

Oct. 1, 1968

C. E. AHLEEN

3,403,720

FOLDING DOOR

Filed July 22, 1966

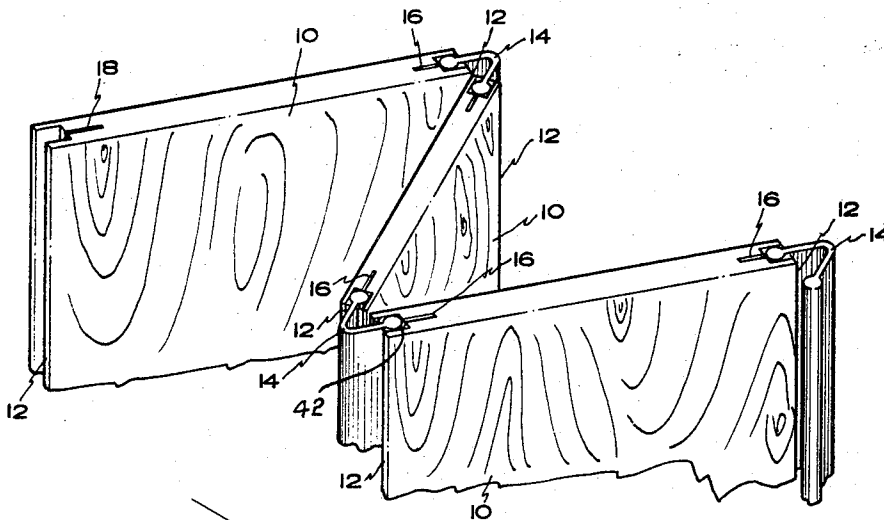


FIG. 1.

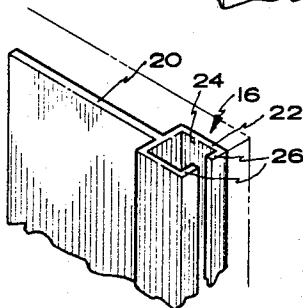


FIG. 2

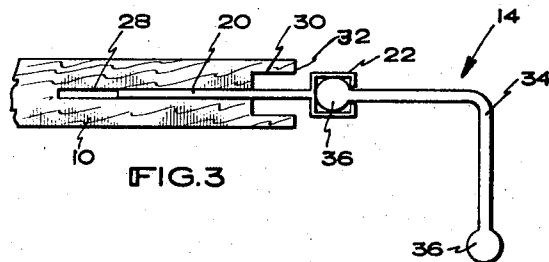


FIG. 3

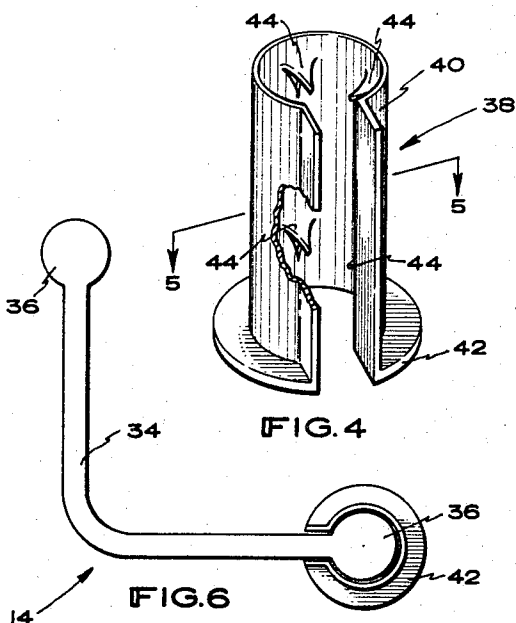


FIG. 4

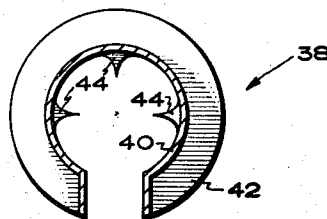


FIG. 5

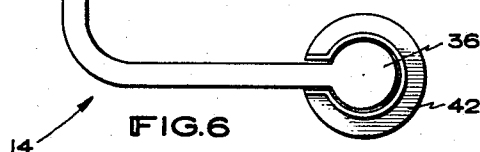


FIG. 6

INVENTOR.
CLARENCE E. AHLEEN

BY

C. H. HARRIS

HIS ATTORNEY

1

3,403,720
FOLDING DOOR
Clarence E. Ahleen, 2741 South 7th East,
Salt Lake City, Utah 84115
Filed July 22, 1966, Ser. No. 567,254
6 Claims. (Cl. 160—231)

ABSTRACT OF THE DISCLOSURE

A folding door which includes a door section having an elongated slot along an edge which extends inwardly into the section, a hinge insert having a connecting end fixedly secured in the elongated slot and an opposite end with a keyway provided therein, hinge means having a beaded end received in the keyway for hinging the section to an adjacent section, an elongated semicylindrical member fixedly connected to the beaded end of the hinge means, and an outwardly projecting flange attached to the elongated member to coact with an end of the hinge insert to prevent longitudinal movement of the hinge in the insert.

This invention relates to a folding door, and in particular, to an accordion type wooden folding door or partition provided with a rigid insert for connecting panels of said doors securely together.

In recent years a great variety of accordion type closures have been devised for use in the home, and on a larger scale, such closures have been used to partition off large areas in schools, gymnasiums or auditoriums, churches, restaurants, etc. Such closures generally comprise a plurality of elongated panels or slats hinged together along their longitudinal edges. The elongated sections are then connected at one end to track means and are positioned so that an accordion movement is imparted to said sections when they are moved on said tracks. One of the most recent developments in the construction of such closures has been the use of flexible connector strips which are used to hinge the elongated sections together. The flexible connector strips have beaded ends which are sized to slide into grooves which are provided along the longitudinal edges of said sections. Since substantial pressure is placed upon the connectors when the closure is pulled to an open position, they must be securely connected to the elongated sections of said closure. Attempts have been made to construct accordion type closures from thin wooden sections according to the fashion heretofore described; however because of the difficulty in making grooves which are strong enough to retain the flexible connector strips when said strips are subjected to substantial pulling forces, accordion type closures constructed from said thin wooden sections have not proven to be entirely satisfactory. As a result, attempts have been made to secure metal hinges to the longitudinal edges of the wooden panels. However, these hinges can be seen which results in an unsightly appearance and, in addition, the closure does not operate smoothly.

It is accordingly an object of my invention to provide an accordion type closure which overcomes the objections and disadvantages heretofore found in such closures.

Another object of my invention is to provide an accordion type closure which is constructed from thin walled wooden panels.

It is another object of my invention to provide an insert to be used in combination with elongated thin walled wooden panels for enabling said panels to be connected together.

Still another object of my invention is to provide an insert for thin walled elongated closure panels which is securely attached to said panels and hidden within.

2

Still other objects of my invention will become apparent to those skilled in the art as the invention is better understood by reference to the detailed description appearing hereinafter.

Briefly the invention comprises a folding door structure including a plurality of elongated vertically spaced sections hinged together between their adjacent longitudinal edges with flexible hinge means. Said hinge means have beaded ends which slid into hinge inserts mounted in slots provided in the edges of the vertically spaced sections. The hinge inserts have an elongated connecting end sized to slide into the slot in the sections and an enlarged head end with a keyway provided therein for receiving the beaded end of a flexible hinge. Longitudinal movement of the flexible hinge in a hinge insert is prevented by affixing an elongated flanged member to the hinge which coacts with an end of the hinge insert.

So that the invention may be more readily understood and carried into effect, reference is made to the accompanying drawings which are offered by way of example only and are not to be taken as limiting the invention, the scope of which is defined by the appended claims, which obviously embrace equivalent structures and processes.

FIGURE 1 is a perspective view of the folding door of my invention showing a plurality of door sections provided with hinge inserts and connected with flexible hinge means.

FIGURE 2 is a partial perspective of the preferred hinge insert of my invention.

FIGURE 3 is an enlarged top view of a door section provided with a slot shaped to receive a hinge insert, which insert, having a flexible hinge connected thereto, is partially inserted in said slot.

FIGURE 4 is a plan view of the preferred hinge locking means of my invention.

FIGURE 5 is a sectional view of FIGURE 4 taken along line 5—5.

FIGURE 6 is a top view of a resilient hinge with locking means connected to a beaded end of said hinge.

Referring now more particularly to the drawings, FIGURE 1 shows the folding door closure of my invention, which closure includes a plurality of elongated sections or slats of wood or other suitable material. The sections are preferably of uniform thickness and width and are interconnected along their longitudinal edges for folding and unfolding in a zigzag or accordion pattern. Said slats 10 are connected along their longitudinal edges 12 with flexible hinges 14 which are in turn connected to rigid hinge inserts 16 secured in slots 18 provided in said sections 10 as hereinafter described.

Hinge insert 16 is shown in detail in FIGURE 2. Said insert 16 comprises connecting end 20 which is elongated to extend inwardly into slot 18, hereinafter described, and form a tight friction contact therewith, and head end 22 which is provided with inwardly extending keyway means 24. Connecting end 20 of insert 16 generally extends into the longitudinal edge of section 10 for a distance which is sufficient to securely hold said insert 16 in said section 10 even when substantial forces are exerted on the insert. Said connecting end 20 extends inwardly into section 10 preferably about $\frac{1}{4}$ to 3 inches, and most preferably $\frac{3}{8}$ to 2 inches. Connecting end 20 generally has a thickness of about $\frac{1}{32}$ to $\frac{1}{2}$ inch, and most preferably, $\frac{1}{16}$ to $\frac{1}{8}$ inch, which enables it to be inserted into very thin wooden panel sections. It is to be noted that insert 16 is generally sized to coact with section 10 along its entire longitudinal edges 12. While the friction contact between connecting end 20 and slot 18 is generally sufficient to secure said end 20 in slot 18, it is also within the scope of my invention to bind said end 20 within said slot 18 through the use of conventional adhesive materials, such as glue; or, insert 16 may be pinned to section 10. As indicated, head end 22

of insert 16 is provided with keyway means 24. Preferably said head end 22 is enlarged, i.e., larger than connecting end 20, thereby enabling my insert to be used with very thin wooden sections 10. The outer edge of keyway means 24 is provided with restriction means 26 which partially blocks the entrance to said keyway means 24 thereby forming a jawed opening which is sized to receive the connecting center portion of flexible hinge 14, herein-after described. Insert 16 may be constructed from any solid material that has the strength to securely hold hinge 14 without breaking or deforming. However, I prefer to construct said insert 16 from a metal such as iron, steel, copper, brass, aluminum, etc., or a plastic or resin such as phenolic resins, amino resins, polyesters, polyurethanes, polyamides, epoxides, polyethers, polyethylene, polystyrene, etc.

FIGURE 3 shows insert 16 partially inserted in slot 18. As shown, said slot 18 is provided with elongated interior end 28 sized to receive connecting end 20 of insert 16 and form a tight friction contact therewith, i.e., inwardly from longitudinal edge on end 32. Preferably, said head end 22 is recessed into said end 32 of section 10 so that its lateral edges are covered by said section 10. Accordingly, enlarged section 30 of slot 18 is formed in section 10 adjacent to longitudinal edge 12, and is sized to receive head end 22 of insert 16. However, it is also within the scope of my invention to have all or a portion of head end 22 extend outwardly past edge 12 of section 10. Slot 18 is generally constructed in section 10 by first cutting interior end 28 and thereafter cutting enlarged section 30, according to conventional cutting techniques.

Turning now to the elongated flexible strip hinges 14, they are preferably formed of a relatively flexible material such as vinyl plastic or other types of resins. Said hinges 14 interconnect the adjacent ends of sections 10 in a manner so as to allow said sections to fold between an open position, wherein the sections are in a substantially face to face relationship to each other, and a position wherein said sections assume a generally shallow angular relation to each other. Hinges 14, which extend along substantially the full length of sections 10, consist basically of substantially V-shaped elongated strips of flexible or resilient material having opposite attaching ends. Elongated enlarged beads 36 are formed along each edge of hinge 14 and are sized to be snugly received within keyway 24, preferably by longitudinally sliding said bead 36 into said keyway 24, to attach said hinge 14 to insert 16. The thickness of center portion 34 of resilient strips 14 is less than the width of the jawed opening of said keyway 24 thereby allowing said center portion 34 to be passed through said jawed opening.

Locking pins 38 are preferably used to lock bead 36 within keyway 24. It will be noted that upon positioning said bead 36 within keyway 24, lateral movement of bead 36 is prevented because of the jawed opening of said keyway 24. Consequently, lateral movement of one facing section 10 relative to an adjacent facing section 10 is prevented to thus effectively maintain said facing members in interlocked relationship with each other. Yet a further connection of each hinge 14 to section 10 is effected by said locking pins 38. Said locking pins 38 generally comprise an elongated semicylindrical tubular portion 40 with an outwardly projecting flange 42 connected to one end of said cylindrical portion 40. Locking pins 38 are utilized by applying one such pin to the upper portion of each bead 36 so as to orient flanged end 42 of said locking pin 38 substantially flush with the upper end of said bead 36. It is intended that locking pin 38 both lock and position hinge 14 relative to the adjacent sections. This is accomplished by crimping or deforming the tubular portion 40 of each locking pin 38 tightly about the upper portion of said bead 36 thereby preventing relative movement therebetween. In its clamped or gripping form, tu-

bular portion 40 is sized to slide in keyway 24 and form a tight, friction interlocking contact therewith, thereby eliminating any tendency to move within said keyway 24. Further, it will be noted that in this position, outwardly projecting radially extending flange 42 engages the top edge of section 10 thus properly orienting hinge 14 relative to section 10 and further preventing or eliminating any tendency of said hinge 14 to slip relative to said section 10. It is to be noted that it is also within the scope of my invention to attach a second locking pin 38 to the bottom end of hinge 14 to insure against any movement of said hinge 14 in keyway 24. This is accomplished by stretching hinge 14 beyond the bottom of hinge 14 and crimping or otherwise attaching a locking pin 38 to the end of said stretched hinge.

In the preferred embodiment of my invention, locking pin 38 is sized to form a tight friction contact with bead 36 thereby eliminating the necessity to crimp said locking pin 38 to bead 36. In addition, inwardly extending prongs 44 are connected to the interior of said elongated section 40. Said prongs 44 are angled so as to allow said locking pin 38 to slide in only one direction on said bead 36. Preferably, said inwardly extending prongs 44 are angled towards flange 42 to enable said locking pin 38 to be slid on bead 36 only in a direction away from said flange 42. Accordingly, when locking pins of this type are slid on bead 36 they will securely maintain hinge 14 in keyway 24 without crimping or otherwise deforming said pins 38.

Whereas there is here illustrated and specifically described a certain preferred construction of apparatus which is presently regarded as the best mode of carrying out the invention, it should be understood that various changes can be made and other construction adopted without departing from the inventive subject matter particularly pointed out and claimed.

I claim:

1. A folding door which comprises a door section having an elongated slot along an edge which extends inwardly into said section; a hinge insert having a connecting end fixedly secured in said elongated slot and an opposite keyway end; hinge means having an attaching end received in said keyway for hinging said section to an adjacent section, wherein said attaching end of said hinge means is sized to be retained in said keyway end of said insert; a tubular member fixedly connected to the attaching end of said hinge means; and an outwardly projecting flange attached to said tubular member to coact with an end of said hinge insert to prevent longitudinal movement of said hinge means in said hinge insert.

2. The door of claim 1 wherein said tubular member is an elongated semicylindrical tube secured to said attaching end of said hinge means and positioned in said hinge insert.

3. The door of claim 2 wherein said elongated semicylindrical tube is attached to said hinge means with inwardly projecting prongs connected to said tube to angle toward said flange.

4. The door of claim 1 wherein the keyway end of said hinge insert is enlarged to have a thickness greater than the thickness of said connecting end of said hinge insert.

5. The door of claim 1 wherein said hinge means is substantially V-shaped elongated resilient strips having beaded longitudinal edges.

6. The door of claim 5 wherein said section is wooden.

References Cited

UNITED STATES PATENTS

2,311,470	2/1943	Ritter	160—231
3,073,382	1/1963	Zimmerman et al.	160—183
3,224,047	12/1965	Horton	49—489

PETER M. CAUN, *Primary Examiner.*