This invention relates to emergency exit window structure, and has particular reference to an improved means for releasably securing a push-out type of emergency exit sash on window opening vehicles.

As is well-known, busses, railway cars and similar public conveyances are frequently equipped with emergency exits. In this case, the window sash can be quickly removed from the window opening to provide an exit for trapped passengers in the event of an accident. Many types of emergency sash are normally retained in place by fastening means which must first be released by operating a lever or button before the sash can be removed from, or swung out in, the window opening. Other types, such as those commonly known as push-out or knock-out sash, may be removed by simply applying sufficient force to the sash itself, which force overcomes the holding action of the fastening means and pushes the sash out in a single operation. This latter type of sash is gaining increasing favor with safety authorities and also with vehicle manufacturers for the obvious reason that its emergency operation is quicker and more certain, and in many jurisdictions it is now a requirement that the emergency windows in school buses must be provided with sash of the push-out type.

While the push-out or knock-out type sash has proved satisfactory in most respects and has the advantage of very fast emergency operation, certain disadvantages have been noted in conjunction with the various fastening means heretofore employed to retain the sash in normal, window closing position. Thus, in many arrangements, the fastening means include expendable parts which are destroyed or lost whenever the sash is intentionally or accidentally destroyed. This, of course, necessitates replacement parts and frequently means that the vehicle must be sent to the repair garage in order to properly secure the sash in window closing position. In other arrangements, even though none of the fastening elements are destroyed or lost, the vehicle must still be sent to the garage to have the sash restored to window closing position. A few arrangements avoid the above-noted disadvantages but in so doing usually introduce more complex and expensive sash and fastening structure. While these disadvantages have been noted in passenger vehicles of all types, they are of particular concern in the case of school buses where the emergency exit sash are sometimes accidentally pushed out by overly rambunctious students and the inconvenience and expense of properly re-securing the sash after each such occurrence can become appreciable.

With the foregoing and other considerations in view, it is the primary object of the present invention to provide an improved fastening means for releasably securing a push-out type sash in an emergency exit window, which fastening means has no expendable parts and is simple, reliable and economical to use. The fastening arrangement provided is particularly well adapted for use in school buses although it can be utilized with improved results in commercial passenger carrying vehicles as well.

A more specific object of the invention is to provide an improved push-out sash fastening means which is easy to install and disassemble, by virtue of an L-shaped handle, to restore the sash to window closing position after it has been intentionally or accidentally pushed out.

Another specific object of the invention is to provide an improved push-out sash fastening means which normally retains the sash in tightly sealed, rattle-proof relation to the window frame.

A further specific object of the invention is to provide an improved push-out sash fastening means which is substantially tamper-proof.

Another object of the invention is to provide a push-out sash comprising normally operated fixed and movable sub-sash or panels.

Still another object of the invention is to provide a push-out sash comprising fixed and movable sub-sash which can be swingably mounted as a unit in a window opening.

A further object of the invention is to provide an emergency exit window construction having a push-out type sash which construction has good sealing characteristics between the window frame and sash, and yet which eliminates edge sealing and the possible necessity for rescaling after the sash has been pushed out.

A still further object of the invention is to provide an emergency exit window construction which is economical to manufacture, install and maintain.

Other objects and advantages will become apparent from the following description in conjunction with the accompanying drawings, wherein like reference numbers designate corresponding parts in all the views.
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Upper panel 15 is similar in construction to lower panel 17 and comprises laminated sheet glass 38, sash glazing rails 40, 41, a top rail 45, and a top sash 44 and a top rail 45. Stiles 42, 44, and top rail 45 are formed with guide ribs 47, Figures 2 and 5, which are received by weatherstripping 46 mounted in the outer edge of channel 22. Channel 22 has a flange, or inner edge of the stile frame, stiles and header, respectively. Panel 15 is a movable, drop type sash guided by the channels 22 and is maintained in its position by sash locks 50 (only one of which is shown in Figure 1) which coat in a well-known manner with stops 51 formed in the upper portion of inner channels 21.

The sash without sash 19 is swingably mounted in the window frame 11 by means of a pair of double action hinges 52, Figures 2-4, extending between the body panels 54 and forming the top of the window frame and the stiles 12 of the sash frame adjacent the top rail or header 14 thereof. Each hinge comprises an offset plate 59 pivotally secured at 57 to the panel 54 and at 58 to the stile 12. A slot 60 being cut in the side wall of the channel bar 20 of the stile to permit the plate to extend through. Double action hinges are provided so that the sash can be swung outwardly 90 degrees on the frame in spite of the overhanging drip cap 61, Figure 4.

Thus, when the sash is first pushed outwardly, it pivots about pivot point 58 until the bottom rail 28 clears the lower panel 17 of the window frame; thereafter, the hinge plate 59 pivots about pivot point 57 while the sash continues to pivot about point 58 which permits the sash to be fully opened and yet clear the drip cap. It will be understood, of course, that in vehicle constructions which do not employ a drip cap, or where the cap does not overhang the window frame, a conventional type of leaf or piano hinge may be used to pivotally secure the top plate 14 of the sash to the body panel 64 forming the top of the window frame.

The window frame 11 is formed with an upstanding flange 67 at the inner side thereof adjacent the bottom rail 28 of the push-out sash. A strip of resilient weatherstripping 67 is bonded or otherwise secured to the flange, and the rail bear against this weatherstripping when the sash is in closed position.

The sash is releasably secured in window closing position by fastening means which include a plurality of oversized apertures 68, Figure 7, formed in the flange 65 and weatherstripping 67, and a plurality of shouldered screws 70 corresponding to the apertures and threaded into the bottom rail 28. The heads 71 of the screws are of smaller diameter than the diameter of the apertures 68, said screws normally preventing from passing therethrough by means of resilient grommets 72 of some suitable material such as rubber, the grommets being of larger diameter than the diameter of the apertures and positioned on the screws between the heads thereof and the inner surface of the flange as shown. The fastening means just described normally hold the sash 19 securely in window closing position when the sash must be opened and sufficient outward force is applied thereto the heads 71 of the screws force the grommets 72 through the annular spaces 75 between the shanks of the screws and the edges of the oversized apertures permitting the screw heads to pass through the apertures and the sash to swing free. In this manner, the screws 70 remain with the sash while the grommets remain stuck to the flange or else drop down inside the bus where they can be easily recovered.

In the event of the sash being damaged in any shape or form, it is necessary only to remove the screws from the rail 28, re-position the grommets on the screws, and re-thread the latter into the rail with the grommets bearing against the flange as before. The amount of pressure needed to push the sash out can be regulated by the thickness of the grommets through which the screw heads must pass. Thus, the thicker the grommets, the greater the pressure needed, and vice versa. Grommets 72 are moulded into metal cups 77 to prevent students or other passengers from cutting or otherwise destroying them. The screw heads 71, Figure 9, are of a special type having portions 78 thereof extending out on opposite sides of the slots 79 as shown, whereby the screws may be tightened with a screw driver but can not be backed out by a screw driver, knotted off, or cut off so that the instrument will climb up and out of the slot.

Figure 8 illustrates a modified form of grommet comprising a cylindrical body 80 having a diameter that is substantially equal to the diameter of the apertures 68 and a flange 81 integral with the body 80 and having a larger diameter than the sash glazing rail 41, Figure 2, 41, 45, and a top rail 45. The grommets are positioned on the screws 70 so that when the latter are threaded into the bottom rail 28 of the sash the cylindrical portion of the body 80 fits in the aperture, while the flanges 81 thereof bear against the flange 65 to retain the sash in window closing position. In this modified form, when sufficient outward force is applied thereto the heads 71 of the flanges 81 of the grommets are rolled over the heads of the screws, as indicated by the dash line, and both the grommets and screws are pushed through the apertures to allow the sash to swing free. The sash, re-securing the sash and grommets are simply removed from the rail and then reassembled therewith from the inside of the flange 65. With either of the forms of grommet described, there are no exposed parts and when the sash is accidentally pushed out, as sometimes happens in school buses, the operator of the bus can easily restore the sash to proper window closing position using an ordinary screw driver.

Window frame 11 is formed with vertical inside flanges 32 which are continuations of the upstanding flange 65 and these flanges carry weatherstripping 84 against which the stiles 12 of the push-out sash 19 bear when the latter is in closed position. Similarly, the top rail 14 of the sash bears against weather-stripping 85 carried by the body panel 64, Figure 4. In this manner, the push-out sash is held in sealed and tight-proof relation to the window frame without edge sealing and the possible necessity for rescating after the sash has been put in place.

The sash can be assembled in a special manner by inserting the two hinge plates 55 to the panels 54 by shoulder screws 57, and securing the bottom of the sash in position by means of the shouldered screws 70 and grommets 72, three sets of such screws and grommets being adequate for an average sized sash as shown.

From the above it will be apparent that the subject invention provides a simplified and yet highly efficient emergency exit window construction including a greatly improved releasable fastening means for a push-out type sash. The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The embodiments disclosed are therefore to be considered in all respects as illustrative rather than restrictive, the scope of the invention being indicated by the appended claims.

What we claim is:

1. In an emergency exit window structure having a pushout sash swingably mounted adjacent one rail in a window opening, releasable fastening means to normally maintain said sash in window closing position comprising a fixed member adjacent the sash having an aperture therethrough, a screw threaded into said aperture, the shank and head of said screw extending through said aperture, the aperture being larger than the diameter of the screw head, and a resilient grommet element of larger diameter than the diameter of said aperture positioned between the screw head and said fixed member.

2. Releasable fastening means for a push-out sash swingably mounted adjacent one longitudinal rail in a window frame comprising a flange on said window frame adjacent the opposite longitudinal rail of said sash and having an aperture therethrough, a screw threaded into said opposite rail, the shank and head of said screw extending through said aperture, the latter being of larger diameter than the diameter of the screw head, and a resilient grommet element of larger over-all diameter than the diameter of said aperture positioned between the screw head and said flange.

3. In combination with a push-out sash swingably mounted adjacent its top rail in a window frame, releasable fastening means to normally maintain said sash in window closing position comprising a flange on said window frame adjacent the bottom rail of said sash and having a plurality of circular apertures therein, a plurality of shouldered screws threaded into said bottom rail, the shank and head of each screw extending through one of said apertures, said screws being of larger diameter than the diameter of the screws and a resilient grommet element of larger over-all diameter than the diameter of said apertures positioned on each screw, at least a portion
of said grommet being positioned between the screw head and said flange.

4. Releasable fastening means for a push-out sash swingably mounted adjacent one longitudinal rail in a window frame comprising a flange on said window frame adjacent the opposite longitudinal rail of said sash and having an aperture therebetween, a screw threaded into said opposite rail and extending through said aperture, the aperture being of larger diameter than the diameter of the screw head, and resilient means to normally secure said screw in said aperture, said means being operable to permit said screw to pass out of said aperture upon the application of sufficient force to said sash.

5. Emergency exit window structure for vehicles comprising a window frame formed by the body members of the vehicle, a drip cap mounted on the outside of said frame and overhanging the upper edge thereof, a push-out sash, double action hinge means to pivotally mount the top rail of said sash in said frame, said hinge means permitting said sash to swing outwardly 90° in said frame and clear said drip cap, a flange on said frame adjacent the bottom rail of said sash and having an aperture therebetween, a screw threaded into said bottom rail and extending through said aperture, the aperture being of larger diameter than the diameter of the screw head, and resilient means engaging said screw and flange to normally retain the former in said aperture and hold said sash in window closing position, said means being operable upon the application of sufficient force to said sash to release said screw from said aperture and permit the sash to swing outwardly in said frame.

6. In combination with a push-out sash swingably mounted adjacent its top rail in a window frame, releasable fastening means to normally maintain said sash in window closing position comprising a flange on said window frame adjacent the bottom rail of said sash and having a plurality of circular apertures therein, a plurality of shouldered screws threaded into said bottom rail, the shank and head of each screw extending through one of said apertures, said apertures being of larger diameter than the diameter of the screw heads, and a resilient grommet of larger over-all diameter than the diameter of said apertures positioned against the head of each screw and engaging said flange to secure the screws and lower sash rail to the flange, said grommets being distortable to permit said screws to be disengaged from said flange upon the application of sufficient force to the sash.

7. Structure as defined in claim 6 wherein said grommets are formed of rubber.

8. Structure as defined in claim 6 wherein each of said grommets comprises a cylindrical body having a diameter substantially equal to the diameter of said apertures, and a flange integral with said body having a diameter larger than that of the apertures.

9. Structure as defined in claim 6 wherein each of said grommets comprises a substantially discoidal body of larger diameter than the diameter of said apertures.

10. Structure as defined in claim 9 wherein each of said grommets is moulded into a rigid, substantially cup-shaped element.

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