

Jan. 11, 1938.

E. M. HICKS

2,104,989

BUS BODY

Filed June 19, 1937

4 Sheets-Sheet 1

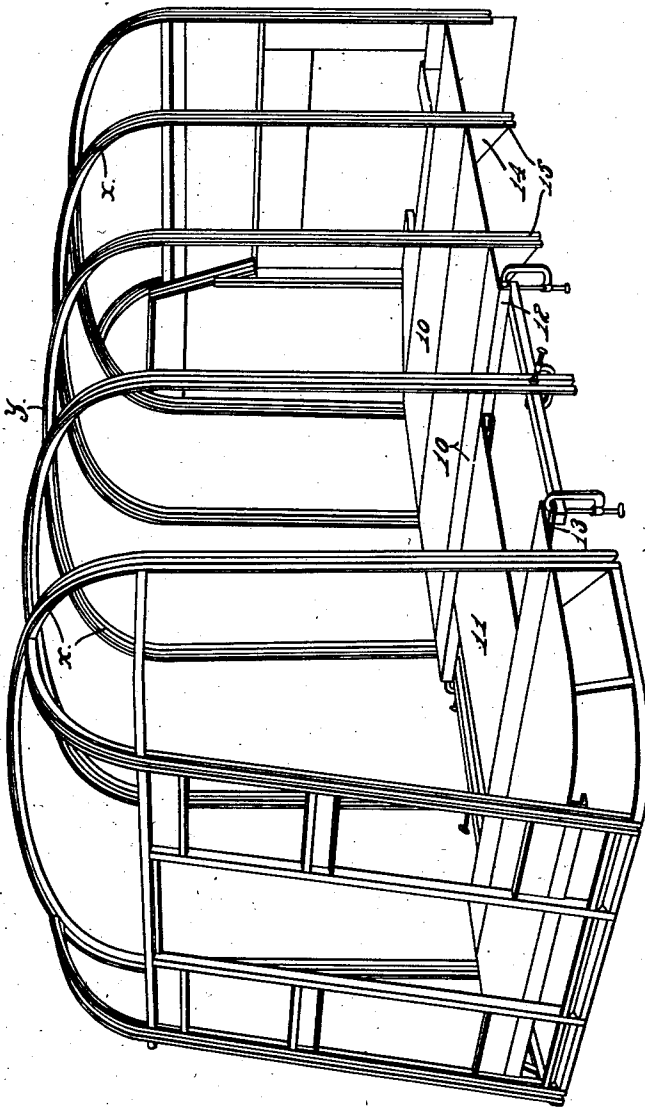


Fig. 1.

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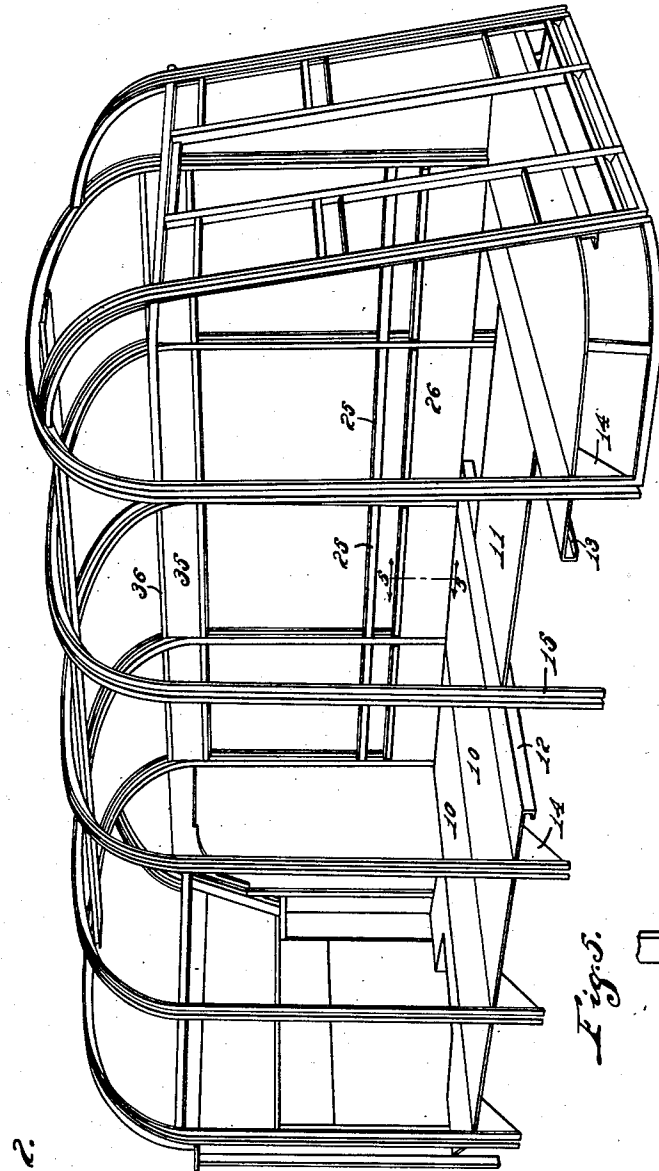
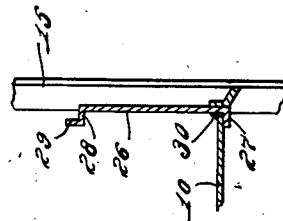


Fig. 2.

Fig. 5.



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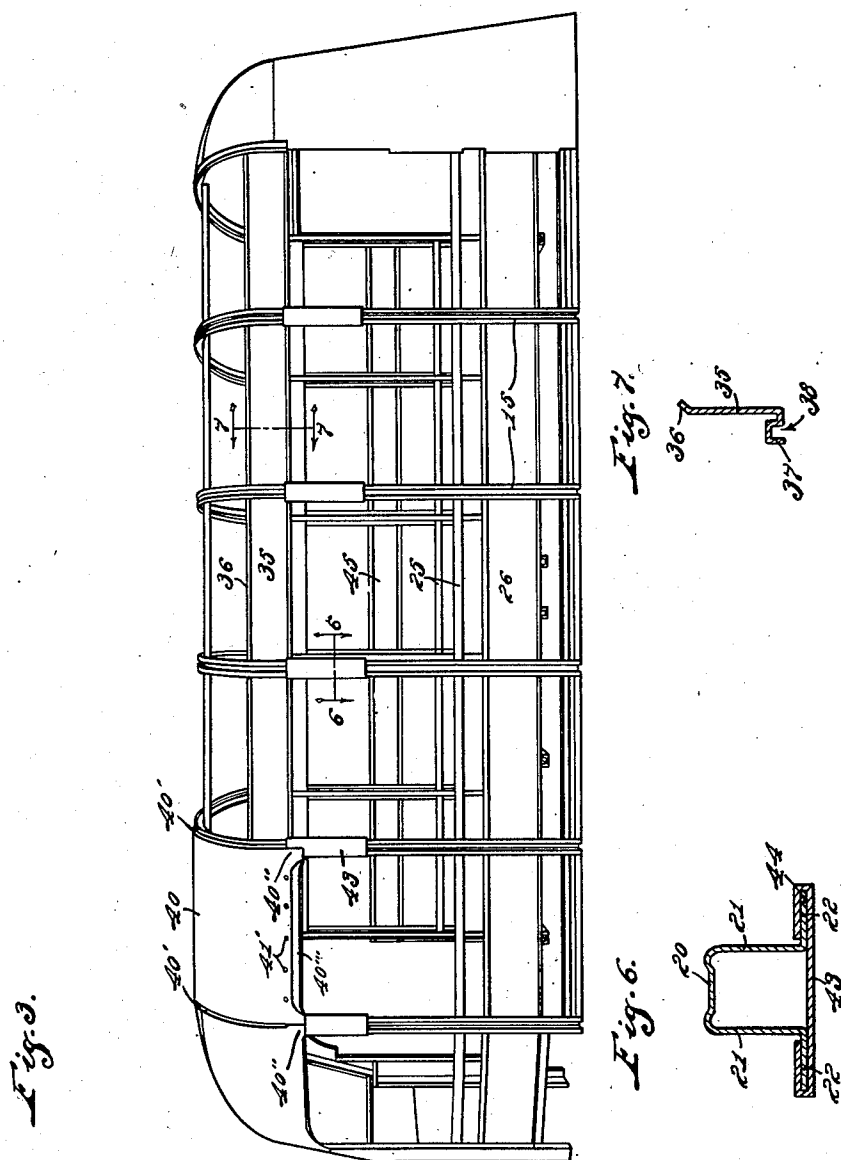
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4 Sheets-Sheet 4

Fig. 1.

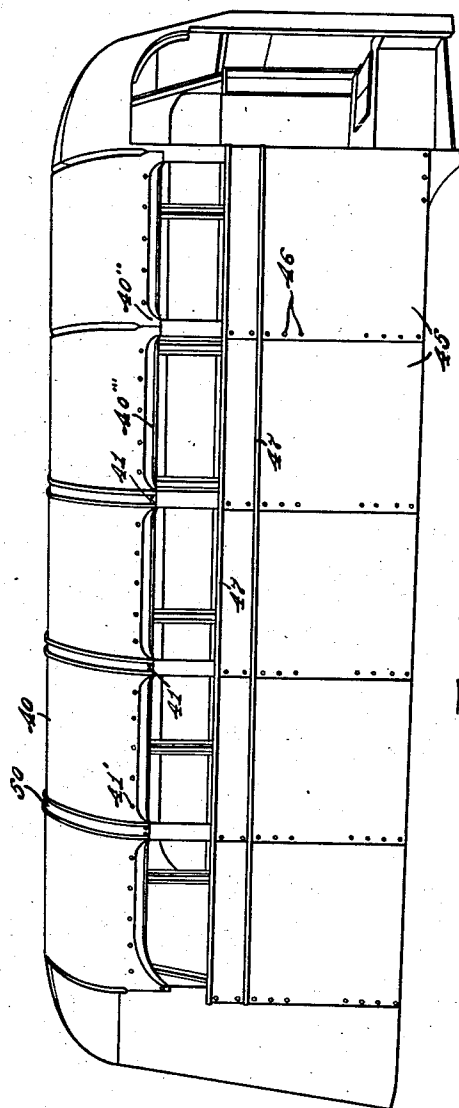
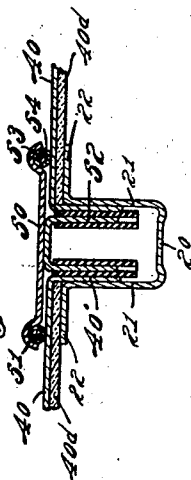


Fig. 8.



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UNITED STATES PATENT OFFICE

2,104,989

BUS BODY

Earl M. Hicks, Lebanon, Ind.

Application June 19, 1937, Serial No. 149,088

3 Claims. (Cl. 298-137)

The object of my invention is to produce a metal bus body which, while having adequate rigidity and load carrying characteristics, will nevertheless be sufficiently flexible, especially in its roof structure, whereby the unavoidable distortion, due to road inequalities will not result in roof leakages or in unsightly finish-marrings.

The accompanying drawings illustrate my invention:

Fig. 1 is a perspective view of the primary frame work of my improved body;

Fig. 2 a perspective view of said body in a further state of development;

Fig. 3 a perspective view of the body in a still further state of developments;

Fig. 4 a perspective view of the body nearly completed;

Fig. 5 a fragmentary detail section on line 5-5 of Fig. 2;

Fig. 6 a fragmentary section on line 6-6 of Fig. 3;

Fig. 7 a fragmentary section on line 7-7 of Fig. 3;

Fig. 8 a section of one of the channel bows with adjacent roof plates and finishing strap.

In the drawings 10, 10, 11 indicate a series of transverse floor plates each of which comprises downturned side portions 12 ending in inturned L-shaped flanges 13, the several plates being arranged in series with their adjacent portions 12 connected by suitable bolts. Between the adjacent portions 12 of the plates 10 are vertical gusset plates 14 which are secured to a side wall of the lower ends of an adjacent channel bow 15. The sheet-metal channel bow 15, in cross-section, comprises a middle portion 20, flanked by two parallel portions 21, 21 at right angles to portion 20, and portions 22, 22 parallel with portion 20 and each springing and extending outwardly from the free end of one of the portions 21.

These bows are formed of comparatively light sheet metal and are bent to U-form so as to provide depending legs and a connecting arch, with the mouth of the channel outwardly. I have found by experience that, in order to obtain desired flexibility to twisting stresses, without sacrifice of stability, and to permit proper cooperation with roof-plates and finish straps, the curvature at the points X-X should not be less than about 10 to 12 inches radius with intermediate connecting portion Y comparatively flat but, largely for the sake of appearance, having a relative curvature as indicated in Fig. 1.

After the lower ends of the depending legs of

the U's are secured to the floor structure, by means of gussets 14, with the lower ends of the depending arms extending substantially below the floor plane, adjacent pairs of depending arms, above the plane of the floor structure, are connected by stretcher bars 25 either by bolting or, more conveniently, by welding.

The mouths of the channels being outwardly presented, and the bows being continuous throughout their lengths, and the depending legs extending below the floor plane, all possibility of leakage through roof joints into the interior of the body is eliminated.

Between the depending legs of adjacent bows, below the stretcher bars 25, I place interior stretcher plates 26 the lower edges of which are inturned at 27 to underlie the floor plate 10 and at their upper edges are inturned at 28 and upturned at 29 to form a pocket for reception of the lower edge of an interior finish plate if desired. These plates are secured in place by welding, at 30, in the corner between the floor plate 10 and the inner face of plate 26 and by welding to a side wall 21 of the adjacent bow 15.

The bows are further connected, adjacent the springs of the arches, by stretcher plates 35 each having an upwardly inclined upper edge 36 and a depending lower edge 37, which parts 36 and 37 contact respectively with portions 22 of the bow and are secured thereto, either by bolts or, preferably, by spot welding. Each of these plates is bent at 38 to form a downwardly presented pocket for the reception of the upper edge of a vertically slidable window frame, not shown.

The roof plates 40 are continuous across the top of the body, one plate for each pair of bows, with their side edges 40' throughout their lengths, except for short portions at their ends (40''), downturned into the channels of the U-bows. Each top plate 40 is underlaid by a sheet of sound deadening material 40d resting upon portions 22 of the U-bows and my present method of fabrication involves a preliminary clamping of the top sheet in place upon the bows, whereupon the edges 40' are battered down into the channels of the bows and the plate then secured in position by bolts 41 passing through said plates and through the subjacent portions 22 of the bows, and also by bolts 41' passing through plate 40 and the depending tongue 37 of the subjacent short sections 43 are sleeved upon the depending arms of the bows, these sections 43 having at each side inwardly presented channels 44 for inter-

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locking reception of portions 22 of the U-bows, and the upper ends of these sections 43 are projected under portions 40'' of roof plates 40 so that the retaining bolts 41 may pass there-through.

Extending from the lower end of plates 43 to the lower ends of the U-bows, between each pair of U-bows, is a side plate 45 the forward edge of each rearward plate underlying the rearward edge of the next forward plate and secured in place by bolts 46 extending through the two side plates and underlying portions 22 of the U-bows. These side plates may be suitably ornamented and stiffened by outwardly presented rib forming portions 47.

The top plates 40 in each end are distorted to form outwardly projecting window caps 40'''.

Overlying the adjacent edges of each pair of roof plates 40 is a finish strap 50 having downwardly projecting channels 51 along each edge and also having, near the middle and near each end, inwardly projecting short rubber-covered fingers 52 lying between and engaging adjacent downturned side edges 40' of roof plates 40. In each channel 51 and engaging the outer face of the subjacent plate 40, substantially throughout the length of strap 50, is a cylindrical packing 53 which comprises a wire core 54 and a flexible cover. I have found that commercial electric wiring is especially useful. I have found that such a packing permits intermediate rolling distortion which is quite essential. The diameter of the packing 53 is such as to hold the strap 50 just clear of the outer finish on plates 40 and the straps 50 are firmly held in place solely by end fastenings 41, conveniently two screws or bolts passing through the strap 50 and the subjacent portions 40'' of the roof plates 40, the upper end of finish plate 43, and the subjacent portions 22 of the U-bows.

It will be noted that the depending legs of bows 15 are tied together in series near their lower ends by the floor structure, the stretcher bars 25, plates 26, and side plates 45 and that they are also tied together at the springs of the arches by the stretcher plates 35. These various parts, however, are of sheet metal yieldable under twisting stress, primarily resulting from road inequalities. The roof plates are anchored in place by bolts 41 and 41' at the ends of the plates; the finish straps 50 are anchored only at their ends; and the curvature, in vertical planes, of plates and straps, is one of relatively large radius. As a consequence of the combination of these various factors, there is a considerable degree of flexibility of the roof structure, particularly in the regions X, permitting relative torsional movements of the finish straps and roof plates. If there is direct contact between roof plates and finish straps, such relative movements would soon create unsightly blemishes in the external finish of the roof plates (paint, enamel, etc.) and rusting in those regions would be promoted. By providing the packing 53, capable of local rolling and twisting without disintegration, I have found it possible to prevent injury in those X regions without sacrifice of the advantages due to twisting flexibility of the structure in these regions. As a result of these details of construction, bodies constructed in accordance with my invention have proved to be leak proof, exceptionally long lived, and capable of withstanding an unusual amount of hard usage and abuse.

When a bus body has been mounted upon a chassis and firmly bolted thereto through the

medium of its floor elements and the vehicle passes over a rough terrain one corner or another is lifted or depressed relative to the other three corners thus subjecting the entire body to a twisting action. A sufficiently rigid structure might possibly successfully withstand these twisting stresses but such a construction would be unavoidably very heavy and expensive. On the other hand, if the structure is such as to yield to the twisting forces the arc-shaped roof plates 40 inevitably tend to buckle relative to the bows and the bows tend to buckle relative to the roof plates and if an attempt is made to anchor the edges of the roof plates to the bows throughout their lengths along their side edges, these buckling stresses are resisted by the fastening means and consequently stresses are set up along the edges of the roof plates which ultimately result in breaks or unsightly permanently set distortions, all of which result in external marblings of finish which become unsightly and which expose the parts to rusting. This has been a problem, as is evident from an inspection of prior art structures, which, so far as I know, has not been solved until my present invention.

It will be noted that in my above-described construction the roof plates are anchored only at their ends and the finish straps 50 are anchored only at their ends; the side edges of the roof plates, between the end anchorages depend into the outwardly opening channel of the bows 15 and are unattached to the vertical walls of the bows; the downturned edges of adjacent roof plates are separated from each other and the depending ringers 52 of the finish straps 50 are flexible and are covered with a flexible packing such as a short length of rubber tube 52' which contacts the downturned edges of the roof plates. As a consequence of this construction, I have found that, when the body is carried over a rough terrain, there will be a quite noticeable movement of adjacent roof plates toward and from each other beneath the finish straps but, as the finish straps and roof plates are anchored only at their ends they are free intermediate their ends to locally move toward or from each other, particularly at the regions X and, as the packings 51 are laterally and locally flexible, these buckling movements have such freedom that the bodies will have a practically indefinite life throughout while the integrity of the parts and finish is maintained. It will also be noted that, even though the packing 53 does not maintain an absolutely waterproof seal, any water which passes there-under can only pass into the outwardly open channel in the bow 15 and, because these bows extend continuously to points below the plane of the floor, adequate drainage is provided to a point where no possible harm can result therefrom.

In Fig. 1, I have shown bars 50 and clamps 51 which, as will be readily understood, are merely temporary to hold the intermediate bow 15 in place (due to the form of floor plate 11) until the necessary stretcher bars are placed.

I claim as my invention:

1. A bus roof structure comprising a multiplicity of laterally-spaced parallel inverted U bows of outwardly-mouthed channel section, roof plates laid upon and each bridging between an adjacent pair of bows, fastening means connecting the transversely-spaced ends only of the roof plates and the bows adjacent the springs of the arches, downturned front and rear edges of the roof plates extending into the channels of two

bows, a finish strap laid over the arches of each bow and overlapping the front and rear edges of adjacent underlying roof plates and of such form as to leave said underlying edges free to shift relative to the strap and underlying bow, fastening means connecting only the ends of said straps to the underlying bow adjacent the springs of the arches, the portions of said roof plates and strap over the arches being capable of yielding relative to each other and the bow, and packing strips interposed between the edges of the finishing strap and the underlying roof plates.

2. A bus roof structure of the character specified in claim 1 wherein the finishing strap has downwardly presented channels along its side edges and the packing strips nested in said channels.

3. A bus roof structure of the character specified in claim 1 and including a yieldable finger means depending from a medial portion of the finishing strap and interposed between the downturned edges of the underlying roof plates.

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