



ENTRANCE SECURITY GATE

Field of the Invention

This invention relates to a gate for securing an entrance to a building, such as a window or doorway, against unauthorized entry therethrough.

5 Background of the Invention

Entrance grilles are used to prevent breaking and entry into a building through an entrance. Such grilles are now becoming widely accepted for residential use. Use in the residential setting has demanded a grille which conforms to residential safety standards. Such standards require that the grille be capable of removable to
10 provide an exit in the case of fire. The procedure for removal of a grille, therefore, should be as simple as possible. To enhance acceptance by residential customers, the gates should be easy to install onto windows of any size and frame arrangement and should be easy to handle in terms of weight, and assembly and mounting procedures.

Security gates are known which are adapted to be mounted adjacent the
15 entrance and are capable of being swung out in a gate-like fashion to allow emergency exit therethrough. In addition to the grille and the pivotal mounting arrangement, these gates often include a locking arrangement for releasably locking the grille in a closed position. Many of these known gates are manufactured in such a way as to be permanently mounted on the pivotal attachment. This necessitates handling the entire
20 grille portion during mounting which complicates the mounting procedure.

Further, the mounting arrangements and grilles of known gates are often fixed so that only one lateral spacing of bars can be provided. This arrangement prevents the adjustment of the mounting system and grille to allow proper bar spacing
25 for the size of the window. To use the gate over larger entrances, the length of the bars



is often increased, such as by telescoping tubes, without increasing the number of cross bars. The resulting gate is therefore weakened.

5 The lock arrangements in known gates often require complicated mounting procedures. For example, many known locking systems are permanently set so that the engaging portion of the lock can only be placed in engagement with a preselected location on the bars of the grille. This arrangement complicates or prevents adjustment of the size of the grille. Adjustments to size in these arrangements are often made by telescoping tubes which complicates the grille
10 manufacture and weakens its structure.

In addition, many lock arrangements are complex and require complicated methods for release of the lock to allow the gate to be removed from the entrance. This is particularly undesirable in security gates.

15 There exists a need for a security gate that is useful for residential use in that it is easy to install and to adjust to fit entrances of various sizes, while having a lock system which is easy to release to allow the removal of the gate from over the entrance.

Summary of the Invention

20 An entrance security gate has been invented which is suitable for securing entrances in buildings, particularly residential buildings. The locking arrangement of the gate facilitates fire escape through entrances protected by the gate. The entrance gate can be easily adjusted to fit an entrance of any size and to be mountable onto various entrance frame configurations. Further, the grille portion, which often proves cumbersome in mounting a gate, can be fitted into place after the hinge and locking
25 arrangements for the gate have been secured. The entrance gate can be fully dismantled to facilitate packaging.



Thus in accordance with a broad aspect of the present invention, there is provided a security gate for an entrance comprising: a grille formed of bars extending substantially over said entrance; hinge means for attaching a first edge of the grille adjacent the entrance, the hinge means allowing pivotal movement of the grille about the hinge means and being adjustable to accommodate different spacing between the bars of the grille; and grille locking means to releasably lock the grille in a position blocking the entrance.

The locking means can be comprised of a means for engaging the bars of the grille which is moveable between a first position in which it engages the grille and retains it in a position blocking the entrance and a second position in which it is disengaged from the grille to permit pivotal movement of the grille to open the entrance and securing means operable to permit movement of the grille engaging means between said first and second positions. The means for engaging the bars is preferably a simple arrangement which engages with the bars of the grille at any position along their length. Preferably, the bars are selected to be of uniform shape along a portion of their length to cooperate with the bar engaging means. This allows for an adjustment in the size of the grille to be made by simply cutting off a portion of the bar without affecting the interaction of the bar and the bar engaging means.

The locking arrangement permits the means for engaging the bars of the grille to be released by a single operation. For example, in one embodiment the bar engaging means drops by gravity out of engagement with the bars of the grille once the securing means is released. In one embodiment, the locking means includes a mounting strip adapted to be mounted about the entrance and having mounted therein a plate disposed to freely slide in a vertical direction. The plate has mounted thereon an extension for fitting within an opening formed on a selected bar of the grille. The plate has further mounted thereon the securing means which is operable to releasably secure the plate in a first position on the mounting strip wherein the extension is fit within the opening formed on the bar. Preferably, when the securing means is



released, the plate is free to drop by gravity to a second position, wherein the extension is not fit within the opening of the bar.

5 To further allow for the adjustment of the size of the gate to fit a variety of entrances, the invention includes hinge means which can be adjusted to cooperate with grilles having different bar spacings and any number of bars. The hinge engages an edge of the grille of the gate. Adjustment to correspond to different bar spacings can be made on site during installation. Optionally, the grille of the gate can be fully constructed on site to fit over any size entrance. Hinges can be added to support the grille along its full length. Thus, the rigidity of the gate is enhanced and torque of the grille about the hinges is made difficult.

15 In a further broad aspect of the present invention there is provided a mounting arrangement for a security grille for an entrance, the security grille having an interconnected first set and second set of bars, the mounting arrangement comprising: hinge means for supporting a first edge of the grille and allowing pivotal movement of the grille about the hinge means, the hinge means being adjustable to accommodate different spacing between the bars of the grille; and, a locking arrangement for releasably locking the grille in a position blocking the entrance.

20 The hinge means is preferably formed of a hinge pin, a first bracket and a second bracket, the brackets being separable from the hinge pin and formed to engage between the hinge pin and the grille. In one embodiment, the hinge pin is formed as a tube and, preferably, of a material able to be cut such as aluminum or polymeric materials. The brackets are, preferably, formed at their first ends to fit into an end of the hinge pin and rotate about an axis parallel to the long axis of the hinge pin. The brackets are formed at their opposite ends to engage an edge of the grille. Preferably, the brackets are formed such that they can directly engage a bar. This engagement is preferably made by engagement of the end of the bracket within a channel formed in the end of the bar.



Brief Description of the Drawings

A further, detailed, description of the invention, briefly described above, will follow by reference to the following drawings of specific embodiments of the invention. These drawings depict only typical embodiments of the invention and are therefore not to be considered limiting of its scope. In the drawings:

Figure 1 is a perspective view of a security gate according to the present invention as mounted in a window;

Figure 2 is a sectional view through a bar useful in the present invention;

Figure 3 is an exploded perspective view of a locking arrangement of a mounting system according to the present invention;

Figure 4 is an exploded perspective view of a hinge arrangement according to the present invention; and

Figure 5 is a perspective view of a portion of a grille arrangement useful in the present invention.

Detailed Description of the Preferred Embodiments

Figure 1, illustrates the use on a window of a security gate 16 according to the present invention. The window 10 has a frame 12 built into a wall 14 of a building.

Security gate 16 is installed over window 10 to discourage breaking and entry through the window. Security gate 16 includes a grille comprising a first set of spaced-apart bars 18 and 20 and a second set of spaced-apart bars 22, 24, 26 and 28. Bars 22, 24, 26, 28 extend in a direction essentially perpendicular to the direction of the first set of bars and are interconnected to form the grille. The spacing between the bars is selected to prevent human passage between, over or under the bars and through the window 10. While the drawing depicts an arrangement of two horizontal bars intersected by four vertical bars, it is to be understood that any number of horizontal and vertical bars can be used to form the grille.

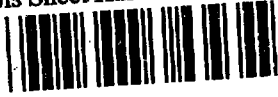


The gate of Figure 1 is shown mounted on the facing wall surrounding a window. The gate of the present invention is also useful for mounting in the opening of an inset window, which will be discussed in more detail below.

5 The security gate, according to this invention, is devised in a manner to readily facilitate installation of the gate by a householder. Since residential homes have a variety of window sizes, it is also necessary to provide a gate which can be readily adjusted to fit these varying window sizes. This is accomplished by the provision of bars which can be cut to fit any size window and variably spaced without complicating the attachment to the mounting arrangement and a mounting arrangement which can
10 be adjusted to accommodate variably spaced bars.

First ends, generally designated 30, of bars 18, 20 are pivotally mounted to wall 14 by a hinge arrangement comprising a housing 92 through which extends brackets 94, 95 for engaging bars 18, 20. Brackets 94, 95 can pivot about housing 92 to swing the attached grille over or away from the window.

15 Opposite ends, generally designated 34, of bars 18, 20 are releasably secured to the wall by a locking arrangement. When the locking arrangement is unlocked, as shown in Figure 1, grille 17 is released to pivot about the mounting arrangement and swing away from window 10 for cleaning or emergency escape. The locking arrangement comprises bar engaging portions 38, 40 and a lock 42 which is
20 actuated to allow the movement of portions 38, 40 into and out of engagement with bars 18, 20. In this embodiment, lock 42 is of a type which is not easily picked to avoid tampering by burglars attempting to gain entry. Other securing means can be used instead of a lock. Remote control systems are particularly preferred as they can be opened from a remote location in case of fire. Such systems can include, for example,
25 a remote lever-actuated cable which draws the bar engaging portions upwards into engagement with the bars or a remote control solenoid type bolt controlled for example by the building fire alarm system. Preferably, the locking arrangement also includes a



stop flange 44 which prevents bar 20 from being moved out of engagement with engaging portion 40.

Referring to Figure 2, a cross sectional view is shown through a bar useful with the locking arrangement of Figure 1. The bar comprises a generally C or U-shaped outer web 52 formed to define an opening 54. Preferably, flanges 56 extend into the opening along the length of the bar to strengthen the outer skin and to form a channel 57 for other purposes as will be described hereinbelow.

The bar is preferably of uniform cross sectional shape along its length so that, regardless of where it is cut, the sectional view will be substantially the same. The bar is formed of any suitable material such as aluminum or polymers, for example organic or inorganic fibre filled resins, which are capable of being cut with common household tools such as a hack saw or circular saw and which are strong and not easily bent or broken. As would be appreciated, a bar formed by extrusion processes using, for example, aluminum would be particularly useful. Preferably, the bars are coated in a durable, attractive coating such as enamel.

Referring to Figure 3, a locking arrangement according to the present invention is shown. The locking arrangement includes a mounting strip 60 for installation by screws 62 or other securing means to an entrance. To mount the strip in an inset window, screws 62 are driven into the wall through apertures 63a. Mounting the strip in a configuration as shown in Figure 1 simply requires that screws 62 be driven into the wall through apertures 63b, instead of apertures 63a.

Mounting strip 60 has two pairs of aligned flanges 64, 66 extending from its inner surface. Aligned flanges 64, 66 together define a pair of aligned channels 68. The locking arrangement further includes a plate 70 which has formed, or securely mounted thereon bar engaging extensions 38, 40 and a lock 42. Plate 70 is formed to fit into, and be slidable within, channels 68. Lock 42 has a bolt 78 which can be



extended from lock housing 80 or retracted therein by turning of key 82. Lock 42 is mounted on plate 70 above aperture 84 such that bolt 78 is free to pass through aperture 84. When plate 70 is correctly positioned along channels 68, bolt 78 can be extended through aperture 84 and into aperture 85 on mounting strip 60. When bolt 78 is extended through apertures 84 and 85, plate 70 is prevented from sliding within channel 68. Extensions 38, 40 are formed to fit within openings 54 on bars 18, 20. Extensions 38, 40 are further positioned on plate 70 such that they are positioned within openings 54 on bars 18, 20 when bolt 78 is engaged within aperture 85.

The bars, such as bar 20, can be as described in Figure 2 or can be any suitable shape for accepting extensions. For example, bar 18 has no inner flanges. The bars must be formed to accept the extension of the locking arrangement along at least a length that will allow adjustments to be made to the length of the bars by cutting off the end of the bar without compromising the engagement of the bar by the extensions. Preferably, the bar is of uniform cross sectional shape along its length to facilitate production of the bar. While the bars have been shown to have openings for accepting extensions of the locking arrangement, it is to be understood that the opposite arrangement is useful wherein the bars have extensions along their length which are accepted into openings in the locking arrangement.

The locking arrangement acts to secure bars 18, 20 in position by engagement of bars by extensions 38, 40. Plate 70 slides freely in channel 68 when bolt 78 is retracted, such that extensions 38, 40 can be moved into and out of openings 54 in bars 18, 20. Plate 70 is positioned such that extensions 38, 40 move out of openings 54 by gravity when lock 42 is unlocked. Because gravity will automatically cause the disengagement of extensions 38, 40 from bars 18, 20, emergency escape requires only the turning of key 82 to retract bolt 78 to allow the pivotal movement of the grille away from the window.

Preferably, a stop plate 86 is provided for insertion into channel 68 above



plate 70. Stop plate 86 is secured in position by screw 62 and limits the upward sliding movement of plate 70. Stop plate 86 has formed thereon stop flange 44 which is positioned so that bar 20 will swing into position between it and extension 40. Stop flange 44 prevents bar 20 from being lifted out of engagement with extension 40, when extension 40 is in position in opening 54 of bar 20.

Bars 18, 20, and thereby the grille of the gate, rotate about a hinge arrangement between the lockable position and the open position. To prevent over-rotation of bars 18, 20 past mounting strip 60, upstanding wall 90 is provided on mounting strip 60. As noted hereinbefore, wall 90 is useful also for the mounting of strip 60 on a facing wall surrounding an entrance.

A hinge arrangement according to the present invention is shown in Figure 4. The hinge arrangement is adjustable to accommodate different bar spacings and includes a housing 92 for supporting a hinge pin 93 and a pair of brackets 94, 95. In a preferred embodiment, hinge pin 93 is separable from each of housing 92 and brackets 94, 95 to allow for adjustment in spacing of brackets 94, 95. In an embodiment, hinge pin 93 is formed to be adjustable in length. For example, in the preferred embodiment, hinge pin 93 is formed of aluminum with a uniform cross section along its length and can be cut to a suitable length by use of a hack saw. Brackets 94, 95 fit into the ends of hinge pin 93 and this assembly is inserted into housing 92 through opening 97. Brackets 94, 95 are free to rotate in and extend out from slots 98. Slots 98 can be spaced along the housing during manufacture or can be formed at site by displacement of knockouts or by the formation of slits by a hacksaw. Housing 92 containing the hinge pin and brackets assembly is secured in position by screws 96 adjacent an entrance. Housing 92 is mounted on the wall such that opening 97 is placed against the wall to retain the hinge pin in the housing. Brackets 94, 95 are formed to be engaged between the hinge pin and the bars of the grille. In the preferred embodiment, as shown, brackets 94, 95 are substantially L-shaped having first ends 94', 95' and second ends 94'', 95''. The first end thereof is engaged in the central



opening of the hinge pin and the second end is inserted in channels 57 formed by flanges 56 of bars 18, 20 (best seen in Figure 2). Preferably, at their second ends the brackets are formed to have a straight edge 101 and a stepped edge 102, with the stepped edge being formed on opposite sides on each of the upper and lower brackets of a pair. Such brackets provide that when the grille is closed, the stepped edges of the brackets abut against the housing to prevent over-rotation of the grille. Further, in combination with the preferred locking arrangement, the brackets cause the bars to be firmly held between the mounting strip and the housing to prevent the bars from being slid off of the brackets. The brackets are formed of a strong material such as, for example, plate stainless steel.

The hinge arrangement can be used for mounting in various configurations such as for a window which is flush with the wall, or left or right side mounting, by simply inverting the housing to allow the free outward rotation of the brackets about the housing. When the hinge arrangement with the preferred brackets is mounted in different configurations, the upper and lower brackets can be reversed so that the stepped edge of the brackets do not prevent the free rotation to close the grille.

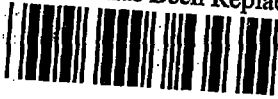
It is to be understood that the housing need not be exactly as shown. Any suitable arrangement which holds the hinge pin in place adjacent an entrance opening can be used. Preferably, the housing further acts to hold the hinge pin and brackets assembly together to facilitate mounting. Preferably, however, housing 92 is substantially as shown in Figure 4 and is formed to have a uniform cross sectional shape along its length. This renders housing 92 suitable for formation by processes such as extrusion from aluminum or polymers.

The locking arrangement, as described in Figure 3 and the hinge arrangement as described in Figure 4 are useful to provide a security gate which offers much flexibility in the size of entrance onto which it can be installed.



The security gate of a preferred embodiment, is formed of a first set of spaced apart bars and a second set of spaced apart bars. The first set of bars are substantially as those described with reference to Figure 2 having formed in their web a plurality of spaced apertures. The second set of bars are of a diameter to fit through the apertures of the first set. These bars can each be cut to the required lengths to cover the window. Referring to Figure 5, the bars are fitted together by inserting a bar 22 from the second set through an aperture 23 formed through a bar 20 from the first set. An assembly key 25 is provided for locking the bars together. The key is formed of a stiff material, such as steel, and is shaped with upturned edges 29 to fit into and slide within channel 57 of bar 18. Key 25 has teeth 27 which are separated to define an opening which is sized to be slightly less than the diameter of bar 22. To lock the bars together, key 25 is fed through channel 57 of bar 20 and is driven within bar 20 into engaging position with bar 22 such that teeth 27 on key 25 pass around bar 22 and cut into bar 22. In this way, bars 20 and 22 are securely interconnected. An assembly key is preferably used at each intersection of the bars. The arrangement as shown in Figure 5, allows a grille to be formed which has variable bar spacing. In this way, a grille can be formed having, for example, closer than normal bar spacing to prevent reaching of arms there through.

To mount the grille, the hinge arrangement, as described in Figure 4, is first assembled and installed. Assembly of the hinge arrangement first includes, if necessary, the adjustment of the length of hinge pin 93, such as by cutting, to correspond to the desired bar spacing of the grille. Slots 98 in the housing 92 are then opened, if required, by displacement of knock outs or by the formation of cuts by a hack saw. Alternately, slots provided in the housing during manufacture are used. Brackets 94, 95 are then inserted into the ends of the hinge pin and this arrangement is placed in the housing such that the brackets extend out from the housing through the slots. The housing containing the hinge pin and brackets is then secured to the wall adjacent the window opening by screws or other fasteners such that the brackets are free to rotate about the housing.



The grille is then installed on the brackets by frictional engagement or with the addition of fasteners or adhesives.

The locking arrangement is then mounted to correspond to and engage the end of the grille opposite from the hinged end. The locking arrangement is assembled by first adjusting the extensions 38, 40 and lock 42 if necessary, and then inserting plate 70 into channels 68 at the end of mounting strip 60. Stop plate 86 is also inserted and the strip is installed onto the wall or opening around the window such that the extensions are positioned to engage the bars when the lock is secured. The gate is then ready for use.

The gate of the present invention is particularly suited for sale as a kit for installation by a householder or contractor. The kit is comprised of a grille, a hinge arrangement and a locking arrangement. The grille can be provided in assembled form or as a plurality of bars to be cut and assembled with keys, as described with reference to Figure 5. The mounting arrangement can be preassembled or comprised separately of a length of tube suitable for cutting into hinge pin lengths, a plurality of brackets and a length of a member suitable for cutting to form the housing. The locking arrangement can be preassembled or can be comprised separately of a length of member suitable for cutting to form the mounting strip including the sliding plate with extensions and lock and the stop plate. A kit such as this is particularly useful for installation of a security gate onto windows of different sizes and is extremely easy to package.

It will be apparent that many changes may be made to the illustrative embodiments, while falling within the scope of the invention and it is intended that all such changes be covered by the claims appended hereto.



THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A security gate for an entrance comprising:
 - a grille comprised of bars extending substantially over said entrance;
 - 5 hinge means for attaching a first edge of the grille adjacent the entrance, the hinge means allowing pivotal movement of the grille about the mounting means and being adjustable to accommodate different spacing between the bars of the grille; and
 - grille locking means to releasably lock the grille in a position blocking the entrance.
- 10 2. The security gate as claimed in claim 1 wherein the grille locking means comprises a grille engaging means moveable between a first position in which it engages the grille and retains it in a position blocking the entrance and a second position in which it is disengaged from the grille to permit pivotal movement of the grille to open the entrance and securing means operable to permit movement of the grille
- 15 grille engaging means between said first and second positions.
3. The security gate as claimed in claim 2 wherein the grille engaging means is moveable between the first position and the second position by a single operation of actuating the securing means.
4. The security gate as claimed in claim 1 wherein the grille is comprised of at least
- 20 a first set of bars, the bars being selected to be of substantially uniform shape along a portion of their length to cooperate with the grille engaging means.
5. The security gate as claimed in claim 4 wherein the grille engaging means is an extension for fitting within an opening on at least a selected one of the bars.
6. The security gate as claimed in claim 4 wherein the extension is mounted on a



plate slidably mounted within a mounting strip, the plate further supporting the securing means.

7. The security gate as claimed in claim 1 wherein the hinge means is comprised of a hinge pin for supporting a pair of brackets, the brackets extending out from the hinge pin to engage the grille, the hinge pin being adjustable in length to provide for adjustment of the spacing between the brackets.

8. The security gate as claimed in claim 1 wherein the grille is comprised of at least a first bar having a plurality of spaced apart apertures extending therethrough, at least a second bar extending through a selected one of the apertures of the first bar, and a locking means for locking the second bar into the aperture of the first bar.

9. A mounting arrangement for a security grille for an entrance, the security grille having an interconnected first set and second set of bars, the mounting arrangement comprising:

hinge means for supporting a first edge of the grille and allowing pivotal movement of the grille about the hinge means, the hinge means being adjustable to accommodate different spacing between the bars of the grille; and,

a locking arrangement for releasably locking the grille in a position blocking the entrance.

10. The mounting arrangement as defined in claim 9 wherein the locking arrangement comprises a grille engaging means moveable between a first position in which it retains the grille in a position blocking the entrance and a second position in which it permits pivotal movement of the grille to open the entrance; and

securing means operable to permit movement of the grille engaging means between said first and second positions.

11. The mounting arrangement as defined in claim 10 wherein the securing means



being disposed to allow the movement of the grille engaging means between the first position and the second position by a single operation.

5 12. The mounting arrangement as defined in claim 9 wherein the hinge means comprises a hinge pin having a long axis, and a first bracket and a second bracket each separable from the hinge pin, the first and second brackets being formed at a first end to fit into an end of the hinge pin and to pivot about an axis parallel to the long axis of the hinge pin, and the first and second brackets each being formed at their opposite ends to engage the first edge of the grille.

10 13. The mounting arrangement as defined in claim 12 wherein the hinge pin is formed of aluminum.

14. The mounting arrangement as defined in claim 12 wherein each of the first and second brackets are substantially L-shaped having their first end extending out substantially perpendicularly from their second end.