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MOVABLE SAFETY GRILLE

BACKGROUND OF THE INVENTION

5 The present invention relates to a movable safety grille, and more particularly to a grille that has sufficient structural strength and can be easily operated to gradually extend or fold within an outer frame to function like a safety guard.

10

Grilles are frequently used in many buildings to shield windows or enclose balconies. For example, the grille used to enclose the balcony is a safety guard and an important protective means against thieves. Such

15 grille is normally fixedly mounted on the building and provides a considerably high load capacity. However, this type of grille could not be easily dismounted or folded once it is installed. A sideward sliding grille has been developed and frequently used at a storefront.

20 Such sliding grille is too bulky to be easily manually or electrically operated, and is therefore replaced by various types of steel shutters. On the other hand, there are also many places, such as windows or balconies of high-rise buildings, that require grilles

25 with less structural strength to protect children, for example, from climbing over a sill or a low railing and falling down the window or the balcony. Such protective grille is necessary when there are children

playing around, but forms a hindrance to a beautiful building appearance and convenient use of the balcony for other purpose when the playing children is not a problem. A type of patterned grille having an increased width is frequently used for enclosing a part of the balcony normally provided behind a kitchen, in order to screen sunlight or to shield clothes drying in the air from other people's vision. Such width-increased patterned grille is also fixedly installed without the possibility of being freely opened or folded as desired. While a steel shutter may be freely wound up to an open position, it has an overall structure, particularly a winding shaft thereof, occupies a considerable space. Such steel shutter is normally electrically operated through a motor and is therefore not suitable for using in front of a window or enclosing a balcony.

SUMMARY OF THE INVENTION

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It is therefore a primary object of the present invention to provide a movable safety grille that mainly includes a horizontal outer frame having a plurality of vertical protective bars provided therein. Each of the protective bars is connected at upper and lower ends to two slide assemblies that are separately movably mounted in top and bottom rails of the outer frame. The slide assemblies may be sequentially slid

to a folded position to closely abut on one another,
or to an extended position to equally spaced from one
another, so that the protective bars are easily
stretched to function like a safety grille. When the
5 slide assemblies are in the folded position, the
protective bars are moved to one or two lateral ends
of the horizontal outer frame without occupying any
additional space or shielding a vision at the window
or the balcony at where the safety grille is mounted.
10 Thus, the movable safety grille of the present
invention is easily operable, and conveniently
stretchable and foldable.

Another object of the present invention is to provide
15 a movable safety grille that includes a plurality of
slide assemblies, on each of which a vertical hook and
a curved elongate hooking strip forward extended from
the vertical hook to suspend in the air are provided.
Each of the elongate hooking strips has a longitudinal
20 opening, and is adjustable to different lengths by
which the strip is extended from the vertical hook to
suspend in the air. When a preceding slide assembly
is slid forward, the vertical hook thereof moves in
and along the transverse opening of the elongate
25 hooking strip of a following slide assembly to finally
reach a suspension section of the elongate hooking
strip of the following slide assembly and pull the
latter to slide forward, too. By adjusting the

suspended length of the curved elongate hooking strip,
the space between two adjacent protective bars of the
safety grille at the extended position may be easily
adjusted to facilitate easy mounting of the movable
5 grille in an outer frame of any width.

BRIEF DESCRIPTION OF THE DRAWINGS

The structure and the technical means adopted by the
10 present invention to achieve the above and other
objects can be best understood by referring to the
following detailed description of the preferred
embodiments and the accompanying drawings, wherein

15 Fig. 1 is a perspective view of a movable safety grille
according to the present invention, wherein the grille
is folded to locate at one lateral end of an outer frame;

Fig. 2 is a perspective view of the movable safety
20 grille of the present invention, wherein the grille
is folded to locate at two lateral ends of the outer
frame;

Fig. 3 is a plan view of the movable safety grille of
25 the present invention being fully extended in the outer
frame;

Fig. 4 is an exploded perspective view of a slide

assembly mounted in a top rail of the outer frame for the movable safety grille of the present invention;

Fig. 5 is an assembled perspective view of the slide
5 assembly of Fig. 4;

Fig. 6 is a fragmentary sectioned side view of Fig.
5;

10 Fig. 7 is a fragmentary sectioned side view showing the manner in which the slide assembly moves; and

Fig. 8 is an exploded perspective view showing an adjusting member for adjusting the position of a slide
15 assembly closest to a side jamb of the outer frame for the movable safety grille of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

20 Please refer to Figs. 1, 2, and 3, in which a movable safety grille according to the present invention is shown. The movable safety grille mainly includes an outer frame 1, a plurality of slide assemblies 2, and a plurality of protective bars 3 in a number
25 corresponding to that of the slide assemblies 2.

The outer frame 1 is a rectangular frame dimensioned to match with a window or an open space above a balcony

railing for connecting to an outer side of the window or to a top of the balcony railing. The outer frame 1 includes top and bottom rails 11, and two side jambs 12. The slide assemblies 2 are correspondingly set in the top and the bottom rail 11 to slide across the outer frame 1. Each pair of slide assemblies 2 correspondingly set in the top and the bottom rail 11 has one protective bar 3 vertically extended therebetween, such that the pair of slide assemblies 2 and the protective bar 3 therebetween together form an integral unit. The slide assemblies 2 may be moved along the top and the bottom rail 11 between a folded position and an extended position. When the slide assemblies 2 are moved to the folded position, they are either located at one lateral end of the outer frame 1, as shown in Fig. 1, or at two lateral ends of the outer frame 1, as shown in Fig. 2. And, when the slide assemblies 2 are moved to the extended position, a safety grille with equally spaced protective bars 3 is provided in the outer frame 1, as shown in Fig. 3. Fastening means 13 may be correspondingly mounted on two outmost protective bars 31 and two side jambs 12 to lock the extended safety grille to the side jambs 12 without the risk of being easily pulled open by children. Since the fastening means 13 are conventional skills, they are not shown in details in the drawings.

Figs. 4 and 5 are exploded and assembled perspective views, respectively, of the slide assembly 2, and Fig. 6 is a sectioned side view thereof. As shown, each slide assembly 2 mainly includes a slide seat 21 and an elongate hooking strip 22. The slide seat 21 is divided into upper and lower sections 210, 211. The upper section 210 is substantially in the shape of a letter U to include two vertically extended side walls 212. A pulley block 213 is mounted to an outer side of each side wall 212 to enable the slide assembly 2 to slide on and along a pair of slide ways 111 provided in each rail 11. Meanwhile, the side walls 212 of the upper section 210 of each slide assembly 2 are in contact with inner wall surfaces 112 of the rail 11 to ensure a smooth sliding of the slide assembly 2 along the rail 11. A vertical hook 214 having a predetermined height upward projects from a lower front edge of the U-shaped upper section 210. The hook 214 has a forward extended and declined free end to provide a hook head 215. A backward slanted toothed slope 216 is provided on a bottom of the upper section 210 behind the vertical hook 214 and is removably covered with a cover 217 having a toothed inner surface. The cover 217 is fixed to the toothed slope 216 with an adjusting screw 218.

The elongate hooking strip 22 is a flat strip having a curved profile, and is preferably made of a nylon

material to provide some extent of elasticity and toughness. The hooking strip 22 includes a longitudinal opening 220 having a predetermined width. A first end of the hooking strip 22 serves as a fixing
5 section 221, upper and lower surface of which are provided with a plurality of teeth. A second end of the hooking strip 22 opposite to the first end serves as a suspension section 222 that extends forward in a curvature to suspend in the air when the elongate
10 strip 22 is put around the vertical hook 214 with the fixing section 221 clamped between the toothed slope 216 and the cover 217. The fixing section 221 may be adjusted in position relative to the upper section 210 of the slide seat 21 before it is finally fixedly
15 clamped between the toothed slope 216 and the cover 217, so that a length by which the suspension section 222 is extended from the slide seat 21 is variable.

The lower section 211 is provided at a bottom with a
20 downward projection 219 that has a cross section corresponding to that of an aluminum extrusion constituting the protective bar 3, so that the slide seat 21 may be stably and firmly connected to an end of the protective bar 3 by engaging the projection 219
25 into the end of the protective bar 3. A self-tapping screw hole 32 is provided on each end of protective bar 3, so that the adjusting screw 218, which also serves as a self-tapping screw, may be screwed through

the slide seat 21 into the self-tapping screw hole 32 to thereby firmly lock the protective bar 3 to the slide assembly 2 without the risk of becoming loosened or separated from the slide assembly 2. Preferably, the protective bar 3 has a transverse width not exceeding that of the lower section 211 to enable a close contact of two adjacent slide assemblies 2 and accordingly a minimized space to be occupied by the slide assemblies 2 in the folded position.

When the plurality of protective bars 3 arranged side by side are sideward pulled across the rails 11 by directly pulling a leading one 31 thereof, as shown in Figs. 1 and 2, the vertical hook 214A of each preceding slide assembly 2A, as viewed from the leading protective bar 31, slides in and along or below the longitudinal opening 220B of the elongate hooking strip 22B of a following slide assembly 2B. When the vertical hook 214A is moved forward to reach the suspension section 222B of the elongate hooking strip 22B, the hook head 215A of the vertical hook 214A naturally engages with the suspension section 222B. When the preceding slide assembly 2A is kept moving forward at this point, as indicated by the arrow C in Fig. 7, the following slide assembly 2B is then pulled to slide forward, too. The same movement is repeated until all the slide assemblies 2 and the protective bars 3 connected thereto are sequentially pulled to

equally spaced from one another. A safety grille is therefore formed and stretched in the outer frame 1. To fold the stretched safety grille, simply push the leading protective bar 31 in a reverse direction to
5 slide each preceding slide assembly 2A backward, that is, in a direction opposite to the arrow C, so that the vertical hook 214A disengages from the suspension section 222B of the following slide assembly 2B and then bears against the fixing section of the following
10 slide assembly 2B. In this manner, the slide assemblies 2 are sequentially pulled one by one to locate at one or two lateral ends of the outer frame 1 in close contact with one another. Since each elongate hooking strip 22 has a predetermined
15 curvature, elasticity, and toughness, and the curvature of the elongate hooking strip 22 is designed to match with a height defined by a stopper 113 in the rail 11 (see also Figs. 4 and 5), the elongate hooking strips 22 of all slide assemblies 2, either being moved
20 to the folded or to the extended position, are always compressed and guided by the stopper 113 in the rail 11. When the slide assemblies 2 are in the folded position, the elongate hooking strips 22 are sequentially overlapped one by one, as shown in Fig.
25 7. And, the slide assemblies 2 in the folded position may be sequentially pulled apart again by moving the vertical hook of a preceding slide assembly.

The slide assembly 2 of the present invention is structurally designed to have an increased load capacity, so that protective bars 3 in the form of aluminum extrusions are acceptable for the purpose of
5 a safety grille. In addition, since each of the protective bars 3 is interposed between a pair of upper and lower slide assemblies 2 and is firmly connected thereto with screws 218, the safety grille constructed from the protective bars 3 made of aluminum extrusions
10 is considerably strong in structure. The slide assemblies 2 are adapted to smoothly and stably slide along the top and the bottom rails 11, enabling the movable safety grille of the present invention to be effortlessly operated to the extended position for use
15 or to the folded position when it is not in use. A hole 23 may be provided on each slide assembly 2 between the upper and the lower section 210, 211 for a hanger to hook thereto, so that a curtain may be hung on the hangers to be stretched, withdrawn or folded along with
20 the protective bars 3 of the safety grille.

A space between two adjacent protective bars 3 small enough to prevent a small child from extending a head therethrough may be determined prior to the
25 installation of the movable safety grille of the present invention. The numbers of required protective bars 3 and corresponding slide assemblies 2 can be derived from an overall width of the outer

frame 1. In the event the overall width of the outer frame 1 is not a multiple of a desired space between two adjacent protective bars 2, two ways are available for solving the problem.

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The first way of solution is to adjust the position of the fixing section 221 of the elongate hooking strip 22 relative to the upper section 210 of the slide seat 21, so that the distance by which the elongate hooking strip 22 forward suspends in the air is adjusted to
10 obtain a desired space between any two adjacent protective bars 3 or between the outmost and the next protective bar 3.

15 The second way of solution is suitable for use when it is not desirable to adjust positions of the elongate hooking strips 22 of the slide assemblies 2. In this case, an adjusting member 14 shown in Fig. 8 is employed. The adjusting member 14 is mounted to one or two lateral
20 ends of the rails 11 and includes a transversely extended long slot 141. The adjusting member 14 is fastened to the stopper 113 in the rail 11 by extending screws 142 through the long slot 141 and fixing holes 114 provided near an outer end of the stopper 113, while
25 a front end 143 of the adjusting member 14 is clamped to the upper section 210 of the slide seat 21 of the outmost slide assembly 2 that is closest to the side jamb 12. By changing positions of the screws 142 in

the long slot 141 of the adjusting member 14, the outmost slide assembly 2 connected to the adjusting member 14, and accordingly, the protective bar 3 connected to the outmost slide assembly 2, may be
5 adjusted to different positions relative to the side jamb 12 as desired.

The top and the bottom rail 11 of the outer frame 1 are not necessarily limited to rails with only one pair
10 of slide ways 111. In the case the outer frame 1 has a considerably large overall length, it is also possible for the top and the bottom rail 11 to have two pairs of slide ways. In this case, the rearmost slide assembly 2 or protective bar 3 in the first pair
15 of slide ways is provided with a one-way pull member, and the leading slide assembly 2 or protective bar 3 in the second pair of slide ways is provided with a complementary pull member. When the movable safety grille is stretched and the slide assemblies 2 and
20 protective bars 3 in the first pair of slide ways are completely moved to the extended position, the one-way pull member on the rearmost slide assembly 2 or protective bar 3 is utilized to pull the leading slide assembly 2 or protective bar 3 in the second pair of
25 slide ways to complete the operation of a movable safety grille with two pairs of slide ways.

The present invention has been described with a

preferred embodiment thereof and it is understood that many changes and modifications in the described embodiment can be carried out without departing from the scope and the spirit of the invention as defined
5 by the appended claims.

What is claimed is:

1. A movable safety grille, comprising an outer frame,
a plurality of slide assemblies, and a plurality of
5 protective bars in a number corresponding to that
of said slide assemblies;

said outer frame being a rectangular frame
dimensioned to match with and shield a working space,
10 such as a window, and including a top and a bottom
rail, and two side jambs; said a plurality of slide
assemblies being correspondingly set in said top and
bottom rails to slide across said outer frame, and
each pair of said slide assemblies correspondingly
15 set in said top and said bottom rail having one said
protective bar vertically extended therebetween,
such that said pair of slide assemblies and said
corresponding protective bar together form an
integral unit to move along said top and bottom rails
20 between a folded position and an extended position;

each of said slide assemblies including a slide seat
and an elongate hooking strip; said slide seat being
divided into a substantially U-shaped upper section
25 and a lower section, said upper section including
two vertically extended side walls, to an outer side
of each of which a pulley block is mounted to enable
said slide assembly to slide on and along a pair of

slide ways provided in each said rail, a vertical hook having a predetermined height upward projected from a lower front edge of said U-shaped upper section, said vertical hook having a forward extended and declined free end to provide a hook head, and a backward slanted slope provided on a bottom of said upper section behind said vertical hook to be removably covered with a matching cover, said cover being fixed to said slope with an adjusting screw, so as to clamp a first end of said elongate hooking strip therebetween; said elongate hooking strip being a flat strip having a curved profile and including a longitudinal opening having a predetermined width to allow mounting of said elongate hooking strip around said vertical hook at said first end that serves as a fixing section, a second end of said hooking strip serving as a suspension section to extend forward in a curvature to suspend in the air; and said lower section being connected to an end of one said protective bar;

said protective bars being unlimited in shape and each of which being connected at upper and lower end to two said slide assemblies separately mounted in said top and bottom rails, such that each said protective bar and two said slide assemblies connected thereto together form an integral unit adapted to slide across said top and bottom rails;

whereby when one of said protective bars or slide assemblies at a preceding position is pulled forward, said vertical hook of said preceding slide assembly slides in and along or below said longitudinal opening of said elongate hooking strip of one said slide assembly immediately following said preceding slide assembly; and when said vertical hook of said preceding slide assembly reaches said suspension section of said elongate hooking strip of said following slide assembly, said hook head of said vertical hook of said preceding slide assembly naturally engages with said suspension section of said following slide assembly to pull the same forward; and when all said slide assemblies and protective bars are sequentially pulled to equally spaced from one another, a safety grille is formed to stretch in said outer frame; and

when said preceding slide assembly is pushed to slide reversely to disengage from said suspension section of said following slide assembly and then bears against said following slide assembly, said slide assemblies are sequentially pushed one by one to locate at one or two lateral ends of said outer frame in close contact with one another.

2. The movable safety grille as claimed in claim 1,

wherein said backward slanted slope on said slide seat of each said slide assembly and said cover are provided at contacting areas therebetween with a plurality of teeth, and upper and lower surfaces of said fixing section of each said elongate hooking strip are also provided with a plurality of teeth, enabling said toothed fixing section of said elongate hooking strip to be firmly clamped between said toothed slope and said toothed cover without the risk of being pulled apart therefrom.

3. The movable safety grille as claimed in claim 1, wherein said elongate hooking strip is a flat strip having a predetermined curved profile to provide an extent of elasticity and toughness, and said curvature of said elongate hooking strip is designed to match with a stopper in said top and bottom rails, whereby when said slide assemblies are moved to said folded position, said elongate hooking strips are always compressed and guided by said stoppers in said rails to sequentially overlap one by one, and said slide assemblies in said folded position may be sequentially pulled open again by said vertical hook of said preceding slide assembly engaging with said suspension section of said following slide assembly while being pulled forward.

4. The movable safety grille as claimed in claim 1,

wherein each said slide assembly is provided at a predetermined position, such as between said upper and said lower section, with a hole for holding a hanger thereto, allowing a curtain to hang on said hangers and be stretched, withdrawn or folded along with said protective bars of said movable safety grille.

5. The movable safety grille as claimed in claim 1, further comprising at least an adjusting member mounted to at least one lateral end of each said top or bottom rail, each said adjusting member including a long slot transversely extended across said adjusting member and being fastened to said stopper in said rail by extending screws through said long slot and fixing holes provided on said stopper near an outer end thereof, while a front end of said adjusting member is clamped to said upper section of said slide seat of one said slide assembly that is located at an outmost position to be closest to said side jamb; whereby by changing positions of said screws in said long slot of said adjusting member, said outmost slide assembly connected to said at least one adjusting member, and accordingly, said protective bar connected to said outmost slide assembly, may be adjusted to different positions relative to said side jamb as desired.