J. A. COSTELLO.

CAR ROOF CONSTRUCTION.

APPLICATION FILED JUNE 9, 1909.

983,689.

Patented Feb. 7, 1911.

3 SHEETS—SHEET 1.

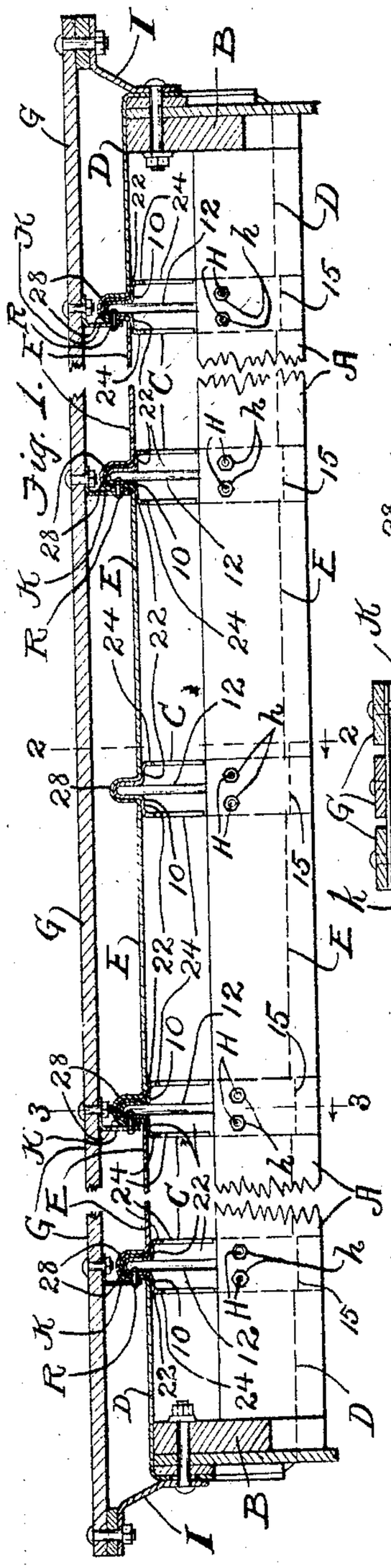

Fig. 1.

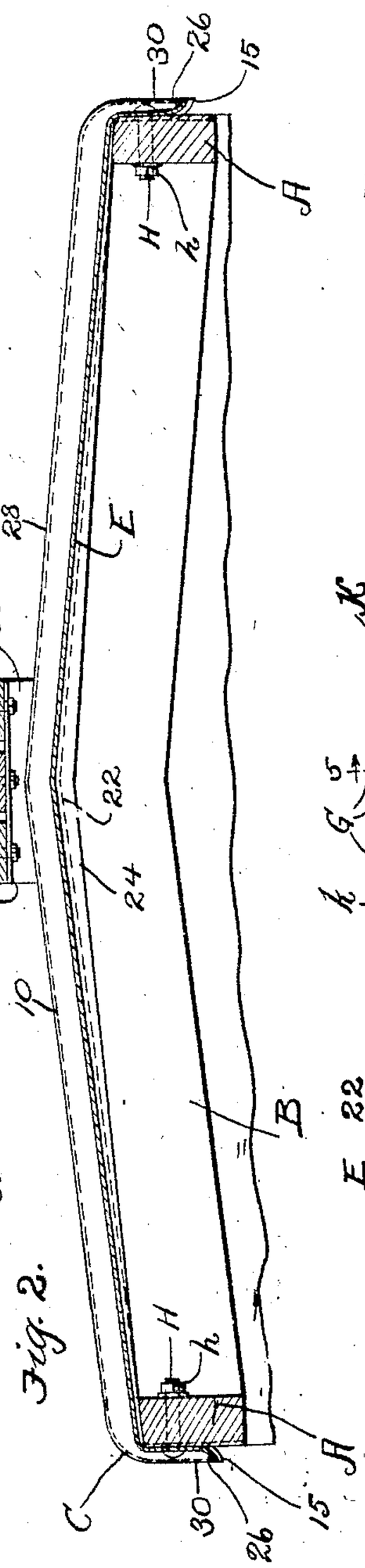

Fig. 2.

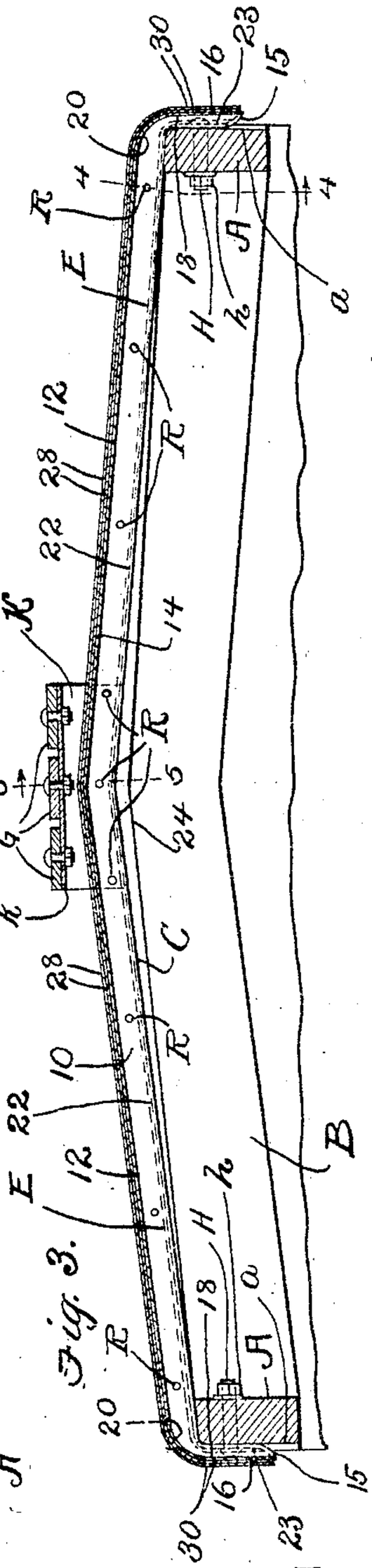

Fig. 3.

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

Inventor:
Joseph A. Costello
By Symmes & Symmes
His Attorneys.

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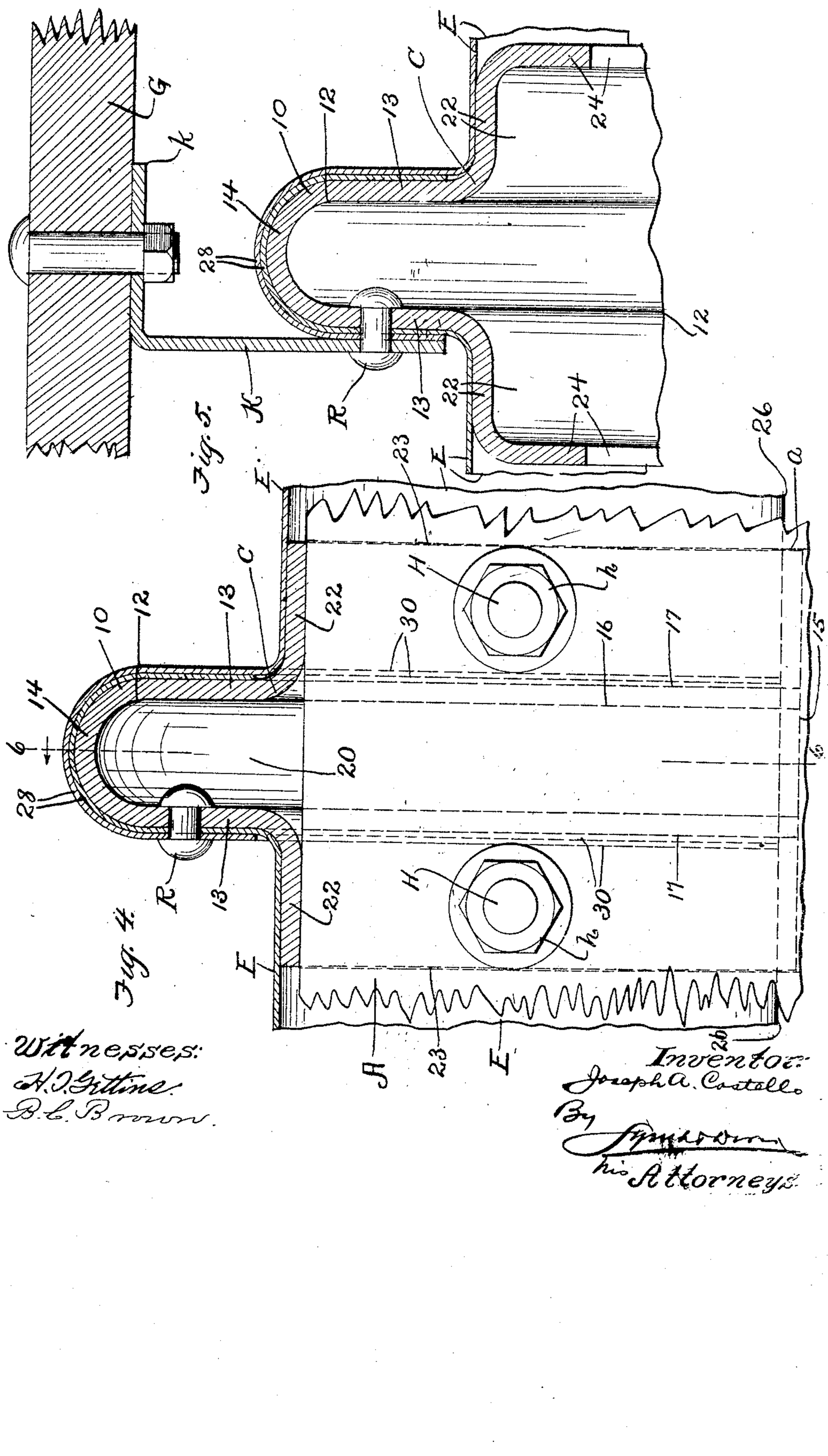

Fig. 5.

Fig. 4.

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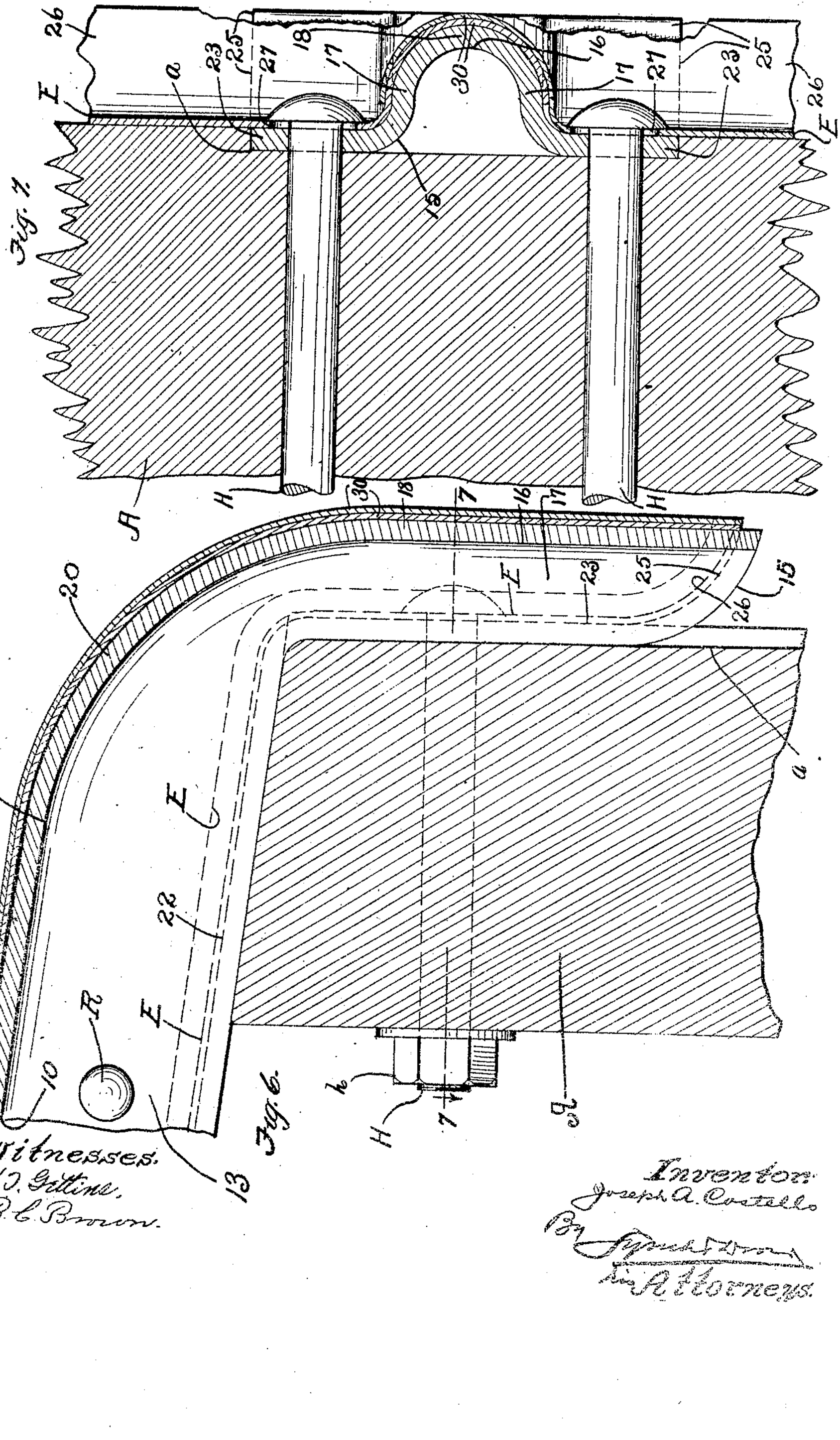

UNITED STATES PATENT OFFICE.

JOSEPH A. COSTELLO, OF CLEVELAND, OHIO, ASSIGNOR TO CLEVELAND CAR SPECIALTY COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF WEST VIRGINIA.

CAR-ROOF CONSTRUCTION.

983,689. Specification of Letters Patent. Patented Feb. 7, 1911.

Application filed June 9, 1909. Serial No. 501,105.

To all whom it may concern:

Be it known that I, JOSEPH A. COSTELLO, a citizen of the United States of America, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Car-Roof Construction; and I 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-roof construction, and pertains more especially to an improved exclusively metal car-roof.

One object of this invention is to avoid the necessity of employing a ridge-pole and purlines or the like in the construction of a car-roof.

Another object is to construct a car-roof comprising metal carlines which are arranged transversely and spaced longitudinally of the roof and connected together by metal roofing-sections, and to have the said parts so relatively arranged that they can be assembled off the main car-frame or car-body and the roof thus formed hoisted onto the said frame or body.

Another object is to ventilate the carlines through passageways which are formed internally of the carlines and in communication, upon the application of the carlines in the construction of the car-roof, with the external atmosphere.

Another object is to provide for the passage or circulation of air next below the said roofing-sections and longitudinally of and through the said carlines so that a car provided with my improved car-roof may if desired be adequately ventilated from the roof and so that the under sides of the said roofing-sections and the internal surfaces of the carlines are kept dry.

Another object is to provide carlines which can be manufactured with facility and possess great strength and durability.

Another object is to provide carlines having such shape in cross-section and such application to the side plates that the car-roof-frame notwithstanding the use of comparatively light material for the roofing-sections will be adequately strong.

Another object is to have the roofing-sections turned laterally and outwardly at the outer sides of the side plates to shed water running down the roof a suitable distance from the said sides of the side plates.

Another object is to provide the carlines with end members which have the shape required to afford adequate bearing to the said laterally and outwardly turned portions of the roofing-sections.

Another object is to have the said carlines and roofing-sections so relatively shaped, arranged and assembled that leakage at the joints between adjacent roofing-sections or between a carline and a roofing-section is avoided.

Another object is to make adequate provision for contraction and expansion of the roofing-sections longitudinally of the car-roof without resulting in leakage or other damage or injury to the roof.

Another object is to have the running board or boards which are arranged above and longitudinally of the roof centrally between the side edges of the roof supported from standards or brackets which are secured to carlines by securing devices employed in securing roofing-sections to the said carlines.

With these objects in view, and to the end of realizing any other advantages hereinafter appearing, this invention consists in certain features of construction and arrangement and combinations of parts, hereinafter described, pointed out in the claims, and illustrated in the accompanying drawings.

In the said drawings, Figure 1 is a central longitudinal vertical section of a car-roof embodying my invention, and portions are broken away in this figure to reduce the size of the drawing. Fig. 2 is a transverse vertical section taken along the line 2—2, Fig. 1, looking in the direction indicated by the arrow. Fig. 3 is a transverse vertical section taken along the line 3—3, Fig. 1, looking in the direction indicated by the arrow. Figs. 1, 2 and 3 are drawn on the same scale. Fig. 4 is a vertical section taken through one of my improved carlines, along the line 4—4, Fig. 3, looking in the direction of the inner side of one of the side plates to which the said carline is secured. Fig. 5 is a vertical section taken centrally between the ends of and through one of the carlines along the line 5—5, Fig. 3, and illustrating the attachment to the respective carline of the adjacent roofing-sections and a

standard or bracket instrumental in supporting the running board or boards above the roof. Fig. 6 is a vertical section on line 6—6, Fig. 4, looking in the direction indicated by the arrow. Fig. 7 is a horizontal section on line 7—7, Fig. 6, looking downwardly, and portions of the metal roofing are broken away in this figure to more clearly show the construction. Figs. 4, 5, 6 and 7 are drawn on a larger scale than Figs. 1, 2 and 3.

The frame-work of my improved car-roof, as shown in Figs. 1, 2 and 3, comprises two laterally spaced side plates A and A which extend longitudinally of the roof and are connected together at their ends in any approved manner by beams or rafters B. Suitable connections in car-roof construction between the two side plates at their ends are too well known in the art to require further description and illustration in this specification. My improved roof however comprises a suitable number of novel and meritorious metal carlines C which are provided between the ends of the side plates. The carlines C extend transversely and are spaced longitudinally of the roof and are attached to the side plates, as will hereinafter appear. Preferably adjacent carlines C are spaced about three feet apart.

Each carline C has two end members 15 and 15 and a central or intermediate member 10 which is considerably longer than and arranged longitudinally between and connects with the said end members. The intermediate member 10 extends over and across and rests upon the tops of the side plates A and the end members 15 and 15 are integral with the said intermediate member and turned or project downwardly at the outer side of and are secured to the different side plates respectively. That is one of the end members 15 overlaps the outer side of one of the side plates and the other end member 15 overlaps the outer side of the other side plate, and the said end members are secured to the said side plates as will hereinafter appear.

Each end member 15 of each carline C has a portion arched or projecting outwardly in cross-section and arranged centrally between the side edges of the said end member and extends up and down the outer side of the side plate overlapped by the said end member, and the said outwardly arched or projecting portion of the said end member, as shown in Figs. 6 and 7, has laterally spaced sides 17 and 17 which are therefore spaced longitudinally of the said side plate and connected together a suitable distance laterally and outwardly from the said side plate by a web 18 which extends from end to end of the said end member. The sides 17 and 17 of the outwardly arched portion of each end member 15 form opposite side walls respectively of a passageway 16 which extends longitudinally of and from end to end of the said end member and is open at the lower or outer end of the said end member and there communicates with the external atmosphere.

The intermediate member 10 of each carline C has an upwardly or outwardly arched or projecting portion which is inverted-U-shaped in cross-section and arranged centrally between the side edges of the said intermediate member, and the said arched or projecting portion of the said intermediate member, as shown in Figs. 4, 5 and 6, has laterally spaced sides 13 and 13 which are consequently spaced longitudinally of the roof. The said sides 13 and 13 are connected together at the top by a web 14 which extends uninterruptedly longitudinally and from end to end of the said intermediate member and connects with the webs 18 of the outwardly arched portions of the end members 15 of the carline. The said sides 13 and 13 form opposite side walls respectively of an air-conducting passageway 12 which extends longitudinally and from end to end of the said intermediate member 10 and communicates at each end of the said intermediate member with the passageway 16 formed internally of the outwardly arched portion of the adjacent end member 15 of the said carline, as shown in Figs. 3, 4 and 6. That is, the sides 13 and 13 of the upwardly arched or projecting inverted-U-shaped portion of the intermediate member 10 of each carline C connect with opposite sides 17 and 17 respectively of the outwardly arched or projecting portion of each end member of the said carline. Obviously the passageways 16 formed internally of the end members 15 of each carline C and the passageway 12 formed internally of the intermediate member of the said carline permit the passage of air longitudinally and internally of the carline from end to end of the carline and consequently from the outer side of one of the side plates to the outer side of the other side plate.

By the construction hereinbefore described it will be observed that each carline C has an intermediate member 10 which is mounted on and bridges the space between the two side plates A and A and has a portion which is inverted-U-shaped in cross section and extends between and connects with the upper or inner ends of the outwardly arched portions of the end members of the said carline and that the said outwardly arched portions of the said end members are employed in placing the interior of the said inverted-U-shaped portion in communication with the external atmosphere.

The end members 15 of each carline are preferably integral with the intermediate member 10 of the carline, and to facilitate

the manufacture of the carline of a single piece the said intermediate member has the top or web 14 of its upwardly arched or projecting inverted-U-shaped portion not only extending continuously and uninterruptedly between the said end members but gradually approaching the bottom of the said intermediate member, as at 20, from a point a suitable distance inwardly from each end member and connecting with the web or central part 18 of the outwardly arched portion of the said end member.

The intermediate member 10 of each carline C preferably slopes upwardly from the upper end of each end member 15 of the carline to a point centrally between the ends of the carline, and the said intermediate member is substantially uniform in cross section from end to end except adjacent the end members of the carline where the top or web 14 of the upwardly arched or projecting inverted-U-shaped portion of the said intermediate member gradually approaches the tops of the side plates in the direction of the end members of the carline. The intermediate member 10 of each carline C also comprises two flanges 22 and 22 which are arranged at opposite sides respectively of its upwardly arched or projecting inverted-U-shaped portion but at the bottom of the said intermediate member, which flanges extend longitudinally of and from end to end of the said intermediate member.

Each end member 15 of each carline C (see Figs. 4, 6 and 7) comprises two flanges 23 and 23 which are arranged at opposite sides respectively of the outwardly arched or projecting portion of the said end member and extends up and down or longitudinally and preferably from end to end of the said member, and the said flanges 23 connect with and form extensions of the flanges 22 and 22 respectively. The flanges 23 of each end member 15 abut against the outer side of the side plate which is overlapped by the said end member, and the said side plate, as shown in Figs. 6 and 7, is recessed, as at *a*, to receive the said flanges.

Each flange 22 of each carline C has a downwardly turned portion 24 which extends longitudinally of the flange between the side plates A and A and is gradually increased in width toward a point centrally between the ends of the carline and thereby materially strengthens the latter.

Preferably the flanges 23 of each end member 15 of each carline extend laterally and outwardly, as at 25, (see Figs. 6 and 7) from the outer side of the adjacent side plate and from a point a suitable distance below the top of the said side plate across opposite sides respectively of the outwardly arched or projecting portion of the said end member for the purpose hereinafter made apparent.

The flanges 22 of each carline C afford support to sheet-metal sections of the metal roofing which is employed in covering the carlines and side plates and in bridging the space between adjacent carlines and the space between the side plates and extends over the side plates and overlaps the outer sides of the side plates.

D and D (see Fig. 1) represent opposite end sections of the metal roofing. The roofing-sections D are attached in any approved manner to the members B which, as already indicated, extend between the side plates A.

E indicates the intermediate sections of the said roofing.

Each roofing-section bridges the space between the side plates A and A and extends over the tops of the side plates and also extends from the said tops downwardly over the outer sides of the side plates.

Adjacent roofing-sections have adjacent portions thereof overlapping each other and arched or bent, as at 28, over and resting on the upwardly arched or projecting inverted-U-shaped portion of the intermediate member 10 of a carline C, as shown in Figs. 1, 2, 3, 4, 5 and 6, and arched or bent, as at 30, over and externally of the outwardly arched or projecting portions of the end members of the said carline, as shown in Figs. 2, 3, 6 and 7, and the said adjacent roofing-sections terminate at opposite sides respectively of the said arched or projecting portions of the said carline, and are secured directly to the upwardly projecting inverted-U-shaped portion of the said carline at one and the same side of the said inverted-U-shaped portion by rivets R, and preferably the same rivets are employed in attaching both of the said adjacent roofing-sections to the said carline. Adjacent roofing-sections consequently extend over the top or outer side of and rest on the different flanges 22 and 22 respectively of the intermediate member of a carline and over the outer side of the different flanges 23 and 23 respectively of each end member of the said carline, and each of the said roofing-sections extends from the flanges 22 overlapped thereby at one side of the upwardly arched or projecting inverted-U-shaped portion of the said intermediate member of the said carline and from the flange 23 overlapped thereby at one side of the outwardly arched or projecting portion of each end member of the carline to and over the said projecting portions of the said carline and terminates at the opposite side of the said projecting portions of the carline.

To shed or conduct any water running down the said roofing-section at the outer sides of the side plates A laterally and outwardly away from the side plates each roofing-section turns laterally and outwardly, as at 26, over and rests on the laterally and

outwardly turned portion 25 of the flange or flanges 23 which are overlapped by the said roofing-section.

It will be observed that the two flanges 23 of each end member of each carline, by having their lower end portions extending from the inner side of the said end member outwardly across opposite sides respectively of the outwardly arched or projecting portion of the said end member, materially reinforce the said end member, and afford a desirable bearing for the overlapping roofing section or sections where the latter are turned laterally and outwardly to shed or conduct any water running down the said roofing section or sections.

Each intermediate roofing-section E bridges the space between the intermediate members 10 of adjacent carlines and extends over or overlaps the outer sides of the flanges 22 and 23 at adjacent sides of the intermediate and end members of the said carlines.

Each intermediate roofing-section E extends across the flanges 22 and 23 at one side of the outwardly arched or projecting portions of the intermediate member and end members of a carline and is loose relative to the said side of the said projecting portions to accommodate contraction and expansion longitudinally of the car-roof of the metal composing the said roofing-section, and thence extends over the said projecting portions to the opposite side of the said projecting portions and is secured to the said carline at the last-mentioned side of the said projecting portion of the intermediate member of the carline preferably by rivets R as already hereinbefore indicated.

It will be observed that each intermediate roofing-section,—that is, each roofing-section E between the end roofing-sections D,—(and one of the intermediate roofing-sections is shown in full in Fig. 1)—extends and is bent over the upwardly projecting inverted-U-shaped portions of the intermediate members of three consecutively arranged carlines and consequently arched or bent over the outwardly arched or projecting portions of the intermediate and end members of each of the said carlines. The said intermediate roofing-section is loose relative to the intermediate of the said consecutive carlines to enhance its contractibility and expansibility longitudinally of the car-roof, but the said roofing-section, which is thus loose relative to the intermediate of the said consecutive carlines, is secured to the outer of the said carlines by rivets R.

Each end member 15 of each carline is (see Figs. 4, 6 and 7) secured to the adjacent side plate A by suitably applied bolts H and nuts *h* which are also preferably instrumental in attaching the roofing-sections overlapping the flanges 23 of the said end member to the said side plate. Preferably the said bolts H have their shanks extending (see Fig. 7) through bolt-holes 27 formed in the said roofing-sections and transversely of and horizontally through the said side plate and have their heads overlapping the outer sides of the said roofing-sections, and the nuts *h* are mounted on the said shanks at the inner side of the said side plate. The said bolt-holes 27 are elongated longitudinally of the said side plate to accommodate expansion and contraction of the roofing-sections.

The air-conducting passageways 12 formed interiorly of the intermediate members 10 of the carlines are open at the bottoms of the carlines. Consequently the passageways 12 internally of adjacent carlines are in communication with the space between the said carlines and next below the roofing-sections so that the said space is in communication through the said passageways and through the passageways 16 formed in the end members 15 of the said carlines with the external atmosphere. The under sides of the roofing-sections are therefore ventilated and kept dry.

A running-board or boards G (see Figs. 1, 2, 3 and 5) are arranged horizontally above the car-roof centrally between the sides of the car and extend longitudinally and from end to end of the roof. The board or boards G are supported at the ends (see Fig. 1) by suitably applied brackets I in the usual manner, but it will be observed that the said board or boards are also supported from some of the carlines to which roofing-sections are secured, and, as shown very clearly in Figs. 3 and 5, rivets R instrumental in attaching roofing-sections to the upwardly arched or projecting portion of the intermediate member of a carline to which the said board or boards are to be attached are also instrumental in the securing, to the said carline, of a standard or bracket K which extends a suitable distance above the said carline and terminates at its upper end in a flange *k* which is arranged horizontally and next below and forms a seat for the said board or boards which are suitably secured to the said flange.

What I claim is:—

1. In car-roof construction, the combination, with the laterally spaced side plates, and metal carlines extending transversely and spaced longitudinally of the side plates and having each an upwardly projecting portion which bridges the space between and extends over the side plates, of sectional metal roofing which bridges the space between and extends over the side plates, which roofing comprises sheet metal sections bridging the said space at and extending laterally of one side of a carline and projecting from the said side over the afore-

said projecting portion of the said carline to the opposite side of the said carline and secured to the said carline at the last-mentioned side only.

2. In car-roof construction, the combination, with the laterally spaced side plates, of metal carlines extending transversely and spaced longitudinally of the side plates, each carline having a portion which is inverted-U-shaped in cross-section and bridges the space between and extends over the side plates, and sectional metal roofing which bridges the space between and extends over the side plates, which roofing comprises metal sections bridging the said space at and extending laterally of one side of a carline and arched over the aforesaid inverted-U-shaped portion of the said carline and secured to the said portion of the said carline at the opposite side only of the said carline so as to be loose relative to the first-mentioned side of the said carline.

3. In car-roof construction, the combination, with the laterally spaced side plates, and two metal carlines extending transversely and spaced longitudinally of the side plates, each carline having an upwardly projecting portion which bridges the space between and extends over the side plates, said carline having two flanges formed at the bottom of the carline and projecting laterally of and outwardly from opposite sides respectively and extending longitudinally of the upwardly projecting portion of the carline, and a sheet-metal roofing-section bridging the space between the two carlines and overlapping those flanges which project toward each other, said roofing-section extending over the upwardly projecting portions of the carlines and overlapping and at least loose relative to one of those sides which face each other of the said upwardly projecting portions of the carlines.

4. In car-roof construction, the combination, with the two laterally spaced side plates, and metal carlines extending transversely and spaced longitudinally of the side plates, each carline having an upwardly projecting portion which bridges the space between and extends over the side plates, said carline also having two flanges formed at the bottom of the carline and projecting laterally of and outwardly from opposite sides respectively and extending longitudinally of the upwardly projecting portion of the carline, of a sectional metal roofing comprising end sections and intermediate sections, each intermediate roofing-section bridging the space between and overlapping the adjacent sides of the upwardly projecting portions of adjacent carlines and being loose relative to one of the said adjacent sides of the said upwardly projecting portions of the said adjacent carlines.

5. In car-roof construction, the combination, with the two laterally spaced side plates, and metal carlines extending transversely and spaced longitudinally of the side plates, each carline having an upwardly projecting portion which bridges the space between and extends over the side plates, said carline also having two flanges formed at the bottom of the said carline and projecting laterally of and outwardly from opposite sides respectively and extending longitudinally of the upwardly projecting portion of the carline, of a sectional metal roofing comprising end sections and intermediate sections, each roofing-section bridging the space between and extending over the side plates, and each intermediate roofing-section bridging the space between and being bent over the upwardly projecting portions of adjacent carlines and extending from one of the said adjacent carlines to and being loose relative to the adjacent side of but secured to the upwardly projecting portion of the other of the said adjacent carlines.

6. In car-roof construction, the combination, with the two laterally spaced side plates, and metal carlines extending transversely and spaced longitudinally of the side plates, each carline comprising an upwardly projecting portion which bridges the space between and extends over the side plates, said carline also comprising two laterally and outwardly projecting flanges which are arranged at opposite sides respectively of the said projecting portion of the carline, of a sectional metal roofing comprising end sections and intermediate sections, each roofing-section bridging the space between and extending over the side plates and each intermediate roofing-section bridging the space between and being bent over the upwardly projecting portions of adjacent carlines and extending from one of the said adjacent carlines to and being loose relative to the adjacent side of the upwardly projecting portion of the other of the said adjacent carlines.

7. In car-roof construction, the combination, with the two laterally spaced side plates, and metal carlines extending transversely and spaced longitudinally of the side plates, each carline comprising an upwardly projecting portion which bridges the space between and extends over the side plates, said carline also comprising two laterally and outwardly projecting flanges which are arranged at opposite sides respectively of the said projecting portion of the carline, of a sectional metal roofing comprising end sections and intermediate sections, each roofing-section bridging the space between and extending over the side plates and each intermediate roofing-section bridging the space between and being bent over the upwardly projecting portions of adjacent car-

lines and extending from one of the said adjacent carlines to and being loose relative to the adjacent side of the upwardly projecting portion of the other of the said adjacent carlines and secured to but at the opposite side of the said projecting portion of the last-mentioned carline.

8. In car-roof construction, the combination, with the two laterally spaced side plates, and three metal carlines extending transversely and spaced longitudinally of the side plates, each carline having an upwardly projecting portion which bridges the space between and extends over the side plates, of a sheet-metal roofing-section bent over and loose relative to the said projecting portion of the intermediate of the said carlines and extending to the said intermediate carline from and secured to the two outer of the said carlines.

9. In car-roof construction, the combination, with the two laterally spaced side plates, and three metal carlines extending transversely and spaced longitudinally of the side plates, each carline having an upwardly projecting portion which bridges the space between and extends over the side plates, said carline also having two laterally and outwardly projecting flanges which are arranged at opposite sides respectively of the said projecting portion of the carline, of a metal roofing-section resting on the flanges of the said carlines and bent over and loose relative to the upwardly projecting portion of the intermediate of the said carlines, said roofing-section being secured to the upwardly projecting portions of the two outer of the said carlines.

10. In car-roof construction, the combination, with the two laterally spaced side plates, and metal carlines extending transversely and spaced longitudinally of the side plates and respectively comprising an upwardly projecting portion which extends longitudinally of the respective carline between the side plates, of a sectional metal roofing which bridges the space between and extends over the side plates and also bridges the space between adjacent carlines and extends over the aforesaid projecting portions of the carlines; a running board arranged above and longitudinally of the roofing: members instrumental in supporting the running board, and securing devices attaching the said supporting members and the roofing to carlines at one side of the aforesaid projecting portions of the carlines.

In testimony whereof, I sign the foregoing specification, in the presence of two witnesses.

JOSEPH A. COSTELLO.

Witnesses:
C. H. DORER,
B. C. BROWN.