Jan. 11, 1927. 1,614,334

W. WRIGHT

CAR ROOF

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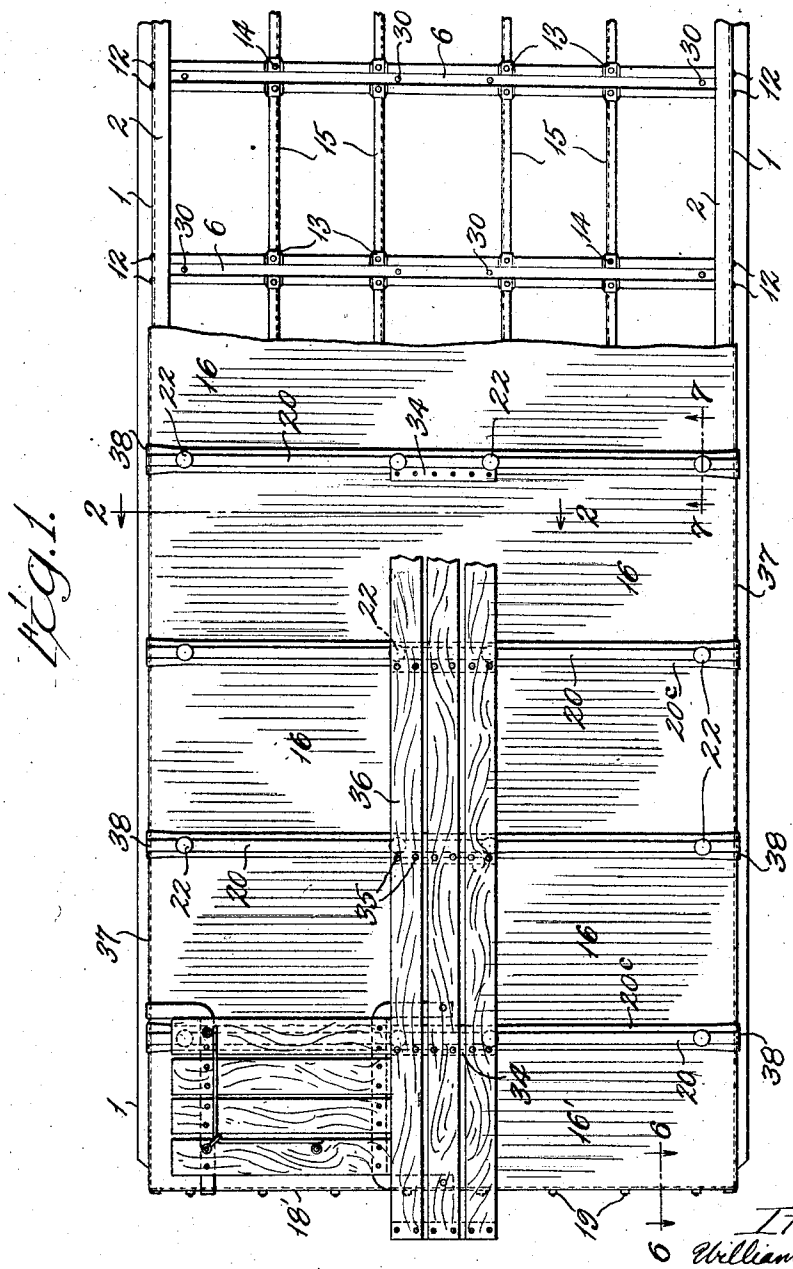


Fig. 1.

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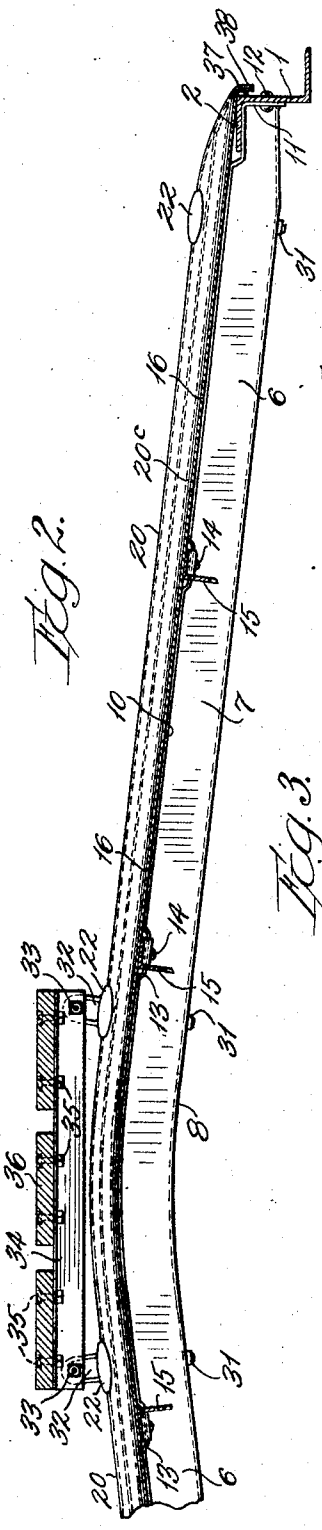


Fig. 2.

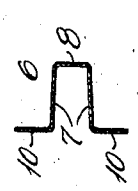


Fig. 5.

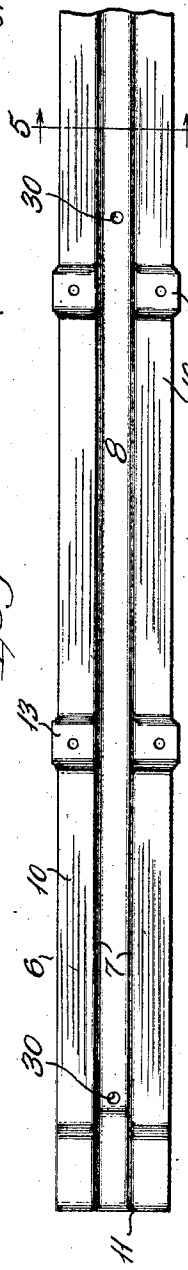


Fig. 3.

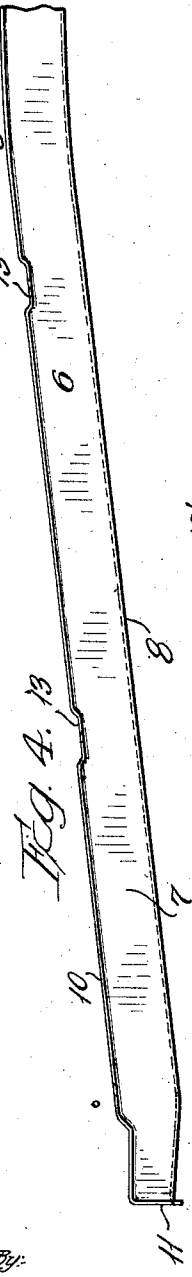


Fig. 4.

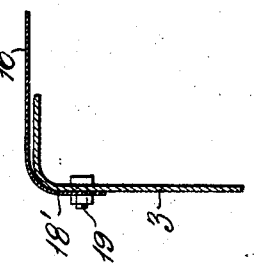


Fig. 6.

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CAR ROOF

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Fig. 7.

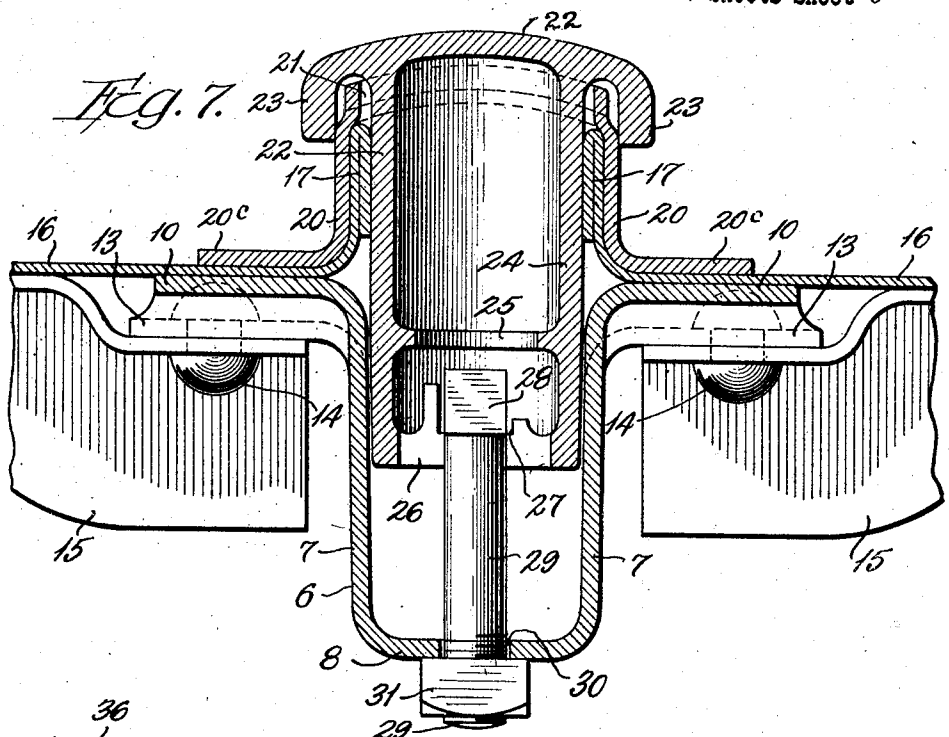
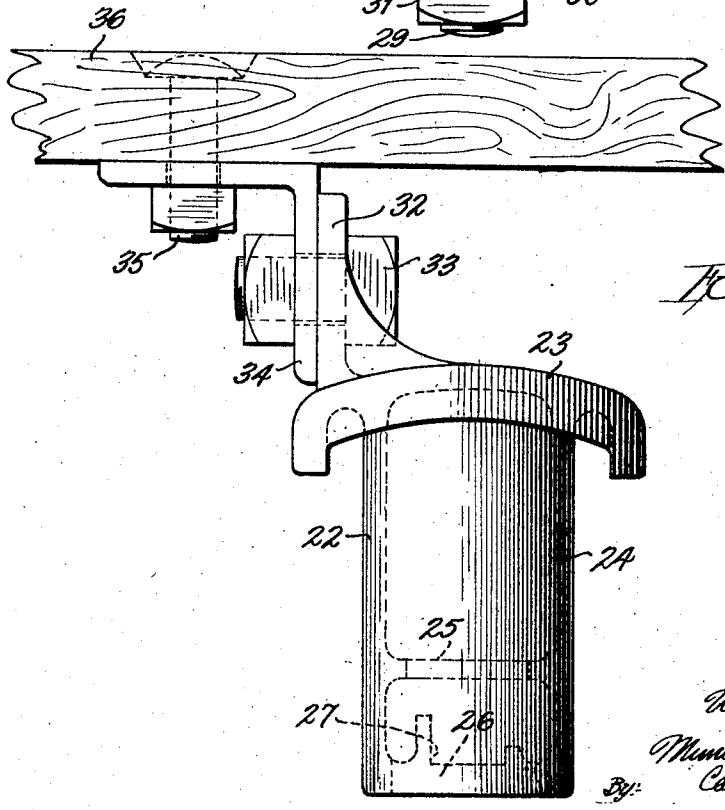


Fig. 8.



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CAR ROOF

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Fig. 11.

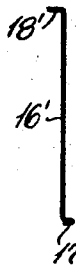


Fig. 9.

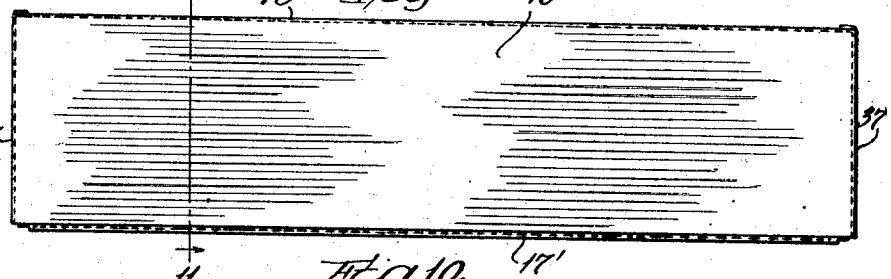


Fig. 10.

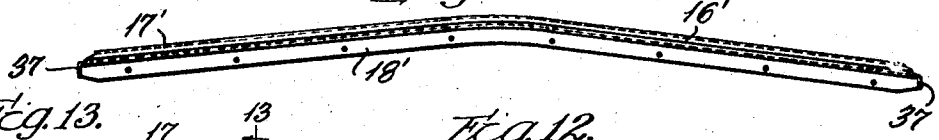


Fig. 13.

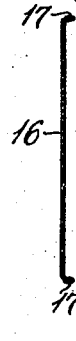


Fig. 12.

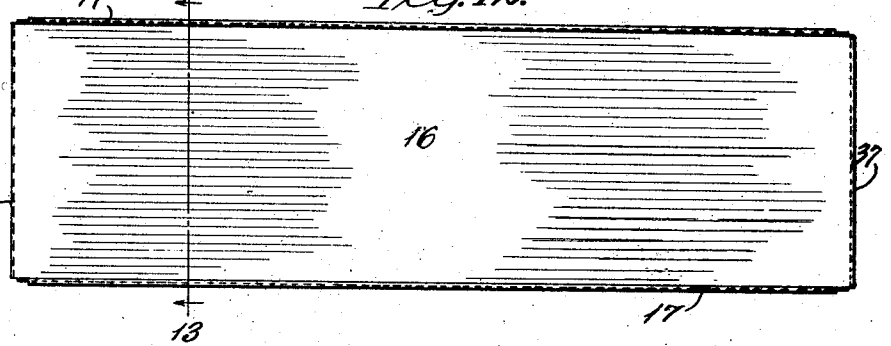


Fig. 16.

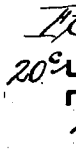


Fig. 14.

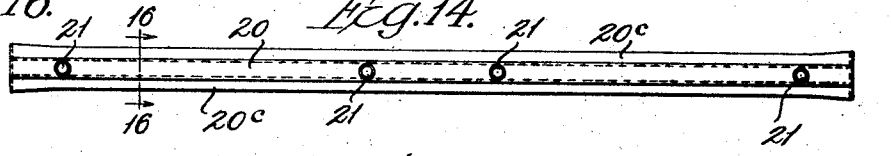


Fig. 15.



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Fig. 17.

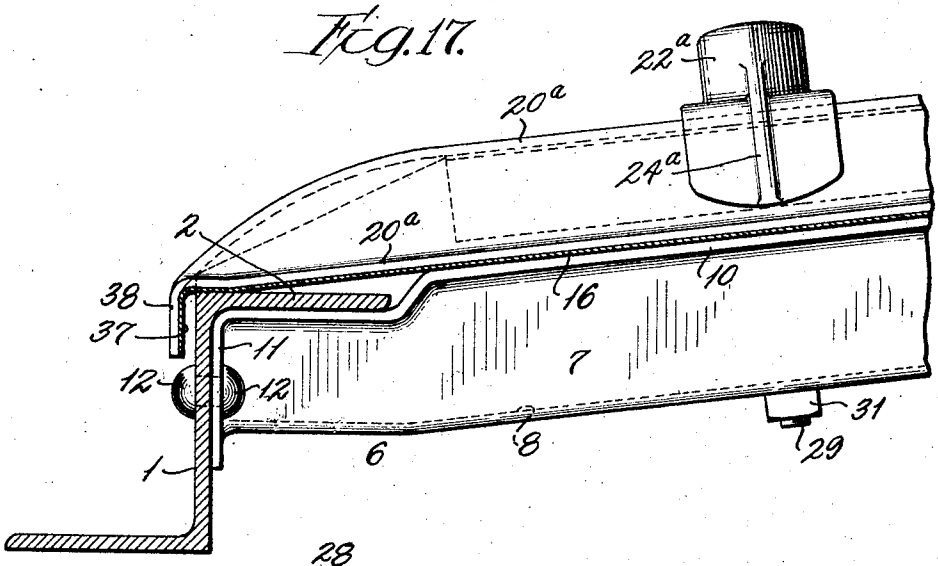


Fig. 18.

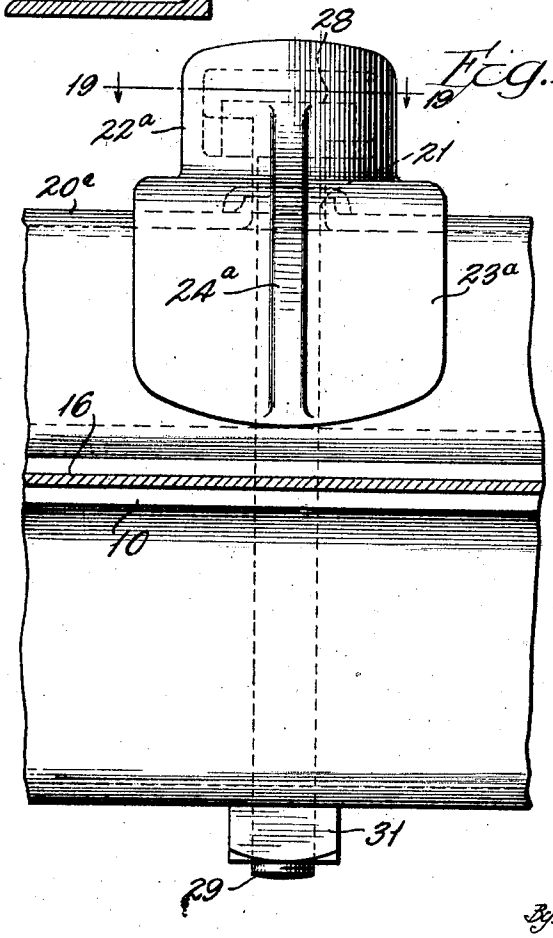
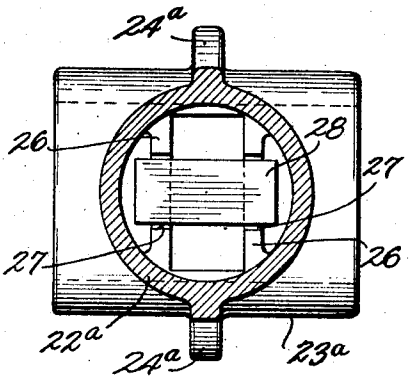


Fig. 19.



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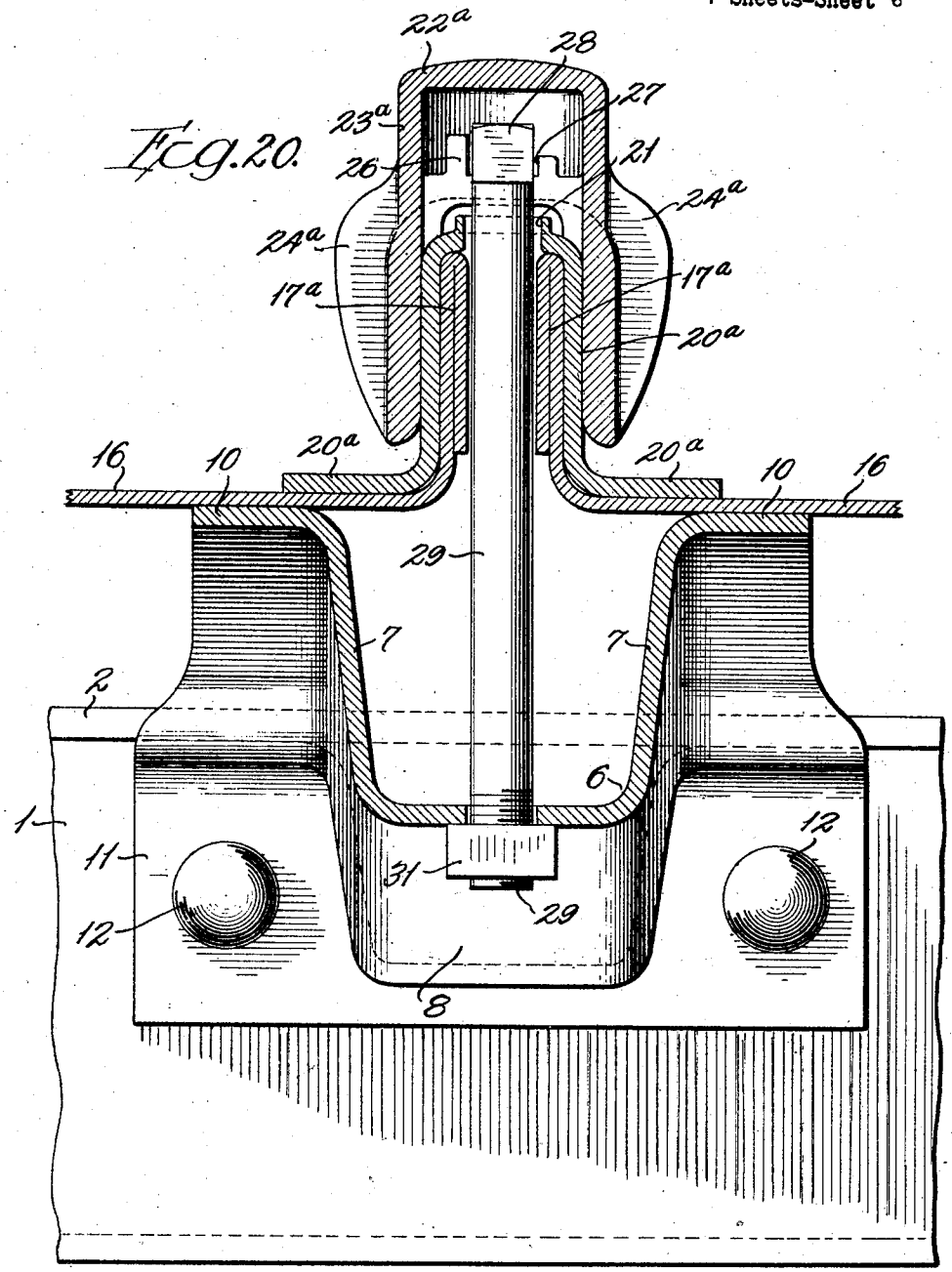
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W. WRIGHT

CAR ROOF

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Fig. 20.



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Fig. 22.

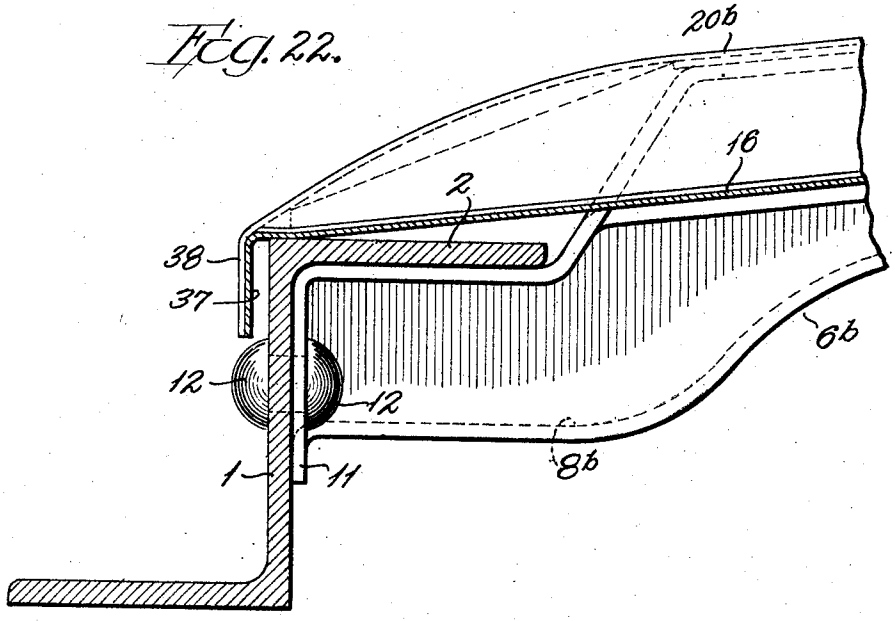
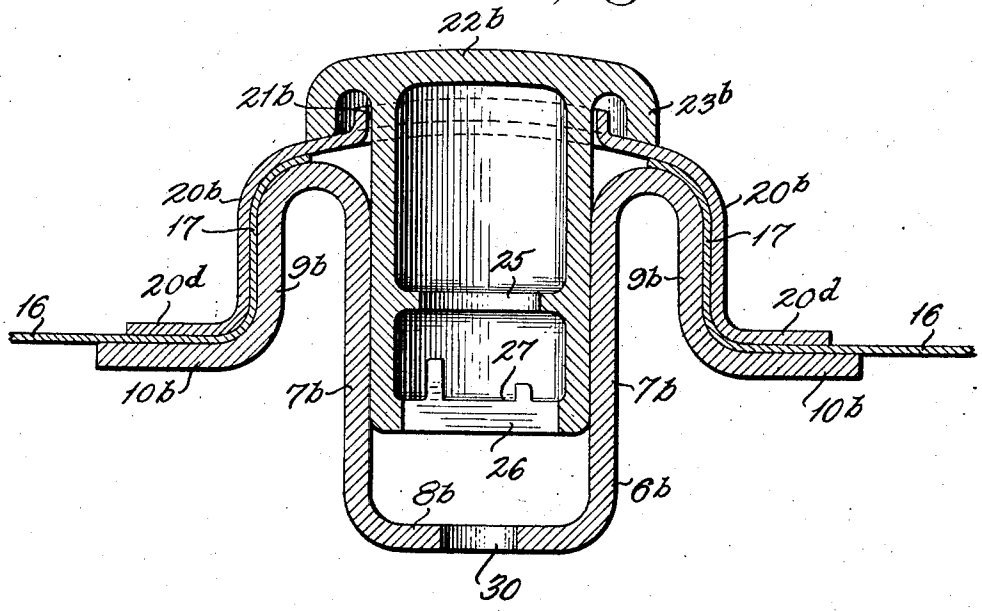


Fig. 21.



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Patented Jan. 11, 1927. 1,614,334

UNITED STATES PATENT OFFICE.

WILLIAM WRIGHT, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CHICAGO-CLEVELAND CAR ROOFING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE.

CAR ROOF.

Application filed January 9, 1924. Serial No. 685,243.

The invention relates to freight car roofs and more particularly to roofs of rigid all-metallic construction, and has for its objects to provide a sheet metal roof which when assembled and applied to a car, results in a rigid unitary structure which is not susceptible of longitudinal or lateral shifting movement relative to the car and which is secured to the car in such manner as to provide a strong and rigid reinforcing structure for the upper portion of the car framing.

A further object of the invention resides in the provision of a rigid metallic roof which may be conveniently assembled and which in its assembled arrangement combines with the car framing to provide a rigid unitary structure.

A further object of the invention is to provide a rigid water-tight roofing structure which is practically self-supporting and which is designed to dispense with the usual ridge pole employed without sacrificing any of the weight sustaining qualities which are desirable and essential in a roofing structure of this character.

In addition to the general objects recited above the invention includes among its objects such other improvements and advantages in construction and operation as are found to obtain in the structure and devices hereinafter described or claimed.

In the accompanying drawings, forming a part of this specification, and showing, for purposes of exemplification, a preferred form and manner in which the invention may be embodied and practised, but without limiting the claimed invention specifically to such illustrated instance or instances:

Fig. 1 is a top plan view of a car roof illustrating a preferred embodiment of the invention, portions of the same being broken away.

Fig. 2 is a transverse vertical sectional view on line 2—2 of Fig. 1.

Fig. 3 is a top plan view of a portion of one of the carlines.

Fig. 4 is a side elevation of the same.

Fig. 5 is a vertical section on line 5—5 of Fig. 3.

Fig. 6 is a detail sectional view on line 6—6 of Fig. 1.

Fig. 7 is an enlarged vertical sectional view through one of the intermediate umbrella bolts or roof clamp castings on line 7—7 of Fig. 1.

Fig. 8 is an enlarged view in side elevation of one of the running board umbrella bolts or roof clamp castings and showing the manner of attachment of the running boards thereto.

Fig. 9 is a top plan view of one of the end roof sheets.

Fig. 10 is a side view of the same.

Fig. 11 is a transverse sectional view on line 11—11 of Fig. 9.

Fig. 12 is a top plan view of one of the intermediate roof sheets.

Fig. 13 is a transverse sectional view on line 13—13 of Fig. 12.

Fig. 14 is a top plan view of one of the seam caps.

Fig. 15 is a side view of the same.

Fig. 16 is a transverse sectional view on line 16—16 of Fig. 14.

Fig. 17 is an enlarged vertical transverse sectional view taken at the eaves portion of the roof and including an intermediate umbrella bolt or roof clamp casting, and illustrating an alternate or modified construction or arrangement.

Fig. 18 is an enlarged view of a portion of the structure shown in Fig. 17 and showing more in detail the modified arrangement.

Fig. 19 is a horizontal sectional view on line 19—19 of Fig. 18.

Fig. 20 is an enlarged vertical sectional view through a modified form of an intermediate umbrella bolt or roof clamp casting.

Fig. 21 is an enlarged sectional view somewhat similar to Fig. 20 and illustrating an alternate or modified roof construction.

Fig. 22 is a sectional view through the eaves portion of one of the roof sheets, similar to Fig. 17, and illustrating the arrangement of the alternate construction shown in Fig. 21.

Referring to the drawings, the upper part of the car body framing, which is the supporting frame for the roof, comprises side plates which may be of Z-bar cross section, each side plate having a vertical longitudinal web 1 and an inwardly extending

substantially horizontal top flange or web 2 and being adapted to support the eaves portions of the carlines and roof sheets, the said carlines being secured to the vertical webs 1 of the side plates. These side plates are united at the ends of the car by the usual end plates 3 (Fig. 6) which may be of any suitable character and are preferably arched from side plate to side plate across the car to conform to the curve of the roofing structure.

At suitable intervals along the side plates 1 are arranged carlines 6 which are arched across the ridge, from side plate to side plate. Each carline is of channel-bar construction and U-shaped in cross section (Figs. 7 and 20), and consists of vertical webs or flanges 7, a base connecting web 8, and laterally extending top webs 10 projecting horizontally from the tops of the vertical webs 7. At their eaves ends the carlines are provided with flared horizontal flanges which terminate in downwardly projecting end flanges or webs 11 bolted or riveted to the side plates 1 by bolts or rivets 12 (Figs. 2, 17, 20 and 22.) The horizontal flanges at the ends of the carlines are adapted to lie closely beneath the top horizontal flanges 2 of the side plates.

The carlines 6 are or may be die-formed of one integral piece of sheet metal, being pressed into the permanent form shown. The carlines 6 have their top webs 10 depressed at intervals therealong to form reinforcing portions or recesses 13, to the under side of which depressions are bolted or riveted at 14, the corresponding depressed ends of the longitudinally extending purlins 15. As best shown in Figs. 1 and 7 the latter are preferably arranged in sections, one section of each longitudinal series being secured by the bolts or rivets 14 between pairs of carlines 6.

The structure above described supports a plurality of intermediate and end roof sheets 16 and 16′ respectively which extend in side by side relation transversely of the car. The construction is preferably such that one roof sheet is provided to span the space between each pair of the carlines 6 and at their sides the intermediate roof sheets are bent or flanged upwardly and thence downwardly to provide close fitting reinforcing side flanges 17. Each of the end roof sheets 16′ are provided with one upwardly and downwardly turned reinforcing side flange 17′, the opposite sides of the end roof sheets being downturned as at 18′ to be secured as by bolts or rivets 19 to the end plates 3 (Fig. 6). At the meeting points between each of the roof sheets and above each of the carlines 6, seam caps 20 are provided and are adapted to overlie and closely fit against the reinforcing side flanges 17 of the roof sheets, said seam caps 20 being provided with lower laterally extending horizontal side flanges or web portions 20ᵉ adapted to rest upon and to be clamped tightly against the roof sheets. At suitable intervals therealong the seam caps 20 are provided with perforations or apertures 21 for the reception of clamping umbrella bolts or roof clamp castings 22 formed with integral overhanging cap portions 23 adapted to be clamped closely against the vertical side flanges of the seam caps 20 to form a water-tight closure (Fig. 17). Each of the castings 22 is provided with a downwardly extending cylindrical portion 24 having an intermediate reinforcing apertured web 25 and a pair of lower transversely spaced reinforcing webs 26. The latter are suitably recessed as at 27 and are adapted to receive and hold against rotation therebetween the squared head 28 of the clamping bolt 29. The carlines 6 are provided at intervals therealong with apertures 30 corresponding in their spaced relation with the apertures 21 of the seam caps 20 and through which apertures 30 the clamping bolts 29 are adapted to extend. Nuts 31 are threaded onto the lower extremities of the bolts 29 and when assembled securely draw the castings 22 down towards the carlines 6. The castings 22 as a result are clamped firmly against the seam caps 20 and flange portions 17 of the roof sheets forming a secure, rigid and watertight union of the several elements described.

The roof clamp castings 22 which are located centrally of the roof sheets and beneath the running board are provided with upstanding preferably integral flanged web portions 32 (Fig. 8) which are apertured to receive bolts or rivets 33 by means of which the roof clamp castings are secured to the running board saddles 34. The latter in turn are secured by bolts or rivets 35 to the running board 36. At their eaves edges the roof sheets 16, 16′ are downturned as at 37 over the vertical flanges 1 of the side plates to insure against the admission of water and foreign matter to the space between the roof sheets and side plates and to the interior of the car. The seam caps at their eaves portions are downturned as at 38 to lie closely against the downturned eaves portions or flanges 37 of the roof sheets. By the assembly described there results a rigid and watertight roofing structure, so combined with the upper portion of the car framing as to effectually withstand longitudinal and transverse strains or shifting movements, without sacrificing any of the frame supporting, weight resisting and water-excluding qualities which are desirable and necessary in a roof construction of this character.

Figs. 17 to 20 inclusive illustrate a slightly modified or alternate form of construction of the seam flanges at the edges of the roof sheets. As illustrated in these figures

the reinforced side edges 17^a of the roof sheets 16 are tightly embraced and held close to the bolts 29 by the seam caps 20^a the whole being embraced at intervals by the roof clamp castings 22^a. The latter are formed with lateral reinforcing opposed web portions 24^a and the whole structure is clamped tightly to the carlines 6 by the bolts 29 and nuts 31 as hereinbefore described. This arrangement, like the preferred construction, results in a rigid watertight construction at the edges of the roof sheets where the latter are secured to the carlines.

A second slightly different modified or alternate form of construction is illustrated in Figs. 21 and 22. In these latter figures the carline 6^b is of substantially U-shape but is provided with the additional vertical and horizontal web portions 9^b and 10^b against which the roof sheets 16 are adapted to be tightly clamped by the seam caps 20^b which latter are somewhat wider in cross section than the caps previously described, and the seam caps 20^b are in turn clamped firmly at intervals against the roof sheets and the web portions 9^b and 10^b of the carlines by the roof clamp castings 22^b which project downwardly through apertures 21^b in the seam caps to nest closely into the space between the main vertical web portions 7^b of the carlines 6^b. A rigid and watertight roofing structure results from this latter described arrangement, the parts being bolted in the manner hereinbefore described to the carlines. The umbrella or overhanging portions 23^b of the roof clamp castings 22^b bind closely against the tops of the seam caps 20^b exteriorly of the upturned apertured portions 21^b, thereby preventing the admission of water and foreign matter to the interior of the seams. The horizontal flange portions 21^a of the seam caps lie closely against the roof sheets thereby strengthening the reinforcement of the structure as an entirety and ensuring against the admission of water to the space between the roof sheets. The eaves structure of both of the alternate or modified constructions above described is similar to the eaves construction described in the preferred arrangement.

The invention as hereinbefore set forth is embodied in a particular form of construction but may be variously embodied within the scope of the claims hereinafter made.

What is claimed is:

1. In a car roof, in combination: a roof frame comprising side plates, arched carlines secured at their eaves ends to said side plates, purlins extending longitudinally of said frame and secured at their ends to said carlines, roof sheets formed with seam flanges and adapted to be supported by said carlines and said purlins, seam caps embracing the adjacent seam flanges of said roof sheets and provided at intervals with apertures, roof clamp castings disposed between said roof sheets and projecting through the apertures in said seam caps, said roof clamp castings being adapted to be brought into clamping engagement with said seam caps, and means carried by said roof clamp castings and cooperating with said carlines to rigidly clamp said castings and said seam caps against said roof sheets and to said carlines.

2. In a car roof, in combination: a roof frame comprising side plates, carlines arched from side plate to side plate and secured at their eaves ends to said side plates, roof sheets formed with seam flanges and supported by said carlines, seam caps embracing the seam flanges of said roof sheets, and means for rigidly clamping said seam caps tightly against the seam flanges of said roof sheets, said clamping means being adapted to apply pressure to the upper portions of said cap seams and being further adapted to rigidly secure said seam caps and said roof sheets to said carlines.

3. A roofing structure comprising side plates, carlines arched from side plate to side plate and secured at their eaves ends thereto, roof sheets formed with seam flanges supported by said carlines, seam caps embracing the seam flanges of said roof sheets and having oppositely disposed webs extending transversely beyond said seam flanges, and clamping means engaging said seam caps and cooperating with said carlines to secure said seam caps and said roof sheets to said carlines.

4. A roofing structure comprising side plates, carlines having laterally extending webs arched from side plate to side plate and secured at their eaves ends thereto, roof sheets formed with seam flanges supported by the web portions of said carlines, seam caps embracing the adjacent seam flanges of said roof sheets and having apertures therein, and clamping means disposed between said roof sheets and projecting through and covering the apertures in said seam caps, said clamping means being adapted to cooperate with said carlines to maintain said seam caps and said roof sheets in overlapping relation to the laterally extending web portions of said carlines.

5. A roofing structure comprising side plates, carlines extending from side plate to side plate and secured at their eaves ends thereto, said carlines having laterally extending web portions, roof sheets formed with seam flanges supported by the web portions of said carlines, seam caps embracing the seam flanges of said roof sheets and having laterally extending web portions engaging the edges of said roof sheets, said seam caps having apertures at intervals therealong, roof clamp castings arranged between the seam flanges of said roof sheets and pro-

jecting through the apertures in said seam caps, said castings having an overhanging portion adapted to embrace said seam caps and clamp the same against the seam flanges of said roof sheets, and means carried by said castings and cooperating with said carlines to rigidly clamp the seam flanges of said roof sheets between said seam caps and said castings, and to rigidly clamp the edge portions of said roof sheets between the web portions of said seam caps and the web portions of said carlines.

6. In a car roof, in combination: a roof frame, comprising side plates, arched carlines secured at their eaves ends to said side plates, said carlines having laterally extending web portions, roof sheets formed with seam flanges and supported by the web portions of said carlines, seam caps embracing the seam flanges of said roof sheets, and means for rigidly clamping said seam caps against the seam flanges of said roof sheets, said clamping means having portions adapted to rigidly clamp said seam caps and said roof sheets against the laterally extending web portions of said carlines.

7. A car roof comprising side plates, arched carlines secured at their eaves ends to said side plates, said carlines having laterally extending web portions, roof sheets adapted to be supported by the laterally extending web portions of said carlines and having reinforced seam flanges along their side edges, seam caps embracing the adjacent seam flanges of said roof sheets and having apertures therein, roof clamp castings disposed between said roof sheets and projecting through the apertures in said seam caps, said roof clamp castings being adapted to be brought into clamping engagement with said seam caps, and means for clamping said castings against said seam caps to press said roof sheets against the supporting web portions of said carlines and to bind the seam flanges of the roof sheets between said seam caps and said clamp castings.

8. A car roof comprising side plates, arched carlines secured at their eaves ends to said side plates, said carlines having laterally extending web portions, roof sheets adapted to be supported by the laterally extending web portions of said carlines and having reinforced seam flanges along their side edges, seam caps embracing the adjacent seam flanges of said roof sheets and having apertures therein, roof clamp castings disposed between said roof sheets and projecting through the apertures in said seam caps, said roof clamp castings being adapted to be brought into clamping engagement with said seam caps, and means cooperating with said carlines for clamping said castings against said seam caps to rigidly secure said roof sheets against said seam caps to rigidly secure said roof sheets against the supporting web portions of said carlines and to bind the seam flanges of the roof sheets between said seam caps and said clamp castings.

9. A roofing structure comprising side plates, carlines extending from side plate to side plate and secured at their eaves ends thereto, purlins extending longitudinally of the roofing structure and secured to said carlines, roof sheets formed with seam flanges overlying and supported by said carlines and said purlins, seam caps enclosing the seam flanges of said roof sheets, clamp castings engaging said seam caps and cooperating with said carlines to rigidly secure said seam caps and said roof sheets to said carlines, and means for clamping said castings in engagement with said seam caps and said roof sheets.

10. A roofing structure comprising side plates, carlines having laterally extending web portions arched from side plate to side plate and secured at their eaves ends thereto, the web portions of said carlines being provided at intervals therealong with corrugated or recessed reinforcing portions, purlins extending longitudinally of the roofing structure and secured at their ends to the recessed portions of the carline webs, roof sheets formed with seam flanges supported by said carlines and purlins, seam caps embracing the seam flanges of said roof sheets and having laterally extending web portions overlying said roof sheets, said seam caps being provided with apertures, roof clamp castings projecting through said apertures in said seam caps and extending between said roof sheets and adapted to embrace said seam caps to firmly clamp the latter against the seam flanges of said roof sheets, and clamping means carried by said roof clamp castings and cooperating with said carlines to clamp said castings and said seam caps against the seam flanges of said roof sheets and to clamp the web portions of said seam caps down upon said roof sheets and upon the web portions of said carlines.

11. A roofing structure comprising side plates, carlines extending from side plate to side plate and secured at their eaves ends thereto, said carlines having laterally extending web portions, roof sheets supported by the laterally extending web portions of said carlines, said roof sheets having at their side edges upwardly and downwardly extending integrally formed reinforcing seam flanges, seam caps overlying and closely embracing the opposed reinforced seam flanges of said roof sheets, said seam caps having laterally extending web portions adapted to rest upon said roof sheets, roof clamp castings having depending reinforcing wall portions overlying and closely embracing said seam caps, and means for clamping said roof clamp castings downwardly upon said seam caps to bind the same firmly against the re-

inforced seam flanges of said roof sheets, said clamping means serving further to rigidly clamp said roof sheets between said laterally extending web portions of said carlines and said laterally extending web portions of said seam caps.

12. A roofing structure comprising side plates, carlines arched from side plate to side plate and secured at their eaves ends thereto, said carlines being of substantially U-shaped channel construction and having opposed integrally formed vertical web portions terminating in laterally extending web portions, roof sheets supported by the laterally extending web portions of said carlines and upturned at their side edges to closely fit against the said vertical web portions of the carlines, seam caps embracing and closely fitting against the adjacent seam flanges of said roof sheets, said seam caps being apertured and provided at their side edges with laterally extending web portions adapted to be clamped tightly against said roof sheets and tightly clamp the same between said laterally extending web portions and the laterally extending web portions of said carlines, and roof clamp castings carried by said seam caps and projecting through the said apertures thereof, said roof clamp castings having downwardly projecting portions adapted to nest within the U-shaped channels of said carlines and having overhanging portions adapted to engage said seam caps above the seam flanges of said roof sheets, and said clamp castings being adapted to cooperate with clamping means secured to said carlines and said roof clamp castings for drawing said castings downwardly toward said carlines to rigidly clamp said seam caps down upon the seam flanges of said roof sheets and the laterally extending web portions of said seam caps down upon the laterally extending web portions of said carlines.

13. A car roof comprising carlines having laterally extending web portions, roof sheets adapted to be supported by the laterally extending web portions of said carlines and having seam flanges along their side edges, seam caps embracing the adjacent seam flanges of said roof sheets and having apertures therein, roof clamp castings disposed between said roof sheets and projecting through the apertures in said seam caps, said roof clamp castings being adapted to be brought into clamping engagement with said seam caps, and means cooperating with said carlines for clamping said castings against said seam caps to bind said roof sheets between and in contact with said seam caps and the supporting web portions of said carlines, the seam flanges of the roof sheets being received between said seam caps and said clamp castings.

14. A car roof structure embodying roof framing members, roof sheets formed with seam flanges and overlying and supported by said members, a plurality of seam caps respectively enclosing adjacent flanges of neighboring roof sheets, and a plurality of means for causing said caps to press downwardly against neighboring roof sheets adjacent a flange of the latter, each of said means being interposed between a framing member and one of said seam caps and having spaced portions between which said seam flanges extend and are clamped.

15. A car roof structure embodying carlines, roof sheets overlying and supported by said carlines and provided with seam flanges, seam caps respectively housing the neighboring flanges of adjacent roof sheets, and a plurality of means for causing said caps to press downwardly against neighboring roof sheets adjacent a flange of each of the latter, each of said means being operatively interposed between a carline and a seam cap adjacent thereto and being provided with spaced portions between which proximate seam flanges extend and are clamped.

16. A car roof structure embodying roof framing members, roof sheets overlying and supported by said members and having seam flanges, a plurality of seam caps enclosing proximate flanges of adjacent roof sheets, and a plurality of means for securing said caps to said framing members, each of said means being operatively interposed between a framing member and one of said seam caps and having spaced portions between which proximate seam flanges extend and are clamped.

17. A car roof structure embodying carlines, roof sheets formed with seam flanges and overlying said carlines, seam caps overlying the seam flanges of adjacent roof sheets and a plurality of means cooperating with the seam caps for pressing said roof sheets downwardly toward said carlines, each of said means being positioned between adjacent flanges of proximate roof sheets and having lateral overlapping engagement with the neighboring carline below the plane of said roof sheets.

18. A car roof structure embodying carlines, roof sheets overlying and supported by said carlines, seam caps overlying the edges of adjacent roof sheets and a plurality of means cooperating with the seam caps for pressing said sheets downwardly toward said carlines, each of said means being interposed between adjacent edges of proximate roof sheets and being adapted to receive the shear force induced between said sheets and an adjacent carline when said sheets tend to shift longitudinally of the car.

In testimony whereof I have hereunto set my hand.

WILLIAM WRIGHT.