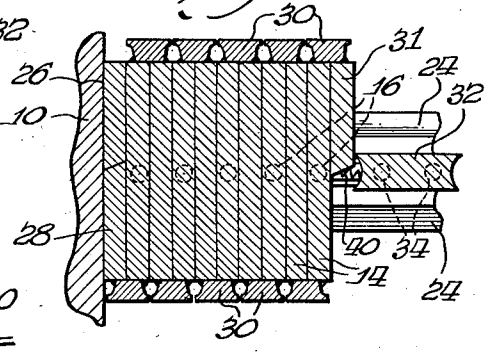
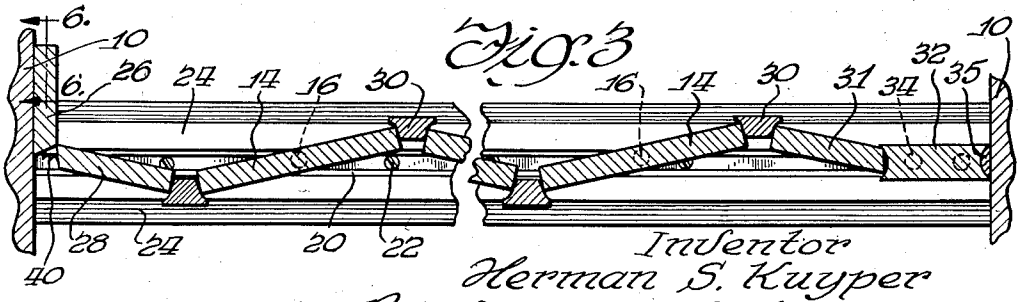


Fig. 3



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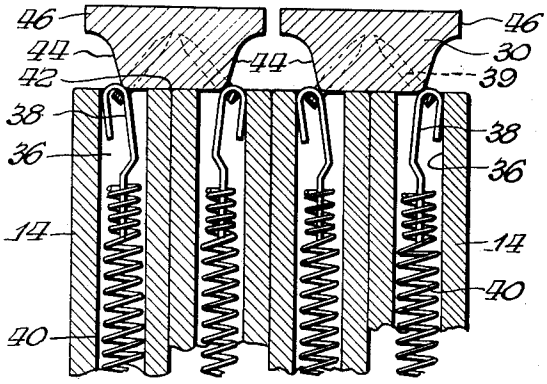


Fig. 5

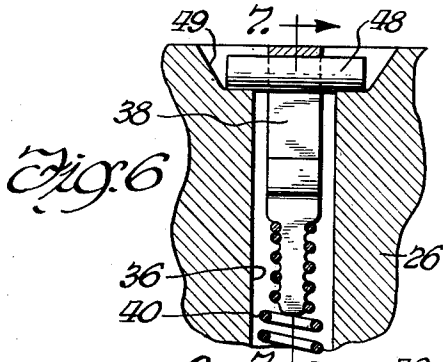


Fig. 6

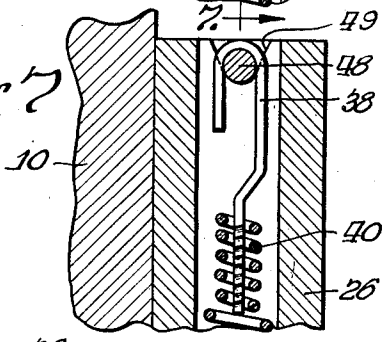


Fig. 7

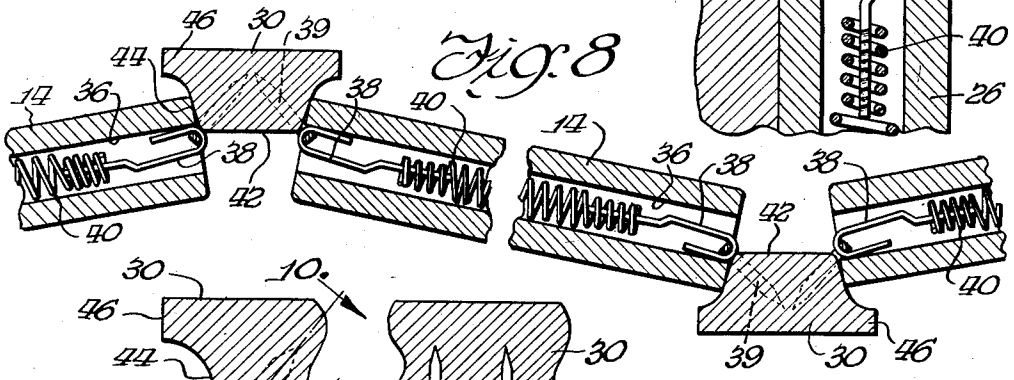


Fig. 8

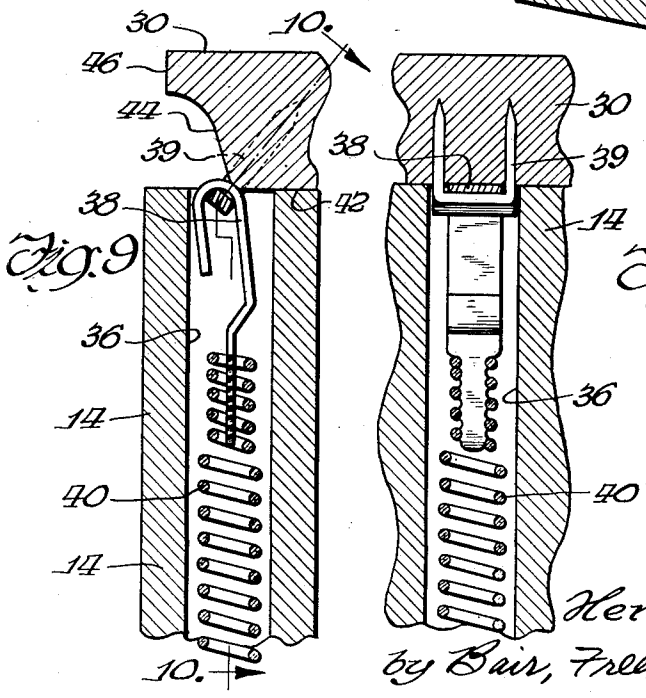


Fig. 9

Fig. 10

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FOLDING DOOR

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Application December 5, 1955, Serial No. 550,875

2 Claims. (Cl. 160—199)

This invention relates to a folding door and particularly one of the type formed of vertically elongated panels folded accordion-like whereby in the closed position of the door the accordion formation is of shallow character; and in the open position of the door the panels are folded in close face-to-face relationship at one side of the door opening.

One object of the invention is to provide a folding door of improved character when compared with the one shown in my prior Patent No. 2,677,420 of May 4, 1954, and particularly an arrangement of molding strips between the panels of the door which effect greater saving of space and at the same time less noise in opening or folding the door, the door folding into a neat compact bundle as compared with the usual hinged door swinging out into the room.

Another object is to provide a folding door which is easy to install, the door being suspended from a track along the head of the door frame, the door being particularly desirable in connection with clothes closets and the like where relatively wide opening is desirable to get at the storage space therein whereas a wide door of the hinged type would have to swing into the room and would therefore be undesirable.

Still another object is to provide a folding door formed of panels with a novel means to hold the panels in edge-to-edge relation, and an arrangement of moldings between the edges of the panels which effectively and substantially completely conceal a hinging means which I provide between the moldings and the panel edges to hold them in assembled relationship.

A further object is to provide the moldings and panel edges shaped so as to permit the panels to nest in close face-to-face relationship when the door is in folded or open position, and retain the panels in a symmetrical, shallow accordion-like formation when the door is extended or closed.

Still a further object is to provide hinging means which tends to keep the edges of the panels in contact with the moldings and effect a hinging action about certain corners of the moldings so that an inner face of the molding or angular side edges thereof are engaged by the edges of the panels in the folded and unfolded position respectively of the door, the hinging means being almost completely concealed within openings in the edges of the panel in both positions thus presenting a neat appearing door whether closed or open.

With the foregoing and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my present folding door whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in detail on the accompanying drawings, wherein:

Fig. 1 is a perspective view of a folding door embodying my present invention;

Fig. 2 is an enlarged vertical sectional view on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged horizontal sectional view on the line 3—3 of Fig. 1 and showing the door closed;

Fig. 4 is a view similar to Fig. 3 showing the door open;

Fig. 5 is an enlargement of a portion of Fig. 4;

Fig. 6 is an enlarged sectional view on the line 6—6 of Fig. 3;

Fig. 7 is a sectional view on the line 7—7 of Fig. 6;

Fig. 8 is an enlargement of a portion of Fig. 3;

Fig. 9 is a further enlarged sectional view of a portion of Fig. 5; and

Fig. 10 is a sectional view on the line 10—10 of Fig. 9.

On the accompanying drawings I have used the reference numeral 10 to indicate the side jambs of a door frame, the head jamb of which is indicated at 12. My folding door comprises a plurality of vertically elongated panels 14 which may be formed of wood or other suitable material with substantially square edges for ease of manufacture. Each of these panels has at the top a screw or the like 16 extending through a traveler shoe 18 (see Fig. 2) which is slidable in a channel-shaped track 20. The track is secured to the head jamb 12 as by screws 22 and the connection just described may suspend alternate panels 14 from the head jamb for support of the door during the opening and movement thereof. The track 20 may be concealed by moldings 24 if desired.

In addition to any required number of panels 14, the complete door includes four narrow panels 26, 28, 31 and 32. Also, moldings 30 are provided between the edges of the panels as shown in Fig. 3. The panel 26 is adapted to be secured to one of the side jambs 10; whereas the panels 28 and 31 fill out the accordion pattern of the door as obvious in Fig. 3. The panel 32 is the finished edge of the door and in the closed position of the door as in Fig. 3 may coact with a molding 35 as shown to provide a light-tight joint. The moldings 30 serve also to provide light-tight joints between the panels 14, 28 and 31. In the closed position of the door as shown in Figs. 1 and 3, a latch knob 29 may be manipulated to cause a latch to engage in a strike plate 33.

The panels 14, 26, 28, 31 and 32 are provided with bores indicated at 36 from edge to edge thereof. Springs 40 under tension are strung through the bores 36 and have hook-like hinge elements 38 threaded into their ends as shown in Figs. 9 and 10 which encircle staple-like hinge elements 39 driven into two corners of each molding 30. The coacting hinge elements 38 and 39 are located adjacent the corners between an inner face 42 of the molding 30 and side edges 44 thereof which are at a desired obtuse angle to the face 42 for a specific purpose which will hereinafter appear. The moldings also have beaded edges 46 closely adjacent each other in the open position of the door as shown in Figs. 4 and 5.

With respect to the panel 26 secured to the left hand side jamb 10, two of the springs 40 extend through bores 36 of the panel 28 and then through similar bores 36 of the panel 26 to be anchored at their ends as shown in Figs. 6 and 7 by pins 48 located in notches 49 of the panel 26. Similarly a pair of the springs 40 may extend through the panels 31 and 32 to be anchored at the right side of the panel 32. The springs bend between the panels 26 and 28 and between the panels 31 and 32 to provide the desired hinging action at these points as shown in Figs. 3 and 4.

In the open position just referred to, it will be noted that the panels 14 are in face-to-face contact with each other. The width of the molding face 42 is substantially the same as the thickness of the panel 14 to accomplish this whereas the width of the molding across the beads 46 is just slightly less in order to permit the face-

to-face relationship of the panels. Obviously, this relationship results in maximum compactness when the door is folded to the open position. Also, this arrangement makes the door operate quietly as even when moved violently to the folded position, the air trapped between the faces of the panels cushions their engagement with each other.

On the other hand, in the opened or unfolded position of the door as in Figs. 3 and 8 the edges of the panels **14** are substantially square against the side edges **44** of the moldings **30** but preferably the door is extended slightly beyond such position as slightly exaggerated in Fig. 8 to place the entire assembly of panels and moldings under tension to keep them in a symmetrical accordion-like position. This is accomplished by having the distance between the side jambs **10** a fraction of an inch greater than the width of the door in its closed position when the edges of the panels are exactly in contact with the molding edges **44**. Thus the door presents a neat appearance in both the opened and closed positions thereof.

I have disclosed the details of a folding door which is simple to construct, assemble and install. The springs **40** or some equivalent resilient elements such as elastic or the like hold the panels in assembled relationship in such manner as to insure proper folding of the door from the closed position of Fig. 3 to the open position of Fig. 4 when the panel **32** is moved away from the right hand door jamb **10** (Fig. 3). The moldings **30** serve to conceal the exposed parts, the hinge elements **38** and **39** which are almost completely within the bores **36** in both the opened and closed positions as obvious from an inspection of Figs. 5 and 8 respectively. The coaction of the panel edges with the molding edges **44** in the closed position of the door as shown in Fig. 8 serves to cause the panels to present an evenly and neatly corrugated appearance.

Some changes may be made in the construction and arrangement of the parts of my folding door without departing from the real spirit and purpose of my invention. It is, therefore, my intention to cover by my claims such modified forms of structure or use of mechanical equivalents as may reasonably be included within their scope.

I claim as my invention:

1. A folding door comprising a series of panels arranged substantially edge to edge, moldings between the edges thereof, said panels having openings extending into the edges thereof, tensioned flexible resilient elements received in said openings, said moldings having inner faces and side edges at obtuse angles to said inner faces, hinge elements at substantially the corners between said inner faces and said side edges lying in registry with said openings and connected with said tensioned flexible resilient elements, said resilient elements urging the edges of said panels against said moldings to cooperate therewith in tending to retain said panels in both edge-to-face relationship with said moldings in the folded position of the door and edge-to-edge relation with said moldings in the unfolded position of the door, and permitting accordion-like folding and unfolding of the door, the coaction of said panel edges and said molding inner faces holding the door in said folded position when open, and the coaction of said panel edges and said molding side edges holding the door in a substantially shallow accordion formation when closed.

2. In a folding door, a series of panels and moldings arranged edge to edge, each of said moldings having a flat inner face and two flat side edges which are at obtuse angles relative to said inner face, said panels having openings therethrough from edge to edge thereof, the edges of said panels being substantially normal to their faces, tensioned flexible resilient elements through said openings, hinging means at substantially the corners between the inner faces and side edges of the moldings and lying in registry with said openings and connecting the ends of said elements and said moldings, said elements normally retaining said panel edges in contact with said moldings, thereby retaining said panels in shallow accordion-like edge-to-edge relation due to the inclination of said molding side edges and permitting accordion-like folding of said panels to decrease, and unfolding thereof to increase, the effective width of the door, and beads along the outer edges of said moldings which are adjacent each other in edge-to-edge relation of the moldings in the folded position of the door to substantially conceal the edges of said panels and said hinging means.

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