United States Patent [19]

Dagenais

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[54] **PROTECTIVE GRILLE**

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[52] **U.S. Cl.** ..... **160/183;** 160/199; 160/229; 16/128 R

[51] **Int. Cl.²** **E05D 3/00;** E05D 7/00

[58] **Field of Search** ..... 160/183, 199, 206, 210, 160/211, 212, 213, 229, 230; 16/128 R

[56] **References Cited**

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2,835,223	5/1958	Erickson	160/210
3,359,594	12/1967	Pastoor	160/199
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Primary Examiner—Peter M. Caun

[57] **ABSTRACT**

A foldable closure structure comprising a foldable curtain having a plurality of panel members hingeably interconnected along opposed vertical edges. Detachable hinge means are secured in spaced apart relationship to each of the vertical edges of the panel members. A connecting rod interconnects the hinge means of adjacent vertical edges along a common axis. Suspension means are provided for suspending the curtain in a frame opening. The hinge means are each provided with attachment means for detachable connection to a portion of a respective vertical edge of adjacent panel members.

7 Claims, 4 Drawing Figures

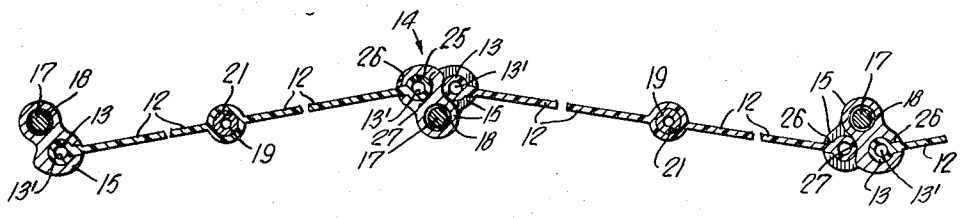
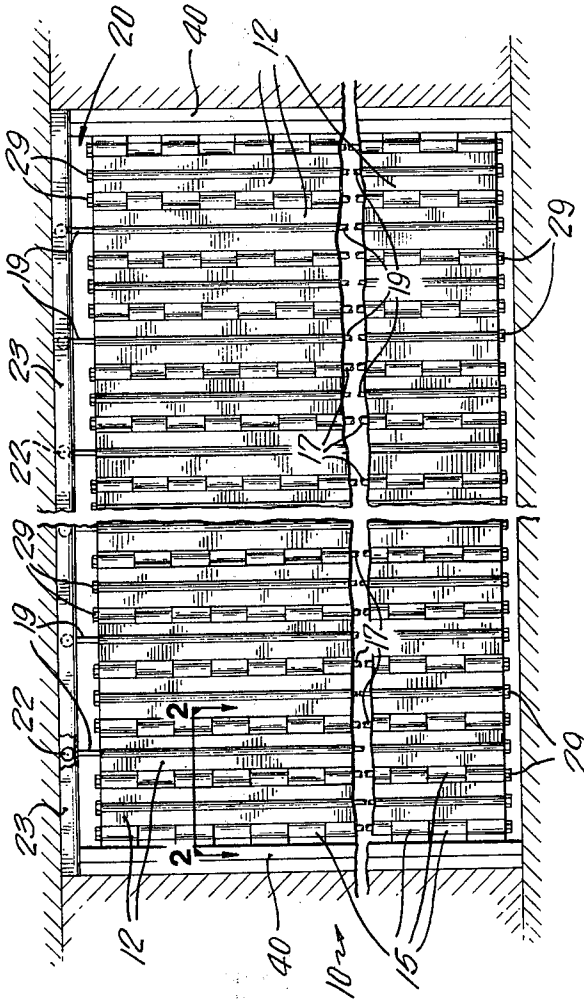
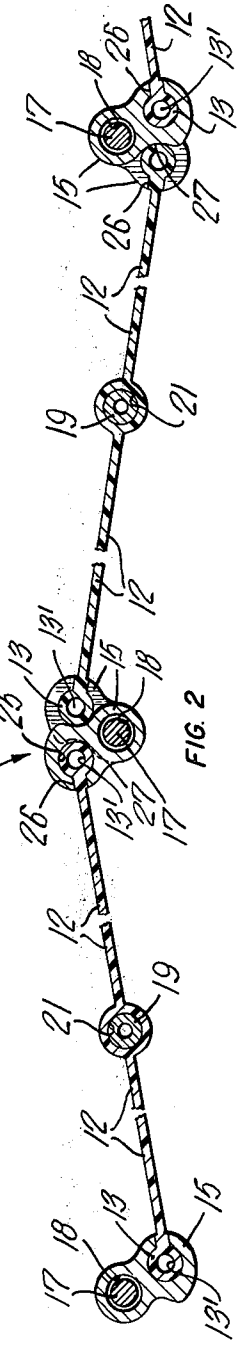


FIG. 1


20
40
12
29
19
23
22
17
2
10
15


12
18
26
13'
17
13
15
27
21
19
131
25
14
FIG. 2

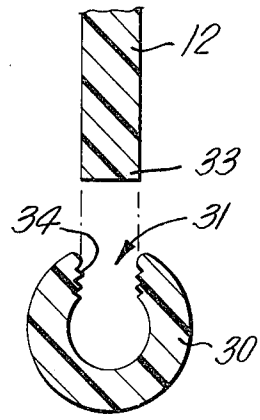

12
33
34
31
30

FIG. 3

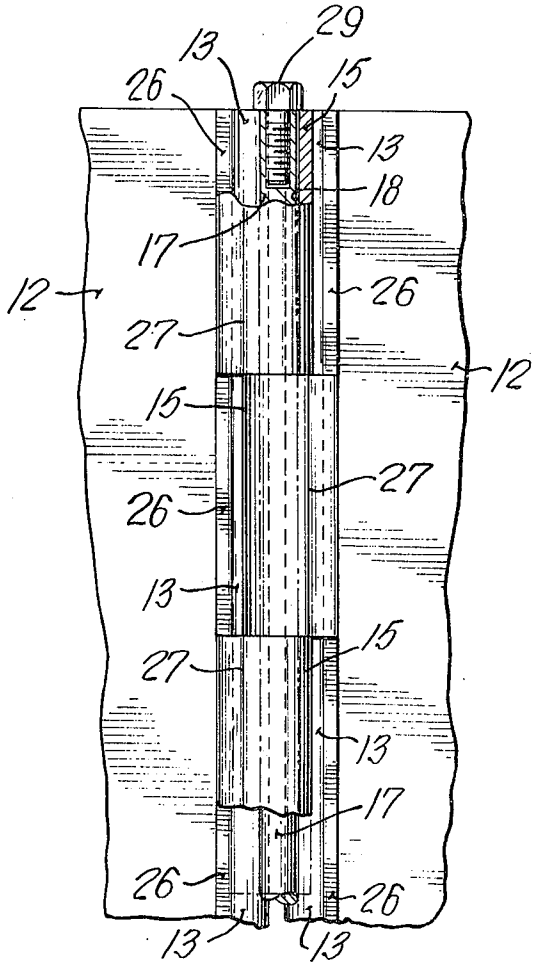

29
13
26
15
13
18
17
12
26
27
12
15
27
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13
15
27
13
17
26
26
13
13

FIG. 4

PROTECTIVE GRILLE

BACKGROUND OF INVENTION

a. Field of the Invention

The present invention relates to a foldable closure structure having detachable hinge members for interconnecting adjacent panels and for pivotally securing the panels together.

b. Description of Prior Art

Prior art foldable closure structures generally comprise numerous parts which are difficult to assemble and manufacture. Also, some of these structures are difficult and time-consuming to install in view of their weight and complex assembly. Still further, such structures are costly to manufacture and repair because of the great number of parts and materials used. Furthermore, known foldable closures have openings therein reducing their security aspect.

SUMMARY OF INVENTION

It is a feature of the present invention to provide an improved foldable closure structure which substantially overcomes the above-mentioned disadvantages of the prior art, thus providing a structure which is easy to manufacture, economical, easy to install and of light weight.

It is a further feature of the present invention to provide a structure having interchangeable parts and which can be assembled in various lengths without requiring special tools or pre-assembly. Thus, the structure can be easily shipped in its non-assembled form and requires very little skill for installation and repair.

According to the above features, from a broad aspect, the present invention provides a foldable closure structure comprising a foldable curtain having a plurality of panel members hingeably interconnected along opposed vertical edges. Detachable hinge means are secured in spaced apart relationship to each of the vertical edges. A connecting rod pivotably interconnects the hinge means of adjacent vertical edges along a common axis. Suspension means are also provided for suspending the curtain from a track secured above an opening.

BRIEF DESCRIPTION OF DRAWINGS

The invention will now be described with reference to the accompanying drawings in which:

FIG. **1** is a fragmented plane view of the folding closure structure extending across an opening;

FIG. **2** is a fragmented sectional view through a portion of the curtain;

FIG. **3** is a fragmented sectional end view of a further embodiment of a panel end edge; and

FIG. **4** is an enlarged fragmented view of the hinge members.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to the drawings, there is shown generally at **10**, the foldable closure structure of the present invention. The structure **10** is a foldable curtain formed from a plurality of elongated rectangular panel members **12** which are interconnected along opposed vertical edges **13** by detachable hinge means **14** adapted to receive and retain the vertical edge **13** therein. The hinge means **14** consist of a plurality of hinge members **15** secured along a vertical edge of each panel member **12** and in spaced apart relationship. The spacing between the hinge members **15** is equal to the length of the hinge member to permit hinge members **15** of an adjacent panel **12** to be interposed in the spaces to provide a series of hinge members positioned in alignment for interconnecting two adjacent panels **12** together. The interconnection is made by securing a connecting rod **17** in a circular bore **18** provided in the member **15.** A washer and bolt **29** is attached to each end of the rod **17** which terminates flush with the ends of the panel members **12.**

The foldable curtain **10** is suspended in an opening **20** by support rods **19** which are held in a vertical through bore **21** extending vertically along the panel member **12.** The support rod **19** is provided with a connectable end **22** which is adapted to be received in a ceiling track **23** for slidable engagement therewith whereby to permit the panel members **12** of the curtain **10** to be foldable in an accordion fashion. As shown in FIG. **1,** a support rod **19** is provided in every second panel member **12.**

As shown more clearly in FIG. **2,** each hinge member **15** is provided with a cylindrical bore **18** for receiving the connecting rod **17** therein as mentioned hereinabove. A further through bore **25** is disposed parallel to the circular bore **18** and provides the attachment means. A panel receiving opening **26** is formed in each member **15** and extends to the attachment through bore **25** whereby to permit the vertical end edge **13** of a panel member **12** to be slid into the attachment bore. Thus, the panel member **12** extends out of the panel receiving opening **26** and the hinge is secured to the panel by merely sliding it over the vertical edge of the panel from the end thereof. Each hinge member **15** is also provided with an abutment surface **27,** herein a concave surface, extending parallel to the through bore **25** for abutment with a portion of the vertical edge **13** of the panel member **12** adjacent to the panel member to which the hinge member is connected to.

As shown in FIG. **2,** when the curtain panel members **12** are fully extended, the end edges **13** are in abutment with the surface **27.** In its fully extended position, the panels **12** extend in an expanded accordion fashion with the panels traversing the central longitudinal axis of the curtain at an angle of approximately 10°.

As shown, the vertical end edges **13** of the panel members **12** are enlarged and hereinshown as being tubular edges having a hole **13'** in at least the extremities of the ends of the tubular edge whereby to permit securement of the panels between a plurality of hinge members **15.** The attachment through bore **25** in the hinge members **15** are also of circular cross-section to receive the tubular edge of the panel members **12.** It is within the ambit of the present invention to provide end edges **13** and attachment through bores **25** of cross-sections different than circular as these provide a rigid connection and many shapes can provide a rigid connection. As shown in FIG. **3,** the tubular end edge **13** may be formed of a tubular member **30** having an elongated slot **31** along its entire length for connection to a vertical flat edge **33** of the rectangular panel member **12.** The edges of the tubular member **30** adjacent the slot **31** may be serrated, as shown at **34,** for securing the panel member **12** therein. Also, glue is preferably applied to the end edge of the panel **12** before inserting it into the tubular member **30.**

Although not shown in the drawings, it is within the ambit of the present invention to provide reinforcing metallic strands throughout the panel members **12** whereby to provide a stronger curtain.

As shown in FIG. **1**, the curtain **10** is supported by the support rods **19** which are preferably located at every second panel member **12** depending, of course, on the width of these panels. If a support rod **19** is not provided in one of the panel members **12**, a connecting rod **17** is inserted into the vertical through bore **21** of the panel and held therein by securement means such as the washer and bolt **29** threaded into each end of the connecting rod **17**.

The foldable curtain **10** is also secured at its vertical ends by suitable connectors attached to the vertical wall members **40** as is commonly used in the art, see for example, U.S. Pat. No. 3,654,982 issued to the assignee of the present application.

The panel members **12** are preferably constructed of plastic and in the present case, these are extrusion moulded. The panels may be constructed of other suitable materials such as aluminum, wood, steel, etc. Also, the hinge members **15** may be formed of plastic or aluminum material and the same hinge member is provided for connection to either one of opposed end edges of the panel members **12**. These hinge members can be formed, for example, by injection moulding. Thus, it can be seen that the curtain of the present invention is relatively light and economical to manufacture and easy to assemble. In its assembled state, it can be seen that the end panels **12** of the curtain wall are secured to the wall members by a cleat section as disclosed in the above-mentioned U.S. patent and not forming part of this invention.

I claim:

1. A foldable closure structure comprising a foldable curtain having a plurality of panel members hingeably interconnected along opposed vertical edges, hinge members secured in spaced apart relationship to each said vertical edges, said hinge members each having panel attachment means for connection to a portion of a respective vertical edge of adjacent panel members, a connecting rod pivotally interconnecting said hinge members of adjacent vertical edges along a common axis, each said hinge member having an abutment surface lying substantially parallel to said connecting rod for abutment with a portion of said vertical edge of said panel member adjacent to the panel member to which said hinge member is connected to, each said hinge member further having a circular bore therein for receiving said connecting rod, said attachment means being a through bore disposed parallel to said circular bore, and a panel receiving opening in said member extending to said through bore for slidingly receiving a portion of said vertical edge of a respective panel member in said through bore, and suspension means for suspending said curtain in a frame opening.

2. A foldable closure as claimed in claim **1** wherein said hinge members are secured in spaced apart relationship along a respective vertical edge of each said panel members, said spacing being equal to the length of said hinge member whereby hinge members from an adjacent panel member may be received in said spacing to permit interconnection of said hinge members of adjacent vertical edges of said panels, along a common axis.

3. A foldable closure as claimed in claim **1** wherein said panel members each comprise a substantially rectangular panel having enlarged elongated vertical edges, said vertical edges being of a cross-section for slideable connection in said attachment through bore of said hinge members with said panel extending out of said panel receiving opening.

4. A foldable closure as claimed in claim **3** wherein said enlarged elongated vertical edges are tubular edges, said through bore of said hinge members having a circular cross-section for receiving said tubular edges, and securement means engageable in the opposed ends of each said tubular members for retaining a plurality of hinge members therebetween.

5. A foldable closure as claimed in claim **4** wherein said tubular edge is formed by a tubular member having an elongated slot along its entire length for connection to the vertical edge of said rectangular panel.

6. A foldable closure as claimed in claim **3** wherein said panel members and said hinge members are made of plastic material.

7. A foldable closure as claimed in claim **1** wherein said panel members are provided with a vertical through bore for receiving a support rod therein, said support rod having a top connectable end secured for sliding displacement in a ceiling track in the top of said opening whereby to permit said plurality of panel members to be folded in accordion fashion below said track.

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