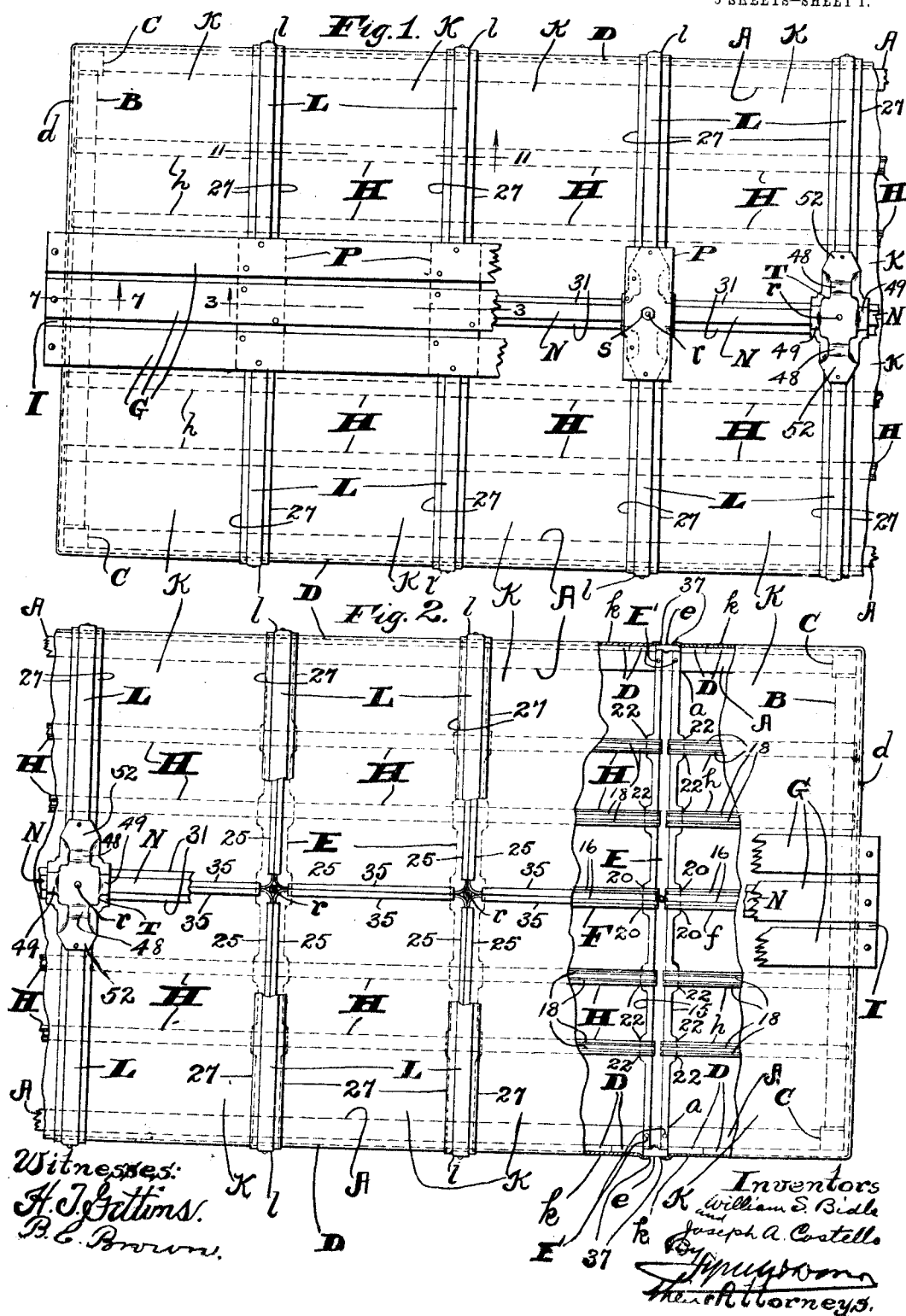


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5 SHEETS—SHEET 1.



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5 SHEETS--SHEET 2.



Witnesses:
H. J. Gettins.
B. L. Brown.

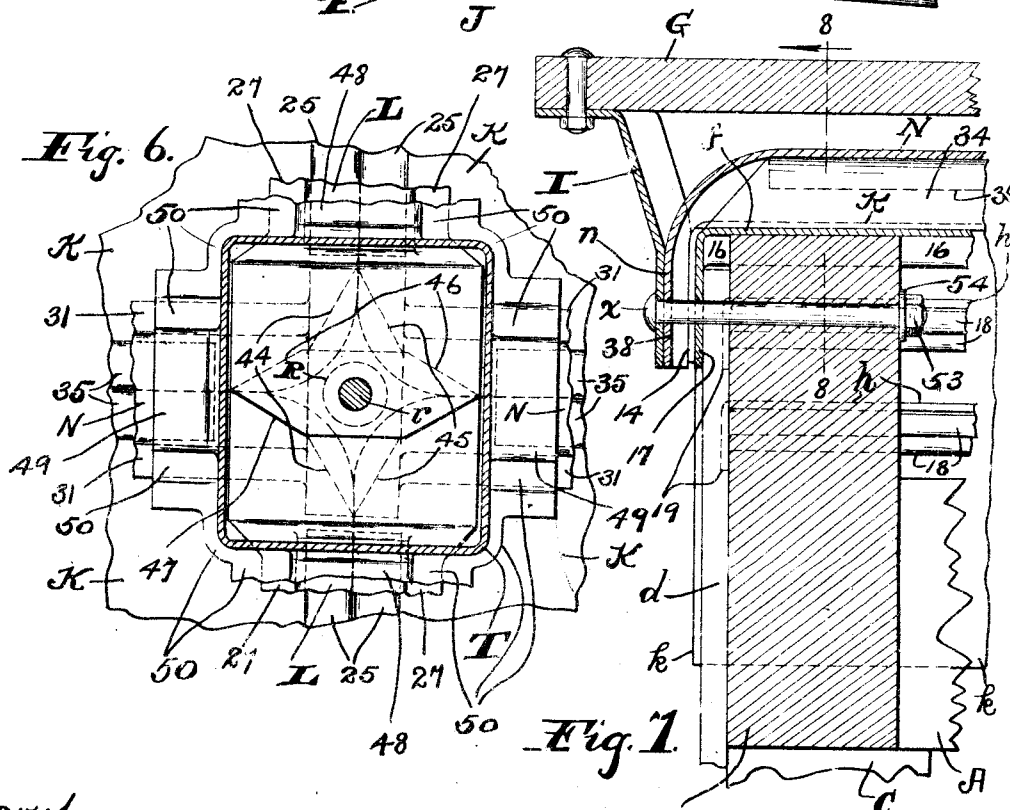
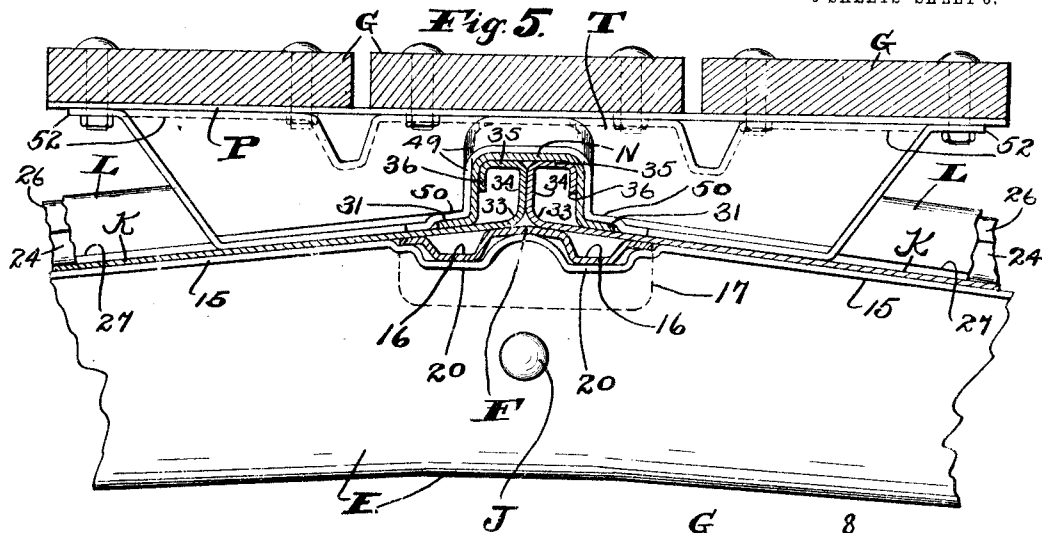
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W. S. BIDDLE & J. A. COSTELLO.
CAR ROOF CONSTRUCTION.
APPLICATION FILED JULY 17, 1911.

1,064,958.

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5 SHEETS—SHEET 3.



Witnesses:
H. J. Gottins.
B. C. Brown.

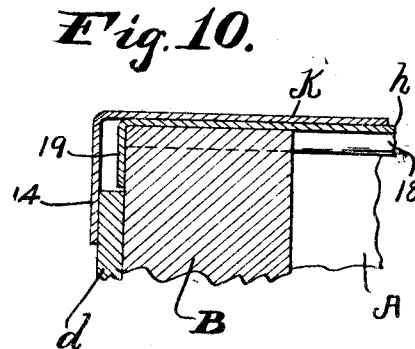
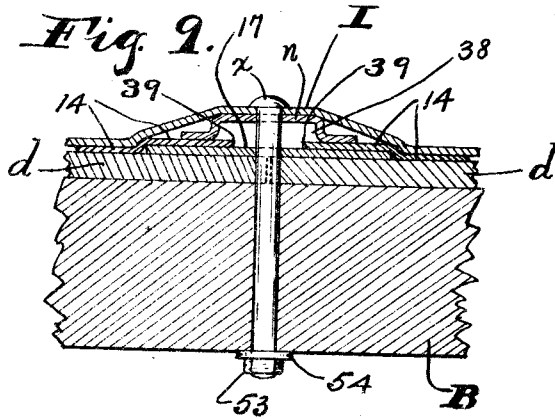
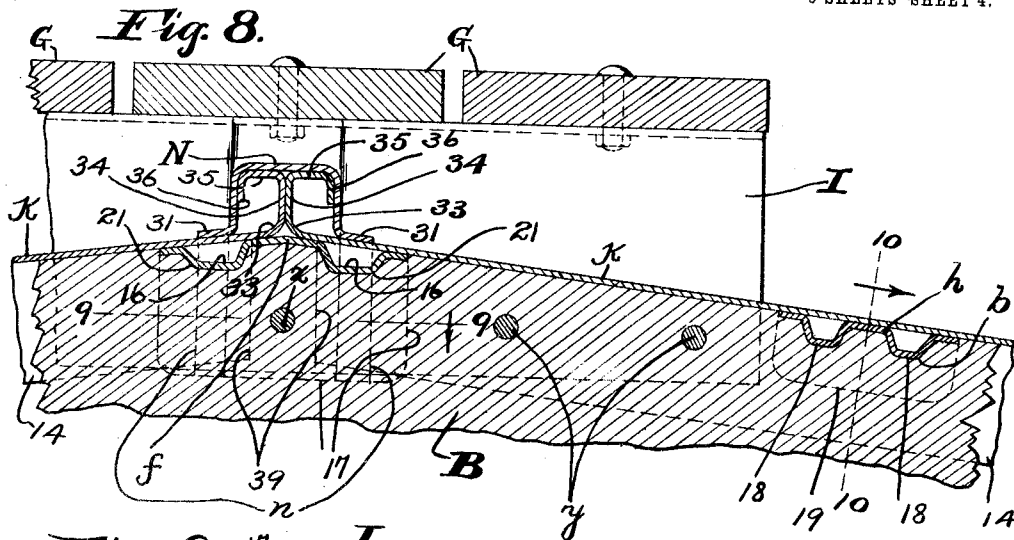
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W. S. BIDLE & J. A. COSTELLO.
CAR ROOF CONSTRUCTION.
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6 SHEETS—SHEET 4.



Witnesses:
H. J. Gattins.
B. C. Brown.

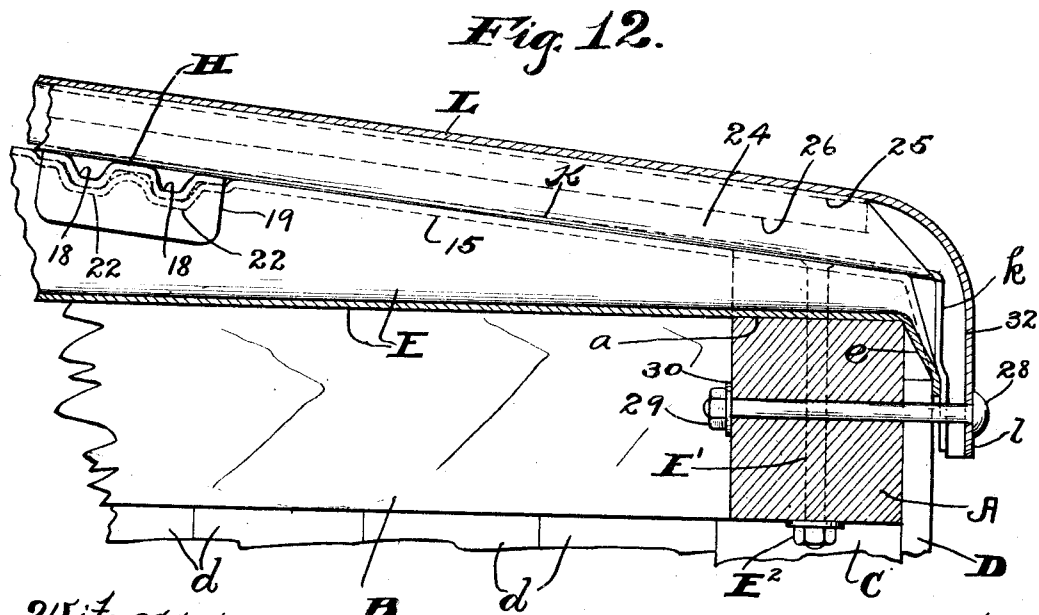
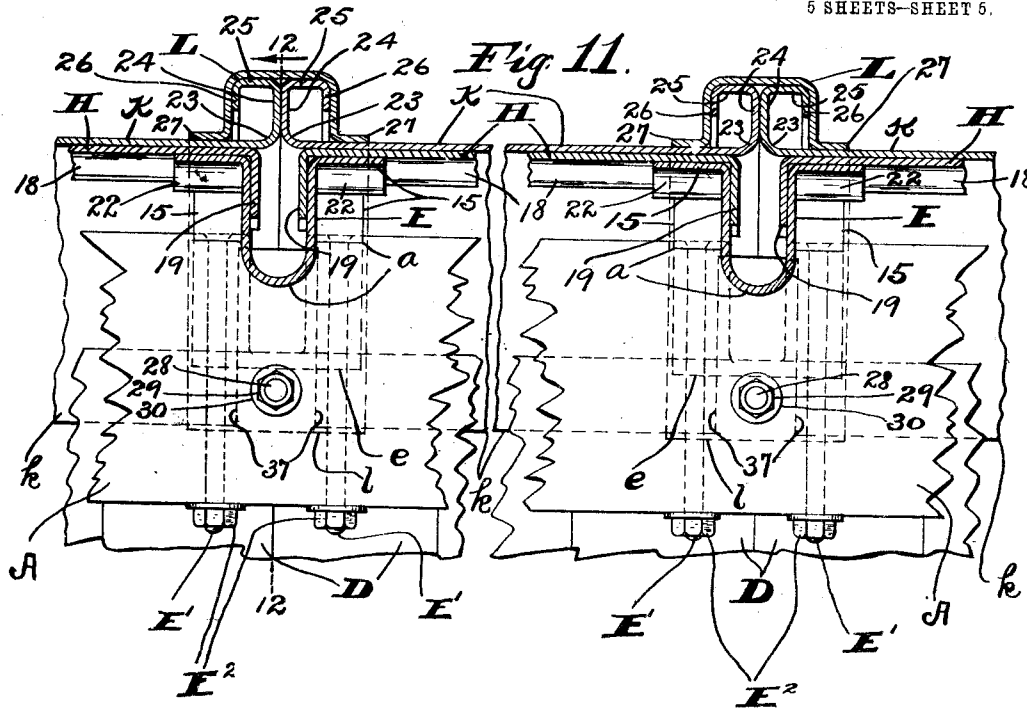
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W. S. BIDLE & J. A. COSTELLO.
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APPLICATION FILED JULY 17, 1911.

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5 SHEETS—SHEET 5.



Witnesses:
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Inventors
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UNITED STATES PATENT OFFICE.

WILLIAM S. BIDLE AND JOSEPH A. COSTELLO, OF CLEVELAND, OHIO, ASSIGNORS TO
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CAR-ROOF CONSTRUCTION.

1,064,958.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed July 17, 1911. Serial No. 638,857.

To all whom it may concern:

Be it known that we, WILLIAM S. BIDLE and JOSEPH A. COSTELLO, citizens of the United States of America, residing at Cleveland, in the county of Cuyahoga, State of Ohio, have invented certain new and useful Improvements in Car-Roof Construction; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to improvements in car-roofs, and pertains more especially to an improved car-roof construction for a railway box-car.

The primary object of this invention is to prevent the blowing of snow, rain and cinders by the wind into a box-car at the joints formed between the component parts of the roof of the car.

Another object is to construct a car-roof whose component parts are readily assembled and secured in place.

Another object is to provide a car-roof which is simple and durable in construction and readily and inexpensively repaired.

Another object is to adequately ventilate the interior or inner surfaces of the component parts of the car-roof.

With these objects in view, and to the end of attaining any other advantage herein-after appearing, this invention consists in certain structural features, and combinations and arrangement of parts, hereinafter described, pointed out in the claims, and illustrated in the accompanying drawings.

In the said drawings, Figure 1 is a top plan of the left-hand end-portion of a car-roof embodying our invention. Fig. 2 is a top plan of the right-hand end-portion of the said roof. Fig. 3 is a vertical section on line 3—3, Fig. 1, looking in the direction indicated by the arrow. Fig. 4 is a vertical section on line 4—4, Fig. 3, looking in the direction indicated by the arrow. Fig. 5 is a vertical section on line 5—5, Fig. 3. Fig. 6 is a horizontal section on line 6—6, Fig. 3, looking downwardly. Fig. 7 is a vertical section on line 7—7, Fig. 1, looking in the direction indicated by the arrow. Fig. 8 is a vertical section on line 8—8, Fig. 7, looking outwardly, the section being taken through an end purlin-bar as well as

through an end ridge-bar. Fig. 9 is a horizontal section on line 9—9, Fig. 8, looking downwardly. Fig. 10 is a vertical section on line 10—10, Fig. 8, looking in the direction indicated by the arrow. Fig. 11 is a vertical section on line 11—11, Fig. 1, looking in the direction indicated by the arrow. Fig. 12 is a vertical section on line 12—12, Fig. 11, looking in the direction indicated by the arrow.

Portions are broken away in the drawings to reduce the size of the same, and to more clearly illustrate certain features of construction, and Figs. from 3 to 12 inclusive are drawn on a larger scale than Figs. 1 and 2.

The framework of our improved car-roof, as shown in Figs. 1 and 2, comprises two laterally spaced side plates A and A which extend longitudinally or endwise of the car-roof and are arranged substantially horizontally and parallel. The side plates A are connected together at their ends by beams B. Under each side plate A, at each end of the frame of the car-roof, is arranged a post C. Each side plate A has its outer side overlapped by car-siding D. Each end beam B has its outer side overlapped by car-siding d.

Metal carlines, which comprise each a trough E, are arranged transversely and spaced longitudinally of the car-roof, being arranged between and spaced from the ends of the car-roof. That is, the carlines are spaced laterally between the end beams B. The trough E of each carline bridges the space between and is supported from the side plates A which are preferably recessed, as at a, at the top thereof to receive the said trough. The troughs E of the carlines are therefore set into the side plates A at the top of the side plates and are thereby prevented from displacement endwise of the side plates. The trough E of each carline at the outer side of each side plate A has a downwardly projecting end-portion e extending to and overlapping the outer side of the car-siding D adjacent the said side-plate. One of the carlines is shown exposed in Fig. 2, and the shape of the carlines is also shown in Figs. 3, 4, 5, 11 and 12. The trough E of each carline slopes at the top thereof from the outer side of each side plate upwardly to a point centrally between the ends

of the carline. Each carline is provided at the top and externally of its trough E with two laterally and outwardly projecting flanges 15 and 15 which are arranged at opposite sides respectively and extend longitudinally of the said trough. Each carline is rigidly secured at its flanges 15 (see Figs. 2, 11 and 12) by suitably applied bolts E' and nuts E², to the side plates A.

10 Instead of employing a ridge-pole extending from end to end of the car, we employ metal ridge-bars F and f (see Figs. 2, 3, 4, 5, 7 and 8) and adjacent carlines are connected together centrally between their ends by a metal ridge-bar F, and each end beam B is connected to the adjacent carline by a ridge-bar f. The bars F and f extend longitudinally of the car-roof and are arranged centrally between and parallel with the side plates A. The bars F and f are each shaped in cross-section to form two troughs 16 arranged side by side and extending longitudinally of the roof at opposite sides respectively of the ridge of the roof. Each side portion of the trough E of each carline is provided at the top of the carline with two depressed seats 20 arranged at opposite sides respectively of the said ridge to receive the troughs 16 of a ridge-bar. Each bar F extends therefore between and is seated at its ends in the adjacent side portions of the troughs E of adjacent carlines. Each bar f is seated, at its inner end, in the adjacent side portion of the trough E of the adjacent carline and, at its outer end, in the adjacent end beam B which is recessed, as at 21, Fig. 8, to receive the said bar.

Each ridge-bar is provided, at each end thereof, with a depending flange 17 which extends across the said end of the bar from the outer side of each trough 16 of the bar to the outer side of the other trough 16 of the bar. The flange 17 of each end of each bar F overlaps the inner surface of the side portion of the trough E of the carline in which the said end of the said bar is seated and depends into the said trough. The flanges 17 of each bar F cooperate with the side portions of the troughs E of the carlines in which the said bar is seated in limiting endwise displacement of the said bar. Each end ridge-bar f has the flange 17 formed on its outer end (see Fig. 7) depending at the outer side of the car-siding d which overlaps the outer side of the adjacent end beam E, and the said beam and the said flange limit endwise displacement of the said bar in one direction, whereas the flange 17 of the other end of the said bar and the inner surface of the side portion of the trough E of the carline in which the inner end of the said bar is seated limit endwise displacement of the said bar in the opposite direction.

Instead of employing purlins extending from end to end of the roof, we employ

metal purlin-bars H and h (see Figs. 2, 3, 8, 10, 11 and 12) and adjacent carlines are connected together, at a plurality of points between each side plate A and the ridge-bar F connecting the said carlines together, by a purlin-bar H, and each end beam B is connected to the adjacent carline at a plurality of points between each side plate A and the ridge-bar f connecting the said carline to the said beam, by a purlin-bar h. The bars H and h extend longitudinally of the roof and are parallel with the ridge-bars and consequently with the side plates A. The bars H and h are each shaped in cross-section to form two troughs 18 arranged side by side and extending longitudinally of the roof. Each side portion of the trough E of each carline is provided at the top of the carline with two depressed seats 22 spaced longitudinally of the said carline and arranged to receive the troughs 18 of a purlin-bar. Each bar H extends therefore between and is seated at its ends in the adjacent side portions of the troughs E of adjacent carlines. Each bar h is seated, at its inner end, in the adjacent side portion of the trough E of the adjacent carline and at its outer end in the adjacent end beam B which is recessed, as at b, Fig. 8, to receive the said bar.

Each purlin-bar is provided at each end thereof with a depending flange 19 which extends across the said end of the bar from the outer side of each trough 18 of the bar to the outer side of the other trough 18 of the bar. The flange 19 of each end of each bar H overlaps the inner surface of the side portion of the trough E of the carline in which the said end of the said bar is seated and depends into the said trough. The flanges 19 of each bar H cooperate with the side portions of the troughs E of the carlines in which the said bar is seated in limiting endwise displacement of the said bar. Each end bar h has the flange 19 formed on its outer end overlapping the outer side of the adjacent end beam B (see Fig. 10) and the said beam and the said flange limit endwise displacement of the said bar in one direction, whereas the flange 19 on the inner end of the said bar and the inner surface of the side portion of the trough E of the carline in which the said inner end of the said bar is seated limit endwise displacement of the said bar in the opposite direction.

By the construction hereinbefore described, it will be observed of course that the bars F and H are free to expand endwise and, when uncovered, removable upwardly from the connected troughs for renewal or repairs, and that the bars f and h are free to expand endwise and removable upwardly, when uncovered, from the connected troughs and end beams for renewal or repairs.

The side plates A, the end beams B, the carlines, the purlin-bars, the ridge-bars and

the spaces between the said parts are covered by sheet-metal roofing which comprises metal roofing-sheets K, metal caps L and metal caps N, and it will be observed that at each side of the ridge of the roof two suitably supported metal roofing-sheets K extend (see Figs. 2 and 11) from over each carline laterally of the said carline in opposite directions respectively and also extend longitudinally of the carline (see Figs. 2, 4, 5 and 12) and over and beyond the outer side of the side plate at the said side of the ridge of the roof, and each roofing-sheet K at the outer side of each side plate A (see Figs. 2, 3, 11 and 12) has a downwardly projecting end-portion *k* arranged at the outer side of the adjacent downwardly projecting end-portion *e* of the trough E of the said carline, and the said roofing-sheet K curves or slopes, as at 23, (see Fig. 11) upwardly over the said carline to a point substantially central between the sides of the carline—that is, between the flanges 15 of the carline,—and at the said point has an upwardly projecting side portion 24 which extends longitudinally of the said carline and terminates in a flange 25 which projects laterally of the said side portion over and is spaced from the body of the said roofing-sheet, which flange extends longitudinally of the said side portion of the said roofing-section and has a downwardly bent portion 26 extending longitudinally of the flange. Each end-roofing-sheet K (see Figs. 7, 8, 9 and 10) of course projects downwardly, as at 11, at the outer side of the car-siding *d* which overlaps the outer side of the adjacent end beam B, but obviously each intermediate roofing-sheet K,—that is, each roofing-sheet bridging the space between two adjacent carlines,—has two upwardly projecting side portions 24 arranged over and extending along the adjacent carlines respectively. Adjacent flanged side portions 24 of adjacent roofing-sheets K are therefore oppositely arranged and contiguous, and a cap L for the said side portions of the said roofing-sheets is provided, which cap covers and extends longitudinally of the flanges 25 of the said side portions of the said roofing-sheets and snugly engages the outer sides of the downwardly bent portions 26 of the said flanges and connects and holds the said side portions of the said roofing sheets together. The adjacent side portions 24 of adjacent roofing-sheets K and the curve or slope 23 of the said roofing-sheets over the carline overlapped in common by the said roofing-sheets permit a limited expansion and contraction of the said roofing-sheets longitudinally of the roof without interfering with the maintenance of a snug engagement between the adjacent roofing-cap L and the downwardly bent portions 26 of the flanges 25 of the said portions of the said roofing-

sheets. Each cap L is provided externally with two laterally and outwardly projecting flanges 27 arranged at opposite sides respectively and extending longitudinally of the cap and overlapping the bodies of the roofing-sheets K whose adjacent side portions 24 are covered by the said cap, and the said cap at the outer side of the adjacent side plate A (see Fig. 12) has an end portion *l* arranged at the outer side of the adjacent downwardly projecting end-portions *k* of the said roofing-sheets and projecting downwardly below the adjacent downwardly projecting end-portion *e* of the trough E of the adjacent carline.

Each downwardly projecting end-portion *l* of each cap L is attached to the adjacent side plate A preferably by means comprising a horizontally arranged bolt 28 and a nut 29. The said bolt 28 has its head arranged at the outer side of the said portion of the said cap and has its shank extending horizontally through the said portion of the cap at a point below the adjacent downwardly projecting end-portion *e* of the body E of the adjacent carline and through the adjacent side plate. The said nut 29 is screwed onto the said shank at the inner side of the said side plate, and a washer 30 is interposed between the said nut and the side plate.

Each roofing-sheet K extends over the adjacent trough 16 of the adjacent ridge-bar. It will be observed that each ridge-bar is overlapped on top by two roofing-sheets K which are arranged at opposite sides respectively of the ridge of the roof; that one of the said roofing-sheets extends over and across one of the troughs 16 of the said ridge-bar, and that the other of the said roofing-sheets extends over and across the other of the said troughs. Each roofing-sheet K curves or slopes, as at 33, (see Figs. 5 and 8) upwardly over the ridge-bar overlapped by the said roofing-sheet to a point substantially centrally between the troughs 16 of the said ridge-bar,—that is, centrally between the side edges of the ridge-bar,—and at the said point has an upwardly projecting portion 34 which extends longitudinally of the said ridge-bar and terminates in a flange 35 which projects in the direction of the side plate A overlapped by the said roofing-sheet and is spaced from the body of the said roofing-sheet, which flange extends longitudinally of the said upwardly projecting portion of the said roofing-sheet, and consequently longitudinally of the said ridge-bar, and has a downwardly bent portion 36 extending longitudinally of the flange. It will be observed that adjacent flanged portions 34 of adjacent roofing-sheets K which are arranged at opposite sides respectively of the ridge of the roof are contiguous and covered

(see Figs. 1, 2, 3, 5, 6, 7 and 8) by a cap N which extends longitudinally of the flanges 35 of the upwardly projecting portions 34 of the said roofing-sheets and snugly engages the outer sides of the downwardly bent portions 36 of the said flange and connects and holds the said portions 34 of the said roofing-sheets together. Preferably the portions 36 of the said flanges 35 of the said roofing-sheets are so tightly engaged by the cap N applied to the said flanges that the application of the said cap to the said portions of the said flanges places the said portions of the said flanges under tension. We would here remark that the adjacent upwardly projecting portions 34 of adjacent roofing-sheets arranged at opposite sides respectively of the ridge of the roof and the curve or slope 33 of the said roofing-sheets over the ridge-bar overlapped in common by the said roofing-sheets permit a limited expansion and contraction of the said roofing-sheets transversely of the roof without interfering with the maintenance of a snug engagement between the adjacent roofing-cap N and the downwardly bent portions 36 of the flanges 35 of the said portions 34 of the said roofing-sheets.

Each cap N is provided externally and over the adjacent ridge-bar with two laterally and outwardly projecting flanges 31 arranged at opposite sides respectively and extending longitudinally of the cap and overlapping the bodies of the roofing-sheets whose adjacent upwardly projecting portions 34 are covered by the said cap over the said ridge-bar.

Each cap N which extends longitudinally of the projecting portions 34 of adjacent end roofing-sheets K extends to and beyond the outer side of the adjacent end beam B (see Figs. 7, 8 and 9) and has a downwardly projecting end portion *n* arranged at the outer side of the adjacent downwardly bent portions 14 of the said roofing-sheets and consequently at the outer side of the adjacent downwardly projecting flange 17 of the adjacent end ridge-bar *f*.

By the construction hereinbefore described it will be observed that each end portion *l* of each roofing-cap L forms an air-conducting passageway 32 which (see Fig. 12) is arranged interiorly and extends longitudinally of the said portion of the said roofing-cap and communicates with the external atmosphere at the lower extremity of the said portion of the said roofing-cap. The end portions *k* of the roofing-sheets K arranged adjacent each roofing-cap L (see Figs. 2 and 11) are separated, as at 37, longitudinally of the adjacent side plate A so that the said passageway 32 in the said roofing-cap is in communication with the trough E of the adjacent carline. The space next under the flanges 25 of adjacent side portions 24 of

adjacent roofing-sheets are obviously also in communication with the passageway 32 formed interiorly of the adjacent end portion *l* of the adjacent roofing-cap L. It will be observed also that the troughs 16 of the ridge-bars connected to each carline and the troughs 18 of the purlin-bars connected to the said carline communicate with the interior of the trough E of the said carline and are consequently in communication with the air-conducting passageway 32 formed in the end portions *l* of the roofing-caps L arranged over the said carline. It will be observed also that each end portion *n* of each end roofing-cap N forms an air-conducting passageway 38 which (see Figs. 7 and 9) is arranged interiorly and extends longitudinally of the said portion of the said roofing-cap and communicates with the external atmosphere at the lower extremity of the said portion of the said roofing-cap; that the downwardly bent portions 14 of adjacent end roofing-sections K are (see Figs. 8 and 9) separated, as at 39, longitudinally of the adjacent end beam B so that the passageway 38 in the adjacent roofing-cap N is in communication with the interior of the troughs 16 of the adjacent end ridge-bar *f*; that the space next under the flanges 35 of adjacent side portions 34 of adjacent end roofing-sections K arranged at opposite sides respectively of the ridge of the roof are obviously also in communication with the passageway 38 formed interiorly of the end portion *n* of the adjacent end roofing-cap N; that obviously therefore the troughs 16 of the ridge-bars, the troughs 18 of the purlin-bars and the troughs E of the carlines are all in communication with the passageways 32 formed in the end portions *l* of the roofing-caps L and with the passageways 38 formed in the end portions *n* of the end roofing-caps N, and consequently the interior or inner surfaces of the component parts of our improved roof and the interior of the car provided with the said roof are adequately ventilated. The hereinbefore described ventilation of the component parts of the car-roof and the interior of the car provided with the said roof successfully prevents sweating of the car interiorly, and consequently the car is kept in a dry condition.

Each carline is provided centrally between the ends of the carline with a rivet J which (see Figs. 3, 4 and 5) is arranged horizontally and transversely of the said carline. The said rivet extends between the sides of the trough E of the said carline and is embraced centrally between its ends, and consequently within the said trough, by the eye 40 formed on the lower end of the lower section R of a substantially vertically arranged eye-bolt which comprises the said section R and an upper section *a*. It will be observed therefore that the said eye-bolt is arranged

centrally between the sides of the trough E of the said carline and centrally between the ends of the said carline and connected to the carline centrally between the ends of the carline. The lower section R of the said eye-bolt projects a suitable distance above the said carline and terminates at its upper end in a vertically arranged socket 42, and the upper section *r* of the bolt extends from within the said socket vertically upwardly. The upper bolt-section *r* preferably has its lower portion screw-threaded externally and screwed into the socket 42 of the lower bolt-section R, which socket is correspondingly screw-threaded internally to receive the upper bolt-section. The said eye-bolt is provided intermediate its upper extremity and the carline to which it is connected with an upwardly facing shoulder 43 which is formed around the upper section of the said bolt by the upper end of the socket 42 of the lower section of the bolt. The upwardly facing shoulder 43 of the said eye-bolt is overlapped by and forms a seat for an arm 44 which extends around the upper section of the said bolt and is formed on and projects from one of the adjacent roofing-caps N, and the other of the said roofing-caps has an arm 45 which projects over and rests on the arm 44 and extends around the said upper bolt-section. The said upper bolt-section also extends upwardly through an arm 46 which is formed on and projects from one of the adjacent roofing-caps L, which arm therefore extends around the said bolt-section and rests on the arm 45 of one of the adjacent roofing-caps N, and the other of the said roofing-caps L is provided with a projecting arm 47 which overlaps the arm 46 and extends around the said bolt-section. In other words, the upper section *r* of the eye-bolt extends loosely through arms 44, 45, 46 and 47 formed on the adjacent roofing-caps L and N, which arms are superimposed over the shoulder 43 formed on and circumferentially of the eye-bolt by the upper end of the lower bolt-section R, and the upper bolt-section projects above the uppermost of the said superimposed arms and extends a suitable distance above and loosely through a cap T which forms the body of a running-board-saddle and rests on and extends over the uppermost of the said arms and also extends around the upper bolt-section R, and the said last-mentioned cap or saddle-body has portions 48 resting on and snugly embracing and conforming to the adjacent roofing-caps L and other portions 49 resting on and snugly embracing and conforming to the roofing-caps N. The said cap or saddle-body T is therefore seated on the roofing-caps L and N. The portions 48 and 49 of the cap or saddle-body T extend over and between the flanges 27 and 31 of the adjacent roofing-caps L and N, as at 50,

(see Figs. 5 and 6) and cover the said flanges. The top of the central portion of the cap or saddle-body T forms a seat for a horizontally arranged metal plate P which forms the top of the aforesaid running-board-saddle and is mounted on the said cap or saddle-body, and the portions 48 of the said cap or saddle-body are provided with seats 52 for the said plate or saddle-top, and a nut *s* is screwed at the upper side of the said plate or saddle top onto the upper bolt-section *r* which has its upper portion correspondingly externally screw-threaded to receive the said nut and extends loosely through and above the said plate or saddle-top. Upon tightening the said nut the said plate or saddle-top, the said cap or saddle-body T and the arms 44, 45, 46 and 47 of the adjacent roofing-caps L and N are clamped by the nut to the shoulder 43 of the bolt and a removable pin Q extending (see Fig. 3) transversely of and through the socket 42 of the lower section R of said bolt and through the upper section of said bolt prevents rotation of said bolt-section during the manipulation of said nut. The employment of a sectional bolt, as hereinbefore described in securing the plate or saddle-top P, the cap or saddle-body T and the arms 44, 45, 46 and 47 of the adjacent roofing-caps L and N to the shoulder 43 on the bolt is important because thereby only a renewal of the upper section of the bolt is required should the threads of the said bolt-section be stripped by undue strain upon the nut.

Three running boards G (see Figs. 1, 2, 3, 4, 5, 7 and 8) are shown arranged in the same plane horizontally and above the car-roof centrally between the side plates and extending longitudinally of and from end to end of the roof. The boards G rest on the plates or saddle-tops P and at the ends of the car-roof (see Figs. 1, 2, 7, 8 and 9) are secured to and supported from suitably applied brackets I which are preferably secured to the end-beams B by suitably applied bolts *x* and *y*, shown in Figs. 8 and 9. The running boards G are secured in place in any approved manner, and the intermediate of the said running boards is recessed in its under side, as at *g*, to accommodate the location of the nuts *s* and the bolts engaged by the said nuts.

Each downwardly projecting end portion *n* of each end cap N (see Figs. 7, 8 and 9) is shown attached to the adjacent end beam B, preferably by means comprising the bolt *x* employed in securing the adjacent bracket I to the said beam, which bracket overlaps the outer side of the said end portion of the said cap. The said bolt *x* has its head arranged at the outer side of the said bracket and has its shank extending horizontally through the said portion of the cap and through the adjacent downwardly pro-

jecting flange 17 of the adjacent end ridge-bar *f* and through the adjacent beam B. A nut 53 is screwed onto the shank of the said bolt *x* at the inner side of the said beam B, and a washer 54 is interposed between the said nut and the said beam.

The lower section I of each eye-bolt, by the construction hereinbefore described, extends between the adjacent flanges 17 of the adjacent ridge-bars, and we would here remark that the said bolt-section has preferably such thickness that the said flanges are spaced from the said bolt-section so as to prevent the said bolt-section from interfering with a limited expansion of the said ridge-bars.

The employment of ridge-bars R and *r* and purlin-bars H and *h* as hereinbefore described, instead of a ridge-pole and purlins extending from end to end of the car, is not unimportant because the ridge-bars R and *r* and the purlin-bars H and *h* applied in accordance with our invention have a limited endwise expansion and contraction without interfering with other parts of the roof, and mutilation of or injury to any ridge-bar or to any purlin-bar from any cause only necessitates the renewal or repair of the affected bar without interfering with the remaining bars.

By the construction hereinbefore described it will be observed that each carline is overlapped by four metal roofing-sheets; that two of the said roofing-sheets are arranged wholly at one side of the ridge of the roof; that the other two of the said sheets are arranged wholly at the opposite side of the ridge; that the roofing-sheets at the same side of the said ridge extend from over the said carline laterally of the carline in opposite directions respectively and have upwardly projecting contiguous portions which extend longitudinally of the carline; that the roofing-sheets which are arranged at opposite sides respectively of the said ridge but extend laterally of the same side of the said carline have upwardly projecting contiguous portions extending longitudinally of the ridge; that the caps covering the upwardly projecting portions of the said roofing-sheets have superimposed arms arranged centrally between the ends of the carline; that the said caps are embraced in common by the body of a running-board-saddle; that said caps and said running-board-saddle are clamped to the shoulder 43 of the section R of the adjacent eye-bolt, and that said caps, by clamping them and said saddle to said shoulder are not clamped down against the roofing-sheets so as not to interfere with expansion and contraction of the roofing-sheets.

What we claim is:—

1. In car-roof construction, the two laterally spaced side plates; an end beam at

each end of the roof, which beam connects the side plates together; metal carlines spaced longitudinally of the roof and comprising each a trough which bridges the space between and is supported from the side plates; several bars arranged longitudinally of the roof at several points between the side plates and spaced endwise, and metal roofing covering the said bars, the carlines, the end beams and the side plates and extending from end to end of the roof, each bar being provided with two end flanges formed on opposite ends respectively, each end bar extending between and being supported from the adjacent end beam and the adjacent carline and having its outer end flange arranged at the outer side of the said beam and having its inner end flange overlapping the inner surface of the adjacent side portion of the trough of the said carline, and each intermediate bar extending between and being supported from two adjacent carlines and having its end flanges overlapping the inner surfaces of the adjacent side portions of the troughs of the said carlines.

2. In car-roof construction, the two laterally spaced side plates; an end beam at each end of the roof, which beam extends between the side plates; metal carlines spaced longitudinally of the roof and bridging the space between and supported from the side plates; metal ridge-bars arranged centrally between the side plates and longitudinally of the roof and spaced endwise, and metal roofing covering the ridge-bars, the carlines, the end beams and the side plates and extending from end to end of the roof, each end ridge-bar extending between and being supported from the adjacent end beam and the adjacent carline, and each intermediate ridge-bar extending between and being supported from two adjacent carlines and said bars being free to expand endwise and free to be removed upwardly when uncovered.

3. In car-roof construction, the two laterally spaced side plates; end beams connecting the side plates together at opposite ends respectively of the roof; metal carlines spaced longitudinally of the side plates and comprising each a trough which bridges the space between and is supported from the side plates; metal ridge-bars arranged centrally between and substantially parallel with the side plates and spaced endwise, and metal roofing covering the ridge-bars, the carlines, the end beams and the side plates and extending from end to end of the roof, each ridge-bar being provided at each end with a flange which extends transversely of the ridge-bar, each end ridge-bar extending between and being seated in the adjacent end beam and the adjacent carline and having its outer end flange arranged at the outer side of the said beam and having the inner

end flange depending into the trough of the adjacent carline, and each intermediate ridge-bar extending between and being supported from two adjacent carlines and having its end flanges depending into the troughs of the said carlines.

4. In car-roof construction, the two laterally spaced side plates; an end beam at each end of the roof, which beam extends between the side plates; metal carlines spaced longitudinally of the roof and comprising each a trough which bridges the space between and is supported from the side plates; metal ridge-bars arranged centrally between the side plates and longitudinally of the roof and spaced endwise; metal purlin-bars arranged longitudinally of the roof between the ridge of the roof and the side plates and spaced endwise, and metal roofing covering the purlin-bars, the ridge-bars, the end beams, the side plates and the intervening spaces, each end ridge-bar and each end purlin-bar extending between and being supported from the adjacent end beam and the adjacent carline and having each a flange at the outer side of the said beam and another flange overlapping the inner surface of the adjacent side portion of the trough of the said carline, and each intermediate ridge-bar and each intermediate purlin-bar extending between and being supported from two adjacent carlines and having flanges overlapping the inner surfaces of the side portions of the troughs of the said carlines.

5. In car-roof construction, the combination, with the two laterally spaced side plates; car-siding overlapping the outer sides of the side plates; an end beam at each end of the roof, which beam extends between the side plates, and metal carlines spaced longitudinally of the roof and comprising each a trough which bridges the space between and is supported from the side plates and placed in communication with the external atmosphere at the outer side of the aforesaid car-siding, of several metal bars arranged longitudinally of the roof at several points between the side plates and spaced endwise, which bars are each shaped in cross-section to form troughs extending longitudinally of the roof, and metal roofing covering the bars, the carlines, the end beams and the side plates and extending from end to end of the roof, each end bar extending between and being supported from the adjacent end beam and the adjacent carline and having its troughs in communication with the trough of the said carline, and each intermediate bar extending between and being supported from two adjacent carlines and having its troughs in communication with the troughs of the said carlines.

6. In car-roof construction, the combina-

tion, with the two laterally spaced side plates; an end beam at each end of the roof, which beam connects the side plates together; car-siding overlapping the outer side of the said beam, and metal carlines spaced longitudinally of the roof and comprising each a trough which bridges the space between and is supported from the side plates, of metal ridge-bars arranged centrally between the side plates and longitudinally of the roof and spaced endwise, which ridge-bars comprise each a trough extending longitudinally of the roof, and metal roofing covering the ridge bars, the carlines, the end beams and the side plates and extending from end to end of the roof, each end ridge-bar extending between and being supported from the adjacent end beam and the adjacent carline and having its trough in communication with the trough of the said carline and with the external atmosphere at the outer side of the car-siding overlapping the said beam, and each intermediate ridge-bar extending between and being supported from two adjacent carlines and having its trough in communication with the troughs of the said carlines.

7. In car-roof construction, the combination, with the two laterally spaced side plates; an end beam at each end of the roof, which beam connects the side plates together; car-siding overlapping the outer side of the said beam, and metal carlines spaced longitudinally of the roof and comprising each a trough which bridges the space between and is supported from the side plates, of metal ridge-bars arranged centrally between the side plates and longitudinally of the roof and spaced endwise, which ridge-bars are each shaped in cross-section to form two troughs extending longitudinally of the roof at opposite sides respectively of the ridge of the roof, and metal roofing covering the ridge-bars, the carlines, the end beams and the side plates and extending from end to end of the roof, each end ridge-bar extending between and being supported from the adjacent end beam and the adjacent carline and having its troughs in communication with the trough of the said carline and with the external atmosphere at the outer side of the car-siding overlapping the said beam, and each intermediate ridge-bar extending between and being supported from two adjacent carlines and having its troughs in communication with the troughs of the said carlines.

8. In car-roof construction, the two laterally spaced side plates; car-siding overlapping the outer sides of the side plates; an end beam at each end of the roof, which beam connects the side plates together; car-siding overlapping the outer side of the said beam; metal carlines spaced longitudinally of the roof and comprising each a trough

which bridges the space between and is supported from the side plates, and metal roofing covering the carlines, the end beams and the side plates and extending from end to end of the roof, each of the aforesaid carlines having its trough in communication at its ends with the external atmosphere at the outer side of the first-mentioned car-siding, and means whereby said trough is placed in communication between the aforesaid side plates with the external atmosphere at the outer side of the car-siding overlapping the aforesaid end beam.

9. In car-roof construction, the two laterally spaced side plates; car-siding at the outer sides of the side plates; end beams connecting the side plates together at the ends of the roof; metal carlines forming troughs which are spaced longitudinally of the roof and bridge the space between and are supported from the side plates and placed in communication with the external atmosphere at the outer side of the aforesaid car-siding; metal ridge-bars arranged centrally between the side plates and longitudinally of the roof and spaced endwise and comprising each a trough extending longitudinally of the roof; metal purlin-bars arranged longitudinally of the roof between the aforesaid ridge and the side plates and spaced endwise and comprising each a trough extending longitudinally of the roof, and metal roofing covering the purlin-bars, the ridge-bars, the carlines, the end beams, the side plates and the intervening spaces, each end ridge-bar and each end purlin bar extending between and being supported from the adjacent end beam and the adjacent carline and having their troughs in communication with the trough of the said carline, and each intermediate ridge-bar and each intermediate purlin bar extending between and being supported from two adjacent carlines and having their troughs in communication with the troughs of the said carlines.

10. In car-roof construction, the combination, with the two laterally spaced side plates, a carline bridging the space between and connected to the side plates, and an upright member arranged centrally between the ends of and connected to and projecting above the carline and provided with an upwardly facing shoulder, of four metal roofing sheets overlapping the carline, two of said roofing-sheets being arranged at one side of the ridge of the roof and the other roofing-sheets being arranged at the opposite side of the ridge, the roofing-sheets at the same side of said ridge extending from over the carline laterally of the carline in opposite directions and having upwardly projecting side portions which extend longitudinally of the carline, the roofing sheets which are arranged at opposite sides of the

ridge but extend laterally of the same side of the carline having upwardly projecting portions extending longitudinally of the ridge; caps covering the upwardly projecting portions of the roofing-sheets and having superimposed members extending over the aforesaid shoulder, and a running-board-saddle arranged over the uppermost of said superimposed members and clamped with said superimposed members to said shoulder.

11. In car-roof construction, the combination, with a suitably supported carline, and a running-board-saddle arranged above the carline centrally between the ends of the carline, of an upright bolt arranged centrally between the ends of the carline and comprising a lower section and an upper section, the lower bolt-section being connected to the carline and having its upper end forming an upwardly facing shoulder arranged below the aforesaid saddle, and the upper bolt-section being removably secured to the lower bolt-section and extending from the latter through and above said saddle, and a nut screwed at the top of said saddle onto the upper bolt-section and clamping said saddle to the aforesaid shoulder.

12. In car-roof construction, the combination, with a suitably supported carline, and a running-board-saddle arranged above the carline centrally between the ends of the carline, of an upright bolt arranged centrally between the ends of the carline and comprising a lower section and an upper section, the lower bolt-section being connected to the carline and terminating at its upper end in a socket which has its upper end forming an upwardly facing shoulder arranged below the aforesaid saddle, and the upper bolt-section being screwed into said socket and extending through and above said saddle, and a nut screwed at the top of said saddle onto the upper bolt-section and clamping said saddle to the aforesaid shoulder.

13. In car-roof construction, the combination, with a suitably supported carline, and a running-board-saddle arranged above the carline centrally between the ends of the carline, of an upright bolt arranged centrally between the ends of the carline and comprising a lower section and an upper section, the lower bolt-section being connected to the carline and terminating at its upper end in a socket which has its upper end forming an upwardly facing shoulder arranged below the aforesaid saddle, and the upper bolt-section being screwed into said socket and extending through and above said saddle; a removable pin extending transversely of and through said socket and through the upper bolt-section, and a nut screwed at the top of said saddle onto

the upper bolt-section and clamping said saddle to the aforesaid shoulder.

14. In car-roof construction, the combination, with the two laterally spaced side plates, a carline bridging the space between and connected to the side plates, and four metal roofing-sheets overlapping the carline, two of said roofing-sheets being arranged at one side of the ridge of the roof and the other roofing-sheets being arranged at the opposite side of the ridge, the roofing-sheets at the same side of the said ridge extending from over the carline laterally of the carline in opposite directions respectively and having upwardly projecting side portions which extend longitudinally of the carline, the roofing-sheets which are arranged at opposite sides respectively of the ridge but extend laterally of the same side of the carline having upwardly projecting portions extending longitudinally of the ridge; caps covering the upwardly projecting portions of the roofing-sheets and having superimposed arms arranged centrally between the ends of the carline; another cap forming the body of a running board-saddle and extending over the uppermost of the said arms and mounted on the aforesaid caps, and a plate forming the top of said saddle and mounted on said saddle-body-forming cap, of an upright bolt arranged centrally between the ends of the carline and comprising a lower section and an upper section, the lower bolt-section being connected to the carline and having its upper end forming a seat for the lowermost of the aforesaid arms, and the upper bolt-section being removably secured to the lower bolt-section and extending from the latter through the said arms and through the aforesaid saddle-body-forming cap and through and above the aforesaid plate, and a nut screwed onto the upper bolt-section at the top of the plate.

15. In car-roof construction, the combination, with the two laterally spaced side plates, a carline bridging the space between and connected to the side plates, and four metal roofing-sheets overlapping the carline, two of said roofing-sheets being arranged at one side of the ridge of the roof, and the other roofing-sheets being arranged at the opposite side of the ridge, the roofing-sheets at the same side of the said ridge extending from over the carline laterally of the carline in opposite directions and having upwardly projecting side portions which extend longitudinally of the carline, the roofing-sheets which are arranged at opposite sides respectively of the said ridge but extend laterally of the same side of the carline having upwardly projecting portions extending longitudinally of the ridge; caps covering the upwardly projecting por-

tions of the roofing-sheets and having superimposed arms arranged centrally between the ends of the carline; another cap forming the body of a running board saddle plate and extending over the uppermost of the said arms and mounted on the aforesaid caps, and a plate forming the top of said saddle and mounted on said saddle-body forming cap, of an upright bolt arranged centrally between the ends of the carline and comprising a lower section and an upper section, the lower bolt-section being connected to the carline and terminating at its upper end in a socket which has its upper end forming a seat for the lowermost of the aforesaid arms, and the upper bolt-section being screwed into the said socket and extending through the said arms and through the aforesaid saddle body-forming cap and through and above the aforesaid plate, and a nut screwed onto the upper bolt-section at the top of the plate.

16. In car-roof construction, the combination, with the two laterally spaced side plates, a carline bridging the space between and connected to the side plates, and four metal roofing-sheets overlapping the carline, two of said roofing-sheets being arranged at one side of the ridge of the roof, and the other roofing-sheets being arranged at the opposite side of the ridge, the roofing-sheets at the same side of the said ridge extending from over the carline laterally of the carline in opposite directions and having upwardly projecting side portions which extend longitudinally of the carline, the roofing-sheets which are arranged at opposite sides respectively of the said ridge but extend laterally of the same side of the carline having upwardly projecting portions extending longitudinally of the ridge; caps covering the upwardly projecting portions of the roofing-sheets and having superimposed arms arranged centrally between the ends of the carline; another cap forming the body of a running-board-saddle and extending over the uppermost of the said arms and mounted on the aforesaid caps, and a plate forming the top of said saddle and mounted on said saddle-body-forming cap, of an upright bolt arranged centrally between the ends of the carline and comprising a lower section and an upper section, the lower bolt-section being connected to the carline and terminating at its upper end in a socket which has its upper end forming a seat for the lowermost of the aforesaid arms, and the upper bolt-section screwed into the said socket and extending through the arms and through the aforesaid saddle body-forming cap and through and above the aforesaid plate; a removable pin extending transversely of and through said socket and through the upper bolt-section, and a nut

screwed onto the upper bolt-section at the top of the plate.

17. In car-roof construction, the combination, with the two laterally spaced side plates; an end beam at each end of the roof, which beam connects the side plates together; car-siding at the outer side of the said beam; carlines bridging the space between and spaced longitudinally of the side plates, and metal ridge-bars arranged centrally between the side plates and longitudinally of the roof and spaced endwise and comprising each a trough arranged longitudinally of the roof, each end ridge-bar extending between the adjacent end beam and the adjacent carline, and each intermediate ridge-bar extending between two adjacent carlines, of metal roofing-sheets arranged wholly at one side of the ridge of the roof; metal roofing-sheets arranged wholly at the opposite side of the said ridge, adjacent roofing-sheets at the same side of the said ridge extending from over a carline laterally of the carline in opposite directions and having covered upwardly projecting side portions extending longitudinally of the carline, adjacent roofing-sheets which are arranged at opposite sides of the said ridge having upwardly projecting portions extending longitudinally of the ridge,

and metal caps covering the last-mentioned upwardly projecting portions of the roofing-sheets, each cap which covers the said last-mentioned upwardly projecting portions of adjacent end roofing sheets having an end portion projecting downwardly at the outer side of the car-siding overlapping the adjacent end beam and forming an air-conducting passageway which communicates with the external atmosphere at the lower end of the said end portion of the said cap and is in communication with the trough of the adjacent ridge-bar.

18. A car roof comprising carlines having upstanding flanges, and purlins extending from carline to carline over the flanges of a pair of adjacent carlines and having depending ends on the far side of said flanges.

19. A car roof comprising carlines each having a pair of flanges, purlins extending from carline to carline and having ends depending between the pair of flanges.

Signed by us at Cleveland, Ohio, this 11th day of July, 1911.

WILLIAM S. BIDLE.
JOSEPH A. COSTELLO.

Witnesses:

B. C. BROWN,
N. L. McDONNELL.