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Frobosilo et al.

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[54] **RETRACTABLE BARRIER**

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[52] **U.S. Cl.** **160/35,** 160/207, 160/235

[51] **Int. Cl.** **E06b 9/00**

[58] **Field of Search** 160/35, 36, 1, 84, 160/235, 206, 207, 33, 34, 32, 19

[56] **References Cited**

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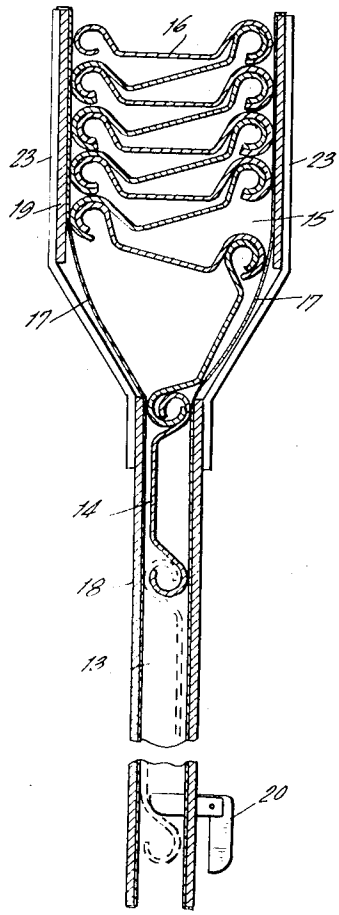
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[57] **ABSTRACT**

A retractable barrier for use in sealing doors, windows, gates, alleys and the like is provided in which a plurality of foldable interlocking slats are disposed in a frame, the frame having channels on each side with a lower section of sufficient depth to receive the unfolded slats and a deeper upper section of sufficient depth to receive the folded slats, and flexible bands disposed within the channels so as to frictionally engage the unfolded slats in the lower section and the folded slats in the upper section.

6 Claims, 4 Drawing Figures



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SHEET 1 OF 2

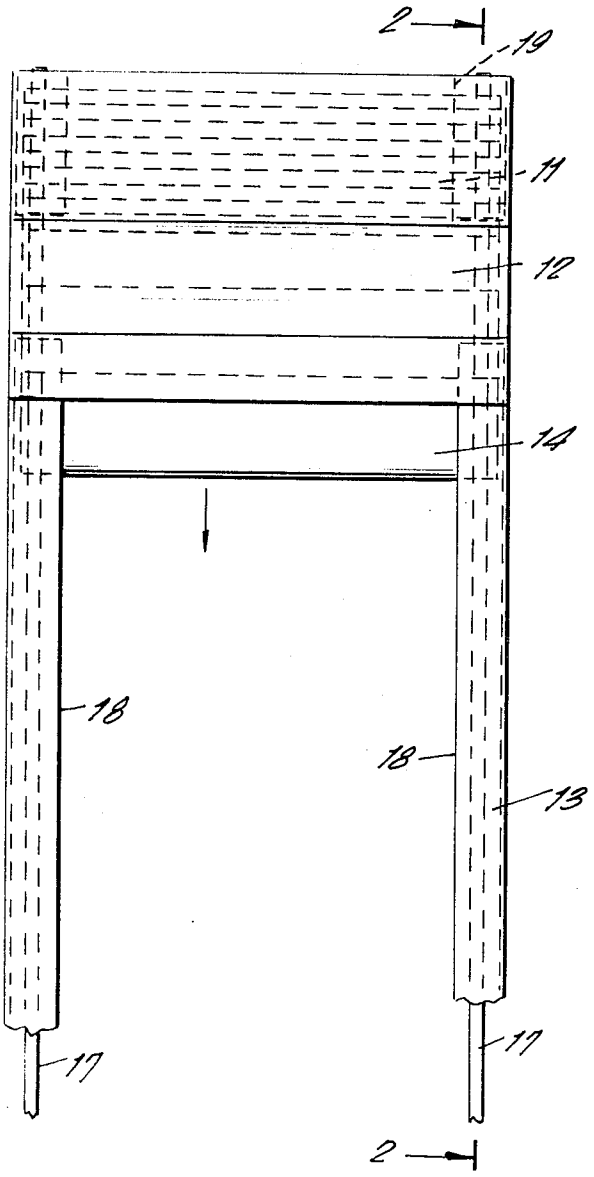


FIG. 1

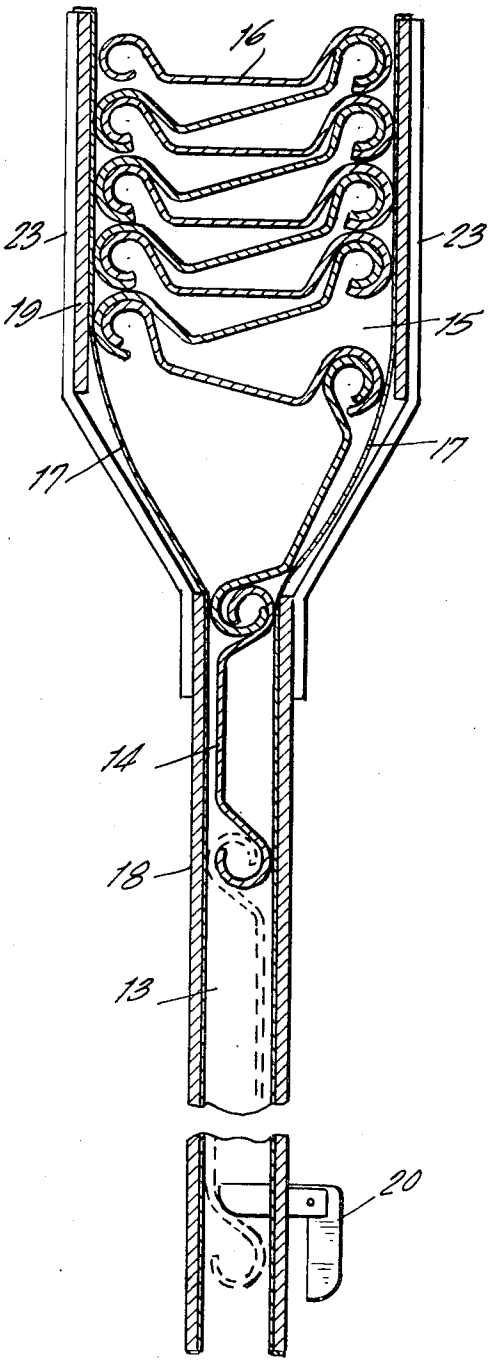


FIG. 2

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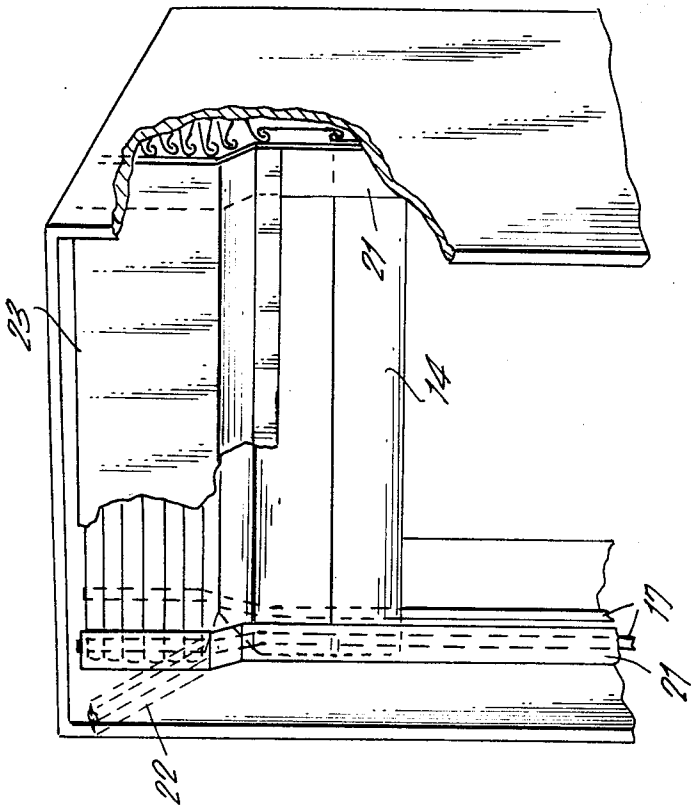


FIG. 4

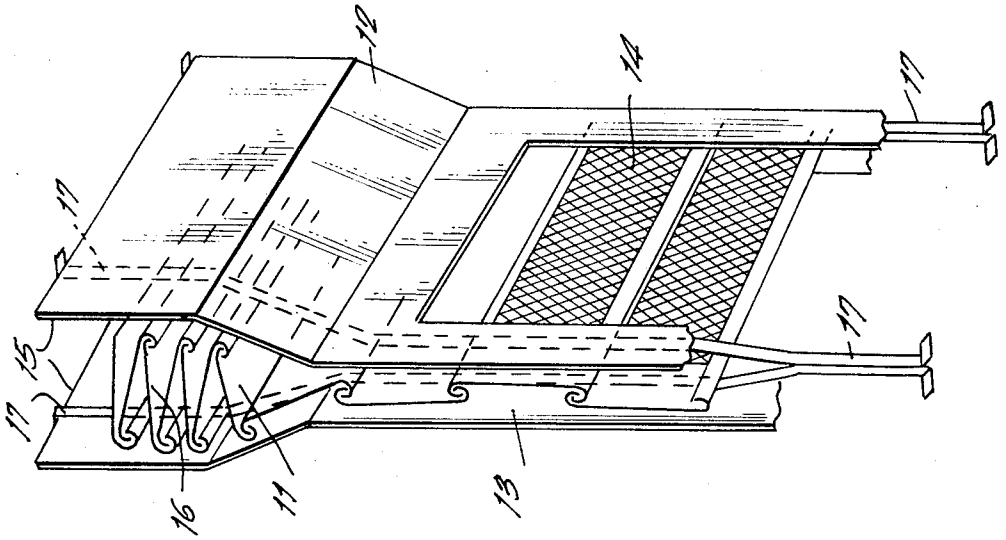


FIG. 3

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RETRACTABLE BARRIER

DETAILED DESCRIPTION

The present invention pertains to a retractable barrier assembly used for security and safety purposes in sealing doors, windows, alleys, gateways and similar openings.

A variety of retractable barriers of different construction is described in the prior art. These include foldable shutter slats which move horizontally along a fixed track, fire dampers of the folding shutter type which move on a vertical track, retractable gates of flexible mesh or grating in which the mesh or grating is retracted onto a roller, and the like. Horizontally disposed shutters are primarily employed in offices and homes for the purpose of appearance and convenience and are typified, for example, by the folder shutter slat and folder shutter described in U.S. Pat. No. 2,586,561. Fire damper assemblies are more generally found in fluid conducting pipes or ducts in industrial heating and air conditioning systems and provide a metal fire barrier or safety curtain as described, for example, in U.S. Pat. Nos. 3,485,284 and 3,467,163. Retractable gratings have been employed for security purposes in sealing store fronts and the like to protect them from unauthorized entrance and acts of vandalism.

The present invention provides a novel retractable barrier assembly which can be used for both security and safety purposes in sealing off doors, windows, alleys, store fronts and the like.

A primary objective of the invention resides in providing a retractable barrier assembly having a plurality of interlocking slats and a frame in which these slats are disposed in such a way as to be easily moved from a storage section, in which the slats are in a folded configuration, to a second section in which the slats are in an unfolded configuration and constitute a barrier.

A further object in conjunction with the preceding object, resides in the ability of the retractable barrier to be placed in any position intermediate between that of being fully retracted or fully extended and to secure the barrier in such intermediate positions through locking means.

A further object of the invention is to provide a retractable barrier which when retracted is unobtrusive and yet when extended presents a solid partition preventing the passage of individuals, objects and the elements.

Other objects of this invention and its novel features will become apparent from the following detailed description, discussion and the appended claims, taken in conjunction with the accompanying drawings showing preferred structures and embodiments, in which:

FIG. 1 is a front elevation of a retractable barrier assembly constructed in accordance with the present invention;

FIG. 2 is an enlarged vertical section taken along line 2—2 of the retractable barrier assembly shown in FIG. 1;

FIG. 3 is a schematic presentation in perspective end view of a retractable barrier constructed in accordance with the present invention illustrating the folded slats in the upper storage section and unfolded slats in the lower side runner sections of the frame; and

FIG. 4 is a perspective front view of a retractable barrier assembly constructed in accordance with the present invention and illustrating the basic frame and barrier component as installed in a door or window opening, a portion of the upper storage section and a portion of the door or window frame being cut away to illustrate the arrangement and operation of the assembly upon installation.

With specific reference to FIGS. 1 and 2, a retractable barrier embodying the present invention is shown in which a plurality of foldable interlocking slats 11 are disposed within a frame 12 having a channel with a lower section 13 of sufficient depth to receive the unfolded slats 14 and a deeper upper section 15 of sufficient depth to receive the folded slats 16, and a pair of flexible bands 17 disposed within the channel so as to frictionally engage both the unfolded slats 14 entering the lower section and the folded slats 16 in the upper section. The outside width, height and depth of frame 12 will vary depending upon the dimensions of the opening in which the retractable barrier is installed. In the embodiment shown in FIGS. 1 and 2, the frame comprises a pair of channels, each constructed of two U-shaped members 18 and 19, which are installed flush against the inside door or window jamb, the overall length being determined by the length of the jamb. Disposed within each of these channels is a pair of flexible bands 17 which are secured at the top and at the bottom of the frame through friction, welding, bolting, or similar fastening but which is otherwise unsecured within the channel. In a vertical section such as illustrated in FIG. 2, the channel resembles an extended Y, the upper section of the channel being of a greater depth than the lower section. The depth of the upper section 15 is determined by the width of the folded interlocking slats 16 while the depth of the lower section 13 is determined by the thickness of the unfolded slats 14. The degree of constriction in the channel in passing from the deeper upper storage section to the lower runner section is determined by the path defined by the slats in passing from a folded to an unfolded configuration.

FIG. 3 illustrates a second embodiment in which the frame is constructed from two single formed sheets with the flexible bands disposed on the side of each sheet contiguous with the other. In operation, slats 11 are nested in the upper storage section 15 in a folded configuration 16. In this folded configuration, the longer edge of each slat is frictionally engaged with the flexible bands 17 and held in this position against the force of gravity by the constriction of these bands in passing from the upper storage section to the lower runner section. Through the application of downward force on the bottommost slat, the folded slats in the upper section pass into an unfolded configuration as they enter the lower section of the channel.

The slats may be fabricated out of any rigid material such as metal, wood or plastic, in virtually any rectangular configuration. When fabricated from metal, they may be solid so as to provide maximum security or may be perforated, as shown on the bottom two slats in FIG. 3, through expanding and flattening techniques or simple punching so as to provide ventilation as well as security. The slats may also be constructed out of wood or plastic, the latter being opaque, colored or transparent. The slats are interlocked with one another through any conventional hinge structure which permits their passage from the folded configurations to the unfolded configurations; i.e., one which permits rotational move-

ment of one slat relative to the next through an arc in the magnitude of from about 160° to 180°. Although not so limited, one such hinge structure involves two interfitting Archimedes spiral form roll hinge sections, as described for example in U.S. Pat. No. 3,485,284.

The slats may be of relatively narrow width so that a larger number are required to close a given area or of a greater width, thereby requiring fewer slats. The number of slats required to close an opening of height *a* is determined by the relationship *a/b* where *b* is the width of each slat. Similarly the thickness of the slats may be varied considerably, depending upon the particular use involved. The height of the upper storage section is then determined by the relationship $a/b \times c$ where *c* is the space occupied by the thickness of a single slat in its folded configuration. The upper storage section will thus be at least as long as $a/b \times c$ but can, of course, be substantially longer.

Since both the folded slats and the unfolded slats are frictionally engaged by the flexible bands, these slats will remain in any position in which they are placed, whether completely folded or extended so as to be completely unfolded, as well as any position intermediate thereto. As shown in FIG. **2**, a locking device **20** may be mounted on one side of the frame so that when the slats are extended in an unfolded configuration, they can be secured in that position so as to prevent unauthorized retraction from the other side. This locking may be effected not only with the barrier fully extended but also with the barrier only partly extended so as to permit ventilation while still barring the passage of individuals through the opening.

Flexible bands **17** may be fabricated from any resilient material compatible with frictional engagement of the interlocking slats. Hence when the slats are of metal, the flexible bands may be, for example, metal strapping. Alternatively, flexible plastic strips may be employed.

FIG. **4** illustrates a third embodiment of the barrier assembly installed in a door or a window opening with part of the door or window jamb cut away to expose the positioning of the various elements involved in a custom-fitted embodiment. Two preformed runner channels **21** are cut to a length corresponding to the inside length of the opening in which the barrier assembly is to be installed, the upper section of the runner channel being of a height sufficient to receive the number of slats required to close the entire opening, determined in the method described above. This runner channel may be provided with hinged panel **22** in the upper section so as to provide an opening through which the slats may be subsequently introduced into the assembly after runner channels **21** have been secured through screws, bolts or the like to the sides of the opening. Flexible bands **17** is in turn secured to the top and bottom of the runner channel, the attachment at the top being at the top of hinged panel **22**. Upon opening hinge panel **22**, the upper portion of flexible band **17** is temporarily bent away from its position in the upper storage section so as to permit insertion of the slats. A suitable number of foldable interlocked slats are then inserted in the upper section and hinged panel **22** is closed so that the slats are then engaged by the flexible bands. A preformed cover plate **23** of length corresponding to the inside width of the opening is then placed across the upper section and secured to it by clips, bolts, metal screws, welding, gluing or similar fastening means.

Although the embodiment shown in FIG. **4** permits loading of the slats into an installed frame, the assembly can be loaded from the top prior to installation and in such an embodiment, the hinged panel **22** can be omitted.

Alternatively when the upper storage section and lower runner section of each channel are constructed from two U-shaped members of different widths as shown in FIGS. **1** and **2**, loading is accomplished by first securing upper U-shaped member **19** to the jamb with flexible bands **17** secured to it, inserting the folded slats into the bands, temporarily supporting the folded slats, inserting and securing the extended flexible bands into the lower U-shaped member **18** and securing the lower U-shaped member to the jamb on center with the upper U-shaped member. A cover plate **23**, which in vertical section may be as shown or which may be a simple L-shape (not shown) is then secured to the two upper U-shaped members **19** and optionally to a portion of the two lower U-shaped members **18**.

Since the invention may be embodied in other specific forms without departing from its essential characteristics, the present description is to be considered as illustrative in all respects, the scope of the invention being set forth in the appended claims and not limited nor restricted by the foregoing presentation of representative embodiments.

What is claimed is:

1. A retractable barrier having a plurality of foldable interlocking slats, a frame having a channel with a lower section of sufficient depth to receive the unfolded slats and a deeper upper section of sufficient depth to receive the folded slats, and disposed within at least the upper section of said channel a pair of flexible bands operable to frictionally engage both the unfolded slats entering the lower section and the folded slats in the upper section to a height in said upper section, of $a/b \times c$ where *a* is the height of the opening resulting from retraction of said barrier, *b* is the width of each slat and *c* is the space occupied by the thickness of a single slat in its folded configuration.

2. A retractable metal barrier having a plurality of interlocking slats, a frame having an upper storage section and two lower parallel side runner sections, said frame defining channels running from the upper storage section to the lower runner section to receive the slats, said channels being of a depth in the upper section slightly greater than the width of the slats so as to receive the folded slats and of a depth in the lower section slightly greater than the maximum thickness of the slats so as to receive the unfolded slats, and a pair of flexible metal bands disposed within each of said channels and frictionally engaged by both the unfolded slats in the lower section and the folded slats in the upper section, one end of each band being secured at the top of the storage section and the other end of each band being secured at the bottom of the runner section, said slats being disposed on each side within and frictionally engaged by a pair of said bands.

3. A retractable barrier according to claim **2** wherein the slats are interlocked through spiral form roll hinge means.

4. A retractable barrier according to claim **2** wherein the slats are solid.

5. A retractable barrier according to claim **2** wherein the slats are perforated.

6. A retractable barrier according to claim **2** wherein the uppermost portion of the upper storage section includes a hinged panel on one side, the flexible metal band on that side being secured to the top of the panel, and a second cover panel secured to the frame and enclosing the upper storage section.

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