

[72] Inventors **John A. Brossart, Jr.**
Munster;
William W. Lannin, Hammond, Ind.
 [21] Appl. No. **750,404**
 [22] Filed **July 3, 1968**
 [45] Patented **Apr. 13, 1971**
 [73] Assignee **Stanray Corporation**
Chicago, Ill.

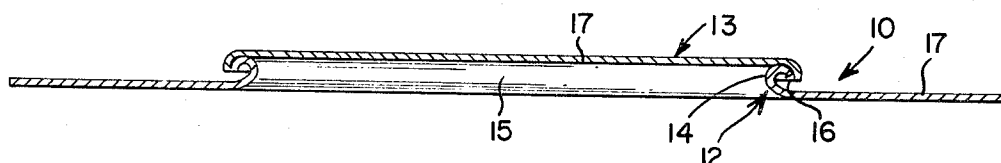
[56] **References Cited**
UNITED STATES PATENTS
 1,580,930 4/1926 Thackray 72/324
 3,090,160 5/1963 Shaver, et al. 52/19
FOREIGN PATENTS
 362,509 7/1962 Switzerland 52/19

Primary Examiner—Lowell A. Larson
Attorney—Sabin C. Bronson

[54] **METHODS OF CONSTRUCTING A HATCH FRAME AND COVER THEREFOR**
9 Claims, 11 Drawing Figs.

[52] **U.S. Cl.**..... **113/116,**
52/19, 72/379
 [51] **Int. Cl.**..... **B21d 51/40**
 [50] **Field of Search**..... **113/116,**
120; 72/324, 338, 379; 52/19, 20, 198, 199

ABSTRACT: Methods for forming hatch frames integral with a roof sheet for a car or container. In one embodiment the hatch frame is constructed so that the cutout portion forming the hatch opening is used to provide a hatch cover. Another embodiment includes the formation of a hatch frame and cover member, simultaneously with corrugations in the roof sheet.



Patented April 13, 1971

3,575,122

2 Sheets-Sheet 1

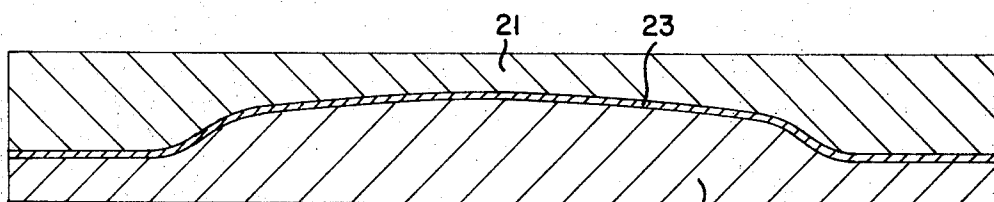


FIG. 1-

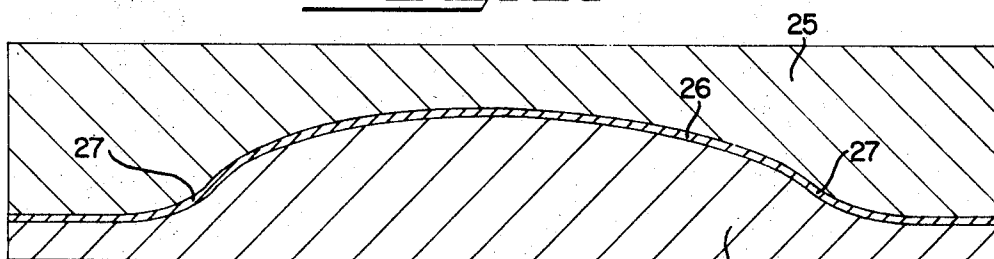


FIG. 2-

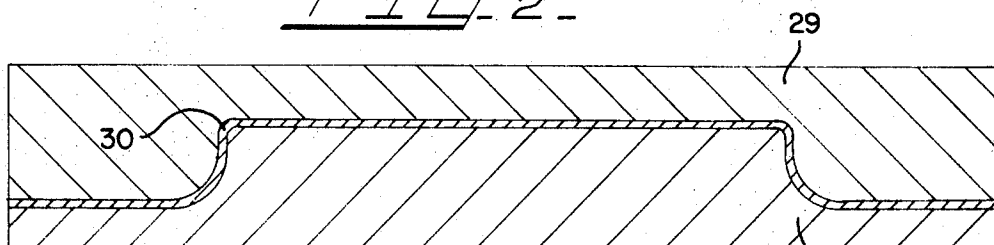


FIG. 3-

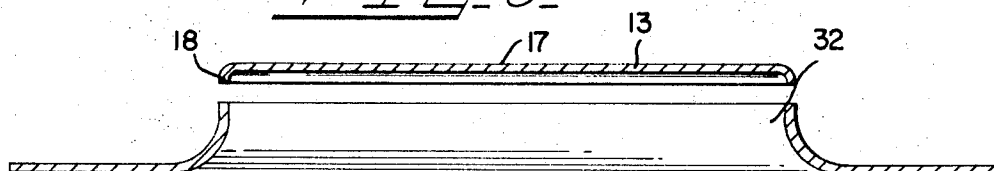


FIG. 4-

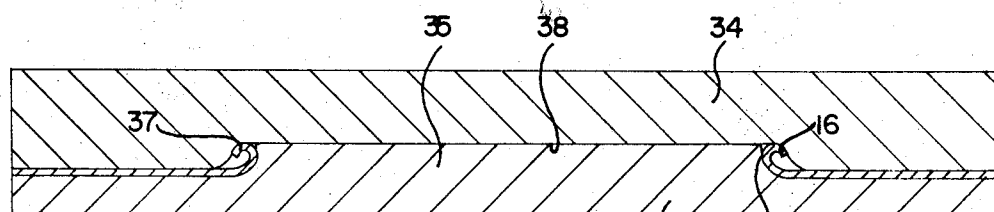


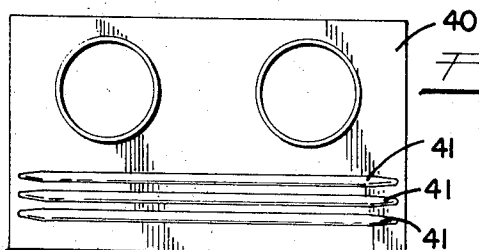
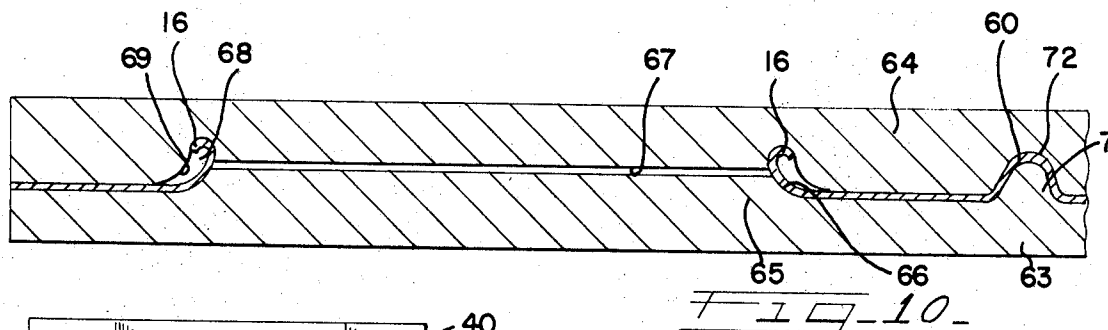
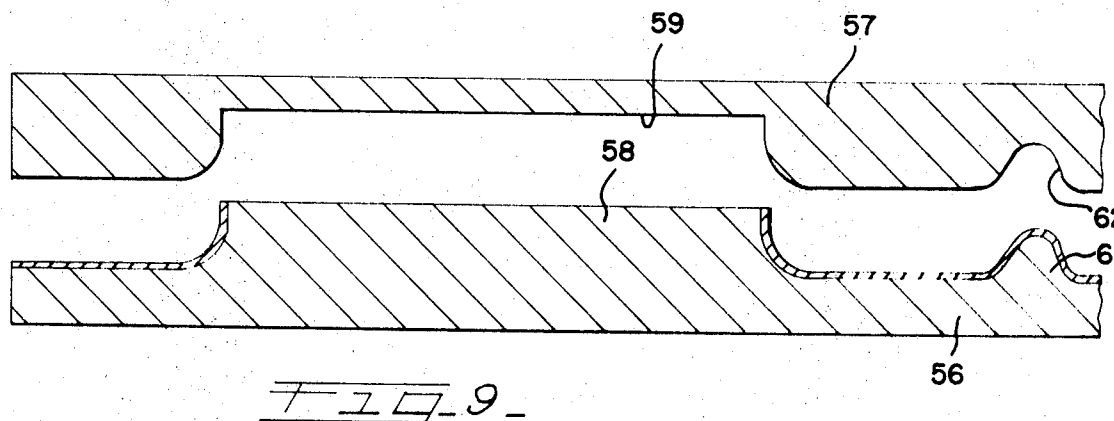
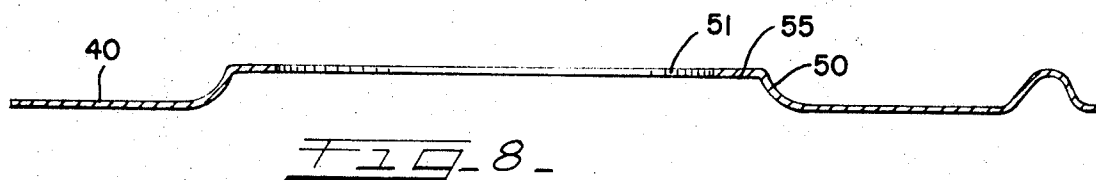
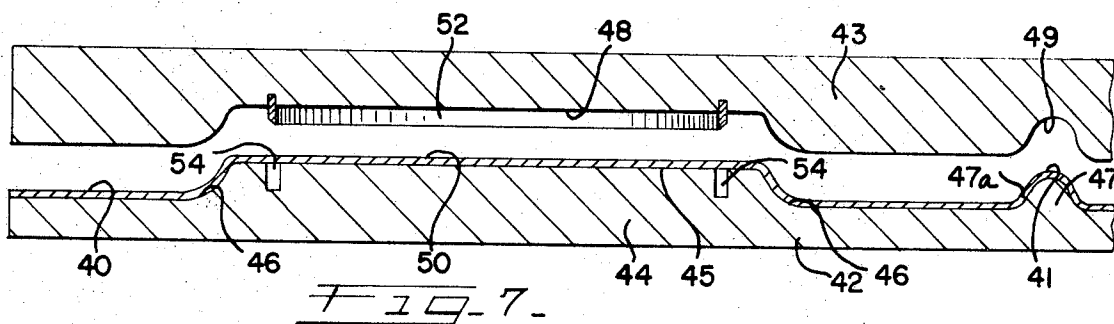
FIG. 5-



FIG. 6-

INVENTORS
JOHN A. BROSSART, JR.
WILLIAM W. LANNIN
BY *Sabin C. Brownson*
ATT'Y.

2 Sheets-Sheet 2



INVENTORS
JOHN A. BROSSART, JR.
WILLIAM W. LANNIN

BY *Sabin C. Brown*
ATT'Y.

METHODS OF CONSTRUCTING A HATCH FRAME AND COVER THEREFOR

BACKGROUND - SUMMARY - DRAWINGS

The present invention relates to methods for forming hatch frames for freight vehicles and more particularly to new and improved methods for forming a hatch frame integral with a roof sheet.

Heretofore, circular hatch frames have been made as a separate subassembly from a flat sheet rolled into an open-ended cylinder which is subsequently welded about a circular opening formed in a roof. A standard roof sheet normally includes two such hatch assemblies fixed thereto. A typical roof sheet with two hatch frames requires approximately 20 feet of welding. The welding operation is not only time consuming and costly, but may also result in poor weld seams which are susceptible to leakage and under some circumstances may even be susceptible to structural failure.

It is a principal object of the present invention to provide a new and novel method for constructing a hatch frame integral with the roof sheet to obviate the necessity of welding as has been practiced heretofore.

This is accomplished generally by a series of hot or cold press operations to stretch and reform the roof sheet to form in the desired locations an integral projection of the height and diameter required for the hatch frame. The hatch frame is formed with a continuous outwardly curled lip to define a weather lip.

In one form of practicing the method of the present invention a hatch opening is formed in the sheet prior to any reforming press operations on the roof sheet to form the hatch frame. In another form the hatch opening is formed after a series of press operations in a manner such that the cutout material may be used as the hatch cover for the hatch frame.

In still another form of practicing the method the hatch opening is formed as a step intermediate one of the plurality of the sheet reforming steps to form the hatch frame.

In another form of practicing the invention the integral circular hatch frames are formed in the roof sheet simultaneously with corrugations which are used for the purpose of replacing carlines and imparting stiffness to the roof sheet.

For a more detailed description and understanding of the invention reference is made to the following drawings forming part of this description and wherein like parts are identified alike.

FIG. 1 is a cross-sectional view of a press showing a roof sheet disposed therein for performing an initial metal drawing step in the forming of a roof hatch frame in accordance with one embodiment of the present invention.

FIG. 2 is a view similar to FIG. 1 of a second metal drawing step in the forming of the roof hatch frame.

FIG. 3 is a cross-sectional view of a third metal drawing operation to reform the metal bubble into a substantially cylindrical protuberance having a substantially flat top wall.

FIG. 4 schematically illustrates the severance of the top end portion of the cylinder to provide the hatch opening and at the same time form the hatch cover.

FIG. 5 is a cross-sectional view showing the press for forming the outwardly curled weather lip and for sizing the hatch opening to accommodate the hatch cover thereon.

FIG. 6 is a cross-sectional view of the completed hatch frame formed in the roof sheet with the hatch cover disposed thereon.

FIG. 7 is a cross-sectional view of a pair of dies and a knife apparatus for practicing a second embodiment for forming a hatch frame in a roof sheet and simultaneously forming corrugations therein.

FIG. 8 is a cross-sectional view of the roof sheet after passing through the dies and knife illustrated in FIG. 7.

FIG. 9 is a cross-sectional view of the die members for enlarging the hatch opening by reforming the embossment formed in FIG. 8.

FIG. 10 is a cross-sectional view of the die members used for forming the outwardly curled weather lip and for imparting the final configuration to the hatch frame.

FIG. 11 is a top view of the roof sheet having the hatch frames formed therein by the apparatus illustrated in FIGS. 7—10.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, in particular FIGS. 1 to 5, there is shown a hatch assembly 10 including a roof sheet 11 having integrally formed therein a hatch frame 12 on which there is seated a hatch cover 13. The hatch frame 12 is of generally cylindrical configuration including a conical sidewall 14 which is curved upwardly and defines a hatch opening 15. At the upper end, the sidewall 14 is formed with a continuous outwardly and downwardly curled lip defining a weather lip 16 on which the cover is adapted to seat.

The hatch cover 13 is of generally cylindrical configuration including a top wall 17 and a downwardly depending flange 18. The flange 18 is joined to the top wall on a radius which is substantially the same as the curvature of the weather lip 16.

Referring to FIGS. 1—5, there is shown the apparatus for forming hatch frames 12 integral with the roof sheet. While the FIGS. only show the formation of a single hatch frame 14, it is to be clearly understood that two hatch frames 14 may be formed simultaneously.

As shown in FIG. 1, the flat roof sheet 11, heated to a temperature of about 1,400° F., which is sufficient to permit reforming thereof, is inserted in a press between a male die member 20 and a female die member 21 to form a circular bulge or pan 23 therein by stretching of the metal. To increase the height of the pan 23 the roof sheet is hot pressed between a second pair of male and female die members 24 and 25 to further stretch the metal and form the pan 26. In this connection it is to be noted that the radius of curvature 27 at the juncture of the pan 26 is relatively large.

Thereafter the pan 26 is pressed hot between male die member 28 and female die member 29 to form a substantially cylindrical boss or protuberance 30 having a flat top. The cylindrical protuberance 30 is formed of a height sufficient to permit the severance of the top therefrom to form the hatch cover 13 with annular flange 18 as shown in FIG. 4. To this end the diameter of the cylindrical protuberance at the upper end is somewhat greater than the diameter defined by the curled weather lip 16 so that the cover may be seated thereon as shown in FIG. 6.

The remaining sidewall, the cylindrical protuberance with the hatch opening 32 formed therein, is then pressed between a male die member 33 and a female die member 34. The male die member is formed with a cylindrical boss 35 to define the final hatch opening diameter. The female die member 34 includes a cavity 38 which is larger than the boss 35 and has a sidewall 37 contoured to bend the weather lip 16 to the final configuration shown in FIG. 6. Thus as the die members 33 and 34 are brought together, the cut end of the protuberance 32 engages the inner transverse wall 38 of the cavity 36 and is bent radially outwardly into engagement with the sidewall 37. Upon further downward movement the curled end 16 in engagement with the sidewall causes the remaining portion of the protuberance 32 to shrink and conform to the contour of the die boss 35. In this manner the desired diameter of the hatch opening 15 is achieved so that the severed hatch cover portion 13 may be applied thereon without further forming or sizing thereof.

Referring now to FIGS. 7—11, there is illustrated another apparatus for practicing the method of forming a hatch frame integral with a roof sheet. The method is particularly suitable for forming the hatch frames 12 integral with a roof sheet 40 having corrugations 41 formed therein to impart rigidity thereto and thereby eliminate the necessity of carlines and the like.

As heretofore described, each of the forming operations, with the exception of the final sizing of the hatch frame and weather lip formation, is formed with the roof sheet 40 heated to a temperature of about 1,400° F. to permit working thereof. Initially the roof sheet is hot pressed between a male die member 42 and a female die member 43. The male die member includes a cylindrical boss 44 having a flat upper face 45 and concave sidewalls 46. Spaced lengthwise from the boss 44 is a male corrugating protuberance 47 for partially forming the corrugation 41.

The female die is formed with a boss-receiving cavity 48 shaped complementary to the boss 44 and a corrugating cavity 49 for receiving the corrugating protuberance 47. The boss 44 and cavity 48 are sized such that the metal sheet is only partially stretched to form a flat pan 50 of lesser height than the hatch frame 12. The pan base is, however, sized about equal to the final base diameter of the hatch frame 12. At the same time the male corrugating die member 47 forces and stretches the metal into the female corrugating cavity 49 to form a partially formed corrugation 47a.

Thereafter a circular opening 51 is formed in the pan 50 as by a shearing blade 52 mounted on the under side of the female die member 43. To this end, the male die member 42 is formed with a circular slot 54 to accommodate the circular blade 52.

The opening 51 is sized to define an annular horizontal panel 55. The panel 55 is of sufficient width so that the hatch frame 12 is of the required height having a weather lip 16 formed thereon.

Obviously the circular opening 51 could be cut in the flat sheet and then press the pan therein which would result in the formation shown in FIG. 8.

Thereafter the pan 50 with the opening 51 therein is hot pressed between a male die 56 and a female die 57 respectively having complementary male boss 58 and boss-receiving cavity 59.

The male boss 58 and female cavity 59 serve to stretch the opening 51 and to reform the panel 55 into a substantially vertical attitude. At this same time the partially formed corrugations 47 are stretched to their final size and shape by a male corrugating die 61 and female corrugating die 62.

The final configuration of the hatch frame 14 is cold pressed by pressing between a male die 63 and female die 64 as shown in FIG. 10. The male die includes an upwardly projecting generally conical boss 65 having a convex wall 66. The female die member 64 includes a cavity 67 having a circular slot formed with a concavoconvex wall 69 which serves to curl the upper end of the panel 55 outwardly to form the weather lip 16. This is accomplished as the die members come together. The free edge of the upright panel engages the wall 69 so as to form a curl. As the curl is formed the remainder of the sidewall portions 55 and 50 are forced into engagement with the convex wall portions of the slot 68 and the convex sidewall 66 of the boss 65. In this manner the hatch frame 12 is formed into the final configuration shown in FIG. 6.

It is to be noted that the final forming die members 63 and 64 also include a corrugating boss 71 and cavity 72 for accommodating and if necessary to finally shape the corrugation 60 formed in the apparatus of FIG. 9.

In the foregoing described method, should the roof sheet not be formed with corrugations 60, circular openings of the required size may be formed directly therein at the desired locations. The sheet with the openings is then hot pressed to increase the size of each of the openings to form vertical upstanding walls of a height sufficient to allow for the formation of the weather lip. This is accomplished on die members similar to those shown in FIG. 9. Thereafter, the upstanding wall is reshaped to provide a weather lip and to finally size the hatch frame 12 by cold pressing in the die members shown in FIG. 10.

Although the embodiments constructed in accordance with the present invention have been described with the requisite particularity, the disclosure is of course exemplary. Changes

in details of construction, in size, configuration and arrangement of components and materials, and in modes of application will be apparent to those versed in the art and may be resorted to without departing from the scope of the invention as set forth in the following claims.

We claim:

1. A method of forming a hatch frame in a roof sheet comprising stretching said roof sheet to form a pan therein having a sidewall and top, cutting a circular opening in the top of said pan after formation of said pan, stretching said roof sheet about said circular opening to form an upstanding wall bounding said opening, reforming said upstanding wall between a pair of die members to form a continuous outwardly curled weather lip at the upper end thereof and shape said wall to the final configuration of a substantially circular hatch frame.

2. The invention as defined in claim 1 wherein said roof sheet is stretched so that said pan is formed with a circular upstanding wall having a diameter greater than said finally configured hatch frame.

3. The invention as defined in claim 1 wherein said top is cut to provide said opening and a bounding annular web, and wherein said pan with said opening formed therein is pressed between die members to stretch said opening and to form said annular web into said upstanding wall.

4. A method of forming a hatch frame in a roof sheet comprising stretching said sheet to form a shallow circular pan having a flat top, simultaneously stretching said roof sheet at a location remote from said shallow circular pan to form a corrugation in said roof sheet, cutting a circular opening in said flat top wall bounded by an annular web, stretching said annular web about said opening to form an upstanding wall, reforming said upstanding wall between a pair of die members to form a continuous outwardly curled weather lip at the upper end thereof and shape said wall to the final configuration of a substantially circular hatch frame.

5. The invention as defined in claim 4 wherein a plurality of said roof hatches are simultaneously formed in said roof sheet, and wherein said corrugation is formed simultaneously with the formation of said plurality of hatch frames.

6. The method of forming a hatch frame in a roof sheet comprising stretching said sheet to form a shallow domed pan, stretching said shallow domed pan to increase the height thereof, stretching and reforming said last-formed domed pan to form a circular pan having a flat top, severing said pan along the side of said pan to form an opening in said pan and provide a hatch cover from said severed pan portion, reforming said remaining pan portion between a pair of die members to shrink and form a continuous outwardly curled weather lip at the upper end thereof with said lip sized to receive said hatch cover thereon and to impart the final hatch frame configuration.

7. The method of forming a cylindrical hatch frame in a roof sheet comprising stretching said sheet by successive pressings to form a domed pan having a flat top, severing said pan along the side of said pan to form a flanged opening and provide a flanged hatch cover from said severed pan portion, reforming said flanged opening between a pair of die members to shrink and form a continuously outwardly curled weather lip at the upper end thereof, sized to receive said hatch cover thereon and to impart the final hatch frame configuration.

8. A method of forming an integral cylindrical hatch frame and cover therefor from a flat sheet, comprising pressing a pan upwardly therefrom, having a diameter larger than the curled edge of the frame to be formed, severing the pan from the frame by cutting the frame circumferentially near the top of the pan to provide a cover with an annular flange, shrinking the remaining flange to a smaller diameter, and finally curling and stretching the top margin of said conical frame into a laterally outwardly curled flange for receiving the flanged cover.

9. A method of forming a hatch frame integral with a roof sheet comprising stretching said roof sheet to form a circular

5

pan with an upstanding sidewall and a top, cutting the sidewall circumferentially adjacent the top to form a hatch cover with a depending annular flange, and provide a hatch opening in said roof bounded by said sidewall, reforming said sidewall to

6

shrink the diameter thereof and simultaneously form an outwardly curled weather lip at the upper end thereof so that the said hatch cover is seatable thereon with said depending flange embracing said weather lip.

5

10

15

20

25

30

35

40

45

50

55

60

65

70

75