

A COLLAPSIBLE BARRIER ASSEMBLY

FIELD OF THE INVENTION

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The present invention relates to a barrier for an opening, such as a window grille, and in particular to an assembly wherein the panels that constitute the assembly are in one plane or in-line with each other and the panels are collapsible at least in part when opened.

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BACKGROUND AND PRIOR ART

The following description relates to one preferred embodiment of the collapsible barrier for an opening, namely a window grille. It can be envisaged that the same
15 invention can be applied to the grilles of a door or as the barrier for any other opening. A typical sliding grille assembly usually consists of at least two panels made of strong metals. When the grille assembly is in an opened position, the panels are parallel and are laterally adjacent to each other. When in a closed position, the panels are parallel but there would be an area of overlap between the
20 panels in the plane of the panels.

This typical type of sliding grille is not secure even in the closed position as there is an overlapping of joints of the two panels when the grille is closed. This overlapping of joints allows an intruder to forcibly separate the window grilles in the
25 direction perpendicular to the plane of the grilles to break the locking mechanism and to easily slide open the grilles when the lock is broken.

Thus, an object of this invention is to provide a design of the panels forming a barrier assembly which does not result in overlapping of the panels when the
30 panels are in the closed position. Therefore, the barrier assembly only requires space to accommodate one runner. One way to achieve this is by using a collapsible barrier assembly.

Collapsible barrier assemblies of the prior generally utilise pivoting mechanisms to enable the interconnecting portion between adjacent grille members to collapse. For example UK patent application numbers GB 2,224,073 and GB 2,318,818
5 disclose collapsible security grilles comprising diagonally arranged elongate bars connected to adjacent vertical grille members which are pivotally interconnected at the points of intersection by rivets. One problem associated with this design is that there is greater movement in the rivets such that wear and tear is created at the joints. The rivets at the pivoting joints may thus become loose with prolonged use.
10 Another disadvantage is that the rivets may be removed by using a drill. Once a line of the interconnecting members are removed, the grille members can be pulled aside at that point without difficulty.

Another object of the invention is therefore to provide an improved design of the
15 barrier which is more secure and elegant.

SUMMARY OF THE INVENTION

Accordingly, the present invention provides a barrier assembly for obstructing a
20 passageway defined at least in part by a frame including first and second panels, wherein the first panel has receiving means to receive at least a portion of the second panel within the first panel, such that the second panel is collapsible to provide an opening in the passageway when said first panel is received by the second panel.

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It will be convenient to hereinafter describe the invention in greater detail by reference to the accompanying drawings which illustrate one embodiment of the invention. The particularity of the drawings and the related description is not to be understood as superseding the generality of the broad identification of
30 the invention as defined by the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings relate to a preferred embodiment of a collapsible barrier for an opening according to the present invention. The said barrier assembly is
5 illustrated as a window grille in the following description, but it should be appreciated that the invention is of wider application.

Figure 1 is a front view of a collapsible grille assembly consisting of two panels at the closed position according to the preferred embodiment of the invention.

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Figure 2 is a front view of the grille assembly wherein one of the panels is collapsed such that the grille assembly is in an opened position.

Figure 3 is a cross-sectional view of detail 'K' from Figure 2 seen from line D-D in
15 Figure 2.

Figure 4 illustrates the linkage mechanism between the vertical grille members at the top of the vertical grille members at the position of detail 'C' in Figure 1.

20 Figure 5 is a cross-sectional view of the horizontal grille members at the position of detail 'C' in Figure 1 seen from line B-B in Figure 1.

Figure 6 illustrates a side view of the linkage mechanism joining two vertical grille members.

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Figure 7 shows a perspective view of a part of a link arm and a link pin of the linkage mechanism.

Figure 8 is an isometric view of a sliding joint at the area marked as 'D' in Figure 1.

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Figure 9 is an isometric view of a sliding horizontal grille member adjacent to a fixed horizontal grille member at the area marked as 'E' in Figure 1.

Figure 10 is an isometric view of a fixed joint at the area marked as 'H' at Figure 1.

Figure 11 is a partial sectional detail view of the lock assembly of the described
5 embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 is a front view of a collapsible grille assembly 10 consisting of two panels
10 14,16 at the closed position according to the preferred embodiment of the invention. There is a frame 12 corresponding approximately to the dimensions of the opening, on which is mounted a first panel 14 that is preferably not collapsible, and second panel 16 that is preferably collapsible. The panels 14, 16 may or may not be symmetrical. They will complement each other so that when in the closed
15 position, adequate partitioning is provided.

Each panel 14,16 has interlocking members forming a grille assembly. These parts are made and finished as required by the use of processes such as cutting, grinding, welding and finishing. Suitable surface finishing may be provided for the
20 frame 12 and the first and second panels 14, 16. For example, painting, powder coating or other processes may be performed on the frame 12 and panels 14, 16.

The first panel 14 includes a series of interlocking horizontal grille members 20 and vertical grille members 17. At the bottom of the vertical grille members 17, 18
25 are mounted two or more rollers 28 for facilitating sliding movement of the first panel 14 within the frame 12 along the bottom track 30. The first panel 14 is not collapsible in the described embodiment. Each horizontal grille member 20 of the first panel 14 has a hollow to receive an adjacent horizontal grille member of the second panel 16.

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The second panel 16 is collapsible. It also includes a series of interlocking horizontal grille members 22 and vertical grille members 19. However, the cross-

sectional area of the horizontal grille members 22 of the second panel 16 is made to be slightly smaller than the cross-sectional area of the horizontal grille members 20 of the first panel 14 such that the former is slidable into the latter, as shall be illustrated below. The top portions of each vertical grille member 19 of the second
5 panel 16 are connected by linkages 26 to link the vertical grille members 19 during the collapsing and extension movements.

At the left-most and right-most ends of the panels 16, 14 are lock sets 24a, 24b which allow the panels 16, 14 to be respectively locked to the frame.

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Figure 2 is a front view of the grille assembly 10 wherein the second panel 16 has been collapsed such that the grille assembly 10 is in an opened position. The lock set 24a corresponding to the second panel 16 has been unlocked and the vertical grille members 19 have been pushed towards the first panel 14, so that the vertical
15 grille members 19 are adjacent one another and to the first panel 14. The horizontal grille members 22 of the second panel have been slidably received into the horizontal grille members 20 of the first panel 14. The linkages 26 are also withdrawn to be substantially adjacent to one another rather than being spaced apart.

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Figure 3 is a cross-sectional view of detail 'K' from Figure 2 seen from line D-D in Figure 2. It more clearly shows the horizontal grille member 22 of the second panel being received into the hollow of the horizontal grille member 20 of the first panel 14. The left-most vertical grille member 18 of the first panel 14 is relatively
25 fixed whilst the vertical grille members 19 of the second panel 16 are movable. To allow sliding movement of the horizontal grille member 22 along the slots of the vertical grille members 19, the vertical grille members 19 include sleeves 32 to facilitate such sliding movement and to reduce friction between the hollow of the vertical grille members 19 and the horizontal grille member 22. It is apparent that
30 the left-most vertical grille member 19 of the second panel 16 will be the main actuator of the collapsing and extending movement, as it will push against the other vertical grille members 19 directly during collapsing the collapsing motion,

and pull them apart during the extending motion via the linkages 26.

Figure 4 illustrates the linkage mechanism 36 between the vertical grille members 19 at the top of the vertical grille members 19 at the position of detail 'C' in Figure 1. There is a link pin 40 located at the top of each vertical grille member 19 of the second panel 16 and at the top of the left-most vertical grille member 18 of the first panel 14. Link arms 18 are slidably connected to the link pins 40. Each link arm 38 has a slot that is engaged by a slit (41 in Figure 6) on the link pin 40 to allow the sliding of the link arm 36 along the link pin 40 when the vertical grille members 19 are pushed or pulled on either side.

Figure 5 is a cross-sectional view of the horizontal grille members 20,22 at the position of detail 'C' in Figure 1 seen from line B-B in Figure 1. Each vertical grille member 19 of the second panel 16 (except the left-most vertical grille member) has a sleeve 32 to which the horizontal grille member 22 is in contact, to permit sliding within the sleeve 32. In the position shown, the second panel 16 has been fully extended. It would be appreciated that the horizontal grille member 22 of the second panel can be slid into the horizontal grille member 20 of the first panel when the vertical grille members 19 of the second panel are pushed towards the relatively fixed vertical grille member 18 of the first panel 20.

Figure 6 is a side view of the linkage mechanism 36 joining two vertical grille members 19 of the second panel 16. Each link pin 40 located at the top of each vertical grille member 19 has slits 41 to receive the slot of a link arm 38. During sliding movement of each vertical grille member 19, the link arm slides relative to the link pin 40 on the slit 41 on an adjacent vertical grille member 19.

Figure 7 shows a perspective view of a part of a link arm 38 and a link pin 40 of the linkage mechanism 36. It again illustrates that the link arm 38 is slidable relative to the link pin 40 when pulled or pushed in either direction.

Figure 8 is an isometric view of a sliding joint at the area marked as 'D' in Figure 1.

The vertical grille member 19 has a hole through which the horizontal grille member 22 extends. There is a sleeve 32 to facilitate sliding movement of the horizontal grille member 22 and reduce friction therebetween.

5 Figure 9 is an isometric view of a sliding horizontal grille member 22 adjacent to a fixed horizontal grille member 20 at the area marked as 'E' in Figure 1. The hollow core of the fixed horizontal grille member 20 of the first panel 14 receives the slidable horizontal grille member 22 of the second panel 16 as the latter has a slightly smaller cross-sectional area. The fixed horizontal grille member 20 is fixed
10 to the relatively fixed vertical grille member 18 of the first panel 14.

Figure 10 is an isometric view of a fixed joint at the area marked as 'H' at Figure 1. Both the horizontal grille member 20 and the vertical grille member 17 are part of the first panel 14 and are relatively fixed in position. As a result, according to the
15 described embodiment, the first panel 14 is not collapsible.

Figure 11 is a partial sectional detail view of the lock assembly of the described embodiment. The lock set 24a is located within the width of the frame 12. The lock set 24a is connected in a cam-lock arrangement with a lock rod 42a above it
20 and a lock rod 42b below it. It should be appreciated from Figure 11 that when the lock set 24a is turned in an anti-clockwise direction, the top lock rod 42a will extend upwards and the bottom lock rod 42b will extend downwards. Lock hole pins 44 are created near the ends of the horizontal grille members 22 (or 20 in the case of the first panel) corresponding to the extended positions of the lock rods
25 42a, 42b. Therefore, when the second panel 16 is fully closed and the horizontal grille members 22 pushed into the frame 12, the lock set 24a is turned so that the lock rod 42a, 42b interlock with the lock hole pins 44. The barrier assembly is thus in a locked position.

30 Further, upon collapse of the second panel 16, the first panel 14 can be unlocked at the lock-set 24b so that the first panel 14 can freely slide within the frame 12, together with the second panel 16.

The invention described herein is susceptible to variations, modifications and/or additions other than those specifically described and it is to be understood that the invention includes all such variations, modifications and/or additions which fall
5 within the spirit and scope of the above description.

CLAIMS:

1. A barrier assembly for obstructing a passageway defined at least in part by
5 a frame including first and second panels, wherein the first panel has receiving means to receive at least a portion of the second panel within the first panel, such that the second panel is collapsible to provide an opening in the passageway when said first panel is received by the second panel.
- 10 2. A barrier assembly according to claim 1, wherein the panel is arranged to be slidably mounted in the frame such that at least part of the second panel is received by the second panel when the first panel is moved from a closed position to an open or collapsed position.
- 15 3. A barrier assembly according to claim 1 or 2, wherein the first panel is adapted to be movable within the frame when the second panel is at least partially received by the first panel to define an opening in the passageway.
4. A barrier assembly according to any preceding claim, wherein the first
20 panel is co-planar with the second panel in both the open and closed positions of the barrier assembly.
5. A barrier assembly according to any preceding claim wherein each panel is defined by a plurality of interconnected horizontal and vertical members.
- 25 6. A barrier assembly according to claim 5, wherein the vertical members of the second panel are movable from a closed position wherein the vertical members are adjacent to one another and an open position wherein the vertical members are relatively spaced apart.
- 30 7. A barrier assembly according to claim 5 or 6, wherein the vertical members of the second panel slidably receive the horizontal members of the second



panel.

8. A barrier assembly according to claim 7, including sleeves in the vertical members to slidably receive the horizontal members of the second panel.
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9. A barrier assembly according to any one of claims 5 to 8, wherein the vertical and horizontal members of the first panel are relatively fixed.
10. A barrier assembly according to any one of claims 5 to 9, wherein a vertical member of the first panel adjacent to the second panel include receiving means to receive the horizontal members of the second panel.
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11. A barrier assembly according to any one of claims 2 to 9, wherein the horizontal members of the first panel have larger cross-sectional areas than corresponding horizontal members of the second panel such that the horizontal members of the second panel may be received by and slide within the perimeter of the horizontal members of the first panel.
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12. A barrier assembly according to any one of claims 5 to 11, wherein the horizontal members of the second panel are substantially received within the horizontal members of the first panel in the fully collapsed position.
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13. A barrier assembly according to any one of claims 2 to 11, wherein the vertical members include linkage means to link the vertical members during movement of the second panel to the closed position.
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14. A barrier assembly according to claim 13, wherein the linkage means extend the width of the second panel and including the nearest vertical member of the first panel adjacent to it.
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15. A barrier assembly according to claim 13 or 14, wherein the linkage means consists of link pins connected to each vertical member of the second panel, and the vertical member of the first panel adjacent to the second panel, including link arms interconnecting each of the link pins of each of the said vertical members, and allow relative movement between the link pins and link arms.
16. A barrier assembly according to any one of claims 12 to 14, wherein in the closed position, the link arms are spaced apart and in the collapsed position, the link arms are adjacent each other.
17. A barrier assembly according to any one of the preceding claims, including lock sets associated with the first panel and/or the second panel for locking the first and/or second panels to the frame.
18. A barrier assembly according to claim 17, wherein the lock set includes locking rods operatively connected to a lock of the lock set, and the first and/or second panels include lock holes arranged in relation to the respective panels to contact the frame in the closed position, wherein locking occurs when the lock rods are actuated to extend into and interlock with the lock holes.
19. A barrier assembly according to any one of the preceding claims, wherein rollers associated with one or both of the first and second panels facilitate movement of the panels within the frame.

