

Oct. 17, 1939.

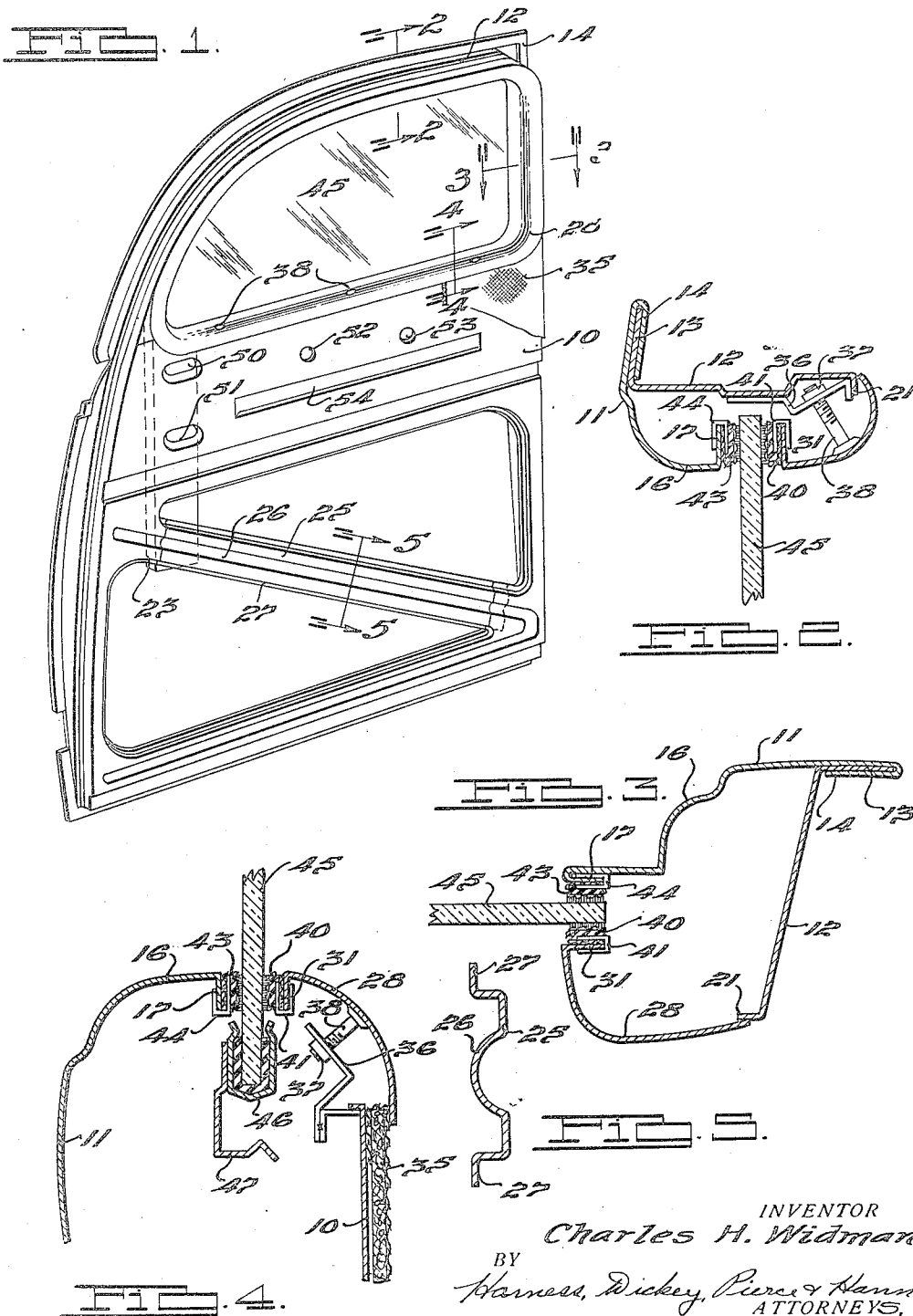
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2,176,192

METHOD OF FORMING VEHICLE DOORS

Filed April 13, 1936

4 Sheets-Sheet 1



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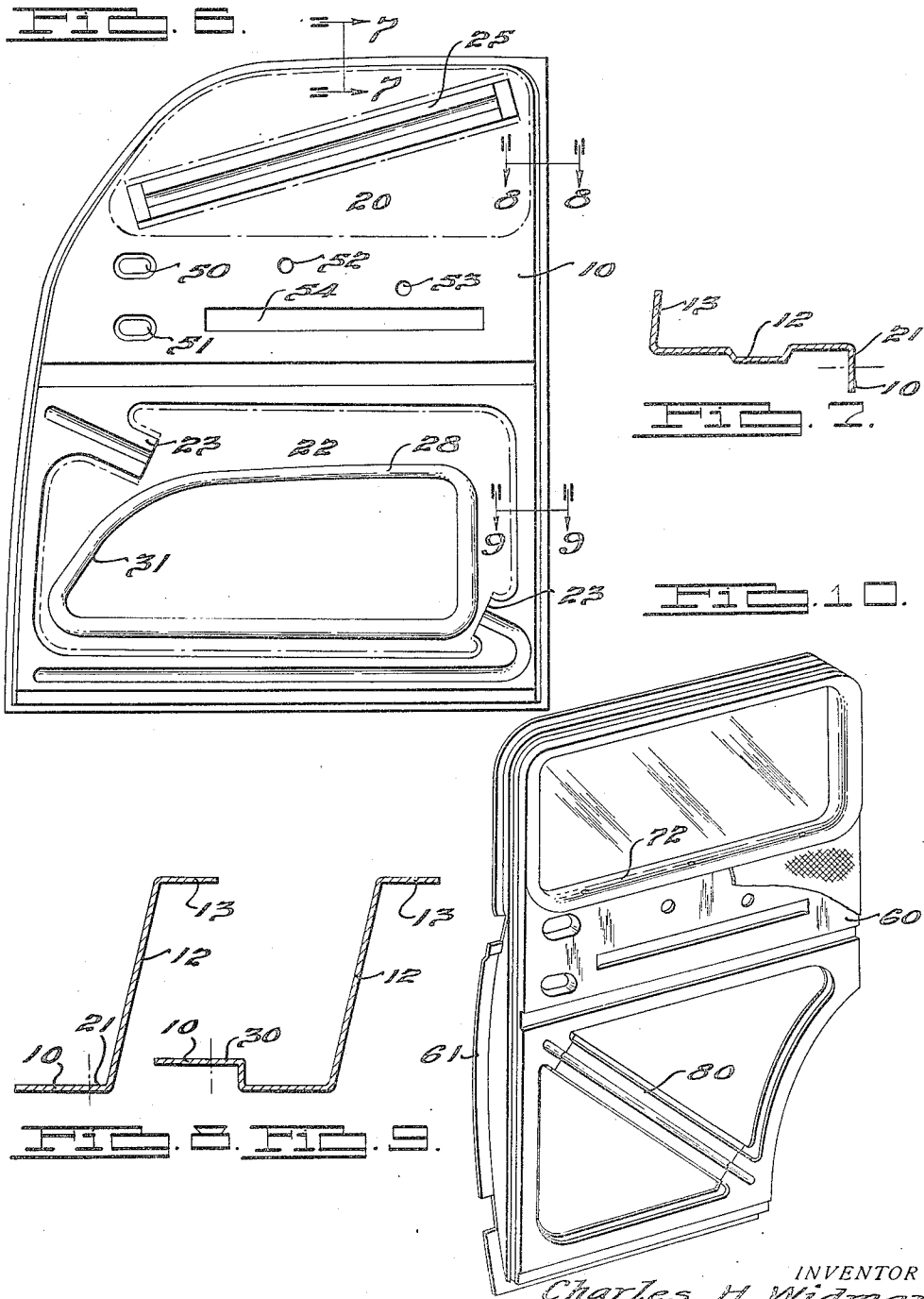
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METHOD OF FORMING VEHICLE DOORS

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4 Sheets-Sheet 2



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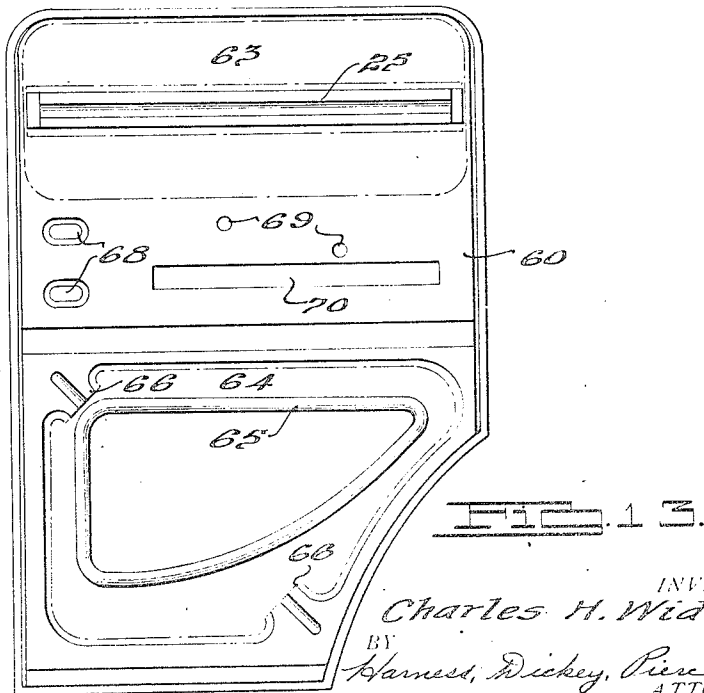
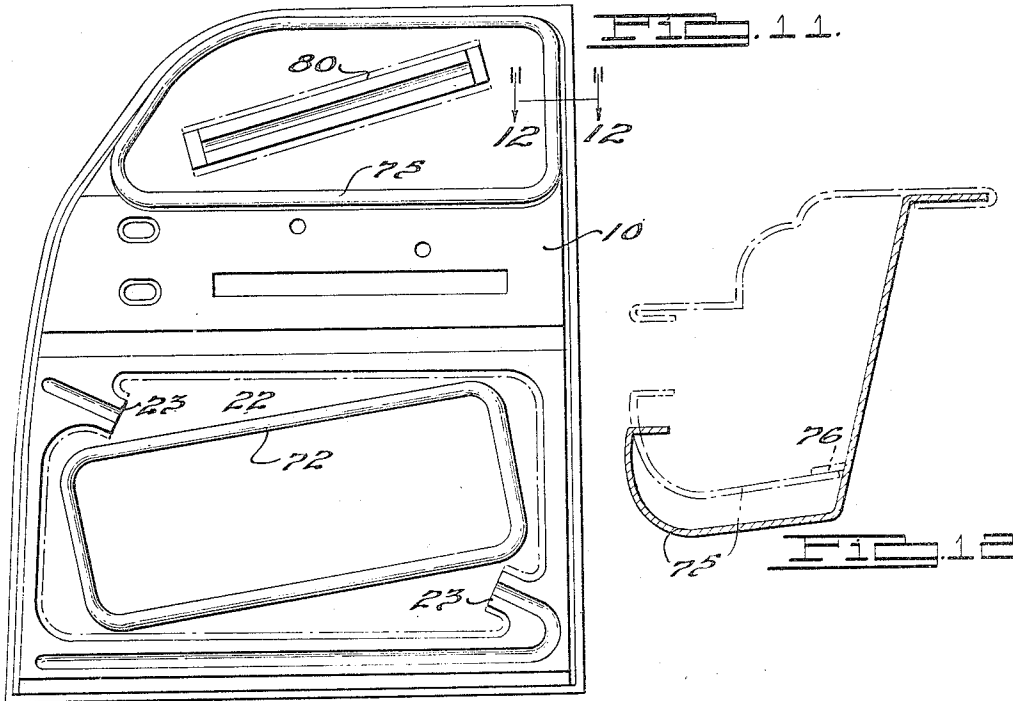
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METHOD OF FORMING VEHICLE DOORS

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4 Sheets-Sheet 3



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METHOD OF FORMING VEHICLE DOORS

Filed April 13, 1936

4 Sheets-Sheet 4

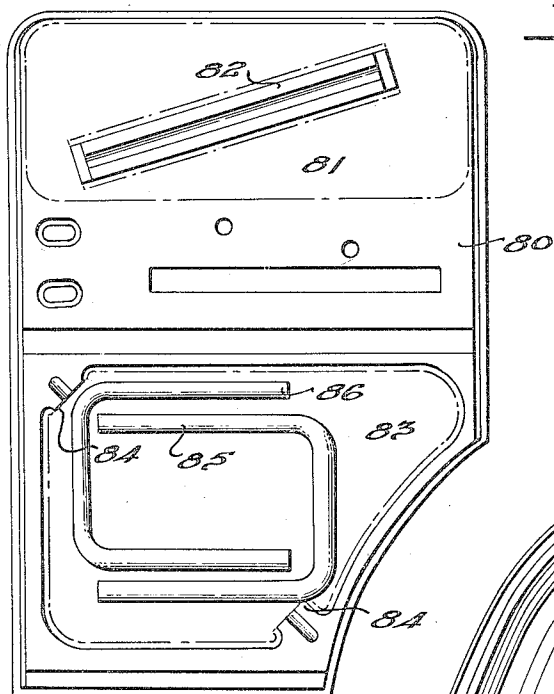


FIG. 14.

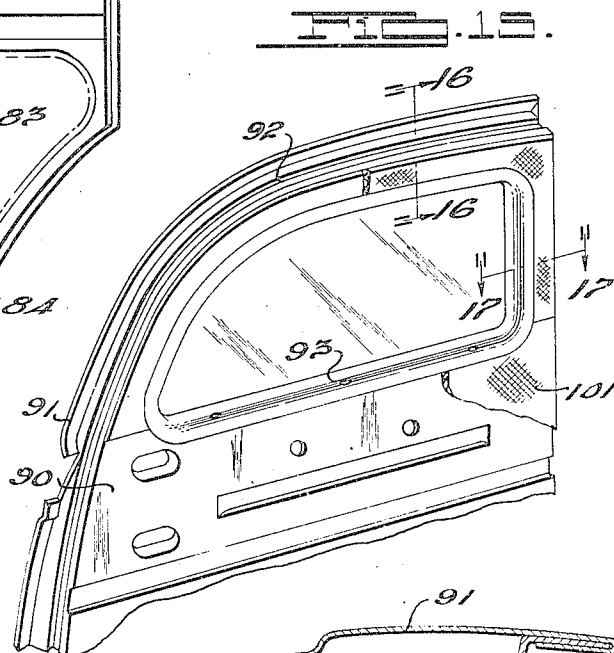


FIG. 15.

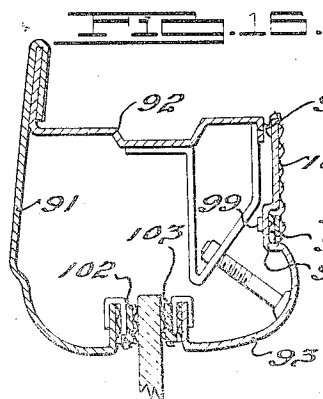
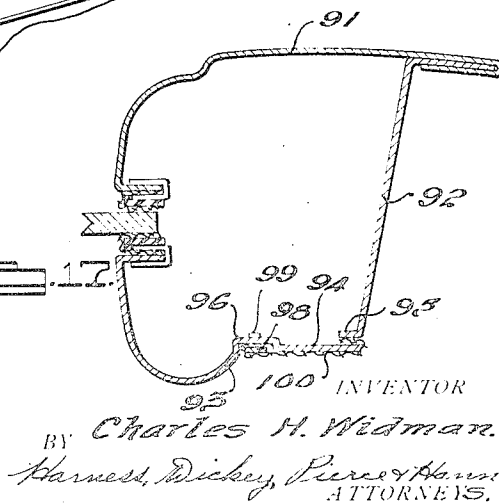


FIG. 16.

FIG. 17.



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2,176,192

METHOD OF FORMING VEHICLE DOORS

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Application April 13, 1936, Serial No. 74,051

4 Claims. (Cl. 29—152)

This invention relates to a method of manu-
facturing automotive vehicle doors. More par-
ticularly it relates to a novel and improved meth-
od of manufacturing sheet metal vehicle doors
5 which method effects a substantial saving in
material and greatly simplifies the process of
manufacture thereof.

In order to obtain a better understanding of
the specific problem solved by the method of
10 the present invention, reference may be had to
applicant's prior copending application Serial
No. 66,542, filed March 2, 1936 in which is dis-
closed a method of manufacturing doors some-
what similar to the method described herein and
15 of which the present application is a continua-
tion in part.

It is a primary object of the present invention
to provide a method for manufacturing sheet
metal doors in which the waste material stamped
20 from the window opening and the opening in the
lower portion of the inner door panel may be
utilized for the purpose of providing garnish
mouldings and braces for the completed door,
consequently effecting a substantial saving in
25 the necessary sheet metal required to provide the
door construction and eliminating unnecessary
waste.

In present day vehicle body constructions the
front door due to the slope of the windshield, is
30 generally tapered and provides an upper portion
of the door of considerably less width than the
lower portion thereof. In closed automobile
bodies having four doors the rear door is usually
shaped to provide a portion which will clear the
35 rear fender and kick-up and consequently the
upper portion of this door is substantially wider
than the lower portion thereof. The present in-
vention contemplates the utilization of waste
metal stamped from the openings in the front
40 door to provide portions which may be used in
the rear door and portions of metal from the
waste portions of the rear door which may be
stamped to a configuration for use in the other
parts of the body.

Still further the present invention contem-
plates the provision of a method in which waste
metal from one of the doors is utilized for the
purpose of providing a garnish moulding adapted
45 to surround one of the rear quarter windows in
the vehicle body.

Doors manufactured in accordance with the
teachings of the present method generally com-
prise a pair of sheet metal panels spaced in their
body portion and secured together in their mar-
50 ginal edges to provide a door overlap. The pan-

els making up the improved door construction
are each stamped to provide a window opening
therein such that when the panels are secured
together the window openings will register with
each other. The inner of the two panels has
5 the marginal edge thereof defining the window
opening preformed to receive a unitary garnish
moulding structure which is adapted for remov-
able mounting therein. The lower portion of
10 this inner panel is blanked out to substantially
reduce the weight of the door as a whole and
the metal blanked out of this lower portion is
utilized for the purpose of forming the garnish
moulding structure adapted to surround the win-
15 dow opening. It has been found exceedingly
practical and satisfactory to blank out this unit-
ary garnish moulding structure from the lower
portion of the inner door panel at the same time
that the panel as a whole is stamped to predeter-
20 mined form.

Many other and further objects and advan-
tages of the present invention will become clearly
apparent from the following specification when
considered in connection with the accompanying
drawings forming a part thereof.

In the drawings:

Figure 1 is a perspective view of a front auto-
mobile door embodying the teachings of the
method of the present invention.

Fig. 2 is an enlarged transverse sectional view
30 taken substantially on the line 2—2 of Fig. 1
illustrating in detail the structure of the upper
door rail and garnish moulding of the improved
door construction.

Fig. 3 is an enlarged transverse sectional view
35 taken substantially on the line 3—3 of Fig. 1
illustrating in detail the rear door rail at the
window opening.

Fig. 4 is an enlarged transverse sectional view
40 taken substantially on the line 4—4 of Fig. 1
illustrating in detail the construction of the door
and garnish moulding at the lower side of the
window opening.

Fig. 5 is an enlarged transverse sectional view
45 taken substantially on the line 5—5 of Fig. 1
illustrating in detail the transverse configuration
of the bracing strut used to strengthen the lower
part of the door panel.

Fig. 6 is a plan view of the inner panel of the
door construction shown in Fig. 1 illustrating
50 in detail the manner in which the component
parts thereof are blanked from a single, integral
sheet of metal.

Fig. 7 is an enlarged transverse sectional view
taken substantially on the line 7—7 of Fig. 6

illustrating in detail the manner in which the marginal edge of the inner panel is preformed around the window opening to provide a structure adapted to receive the removable garnish moulding.

Fig. 8 is an enlarged transverse sectional view taken substantially on the line 8—8 of Fig. 6 illustrating in detail the manner in which the rear rail of the door adjacent the window opening is formed.

Fig. 9 is an enlarged transverse sectional view taken substantially on the line 9—9 of Fig. 6 illustrating in detail the manner in which the paneling is preformed around the lower opening in the inner panel.

Fig. 10 is a perspective view of a rear door for an automotive vehicle manufactured in accordance with the teachings of a modified method of the present invention.

Fig. 11 illustrates a plan view of a front door of this modified form of the invention showing a construction in which the garnish moulding for the rear window is stamped from the lower opening in the front door panel.

Fig. 12 is an enlarged transverse sectional view taken substantially on the line 12—12 of Fig. 11 illustrating the steps in the formation of the modified form of the invention shown therein.

Fig. 13 is a plan view of the stamping forming the inner panel of the rear door shown in Fig. 10, illustrating the parts blanked therefrom.

Fig. 14 illustrates in plan an inner stamping embodying a modified form of the present invention particularly adaptable to the manufacture of rear doors.

Fig. 15 illustrates a door manufactured in accordance with a modified method of the present invention having a modified garnished moulding structure.

Fig. 16 is an enlarged, transverse sectional view taken substantially on the line 16—16 of Fig. 15 illustrating in detail the upper door rail of the door shown in Fig. 15 and the improved removable garnish moulding element associated therewith.

Fig. 17 is an enlarged transverse sectional view taken substantially on the line 17—17 of Fig. 15 illustrating in detail the construction of the improved removable garnish moulding element adjacent the rear rail of the door.

With more particular reference to the drawings, it will be appreciated that the door construction manufactured according to the teachings of the present method comprises inner and outer panels 10 and 11 respectively which together form the door structure. As will be more clearly appreciated hereinafter, it is with the inner panel that the method of the present invention is primarily concerned.

The inner panel 10 is preformed to provide a jamb face portion 12 which extends entirely around the door and the edge of this jamb face portion 12 is outwardly bent substantially in the plane of the door to provide a substantially continuously extending flange 13 around which the marginal edge 14 of the outer panel 11 is crimped to provide the door overlap. It will be appreciated that this structure results in a door in which the inner and outer panels are rigidly secured together to provide a unitary construction and in which the body portions of the panels are spaced substantially from one another and lie substantially parallel to each other.

The outer panel 11 is stamped to provide a window opening therein and the metal of the

panel surrounding this window opening is preformed inwardly to provide an integral garnish moulding structure 16 surrounding and defining the window opening. The inner marginal edge of this garnish moulding structure is bent to lie substantially in the plane of the window opening and to provide a flange 17 adapted to receive a resilient guide strip for the window as is explained in greater detail below.

The inner panel 10 is stamped to provide a window opening 20 therein and the metal surrounding this window opening is stamped to provide an inwardly projecting flange 21 adapted to receive and seat the removably mounted garnish moulding hereinafter described in detail.

It will be seen by reference to Fig. 6 that front doors of the type disclosed herein are considerably narrower in their upper portion than in the lower portions thereof and at the time the door is formed a considerable amount of metal may be stamped out of the lower portion of the inner door panel to provide a generally rectangular opening 22 having projecting lugs or ears 23 at diagonally opposite corners thereof. The removal of this metal from the lower portion of the door serves to materially decrease the weight of the door as a whole and as will hereinafter be more clearly seen, does not serve materially to impair the strength of the door structure. Inasmuch as this entire area below the window opening is, as is conventional in the art, covered by a relatively stiff unitary inner trim panel the interior appearance of the finished product is not impaired.

At the time the upper and lower openings 20 and 22 are stamped in the panel 10 the metal of the panel lying in the opening 20 is preformed to provide a brace member 25 of sufficient length to extend between the lugs 23 in the lower opening 22. This brace member shown in cross-section in Fig. 5 is preferably preformed to provide a channel-way 26 running longitudinally thereof and preferably has the marginal edges flanged downwardly and outwardly to provide flanges 27 thus materially increasing the strength of the brace member as a whole.

At the time the lower opening 22 of the door is stamped out, the projecting lugs 23 are formed and it has been found desirable to form the exposed ends of these lugs 23 of a cross-sectional configuration substantially identical with the cross-sectional configuration of the brace 25. The metal in the opening 22, at the time this opening is formed, is stamped to provide a unitary garnish moulding structure 28 of a configuration adapted to fit the window opening 20 in the upper portion of this inner panel.

Heretofore in order to economize in the amount of metal required to form garnish mouldings for window openings in automobile doors continuous lengths of rolled section having the desired cross-sectional shape have been bent to a configuration adapted to surround and define the window opening in the inner panel and the ends of the predetermined section have been secured together to provide a unitary structure. Due to the utilization of the continuous lengths of rolled section it has been inherently necessary to provide these removable garnish moulding elements of uniform cross-sectional configuration throughout. It will be appreciated that unitary garnish mouldings such as 28 which are stamped from the sheet metal panel 10 and formed in the lower opening thereof may be stamped to substantially any desired configuration within the limit of the mate-

rial available and consequently it has been found exceedingly satisfactory to vary the cross-sectional configuration of the garnish moulding 28 thus formed to fit the particular needs of the window opening with which it is associated.

At the time the opening 22 is formed in the lower portion of the inner panel of the door the marginal edge of this opening is preferably preformed to provide an inwardly projecting flange 30 offset substantially from the body portion of the panel 10 in order to materially increase the strength of the inner panel as a whole. This construction is shown in detail in Fig. 9 and it will be seen that the inner panel 10 may be cut off along the dotted line in order to form the marginal edge of the lower opening in the door. Likewise the waste material from the window opening 20 may be cut off along the dotted line in Fig. 8 leaving an inwardly projecting flange 21 surrounding the window opening 20 in the door and providing a seat for the removably mounted garnish moulding 28 which has been stamped from the lower opening in the door.

After the garnish moulding 28 has been stamped from the opening 22 in the lower portion of the door, the inner marginal edge thereof may be bent over to provide a flange 33 which when the garnish moulding 28 is mounted in position will lie substantially parallel to the flange 17 formed on the outer door panel and it will be seen that these two flanges serve to position the vertically adjustable window with respect to the window opening. The brace member 25 may be butt welded or otherwise suitably secured to the projecting lugs 23 in the lower opening of the door to provide a continuous diagonally extending brace for the lower portion of the inner panel and this lower portion of the door construction as a whole may be covered by means of a suitable conventional inner trim panel 35.

A plurality of suitable sheet metal clips 36 may be secured at suitable intervals to the inner panel 10 around the window opening 20 and it will be seen by reference to Figs. 2 and 4 that each of these clips 36 is provided with a screw boss 37 permanently secured thereto and adapted to receive screws 38 for removably retaining the garnish moulding element 28 in position. The flange 31 of the garnish moulding 28 may have secured thereto a resilient guiding and sealing strip 40 formed of composite construction of rubber and woven fibrous material such as is conventional in the art and this sealing strip may be permanently secured to the flange 31 by means of suitable spaced clips 41. The flange 17 of the garnish moulding structure 16 of the outer panel of the door may likewise be provided with a guiding and sealing strip 43 secured thereto by means of suitable spaced sheet metal clips 44. The guiding and sealing strips 43 and 40 preferably extend entirely around the window opening and serve to provide a runway for the vertically adjustable window 45. The window 45 may, as is conventional in the art, be seated in a suitable channel element 46 which has secured thereto a bracket 47 adapted to cooperate with the arms of a conventional double arm regulator mechanism such as is usually used in door constructions of this generic type. At the time the inner panel of the door is formed the space between the upper and lower openings 20 and 22 is preferably preformed to provide inward depressions 50 and 51 which provide surfaces to which the guide channels for the vertically adjustable window 45 may be butt welded. Suitable openings 52 and 53 may be

formed in this panel to receive the regulator and latch operating controls and the panel is preferably provided with a transversely extending recess 54 adapted to receive the conventional transversely reciprocable latch operating arm.

From the foregoing it will be appreciated that a particularly strong and satisfactory form of sheet metal door construction may be economically stamped from two sections of sheet metal, one forming the inner panel and the other forming the outer panel and that the accessory parts required to complete construction of the inner panel may be conveniently stamped from the openings therein at the same time that the inner panel structure as a whole is stamped.

In the modified form of the invention illustrated in Figs. 10 to 13, inclusive, of the drawings a particularly economical method is disclosed where it is desirable to manufacture front and rear doors for a vehicle body having two doors on the same side thereof and wherein parts from the openings of one door are utilized in the construction of the other door.

In Fig. 10 is illustrated a rear door for a conventional sedan body including inner and outer panels 60 and 61 secured together in their marginal edges to provide a door overlap and it will be seen that as has been described above the inner panel is preformed to provide a jamb face extending entirely around the periphery of the door as a whole. As is conventional in present day construction these rear doors are substantially of less width in their lower portion than in their upper portion and consequently it is impossible to stamp the garnish moulding for the window as a unitary structure from the opening in the lower portion of the door. According to this modified form of the present invention the inner panel of the rear door shown in Fig. 10 is stamped to provide a window opening 63 and an opening 64 in the lower portion of the door. A substantially unitary triangular garnish moulding structure 65 may be simultaneously formed from the waste material in the lower portion of the door at the time this opening is formed and as has been described above this lower opening is preformed to provide projecting lugs 65 at diagonally opposite corners of the opening which lugs are adapted to receive the ends of a brace member subsequently secured thereto. The garnish moulding 65 is sufficiently large to be particularly adaptable for mounting in the rear quarter window of the vehicle body.

At the time the window opening 63 is formed the brace member 25 utilized for bridging the aperture between the lugs 23 in the front door construction may be simultaneously stamped from the waste metal in this opening. The inner panel 60 of the rear door is preformed to provide a pair of depressions 68 which are adapted to support the vertically disposed glass run channel for the window in the rear door and likewise may be provided with suitable apertures 69 to receive the latch mechanism and window regulator operator as well as a longitudinally disposed recess 70 to receive the latch operating arm. The marginal edge of the window opening in the rear door is preformed to provide a flange adapted to receive a removably mounted garnish moulding substantially as has been described in connection with the front door shown in Fig. 1. The front door, manufactured in accordance with the method illustrated in Fig. 11, has the lower opening 22 therein formed of substantially identical configuration, as has been described in connection

Fig. 6 and the waste material in this opening is stamped at the same time the opening is formed to provide a rectangular garnish moulding structure 72 of a shape and configuration adapted to surround and define the opening 63 in the rear door shown in Fig. 13. Due to the extreme width and size of the opening 22 in the lower portion of the front door, it will be seen that sufficient metal is readily available for the formation of this garnish moulding structure as a unitary element and this garnish moulding may be conveniently stamped from the lower portion of this door at the same time the opening 22 is formed therein. The material around the window opening in the upper portion of the front door shown in Fig. 11 is preformed to provide a garnish moulding structure 75 and subsequently severed from the inner panel 10. The marginal edges of the inner panel 10, surrounding the window opening, are then bent to provide an inwardly projecting flange 76 surrounding this window opening and adapted to seat the garnish moulding element 75 and it will be readily appreciated that this garnish moulding may be mounted in substantially the same manner as has been described above. For a clearer understanding of the manner in which this garnish moulding surrounding the window opening of the front door is formed from the metal surrounding the window opening and subsequently severed therefrom, reference may be had to applicant's prior co-pending application referred to above.

The waste material in the window opening interiorly of the garnish moulding structure 75 is preformed to provide a brace member 80 of sufficient length to bridge the distance between the projecting lugs 66 in the lower portion of the rear door and it will be appreciated that due to the extreme narrowness of the rear door in its lower portion, ample material will be available in the front window opening interiorly of the garnish moulding 75 in order to form this brace member at the same time the window opening and garnish moulding 75 are stamped from the panel 10.

It will be appreciated from the foregoing that a front and rear door may be manufactured at the same time in accordance with this modified method and that the garnish moulding for surrounding the window opening in the rear door may be stamped from the lower portion of the front door. The garnish moulding surrounding the window opening in the front door may be stamped from the material surrounding this window opening. The brace member for the lower portion of the front door may be stamped from the material available in the window opening of the rear door and the brace member for the lower portion of the rear door may be conveniently stamped from the remaining material available in the window opening of the front door. The material from the lower opening in the rear door is utilized for the purpose of fabricating a garnish moulding for one of the rear quarter windows of the vehicle body and it will be appreciated that from the four panels required, two complete door structures, together with a garnish moulding from the rear quarter window, may be conveniently stamped by means of a simple stamping operation.

In the modified form of the invention illustrated in Fig. 14, it will be appreciated that substantially the same basic principles are utilized as have been employed in the above described modifications of the invention shown in the preceding figures. In this form of the invention, a

rear door is completely fabricated from two substantially co-extensive sheet metal panels. The inner panel 80 is shown in plan in Fig. 14. A window opening 81 is stamped in the upper portion of this panel at the same time the panel is formed to provide the jamb faces and overlap flanges thereof. The material from within the window opening 81 is preformed to provide a brace member 82 adapted to bridge the space between lugs in the lower opening described below. The lower opening 83 is stamped out to the desired configuration at the same time as the upper opening is stamped out and at the time this stamping is formed, inwardly projecting diagonally disposed lugs 84 are provided, to which the ends of the brace member 82 may be welded in order to strengthen the lower portion of the door structure. The garnish moulding for the window opening 81 may be simultaneously stamped from the waste material within the opening 83 and may be formed into substantially complementary sections 85 and 86, each adapted to extend substantially half-way around the window opening 81. After these sections 85 and 86 have been stamped out from this lower opening, their adjacent ends are butt welded together to provide a substantially integral, unitary garnish moulding structure adapted to surround and define the window opening 81 in the panel 80. It will be appreciated that in this form of the invention means are provided for forming an entire rear door from inner and outer panels and the method contemplated includes the provision of a garnish moulding for the inner panel formed from the lower portion of the inner panel and a brace member for the lower portion of the inner panel formed from the material normally removed from the window opening thereof.

In the modified form of the invention illustrated in Figs. 15 to 17, inclusive, a novel form of garnish moulding structure is disclosed which has been found to be particularly adaptable for formation by the above described method.

This garnish moulding structure is of a particular configuration adapted to receive a fabric finish and is of such structure that it is particularly adaptably formed by stamping from a single sheet of metal such as may be obtained from the windows or door openings in accordance with the method described above.

In Fig. 15 is illustrated a door construction comprising inner and outer panels 90 and 91, respectively, secured together in their marginal edges to provide the door overlap. As has been described above, the inner panel 90 is preformed to provide a jamb face 92 extending substantially entirely around the periphery of the door and the window opening in the door is defined by a unitary garnish moulding structure 93 stamped from a single integral sheet of metal. This garnish moulding structure 93 is preformed to provide a portion or a flange 94 adapted to mate with a flange 95 formed on the inner panel of the door adjacent the jamb face 92 thereof. The portion of the garnish moulding structure 93 surrounding the window openings is preformed to the desired ornamental curvature and is depressed to provide a channel 96 adjacent the flange 94. This channel structure 96 extends around three sides of the window opening, namely, the front, rear, and top sides thereof, and has holes punched through the base of the channels at suitable intervals therealong. A metallic strip 98 is provided of a configuration adapted to seat the channel 96 and this metallic securing strip is

provided at suitable intervals along its length with up struck fangs or lugs 99 which are adapted to extend through the holes formed in the base of the channel.

5 A section of fabric trim material has one of the marginal edges thereof disposed in the channel and the lugs 99 extend through this fabric trim material and are clinched over on the inside of the garnish moulding 93. The upper surface of the metallic securing strip 98 will then lie substantially flush with the upper surface of the flange 94 and the fabric trim material is drawn around over the securing strip 98, over the flange 94, and adhesively secured to the rear side of the flange adjacent the marginal edge thereof. 10 This construction has been found to provide an exceptionally neat and attractive fabric trim for the interior surface of the door around the garnish moulding, and it will be seen by reference to Fig. 15 that this interior trim 100 mates with the inner trim panel 101 which is secured to the lower portion of the door structure. 15 20

It will be appreciated that the specific embodiments of the invention illustrated and described herein are merely illustrative of the generic inventive concept presented in this application. Many other and further modifications thereof, falling within the scope of the invention as defined in the subjoined claims, will be apparent to those skilled in the art. 25 30

What is claimed is:

1. In the method of forming a vehicle door panel including a garnish molding, the steps of blanking out an inner sheet metal panel for said

door and stamping a unitary garnish moulding for the window opening in said door from a portion of said paneling below the window opening of greater extent than the size of the window opening.

2. In the method of forming a vehicle door panel including a garnish molding, the steps of blanking out an inner sheet metal panel for said door and in the same operation blanking out a unitary garnish moulding for the window opening in said door from the portion of said door below said window opening of greater extent than the size of the window opening. 5 10

3. In the method of forming a vehicle door panel including a garnish molding, the steps of stamping an inner panel for said door to form, stamping a window opening in the upper portion of said panel, forming the marginal edge of said panel around said window opening to receive a garnish moulding, and stamping a garnish moulding for said window from a portion of said door beneath said window opening of greater extent than the size of the window opening. 15 20

4. In the method of forming a vehicle door panel including a garnish molding, the steps of stamping a sheet of metal to substantially the desired form and stamping a window opening therein, forming the edge of said sheet around said window opening to receive a garnish moulding, and, in the same operation stamping a unitary garnish moulding from a portion of said door below said window opening of greater extent than the size of the window opening. 25 30

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