

PATENT SPECIFICATION

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(54) GRATING ASSEMBLY

(71) We, YOSHIDA KOGYO K.K., a corporation duly organized under the laws of Japan and existing at No. 1, Kanda Izumicho, Chiyoda-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a grating assembly for use as a door.

Grating doors are formed of parallel or crossed bars extending in and enclosed by the door framings including a pair of opposed stiled and a pair of top and bottom rails. One well known and established practice to assemble this type of door is to attach the bars one by one directly to the framing members as the latter are united together. The prior art structure, therefore, involves much complicated work at the time of assembling the door components together.

The present invention seeks to provide a grating assembly which includes a preassembled grating unit having a plurality of parallel bars or crossed bars.

The invention further seeks to provide a grating assembly which can be assembled with utmost ease.

The invention further seeks to provide a grating assembly in which the bars are supported stably in place without rattling.

According to the invention, there is provided a grating assembly comprising: an outer framing including a pair of first frame members and a pair of second frame members extending perpendicularly to said first frame members and connecting said first frame members at the ends thereof, either pair of said first or second frame members having a pair of opposed support structures extending along the inside of the frame members; and a grating unit support-

ed in place by and enclosed in said outer framing, said grating unit having a pair of attachment members extending along opposite sides of the grating unit and held in engagement with said support structures.

Two embodiments of the invention will now be described, by way of example, with reference to the drawings, in which:—

Figure 1 is a front elevational view of a pair of grating assemblies constructed in accordance with a first embodiment of the invention, each of the assemblies having a plurality of horizontal parallel bars;

Figure 2 is an enlarged cross-sectional view taken along line II—II of Figure 1;

Figure 3 is a fragmentary exploded perspective view, on an enlarged scale, illustrative of one way of coupling a horizontal bar with a vertical frame member of the grating unit shown in Figure 1;

Figure 4 is an exploded front elevational view showing the grating assembly parts before being put together;

Figure 5 is a front elevational view of a pair of grating assemblies provided in accordance with a second embodiment, each assembly having crossed bars;

Figure 6 is an enlarged cross-sectional view, with parts cut away, taken along line VI—VI of Figure 5;

Figure 7 is a fragmentary exploded perspective view, on an enlarged scale, which illustrates connectors for connecting horizontal bars with a vertical frame member of the grating unit shown in Figure 5;

Figure 8 is an enlarged vertical cross-sectional view of a modification of the grating assembly of Figure 5; and

Figure 9 is a fragmentary exploded perspective view of the modification shown in Figure 8

8, the view being partly broken to show a retainer on the top rail.

In Figure 1, there are shown a pair of grating assemblies 10,10 used as doors. Each of the grating assemblies 10,10 comprises an outer framing 11 and a pair of upper and lower grating units 12,13 supported in place by and enclosed in the outer framing 11. The outer framing 11 includes a pair of stiles or vertical frame members 14,15, a pair of top and bottom rails or horizontal frame members 16,17 connecting the stiles 14,15 together at the ends thereof, and a horizontal middle rail 18 extending between the stiles 14,15 to define a pair of upper and lower accommodating spaces above and below the middle rail 18, respectively.

The pair of grating units 12,13 are supported within the upper and lower accommodating spaces, respectively. Since the grating units 12,13 differ only in the number of their constituting parts used, and have the same structural details, the structure of the grating unit 12 only will be explained. The grating unit 12 has a plurality of, four in the illustrated embodiment, horizontal parallel bars 19 that are hollow as shown in Figure 3 and spaced vertically apart from each other to permit the passage of light through the grating door 10, the bars 19 being connected endwise to a pair of vertical attachment members 20,20.

As shown in Figure 2, the stiles 14,15 are hollow extrusions and have opposed channels 21,21 each defined by a pair of inner and outer flanges 22, 23, the channels 21, 21 receiving in their grooves the peripheral margin of a gasketed pane 24 of glass. The stiles 14,15 are also provided with opposed walls 25,25 to which the inner flanges 22,22 extend perpendicularly, the walls 25,25 each having an extension 26 of hook-shaped cross-section positioned remotely from the inner flange 22. The inner flanges 22,22, the walls 25,25, and the hook-shaped extensions 26,26 jointly form support structures 27,27 for the grating units 12,13.

As best shown in Figure 3, each of the attachment members 20,20 is formed of an elongated extrusion including a flat plate 28 having substantially the same width as that of the bar 19. A plurality of holes as shown at 29 are formed through and at regularly spaced intervals along the flat plate 28, the intervals being equal to those at which the bars 19 are vertically spaced. Each bar is connected endwise to the flat plate 28 by means of a screw 30 extending through the hole 29 threadedly into a socket 31 formed on the interior of the bar 19. A decoration member 32 is formed on and along one edge of the flat plate 28. An angle member 33 is provided on and along one edge of the decoration member 32 and is located remotely from the flat plate 28. The angle member 33 has a pair of perpendicularly extending flanges 34,35, the flange 34 being directed parallel to the plate 28, and the flange

35 being directed normal to the plate 28. The decoration member 32 is the only portion of the attachment member 20 which is exposed to sight, and may be of other cross-sectional shapes.

To form the grating assembly 10, the bars 19 are assembled together by the attachment members 20 to provide the grating units 12 and 13 and, at the same time, the stiles 14 and 15 are interconnected by the middle rail 18 with the sheets 24 of glass held in position. As illustrated in Figure 4, the grating units 12 and 13 are then inserted between the stiles 14 and 15 from the ends thereof. At this time, the attachment members 20 are slid along the support structures 27 and retained therein by engagement of the angle flanges 35 with the distal edges of the hook-shaped extensions 26, as shown in Figure 2. The distal edges of the flat plates 28 are held against the inner flanges 22, and the distal edges of the angle flanges 35 are held against the walls 25. Thus, the grating units 12 and 13 are supported in place against rattling movement. Upon attachment of the grating units 12 and 13, the top and bottom rails 16,17 are affixed so as to capture the grating units 12,13 and the glass panes 24.

With this structure, the outer framing 11 requires no special machining, such as the drilling of screw holes, for attachment of the bars 19.

In accordance with a second embodiment shown in Figures 5 to 7 inclusive, a pair of grating assemblies 40,40 used as doors each comprise an outer framing 41 and a grating unit 42 held in place by and enclosed in the outer framing 41. The outer framing 41 includes a pair of stiles 43,44 and a pair of top and bottom rails 45,46 interconnecting the ends of the stiles 43,44. The grating unit 42 has a plurality of horizontal parallel bars 47 vertically spaced from each other, a plurality of vertical parallel bars 48 horizontally spaced apart from each other and extending in criss-cross relation to the horizontal bars 47, and a pair of vertical attachment members 49,49 to which the horizontal bars 47 are connected endwise.

As shown in Figures 6 and 7, the stiles 43,44 and the attachment members 49 have the same structures as those illustrated in Figure 2. The horizontal bars 47 are connected to the attachment members 49 by means of wedge-shaped connectors 50. The horizontal bars 47 are of a lipped channel cross-section having a bottom wall 51, a pair of opposed flanges 52, 52, and a pair of opposed lips 53, 53. Each attachment member 49 has a plurality of slots 54 formed through the flat plate 28 and spaced at regular intervals therealong. Each of the wedge connectors 50 is a plate member tapered towards its one end and has two edges 55, 55 serrated, the other end having projections 56, 56. The connector 50 is made preferably of metal or plastics material. When the

horizontal bar 47 is to be connected to the attachment member 49, the wedge connector 50 is passed through the slot 54 and thrust into the channel-shaped bar 47 at the end thereof until shoulders at the beginning of the projections 56 abut against the surface of the flat plate 28. The connector 50 can be prevented from being pulled out because the serrated edges 55, 55 are pressed forcibly against and held in locking engagement with opposed inner surfaces of the flanges 52, 52.

The vertical bars 48 are each formed of a hollow structure having a bottom plate 57 and a channel formed by projecting platelike portions 58, 58 forming a pair of legs on and along the opposite edges of the bottom plate 57. A plurality of paired recesses 59, 59 are formed in the legs 58, 58 and equally spaced along the length of the legs 58, 58. The horizontal bars 47 are fitted in the pairs of recesses 59, 59 and fixed to the vertical bars 48 by means of screws 60 extending through the bottom wall 51 threadedly into the bottom plate 57. For installation of the grating unit 42, the stiles 43, 44 and one of the top and bottom rails 45, 46 are connected together, and a gasketed sheet 61 of glass is simultaneously placed in. The grating unit 42 is then installed in substantially the same manner as with the first embodiment. Finally, the other rail is attached to make the grating unit 42 and the glass sheet 61 captive within the outer framing 41.

With the horizontal bars 47 of channel cross-section as shown in Figure 7, the grating unit 42 is liable to bend and rattle somewhere, especially midway, between the fixed attachment members 49, 49. Figures 8 and 9 illustrate a device that enables the central portion of the grating unit 42 to be retained against moving back and forth. The top and bottom rails 45 and 46 of the outer framing 41 have retainers 62, 62 fixed thereto by means of screws 69. Each of the retainers 62 is located at a suitable position on and along the inner wall 63 of a channel 64 in which a periphery of the glass pane 61 is supported. The retainer 62 has its free end curved away from the inner wall 63. A pair of top and bottom horizontal bars 65 are each provided with a recess 66 for the passage therethrough of the retainer 62 during assembly.

As the top and bottom rails 45, 46 are installed, the retainers 62 are passed through the recesses 66 and have their free ends inserted between bottom plates 67 and lips 68 of the bars 65. The top and bottom horizontal bars 65, 65 are maintained stably in place relatively to the top and bottom rails 45, 46, respectively, by engagement with the retainers 62.

While the support structures 27 or attachment members 49 shown and described are formed on the stiles, they may be formed on the top and bottom rails. In such a case, the grating unit is installed on the top and bottom

rails previously interconnected by one of the stiles. The support structures 27 and the attachment members 20, 49 may be configured otherwise. For example, the support structures 27 can be projections and the attachment members 70, 29, 49 can be grooves shaped to receive the projections. The grating units are available in a variety of designs other than those illustrated in the drawings. A typical alternative is a grating unit comprising a plurality of vertical bars connected endwise to a pair of top and bottom horizontal attachment members.

It will be appreciated that the retention of bars such as 47 or 19 in constructions similar to those of Figures 1 and 5 can be effected by means of either screws such as shown in Figure 3 or wedges such as shown in Figure 7 or by any other suitable means of securement.

WHAT WE CLAIM IS:-

1. A grating assembly comprising: an outer framing including a pair of first frame members and a pair of second frame members extending perpendicularly to said first frame members and connecting said first frame members at the ends thereof, either pair of said first or second frame members having a pair of opposed support structures extending along the inside of the frame members; and a grating unit supported in place by and enclosed in said outer framing, said grating unit having a pair of attachment members extending along opposite sides of the grating unit and held in engagement with said support structures.

2. A grating assembly according to claim 1, said grating unit including a plurality of first parallel bars spaced apart from each other and connected endwise to said attachment members.

3. A grating assembly according to claim 2, said grating unit further including a plurality of second parallel bars spaced apart from each other and extending in crisscross relation to said first parallel bars.

4. A grating assembly according to claim 2 or 3, further including retainers provided on the pair of frame members not having the support structures and engaging top and bottom ones of said first parallel bars.

5. A grating assembly according to claim 2, 3 or 4 in which said first parallel bars are each of a lipped channel cross-section, and said attachment members have slots formed therethrough and spaced at intervals therealong, there being a plurality of wedge-shaped connectors thrust through said slots into the ends of said first parallel bars.

6. A grating assembly according to Claim 5, each of said wedge-shaped connectors being a plate member tapered toward one end.

7. A grating assembly according to Claim 5 or 6, each of said wedge-shaped connectors having two edges serrated.

8. A grating assembly according to any preceding Claim, in which said first and second frame members jointly provide a



12

horizontal bar 47 is to be connected to the attachment member 49, the wedge connector 50 is passed through the slot 54 and thrust into the channel-shaped bar 47 at the end thereof until shoulders at the beginning of the projections 56 abut against the surface of the flat plate 28. The connector 50 can be prevented from being pulled out because the serrated edges 55, 55 are pressed forcibly against and held in locking engagement with opposed inner surfaces of the flanges 52, 52.

The vertical bars 48 are each formed of a hollow structure having a bottom plate 57 and a channel formed by projecting platelike portions 58, 58 forming a pair of legs on and along the opposite edges of the bottom plate 57. A plurality of paired recesses 59, 59 are formed in the legs 58, 58 and equally spaced along the length of the legs 58, 58. The horizontal bars 47 are fitted in the pairs of recesses 59, 59 and fixed to the vertical bars 48 by means of screws 60 extending through the bottom wall 51 threadedly into the bottom plate 57. For installation of the grating unit 42, the stiles 43, 44 and one of the top and bottom rails 45, 46 are connected together, and a gasketed sheet 61 of glass is simultaneously placed in. The grating unit 42 is then installed in substantially the same manner as with the first embodiment. Finally, the other rail is attached to make the grating unit 42 and the glass sheet 61 captive within the outer framing 41.

With the horizontal bars 47 of channel cross-section as shown in Figure 7, the grating unit 42 is liable to bend and rattle somewhere, especially midway, between the fixed attachment members 49, 49. Figures 8 and 9 illustrate a device that enables the central portion of the grating unit 42 to be retained against moving back and forth. The top and bottom rails 45 and 46 of the outer framing 41 have retainers 62, 62 fixed thereto by means of screws 69. Each of the retainers 62 is located at a suitable position on and along the inner wall 63 of a channel 64 in which a periphery of the glass pane 61 is supported. The retainer 62 has its free end curved away from the inner wall 63. A pair of top and bottom horizontal bars 65 are each provided with a recess 66 for the passage therethrough of the retainer 62 during assembly.

As the top and bottom rails 45, 46 are installed, the retainers 62 are passed through the recesses 66 and have their free ends inserted between bottom plates 67 and lips 68 of the bars 65. The top and bottom horizontal bars 65, 65 are maintained stably in place relatively to the top and bottom rails 45, 46, respectively, by engagement with the retainers 62.

While the support structures 27 or attachment members 49 shown and described are formed on the stiles, they may be formed on the top and bottom rails. In such a case, the grating unit is installed on the top and bottom

rails previously interconnected by one of the stiles. The support structures 27 and the attachment members 20, 49 may be configured otherwise. For example, the support structures 27 can be projections and the attachment members 20, 49 can be grooves shaped to receive the projections. The grating units are available in a variety of designs other than those illustrated in the drawings. A typical alternative is a grating unit comprising a plurality of vertical bars connected endwise to a pair of top and bottom horizontal attachment members.

It will be appreciated that the retention of bars such as 47 or 19 in constructions similar to those of Figures 1 and 5 can be effected by means of either screws such as shown in Figure 3 or wedges such as shown in Figure 7 or by any other suitable means of securement.

WHAT WE CLAIM IS:—

1. A grating assembly comprising: an outer framing including a pair of first frame members and a pair of second frame members extending perpendicularly to said first frame members and connecting said first frame members at the ends thereof, either pair of said first or second frame members having a pair of opposed support structures extending along the inside of the frame members; and a grating unit supported in place by and enclosed in said outer framing, said grating unit having a pair of attachment members extending along opposite sides of the grating unit and held in engagement with said support structures.

2. A grating assembly according to claim 1, said grating unit including a plurality of first parallel bars spaced apart from each other and connected endwise to said attachment members.

3. A grating assembly according to claim 2, said grating unit further including a plurality of second parallel bars spaced apart from each other and extending in crisscross relation to said first parallel bars.

4. A grating assembly according to claim 2 or 3, further including retainers provided on the pair of frame members not having the support structures and engaging top and bottom ones of said first parallel bars.

5. A grating assembly according to claim 2, 3 or 4 in which said first parallel bars are each of a lipped channel cross-section, and said attachment members have slots formed therethrough and spaced at intervals therealong, there being a plurality of wedge-shaped connectors thrust through said slots into the ends of said first parallel bars.

6. A grating assembly according to Claim 5, each of said wedge-shaped connectors being a plate member tapered toward one end.

7. A grating assembly according to Claim 5 or 6, each of said wedge-shaped connectors having two edges serrated.

8. A grating assembly according to any preceding Claim, in which said first and second frame members jointly provide a

(18)

4

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4

channel for receiving the periphery of a sheet of glass, and said support structures being located adjacent to said channel.

9. A grating assembly substantially as described herein with reference to, or as illustrated in, the drawings.

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10

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