March 20, 1928. 1,663,517

J. LEDWINKA

DOOR CONSTRUCTION

Filed Nov. 14, 1925 3 Sheets-Sheet 1

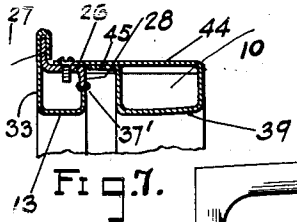


FIG. 7.

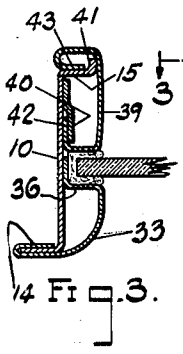


FIG. 3.

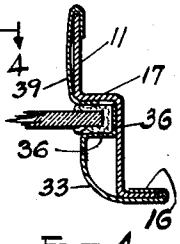


FIG. 4.

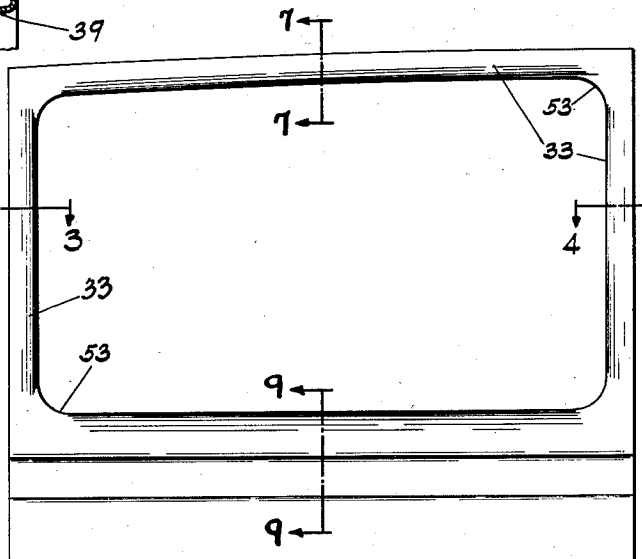


FIG. 1.

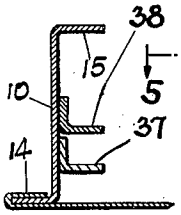


FIG. 5.

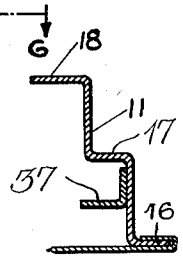


FIG. 6.

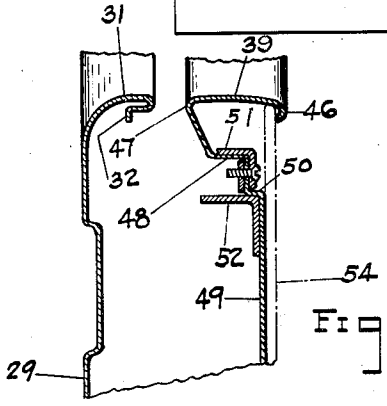


FIG. 9.

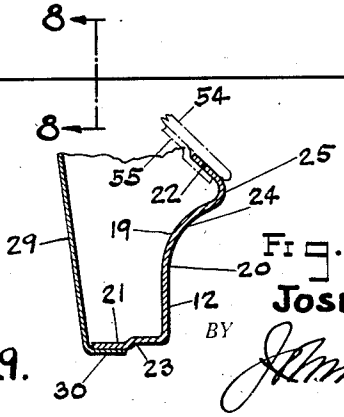


FIG. 8.

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March 20, 1928. 1,663,517

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DOOR CONSTRUCTION

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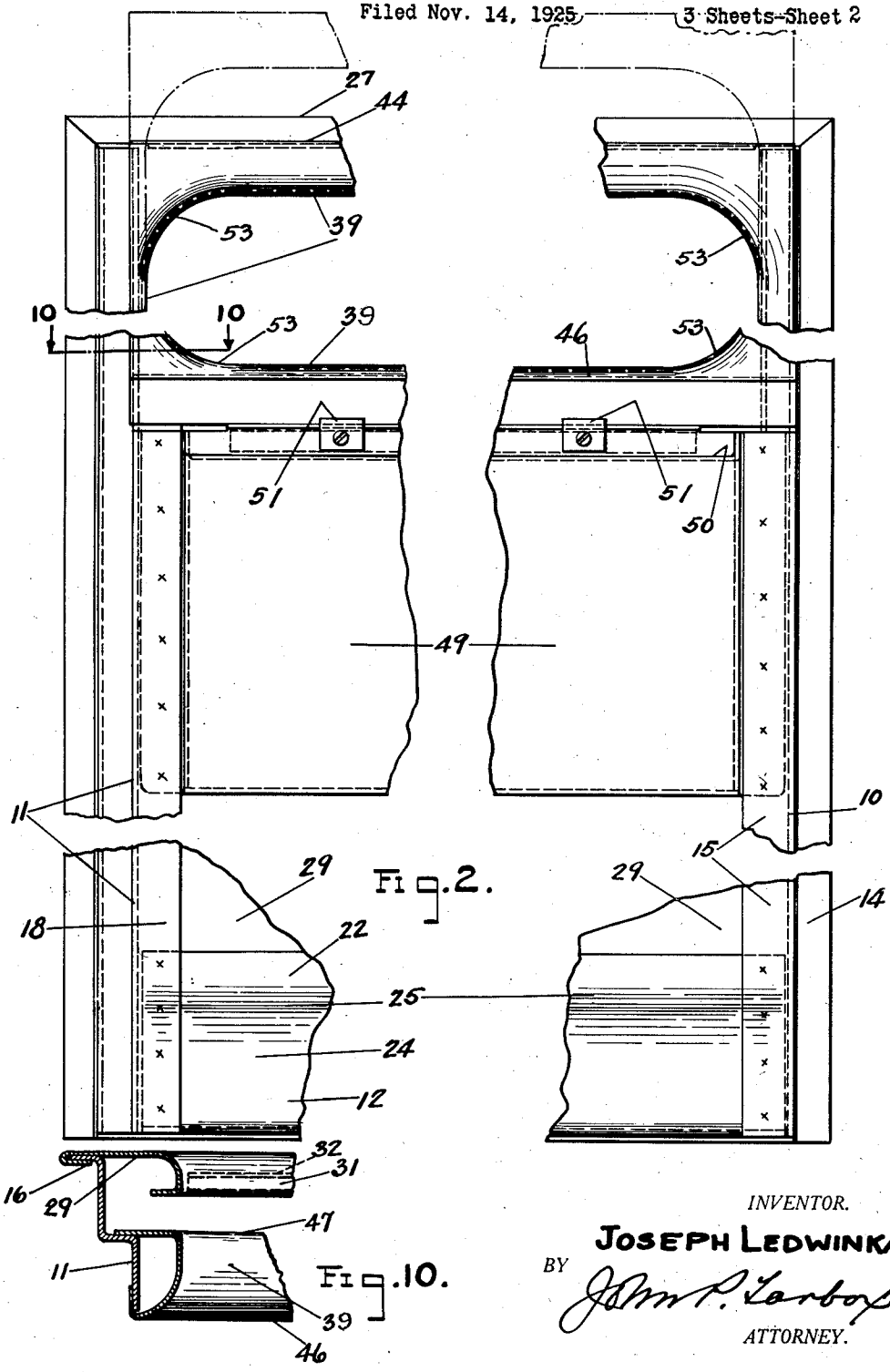


Fig. 2.

Fig. 10.

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DOOR CONSTRUCTION

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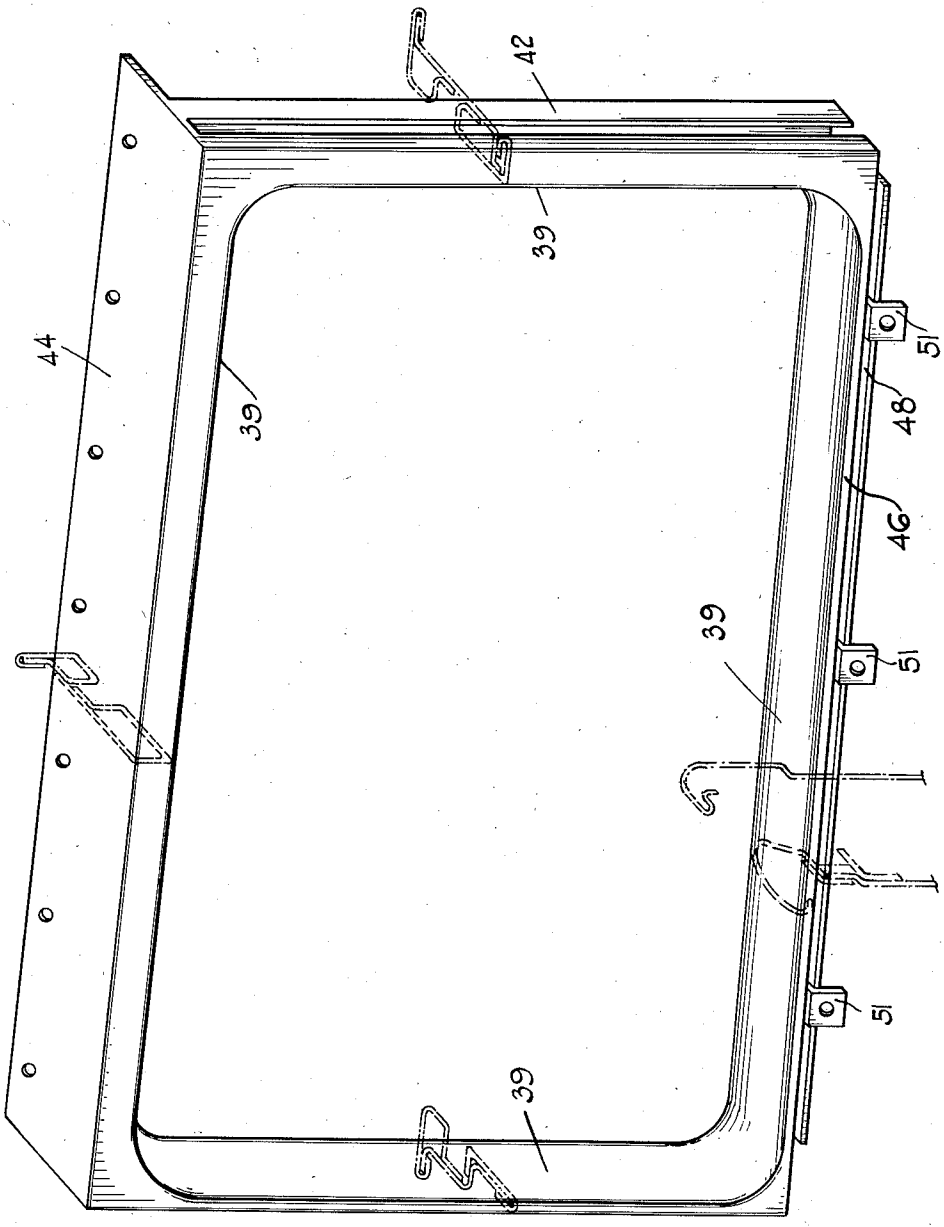


FIG. 11

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Patented Mar. 20, 1928. 1,663,517

UNITED STATES PATENT OFFICE.

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DOOR CONSTRUCTION.

Application filed November 14, 1925. Serial No. 69,012.

The door and window construction of this invention is of special applicability to embodiment in the pressed metal constructions now commonly used in automobile bodies constructed entirely of steel. The use of pressed steel in the construction of closed body pleasure cars has made possible a type of door having an extremely small transverse opaque projection. The side rails of such doors are given a Z cross section, the web of the Z being comprised of a single thickness of metal. The glass run channel of the window of the door lies over against the web of this rail (the main body of the Z) and is of the minimum depth consistent with the attainment of secure weatherproofing and efficient working of the glass. The exterior paneling is used to form the outer wall of the glass run channel. Heretofore, metal or wooden interior window retaining and interior finish strips were connected to the inner body of the rail and independently secured in place by numerous screws and the like in order to form the other wall of the channel and to retain the window glass in place.

For many years the multiplicity of retaining strips so employed, the great number of securing screws or the like required to hold them in place, the independence of such strips from each other and from the window sill and top rail finishing strips and the general complexity of the construction involved have given trouble in different ways and increased the expense of the car. Moreover, they have been found particularly objectionable in connection with the relatively thin side rails of these pressed metal doors of minimum transverse opaque projection.

It occurred to me that this entire structure might be much simplified and I have made this the primary object of my invention. It has been my aim not only to simplify the structure at large but to simplify the assembly thereof. I have aimed to improve the method of retaining the glass in place and to improve the refinement of the interior finish of the car at the same time. This improvement of the method of retaining the glass is comprehended by the securing of uniform clearances and working pressures in the glass run channels. And with these other objects has been the object of generally improving the construction of the door and the importance of retaining the interior finish and upholstery upon it.

These objects I have attained in the main by forming the glass retaining strips, the interior window sill and the interior top finish strip as a unitary pressed metal frame in the shape of a closed figure and attaching it to the frame by interlocking engagement therewith. The number of independent parts is thereby reduced from several to one, the multiplicity of fastening devices is entirely eliminated, and both the cost of manufacture and the cost of assembly are reduced. There are no securing means to become loose and the structure is free from squeaking and rattling. Moreover, such a structure lends itself to a greater degree than prior structures to a finer finish and appearance and by the combination with the upholstery panels of the interior walls of the car enables the entire structure of the door to be improved.

In the drawings and in the annexed description is given the disclosure necessary to enable those skilled in the art to effect a complete embodiment of my invention, and through it they will doubtless be able to make other such embodiments.

Figure 1 is an exterior side elevation of the door of a closed body pleasure car provided with a window.

Fig. 2 is a greatly enlarged inside elevation of the same door with large areas broken away to enable the view to be condensed upon the standard sheet.

Figs. 3, 4, 5 and 6 are transverse sections of the side rails of the door taken on lines of corresponding numbers applied to Fig. 1 and looking in the direction of the applied arrows.

Figs. 7 and 8 are similar sections of the top and bottom rails of the door similarly taken on lines and in directions indicated in Fig. 1.

Fig. 9 is a transverse section of the window sill portion of the door.

Fig. 10 is a horizontal sectional view taken on the line 10—10 of Fig. 2.

Fig. 11 is view in perspective of the unitary window retaining frame; its connection and relation to the adjacent parts of the door is indicated by the phantom sections showing the frame in dotted lines and the associated door parts in dot and dash lines.

The door is built upon a rectangular

frame comprised of hinged and jamb rails 10 and 11, respectively, and bottom and top rail structures 12 and 13, respectively, particularly designated in Figs. 2 to 8. The main body of the hinge rail is a pressed metal stamping of simple Z cross section having an exterior out-turned overlap flange 14 and an interior inturned strengthening and panel securing flange 15. The section is of substantially the same depth from top to bottom. The jamb rail 11 is of double Z cross section being provided with an exterior out-turned overlap flange 16 and an intermediate offset 17 which constitutes the rabbet of the door. This rabbet extends all the way from the bottom to the top of the door, and the section is of substantially the same depth from top to bottom. Interiorly, however, this rail is provided with an inwardly extending flange extending upwardly only so far as the window sills 18 of the door. At the bottom these hinge and jamb rails 10 and 11 are joined together by the bottom rail 19 (Fig. 8). This bottom rail is of angle or channel shape in cross section having an interior main body or bottom wall 20, an outwardly extending side wall 21 lying substantially in a horizontal plane and an upper side wall 22 extending outwardly at an angle to the horizontal plane. The bottom side wall 21 has its edge downwardly offset as at 23, the bottom wall 20 is arched upwardly and inwardly as at 24, and connected by a rounded corner 25 with the upper side wall 22. The lower ends of the hinge and jamb rails 10 and 11 are cut away to conform to the section of this bottom rail and the several rails are welded together at their meeting edges in a manner not necessary to show here. Connecting the tops of the side rails 10 and 11 is a top rail having a main body 26 of Z section of reduced depth having its web in a substantially horizontal plane and an outer upwardly extending arm 27 in the plane of the outer overlap flanges 14 and 16 of the rails 10 and 11, and an inner downwardly extended arm 28. This rail has the ends of its arm 27 connected by welding with the ends of the overlap flanges 14 and 16 and constituting the outer overlap of the door. The web of the Z is connected to the adjoining portion of the main bodies of the rails 10 and 11. The inner arm 28 is likewise connected by welding to the inner face of the upper end of each of the rails 10 and 11.

An exterior surface paneling in two sections connects this rectangular frame together. The lower panel is designated 29, and extends from the bottom rail 19 to which it is connected by the welding on flange 30 upwardly to the window sill shown in Fig. 9. Its upper edge is arched upwardly and inwardly as at 31 and then reversely bent outwardly and provided with a similar down-turned flange 32. This presents a smoothly rounded edge toward the window glass. The down-turned flange 32 serves the purpose of reinforcing the outer paneling around the window opening. The sides of panel 29 are reversely bent over and crimped down upon the overlap flanges 14 and 16 of rails 10 and 11 and with those flanges constitute the overlap of the door.

The upper exterior paneling is designated 33. It encases the window frame constituted of the upper portions of rails 10 and 11 and the top rail of the door 13, and is a continuation of the panel 29. The outside edges of the upper paneling 33 are commonly reversely bent around the flanges 14, 16 and 27 of the side and top rails and crimped thereupon in the same manner as the sides of the lower panel 29. The inside edges of panel 33 are extended inwardly and interiorly in spaced relation to the webs of the side and top rails and their inner edges are then welded to the bodies of the rail. In the instance of the side portions, the interior edge is again turned outwardly at 36 in order to form the outer wall of the glass run channel and inwardly flanged as at 36′, the flange 36′ lying against the web of the rail and being spot-welded thereto. In the case of the upper portion the interior edge is also out-turned toward the main top rail body 26 but in this case, instead of being flanged, abuts the down-turned arm of the Z-section main body 26 of rail 13 and is welded thereto as indicated at 37′.

In the jamb rail 11 of the door the glass run channel is formed at the upper portion of the door between the flanged inner wall 36 of the panel 33 and the rabbet 17. The walls of the glass run channel in other portions of the door lie in the same planes as do the walls constituted by the panel 33 and the rabbet 17. In the lower portion of the door the walls of the channel are constituted at the hinge rail 10 by angles 37—38 and at the jamb rail 11 by rabbet 17 and an angle 37. The angles 37 are in continuation of the walls of panel 33. The angles 37, 38 are welded to the webs of the rails. But in the upper portion of the hinge and jamb rails, the outer wall of the channel is constituted by the panel 33 as aforesaid and the inner wall by the glass or window retaining frame 39 (see Figs. 2, 3 and 7) which constitutes the principal feature of this invention.

This retaining frame is a unitary structure, see Fig. 11, comprised in the form of a closed figure of the shape of the window frame constituted by the sill portion 31 of panel 29 and those elements of the door frame which project above it. In this case the shape is rectangular. The frame is comprised of bottom and side members in gen-

eral of channel shape in cross section but differing in form one from the other, and a top member of box section. A box section is, of course, a channel cross section with a closed top. This frame, as clearly appears in Figs. 2, 3, 4, 7 and 9, is fixed to the window frame in such position that the outer side walls of the channel and box sections constitute the inner side wall of the glass run channel.

On the side of the hinge rail 10 of the door the channel section of the frame 39 is retained in place jointly by an offset guide strip 40 welded to the web of the rail and by an interiorly projecting edge 41 on the inside rail flange 15. An inturned flange 42 on the outer side wall of the channel of the frame 59 underlies the offset under edge of the retaining strip 40. A reversely bent edge 43 of the inside side wall of frame 39 lies against the flange 15 and engages the projecting edge 41 by its own edge. On the side of the jamb rail the outer wall of the channel section of frame 39 engages the outer face of the rabbet 17 of the side wall of the glass run channel. The bottom wall of the frame 39 instead of being spaced away from the web of the rail 11 as in the case of the rail 10, lies closely adjacent the face of this rail. The inner side wall is reversely bent over the inner edge of the rail 11.

The top member of box section is in reality formed of a channel section having its inner side wall extended outwardly as at 44 to overlap the outwardly extending flange 45 of the outer side wall and to be welded thereto. But extension 44 projects beyond flange 45 to overlap the body 26 of the Z section top rail 13.

The bottom member of frame 39 has its inner side wall curved downwardly and outwardly as at 46 to form a smooth and pleasing curved inner edge and to constitute the bottom member the inside window sill of the structure. The outer side wall is connected with the bottom wall of the channel by a similarly curved joinder and is then inwardly extended and inwardly flanged as at 48 to provide for connection with the lock board 49 constituting a portion of the inner paneling of the door. Lock board 49 is connected at its opposite ends by welding to the corresponding flanges 15 and 18 of the lower portions of the hinge and jamb rails 10 and 11 as shown in Figs. 2, 5 and 6. The upper edge of this lock board is outwardly offset as at 50. A series of angles 51 spot welded through one of their branches to the flange 48 of the bottom portion of frame 39 overlap the offset 50 by their other branches and are detachably secured thereto. Underlying the offset 50 is a reinforcing angle 52 nested in the angle of the offset and having a vertical branch welded to the body of the lock board.

As clearly appears in Fig. 2 and in Fig. 9 the channel sections of the side members 39 of the frame are open at the bottom. As clearly appears in Figs. 2 and 7 the upper ends of the inner portions of the hinge and jamb rails 10 and 11 are free from obstruction. Thereby the entire window retaining frame 39 as a unit may be entered by its bottom over the upper ends of the hinge and jamb rails 10 and 11 with the flanges of the channel section side member in engagement with strip 40 and edge 41 on the one hand and with rabbet 17 and the inner edge of rail 11 on the other hand and slid downwardly into the full interlocking engagement with jamb rails 10 and 11 of the window frame as has just been described in detail, slid downwardly until the bottom portion of frame 39 lies opposite the outer window sill 31 and the frame 39 can be secured in this interlocked position by means of the angles 51 and lock board 49. In this position the outer edge of extension 44 of the top portion of the frame laps down upon the body of the top rail 26 and may, if desired, be separately secured thereto as shown.

But the frame as a whole is held in position by two other means with such effect that the two former means may be omitted if desired. The first of these is the action of gravity. The weight of the retaining frame, light though it is, tends to hold it in place, since it is slid into interlocking engagement and to its lowermost position with the angles 51 bearing against the offset 50 from the top and offset 50 lies beneath it. So also the body of top rail lies beneath extension 44. Thus the offset 50 and the top rail 26 constitute stops which limit the downward movement of frame 39. Furthermore, however, the bottom walls of the channel sections which constitute the sides of frame 39 are slightly bowed as clearly appears in Figs. 3 and 4 and the side walls of the channel are of an appreciable depth. These provisions jointly give to the channels a flexibility at their mouths which flexibility is utilized to frictionally grip and more or less lightly clamp the coacting interlocking members 41, 40 on the one hand and 17, 11 on the other. These two actions, that of gravity and of the spring clamp, effectually eliminate rattling and squeaking from the unitary structure. Making the structure unitary eliminates joints and the possibility of squeaking and rattling from this source. Making it a unitary structure either eliminates necessity for fastening devices or cuts down the number to a minimum.

The channel sections themselves have smoothly rounded corners and finely finished faces. In addition, at the junction of the several members which compose the frame 39 are provided cornices 53 which relieve the sharpness and depth of the corners of the usual rectangular frame. These cornices are

preferably also formed in the outer paneling. This smooth finish around the corners of the frame is a high finish in enamel or any other appropriate paint or coating and may be very effectively given in imitation wood finish. The frame 39 thus constitutes a one-piece interior finish for the entire window frame.

Beneath the inner rounded side wall of the channel section of the bottom member of frame 39 is projected the upper edge of the upholstery 54 of the lower panel. The lower edges of this upholstery are provided with clips 55 hooked over the side wall 22 of the channel bottom rail 19 of the door frame. The upholstery is made up on a flexible body and is put in place by first hooking the clips 55 over the wall 22, inwardly flexing the panel, projecting its upper edge within the side wall 46 of frame 33, and then pressing the resilient panel outwardly into engagement with the frame and inner paneling including the lock board 49 of the door all after the fashion described in my co-pending application, Serial No. 8,902, February 13, 1925. In such position the upholstery hides the interior of the bottom member of frame 39 and the securing means 51 as well, so that neither in connection with frame 39 nor in connection with upholstery 54 are any securing means visible from the interior of the body.

Obviously the constituting of the window-retaining means a unitary structure makes it possible to assemble the structure as a unit upon the accurately dimensioned jig just as are the doors themselves assembled and thereby accurately to dimension and align the outer faces of the frame which are to constitute the inner side walls of the glass run channel. A more perfect glass run channel and more efficient operation of the window result.

My endeavor has been to express the generic spirit of my invention in the annexed claims. I desire to have it understood that the terms used are intended to cover all embodiments of my invention which fall within the generic spirit as defined by prior achievements in this field.

What I claim is:—

1. In combination, a window frame for closed vehicle bodies, a removable one piece glass retaining frame forming a closed figure, and interengaging means on said frames for effecting an interlocking engagement therebetween by relative movement of the frames in the plane of the window.

2. In combination, a window frame for closed vehicle bodies adapted to carry a sliding window glass, a removable one piece glass retaining frame in a closed figure having two parallel sides, said parallel sides of the retaining frame and the adjacent sides of the window frame being provided with interengaging formations for effecting a lateral interlock between said frames by relative movement of the frames substantially in the plane of the window.

3. In combination, a window frame for closed vehicle bodies having a window glass slidable therein, a glass retainer, interengaging means on the frame and retainer for effecting a lateral interlock between said frame and retainer by endwise movement of the retainer substantially in the plane of the window, and means securing the retainer in such interlocking engagement.

4. In combination, a window frame for closed vehicle bodies adapted to carry a sliding window glass, a removable unitary retaining frame having two parallel sides and means connecting said sides, and interengaging means on said parallel sides of the retainer and adjacent sides of the frame for effecting a lateral interlock between said frame and retainer by movement of said retainer in the plane of the window, together with securing means between said connecting means and window frame for securing the retainer in interlocking relation with the frame.

5. In combination, a window frame adapted to carry a sliding window, a removable one-piece window retainer comprising spaced parallel members and means interconnecting said members, interengaging means on said parallel members and frame for effecting a lateral interlock therebetween by movement of said retainer endwise of said parallel members in substantially the plane of the window.

6. In combination, a door having a window, a door lock board at the base of the window frame, a removable one piece window retaining frame forming a closed figure movable into interlocking engagement with the window frame by a movement substantially in the plane of the window, and means to secure the bottom of the retaining frame to the lock board.

7. In combination, a window frame adapted to carry a sliding window, together with a removable one piece window retaining frame forming a closed figure in interlocking engagement with the window frame and insertable into and out of locking engagement from the top of the window frame.

8. In combination, a window frame adapted to accommodate a window, and a removable window retaining strip interlocked jointly with the edge of the window frame and an inward offset from the body thereof.

9. In combination, a window frame adapted to accommodate a window, and a removable window retaining strip of channel cross section embracing the body of the window frame inwardly of the window and forming a finish for the inner side of the frame.

10. In combination, a window frame for

closed vehicle bodies having a side member having a main transversely extending body portion provided with means forming a shoulder intermediate its edges and a window retaining strip of channel form in section having one side wall thereof engaging the outer side of said shoulder and its other side wall extended over and covering the inner edge of the main side member of the frame.

11. In combination, a rail constituting a part of the door window frame having a fixed exterior paneling covering the exterior of the frame constituting one wall of the window glass channel, and a removable interior paneling in interlocking engagement with the rail, covering substantially the entire inwardly facing surface at the inner edge of the rail and constituting the other wall of the channel, the retaining strip and the interior finish of the window.

12. In combination, a vehicle door having a stamped metal rail constituting a part of a window frame and provided with a rabbet, and a removable sheet metal strip having an interlocking engagement between the rabbet of the rail and the inwardly facing edge thereof and covering said edge.

13. In combination, in a vehicle body door, a pressed metal door rail having an interior flange with an interiorly turned edge together with a guide strip secured to the web of the rail, and a window retaining element having interlocking engagement with said interiorly projecting edge and said guide strip.

14. In combination, a vehicle door having a window therein and a window retaining frame forming a closed figure and having a top member of box section of which one wall is extended to overlap the top of the window frame.

15. In combination, a vehicle door having a window frame having side members, a window retaining frame and having a bottom member of downwardly presenting channel cross section, an inner panel connecting the side members of the frame below the window opening, the outer wall of said channel being extended downwardly and joined to said inner panel and the inner wall forming an upholstery retaining element.

16. In a vehicle body, a window frame having a window slidable therein, a window retaining frame having a bottom member of downwardly presenting channel cross section, the outer wall of which is deflected inwardly and the inner wall of which is of inwardly arched formation and adapted to receive behind it the upper edge of an upholstery panel.

17. A vehicle door having a window frame and a movable window slidable therein, the upper transverse member of the frame comprising a fixed outer portion, and a removable inner portion of box section having one side wall thereof extended and secured to the fixed portion.

In testimony whereof I hereunto affix my signature.

JOSEPH LEDWINKA.