Aug. 1, 1961 R. H. MORSETH ET AL 2,994,371

ACCORDION-FOLDED DOOR ASSEMBLY

Filed Dec. 23, 1957

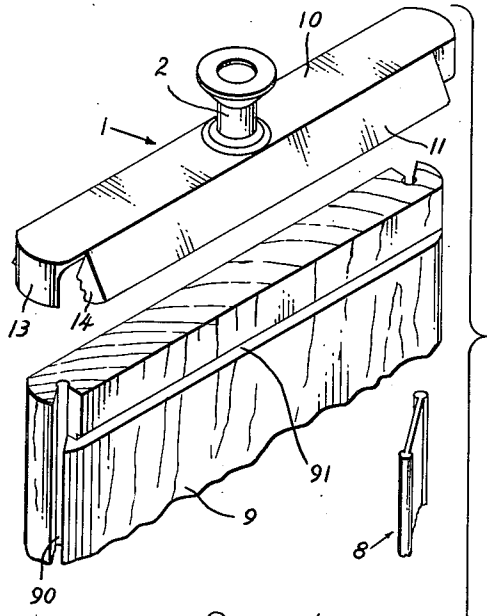


Fig. 1

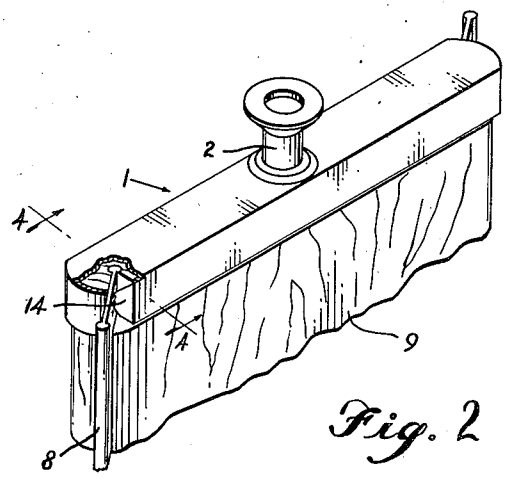


Fig. 2

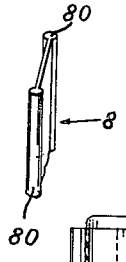


Fig. 3

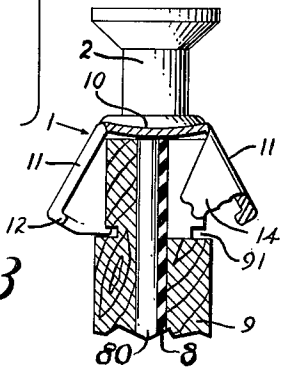
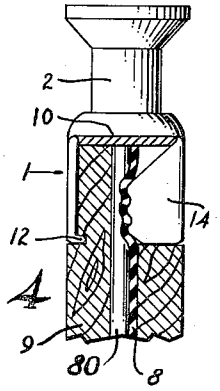


Fig. 4



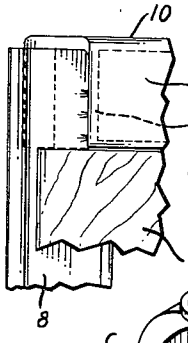


Fig. 5

Fig. 6

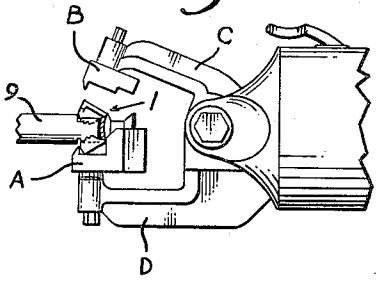


Fig. 7

INVENTORS.
RICHARD H. MORSETH
PHILIP M. PAULSRUDE

BY Reynolds, Beach & Christensen

ATTORNEYS

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ACCORDION-FOLDED DOOR ASSEMBLY

Richard H. Morseth, Arlington, and Philip M. Paulsrude, Shelton, Wash., assignors to Wood Specialty Products, Inc., Mountlake Terrace, Wash., a corporation of Washington

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This invention relates primarily to accordion-folded doors composed of slats of wood or similar solid material, connected by flexible hinge strips at their edges. Such slats, when of wood or similar material subject to splitting, splintering, or like injury, should be protected at their ends, either to top end or both top and bottom ends, and the invention concerns more particularly an end cap which will serve this purpose. In addition, the individual slats must be suspended from and capable of movement along a slotted guide in the doorway lintel, and according to the present invention, the end cap will serve for the support of a suspending button and as a means of securing the button readily and without injury to the slat. Even further, in a given form the individual slats and the flexible hinge strips which connect adjoining slats are so formed as to be readily interconnected by relative longitudinal movement between the hinge strips and the slats. While the hinge strips and the slats in this particular are not in themselves the subject of this invention, the end cap of this invention is particularly designed to function with a slat and hinge strip of the character mentioned, and more particularly, serves to anchor the hinge strip and the slat against relative longitudinal movement, and so retains the hinge strip and the slat in their interengaged position.

It is a particular object of the present invention to provide an end cap of the nature and having the capabilities indicated which is of simple construction and which is readily securable in place by a simple and single deforming operation, whereby the end cap is secured fixedly upon the end of the slat, the suspending button is thereby located in correct position, the hinge strip is simultaneously anchored in place, and the whole protects the slat end.

The accompanying drawings illustrate the invention in a presently preferred form, and illustrate the manner of assembling the end cap, hinge strip and slat by the use of a simple and conveniently operated tool.

FIGURE 1 is an exploded isometric view of the upper end of a slat and the associated hinge strips, and of the end cap ready for application. FIGURE 2 is a similar view, showing the parts assembled. A portion of the end cap is broken away for better illustration.

FIGURE 3 is a sectional view, substantially at the plane indicated by the line 4—4 in FIGURE 2, but showing the parts in assembled but unsecured relationship. FIGURE 4 is a similar view, but showing the parts in secured relationship.

FIGURE 5 is a view of the parts in the relationship of FIGURE 4, taken from a viewpoint at 90° to FIGURE 4.

FIGURE 6 is an isometric view of a clamping or deforming tool that is suitable for use in securing the end cap to the slat end, and FIGURE 7 is a side elevation of the same, with the slat end and end cap in position ready for securement.

The present invention, it will be understood, concerns primarily the end cap, but not exclusively so. It concerns also the combination of such an end cap with the slat and with the hinge strips connected to opposite edges of the slat, and while a particular form of the hinge strips and their relationship to the slat is shown, this particular hinge strip is not per se the subject of this application.

The slat 9 is indicated as made of wood, and is one of a number that hang vertically and are hingedly connected together at their edges to make up an accordion-folded door or the like. Each slat has along its opposite edges grooves 90 for the reception of flexible hinge strips 8 of vinyl plastic or like material. Preferably the opposite longitudinal edges of the hinge strips are beaded, as indicated at 80, with the intervening web thinner than the diameter of the beads, and the grooves 90 are complementally keyhole-shaped as viewed in cross section. Consequently the hinge strips 8 and the slats 9 may be interengaged by relative longitudinal movement of the beads 80 within the enlargement at the bottom of the grooves 90. The beads 80, when the hinge strips are thus engaged with the slats, are large enough to prevent the hinge strips from being pulled directly out of the grooves 90.

The end cap 1 is fitted upon the end of the wood slat 9, and it may be assumed that this slat end is end grained, and the end cap 1 is preferably of a size and shape to completely cover the end grain, although this is not strictly essential. When it does so cover over the end grain, it thoroughly protects the slat from splintering or injury in this region. The end cap is therefore preferably of channel shape including a web 10 and two flanges 11 projecting from opposite edges of said web which are initially spread sufficiently that they may straddle the end of the slat 9. Preferably the channel cap is made of sheet material or other deformable metal, so that when it is positioned upon the end of the slat, as in FIGURE 3, the flanges 11 may be squeezed and bent inwardly into the position shown in FIGURE 4 so that such flanges overlie in face to face relationship the end portions of the opposite sides of the slat. In order to lock or secure the channel cap in place the free edges of the flanges 11 are provided with inwardly projecting ribs 12 which bite into the opposite surfaces of the slat 9, or are received within preformed recesses or grooves 91 in the opposite surfaces of the slat extending transversely of the slat length near its end. It will be understood that the flanges 11 and the ribs 12 are not necessarily continuous, although they should engage the slat at least at points adjacent the opposite longitudinal edges of the slat, and preferably at intermediate points if they are not continuous. The continuous form is, however, preferred.

Since the narrow channel cap web 10 is likely to bow when the flanges 11 are bent inward, and it is preferable that it be substantially flat when the cap is in place upon the slat, it is desirable for the web initially to have a reverse bow, that is, be concave outwardly, as seen in FIGURE 3. Moreover, when the flanges are bent into parallelism and then released the resilience of the bowed web would tend to make the flanges flare outward again somewhat. By making the web initially concave outwardly the tendency of the web to spring the flanges outward will be reduced and the web will stay substantially flat as seen in FIGURE 4.

The end cap 1 preferably mounts a button 2 of conventional form, intermediate its ends, whereby to suspend the slat in the usually manner in a slotted overhead track supported by the door lintel, and whereby the slats may slide transversely of the doorway.

It is preferred that the end cap be provided also with end flanges 13 which overlie in face to face relationship the edges of the slat, and these will serve to prevent any relative movement of the end cap and the slat in the direction of the length of the end cap.

In order to anchor the hinge strips 8, the end cap is provided with hinge-gripping lugs 14. These lugs are

located respectively at the opposite ends of the end cap and adjacent to opposite surfaces of the slat. Each such lug is carried by and extends inward from an end of a channel flange **11**, directed towards a hinge strip receiving groove **90**. Each lug is urged directly inwardly toward one wall of the adjacent groove **90**, the wall of the groove nearer the lug having been cut away in each instance, as seen in FIGURE 2. Such lug is then moved inward as the channel flange **11** carrying it is bent inward to lock the cap on the slat end. The inner end of the lug **14** is thereby forced against hinge **8** and presses it against the wall of the groove **90**. The lug is thus disposed transversely of the strip **8** and the lug edge preferably is serrated, toothed or roughened to bite into the side of the strip and pin it to the side of the groove **90**. So in the single operation of bending the channel flanges inward the channel cap and slat are locked together and the edges of the two connected hinge strips are anchored to the slat against relative longitudinal movement. The channel-closing operation can readily be performed by a pair of clamping jaws A and B shaped to receive the end cap with its button **2**, and capable of being closed by fluid-pressure-actuated arms C and D (see FIGURES 6 and 7), in the same manner that a squeeze-riveting operation is accomplished.

It is normally adequate to apply an end cap to the upper end only of each of the slats but, as a matter of precaution, the lower end of the hinge strips may be anchored to the slats by a brad or the like. Alternatively, an end cap lacking the button **2** may be applied to the lower ends, also, of the slats. This will protect the lower ends of the slats and will anchor the lower ends of the hinge strips with relation to the slats.

The outer surfaces of the slat ends preferably are recessed somewhat so that the outer surfaces of the channel flanges will be substantially flush with the surfaces of the slat when the cap has been secured in place. These end caps may be of any desired finish, for instance, bright chrome, or copper, or any other finish to accord with the finish applied to the wooden slats or to the trim within the structure.

I claim as my invention:

1. In an accordion-folded door structure including slats disposed with their lengths parallel, having longitudinally extending grooves in the opposite edges thereof and connected by hinge strips of flexible material having their edges received in such slat grooves, the improvement comprising a channel cap applied to an end of a slat and including flanges overlying the end portions of the opposite sides of such slat, respectively, the end portion of the slat being removed at one side of a strip-receiving groove thus forming a passage between such groove and the slat side adjacent to one side flange of said cap, the other side of such groove constituting a backing surface, and a lug carried by said one cap flange, extending through such passage and disposed with the lug end bearing against the adjacent side of the portion of such hinge strip which overlies such backing surface, the direction in which said lug projects from such flange being transverse to such backing surface and to the portion of such adjacent hinge strip side engaged by the lug end, said lug thus pressing such hinge strip against such backing surface.

2. In an accordion-folded door structure including slats disposed with their lengths parallel, having longitudinally extending grooves in the opposite edges thereof and connected by hinge strips of flexible material having their edges received in such slat grooves, the improvement comprising a channel cap applied to an end of a slat and including a web having opposite side flanges projecting therefrom and overlying in face to face relationship the end portions of the opposite sides of such slat, respectively, and further having opposite end flanges projecting from said web and overlying in face to face relationship the end portions of the opposite edges of such slat, respectively, the end portion of the slat being removed at one side of a strip-receiving groove thus forming a passage between such groove and the slat side adjacent to one side flange of said cap, the other side of such groove constituting a backing surface, and a lug carried by an end portion of said one cap side flange, spaced from the adjacent end flange, extending through such passage and disposed with the lug end bearing against the adjacent side of the portion of such hinge strip which overlies such backing surface, the direction in which said lug projects from such side flange being transverse to such backing surface and to the portion of such adjacent hinge strip side engaged by the lug end, said lug thus pressing such hinge strip against such backing surface.

3. An end cap for application to an end of a slat of an accordion-folded door, comprising an element of generally channel shape including a web, side flanges on opposite edges of said web and end flanges on opposite end portions of said web, all of said side and end flanges projecting beyond the same side of said web and each flange being at an angle to such web side, said side flanges flaring away from said web, and a lug on one end portion of each of said flaring side flanges between said web and the free edge of its flange, spaced from the adjacent end flange and projecting inward transversely of its respective side flange, and said lugs being movable lengthwise inwardly by bending of said flaring side flanges inwardly to decrease the degree of their flare.

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