July 19, 1932. C. D. BONSALL 1,868,159

CAR ROOF

Filed July 6, 1931 2 Sheets-Sheet 1

Fig. 1.

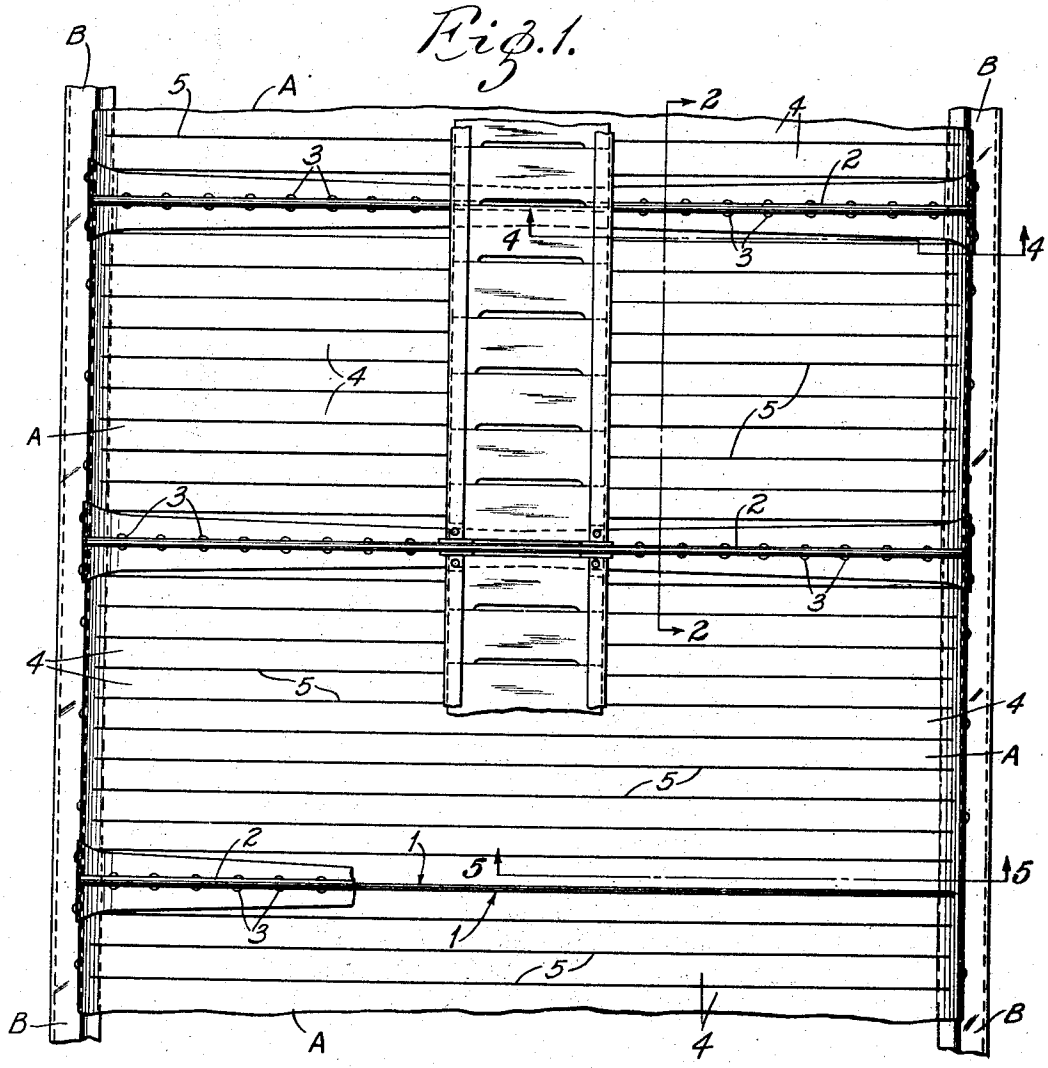
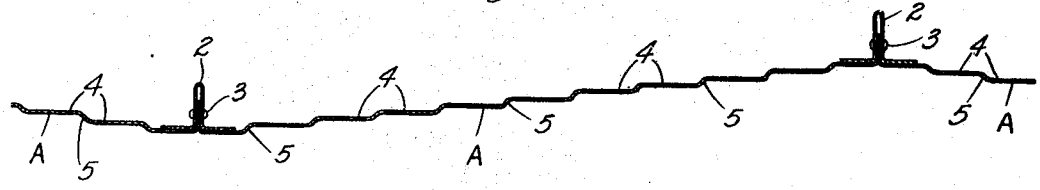


Fig. 2.



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Fig. 3.

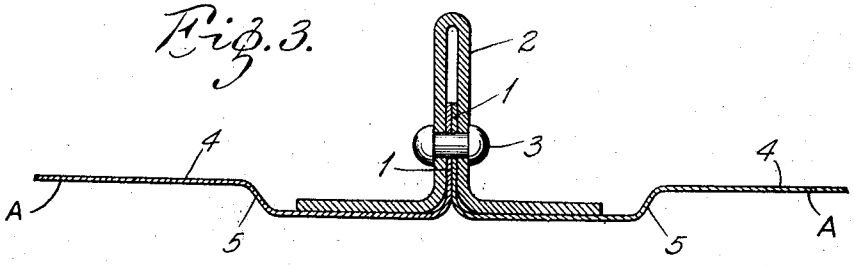


Fig. 4.

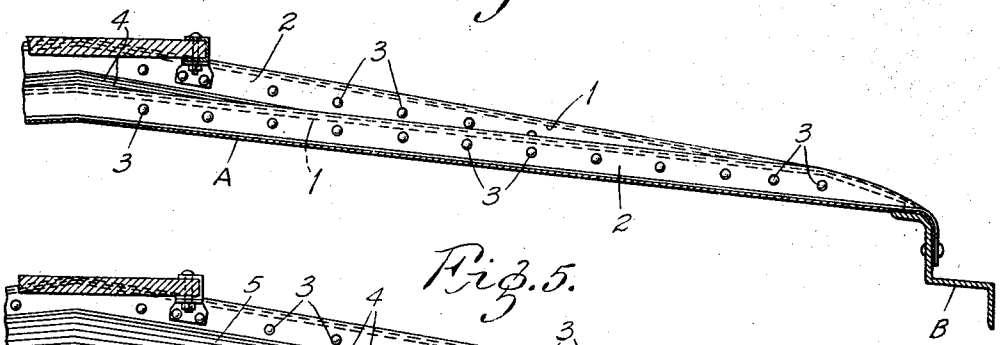
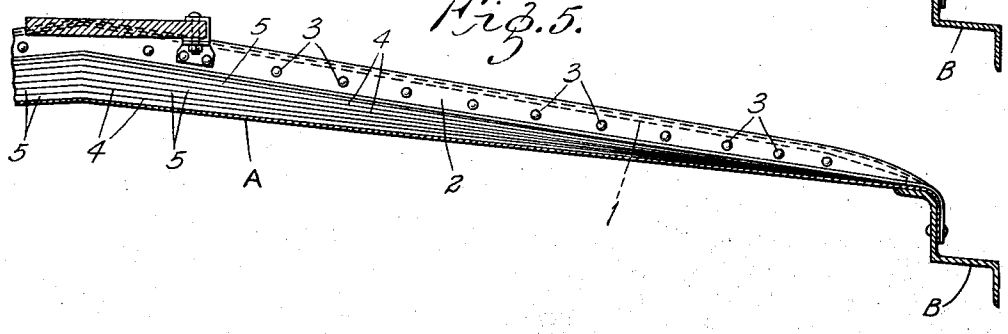


Fig. 5.



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Patented July 19, 1932 1,868,159

UNITED STATES PATENT OFFICE

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CAR ROOF

Application filed July 6, 1931. Serial No. 548,955.

This invention relates to metal car roofs. In the typical form of so-called neutral axis roof, the sheets are secured together at their margins and arranged to form panels at one level alternating with panels at a different level, the adjacent panels being connected by vertically disposed web portions whereby the roof as a whole functions after the manner of a beam, with the upper and lower panels taking care of their full share of the tensile and compressive stresses and with the connecting web portion taking care of the shearing stresses. The height of the web portion is limited both by manufacturing considerations and by the danger of failing under buckling and cross bending stresses. Where head room and tunnel clearance are limiting factors, this typical form has a great advantage due to the relatively small distance between the upper and lower surfaces thereof. The principal object of the present invention is to increase the spread between the uppermost and lowermost portions of the roof and thereby impose on the upper and lower seam constructions a greater proportion of the tensile and compressive stresses and make it practicable to use lighter roof sheets and produce a lighter roof construction.

In the accompanying drawings wherein like numerals refer to like parts wherever they occur,

Fig. 1 is a plan view of a portion of the car roof embodying my invention,

Fig. 2 is a vertical longitudinal section through the roof on the line 2—2 in Fig. 1,

Fig. 3 is a vertical cross-section through one of the lower roof seams;

Fig. 4 is a vertical cross-section through one-half of the roof on the line 4—4 in Fig. 1; and

Fig. 5 is a section similar to Fig. 4 on the line 5—5 in Fig. 1.

The present roof comprises metal roof sheets A that span from side plate B to side plate B of the car and are rigidly secured thereto and have upstanding flanges 1 along both side margins, said flanges being capped or straddled by inverted U-shaped seam covers 2 rigidly secured thereto by horizontal rivets 3.

The body of each roof sheet A is formed into a series of raised panels or steps 4 which flatten out into a single plane near the ends of the sheet where it rests upon the side plates B. Beginning on one side of the sheet, each successive step or panel 4 is higher than the one preceding it, being connected thereto by a relatively narrow or low web 5. While each individual web 5 is relatively low or narrow, the webs are sufficiently numerous to raise one margin of the sheet considerably higher than the other margin and considerably higher than would be feasible with a single offset of the sheet.

As stated above, the side margins of the roof sheets A are provided with upstanding flanges 1. The side flanges 1 of adjacent roof sheets abut against each other and are straddled by a seam cover 2 rigidly secured by rivets 3 extending horizontally through said seam cover and said flanges. At the eaves, the ends of the seam cover are turned down and riveted to the side plates. Preferably the roof sheets are all formed alike, with the high marginal flanges of adjacent sheets abutting against each other and with the low marginal flanges of adjacent sheets abutting against each other.

On account of the multiplicity of relatively narrow panels or steps 4 and the wide spread between the upper and lower seams, there is a considerable concentration of the tensile and compressive stresses at and near the lower and upper seams, respectively, the intermediate portions of the roof sheets being subject to relatively little tensile and compressive stresses. Accordingly, it is desirable to make the seam caps 2 of relatively large cross-sectional area. In so far as taking care or stress is concerned, the principal duty of the roof sheets is to resist the shearing, buckling and cross-bending stresses arising from beam action, that is, to provide the factors that make the upper and lower seam constructions function as the compression and tension members of a single beam. In performing this function, the shallowness of the individual webs 5 and the narrowness of the individual steps 4 are items of importance, as such webs and panels afford mutual

support and adapt the body of the sheet to brace the seam constructions and hold such seam constructions to their work as members of the single beam. In consequence of the manner in which the elements are coordinated, it becomes feasible to use thinner gage sheets than would otherwise be practicable for a given strength of roof, and the total weight of the roof may be considerably reduced.

While the seam construction hereinbefore mentioned is simple, strong and well adapted for use with the roof sheets described, other seam constructions may be used in place of it and the marginal portion of the roof sheet modified conformably thereto, if necessary.

What I claim is:

1. A car roof comprising roof sheets whose longitudinal side portions are respectively above and below the level of the longitudinal middle portion, said side portions being provided with upstanding flanges, and the flanges at the lower sides of adjacent sheets being secured together flatwise, and the flanges at the higher sides of adjacent sheets being secured together flatwise.

2. A car roof comprising roof sheets whose body portions comprise longitudinal side panels and at least one intermediate panel, all at different levels, the lower sides of adjacent sheets being secured together flatwise, and the higher sides of adjacent sheets being secured together flatwise.

3. A car roof comprising roof sheets whose body portions comprise longitudinal side panels and at least one intermediate panel, all at different levels, said side panels being provided with upstanding flanges, and the flanges at the lower sides of adjacent sheets being secured together flatwise, and the flanges at the higher sides of adjacent sheets being secured together flatwise.

4. A car roof sheet comprising a series of more than two panels extending longitudinally thereof and merging near their ends into a common plane, each successive panel being higher than the one that precedes it.

5. A car roof sheet comprising a series of more than two panels extending longitudinally thereof and merging near their ends into a common plane, said sheet having side marginal flanges and downturned ends, each successive panel being higher than the one that precedes it.

6. A car roof comprising roof sheets with upstanding flanges along their sides and seam caps straddling the flanges of adjacent sheets and secured thereto, each sheet comprising an upper side panel and a lower side panel and a plurality of intermediate panels extending substantially the width of the car, each successive panel of a sheet being higher than the next preceding panel of said sheet, the upper panels of adjacent sheets being joined together at one level and the lower panels of adjacent sheets being joined together at a lower level.

Signed at New Kensington, Pennsylvania, this 29th day of June, 1931.

CHARLES DAVID BONSALL.