

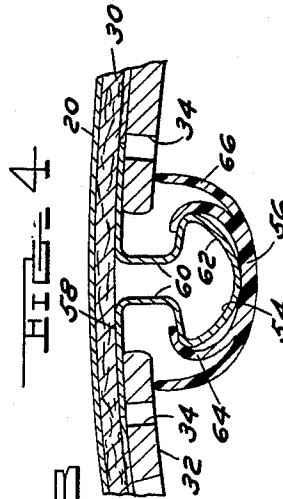
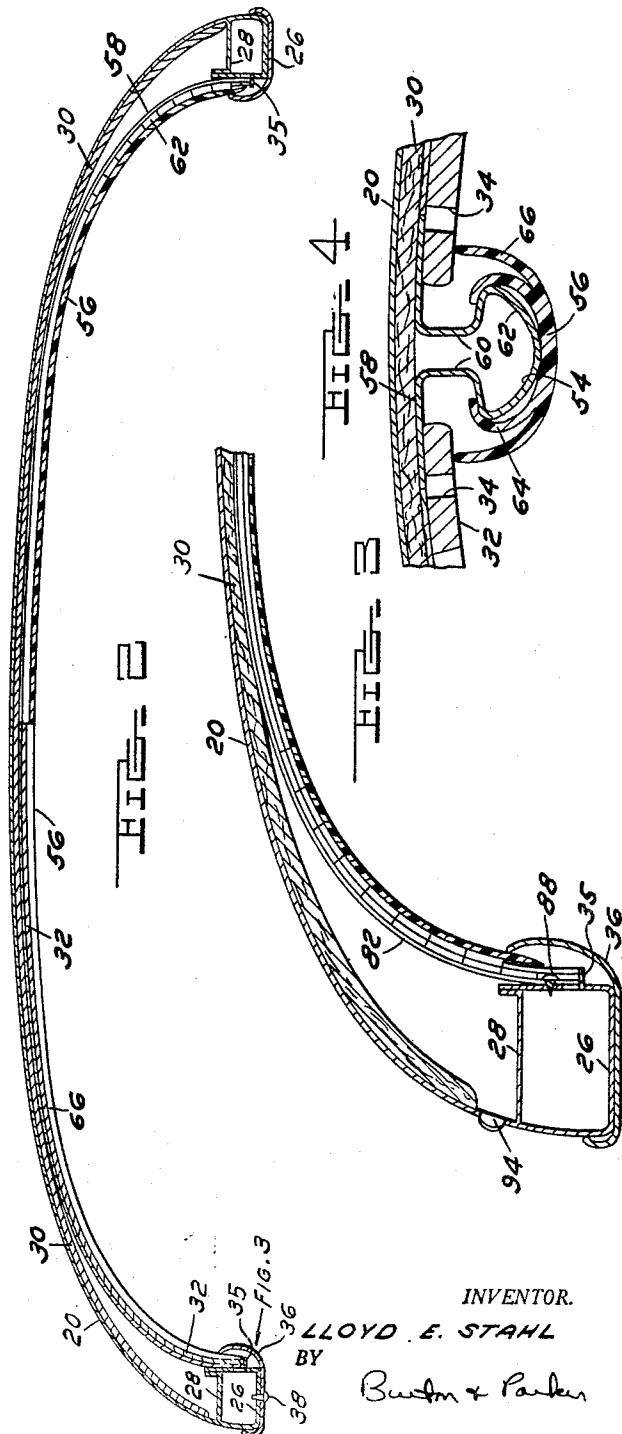
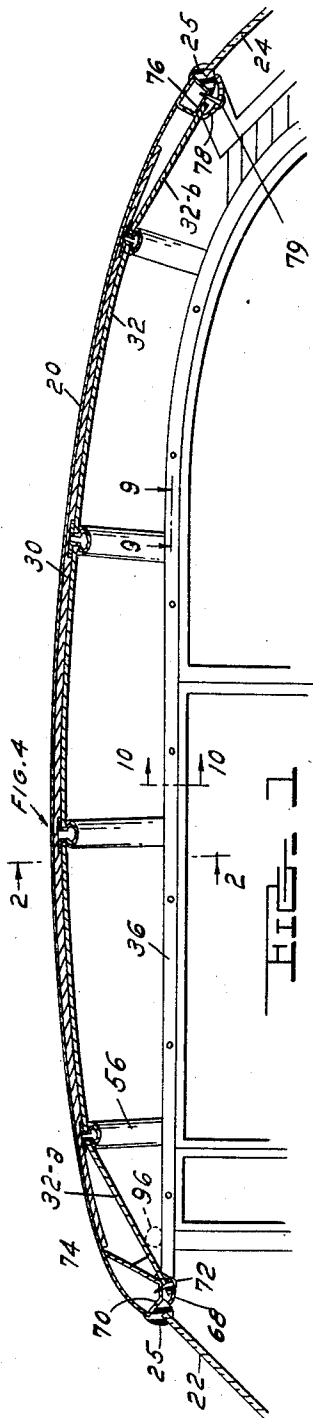
Feb. 18, 1958

L. E. STAHL
HEAD LINER ASSEMBLY

2,823,951

Filed Nov. 26, 1957

6 Sheets-Sheet 1



Feb. 18, 1958

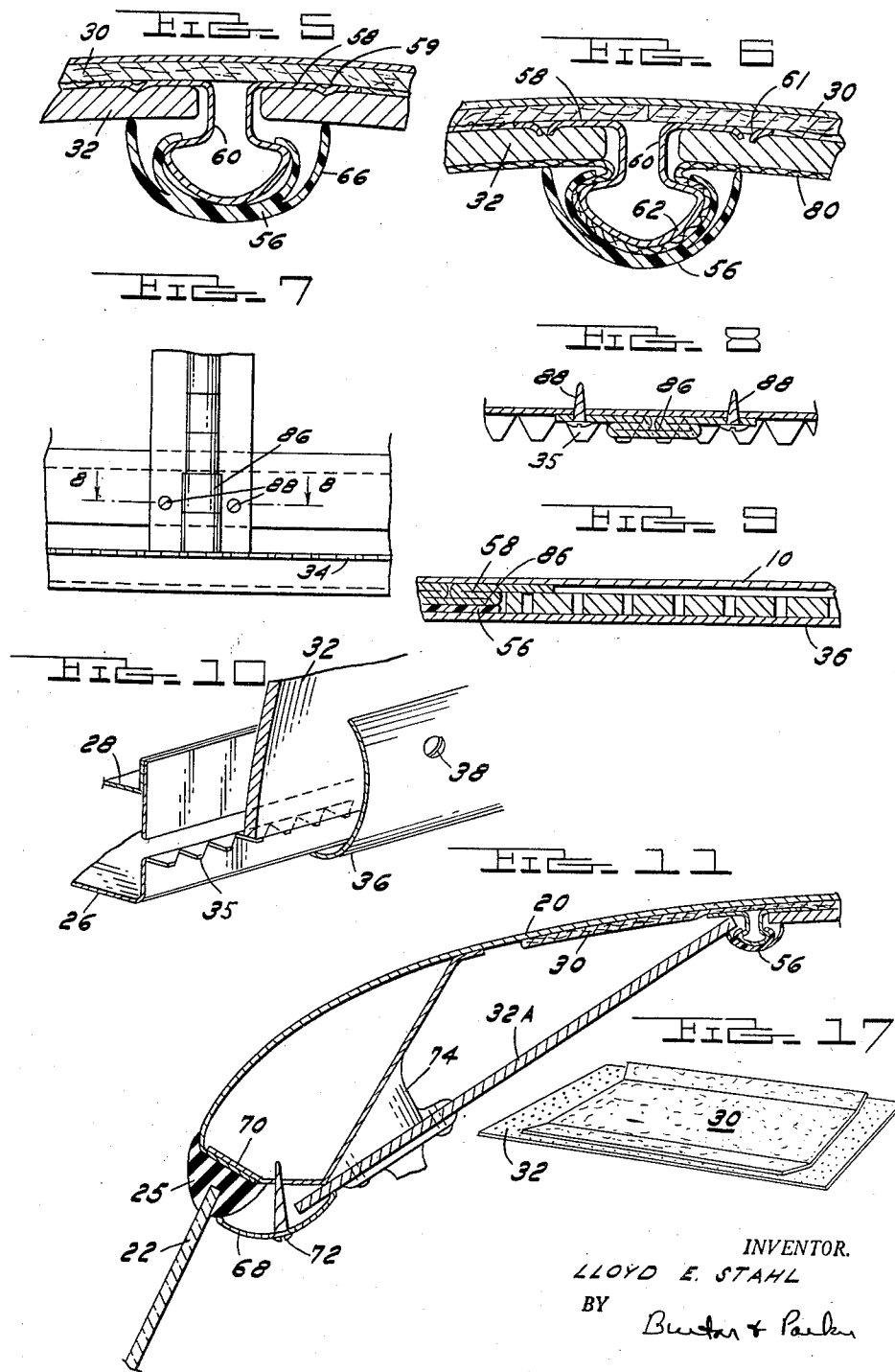
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HEAD LINER ASSEMBLY

Filed Nov. 26, 1957

6 Sheets-Sheet 2



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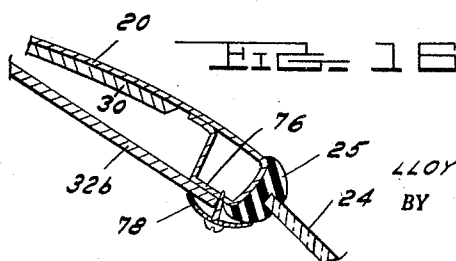
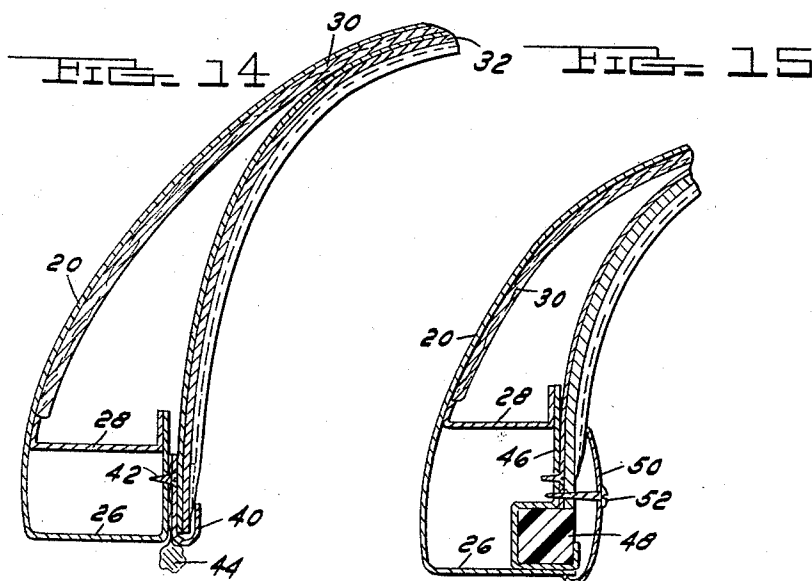
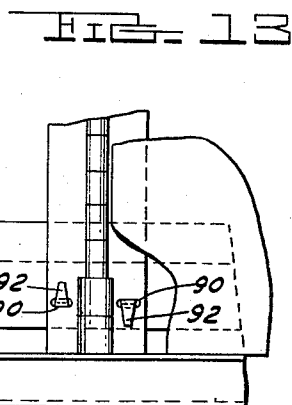
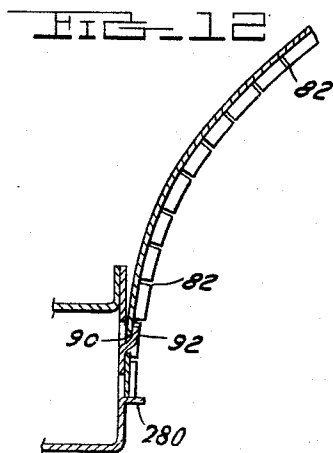
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L. E. STAHL
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6 Sheets-Sheet 3



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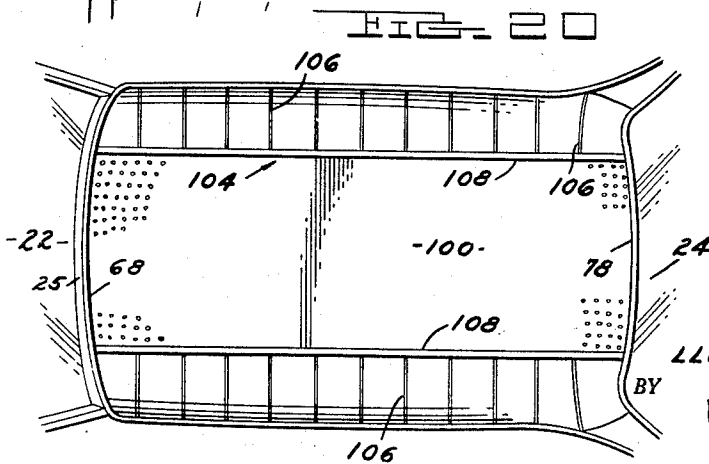
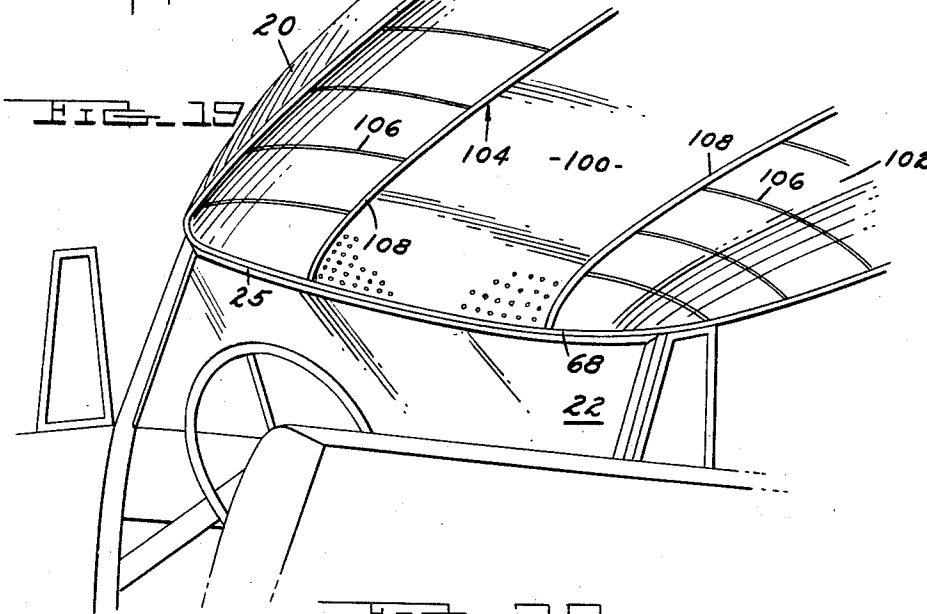
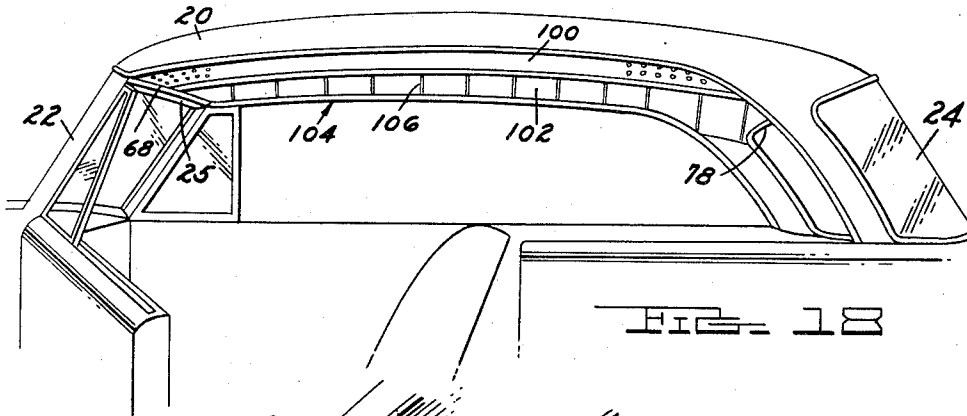
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L. E. STAHL
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6 Sheets-Sheet 4



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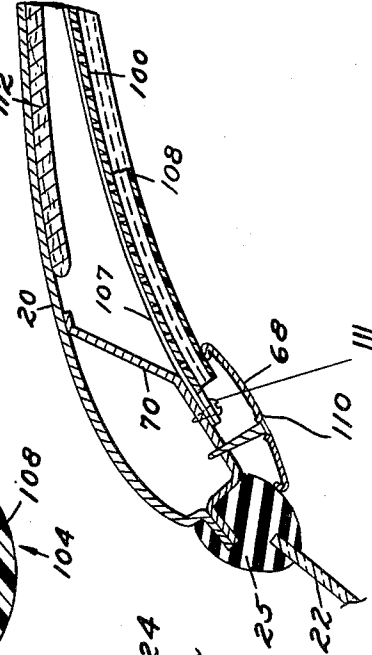
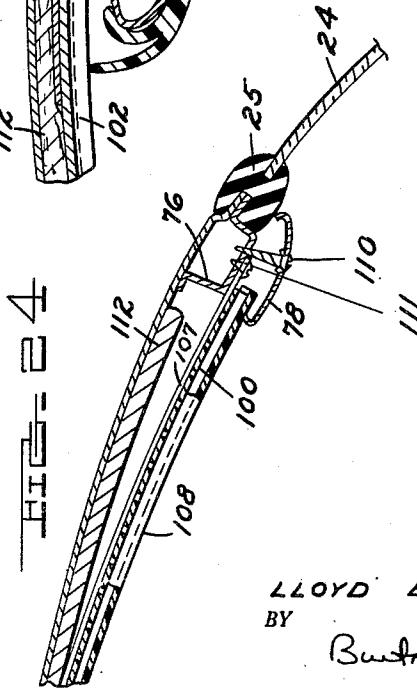
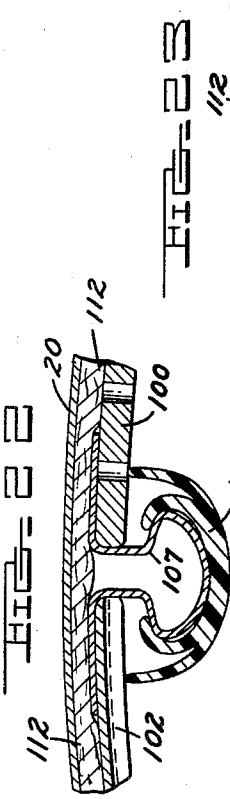
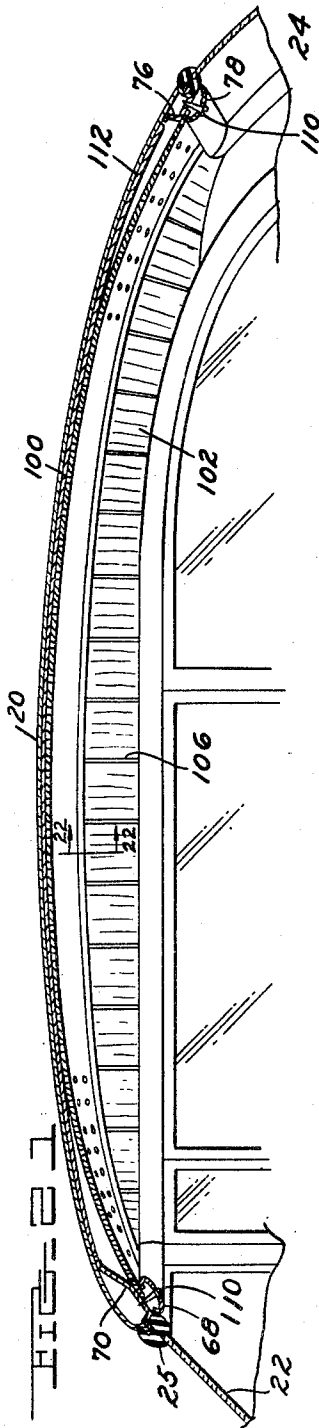
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L. E. STAHL
HEAD LINER ASSEMBLY

2,823,951

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6 Sheets-Sheet 5



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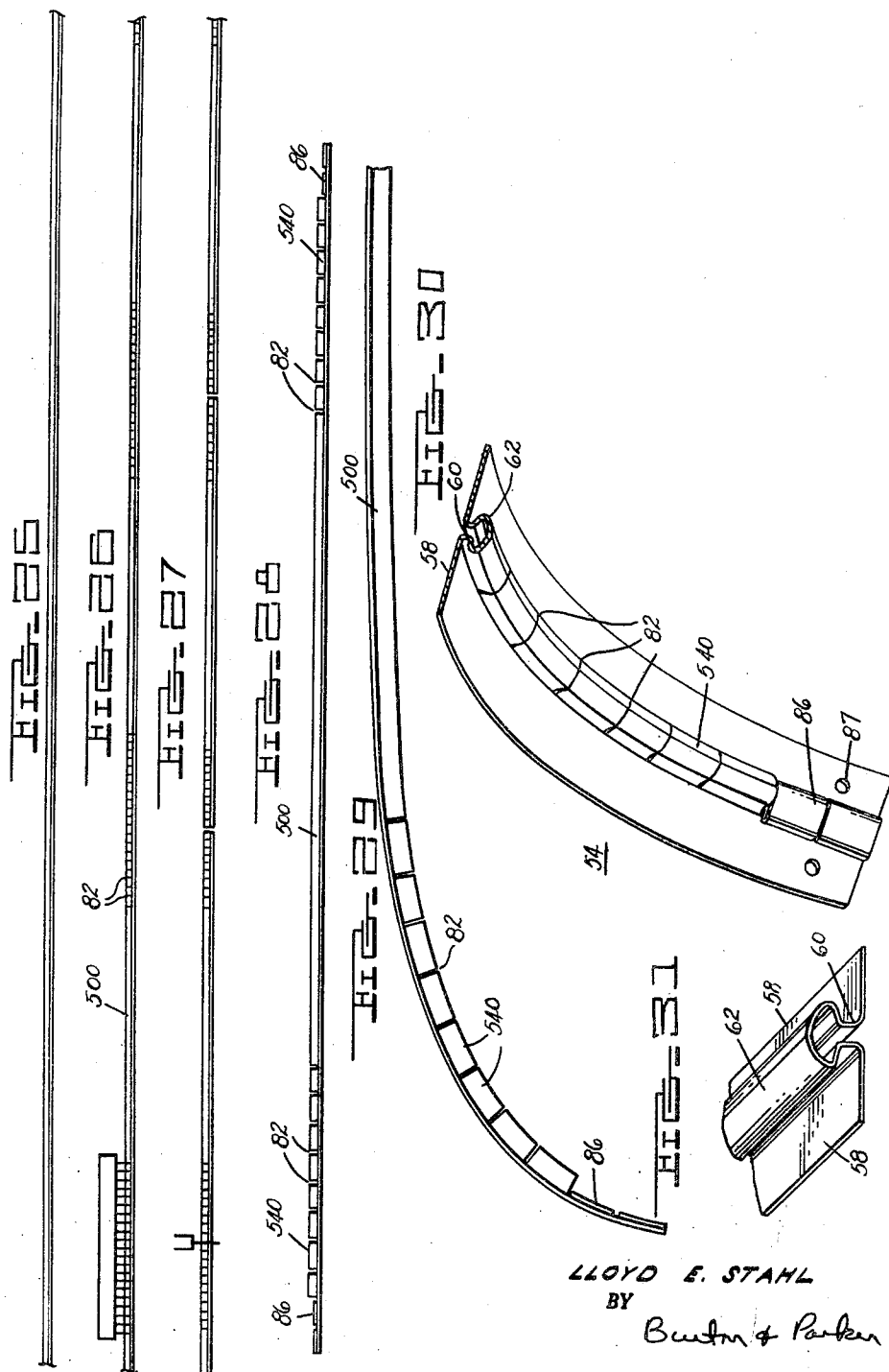
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L. E. STAHL
HEAD LINER ASSEMBLY

2,823,951

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6 Sheets-Sheet 6



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2,823,951

HEAD LINER ASSEMBLY

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Application November 26, 1957, Serial No. 697,181

16 Claims. (Cl. 296—137)

This invention relates to an improved head liner assembly and to be improved matching and supporting strip which forms a component part of the assembly, particularly as designed for use in a motor-driven road vehicle.

This application is a consolidation of applications S. N. 569,998 filed March 7, 1956 and S. N. 529,188 filed August 18, 1955, both now abandoned, and is a continuation-in-part of each. Application S. N. 569,998 is a continuation-in-part of application S. N. 529,243 filed August 18, 1955 and now abandoned.

One object of the invention is the provision of a head liner which may be easily and quickly installed within the interior of a vehicle body underneath the roof thereof. Not only is this head liner simple to install but it is capable of being readily removed for replacement in whole or in part or for repair.

A meritorious feature of this head liner assembly is that it cooperates with the roof to strengthen and reinforce the roof and to strongly resist any downward deflection of the roof due to blows or pressures which might result from accidents to the body. My improved head liner is not supported by the roof but by opposite side walls of the vehicle body. It extends as a bridge between such opposite walls underneath the roof and exerts a tension upwardly against the underside of the longitudinal mid-section of the roof.

Another important and highly desirable characteristic of this head liner is that it comprises an assembly of a plurality of resilient head liner panels and a plurality of resilient panel matching and supporting strips or bows, which strips or bows are interposed between adjacent edges of adjacent head liner panels.

The head liner panels and strips may extend transversely of the body between the longitudinal side walls as illustrated in Figs. 1, 2, and 3, or they may extend lengthwise or fore and aft between the opposite end walls as illustrated in Figs. 18–21. The term opposite side walls as used herein, may refer to either of such opposite walls.

The articulation of the panels and the panel matching and supporting strips is such that the composite assembly functions as a complete structure as a reinforcing bridge underneath the roof to resist downward deflection of the roof. When the panels and strips are so assembled together, the composite assembly strongly supports the roof.

Another object is that the construction is such that the longitudinal mid-section of the head liner presents a relatively flat or slightly arcuate contour as determined by the contour of the longitudinal mid-section of the roof, while the opposite side portions of the head liner assembly may be bowed on arcs of greatly reduced radius as compared with the longitudinal mid-section.

Another object is to provide a panel matching or supporting strip or bow for the panels of a head liner assembly for a vehicle body which strip is adapted to cooperate with the panels to maintain the adjacent edges of the

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panels in matching alignment and which strip is further adapted to cooperate with the panels to assist them in exerting as an assembly an upward tension against the longitudinal mid-section of the roof of the vehicle body within which the head liner is installed.

Another object is the provision of such a panel matching and supporting strip which while maintaining the adjacent edges of the adjacent panels in flush alignment is also adapted to permit expansion and contraction of the separate panels as such may occur under varying atmospheric changes while retaining engagement of the panels to maintain adjacent panel margins in alignment.

A further object is the provision of a strip of the character described which is so constructed as to lend itself to conform to the desired curvature of the head liner. My improved strip may be pre-formed, to exhibit such a shape and to fulfill the objects hereinabove set forth, but in its preferred form, it is fabricated as a normally flat strip. When put into use, such flat strip may be bent on the job to exhibit the desired curvature.

A meritorious feature of the preferred forms of my bow or strip is that the linear intermediate portion thereof is substantially flat or is formed on only a slight upward arc and is substantially inflexible or only slightly flexible. On the other hand, the end portions of the strip are flexible to assume an arc of greatly reduced radius as compared with the contour of the intermediate portion and are relatively readily flexible to establish such arcs. The intermediate portion of the strip is therefore relatively inflexible or flexible with difficulty and only to a limited extent while the end portions are relatively easily flexible and to a substantially greater extent. When the strip of this invention is installed in a body with the end portions of the strip secured to or adjacent to opposite side walls of the body, such end portions are flexed to an arc corresponding to the contour of the cove portions of the body roof. The arcuate end portions of the strip are tensioned so as to hold its intermediate portion up against the roof of the body. The strip has such a length and the end portions are so flexed and tensioned as to accomplish the above result.

An important feature of one embodiment of the invention is that the relatively flexible end portions of the strip are capable of being readily bent to a determined curvature, at which curvature further bending is substantially resisted and the end portions resist such further bending to substantially the same degree as the intermediate portion of the strip.

In another embodiment of the invention the end portions are readily flexible as compared with the relatively inflexibility of the intermediate portion but they are so constructed as to be adaptable for use at different arcs of curvature and therefore accommodate themselves to manufacturing variations such as transverse dimension in automobile body construction.

More particularly, the strip is formed to exhibit generally an H-shape in cross section, being somewhat in the shape of a standard railway rail in cross section and having a base part, a web part and a head part. In one form of the strip the linear intermediate portion is substantially continuous but throughout the end portions of the strip the head part and the web part are severed at intervals to facilitate bending of such end portions. When an end portion of the strip is bent to a determined curvature such partially severed segments may be brought into abutting engagement and exhibit a rigidity relatively comparable to that of the continuous intermediate portion of the strip. When the strip is so formed it functions very effectively to assist in supporting the flexible panels holding them upwardly toward the roof. On the other hand the end portions may be so provided with

lines of severance that when they are bent to a determined curvature the segments formed by the lines of severance are not brought into abutting engagement and such end portion is therefore adaptable to assume different arcs of curvature while still serving to properly support the intermediate portion.

A meritorious feature of this matching and supporting strip is that the web part of the strip which defines the bottoms of the exposed channels which receive the margins of the head lining panels may be transversely compressible and expandable to accommodate for the expansion and contraction of the panels while engaged by the strip.

The above objects and others will more fully appear from the following description, claims, and accompanying drawings, wherein:

Fig. 1 is a longitudinal sectional view through the upper portion of a closed automobile body;

Fig. 2 is a transverse sectional view taken on the line 2—2 of Fig. 1 with the supporting strip shown partly in section;

Fig. 3 is a fragmentary sectional view taken on the same line as Fig. 2 but enlarged and with the supporting strip shown in section;

Fig. 4 is an enlarged fragmentary sectional view taken on the same line as Fig. 1 but limited to the portion adjacent to one of the head lining supporting ribs;

Fig. 5 is a fragmentary sectional view similar to Fig. 4 but showing a slightly modified rib construction;

Fig. 6 is a fragmentary sectional view similar to Fig. 5 but showing a modified type of construction;

Fig. 7 is a fragmentary elevation partly in section of an end of one of the panel supporting ribs;

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 7;

Fig. 9 is a sectional view taken on the line 9—9 of Fig. 1;

Fig. 10 is a perspective of a fragment of one modification of the head lining panel supports for the ends of the panels;

Fig. 11 is an enlarged sectional view taken on the same line as Fig. 1 but of a fragment of the roof portion of the body adjacent to the windshield;

Fig. 12 is a sectional view taken on the same line as Fig. 3 but showing a modified form of support for one of the head lining panel matching and supporting strips;

Fig. 13 is a fragmentary elevation of the modification shown in Fig. 12;

Fig. 14 is a view taken on the same line as Fig. 3 but showing a slightly modified form of support for the end of the head lining panel;

Fig. 15 is a view taken on the same line as Fig. 14 but showing a second modified form of support for the ends of the head lining panel;

Fig. 16 is a fragmentary sectional view taken on the same line as Fig. 1 showing the mounting of the head lining panel adjacent the rear window;

Fig. 17 is a perspective of a panel section provided with insulating felt adhesively secured to the back thereof as may be employed in my invention;

Fig. 18 is an interior view of an automobile body being a modification of the head liner structure found in Figs. 1-3 wherein the head lining panels and supporting strips are disposed to extend fore and aft of the body;

Fig. 19 is an interior view of the front end of the body shown in Fig. 18;

Fig. 20 is a plan taken from the underside of the roof showing the structure of Fig. 18;

Fig. 21 is a longitudinal sectional view through the structure shown in Fig. 18;

Fig. 22 is a cross sectional view taken on the line 22—22 of Fig. 21;

Fig. 23 is a fragmentary longitudinal sectional view through the front end of the head liner;

Fig. 24 is a fragmentary longitudinal section through the rear end of the head liner;

Fig. 25 is a side elevation of a strip of sheet metal in the process of being fabricated to form the foundation section of the two-part strip of my invention;

Fig. 26 is a side elevation of the same strip after having been acted upon by the carrying out of the succeeding step in its formation;

Fig. 27 is a side elevation of the same strip divided into strip lengths as required for its use;

Fig. 28 is an enlarged side elevation of the completely formed strip shown in various stages in Figs. 25, 26 and 27;

Fig. 29 is an enlarged side elevation of a fragment of the same strip showing the end portion bent on an arc;

Fig. 30 is a perspective of a fragment of the strip shown in Fig. 29 but showing the same bent on a shorter radius and/or showing a modification as compared with Fig. 29; and

Fig. 31 is a perspective of an end fragment of a strip modified as compared with Figs. 5 and 6.

Heretofore one common practice of trimming the ceiling of the interior of a closed automobile body has been to trim the same with upholstery cloth which is similar to or corresponds with the remainder of the trim within the body. Leather or artificial leather has also been used for the same purpose. This cloth is held up toward the roof to form the interior ceiling by a plurality of resilient listing wires or rods which are bent into bow shape to fit closely underneath the ceiling and which extend transversely between the side walls of the body underneath the ceiling. The ends of the wires are secured by screws, nails, or the like to ledges on opposite sides of the body.

This invention relates to a head lining which comprises a plurality of flexible panels secured at opposite ends to opposed body side walls and which are bowed upwardly to bear against the underside of the roof and which have associated therewith flexible panel matching and supporting strips secured at opposite ends to opposed body walls and which strips are also bowed upwardly to bear against the underside of the roof. The matching and supporting strips extend between and engage adjacent edges of adjacent panels to hold panels in flush alignment. Such strips also cooperate with the panels to provide an assembly which serves as a reinforcing bridge exerting an upward pressure against the underside of the roof. Such assembly bears against the roof on the underside to damp out the vibration thereof and to support the same against downward deflection and eliminates the necessity of providing rigid carlines extending transversely across the body underneath the roof and it facilitates sound and heat insulation of the automobile interior.

In the drawings an automobile metal roof of conventional construction is indicated by the numeral 20. The windshield is indicated as 22 and the rear window as 24. The glass windshield 22 and the rear glass window 24 are each shown as mounted within a suitable gasket or grommet type of frame element 25. The side margins of the metal roof are bent over upon themselves as at 26 forming together with a supplemental strip 23 a boxlike section which extends along each longitudinal side margin of the roof and above the door and window frames of the side walls. Such door and window frames or body pillars are formed at their upper ends to engage underneath this boxlike margin and support the roof. They are commonly welded thereto. This is conventional practice. This particular construction shown in Figs. 2 and 3 is conventional on one well known make of automobile. Adhesively secured to the underside of the roof is a layer of insulating material 30. Such may be loosely felted fibrous material of any suitable character. It is shown in Figs. 2 and 3 as extending only throughout the longitudinal mid-section of the roof although it might extend

completely throughout the underside of the roof as shown in Figs. 14 and 15.

In the first sixteen figures of the drawings my head lining assembly comprises a plurality of transversely extending resilient panels 32. These panels may be formed of Masonite or any other suitable material. Such material could be finished on its under surface by being lacquered, painted or otherwise suitably decorated as desired. It might even be covered with cloth or leather if such were desired. Preferably the Masonite panels would be perforated as at 34. Such perforations might be a closely spaced arrangement of relatively small perforations. They would serve to break up the plain appearance of the broad expanse of the Masonite and add decorative value. They would also serve as hereinafter set forth to permit passage of air therethrough for ventilation or air conditioning or for the passage of sound waves to enter into the insulating material above the panels and be dissipated therein. Such panels are provided in flat form. As shown in these figures these panels are sprung into position with the ends supported upon head lining supporting portions in the form of ledges extending along the longitudinal side walls of the body below the roof line.

In Figs. 2 and 3 these ledges are illustrated as a part of the marginal box section 26 heretofore mentioned. Such box section 26 has a series of lugs or the like 35 punched therefrom at intervals and the ends of the Masonite panels 32 as shown in Fig. 10 seat upon these lugs. A molding strip 36 may be provided as shown in Figs. 2, 3 and 10 to extend over the boxlike section and form a molding both on the outside and on the inside of the body. Such molding strip is shown in Figs. 2 and 3 as overlapping the ends of the panels. Such molding may be held in place by screws 38 or the like.

These Masonite panels have a length sufficiently greater than the transverse dimension between the ledges formed by the lugs 35 so that when the panels are sprung upwardly into a bowed shape as shown in Figs. 2 and 3 and the ends of the panels supported upon the ledges 35 the panels are tensioned upwardly against the longitudinal mid section of the roof and against the layer 30 of insulating material interposed between the panels and the roof.

It will be noted that the end portions of the panels are bent on an arc of substantially shorter radius than the intermediate portions. The intermediate portion of each panel is bent on a very slight upward arc. The end portions, however, are bent on such an arc that when the ends of the panel are supported as shown, there is a cove space between the cove portion of the roof and the end portions of the panels throughout which the panel is spaced from the underside of the roof. This is due to the fact that the ends of the panels are supported spaced inwardly as well as below the side portions of the roof and the panels are brought into engagement with the roof along a line shown in Fig. 2. Obviously the area of engagement of the panel with the roof depends upon the length of the panel. Throughout the intermediate portions of the panels they exert an upward tension upon the roof which reinforces the same against downward deflection and when the several panels are assembled together as hereinafter described such assembly as a unit exerts a very substantial resistance to downward deflection of the roof.

In Fig. 14 there is shown a modified form of side wall supporting ledge for the end of the panels. In such figure a J-shaped strip 40 is shown as secured to the boxlike formation 26 by a screw 42 and the end of the panel seats within this J-shaped member. A trim welt 44 may be provided to conceal the joint between the box-shaped formation and the J-shaped strip.

In Fig. 15 another modification is illustrated for this same feature of construction. In this figure the roof is folded over at its margin as at 26 but the box-shaped formation is provided by the employment of not only

the supplemental strip 28 but a second supplemental strip 46 which strip carries a tacking strip 48. This arrangement thus far described is conventional on certain makes of cars. Applicant makes use of the tacking strip 48 as a support for the ends of the Masonite panels. In this construction a molding 50 is shown as extending over the tacking strip and the end margins of the panels and is held in place by a screw 52.

Whichever type of ledge construction is provided to support the ends of the panels the result is the same and the arrangement is similar. To hold the linear margins of the panels in flush alignment and to assist in holding the panels upwardly against the underside of the roof throughout the mid section of the roof and to secure the panels together so as to form a complete head lining assembly, I provide panel matching and supporting strips or bows. Such a panel matching strip is illustrated in Figs. 1, 3, and 4 and Figs. 25 through 31 inclusive and they are shown as consisting of two cooperating sections. There is a male section 54 and a female section 56. These are shown in their cooperating relationship in Fig. 4. The two sections together define a pair of oppositely opening channels at opposite sides of the strip and into which the margins of the Masonite panels are received as shown in Figs. 4, 5, 6 and 13. The two strips together are somewhat H-shaped in cross section.

The male section 54 is shown as formed of a strip of sheet metal which is bent upon itself along linear lines into a configuration in cross section which resembles the conventional railway rail. It exhibits a base portion 58, a web portion 60, and a head portion 62. It is bent into this shape as shown in Figs. 4, 30 and 31. The web portion 60 comprises the two spaced apart side walls which are integrally connected at the top to form the head portion 62. These two side walls of the web are bent outwardly forming complementary base flanges 58.

The female cap section of the strip 56 is generally channel-shaped in cross section. It really exhibits two U-shaped channels, one disposed interiorly of the other. The side walls 66 define the longitudinal margins of the section and are held toward the base 58 of the male section of the strip. The side walls of the interior channel 64 are adapted to grippingly engage over the head 62 of the male section as shown in Fig. 4. When so engaged thereover, the edges of the marginal side walls 66 are held yieldingly against the Masonite panels 32 and hold such panels up against the base flanges 58 of the male section as shown in Fig. 4 of the drawings. The female section 56 may be formed of plastic which is relatively flexible so that it can be engaged with the male section while exhibiting the desired flexing throughout the end portions of the strip as shown in the figures.

If desired the male section shown in Figs. 29, 30 and 31 and 4 may be a pre-formed section and be continuous throughout its length without any lines of severance. An end portion of such a section is shown in the fragment of Fig. 31. In order to fit the curvature of the underside of the roof of an automobile body, such pre-formed section would have its end portions pre-formed on the desired arc as shown in Fig. 2.

In the preferred form, however, the strip 54 is normally formed flat as shown in Fig. 28. It has an intermediate linearly unbroken portion 500 and two end portions which are provided with a series of spaced slots 82 defining successive spaced segments 540. These slots extend through the head and web portions 62 and 60 only, as shown particularly in Figs. 28, 29 and 30. The base or flange portions 58 of the strip are uncut. These slots are for the purpose of facilitating the bending of the end portions of the strip to conform with the curvature of the cover portions of the roof as shown in Figs. 2 and 3. The ends of the strip may have the segments immediately adjacent the ends flattened down as at 86 and be provided with apertures 87 as shown in Fig. 30. Screws 88 may be used to secure the ends of the strips to

the side walls of the body as shown in Figs. 3, 7 and 8.

The purpose of flattening the segments immediately adjacent the ends of the strip down against the base flange as above described is to facilitate the reception of the ends of the strip underneath the molding such as 62 shown in Figs. 2 and 3. This molding may be held in place by a screw 38 as appears in Fig. 2. Moldings of various kinds are in common use in this particular location of an automobile body to cover the edges of trim material now used.

Instead of securing the ends of the strips to the side walls by the screws 88 as above set forth, the ends of the strips may be provided with slots 90 in Figs. 12 and 13 and lugs or tangs 92 may be bent up from the box section to extend through these apertures and secure the ends of the strips against the side wall. This construction is shown in Figs. 12 and 13. It is an alternative construction. Obviously the strips might be fastened at the ends to the side walls in any manner desired. It is desirable to so support the ends of the strips that the intermediate portions thereof are held upwardly against the underside of the roof throughout the intermediate longitudinal portion of the roof as shown particularly in Figs. 2 and 4.

When the end portions of the head and web parts of the male section of the two-piece strip are provided with the slots 82, such end portions are relatively easily flexed to conform to the curvature of the cove portions of the roof. The intermediate portion 500 of this section of the strip is relatively inflexible or is flexed only with difficulty and to a limited degree. The intermediate portion of the roof of the vehicle exhibits only a very slight curvature transversely and this intermediate portion of the strip is adapted to flex sufficiently to conform to such curvature as shown in Fig. 2 but is held as an intermediate section up snugly against the mid-section of the roof.

The slots 82 may be of such dimension that when the end portions are bent to the curvature shown in Figs. 2 and 3, the slots are still spaced apart or some of them are so that the strips might be bent to conform with manufacturing variations in an automobile body between the front and rear portions thereof, or variations due merely to manufacturing tolerances. On the other hand, the slots 82 may be so dimensioned that when the strip is bent to the desired curvature as shown in Figs. 30 and 3, the ends of the segments 540 are brought into abutment. When this occurs the strip exhibits throughout its complete length considerable rigidity and defines a bow-shaped strip which offers the maximum support for the head lining panels. It offers substantially the same support that the pre-formed uncut strip of Fig. 31 offers. Even if all the segments are not brought into complete and tight abutment it has been found that when the majority of them are, the supporting rigidity of the strip is substantially increased.

The male section of the strip which may be formed of sheet metal as described may be rolled into the general railway rail type of shape as a flat strip and as shown in Fig. 25. In Fig. 26 such strip is shown as provided with the slots 82 arranged in groups to correspond with the end portions of the strip lengths desired. Such strip in Fig. 26 may then be cut into suitable lengths as shown in Fig. 27 and the two end segments may be flattened down as shown in 86 of Fig. 28. Fig. 28 shows a single one of such strips.

The strips are cut to such a length as are the panels so that when they are mounted as described and bowed upwardly with the ends of the strips seated upon the lugs 280 as shown particularly in Fig. 12, the intermediate slightly arcuate or relatively flat portions of each strip are held upwardly against the underside of the roof. The panels themselves as above described are of corresponding length so that they also are inherently urged upwardly against the underside of the roof. In Fig. 4

the base portion of the male section is shown as urged against the felt layer 30 in such a manner as to deform the same slightly and the panels which has their marginal portions seated upon such base 58 likewise bear snugly against the felt layer.

The construction just described pertains to the head lining panels other than the one at the rear and the one at the immediate front. In Fig. 1 three such panels are shown as the head liner there is shown as consisting of five panels only. It is apparent that such number of panels believed most desirable might be employed. The only difference between the front and rear panels is that in front the panel which is indicated as 32 has its rear margin engaged by the matching and supporting strip as hereinabove described but its forward margin is held by a molding 68 upwardly against the rolled-over boxlike formation 70 at the forward end of the roof. Screws 72 may be used to hold such molding in place. A visor bracket 74 of conventional construction is illustrated in Fig. 11 secured to this boxlike portion of the roof.

At the rear the roof is also rolled over to form a boxlike formation 76 and the rear head lining panel 32_b has its rear margin held up against this boxlike formation 76 by a molding 78 held in place by screws 79.

In Fig. 5 the matching and supporting strip has a slightly different formation from that shown in Fig. 3. The outer female section 56 is the same as is shown in Fig. 3 but the male section has its base portion 58 provided with detents 59 or the like which may be spaced therealong and which engage the head lining panels 32 as shown.

In Fig. 6 the strip is slightly modified over that shown in Fig. 5 in that instead of detents prongs 61 are shown as punched up out of the base 58 and these prongs engage in the Masonite. Fig. 6 also shows a piece of cloth 80 as extending over the head lining panel 32 and extending underneath the channel section 56 and over the head portion 62 of the rail-like formation of the male section. Such cloth would be stretched taut over the panels and would be held in place by the matching strips. This treatment might be used if desired.

When the entire assembly of panels and strips is assembled together as described and installed within the interior of an automobile body as a sheet-like head liner assembly, such structure possesses very substantial strength in its upward thrust against the roof of the body while it can be disassembled by removing separate panels. It could not be pulled down as a unit without breakage and the reinforcing tension it exerts underneath the roof is substantial.

The presence of the insulating material 30 interposed between the head liner panels 32 and the roof 20 serves in the usual manner to furnish insulation against heat. Such insulating material may be of such a character as also to serve the purposes of sound insulation according to well known standard practices. The provision of the multiplicity of small apertures 34 through the panels 32 makes the insulating material accessible to the interior of the vehicle and provides appreciable sound insulation.

The cove space between the cove portion of the roof 20 and the cove portion of the head liner panels extends substantially unobstructed from front to rear of the vehicle. This space may serve as a plenum chamber into which air is taken in a suitable manner and from which it may be discharged through the perforations 34 in the head liner panels. In Fig. 3 there is shown at 94 what may be part of a duct or air scoop opening through the roof through which air may be taken into this cove space. If desired a connection might be made with air conditioning apparatus within the vehicle and in such case an intake 96 (Fig. 1) leading into the cove space might be coupled with suitable air conditioning apparatus. The perforated end portions of the head liner panels which

underlie the cove space would provide communication with the interior of the vehicle body.

Instead of the layer of insulating material 30 being adhesively secured to the roof as is the present practice and as has been hereinabove described, such layer might be secured to one side of the perforated panels. In Fig. 17 a fragment of such a panel is shown. A layer of insulating material 30 is illustrated as adhered to one side of this panel 32. Such insulating material is adhered to the panel preferably throughout the intermediate portion only so that the end portions would be free thereof as shown in Figs. 2 and 3. Such material 32 would be free along the linear margins of the panel as shown in Fig. 17 wherein a margin is shown separated from the marginal area of the panel. Such margin of the insulating layer constitutes a form of skirt or free margin and may overhang the panel margin. When the panels are installed in place the edge portions of the panels are received by the channel of the matching and supporting strips. The free skirt or marginal portion of the insulating layer is allowed to extend between the base 58 of the strip and the metal roof of the vehicle, as shown in Fig. 6.

In Fig. 4 the margins of the head liner panels are shown as spaced away from the web portion 60 of the male section of the matching and supporting strip. Non-metallic fiber panels of the character described have a tendency to pick up moisture and expand and contract under various atmospheric conditions. Spacing the margins of the panels from the web of the matching and supporting strip permits this expansion to take place without release of the panels by the strip. The overlapping by the strip of the margin of the panel is sufficient to permit such expansion and contraction.

In Figs. 5 and 6 the margins of the panels are shown as attached to the strip by prongs or detents 61 and 59 respectively, but it is to be noted that such web portion is so formed that the two walls thereof can move toward each other or be drawn apart. The strip therefore may be compressible and expansible throughout the web portion to permit expansion and contraction of the panels.

In Figs. 18-24 the head liner panels and the matching and supporting strips are shown as extending lengthwise of the body or in a fore and aft direction. In such figures a head liner panel 100, of perforated Masonite or the like, is shown as extending lengthwise of the body along the center line of the underside of the roof. On either side of this panel 100 is a panel 102. These panels 102 may be of suitable composition fiber board. Panel matching and supporting strips 104 are provided extending between the adjacent edges of adjacent panels 100 and 102 and hold such panels in flush alignment with each other. These strips secure the panels together as an assembly on the underside of the roof and bear upwardly, against the roof. The head liner assembly structure shown in these Figs. 18-24 is generally similar to and serves generally the same purpose as the assembly structure heretofore described except that the panels and the strips extend in a fore and aft direction instead of transversely across the body.

The panels 102 are provided with corrugations or beads 106 which extend transversely of the panels and are deformed out of the plane of the panels. These panels 102 are bent on compound curves, i. e., along longitudinal lines and transverse lines so as to be received within the cove portions of the body. Such cove portions at the front and the rear and at both sides assume compound curves. The beads 106 facilitate bending along these compound arcs. The corrugations or beads may be expanded or distended along one longitudinal margin of the panel and may be compacted or compressed along the opposite longitudinal margin of the panel so as to accommodate for the varying curvatures the panel takes in being fitted into the cove portions of the ceiling, 75

all as more fully described in copending application, Serial No. 570,089, filed March 7, 1956.

The matching and supporting strips 104 are of the same two-piece character hereinafter described. Each comprises a base or male portion 107 and an outer or female portion 108. The base portion 107 may be formed of metal and is of the same general character shown in Figs. 3-7 and Figs. 12 and 13 and heretofore described. Such strip has its end portions bent to conform to the curvature of the roof at the front and rear when it is installed in the body. Such end portions are secured by screws or the like 111 to front and rear frame members 70 and 76 respectively of the body. When such base strip is installed, it is bowed upwardly toward the roof and throughout its intermediate length. It is urged resiliently upwardly against the underside of the roof bearing directly against an insulation pad 112 which underlies the metal roof 20. Such insulation pad 112 may be adhesively secured to the roof as heretofore described in connection with the first modification of Figs. 1-17.

The outer female portion 108 of the matching and supporting strip is of the character shown in such Figs. 3-6 and heretofore described. It snaps over the head of the railway rail-like base strip and holds the margins of the panels thereagainst as shown and described in connection with such earlier figures.

In the construction shown in the earlier figures in which the head lining panels extend transversely of the body, the ends of the panels seat upon panel supporting ledges at opposite sides of the body and such ledges constitute part of the head lining supporting portions to which the ends of the panel matching and supporting strips are secured. The head lining assembly is therefore mounted upon these head lining supporting portions bowed upwardly against the underside of the roof.

In the fore and aft arrangement shown in Figs. 18-24, the end edges of the panels do not seat directly upon panel supports at the front and rear as will appear from Figs. 23 and 24. The end portions of the panels bear against front and rear frame elements 70 and 76 as shown in Figs. 21, 23 and 24. The panels are held upwardly to the roof by the matching and supporting strips 104. These strips have their ends secured as hereinabove described and as shown in Figs. 23 and 24 to front and rear frame elements 70 and 76 which constitute the head lining supporting portions at opposite ends of the body. The head lining assembly of the fore and aft arrangement, therefore, bears resiliently upwardly against the roof throughout the mid section thereof and the outer longitudinal margins of the cove panels seat upon ledges at opposite sides of the body.

What I claim is:

1. A head liner panel matching and supporting strip for a motor vehicle body roof, said strip comprising cooperating linear base and cap sections and having a cross sectional shape providing two oppositely opening panel margin-receiving channels extending along opposite longitudinal margins; said base section being formed of sheet metal bent along parallel spaced-apart longitudinal lines into a configuration in cross section generally resembling the conventional railway rail having a base part, a web part, and a head part surmounting the web part; said cap section having a longitudinally extending portion channel-shaped in cross section grippingly receivable over the head part of the base section and having longitudinal portions held thereby toward the base part of the base section; said base section consisting of an intermediate portion and two end portions, the head part and the web part of said two end portions of the base section of the strip being provided with a longitudinal succession of transversely extending spaced-apart slots rendering the end portions flexible to be bent into an arched shape, said slots adapted to be substantially closed together when such slotted end portions are bent through a predetermined arc with respect to the intermediate portion thereby

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rigidifying the end portions, the head part of the intermediate portion of the strip being longitudinally continuous.

2. A head liner panel matching and supporting strip for a motor vehicle body roof as defined in claim 1 characterized in that the web part of the base section comprises two spaced side walls integrally connected by the head part and provided at their bottoms with complementary flanges projecting outwardly substantially normal to the side walls and constituting the base part of the section, said side walls being held tensioned apart by the head part but resistingly yieldable to permit movement toward each other.

3. A head liner panel matching and supporting strip as defined in claim 1 characterized in that the intermediate portion of the strip which extends between the arched end portions is formed on an arc bowed in the same direction as the end portions of the strip.

4. A head liner panel-matching and supporting strip for a motor vehicle body roof provided with abutments along opposite margins of the underside of the roof: said strip being bow-shaped and consisting of an intermediate portion and opposite arched end portions and comprising cooperating linear base and cap sections and having a cross-sectional shape providing two oppositely opening panel margin-receiving channels extending along opposite longitudinal margins; said base section being formed of sheet metal bent along parallel spaced-apart longitudinal lines into a configuration in cross section generally resembling the conventional railway rail and having a base part, a web part, and a head part surmounting the web part, said web part comprising two spaced side walls integrally connected at the top by the head part and provided at their bottoms with complementary flanges projecting outwardly substantially normal to said side walls with each flange consisting of a single flat piece of sheet metal terminating at the edge of the flange spaced outwardly from the web part at the lateral extremities of the base section, said head part extending throughout the intermediate portion and the arched end portions of the base section, said base section being resistingly resilient to flexure of the intermediate portion inwardly between and counter the arched end portions; said cap section being flexible and having a longitudinally extending portion channel-shaped in cross section continuously grippingly receivable over the head part of the base section and having longitudinal portions yieldably held thereby toward the base part of the base section to clampingly engage the margin of panels therebetween; and the intermediate portion of the base section being bowed in the same direction as the arched end portions and tensioned upwardly against the underside of the roof to conform to the curvature thereof when the end portions are supported on said abutments.

5. A head liner panel matching and supporting strip for a motor vehicle body roof provided with abutments along opposite margins of the underside of the roof, said strip being in the form of a bow and having one end arch-shaped and provided with a succession of longitudinally spaced-apart transverse slots rendering the same readily manually bendable from a substantially flat posture to said arch shape, said slots adapted to be substantially closed when opposite ends of the strip are supported on said abutments, and the adjacent intermediate portion of the strip being substantially continuous and unslotted and bowed in the same direction as the arched ends of the strip and tensioned upwardly against the underside of the roof to conform to the curvature thereof when the ends of the strip are supported on said abutments.

6. A head liner panel matching and supporting strip for a motor vehicle body roof provided with head liner supporting abutments along opposite margins of the underside of the roof, said strip having a cross sectional shape providing a pair of coplanar oppositely opening

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panel margin-receiving channels extending along opposite longitudinal margins of the strip, said strip consisting of an intermediate portion and opposite end portions, said opposite end portions provided with a longitudinal succession of transversely extending spaced apart slots rendering the end portions flexible to be bent into an arched shape, said slots adapted to be substantially closed when said end portions are bent through a predetermined arc, and said intermediate portion being bowed in the same direction as the end portion and tensioned upwardly against the underside of the roof to conform to the curvature thereof when the end portions are supported on said abutments and said slots are substantially closed.

7. A head liner panel matching and supporting strip for a motor vehicle body roof provided with abutments along opposite margins of the underside of the roof, said strip having a cross sectional shape provided with oppositely opening panel margin-receiving channels extending along opposite longitudinal margins of the strip, said strip having resilient arched end portions and an intermediate portion extending therebetween and bowed in the same direction as the arched end portions, and said bowed intermediate portion being tensioned upwardly against the roof and slightly flattened to conform to the shape of the roof between said abutments when said arched end portions are supported on the abutments.

8. A head liner panel matching and supporting strip as defined in claim 7 characterized in that the strip comprises: a base section having a configuration in cross section generally resembling the conventional railway rail and having a base part, a web part, and a head part surmounting the web part; and a cap section having a longitudinally extending portion channel shaped in cross section grippingly receivable over the head part of the base section and having longitudinal portions yieldingly held thereby toward the base part of the base section and forming with said base part said oppositely opening panel margin receiving channels.

9. A head liner panel matching and supporting strip as defined in claim 7 characterized in that at least one side wall of each panel wall receiving channel is tensioned yieldingly toward the opposite side wall of the channel to grippingly hold a panel margin therebetween.

10. A head liner panel matching and supporting strip as defined in claim 7 characterized in that the strip comprises a base section and a cap section releasably grippingly engageable together and defining therebetween said two oppositely opening panel margin receiving channels.

11. A head liner panel matching and supporting strip as defined in claim 7 characterized in that the intermediate portion of the strip which extends between and is supported by the two arched resilient end portions is itself substantially less flexible and resilient than the two arched end portions and is bowed slightly upwardly in the same direction as the arched end portions.

12. A head liner panel matching and supporting strip for a motor vehicle body roof, said strip having two oppositely opening panel margin receiving channels extending along opposite longitudinal margins and comprising two arched end portions and an intermediate portion extending therebetween and supported thereby, said arched end portions provided with a plurality of transversely extending longitudinally spaced-apart slots rendering the end portions flexible and resilient, said intermediate portion being substantially less flexible and resilient than the two end portions, said slots in the end portions adapted to substantially close together when the end portions are bent through a determined arc whereby the end portions resist further bending to substantially the same extent as the intermediate portion.

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13. A head liner assembly for a motor vehicle body roof provided with abutments along opposite margins of the underside of the roof comprising, in combination: a plurality of resilient panel-matching and supporting strips sprung into arched shape upwardly against the roof with the end of the strips supported on said abutments tensioning the intermediate portions of the strips upwardly against the underside of the roof, said strips provided with oppositely opening longitudinally extending panel-receiving channels, a plurality of resilient board-like panels sprung into arched shape below the roof and between the strips and conforming in arched shape with that of the strips and with the opposite edges of the panels received and supported within the channels of the strips, said strips resiliently maintaining the panels in such arched shape and said panels maintaining the strips against relative displacement toward or away from each other providing a self-supporting resilient head liner assembly supported at opposite edges by said abutments and having its intermediate portion held upwardly and tensioned against the underside of the roof.

14. A head liner assembly for a motor vehicle body roof provided with abutments along opposite margins of the underside of the roof comprising, in combination: a plurality of resilient panel-matching and supporting strips each having a cross sectional shape provided with oppositely opening panel margin receiving channels extending along opposite longitudinal margins of the strip, each strip having arched end portions and an intermediate portion extending therebetween and bowed in the same direction as the arched end portions, said bowed intermediate portion being tensioned upwardly against the roof and slightly flattened thereagainst when the arched end portions are supported on the abutments, and a plurality of resilient boardlike panels sprung into arched shape below the roof and between said strips and conforming in arched shape with that of the strips and with the opposite edges of the panels received and supported within the channels of the strip, said strips resiliently maintaining the panels in such arched shape and said panels maintaining the strips against relative displacement toward or away from each other, providing a self-supporting resilient head liner assembly held up at

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opposite edges by said abutments and having its intermediate portion held upwardly and tensioned against the underside of the roof.

15. A head liner assembly for a motor vehicle body roof provided with abutments along opposite margins of the underside of the roof comprising, in combination: a panel-matching and supporting strip having a cross sectional shape provided with oppositely opening panel margin-receiving channels extending along opposite longitudinal margins of the strip, said strip having resilient arched end portions and an intermediate portion extending therebetween and bowed in the same direction as the arched end portions, said bowed intermediate portion being tensioned upwardly against the roof and slightly flattened thereagainst when the arched end portions are supported on the abutments, and two resilient boardlike panels sprung into arched shape below the roof on opposite sides of the strip and conforming in arched shape with that of the strip and with an edge of each panel received and supported within a channel of the strip, providing a self-supporting resilient head liner assembly held up at opposite edges by said abutments and having its intermediate portion held upwardly and tensioned against the underside of the roof.

16. A head liner assembly for a motor vehicle body roof provided with abutments along opposite margins of the underside of the roof comprising, in combination: a plurality of panel-matching and supporting strips each having a cross sectional shape provided with oppositely opening panel margin-receiving channels extending along opposite longitudinal margins of the strip, each strip having resilient arched end portions adapted when supported upon the abutments to tension the intermediate portion of the strip extending therebetween upwardly against the roof; and a plurality of resilient boardlike panels sprung upwardly into arched shape between the strips and conforming in arched shape with the strips and with opposite edges of the panels received and supported within the channels of the strips providing a self-supporting head liner assembly held up at opposite edges on the abutments and tensioned upwardly against the roof.

No references cited.