March 13, 1934. U. K. JOHANNSEN ET AL 1,951,306

METHOD OF MAKING RADIATOR SHUTTERS

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Fig. 1.

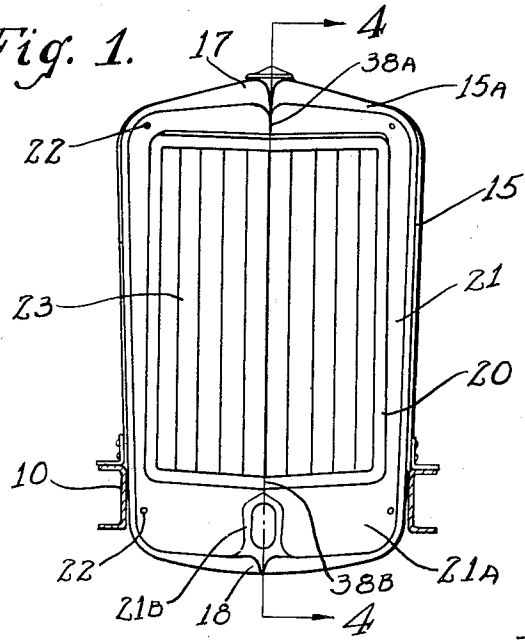


Fig. 2.

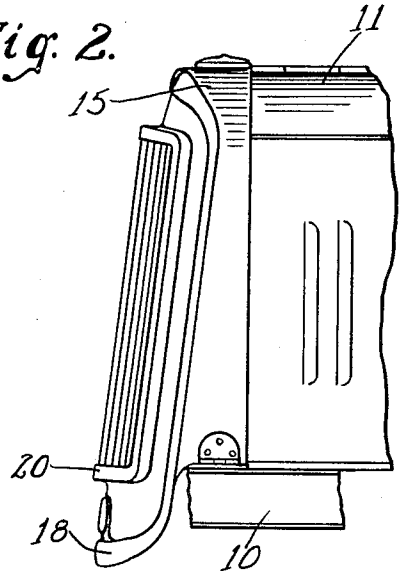


Fig. 3.

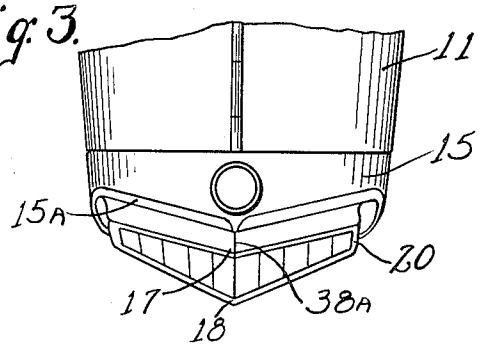


Fig. 4.

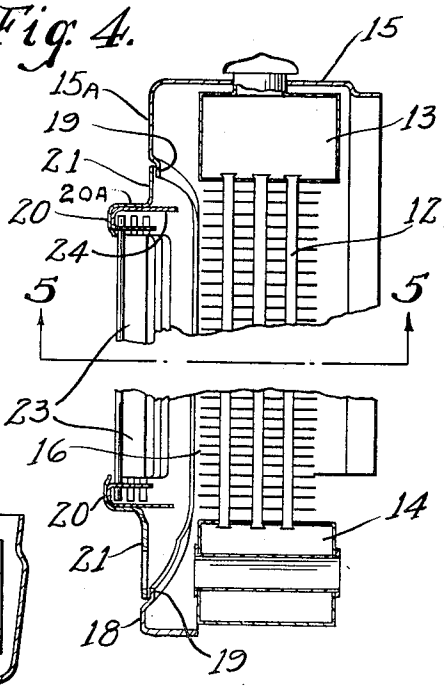
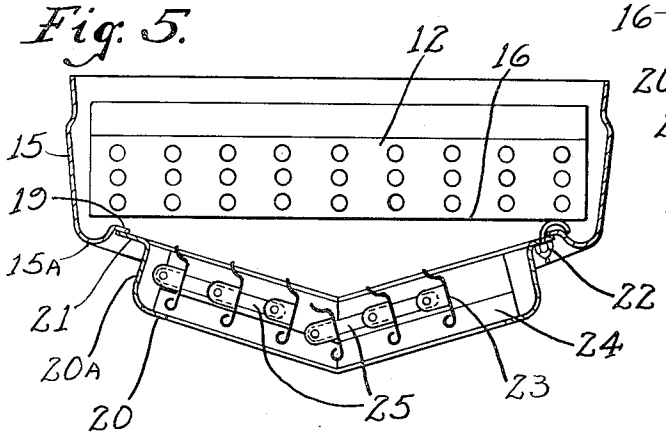


Fig. 5.



INVENTORS
UDO K. JOHANNSEN.
& MARK E. MAXON.
BY Louis Illmer.
THEIR ATTORNEY

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Fig. 6.

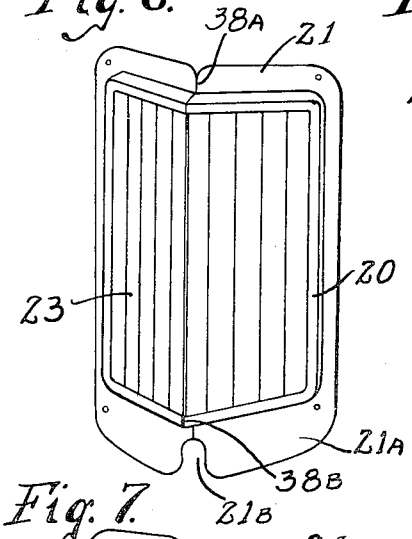


Fig. 8.

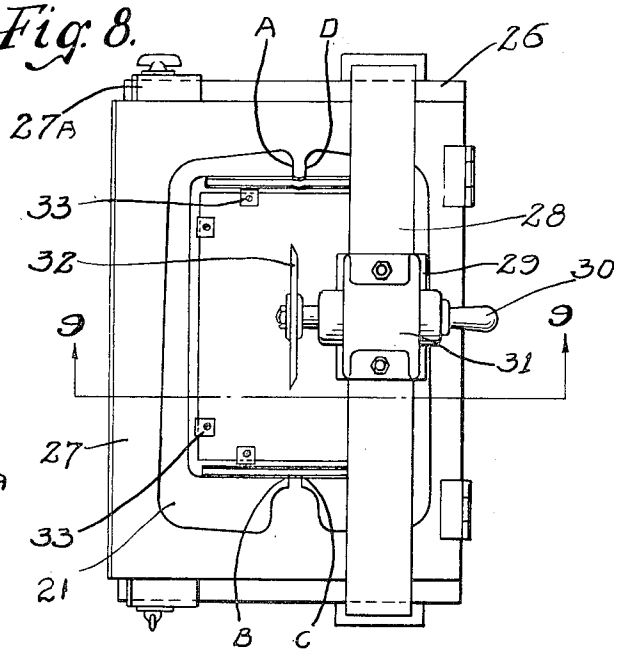


Fig. 7.

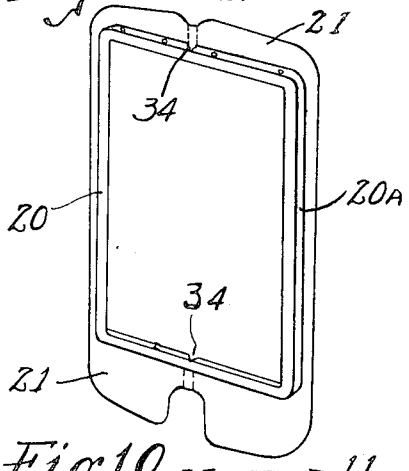


Fig. 9.

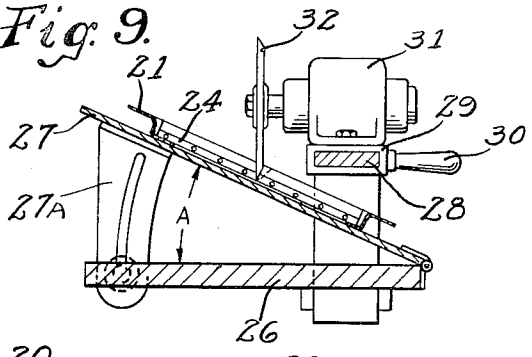


Fig. 10.

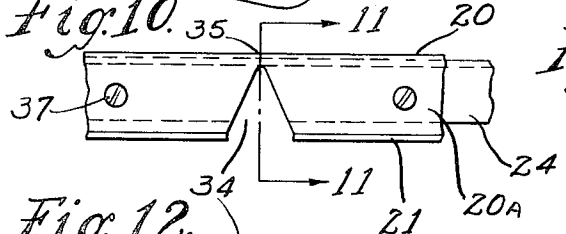


Fig. 11.

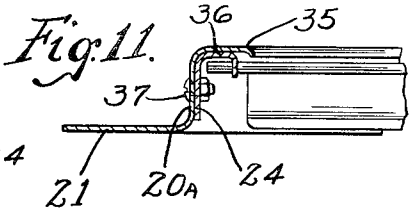
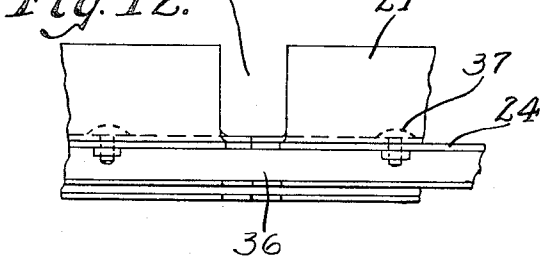


Fig. 12.



INVENTORS
UDO K. JOHANNSEN.
& MARK E. MAXON.
BY Louis Dilmer.
THEIR ATTORNEY

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Fig. 13.

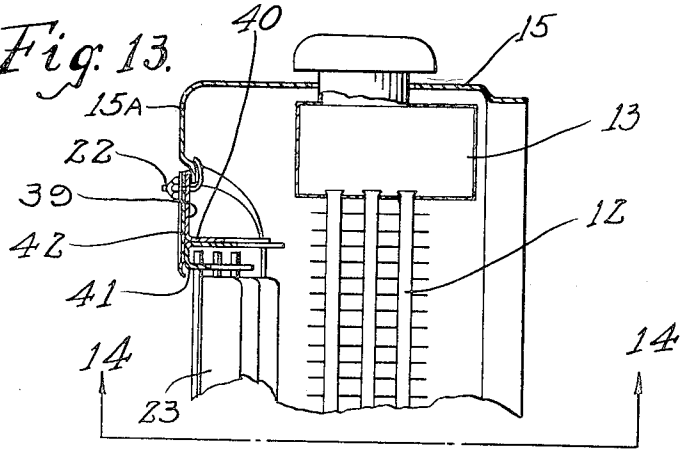


Fig. 14.

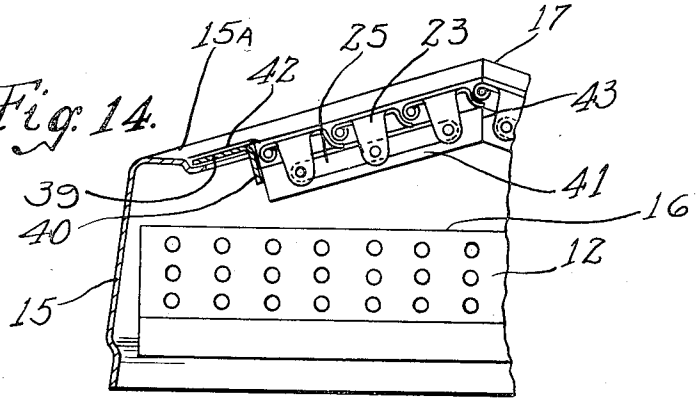
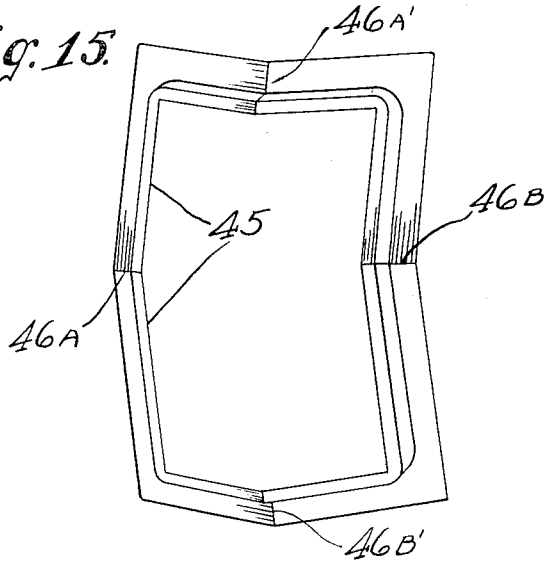


Fig. 15.



INVENTORS
UDO K. JOHANNSEN.
BY & MARK E. MAXON.
Louis Ilmer.
THEIR ATTORNEY

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1,951,306

METHOD OF MAKING RADIATOR SHUTTERS

Udo K. Johannsen, Cortland, and Mark E. Maxon, Binghamton, N. Y., assignors to The Brewer-Titchener Corporation, Cortland, N. Y., a corporation of New York

Application December 10, 1931, Serial No. 581,376

7 Claims. (Cl. 29—148)

This invention relates to the art of making a skewed framework from a single blank, and is more particularly directed to improvements that facilitate the fabrication of the so-called V-type of sheet metal shutter fronts or cold weather shields for use upon new or existing motor vehicle radiator shells.

The fantastical contour that is now being given to this style of protective framework tends to complicate the making thereof, and an outstanding purpose of the present improvements is to economically produce a reshaped or distorted shutter framework that shall effectively enhance the appearance of different shutter front installations without need of a correspondingly large number of forming dies. The object of our invention is to provide a simple and novel method for shaping up a smartly designed automobile or other framework of the character indicated and one that can be readily applied to many motor car or truck radiator shells without requiring extensive changes in the prevailing structure thereof.

The reshaping method herein practiced is characterized by first drawing up a single blank to give the resulting framework the desired angular cross-sectional profile and then notching such biplanar formation for skewing purposes, as distinguished from the prior art, wherein the blank itself is initially slitted or notched out prior to being originally formed up. The latter conventional procedure is not well suited to the making of angularly disposed frame elements, particularly when formed from a sheet metal blank, for the reason that such deep drawing operation tends to unduly distort the original notch contour or to initiate a tear in the slitted metal region.

In order to accomplish the cited new and useful results, said method further consists in the use of certain instrumentalities serving to notch out the frame for skewing purposes, all of which will hereinafter be set forth in detail.

Reference is had to the accompanying three sheets of drawings which are illustrative of a specific embodiment of our invention, and in which drawings:

Fig. 1 is a fragmental elevational front view of our skewed shutter frame that is cooperatively attached to a regulator radiator shell, while Figs. 2 and 3 respectively represent a side and a top view thereof.

Fig. 4 shows a vertical sectional view taken along line 4—4 of Fig. 1 while Fig. 5 shows a horizontal sectional view of our shutter assembly as taken along line 5—5 of Fig. 4.

Fig. 6 illustrates in perspective, an exterior view of a dismounted V-shaped frame assembly ready to be attached into operative position.

Fig. 7 is a perspective plan view of our shutter frame as provided with a radially flat brim flange prior to notching out and forming up the frame into a cross-sectionally V-shaped profile.

Figs. 8 and 9 respectively represent a top and a side elevational view of a tool fixture adapted to cut the frame notches while Figs. 10 to 12 inclusive, show various fragmental views of one such frame notch to indicate the kind of operation that is performed by means of said tool.

Figs. 13 and 14 respectively show a vertical and a horizontal fragmental sectional view of a modified reversely mounted type of our V like shutter frame.

Fig. 15 illustrates still another modification in which the frame is given a compound warpage.

Referring first to Figs. 1 to 6 inclusive, these collectively illustrate the preferred skewed shape given to our shutter framework, also some of the more conventional motor radiator elements commonly associated with such assembly, including the following parts: a pair of spaced chassis beams 10; the motor hood 11; a honeycomb or equivalent type of relatively thin cellular radiator core 12 having a rectangular shape; an upper radiator tank 13 and a lower tank 14 which are housed within a regular radiator shell 15.

In the present instance, the front face 16 of said core is kept flat as represented in Figs. 4 and 5 although if preferred, this may also be given a V-shaped profile. Said shell may be of the conventional one-piece, sheet-metal type in which the inturned trim flange 15A is carried forwardly ahead of the flat core face 16 to form the projecting top and bottom V like noses 17 and 18, respectively. Although these nose porjections are here kept substantially alike, it is not uncommon to give distinctive shapes thereto or to dispense with the bottom nose, which in turn implies a similar differentiation on part of the fitted frame. The shell trim-flange has an air flow opening therethrough which it is the purpose of our device to control by operable shutter means. The marginal edge that defines said shell opening is preferably inset to provide for an endless bead 19 adapted to overlappingly cooperate with the correspondingly shaped brim flange perimeter of our shutter frame.

Referring in detail to Figs. 4 and 5, this particular style of shutter frame may be fabricated from a single sheet metal blank to comprise a depressed central portion that is originally drawn

up and then pierced to form the interior flange 20 and a web interconnected marginal or brim flange 21, both of which complementary flanges are initially stamped up in offset parallel relationship and which frame is subsequently formed into a V like profile in a manner presently to be described. The cross-sectional shape of this annular frame is Z like in character and provides for a comparatively stiff web element 20A that may stand in a substantially rectilinear or slanting relation to said spaced flat flanges. Said brim flange may be extended into a bifurcated skirt portion 21A provided with a slot or perimetric indentation 21B for cranking purposes and may further be apertured to receive a plurality of J-bolt fastenings such as 22 (see Fig. 5), although this particular mode of securement represents an immaterial detail.

The interior flange 20 has a pierced rectangular opening therethrough which may be closed in the conventional manner by a series of vertical slats such as 23. A channel-like slat rack 24 may be detachably disposed medially behind each opposite transverse edge region of the flange 20 in the fashion shown in Fig. 4. One upstanding leg of each such rack is provided with a series of trunnion receiving holes adapted to pivotally mount the respective slats therein. Said slats are operatively interconnected by tie rods 25 and intended to be actuated in unison by any suitable means.

Attention is now directed to the fixture shown in Figs. 8 and 9, which schematic representation essentially comprises a suitable platen 26 which hingedly carries a tiltable table or frame holder 27. Slotted bracket means such as 27A serve to adjustably fix the inclination given to said table. The platen mounts an inverted U shaped guide bar 28. A cross-head 29 has a motor 31 superimposed thereon and the overhanging spindle of this motor is provided with a circular metal disc saw or thin carborundum wheel 32 which is bodily shiftable lengthwise of the guide-bar by means of the manipulative handle 30. The plane of this power driven rotary saw is arranged to set in an upright relation to the horizontal face of the platen. A trimmed flat shutter frame of the type described, is placed upon the inclined face of the holder with the interior flange 20 resting upon the top table face and having its spaced brim flange overhanging therefrom in the manner represented in Fig. 9. A series of centering lugs such as 33 serve to hold the framework in fixed position.

When the motor driven wheel 32 is gradually moved into operative engagement with the jigged framework at the point marked "A" for instance, this will produce an oblique kerf or slot as cut through certain portions of the underlying sheet-metal having an inclination relative to the flat brim flange that is fixed by the tilt of the top table face. When the top and bottom frame notches are to be kept identical, the wheel may next be shifted to similarly cut the opposite aligned kerf designated as "B". To complete said notches, the frame is released and turned end for end, when like slotting operations are repeated at the points C and D, the frame inclination relative to the saw face being set to shape up a V notch or parting formation 34 of the kind that is detailed in Figs. 10 to 12 and the oppositely disposed relation of which is indicated in dotted lines in Fig. 7. It will be observed that the crotch thereof is not wholly carried into adjacency with the interior flange 20 and that a portion of said flange is purposely left intact and made to span said crotch region to constitute a bendable tie strip or bridge piece 35 for holding together the nearly severed frame sections. The kerfed brim flange edges become oppositely beveled with respect to the face of said flange and respectively fall into common alignment with the converging edges of the web element. A further distinctive feature of our method resides in simultaneously cutting both the web element and a contiguous flange after these have been disposed in angular relation. The disposition is such that the respective bipartite frame sections may now be hingedly sprung together about the complementary tie strips, whereupon the defined saw cut edges will fall into a substantially abutting relationship and the shape of the respective frame sections assume a relative skewed sectional profile such as is represented in Fig. 6. It is emphasized that prior to notching out my frame, the perimeter of the brim flange while flat, is trimmed to a prescribed template shape which may include a marginal slot or perimetric indentation such as 21B.

In the event that it is desired to provide for a tapered frame requiring a different degree of skew offset between the top and bottom frame regions, this may readily be accomplished by first finishing the complementary saw cuts A and D in the manner previously described and then re-adjusting the table 26 to a different tilt angle in order to complete the remaining saw cuts B and C at a distinctive divergence.

As a further refinement, it is preferred to detachably assemble the slat racks 24 in our framework prior to cutting the respective notches therein, to the end that a single saw cut will suffice to simultaneously prepare both the frame and its rack with perfectly aligned notch edges in the fashion shown in Fig. 11. The web portion of our channel-like rack may be detachably secured to the innermost face of the interior flange 20 by any suitable means such as the bolts 37. The crotch depth of such notching is preferably so cut as not to wholly sever said rack web, which latter serves as a backing strap 36 for the inherently weak tie strip 35 and is thus made to reenforcingly hold the warped frame sections in proper alignment.

The pair of rectilinear racks are now removed from the framework prior to deforming the respective sections thereof. After assembling the required slats between said notched racks by means of a suitable jig, these straight racks are now remounted into their original frame, whereupon the sections may be deformed into a transversely V like profile such as is represented in Figs. 5 and 6 in which said racks have now become correspondingly kinked. By the aid of suitable fixtures (not shown), said framework may be held in the desired skewed relation and the described notch edges brought into substantial abutting registry, while the respective seams 38A and 38B (see Fig. 1) are being neatly welded or otherwise secured against separation.

In Figs. 13 and 14 there is shown a modified or inverted shutter frame having a brim flange 39 and an inturned, reversely mounted web element 40. The interior flange has here been eliminated while the slate-rack 41 is adjoined to the innermost face of said web element and concealed behind the blinder plate 42. In order to correspondingly skew this modified framework, the web element and said rack may be medially notched and welded at 43 in the manner previ-

ously described. In the present instance, it becomes unnecessary to notch out the brim flange 39 since this now replaces the aforesaid tie-pieces 35 and needs merely to be kinked into a V like profile that aligns with the complementary top and bottom rack notches.

To recapitulate, our method as applied to shutter fabricating purposes, consists in first forming up a drawn, one piece framework out of a single sheet metal blank to afford a flat brim flange that is laterally reenforced by web means and adapted to be trimmed and fitted to a radiator shell, then notching out spaced flange regions together with their respective associated web portions (which may or may not include adjacent slat racks) so as to provide oppositely disposed, beveled edges for the respective frame sections, and which registering edges are then brought into abutment and welded into a unitary frame structure comprising two bipartite or wing-like frame sections that are set radially and have a common air flow opening therethrough adapted to be commanded by shutter means.

Owing to the numerous models and structural differences in radiator shells found in present-day motor car practice, only a limited number of any one particular design of shutter framework is likely to find a profitable market. In order to reduce die charges, the intent and advantages afforded by our developed method is to fix upon a comparatively few standard frame sizes and so trim down their respective brim flanges as to collectively fit most of the leading car makes. It is emphasized that present improvements further adapt such trimmed shutter frames to fit practically all radiator shells of the depicted V front type or similarly skewed modifications thereof, without the need of any special dies for each different notch pattern.

It is emphasized that our method also admits of subdividing a shutter framework or the like into other than bipartite sections. This aspect is amplified in Fig. 15 which shows how an originally flat frame flange or a similar laterally reenforced blank may by notching means, be warped in the substantially spheroidal frame shape 45 to allow of closely fitting such frames to the more complex streamline surfaces now being resorted to in automobile or aeroplane bodies. Where a considerable degree of spherical curvature is desired, it is preferred to initially stamp up or otherwise impart to the original frame flange, a predetermined supplementary dishing effect, whereupon the inclined web element may be notched out in complementary fashion at a plurality of oppositely spaced points such as 46A and 46B, to facilitate a deeper compound skewing of the frame flange. Such refinement in method augments the aforesaid predetermined degree of flange dishing and thus again permits of shaping up a variety of differently skewed shutter frames or the like from a single set of primary forming dies, it being apparent that all distorted frames of this type may be equipt with reenforcing shutter slat racks that may likewise be notched prior to the final skewing of the frame flange.

It is thought that the advantages of our refinements in shutter fabrication will be obvious to those skilled in this art, and that the described improvements are likewise applicable to radiator shutters in which the protrusion of the interior frame flange is less pronounced, or in which the respective sections have been struck up as separate entities, and that various other structural alternatives may be resorted to in likewise carrying out the illustrative method for distorting any of such initially flat frames, all without departing from the spirit and scope of our invention heretofore described and more particularly pointed out in the appended claims.

We claim:

1. The method of making a radiator shutter frame which consists in forming from a blank a depressed central portion, a web portion extending at an angle from the margin of said central portion and a flange portion extending laterally and outwardly from said web portion, cutting out a part of said depressed portion to form an air inflow opening, cutting through said flange and into said web portion to form a V shaped notch in said web portion, and bending said frame at the apex of said notch to form two parts the one at an angle to the other.

2. The method of making a radiator shutter frame which consists in forming from a blank a depressed central portion, a web element extending at an angle from the margin of said central portion and a flange portion extending laterally and outwardly from said web element; cutting through said flange to produce oppositely beveled edges thereon and cutting into the web element to form a V shaped notch in said web element; and bending said frame at the apex region of said notch to form two frame parts of which one such is skewed relative to the other part and whereby the aforesaid beveled edges are brought into flush abutment.

3. The method of making a radiator shutter frame which consists in forming from a blank a depressed central portion, a web element extending at an angle from the margin of said center portion and a flange extending laterally and outwardly from said web element; adjoining a reenforcing strip to said web element; then cutting through said flange and cutting into both the web element and its adjoined strip to form a common V shaped notch therein; and thereupon bending said frame at the apex region of said notch to form two frame parts of which one such is skewed relative to the other part.

4. The method of making a shutter assembly which consists in forming from a blank a depressed central portion, a web element extending at an angle from the margin of said center portion and a flange extending laterally and outwardly from said web element; cutting out a part of said depressed portion to form an inflow opening therethrough; demountably adjoining a pair of rackstrips to the web element and which rackstrips are respectively disposed in opposed relation with respect to the inflow opening; then cutting through said flange and into the web element and the respective adjoining rackstrips to form complementary V shaped notches therein; demounting said rackstrips and assembling shutter slats therebetween; and thereupon remounting said assembled rackstrips and bending said frame at the respective apex regions of said notches to form two frame parts of which one such is skewed relative to the other part.

5. The method of making a radiator shutter frame which consists in forming from a blank a depressed central portion, a web element extending at an angle from the margin of said center portion and a flange extending laterally and outwardly from said web element; cutting a pair of angularly disposed kerfs through said flange and into said web element to form a V shaped notch in said web element; and thereupon bending said

frame at the apex region of the notch to form two frame parts of which one such is skewed relative to the other part.

6. The method of making a radiator shutter frame which consists in forming from a blank a depressed central portion, a web element extending at an angle from the margin of said center portion and a flange extending laterally and outwardly from said web element; trimming the perimeter of the flange to include a marginal indentation; then cutting through said flange within the indented confines thereof and into said web element to form a V shaped notch in said web element; and thereupon bending said frame at the apex region of the notch to form two frame parts of which one such is skewed relative to the other part.

7. The method of making a radiator shutter frame which consists in forming from a blank a depressed central portion, a web element extending at an angle from the margin of said center portion and a flange extending laterally and outwardly from said web element; cutting through said flange and into said web element to form a pair of complementary V shaped notches in said web element which are respectively given a different divergence; and thereupon, bending said frame at the respective apex regions of said notches to constitute two parts of which one such is skewed relative to the other part.

UDO K. JOHANNSEN.
MARK E. MAXON.