EXTERIOR SLIDING WINDOW SHUTTERS

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Filed Oct. 6, 1967, Ser. No. 673,473

Int. Cl. E06F 17/00

U.S. Cl. 49—116

3,452,477

6 Claims

ABSTRACT OF THE DISCLOSURE

A shutter assembly for use on an exterior wall surface at a window opening or the like comprising a plurality of horizontally reciprocable pairs of apertured shutters restrained in reciprocable movement by guide rails, and moveable in relatively smooth relative reciprocation by a pair of opposed gear racks respectively connected to at least one pair of shutters and operated by a transversely disposed shaft including a pinion meshed with the gear racks, and in which the gear racks and pinions are disposed in a hollow chamber generally below the path of travel of the shutters, and in which the chamber opens outwardly and is closed by a displaceable access panel.

This invention pertains to shutters and means to moveably mount them on an exterior wall of a home or building on tracks which extend laterally across the top and bottom of the window opening, and which includes means to open and close the shutters which comprises gear racks on the shutters, to be actuated by a single pinion gear with an operator within the building.

Shutters of this type are generally used as storm protection and to close the window openings for various other reasons such as when the residents are absent for an extended period of time. Many other types of shutters, awnings or the like are provided for this purpose, most of which are operable from the outside only; however, other attempts at providing such closures operable from the inside have not met with complete success due to one or more undesirable features.

One of the principal objects of the invention is, therefore, to provide a window covering shutter structure which is mounted on an outside wall relative to a window opening and wherein the shutters are adapted to be actuated to a completely closed position or a completely unobstructing, open position by means of a single crank on the inside of the wall.

A further object of the instant invention is to provide such a shutter structure which is equally as adaptable for use on structures such as one or two story homes or on high rise apartment buildings, multi-story hotels or the like.

Yet another object of the invention is to provide shutters which will permit the windows to be opened at least partially when said shutters are completely closed and to incorporate ventilation means therein to permit free passage of air therethrough yet providing complete protection from weather elements such as rain, snow, high winds, etc.

Another object of the invention is to provide a shutter structure which is adaptable to window openings of various widths by varying the width of the shutters and the number of shutters in an assembly. However, in the most practical application, a single standard width shutter is used for most standard sized window openings and the number of shutters is varied to accommodate the various widths; for instance, various narrow width openings within certain limits will require two shutters while intermediate and wide window openings within certain limits will require the use of four and six shutter assemblies respectively.

Still another object of the instant invention is to provide a shutter structure which is durable and decorative in both the open and closed positions.

Other shutter assemblies have been developed in the past and in particular that disclosed in U.S. Letters Patent No. 2,808,626, and it is an object of this invention to provide an improved shutter assembly which includes shutters moveable in a plane of closure that is closely adjacent the outside surface of a wall on which the assembly is installed, for use in high apartment building type installations where increased wind velocities are encountered and more forcibly driven rain and sleet are impacted upon the building.

It is also an object of this invention to provide structure such that the mechanism is arranged to be protectively housed in a chamber which is arranged beneath the plane of closure and not between the closure plane and the outer surface of the building, so that the shutters may closely overlap the surface of the building.

It is also an object to provide a shutter assembly which includes a plurality of shutters which are adaptive to be stacked on the side of an opening when not in use, and, when in the closed condition, the center-most pair or furthest out from the wall surface and on either side of the center shutters as is indicated by the arrowed lines in FIGURE 4, so that there will be a shielding and relatively weather-proof structure provided.

Another object of the invention is to make the actuating mechanism readily accessible for repairs or replacement if necessary without dismounting the bottom rail structure from the wall.

In accordance with these and numerous other objects and advantages which will become more fully apparent hereinafter, the instant invention will now be described with reference to the accompanying drawings.

FIGURE 1 is a perspective view of a window shutter assembly mounted in accordance with the instant invention and illustrating the shutters in an open position;

FIGURE 2 is a perspective view similar to FIGURE 1 but illustrating the shutters in a closed position;

FIGURE 3 is a cross sectional view taken along the line 3—3 on FIGURE 1 looking in the direction of the arrows and illustrating the shutters open;

FIGURE 4 is a cross sectional view similar to FIGURE 3 with the shutters closed;

FIGURE 5 is a fragmentary elevational view of the bottom rail and bottom portions of the shutters with certain parts broken away to better illustrate the operating mechanism;

FIGURE 6 is a fragmentary vertical sectional view taken along the line 6—6 of FIGURE 5 and looking in the direction of the arrows;

FIGURE 7 is an enlarged fragmentary sectional view taken from FIGURE 6 to better illustrate the slidable mounting of the gear racks within the bottom rail;

FIGURE 8 is a vertical sectional view taken along the line 8—8 of FIGURE 2 and looking in the direction of the arrows;

FIGURE 9 is a vertical sectional view taken along the line 9—9 of FIGURE 8 and looking in the direction of the arrows;

FIGURE 10 is an enlarged fragmentary elevation of a typical shutter slat;

FIGURE 11 is a vertical sectional view illustrating the interlocking of two shutters slats and the ventilation apertures therein;

FIGURE 12 is an elevational view of a typical two shutter installation of the instant invention for narrow window openings; and

FIGURE 13 is an elevational view of a typical six shutter installation for wide window openings.
In the drawings in which like reference numerals designate like or similar parts throughout the various views, the shutter assembly 10 of the instant invention consists generally of upper and lower rails 12 and 14 fixed to the outer surface 16 of a wall outwardly from and parallel to the upper and lower horizontal edges of a conventional window opening 18. The rails 12 and 14 extend laterally outwardly from the side vertical edges of the window opening a distance at least as far as the width of one shutter 20. Included within the upper rail 12 is a suspension trolley means 22 for guiding shutter 20, and guide tracks and actuating means 24 and 26 respectively are included within the lower rail 14. An operator crank 28, projecting inwardly from the inside surface 30 of the wall, connects to a shank portion 32 extending through said wall centrally of the shutter assembly in operable connection with the means for actuating means 26. Thus, by manipulation of the operator crank on the inside of the wall the shutters may be slid from the open position illustrated in FIGURE 1 to the fully closed position of FIGURE 2 or vice versa, as set forth hereinafter.

In more detail the upper rail 12 as best seen in FIGURES 3 and 4 is inclined inwardly upwardly extending flange 34 for attachment to the outer surface 16 of a wall by any appropriate means 36. A horizontally disposed outwardly extending roof portion 38 connects the flange 34 to a downwardly extending flange 40 to enclose the top edges of the shutters 20. Flange 40 is provided with an outwardly angulated drip lip 42 along its lower edge. Preferably, this upper rail is constructed of extruded aluminum and includes a floor 44 providing tracks 46 and 48 for trolley rollers sets 50 and 52 rotatably fixed to upwardly extending flanges 54 of angle brackets 56 fixed to both top corners of each shutter 20 by screws 57. A septum 58 extending downwardly from the roof 38 supports the central portion of the floor 44.

It should be noted at this point that the upper rail as described is for use with a four shutter assembly for intermediate width window openings as detailed in the drawings. However, when used with a two shutter assembly as seen in FIGURE 12, the upper rail includes but one trolley track 46 and when used with a six shutter assembly, FIGURE 13, the upper rail is extended outwardly to include a third trolley track.

The lower rail 14, also preferably constructed of extruded aluminum, includes a downwardly extending inner flange 60 fixed to the outer surface 16 of a wall in the same manner as the upper rail. The upper portion of the tracks 62 and 64 are provided longitudinally across the top surface of the roof portion 66 of the lower rail 14, to be slidably traversed by grooves 68 formed in the bottom rail 69 of each shutter. Nylon bearing plates 70 are fixed to the lower ends of each shutter side rail 72—72 by screws 74, FIGURE 6, with appropriate U-shaped cutouts for bearing engagement with the tracks 62 and 64.

The lower rail 14 also includes a floor 74 connected to the roof 66 by a rear upstanding wall 76 and a septum 78 forming two longitudinal chambers 80 and 82 therein. A pair of gear racks 84 and 86 are slidably carried in the outer chamber 82 on a pair of tracks 88 and 90 formed integral with the roof 66 and 74 respectively, said racks including L-shaped nylon bearings 91 pinned thereto in engagement with the tracks. Gear racks 84 and 86 are disposed in a parallel opposed relation to be simultaneously engaged and actuated by a pinion 92. Referring to FIGURE 5, the upper gear rack 84 is fixed in counter direction to the outer shutter 95 on the left side by means of a connecting plate 84 and screws 96 and extends longitudinally to the right a distance sufficient to allow the shutters on the left to be opened clear of the window opening. The lower gear rack 86 is fixed to the outside shutter 99 on the right side by means of a connecting plate 100 and screws 102 and extends an equal distance to the left. When the pinion is turned counterclockwise as indicated by arrows 103, the shutter 95 and top gear rack is slid to the left as indicated by arrow 104 and the shutter 99 and lower gear rack 86 is slid to the right as indicated by arrow 106. Thus, the shutters are opened, and by turning the pinion the shutters are moved from an open to a closed position.

The pinion 92 is fixed as at 110 to the outer end of the shank portion 32 of the operator means which as previously stated extends through the wall to carry a crank handle 28 which projects inwardly from the inside surface 30 of the wall. The crank operator mechanism is preferably of a conventional type that automatically locks the shutters in any desired position by slidably removing the crank handle 28.

As described in relation to the top rail, the bottom rail varies for a two, four or six shutter assembly only in the number of tracks provided, the gear racks and pinion drive being common to each.

For four and six shutter assemblies the vertical side rails 72 of each shutter is provided with abutting pick up fins. As seen in FIGURES 3 and 4, the outer shutters 95 and 99 are provided with inwardly projecting fins 120 which are adapted to contact confronting fins 122 on the inner shutters 124 and 126 to move said inner shutters to the completely open position illustrated in FIGURES 1 and 3 or to the closed position of FIGURES 2 and 4.

A pair of vertical channel members 130 and 132 extend between the outer distal ends of the top and bottom rails and are fixed thereto to nest the outer vertical side rails of the shutters in their closed position. To provide for easy accessibility of the operating mechanism for repairs or the like, a cover plate 134 extends longitudinally across the front of the lower rail 14 and is hinged thereto as at 136. The cover plate is held in its normally closed position by screws 138 adjacent its outer distal ends. An overlap flange, FIGURE 4, 137 of vertical rail 139, fixed as by screws or rivets 141 along the center abutting edge of one of the outer shutters, provides a weather tight relationship between the abutting shutters when closed.

Each shutter is composed generally of a rectangular frame composed of vertical side rails 72, top and bottom rails 140 and 169 respectively, and a plurality of interlocking laterally disposed slats 142. The bottom and top walls 144 and 146 of the top and bottom rails respectively include slots 148 and 150 to capture the curled lateral edge 152 of the upper and lower shutters as illustrated in FIGURES 6 and 8. The vertical side rails 72 include vertical channel members 154 and 156 of the plurality of interlocked slats 142. As best illustrated in FIGURE 11, the top and bottom lateral edges of each slat are curved as at 152 to provide for a weather tight interlocking relationship therebetween.

Additionally, each slat is provided with a multiplicity of relatively short lateral slits 168, with the material above each slit being angulated outwardly and downwardly as at 162 and inwardly and upwardly as at 164 along the bottom thereof to provide for ventilation therethrough.

It will be noted that the outer chamber 82 of the lower rail 14 or track means opens or faces away from the wall and that the chamber is directly below a closure of the center-most or drive shutter panels, so that the distance between the plane of closure and the wall surface is minimized or not increased by reason of the gear type drive means which are employed and located by reason of this structure wholly beneath the outer abutting drive shutters. This drive is therefore adapted to be installed in close adjacent relation to the wall surface having the openings to be protectively covered. Additionally, the follower or driven outer shutters are arranged for movement in planes closer to the wall than the aforesaid plane of closure of the drive panels or shutters. There results a multi-shutter assembly, when the shutters are in the closed position and as viewed in plan, which projects in a generally V-shaped projection from the building to an apex or vertical center.
line of abutment, as illustrated in FIGURE 4 to resist entrance of wind driven elements. It will further be noted that by reason of this structure, the drive means effective to translate the shutter assembly are disposed for ready access for repair or maintenance simply by removing the cover plate which is apparent in FIGURE 6.

While the instant invention has been shown and described herein in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention.

What is claimed is:

1. A shutter assembly for use on the outer surface of a wall at a window opening or the like, comprising:
   upper and lower guide rails disposed in mutually parallel relation;
   at least a pair of opposed shutters reciprocably supported between said rails for movement toward and away from each other relative to said opening; the improvement therein:
   said lower guide rail including an outwardly-opening hollow chamber generally underlying the path of movement of said shutters,
   said chamber including opposed tracks on upper and lower portions thereof and extending along the path of movement of the shutters,
   opposed gear racks reciprocably supported on a respective one of said tracks and being operatively connected to a respective one of said shutters for movement therewith,
   an operating shaft having an integral pinion meshed with said gear rack and extending between the racks in said hollow chamber whereby rotation of said shaft causes relative reciprocation of said shutters; and
   a closure panel overlying said outwardly-opening chamber and closing the outer side thereof and including means displaceably mounting said panel on said rail over said chamber for permitting displacement of the panel and ready access to the interior of the chamber and the mechanism housed therein.

2. The structure as claimed in claim 1 in which said last mentioned means comprises a hinge connected between said closure panel and said lower guide rail, and fastener elements between said panel and lower rail.

3. The structure as claimed in claim 1 in which said shutters include a sealing strip secured to and extending the length of one of said shutters, said strip including a lateral flange extending toward said other shutter and engageable over the other shutter inner edge when said shutters are in abutting relation at their inner edges.

4. The structure as claimed in claim 1 in which said guide track in said chamber include anti-friction means engaging said gear racks.

5. The structure as claimed in claim 1 in which said shutters comprises a plurality of apertured slats having reversely bent portions adjacent interengaged upper and lower edge portions.

6. The structure as claimed in claim 5 in which said apertured slats include a plurality of horizontal slits bordered by angularly disposed lips integral with said slats.

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U.S. Cl. X.R.