May 22, 1956 G. E. DIXON, JR 2,746,540

ACCORDION FOLDING DOOR

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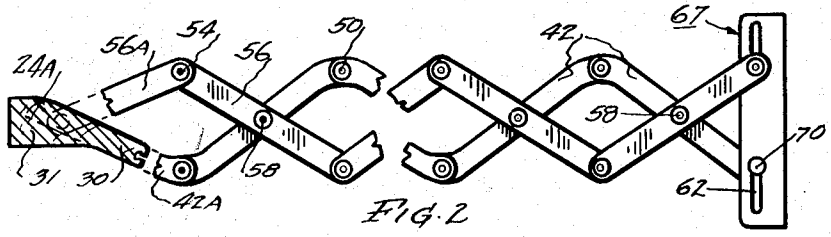

FIG. 2

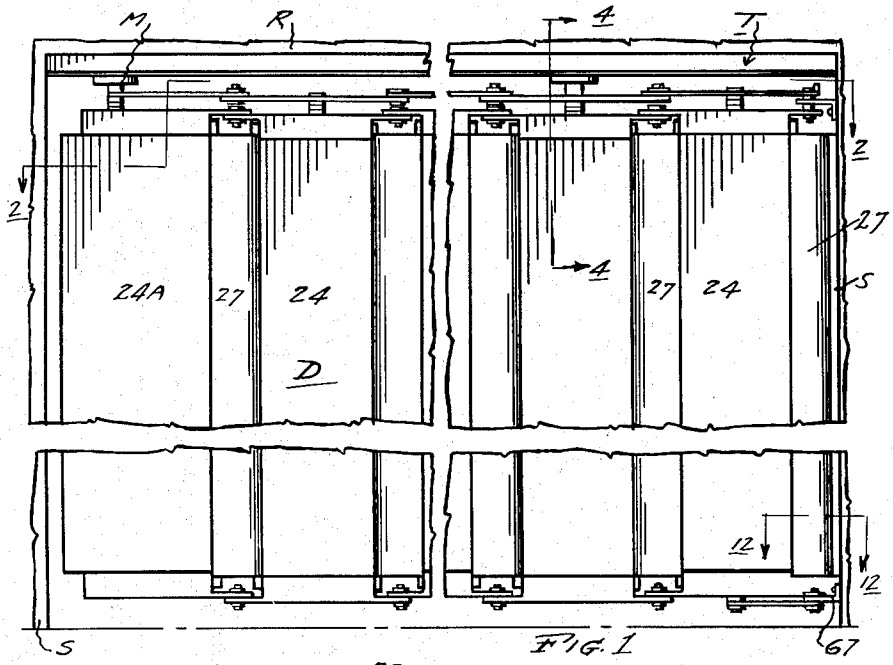

FIG. 1

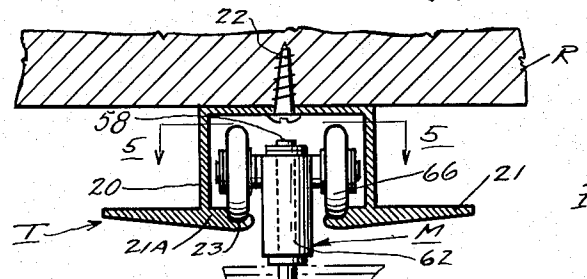

FIG. 4

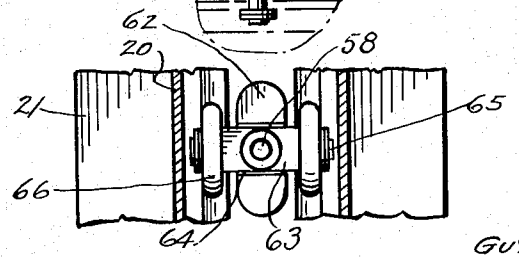

FIG. 5

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FIG. 6

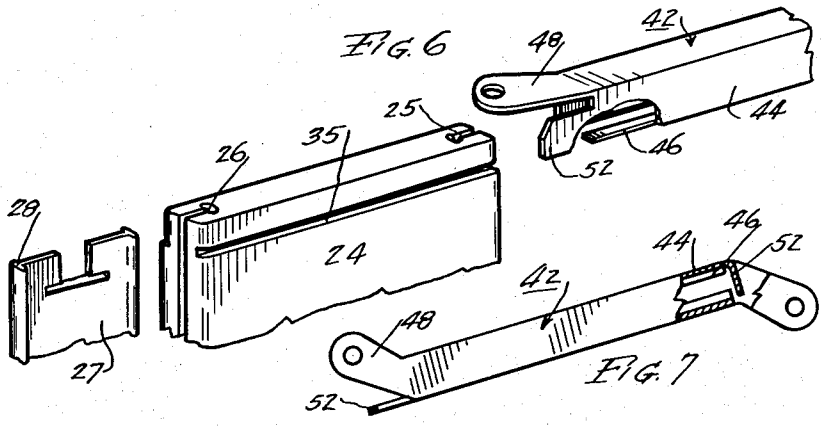

FIG. 7

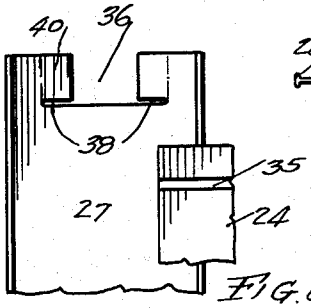

FIG. 8

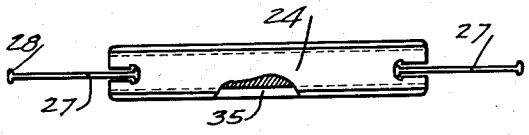

FIG. 10

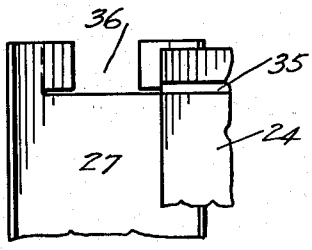

FIG. 9

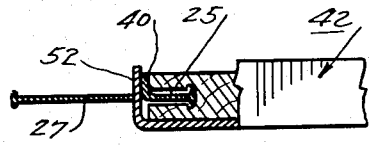

FIG. 11

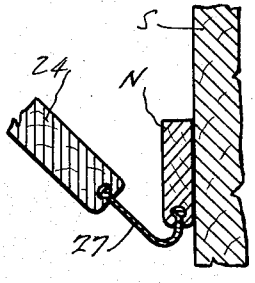

FIG. 12

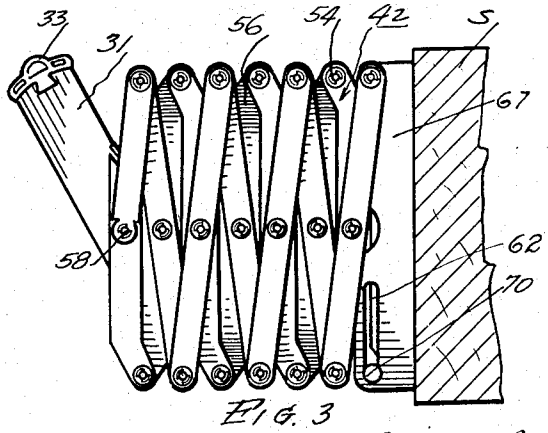

FIG. 3

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ACCORDION FOLDING DOOR

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Application May 4, 1955, Serial No. 506,019

2 Claims. (Cl. 160—206)

This invention relates to doors of the type which includes vertical panels adapted to fold in an accordion-like manner.

An object of the invention is to provide a door which is primarily made of wood or other substantially inflexible material, and yet will fold in a compact, attractive manner adjacent one side of the opening to be closed.

Another object of the invention is to provide a folding door which is attractive in appearance and yet is simple to operate and will give a lasting and durable performance.

Another object of the invention is to provide a mounting means for the individual panels making up the door which dispenses with the use of screws or like fasteners for attaching the panels to the mounting means.

Still another object of the invention is to provide a mounting means for the individual panels which in addition to retaining the panels in place, assists in retaining in place flexible strips which hingedly connect adjacent panels.

In the drawings, which illustrate the preferred embodiment of the invention,

Figure 1 is a fragmentary side elevation of a complete door assembly, in extended or door-closing position;

Figure 2 is a section on about line 2—2 in Figure 1;

Figure 3 is a view substantially similar to that of Figure 2, on an enlarged scale, but showing the door in completely folded position;

Figure 4 is a section on about line 4—4 in Figure 1, on an enlarged scale;

Figure 5 is a section on line 5—5 in Figure 4;

Figure 6 is a fragmentary, perspective, exploded view of one of the panels making up the door, the panel suspending link, and a hinge strip which connects adjacent panels;

Figure 7 is a top plan view of the panel-suspending link, in part broken away;

Figure 8 is a fragmentary side elevation showing the hinge strip in the process of being assembled to a panel;

Figure 9 is a view similar to that of Figure 8, but showing the hinge strip in position in the panel preparatory to mounting the panel-suspending link to the panel;

Figure 10 is a top plan view substantially similar to that of Figure 9, partly broken away;

Figure 11 is a view similar to that of Figure 10, with the suspending means mounted on the top of a panel, parts being broken away; and,

Figure 12 is a fragmentary section on line 12—12 in Figure 1, on an enlarged scale.

Referring now by numerals to the drawings, the folding door, shown as D, is adapted to close an opening, doorway, or the like, the vertical stiles of which are indicated as S.

The door is suspended from a track T attached to and carried by the door opening upper rail R, which conveniently may take the form shown in Figure 4.

As shown, the track is of generally channel cross section and is formed with depending side wall portions 20

merging with transverse members 21 extending on either side of the wall portions 20. The track T is secured to the rail R as by screws 22. The inner terminals 21A of the members or flanges 21 are formed on their upper faces with longitudinally extending grooves 23 to provide a trackway for carriages M (to be referred to later). The track is at least substantially co-extensive with the width of the door opening.

A plurality of vertical inflexible panels 24, preferably of wood or the like, and of equal length, and of substantially rectangular cross section, comprise the main portions of the door. Each panel 24 is formed on its opposite faces, adjacent its upper and lower ends, with a slot 35 extending throughout the width of the panel. Each panel 24 is also formed on each of its opposite longitudinal edges, with a slot or recess 25 extending throughout the length of the panel. The slot is somewhat keyholed or T-shaped in cross section so that the inner end of the slot is enlarged as at 26, as best shown in Figure 6.

The panels are hingedly connected together by strips 27 of flexible material such as rubber, plastic or the like, the vertical edge portions of each strip being enlarged or beaded as at 28 to fit snugly within the enlarged inner end portions 26 of the slots 25. The strips are held in assembled position on or to the panels 24 in a manner to be explained later.

The strip 27, at one end of the door assembly, is (as best shown in Figure 12) secured to the adjacent stile S by means of a member N fastened to the stile and formed on one edge with a slot similar to the slot 25 formed in the panel 24. The slot receives the flanged or beaded edge of the strip 27.

At the opposite side of the door assembly, the outermost inflexible panel, shown as 24A, is preferably formed as shown in Figure 2, having a portion 30 of rectangular cross section merging in an outer enlarged portion 31 directed at an acute angle to the plane of the inner portion 30, so that the outer panel is presented substantially at right angles to the face of the adjacent stile when the door is in extended or closing position.

Each strip 27, at its upper and lower ends, and intermediate its length, is formed with a cut out or notch 36, as best seen in Figure 8. The strip is slit as at 38 on either side of the notch to define or provide readily flexible or folding flaps or portions 40.

An inverted, generally U-shaped elongate plate or member 42 is adapted to be attached to each end of each of the panels 24, such members being part of the lazy tong system by which the door is effectually folded and unfolded. As best seen in Figures 6 and 7, the vertical legs 44 of the member 42 are provided at their lower edges with inturned flanges 46 which are received into the slots 35 of the panel 24.

The vertical walls 44, respectively, of the member 42 are formed to present extensions or ears 52 at opposite ends, the ears extending beyond the end of its corresponding vertical wall 44. The ears are adapted to be bent transversely to be presented to the opposite edges of the panel 24 to which the member 42 is attached, as best seen in Figure 11, and therefore prevent substantial displacement of the panel relatively to the member 42. The members are thus locked or attached to the opposite ends, respectively, of the panel. The members are formed at opposite ends with hinge butts 48.

As already stated, the flexible strips or panels 27 are locked or assembled to the adjacent inflexible panels 24 by the interengagement of the beaded edges 28 of the panels 27 with the enlarged portions 26 of the slots 25 formed on the longitudinal edges of the panel 24. As already stated, also, the opposite ends of the flexible strips or panels 27 are to provide flexible flaps 40. When the panels 24 and 27 are in their intended, interlocked posi-

tion, the flexible flaps extend or project inwardly of the adjacent edges of the adjacent panels **24**, so that flaps when bent laterally, will engage or be presented to the side edges of the adjacent panels, as best seen in Figure 11. The extensions or ears **52**, when bent laterally as seen in Figure 11, serve to hold flexible panels **27** assembled to the adjacent panels **24**, the flexible strips being incapable of any substantial displacement lengthwise of the adjacent panel **24**.

The several members **42** are pivotally connected together, end to end, by pins **50** mounted through the hinge butts **48**. Pivotally connected together, end to end as by pins **54**, are links **56**. These links in turn are pivotally connected at mid length, to the members **42** at mid length thereof by pins **58**, so as to form lazy tongs. As will be obvious, such lazy-tong pantograph system causes all of the panels to extend and stack in alignment equally and simultaneously.

Obviously, the forwardmost member, shown as **42A**, and the forwardmost link, shown as **56A**, are substantially half the effective length of the member **42** and the link **56**.

Washers (not shown) are preferably provided between the members **42** and the links **56**, so that the members and links will not engage.

The door is suspended, at spaced intervals, by the carriage M aforesaid. In Figure 1, two such carriages are shown; their number is a matter of choice, depending on the width of the door.

The carriage may comprise an elongate block **62** recessed transversely as at **64** (see Figure 5) to receive a block **63** formed with journals **65** on which wheels **66** are suitably fixed for free rotation. The block **62** is suitably secured for free rotation on a pin **58** forming the pivotal connection between the corresponding member **42** and link **56**.

The inner end of the door is operatively connected to its corresponding stile S as by angles **67** suitably secured to the stile, each having a horizontal leg slotted as at **62** in which pins **70** mounted on the adjacent (inner) ends of the adjacent members **42** and of the links **56** may freely slide.

What I claim is:

1. A folding door comprising a plurality of inflexible vertical panels formed with vertical slots having their inner ends enlarged in and substantially co-extensive with vertical edges of said panels and having horizontal slots in and adjacent the horizontal edges of said panels and coextensive therewith, strips of flexible material substantially coextensive with said vertical slots and having enlarged vertical edge portions received in the enlarged inner ends of said vertical slots, said strips connecting the panels in series, a horizontal track above said panels, rollers supported on said track and having axle members connected to and supporting said panels, a lazy-tong system between said track and the upper ends of said panels, another lazy-tong system at the bottom of the door, each system including similar generally U-shaped plates each having inturned flanges received in said horizontal slots and end flanges to lock said plates to panel bars substantially equal in length to said plates and pivoted at their centre points to said plates, said plates and said bars having pivotally connected terminals, the terminals of said plates being offset from the longitudinal axes thereof so that said panels can collapse into parallel relation when the door is fully opened, and an attaching plate for each of said systems, said plates having slots, one of said plates and one of said bars in each of said systems having terminal elements pivotally and slidably mounted in said slots.

2. A folding door comprising a plurality of inflexible vertical panels formed with vertical slots having their inner ends enlarged in and substantially co-extensive with vertical edges of said panels and having horizontal slots in and adjacent the horizontal edges of said panels and co-extensive therewith, strips of flexible material substantially co-extensive with said vertical slots and having enlarged vertical edge portions received in the enlarged inner ends of said vertical slots, said strips connecting the panels in series, a horizontal track above said panels, rollers supported on said track and having axle members connected to and supporting said panels, a lazy-tong system between said track and the upper ends of said panels, another lazy-tong system at the bottom of the door, each system including similar generally U-shaped plates each having inturned flanges received in said horizontal slots and end flanges bent transversely of the length of said plates to lie adjacent the vertical edges of said panels to lock said plates to a panel, bars substantially equal in length to said plates and pivoted at their centre points to said plates, said plates and said bars having pivotally connected terminals, the terminals of said plates being offset from the longitudinal axes thereof so that said panels can collapse into parallel relation when the door is fully opened, and an attaching plate for each of said systems, said plates having slots, one of said plates and one of said bars in each of said systems having terminal elements pivotally and slidably mounted in said slots, said strips having oppositely-disposed flaps adjacent their horizontal end edges bent transversely to lie between an end flange of the plate and the adjacent vertical edge of the panel to lock the strip against substantial displacement relatively to the panel.

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