

Dec. 23, 1958

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2,865,437

SEAT FOR FOLDING CHAIRS AND THE LIKE

Filed April 29, 1957

3 Sheets-Sheet 1

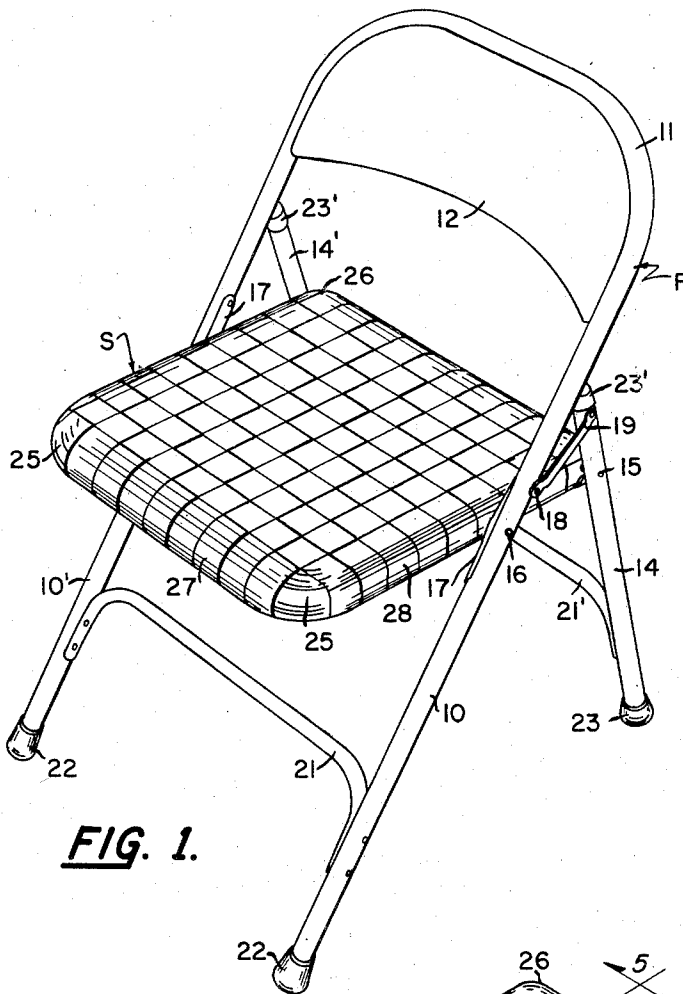


FIG. 1.

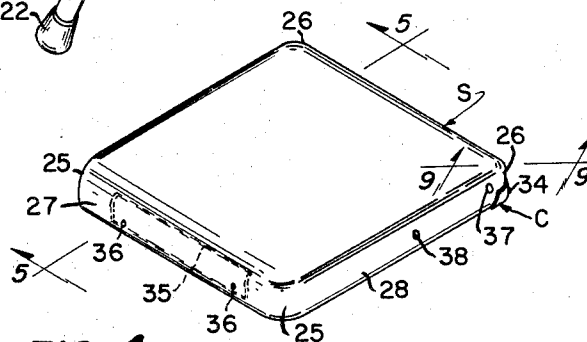


FIG. 4.

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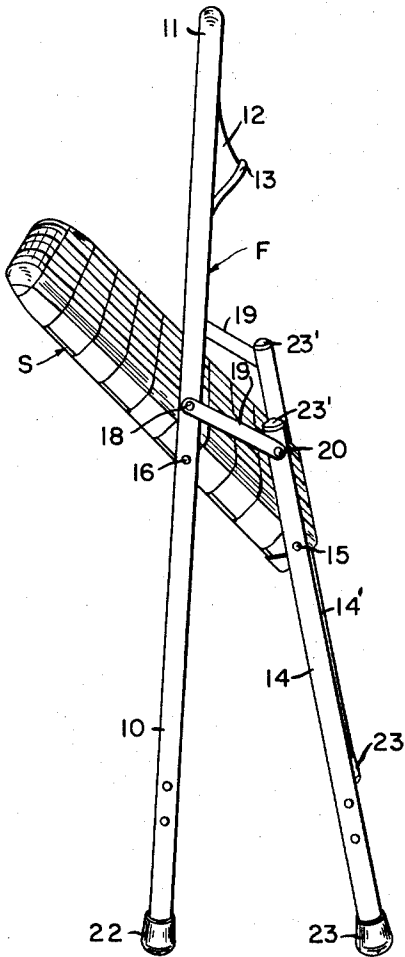


FIG. 2.

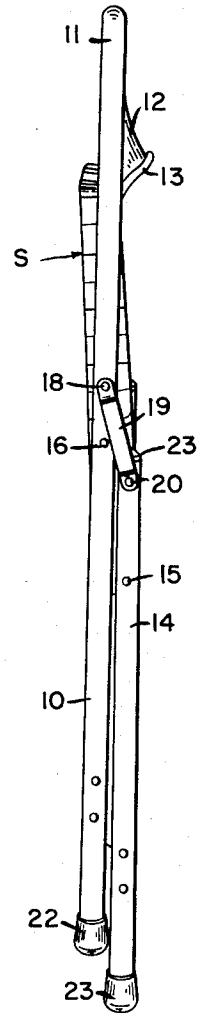


FIG. 3.

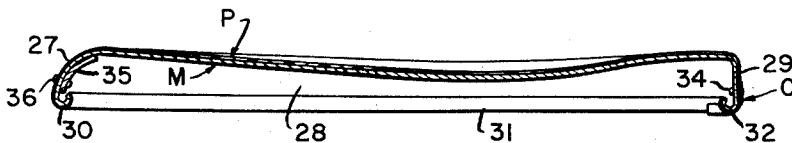


FIG. 5.

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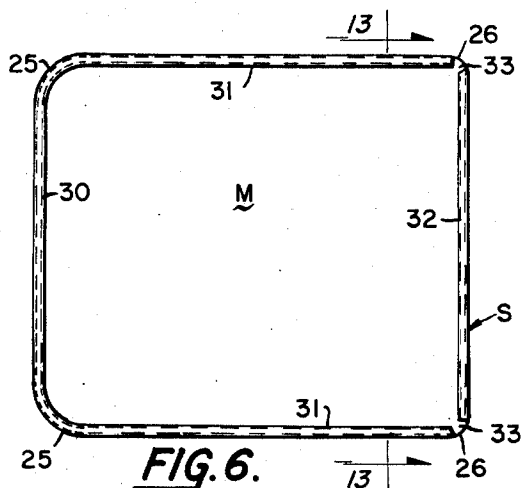
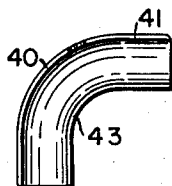
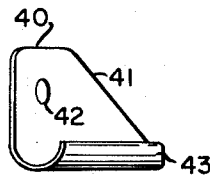


FIG. 7.

FIG. 8.

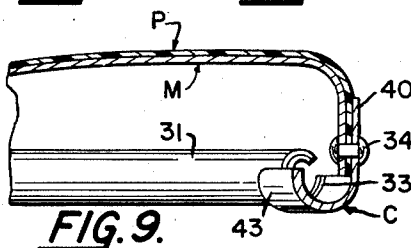


FIG. 9.

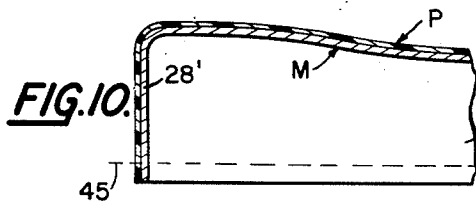


FIG. 10.

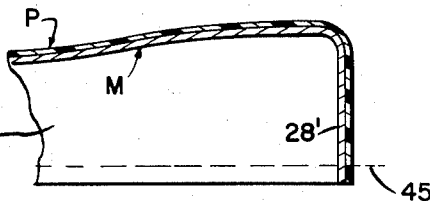
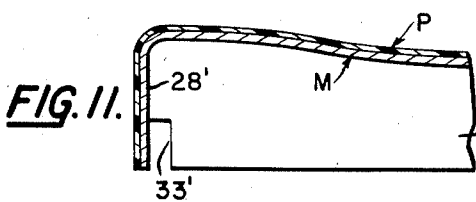


FIG. 11.

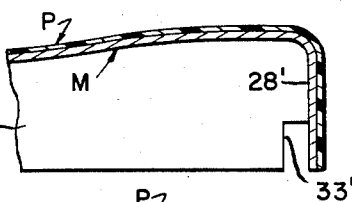
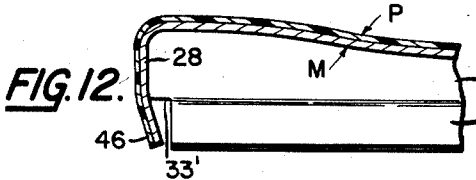


FIG. 12.

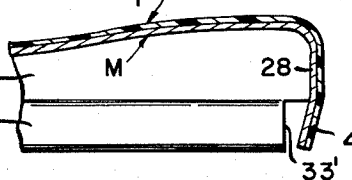
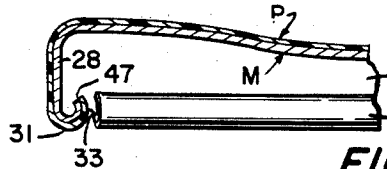


FIG. 13.

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SEAT FOR FOLDING CHAIRS AND THE LIKE

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Application April 29, 1957, Serial No. 655,838

7 Claims. (Cl. 155—186)

This invention relates to chairs, and more particularly to seats for chairs, such as folding chairs.

Chairs, and particularly folding chairs, have been made of wood for years, but are often unduly heavy and cumbersome to handle, as well as having a tendency to become marred and scratched. In addition, the life of such chairs is often limited by the strength of the wood at joints or pin connections, since wood tends to split or wear unduly at such connections. A folding chair made of metal has a relatively long life, as well as being capable of being made comparatively light in weight, but the seats of all-metal chairs, when painted or enameled, have a low coefficient of friction, so that the user tends to slide around on the seat. Also, a paint or enamel coating on metal has a tendency to wear through relatively quickly. Seats of such chairs have sometimes been upholstered, but this is unduly expensive and such chairs have not had as long a useful life as desired. A metal seat for a chair, if made sufficiently light, must be reinforced in some manner, as by depending flanges around the peripheral edges of the seat, or extra reinforcing members. Also, both the appearance and comfort and use of the chair can be enhanced by providing the seat with a layer of a relatively long-wearing, non-metallic material, such as a plastic. However, it is difficult to apply a plastic layer to a preformed seat, because of the corners and the necessity for shaping a plastic layer to conform to the shape of the seat, including the corners, as well as attaching the plastic layer to a non-planar surface. In addition, the exposed edges of a plastic layer are more susceptible to becoming dislodged, so that the plastic layer should extend to the underside of the seat, but this produces additional difficulties in attaching it to the seat.

Among the objects of the present invention are to provide a novel chair seat; to provide such a chair seat which is formed of metal covered by a layer of non-metallic material, such as plastic; to provide such a seat in which the covering layer may have a suitable design embossed or otherwise formed therein, to improve the appearance of the seat; to provide such a seat in which the problems pertaining to the attachment of the layer, particularly around the corners, are overcome; to provide a novel method of forming a chair seat; and to provide such a chair seat and a method of forming the same which will be readily adaptable to commercial practice.

Additional objects of this invention, as well as the novel features thereof, will become apparent from the description which follows, taken in connection with the accompanying drawings, in which:

Fig. 1 is a perspective view of a folding chair provided with a seat constructed in accordance with this invention;

Fig. 2 is a perspective view of the chair of Fig. 1, partially folded;

Fig. 3 is a side elevation of the chair of Fig. 1, when folded for storage or the like;

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Fig. 4 is a perspective view of the seat of the chair of Fig. 1;

Fig. 5 is a vertical section, on a slightly larger scale, taken along line 5—5 of Fig. 4;

Fig. 6 is a bottom view of the seat of Fig. 4, with certain parts omitted;

Fig. 7 is a top plan view, on a larger scale, of a corner clip of the seat of Fig. 4;

Fig. 8 is a side elevation of the corner clip of Fig. 7;

Fig. 9 is a fragmentary, oblique section, taken along line 9—9 of Fig. 4, on a larger scale;

Fig. 10 is a condensed, transverse vertical section of a blank utilized in forming the seat of Fig. 4, and illustrating one step in the production of the seat; and

Figs. 11, 12 and 13 are similar condensed vertical sections, illustrating further steps in the production of the seat, with Fig. 13 being a section taken along line 13—13 of Fig. 6, on an enlarged scale.

A chair having a seat S, constructed in accordance with this invention may include, as in Fig. 1, a substantially U-shaped tubular frame member F forming the front legs 10 and 10' and within the upper end 11 of which is installed a back 12. Back 12 may be contoured for comfort, so as to fit the curve of the back of the user, and may be provided with a flange around its edges by which the sides and top of the back may be attached, as by welding, to the upper end 11 of the frame member. Back 12 may also have a lower edge 13 which is curled rearwardly, as shown in Figs. 2 and 3, to eliminate sharp edges at the lower edge of the back and also to add additional strength to the back. The rear legs 14 and 14', which in the open position of Fig. 1, but against the frame member F at their upper ends, may be pivotally attached, as by pins 15, to the seat S adjacent the rear edge thereof, while the frame member F may be pivotally attached, as by pins 16, to the seat S at a position approximately one-third the distance forwardly from the rear edge of the seat. Washers may be placed on pins 15 and 16, respectively, next to the seat, while the sides of the frame F, as in Fig. 1, may be spaced from the seat S by a spacer 17 at each side, each spacer 17 being shaped to fit against the cylindrical surface of the frame F and also extend outwardly therefrom at the center, i. e., at the position of pin 16. Each spacer 17 may be spot welded to the frame F and also may be additionally secured in position by pin 16 and by a rivet 18, which pivotally attaches one end of a link 19 to the frame, while the opposite end of each link 19 may be pivotally attached, as by a rivet 20, to the rear leg 14 adjacent the upper end of the latter. Struts 21 and 21', having downwardly extending ends, may be riveted between the front legs 10, 10' and rear legs 14, 14', respectively, while the lower ends of front legs 10 and 10' may be provided with caps 22 and the upper and lower ends of rear legs 14 and 14' may be provided with caps 23 and 23', respectively. As will be evident from Figs. 2 and 3, to fold the chair for storage or similar purposes, the seat S may be tipped upwardly at the front, as in Fig. 2, and thence substantially into the frame F, as in Fig. 3, so that the rear legs will be moved against the front legs as the links 19 pivot from the position of Fig. 1 to the position of Fig. 2, and thence to the position of Fig. 3.

In accordance with this invention, the seat S, as in Figs. 4, 5 and 6, may be formed from a strip or sheet of metal M, such as cold rolled steel, to which a plastic layer P, such as a plasticized polyvinyl chloride resin, the outer surface of which has a desired color and a suitable design embossed thereon, is bonded while the metal and plastic strips are flat in a suitable manner, such as described in U. S. Patent 2,728,703. The vinyl layer P extends over the front corners 25, rear corners 26, front

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flange 27 and side flanges 28, shown in Figs. 1 and 2, as well as over rear flange 29 and around curls 30, 31 and 32, shown in Fig. 6, the latter of which extend inwardly and upwardly from the lower edge of the front, side and rear flanges, respectively. Front curl 30 may be integral with the side curls 31 at the front corners 25, while a notch 33, shown in Figs. 6 and 9, is provided at the corner between each side flange 28 and rear flange 29, for a purpose described later. A corner clip C, as in Figs. 4 and 7-9, is attached to each side flange 28 and extends around the rear corner and also beneath the curls 31 and 32 adjacent the corner. The corner clips C may be attached to the rear corners 26 by rivets 34, while a curved reinforcing bar 35, having an arcuate upper edge, may be attached to the front flange 27, on the inside thereof, by rivets 36, as in Figs. 4 and 5. The reinforcing bar 35 not only stiffens the front edge of the seat, but also assists in maintaining the desired curvature of the top, which is preferably shaped to a contour which will provide as great a degree of comfort as possible for a person sitting on the seat. Thus, the upper surface of seat S may be dished, such as to the longitudinal concavity shown in Fig. 5 and the lateral concavity indicated in Fig. 13. In addition to the holes for rivets 34, the side flanges 28 may be provided with holes 37 and 38, as in Fig. 4, for the respective pins 15 and 16.

As illustrated in Figs. 7-9, each corner clip C may be provided with an outer flange 40 which conveniently extends for an arc of approximately 90° with a straight section at each end of the arc, the radius of the arcuate portion of the outer flange 40 corresponding to the radius of the outside of the rear corner 26 of the seat panel. A front edge 41 of the outer flange 40 may slant downwardly, as in Fig. 8, to provide clearance for the rear legs 14 and 14', as well as to improve the appearance of the seat. Each corner clip may also be provided with a hole 42 for the rivet 34, while the lower edge is preferably provided with an arcuate flange 43 adapted to extend around the curls 31 and 32, such as to approximately the mid-point of the inside of each curl, as in Fig. 9. As will be evident, the lower flange 43 of each corner clip C, through engagement with the curls 31 and 32, in effect provides a continuation of the curls around each rear corner.

In accordance with this invention, a strip or sheet of metal, such as cold rolled steel of an appropriate width and an appropriate thickness, such as 0.035 in., may be treated by the "Marvibond" process, in which the steel is cleaned chemically and treated to produce a deposit of iron phosphate on the surface. The steel sheet may then be covered with an adhesive layer, such as a one-half mil layer of "Kotol" cement, supplied by the Naugatuck Division of U. S. Rubber Company, then subjected to a temperature of 175° F. in an oven for approximately one minute in order to evaporate the solvents in the adhesive. The temperature of the oven may then be raised to elevate the temperature of the sheet to 400° F., and as the steel sheet emerges from the oven, the plastic layer is applied to the adhesive coated surface of the steel sheet and then subjected to pressure, as by rolls, to insure uniform adhesion. The plastic layer may be a plasticized polyvinyl chloride sheet of appropriate thickness, such as on the order of 0.012 in., which may be a calendered, semi-rigid sheet having any desired print or embossed pattern applied by the manufacturer thereof. After cooling, the vinyl clad steel sheet is cut into lengths, or lengths and widths, appropriate for the individual panels which are to be used in making the seat S. Each vinyl clad steel panel is then placed in a die and formed to the shape illustrated in Fig. 10, i. e., with the top dished to form the desired contour and with a front flange, side flanges 28' and a rear flange 29' depending therefrom. The vinyl layer P, during this forming operation, will be drawn over the front and rear corners 25 and 26 of Fig. 1, with perhaps a slight distention or distortion of the pattern which, however, will not be par-

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ticularly evident to the average observer and, in any event, will not detract from the appearance thereof. The lower edges of the flanges may be trimmed, as along the trim line 45 of Fig. 10.

As in Fig. 11, notches 33' then may be cut in the rear corners between the side flanges 28' and rear flange 29', the depth of the notches 33' being such that the inner edge of each final notch 33 will correspond to the beginning of curvature of the curls 31 and 32, when formed later, and the width of the notches being such that the curls 31 and 32, when formed later, will end at the notches 33 in a substantially straight line. In other words, the notches 33 prevent the curls 31 and 32 from having to extend around the rear corners. As in Fig. 12, the lower edges 46 of the flanges may then be bent inwardly in a precurling operation; and then the precurled edges of the flanges may be bent inwardly and around to form the curls 30, 31 and 32, as in Fig. 13. As will be evident, the radius of the front corners 25 is such that the curls at the lower edges of the front and side flanges may be bent around the corner without placing an undue strain on the plastic layer P. However, since the rear corners have a much smaller radius than the front corners, if an attempt were made to form the side curls 31 and rear curl 32 integrally, the plastic layer P would tend to be pushed together and perhaps separated from the metal. Also, due to the smaller radius at the rear corner, it would be difficult to support both the metal and plastic while bending the curls around the rear corners. Thus, the notches 33' eliminate both the possibility of separation of the plastic layer from the metal and also the difficulties in bending and supporting the metal and plastic when forming the curls 31 and 32 at the rear corners. After the seat S has been formed to shape, such as shown in Fig. 6, the holes 37 and 38 in the side flanges 28, as well as the holes in front flange 27 for rivets 36 for the reinforcing bar 35 and the holes for the rivets 34 for the corner clips C may be punched and the reinforcing bar 35 and corner clips C attached to the seat panel. Then, the remainder of the parts may be assembled in a conventional manner.

Due to the fact that the plastic layer P extends around the outside of the metal layer M, both over the top, around all of the top corners and also downwardly over the front, rear and side flanges and, in addition, inwardly around the curls 30, 31 and 32, the plastic will tend to remain adhered to the metal, even though relatively rough usage is encountered. As will be evident from Fig. 13, the edges 47 of the metal M and plastic P are protected from blows or impacts, due to the preferred shape of the curls 30, 31 and 32, while the corner clips C protect the exposed edges at slot 33. Placing such exposed edges in a protected position increases the useful life of the seat, since a plastic layer bonded to metal is more readily separated at an exposed edge. The corner clips C not only cover the notches and reinforce the seat S adjacent the point of attachment to the rear legs 14 and 14', but also prevent damage to the plastic layer P at the rear corners when the seat is being pivoted between the open and closed positions of Figs. 1 and 3, respectively, as well as vice versa.

From the foregoing, it will be evident that a chair seat constructed in accordance with this invention fulfills to a marked degree the requirements and objects hereinbefore set forth. By covering the metal seat with a layer of plastic, such as a polyvinyl resin, not only is the seat's appearance improved, but also its wearing qualities, due to the greater resistance of the plastic to scratching or scuffing than paint or enamel coating on a metal seat. A plastic covered metal seat is also more comfortable for the user, particularly when the seat is formed to provide a concavity in the top which will correspond more nearly to that portion of the anatomy of the user which is placed upon the seat. The curls, which extend inwardly and around from the lower edge of the depending flanges on all four sides of the seat, not only increase resistance of

the seat to deformation, but also prevent the edge of the plastic layer from being exposed, since the plastic layer extends around each curl. The corner clips C, which form an important feature of this invention, not only reinforce the rear corners of the seat, but also the appearance of the seat by covering the notches, which permit the curls to be formed more readily at a corner having a relatively small radius. The front reinforcing bar, placed on the underside of the front edge of the seat, not only adds strength to the seat as a whole, but also stiffens the seat at the point at which the weight of the user is most likely to be concentrated.

The method of forming a chair seat, in accordance with this invention, permits a chair seat to be formed quite readily and economically. A firm bond between the plastic layer and the metal of the seat may be formed while the layers from which the seat is made are in strip form, thereby permitting the desired pressure, as by rollers, to insure a firm bond much more readily than if the plastic layer were attempted to be applied after the metal portion of the seat has been previously formed to shape, or even partially formed to shape. Due to the bond between the plastic layer and the metal, which may be thus formed so readily, the plastic layer will remain adhered to the metal during the forming operations. The forming operations may also be carried out quite readily. The notching and the precurling of the lower edges of the flanges are also important, since they permit the curls at the lower edges of the flanges to be formed to a desired shape with a minimum of possibility of destroying the bond between the plastic and metal.

Although a specific embodiment of this invention has been illustrated and described, it will be understood that other embodiments may exist and that various changes may be made, both in the construction and in the method of forming the seat, without departing from the spirit and scope of this invention.

What is claimed is:

1. A chair seat comprising a layer of metal having a plastic layer bonded to the exterior surface thereof and having a top and depending flanges on substantially all sides, the lower edges of said flanges extending inwardly and upwardly as a curl so as to add rigidity to said seat and also place the exposed edges of said metal and plastic layers in a protected position.

2. A chair seat, as defined in claim 1, wherein said flange at the front of said seat merges with said top in a convex portion; and including a convex, laterally extending reinforcing bar attached to said front depending flange on the inside thereof and engaging the underside of said convex portion.

3. A chair seat comprising a layer of metal having a plastic layer bonded to the exterior surface thereof and having a generally rectangular top and depending flanges on substantially all sides, the lower edges of said flanges extending inwardly and upwardly as a curl so as to add rigidity to said seat and also place the exposed edges of said metal and plastic layers in a protected position, each rear corner having a notch between said curls; and a clip attached to each corner, each said clip extending around said corner and having a lower flange in engagement with said curl at each side of said notch.

4. A chair seat, as defined in claim 3, wherein the corners of said top are generally rounded and the front corners have a greater radius than the rear corners.

5. A chair seat, as defined in claim 4, wherein said curls are arcuate; and each said corner clip is provided with an arcuate lower flange extending around said corner and corresponding in shape to the engaged portion of said curls.

6. A chair seat comprising a layer of metal having a plastic layer bonded to the exterior surface thereof and having a generally rectangular, concave top provided with rounded corners, the front corners having a greater radius than the rear corners, a depending flange at the front, rear and sides, the lower edges of said flanges extending inwardly and upwardly as an arcuate curl so as to add rigidity to said seat and also place the exposed edges of said metal and plastic layer in a protected position, said flanges having a notch at each rear corner between said curls; a convex laterally extending reinforcing bar attached to said front depending flange on the inside thereof and engaging the underside of said convex portion; and a clip attached to each rear corner, each said clip having an upright flange extending around said corner and an arcuate lower flange extending around said corner and in engagement with said curl at each side of said notch, the side of each said upright flange having a forwardly and downwardly inclined edge.

7. A chair including a seat as defined in claim 6; an inverted U-shaped frame member providing front legs and pivotally attached at opposite sides to the depending side flanges of said seat; and a rear leg pivotally attached to each said side flange adjacent the rear thereof at a point above said inclined edge of said upright flange of a corner clip.

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