

PATENT SPECIFICATION

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(54) A MIDDLE RAIL ASSEMBLY FOR USE IN SCREEN DOORS AND SASHES

(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:-

This invention relates to a middle rail assembly for doors, windows or the like and more particularly to a middle rail assembly for tensioning a screen within a frame structure of such door and sash.

In prior-art screen doors or sashes, there were used woven mesh screens made of metal or plastics wires, or screens formed of textile materials, such screens being retained in place usually by rubber sealing elements disposed along the inner periphery of a frame structure formed by upper and lower rails and a pair of spaced-apart vertical stiles. The screen was further held taut at a middle rail of the frame structure by similar sealing elements in order to prevent the entrance of litter and insects into the building interior. The marginal edges of the screen were thrust into a groove formed in the middle rail by rubber sealing elements thereby permitting the screen to be tautly expanded within the frame structure. The operation of stretching or tautening the screen on the middle rail by such rubber sealing elements was time consuming and tedious. As the rubber sealing elements were exposed on the surface of the middle rail, the screen sash or door as a whole appeared unsightly. Screen doors or sashes as used with this middle rail construction were not compatible with a single-expanse screen but only with a two-piece screen, one of the latter being expanded between the top rail and the middle rail, and the other disposed between the middle rail and the bottom rail.

The present invention seeks to provide an

improved middle rail assembly which reduces or overcomes some or all of the above-mentioned disadvantages.

According to the invention, there is provided a middle rail assembly for a door, window or the like having a frame supporting a screen or mesh material, comprising a supporting member adapted to extend across the frame to engage opposite sides thereof and having a plurality of apertures, a cover member having a longitudinal undercut channel extending along its length and facing the said supporting member, a plurality of fastening plates slidably disposed in said channel, and coupling means projecting from each of said adjusting plates, the coupling means being so shaped that they penetrate the screen or mesh material and fit tightly into one of the said apertures in the supporting member thereby clamping the screen or mesh material between the supporting member and the cover member.

The present invention also comprehends a door, window or the like incorporating such a middle rail assembly for tensioning the screen or mesh.

The invention will now be described in greater detail, by way of example, with reference to the drawings, in which:-

Figure 1 is an elevational view of a screen sash provided with a middle rail assembly embodying the invention;

Figure 2 is an enlarged perspective view of the middle rail assembly, partly exploded, and shown as attached to a vertical stile of the sash; and

Figure 3 is a vertical cross-sectional view of the middle rail assembly in its assembled state.

In Figure 1 is shown a screen sash 10 which generally includes a pair of vertical stiles 11, 12, between which extend a top rail 13, a bottom rail 14, and a middle rail 15, to thereby form a frame structure of the

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sash 10, within which a woven mesh screen 16 made of metal or plastics wire, or a screen formed of textile material is supported. As is conventional in the art, the marginal edges of the screen 16 are held and retained by a strip of gasket 17, made of rubber. The gasket 17 together with the marginal edges of the screen 16 is tightly received into a slit 18 formed along the outer surface of each of the vertical stiles 11, 12, the top rail 13, and the bottom rail 14. The confronting inner surface of each of the stiles 11, 12 is provided with a groove 19 extending substantially along its entire length and which receives in and holds a lateral end of a supporting member 20 of the middle rail, so as to enable the member 20 to be tightly held horizontally between the stiles 11, 12. The supporting member 20 is made of an extruded steel and has a hollow rectangular cross section along its entire length. The exterior surface of the supporting member 20 facing the screen 16 is provided with a plurality of apertures 21 spaced apart at suitable intervals along the entire length of the member 20.

Numeral 22 designates a middle rail cover of C-shaped cross section. The middle rail cover 22 defines a longitudinally extending channel 23 along its entire length with a pair of opposed flanges 24, 25 extending the entire length of the cover. A plurality of adjusting plates 26, substantially rectangular in cross section and provided with a coupling member 27, is slidably received into the channel 23 of the middle rail cover 22. The adjusting plate is substantially complementary in cross section to the channel 23. The coupling member 27 includes a neck 28 and a spear-headed end 29. The neck 28 of the coupling 27 has a length substantially equal to the total thickness of the screen 16 and one side of the extruded metal which forms the supporting member 20. The spear-headed end 29 of the coupling should be smaller in dimension than the width of a hollow interior formed within the supporting member 20.

The coupling member 27 is made of plastics or any other suitable resilient material.

As shown in Figures 2 and 3, the adjusting plate 26 bearing the coupling member 27 is first slidably inserted into the channel 23 from a longitudinal end thereof such that the coupling member 27 projects inwardly through a space defined by the flanges 24, 25. The plate is slidably brought to a position where the aperture 21 is formed on the supporting member 20. To be more specific, the adjusting plate 26 is slid till the coupling member 27 mates with the aperture 21. Thereafter, the middle rail cover 22 holding the adjusting plates 26 within its channel 23 is pressed laterally on the supporting member 20 till the spear-headed end 29 of

the coupling 27 is forced through the screen 16 and snugly fits into the aperture 21 of the supporting member 20. The screen 16 is therefore tightly sandwiched between the middle rail cover 22 and the supporting member 20 and thereby is tightly held within the frame structure. The flanges 24, 25 and the coupling member 27 which is forced into the aperture 21 cooperate to tightly retain the middle rail cover 22 from any accidental detachment from the supporting member 20.

As the middle rail cover 22 hides the coupling 27 from external view, the entire screen sash is rendered aesthetic in appearance. With the above middle rail construction, the use of a single expanse screen is made possible, and the tautening operation of the screen is reduced to only two manual actions, namely mating the coupling member 27 to the apertures 21, and laterally forcing the member through the screen and into the apertures 21. Furthermore, as the adjusting plate 26 is slidably movable within the channel 23 of the middle rail cover 22, apertures 21 for receiving the coupling member 27 can be bored at any desired position in the supporting member 20.

WHAT WE CLAIM IS:-

1. A middle rail assembly for a door, window or the like having a frame supporting a screen or mesh material, comprising a supporting member adapted to extend across the frame to engage opposite sides thereof, and having a plurality of apertures, a cover member having a longitudinal undercut channel extending along its length and facing the said supporting member, a plurality of fastening plates slidably disposed in said channel, and coupling means projecting from each of said adjusting plates, the coupling means being so shaped that they penetrate the screen or mesh material and fit tightly into one of the said apertures in the supporting member thereby clamping the screen or mesh material between the supporting member and the cover member.

2. A middle rail assembly as claimed in claim 1, wherein the supporting member is made of an extruded metal having a hollow rectangular cross section, and the apertures are in one wall thereof.

3. A middle rail assembly as claimed in claim 1 or claim 2, wherein the longitudinal undercut channel along the cover member is provided by a pair of opposed flanges.

4. A middle rail assembly as claimed in any of claims 1 to 3, in which the cover member has a C-shape cross section.

5. A middle rail assembly as claimed in any of claims 2, 3 or 4 wherein the coupling means comprises a neck and a spearheaded end on said neck, the neck having a length substantially the same as the combined

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sash 10, within which a woven mesh screen 16 made of metal or plastics wire, or a screen formed of textile material is supported. As is conventional in the art, the marginal edges of the screen 16 are held and retained by a strip of gasket 17, made of rubber. The gasket 17 together with the marginal edges of the screen 16 is tightly received into a slit 18 formed along the outer surface of each of the vertical stiles 11, 12, the top rail 13, and the bottom rail 14. The confronting inner surface of each of the stiles 11, 12 is provided with a groove 19 extending substantially along its entire length and which receives in and holds a lateral end of a supporting member 20 of the middle rail, so as to enable the member 20 to be tightly held horizontally between the stiles 11, 12. The supporting member 20 is made of an extruded steel and has a hollow rectangular cross section along its entire length. The exterior surface of the supporting member 20 facing the screen 16 is provided with a plurality of apertures 21 spaced apart at suitable intervals along the entire length of the member 20.

Numerals 22 designates a middle rail cover of C-shaped cross section. The middle rail cover 22 defines a longitudinally extending channel 23 along its entire length with a pair of opposed flanges 24, 25 extending the entire length of the cover. A plurality of adjusting plates 26, substantially rectangular in cross section and provided with a coupling member 27, is slidably received into the channel 23 of the middle rail cover 22. The adjusting plate is substantially complementary in cross section to the channel 23. The coupling member 27 includes a neck 28 and a spear-headed end 29. The neck 28 of the coupling 27 has a length substantially equal to the total thickness of the screen 16 and one side of the extruded metal which forms the supporting member 20. The spear-headed end 29 of the coupling should be smaller in dimension than the width of a hollow interior formed within the supporting member 20.

The coupling member 27 is made of plastics or any other suitable resilient material.

As shown in Figures 2 and 3, the adjusting plate 26 bearing the coupling member 27 is first slidably inserted into the channel 23 from a longitudinal end thereof such that the coupling member 27 projects inwardly through a space defined by the flanges 24, 25. The plate is slidably brought to a position where the aperture 21 is formed on the supporting member 20. To be more specific, the adjusting plate 26 is slid till the coupling member 27 mates with the aperture 21. Thereafter, the middle rail cover 22 holding the adjusting plates 26 within its channel 23 is pressed laterally on the supporting member 20 till the spear-headed end 29 of

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WHAT WE CLAIM IS:-

1. A middle rail assembly for a door, window or the like having a frame supporting a screen or mesh material, comprising a supporting member adapted to extend across the frame to engage opposite sides thereof, and having a plurality of apertures, a cover member having a longitudinal undercut channel extending along its length and facing the said supporting member, a plurality of fastening plates slidably disposed in said channel, and coupling means projecting from each of said adjusting plates, the coupling means being so shaped that they penetrate the screen or mesh material and fit tightly into one of the said apertures in the supporting member thereby clamping the screen or mesh material between the supporting member and the cover member.

2. A middle rail assembly as claimed in claim 1, wherein the supporting member is made of an extruded metal having a hollow rectangular cross section, and the apertures are in one wall thereof.

3. A middle rail assembly as claimed in claim 1 or claim 2, wherein the longitudinal undercut channel along the cover member is provided by a pair of opposed flanges.

4. A middle rail assembly as claimed in any of claims 1 to 3, in which the cover member has a C-shape cross section.

5. A middle rail assembly as claimed in any of claims 2, 3 or 4 wherein the coupling means comprises a neck and a spearheaded end on said neck, the neck having a length substantially the same as the combined

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5 thickness of the screen and one side of the supporting member, and the spear-headed end having a length shorter than the width of the hollow interior of the supporting member.

6. A middle rail assembly substantially as herein described with reference to the drawings.

7. A door, window or the like having a

frame supporting a screen or mesh material 10
and incorporating a middle rail assembly as claimed in any preceding claim.

FOR THE APPLICANTS:

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