

[54] SAFETY DOOR HINGE

[76] Inventor: **Wilfred Stouffer**, 4127 Claridge St.,
Philadelphia, Pa. 19124

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160/135, 229, 235; D10/9

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Primary Examiner—Richard J. Scanlan, Jr.

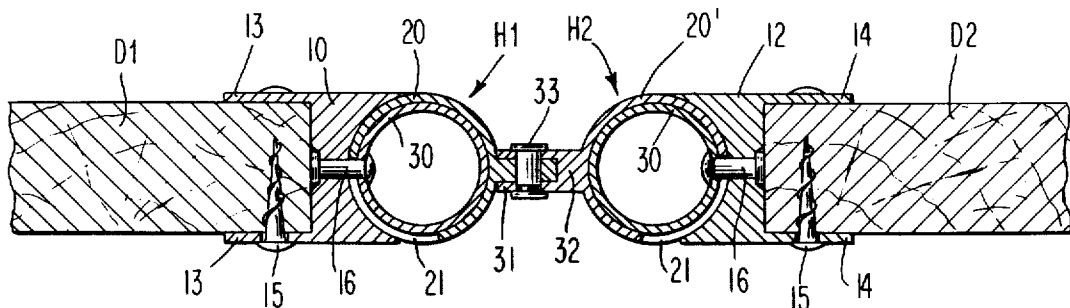
Attorney, Agent, or Firm—Paul & Paul

[57]

ABSTRACT

A compound safety hinge for folding doors comprises a pair of elongated vertical stationary horizontally-slotted tubular connectors each having therein an elongated sleeve insert which is pivotal through an angle limited by the length of the slots, typically through 90°. One vertical edge of each door panel is fastened to one edge of an elongated casing. The other edge of each casing abuts against one of the stationary tubular connectors and is fastened to the pivotal insert by fastening pins or screws which extend through the slots in the stationary connector. Each stationary tubular connector is provided with an outward flange which mates with, and is connected to, the flange of the other stationary tubular connector. The lower end of the pivotal tubular insert is provided with an outward annular flange which serves as a bearing support for the stationary tubular connector.

9 Claims, 4 Drawing Figures



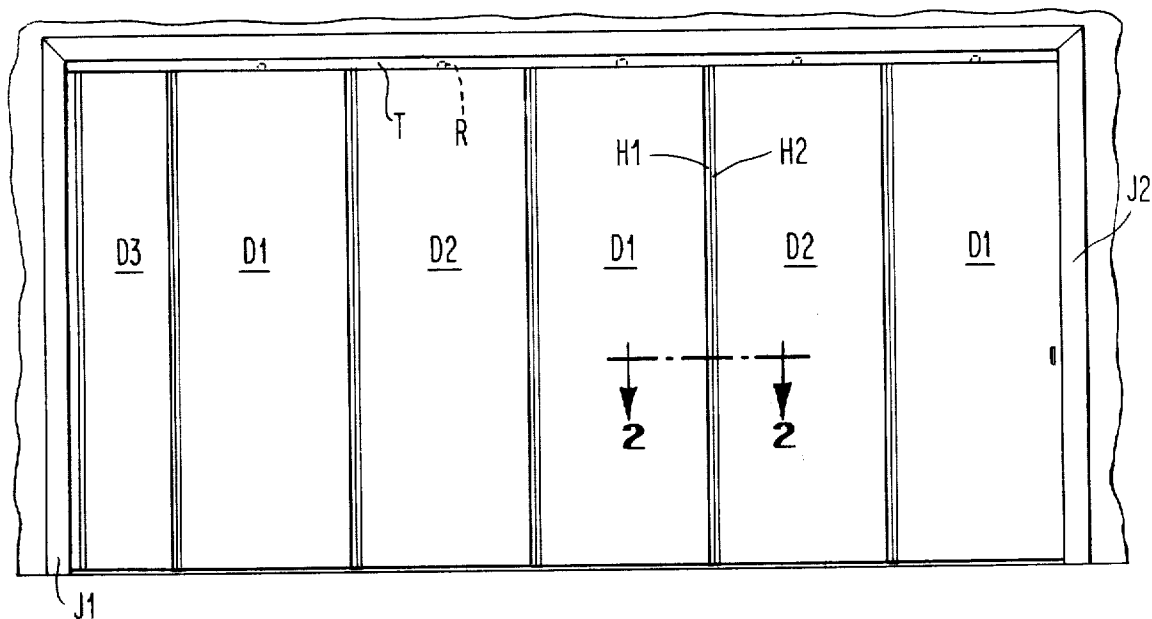


Fig. 1

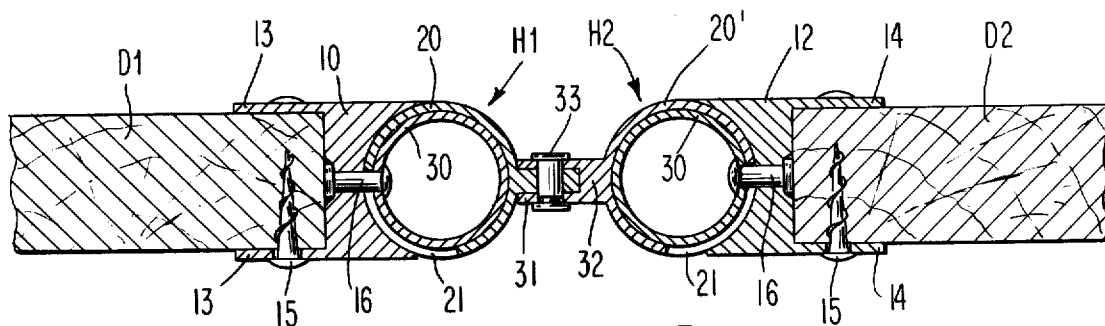


Fig. 2

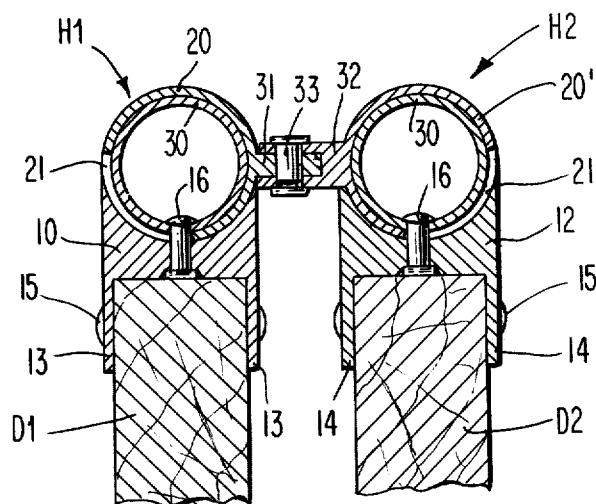
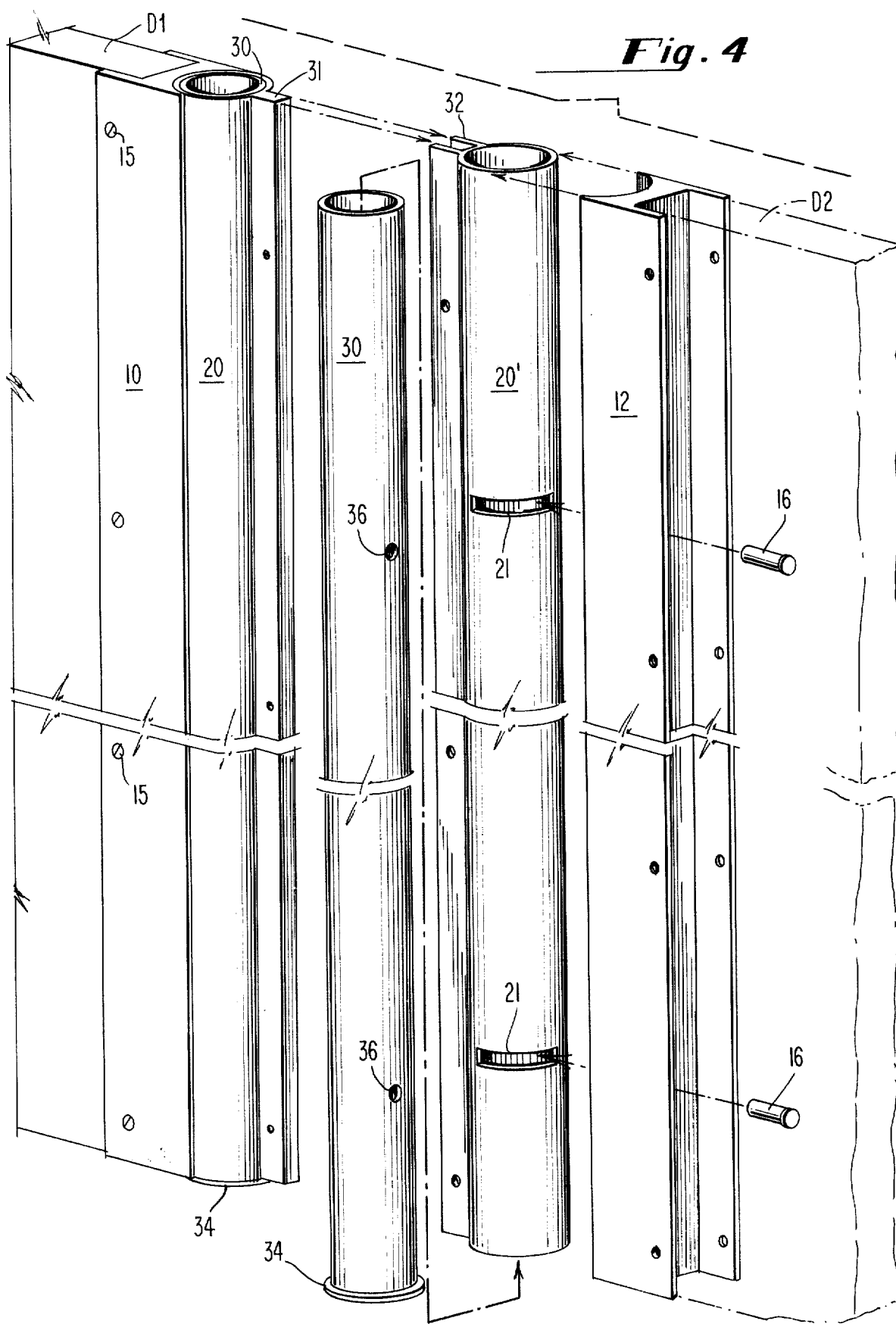


Fig. 3

Fig. 4



SAFETY DOOR HINGE

BACKGROUND OF THE INVENTION

The present invention relates to folding doors, and particularly to folding door panels which can be extended to form what may be referred to as a "flat wall" to distinguish it from an accordion type wall in which the door panels are inclined angularly relative to the center line of the fully extended wall.

Folding doors are widely used as closet doors, particularly in apartments and in condominiums where they are useful as space savers. Folding doors are also widely used as room dividers, and are frequently found in schools and the like. When so used, it is important, from a safety point of view, that the fingers of the children not be caught and smashed when the door panels are pulled out to extended in-line position.

SUMMARY OF THE INVENTION

An important object of the present invention is to provide a safety door hinge which can be safely employed on folding doors of the flat wall type without exposing the children or other persons to the hazard of having fingers caught and smashed when the door panels are extended to assume their inline flat wall position.

The foregoing object, as well as other objects and advantages of the present invention, are achieved, in accordance with a preferred embodiment, by providing a compound hinge comprising a pair of elongated stationary tubular connectors each of which has an elongated sleeve insert which is pivotal within the stationary tubular connector to a limited extent, preferably 90°. The two stationary tubular connectors are connected together. Each of the sleeve inserts is connected, through an intermediate casing, to a different one of the door panels. The casing is connected to the sleeve insert by screws or pins which extend through slots in the wall of the stationary connector. The length of the slots determines the limits of the pivotal movement of the door panel relative to the stationary connector.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic elevational view of the folding door employing hinges according to the present invention.

FIG. 2 is a view, in section, looking down along the line 2—2 of FIG. 1 showing the compound hinge of the present invention in the position it assumes when the door panels are fully extended into flat wall position.

FIG. 3 is a view, in section, showing the hinge of FIG. 2 when the door panels are in fully retracted open position.

FIG. 4 is an exploded perspective view showing the component parts of the compound hinge of FIGS. 2-3.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates schematically a folding door consisting of five and a half panels. The half panel, identified D3, is supported on the door jamb J1 at one side of the doorway or opening. The five full panels, identified D1, D2, D1, D2 and D1, are shown in full extended position with the right edge of the last panel D1 abutting against the door jamb J2. The door panels are illus-

trated as being equipped with guide rollers R which ride in overhead track T.

The door panels shown in FIG. 1, when fully extended, form a flat wall in which each panel is in line with each other door panel.

A presently preferred form of hinge is shown in section in FIGS. 2 and 3. This form of hinge may be referred to as a compound hinge, or a double hinge. FIG. 2 shows the hinge when the door panels are fully extended into closed flat wall position. FIG. 3 shows the position of the hinge when the door panels are fully retracted into open positions, at which time the door panels occupy parallel positions relative to each other. FIG. 4 is an exploded perspective view showing the elements which form the compound hinge of FIGS. 2 and 3.

Referring now to FIGS. 2, 3 and 4, the compound hinge there shown consists of two generally similar hinge assemblies, identified H1 and H2. Each of the hinge assemblies, H1 and H2, includes an elongated vertical stationary tubular connector, identified generally as 20, which is horizontally slotted at spaced intervals along its length. Such slots, identified 21, are seen in FIGS. 2, 3 and 4, and may, for example, be spaced 18 to 20 inches apart. The two assemblies are similar to each other with the exception that in the one, H1, the stationary connector 20 has a male flange or rib 31, while in the other, H2, the stationary connector, identified 20', has a female rib or flange 32. These two ribs or flanges 31 and 32 are intermated and fastened, as by the stud fasteners 33.

Within each of the elongated vertical stationary tubular connectors 20, 20' is an elongated tubular sleeve insert 30. The lower end of the tubular sleeve insert 30 is provided with an outward flange 34 which functions as a bearing support on which the stationary slotted tubular connector rests.

The vertical edge of each of the adjacent door panels D1 and D2 is secured to one edge of one of two elongated casings, identified 10 and 12. In the embodiment shown, the said one edge is flanged as by flanges 13 and 14, to form a door-receiving recess. Screws 15, or other suitable fastening means, secure the door panels to the casing. The other edge of each of the casings 10, 12 is curved to conform to, and to receive, the elongated stationary slotted tubular connector 20, 20'. Pin fasteners 16 are inserted through holes in the casings 10, 12, through the slots 21 in the wall of the stationary tubular connector 20, 21' and through holes 36 provided in the wall of the pivotal tubular insert 30.

As already mentioned, the stationary slotted tubular connector 20 of the hinge assembly H1 has an outwardly projecting male rib or flange 31, while the stationary slotted tubular connector 20' of the hinge assembly H2 has an outwardly extending female rib or flange 32. The ribs 31 and 32, when intermated, are secured together, as by the stud fasteners 33 or other suitable fastening means.

FIG. 2 shows the compound hinge of the present invention in the position it assumes when the door panels are in fully extended position, forming the so-called flat wall. FIG. 3 shows the compound hinge of the present invention in the position it assumes when the door panels are fully retracted. It will be seen, that when the folding door is moved from fully extended to fully retracted position, or vice versa, there is no possibility of a school child or other person having his or her fingers

caught and crushed by the edge of a door panel as it is moved into its final position.

While the hinge of the present invention, in preferred form, is a compound or double hinge, comprising the two hinge assemblies identified H1 and H2, a single one of those assemblies may be used alone as a single hinge for supporting a single door on a door jamb in a simple opening or doorway. In that case the rib or flange 31 or 32 is fastened to the door jamb by way of a suitable adaptor strip.

As previously indicated, an important advantage of the hinge of the present invention is that it functions as a safety hinge, with no possibility of a child's finger being caught and crushed. Other advantages of the hinge arise from its economy and simplicity of construction and assembly. The elongated stationary tubular connectors 20 and 20', together with their respective ribs or flanges 31, 32, may be integral extrusions of aluminum. The tubular sleeve insert 30 and the casing 10, 12 may likewise be extrusions of aluminum.

The outward annular flange 34 located at the bottom of sleeve insert 30, by supporting the tubular stationary connector 20, allows the pins 16 to move easily and with a minimum of friction within the slots 21. The slots 21 are preferably just sufficiently longer than 90° to allow the axis of pins 16 to move through an angle of 90°.

While the pivotal insert 30 has been shown and described as a tubular sleeve, which is the preferred form, the pivotal insert 30 could be a solid cylinder and the fastening means 16 could be screws. Other modifications and variations will occur to those of ordinary skill without departing from the concepts of the present invention, as claimed in the claims.

What is claimed is:

1. A door hinge comprising:

- a. an elongated vertical stationary tubular connector having horizontal slots at spaced intervals along the length of said connector;
- b. an elongated cylindrical insert pivotal within said stationary connector;
- c. an elongated vertical support casing having means along one edge for receiving an edge of door panel and having means along its opposite edge for receiving said stationary tubular connector;
- d. fastening means extending through said slots in said stationary tubular connector for fastening said casing to said pivotal cylindrical insert;
- e. elongated flange means extending radially from said stationary tubular connector for securing said connector to an adjacent stationary support.

2. A door hinge according to claim 1 wherein said elongated cylindrical pivotal insert is a tubular sleeve.

3. A door hinge according to claim 2 wherein the lower end of said elongated pivotal tubular sleeve insert is provided with an outwardly extending flange on which said stationary tubular connector is supported.

4. A door hinge according to claim 2 wherein said means along said one edge of said support casing for receiving an edge of a panel door comprises a recess formed by pair of opposed flanges which extend from the body of said casing.

5. A door hinge according to claim 4 wherein said means along said other edge of said support casing for receiving the tubular stationary connector comprises a surface having a curvature corresponding to that of said tubular stationary connector.

6. A compound hinge for folding doors comprising:
A. First and second hinge assemblies, each assembly comprising:

- a. an elongated vertical stationary tubular connector having elongated flange means extending outwardly therefrom and having horizontal slots in its wall at spaced intervals therealong;
- b. an elongated cylindrical member inserted for pivotal movement within said stationary connector;
- c. a door-panel support casing having a recess along one edge for receiving an edge of a door panel and having an arcuate surface along its other edge having a curvature corresponding to that of said stationary tubular connector for receiving said tubular connector; and
- d. fastening means extending through said slots in said stationary tubular connector for fastening said casing to said cylindrical insert, and for allowing pivotal movement of said casing relative to said stationary connector through an angle limited by the length of said slots.

B. Fastening means for fastening together the elongated flange means of said first and second hinge assemblies.

7. A compound door hinge according to claim 6 wherein said elongated cylindrical insert is a tubular member.

8. A compound door hinge according to claim 7 wherein said fastening means extending through said slots are pins.

9. A compound door hinge according to claim 8 wherein said stationary tubular connectors and said tubular pivotal insert are extruded aluminum.

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