

April 8, 1941.

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2,237,623

LAMINATED SHEET AND STAMPED METAL PANEL

Filed Jan. 31, 1935

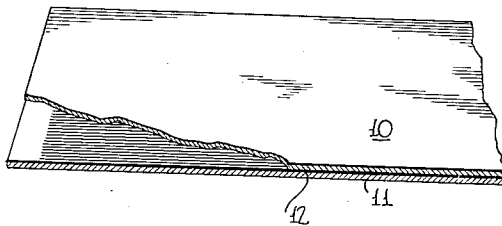


FIG. 1

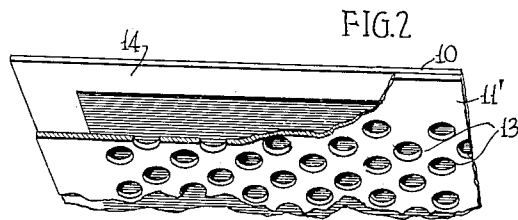


FIG. 2

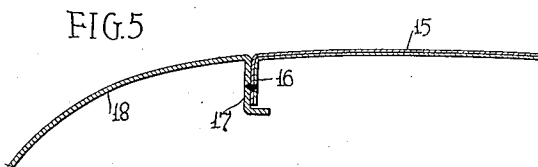


FIG. 5

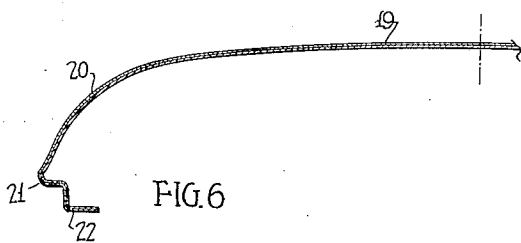


FIG. 6

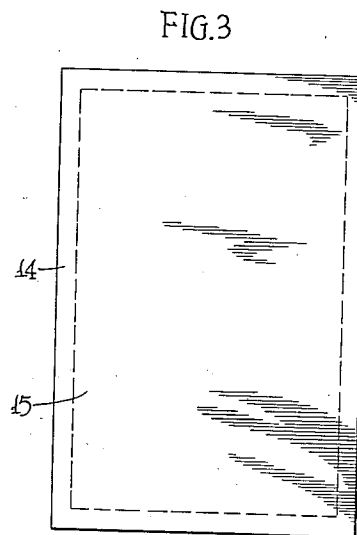


FIG. 3

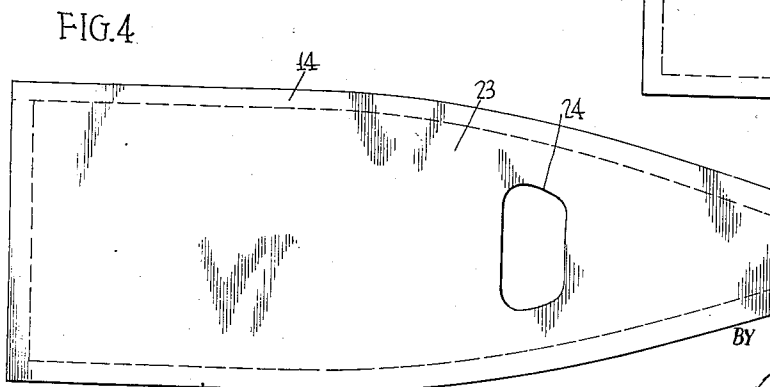


FIG. 4

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2,237,623

LAMINATED SHEET AND STAMPED METAL
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Application January 31, 1935, Serial No. 4,257

1 Claim. (Cl. 154—45.9)

The invention relates to sheet stock material suitable for die drawing and to die drawn panels, particularly vehicle body wall panels, formed from such material.

The material of the invention is designed for use in all relations where die drawn sheet metal stock is required or desirable, and particularly in such relations where the use of such stock has heretofore, while desirable by reason of ease of fabrication and considerations of lightness combined with strength, been more or less unsatisfactory because of the metallic sounds emitted due to vibration thereof. The use of metal panels in these relations has required the application of various sound deadening devices to avoid the objectionable metallic sounds, and these added materially to the cost of fabrication, both by reason of the materials employed and by reason of the time and labor required for their application. Particularly, where the metal panel required die drawing to give it the proper contour, these applications of the sound deadening material had to be made subsequent to the die drawing operation, when their application, particularly when in sheet form, was made increasingly difficult by reason of the curved surfaces to which they had to be applied. Such applications of sound deadening material to the surface of the panel also required that trim be applied to cover up the material and where the panel was a roof panel, of a vehicle body, this increased the overall thickness of the roof, and correspondingly decreased the head room on the inside of the vehicle.

It is an object of the invention to provide a stock sheet which is suitable for die drawing and a die drawn contoured panel which embodies in its construction excellent sound deadening qualities, and which has the qualities of strength and lightness required without the attendant objectionable metallic noises inherent in certain relations in metallic panels, as when used in sheet metal vehicle body walls, of large unsupported expanse.

I attain this object by taking two thin metallic sheets and placing them in superposed relation and connecting them together by an adhesive, permanently plastic, elastic cement, such as rubber cement or the like which, while strongly adhesively securing them together through the areas thereof to which it is applied, is substantially non-hardening and retains its elasticity over a long period of time. The thin metallic sheets may be of a thinness such that the overall thickness of the laminated sheet so produced does not materially exceed the thickness of the metal

panel which it is designed to replace, such as the wall panel of a vehicle body. Such a laminated sheet, when suspended by a string and struck by a hammer, does not as would be expected of a metal sheet, emit a sharp metallic sound, but emits but a dull thud. Not only does it have this excellent sound deadening quality but such a sheet is suitable for die drawing in the same way as a solid sheet, by gripping its edges with clamping dies, and shaping the metal intermediate the gripped edges by a suitable punch and die. The thin elastic bonding layer between the metal sheets is so strongly adhesive to the sheets as to permit slight relative movement between the sheets in the drawing operation without disturbing their strong bonded union. The favorable sound-deadening quality may be enhanced by making one of the sheets of the laminated sheet, foraminant, and this also has the advantage of reduction in weight without materially decreasing the strength of the sheet.

These qualities make the sheet of my construction useful and desirable in a great many fields and particularly so in the field of vehicle body walls, to which I have already applied it successfully. In this field it lends itself especially to the formation of expansive roof panels, which are formed from a single sheet and require no excessive depth of draw. Such panels, when drawn out of a single steel sheet have heretofore required the application of a thick covering of sound-deadening material on the inside and/or the application to their inner faces of transverse ribbing to break up the surface, all of which required finally to be covered by inner trim fabric making the roof several inches in thickness and cutting down the headroom. By the use of my improved laminated sheet the major portion of the area of the roof may be stamped from a single laminated sheet which is substantially of the same thickness as the metal panel previously used, and which by reason of its sound-deadening qualities, enables a roof to be provided, not substantially thicker overall than the gauge of the laminated sheet. By reason of its smooth inner face, a thin layer of trim fabric may be applied directly thereto as by adhesively securing it directly to the inner face of the panel, thus saving several inches in headroom over the usual prior constructions, and providing a very pleasing appearance.

Where the stamped panels formed from my improved stock sheet are to be secured along their margins to adjacent panels by spot welding, as in the roof construction to which I have already

applied the sheet, I preferably leave the sheets uncemented along their margins, the width of said uncemented margins depending upon the amount of trim required after the drawing operation and the width of the overlap through which the joinder is to be made. By omitting the cement in the region of joinder, the spot welds can be effected through the laminated sheet substantially as readily as through a single sheet of the same thickness. I prefer to make, particularly in vehicle body constructions, the thin metallic sheets of my improved laminated stock sheet each of the same metal, preferably sheet steel and they may be of the same or unequal thickness, but it is obvious that many of the advantages of this construction may be obtained where the two sheets are of different metals, or where the metal is other than steel, particularly when used in relations not requiring the strength of steel, or where one of the sheets is required to have a certain finish not capable of being furnished by steel.

It is also to be understood that, where desired to secure a stronger bond between the sheets and the cement, the sheets may have their surfaces adhering to the cement pre-treated. For example, steel sheets used with rubber cement or other rubberized bond, may have their adjacent surfaces coated with brass, since it is well known that rubber bonds with brass more strongly than with steel, especially when subjected to vulcanization.

In the drawing,

Figure 1 is a perspective view, with parts shown in section and broken away, of a fragmentary portion of a laminated sheet according to the invention.

Figure 2 is a similar view of a slightly modified form of sheet.

Figure 3 is a plan view of a sheet blank adapted to be die drawn to form the usual central rectangular roof panel of an automobile body.

Figure 4 is a similar view of another form of blank such as might be used in die drawing a central roof portion and inclined rear portion of a streamline automobile body.

Figure 5 is a transverse vertical section through the roof of an automobile body showing one manner of securing a die drawn panel drawn from a blank such as is shown in Figure 3 to the curved side portion of the roof.

Figure 6 shows another form of roof panel constructed out of the novel laminated sheet.

As shown most clearly in Figure 1, the laminated sheet of my invention comprises superposed metal plates 10 and 11 such as thin steel and an interposed thin layer 12 of a cement, said layer being appreciably thinner than the metal plates, strongly adheres to both sheets and is elastic and maintains its elasticity for a long period of time. Such a cement may be a rubber cement or some other cement having these desired characteristics. Alternatively, a thin sheet of rubber may be laid between the metallic sheets 10 and 11 and cemented or otherwise strongly bonded thereto, as by vulcanizing thereto.

I have discovered that such a laminated sheet can be readily die drawn or given relatively sharp bends or flanged in its edges and is thus admirably suited for use in forming the irregular contours of automobile or other vehicle body walls, since it may be given substantially any form of contour which a solid sheet of corresponding gauge may be given. In particular, is this laminated sheet suitable for use in large

expanses of body wall unsupported by inner framing such as in the roof panels of vehicle body constructions.

In such constructions it may be desirable to lighten the construction as shown in Figure 2 by making the inner panel designated in this figure by the numeral 11' of foraminate construction. This also somewhat improves the sound-deadening characteristics of the laminated panel since the openings break up the continuity of the sheet and these openings are not objectionable upon the inner side of the wall where they are covered by the upholstery, which may be as above indicated, directly adhesively secured to the inner face of the panel.

To facilitate the attachment of the margins of a panel made of laminated stock according to this invention, the elastic cement is omitted along the margins of the blank as indicated at 14 in Figures 1, 2, 3 and 4. The purpose of the omission is two-fold, first it enables the margin of the blank to be firmly gripped by the hold-down dies during the drawing operation through a direct metal to metal engagement. It is desirable that sufficient of this marginal portion free of cement remain after the blank has been trimmed to the final size, as for example, when the blank is used to form a central roof panel of rectangular form as shown at 15 in Figure 3, as to leave the flanged margin 16 shown in Figure 5 free of cement so that it may be readily spot welded to the corresponding flange 17 of the curved side of the roof 18.

According to the showing in Figure 5 only the central portion of the roof is formed of laminated construction according to the invention, since that portion is ordinarily most subject to objectionable metallic sounds due to vibration when constructed out of ordinary sheet metal unsupported by transverse ribbing.

In Figure 4, I have shown a blank 23 of this laminated sheet stock of a shape adapting it to be drawn to form the central portion of the roof as well as the inclined central portion of the back of a streamline automobile body. In this, an opening 24 smaller than the dimensions of the final window opening may be cut out prior to the drawing operation.

Figure 6 shows another form of roof construction in which the laminated panel 19 is shown forming the entire width of the roof including the sharply curved side quarters thereof at 20, the drip channel at 21, and the inwardly offset angular portion 22 adapted to seat upon and be secured to the side walls of the body.

The several applications of the improved laminated panel construction showing its usefulness in vehicle body construction by no means exhaust its field of use, but its usefulness in this relation is particularly marked in view of its good sound-deadening characteristics, a strength equal to or even greater than that of a solid sheet of equal gauge, its ease of formation by the usual die drawing processes to any desired contour and finally its capability of joinder with adjacent panels by that simplest method of joining sheet metal, namely, spot welding. Since the sheet itself has such good sound-deadening characteristics, no additional sound-deadening lining is required such as is commonly required in expansive metal panels now used in vehicle body walls, and this leaves the inner surface of the panel free to directly receive the trim which may be simply secured thereto by any suitable adhesive. Thus by the use of this laminated panel construction,

several inches of space usually occupied by the head lining or other interior trim is made available, thus providing additional roominess.

The thickness of the cement layer 12 between the metal sheets is preferably less than one-third of the thickness of the laminated structure. In fact, a very good structure is obtained by merely applying the cement, such as rubber cement, to one of the sheets of the laminated structure to a thickness not substantially greater than the thickness of a coat of paint and then bringing the other sheet in superposed relation, pressing them together with the cement therebetween, and effecting a sufficient drying of the cement to cause a strong bonding between it and the metal sheets. With the cement of the right characteristics, it retains sufficient elasticity to permit drawing of the laminated sheet without destruction of the bond between the sheets.

What I claim is:

A self-sustaining wall panel unit of diaphragm-like character capable of being handled and

shipped as a unit and having a thickness and stiffness adapting it to be self-supporting laterally over large areas thereof, said wall panel unit consisting of a plurality of thin vibratile metal sheets and a single thin layer of a permanently plastic cement between each two adjacent sheets and adhesively bonded as a layer directly to the adjacent faces of the thin metal sheets and tying them together substantially throughout their areas, the bonding medium having such characteristics as not only to strongly tie the sheets together to prevent vibratory separation under the vibrations to which the unit may be subject in use but also to dampen out sound producing vibrations of the panel at large in response to vibrations transmitted to it in use, the cement between the sheets in certain limited localized areas thereof being omitted, thereby providing localized areas through which the panel may be joined by spot welding to an adjoining metal part.

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