July 8, 1941. J. M. HILBISH ET AL 2,248,500

REMOVABLE ROOF STRUCTURE

Filed May 29, 1940 3 Sheets-Sheet 1

Fig. 1.

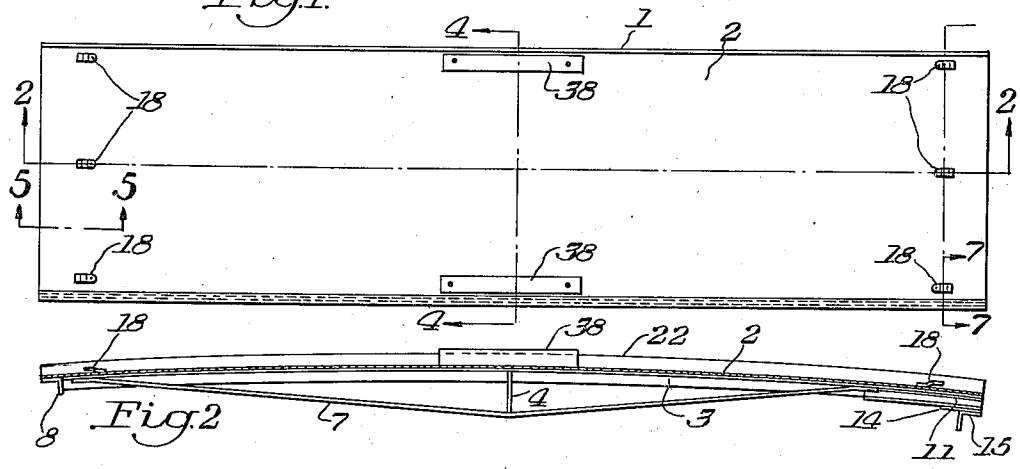


Fig. 2.

Fig. 4.

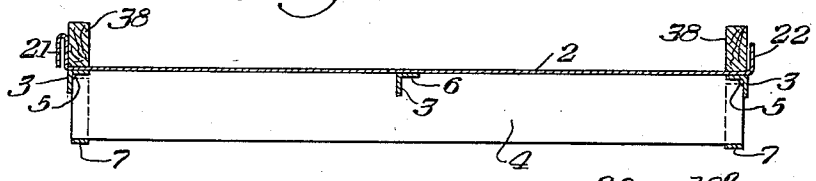


Fig. 5.

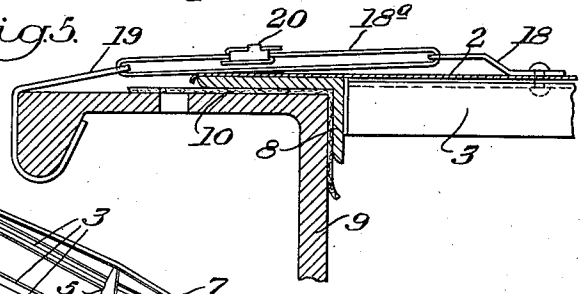


Fig. 3.

Fig. 7.

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Fig. 6.

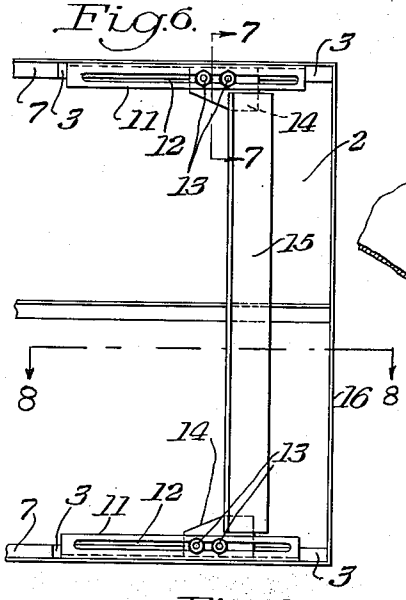


Fig. 9.

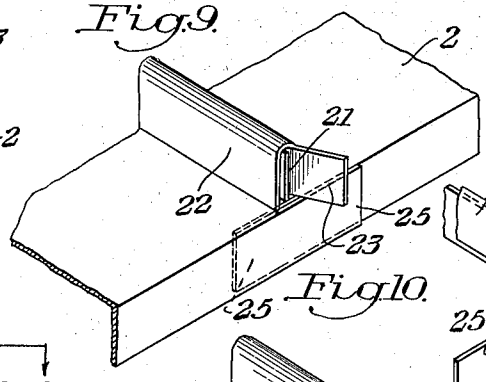


Fig. 10.

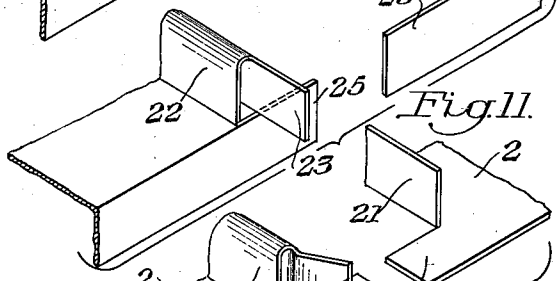


Fig. 11.

Fig. 8.

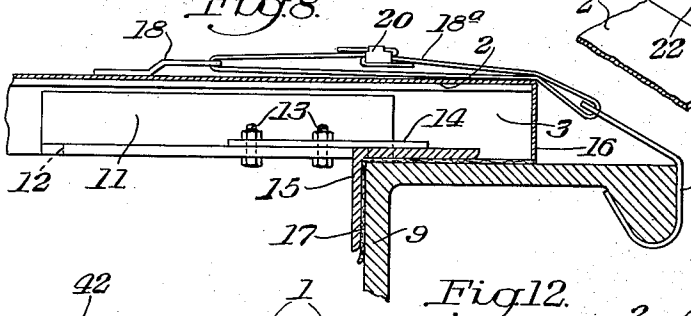
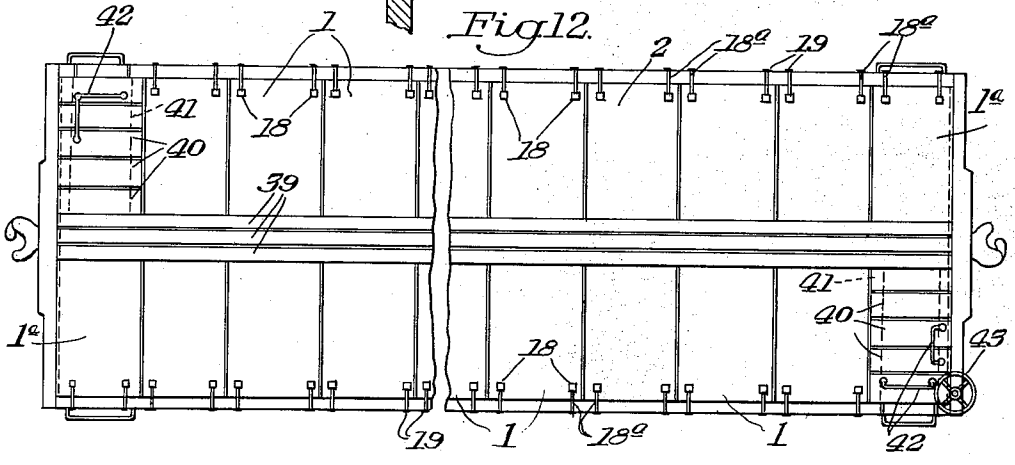


Fig. 12.



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Fig. 13.

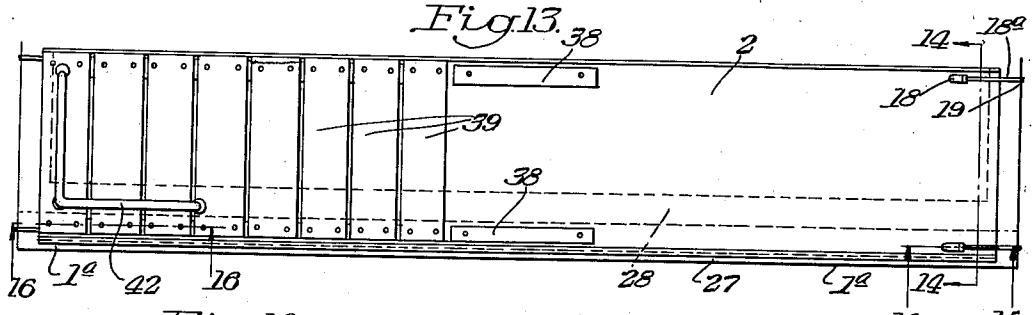


Fig. 14.

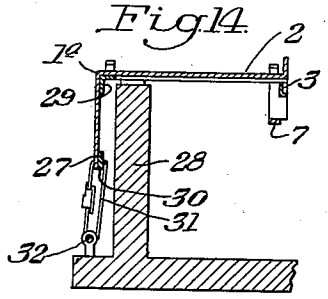


Fig. 16.

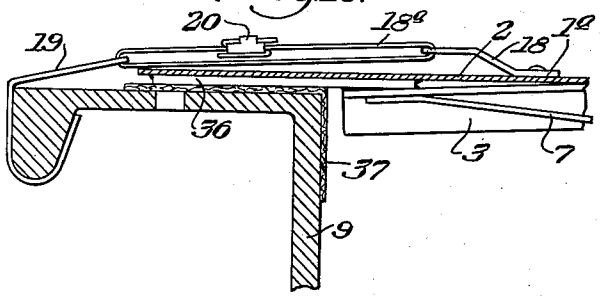


Fig. 15.

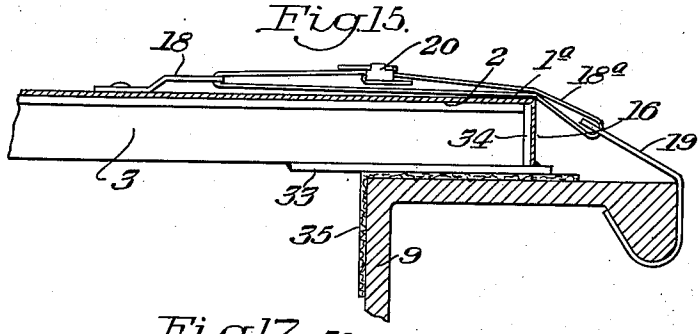
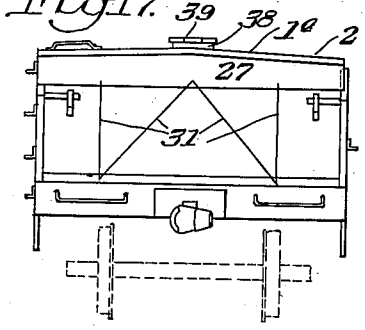


Fig. 17.



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UNITED STATES PATENT OFFICE

2,248,500

REMOVABLE ROOF STRUCTURE

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Application May 29, 1940, Serial No. 337,870

8 Claims. (Cl. 105—377)

The present invention relates to removable roofs or top closures for open vehicles such as "gondola" railway cars, motor trucks and the like.

In the transportation of many different characters of goods much care is required to prevent deterioration resulting from exposure to the atmosphere or weather.

Thus, for instance, steel shapes, bars, rods and sheets are subject to rust or corrosion, and when shipped in open vehicles great loss may result. To avoid this danger the pieces are sometimes wrapped in waterproof paper, but this is found to be unsatisfactory because such covering is fragile and easily torn or ruptured, permitting the access of moisture, with the result that the goods must be returned to the mill for cleaning and refinishing. The method also is time consuming and expensive.

In some instances shipment in boxcars is resorted to, but the loading and unloading of steel shapes, bars, rods and sheets into and from boxcars usually is done by hand, involving increased labor costs and expenditure of time compared to the loading and unloading of such goods when open cars are used.

Removable roofs or coverings for gondola cars have been proposed, but they have not met with general use because of their failure to satisfy numerous requisites, among which are the following:

Such coverings must of course be effective, for otherwise they serve no useful purpose; but at the same time they must be inexpensive even if capable of re-use.

They must also be capable of quick installation and removal without requiring skilled labor and must be rugged enough to withstand the jolts and vibrations of travel.

If the temporary roof structure be expensive to manufacture, or if it require skilled labor to install or remove, the costs involved are likely to equal or exceed those incurred in the use of boxcars for shipment.

Among the objects of the present invention is the provision of a removable roof structure which is relatively inexpensive to manufacture; is capable of convenient and quick installation and removal, which will positively and completely protect the goods against injury, and which after its removal when the goods have reached their destination, may be conveniently and cheaply returned to the shipper for repeated re-use.

Other objects will appear from the following description.

In the accompanying drawings, wherein is illustrated a practical embodiment of the present invention for use with standard steel gondola cars—

Fig. 1 is a top plan view of one of the roof sections.

Fig. 2 is a longitudinal section of the same taken along the line 2—2 in Fig. 1.

Fig. 3 is an inverted perspective of one of the said units.

Fig. 4 is a cross sectional view taken along the line 4—4 in Fig. 1.

Fig. 5 is an enlarged sectional detail of one end of the unit taken along the line 5—5 in Fig. 1, and showing a side of the car in section.

Fig. 6 is an inverted partial plan view of one of the sections illustrating the provision for adjustment of effective length of the unit.

Fig. 7 is an enlarged sectional detail taken along the line 7—7 in Figs. 1 and 6 and inverted, and also showing the side wall of the car in section.

Fig. 8 is a sectional view taken along the line 8—8 in Fig. 6 but on somewhat larger scale.

Fig. 9 is a broken perspective illustrating the method of interlocking the lateral edges of two adjacent units to obtain a sealed joint, the ends of the units arranged for longitudinal adjustment being shown.

Fig. 10 is an exploded view of the parts of the same.

Fig. 11 is an exploded perspective showing the other end of the units.

Fig. 12 is a broken top plan view of a gondola car to which the present invention is applied.

Fig. 13 is a plan view of one of the end roof sections, the top edges of the sides of the cars appearing at the ends of the sections.

Fig. 14 is a cross sectional view taken along the line 14—14 in Fig. 13.

Fig. 15 is an enlarged sectional detail taken along the line 15—15 in Fig. 13.

Fig. 16 is an enlarged sectional detail taken along the line 16—16 in Fig. 13.

Fig. 17 is an end elevation of the gondola car illustrating the securing of the end roof section in place.

Referring first to Figs. 1, 2, 3 and 4 of the drawings, the removable roof structure comprises a plurality of units which span the car or vehicle from side to side, and when assembled together cover the car from end to end. The characteristic unit is indicated generally by the numeral 1, and it comprises a sheet 2 of steel preferably of about twenty gauge to provide the requisite strength

and stiffness and of sufficient length to somewhat more than span the width of the standard gondola railway car, thus allowing for cars of different widths and also "bulged" cars.

The sheet 2 is cambered or arched longitudinally to shed water, with a rise of approximately one inch. A greater camber may be employed if desired. The sheet is reinforced by means of the longitudinally disposed angle bars 3 which are attached to the under surface of the sheets, one adjacent each longitudinal edge of the sheet 2 and one along the longitudinal center of the same, the horizontal flanges of the outer bars being faced inwardly. The horizontal flanges of the angle bars preferably are welded to the sheets.

To further stiffen and strengthen the units they are provided with a truss reinforcement. Thus in the embodiment shown, 4 indicates a king plate, shown in detail in Fig. 4, the upper edge of which is notched at the ends as at 5 and at the center as at 6 to fit up over the angle irons 3 and against the under face of the sheet 2. The king plate is welded in place to the sheet and to the angle bars. 7 represents flat strip irons which function as the tie-rods of the truss structure and at their center cross and bear on the lower edge of the king plate 4 and are welded thereto, while their ends fit against the horizontal flanges of the outer angle bars 3, adjacent the ends of the latter, and are secured thereto, as by welding.

If desired an intermediate tie-rod may be provided crossing and welded to the center of the king plate and having its ends welded to the intermediate angle bar, but two tie rods are usually sufficient for a unit.

Owing to the fact that the widths of steel gondola cars vary somewhat, and also to the fact that steel cars frequently become bulged in width after some service, the roof units 1 must be provided with means for adjustment, so that they will fit the run of gondola cars which the railways deliver to the mills for loading.

Out of consideration of convenience in installation on the cars and of economy, provision for adjustment of effective length is provided at one end only of the units. Thus at one extremity of a unit, the left end in Figs. 1, 2 and 3, and as shown in Fig. 5, which is the extremity not provided with means for adjusting the effective length of the unit, the angle bars 3 stop short of the end of the sheet 2 to provide room for a cross angle iron 8, the horizontal flange of which extends toward the end of the sheet 2 and is welded to the under surface of the sheet 2 while the vertical flange of the angle iron 8 is welded to the ends of the angle bars 3.

When the unit is in position on the car, the angle iron 8 fits down against the inner edge of the angle beam 9 which forms the top edge of the side of the car, the horizontal flange of the angle iron 8, as shown in Fig. 5, and the end of the sheet 2 overlap the top of the angle beam 9. A bent sheet 10 of asbestos, paper or other flexible waterproof material is interposed between the beam and the angle iron to prevent the entrance of water.

The provision for adjustment is made at the other end of the unit, and is illustrated in Figs. 6, 7 and 8.

Thus 11 indicates relatively short lengths of angle iron with their vertical flanges extending upwardly and welded to the inner sides of the outer angle irons 3 adjacent the ends of the latter. The horizontal flanges of the angle irons 11 are provided with elongated slotted openings 12 which are preferably about fifteen inches in length and are engaged by the bolts 13 which extend also through bolt-holes in bracket plates 14 which rest on the flanges of the irons 11 and are welded to the ends of the cross angle iron 15 the horizontal flange of which faces toward the end of the unit.

It is evident that when the nuts on the bolts 13 are loosened the angle iron 15 with its brackets 14 may be shifted along the angle irons 3 to bring the adjustable angle iron 15 into proper position to fit against and on the angle beam 9 at the other side of the car from the side illustrated in Fig. 5. It will be observed in this instance that the unit fits on top of the sides of the car and therefore the extremity of the sheet 2 is flanged downwardly as at 16 to close the end of the unit, and a bent piece of waterproof paper 17 is interposed between the flange 16 and the angle iron 15 and the angle beam 9 to prevent the entrance of moisture. At this end of the unit the angle bars 3 are extended to the end of the sheet and welded to the flange 16.

Means are provided to securely fasten the units to the car so the former cannot shift either laterally or longitudinally of the car. Thus 18 indicates brackets, two or more of which are riveted or otherwise secured to the top surface of the sheet 2 adjacent each end of the unit. The outer ends of the brackets are upwardly offset and provided with transversely elongated holes though which are looped the metal bands 18a which are also looped through slotted holes in the inner ends of hooks 19 which hook down over the outwardly extending flanges of the car sides. The bands are tightened and secured by means of the buckle plates 20. Bands and buckles of this character are in general use and any convenient type of the same may be employed.

Provision is made for watertight connection between the lateral edges of adjacent roof units.

Referring to Figs. 9, 10 and 11, one lateral edge of the sheet 2 of each unit is provided with a simple upturned flange 21 and the opposite edge with an inverted trough flange 22 arranged to receive the flange 21 of an abutting sheet, as illustrated in Fig. 9. The free side of the trough flange 22 at both ends of the sheet is provided with an elongation or flap 23 which, when the two units are assembled, is bent across the end of the trough and then back against the other wall of the trough flange to seal the end of the trough against the entrance of moisture. Preferably a folded strip 24 of waterproof paper or the like is laid on the flange 21 before the trough 22 of the next unit is placed down over the flange 21, to seal the joint between the sheets against moisture. The paper may extend beyond the edge of the flange 21 to be folded over the same before the trough flange is put in position. After the joint is assembled the trough flange is compressed against the flange 21.

At the end of the unit arranged for adjustment to fit varying car widths as already described, the depending flange 16 is prolonged beyond both of the lateral edges of the units, as illustrated at 25 in Figs. 9 and 10, so that when the units are assembled side by side with their lateral edges interlocked as above described, these portions 25 overlap each other as an additional guard against the entrance of moisture.

At the non-adjustable extremity of the unit the flanges 21 and 22 stop short of the end of the sheet 2, as shown in Fig. 11, and lateral extensions or flaps 26 are provided which overlap,

when the units are interlocked, thus providing further provision against the entrance of moisture.

Inasmuch as the length of the gondola railway cars and other roofless vehicles vary, provision must be made for adjusting the roof thereto. For this purpose roof units are made in standard widths with extra units of other widths to provide a roof covering the entire length of the car.

Preferably the standard roof units are made in 31 inch effective width while additional units of say 18 inches or 12 inches in width are provided.

At the ends of the car special roof units *1a* are provided as illustrated in Figs. 13 and 14.

In the case of these end units the truss reinforcement comprising the king support and tie rod is preferably confined to the inner side of the unit, while the outer side, adjacent the end of the car, is provided with a downturned skirt 27, integral with the sheet 2 of the unit, which depends over the outside face of the end wall or end gate 28 of the car, as illustrated in Fig. 14. To reinforce the angle formed between the main portion of the roof sheet 2 and the skirt 27, preferably an angle iron 29 is welded in place.

The lower edge of the skirt 27 is reinforced by a flat bar 30 and the bar and the skirt are pierced with registering holes to receive the wire 31 as indicated in Fig. 17 or the straps as indicated in Fig. 14 which engage said holes and the cross rod 32 or similar element of the car, and is tightly stretched and secured to clamp the skirt in place. The inner lateral edge of the end unit *1a* is connected to the adjacent unit by the flange and through joint above described.

Inasmuch as the end gates of gondola cars and other vehicle bodies are usually of the drop type, hinged at their lower edges, and are provided with latches or other means to hold the end gates in their vertical position, which latches are inside the car, the transverse angle irons, such as the fixed iron 8 in Fig. 5 at one end of the unit 1 and the adjustable angle iron 15 at the opposite end of the unit 1, as illustrated in Figs. 6, 7 and 8, which would interfere with the latch mechanism, are not used in the case of the end units *1a*.

At one end of the unit *1a*, the end corresponding to the adjustable end of the units 1, a flat extension plate 33 is welded to the under side of the angle bars 3 and 29 and to the flange 16 at the end of the unit, a flat bar 34 being welded to the inner side of the flange 16 and to the underside of the sheet 2. The plate 33 is extended sufficiently beyond the end of the unit *1a* to overlap the angle beam 9 forming the top of the side of the car. An angularly bent strip 35 of asbestos paper or other flexible waterproof material is interposed between the plate 33 and the beam 9 to exclude moisture.

At the other end of the unit *1a* an extension plate 36 is welded to the underside of the sheet 2 and at one end is interposed between the sheet and the angle bar 3 and at the other end between the stiffening angle iron 29 and the sheet. At its end the plate 36 is welded to the inner surface of the skirt 26. Waterproof paper 37 is interposed between the plate 36 and the car beam 9 to exclude moisture.

Running boards longitudinal of the car are provided for use by the trainmen. Thus 38 represents wooden saddle blocks, two or more of which are provided for each unit 1 and *1a*. These are provided with slightly arcuate under surfaces and are disposed longitudinally of the roof units and at the center of the same, being secured in place by bolts extending up through the horizontal flanges of the longitudinal angle bars of the units and through the sheets 3.

39 represents the boards which are secured as by screws to the saddles. If desired the boards 39 are of proper length to span a unit so that they may be permanently secured to the saddles.

At the end of the car short foot boards 40 are disposed transversely of the unit and secured on saddle blocks 41 which are mounted longitudinally of the unit by being bolted through to the angle irons 3 and 29. These foot boards 38 enable a trainman to mount the roof of the car and to reach the brakes. Hand grips 42 are provided for assisting the trainmen in mounting the cars. 43 represents the hand wheel of the brakes.

It is evident from the foregoing description that the improved removable car roof has many substantial advantages new to the art.

The units are of relative light weight and thus may be conveniently handled and quickly installed and removed from a car.

The units are inexpensive to manufacture, the labor and material costs being low.

When the roof structure is to be removed, as when the car has reached its destination and its contents are to be unloaded, the ties *18a* along the sides of the car and the wires 31 at the ends of the cars are cut, and the trough flanges 22 spread to release the flanges 21.

The units then may be lifted from position, and shipped back to the mill for reuse.

It is further evident that when the removable roof is in position substantially as complete protection is afforded the goods in the car as would be afforded the same were the goods shipped in boxcars.

We claim:

1. A removable roof structure for gondola railway cars and other open vehicles comprising a plurality of assembled units each consisting of a sheet of metal or the like reinforced against longitudinal flexing and spanning the width of the car and supported at its ends by the sides of the car, the opposite lateral edges being provided, respectively, with an upstanding flange and an inverted trough arranged to receive the flange of an adjacent unit and to be compressed thereon, and an extension of one wall of the trough arranged to be folded back against the other wall of the trough to seal the end of the trough.

2. A removable roof structure for gondola railway cars and other open vehicles comprising a plurality of assembled units each consisting of a sheet of metal or the like reinforced against longitudinal flexing and spanning the width of the car and supported at its ends by the sides of the car, the opposite lateral edges being provided, respectively, with an upstanding flange and an inverted trough arranged to receive the flange of an adjacent unit and to be compressed thereon, an extension of one wall of the trough arranged to be folded back against the other wall of the trough to seal the end of the trough, and a packing of waterproof material for the joint between the flange and the trough.

3. A removable roof structure for gondola railway cars and other open vehicles, comprising a plurality of assembled units each consisting of a sheet of metal or the like spanning the width of the car and supported at its ends by the sides of the car, the opposite lateral edges

being provided, respectively, with an upstanding flange and an inverted trough arranged to receive the flange of an adjacent unit, and at least one extremity of the sheets provided with downturned flanges, the material of said flanges being extended beyond the line of the lateral edges of the main portions of the sheets, said extended portions of the flanges of adjacent units being arranged to overlap each other to guard against the entrance of moisture.

4. A removable roof structure for gondola railway cars and other open vehicles, comprising a plurality of assembled units each consisting of a sheet of metal or the like spanning the width of the car and supported at its ends by the sides of the car, the opposite lateral edges being provided, respectively, with an upstanding flange and an inverted trough arranged to receive the flange of an adjacent unit, said upstanding flanges and said inverted trough flanges ending short of at least one extremity of the sheets and the material of the sheets adjacent said end being extended laterally to form flaps and the said flaps of adjacent sheets overlapping each other to prevent the entrance of moisture.

5. A removable roof unit for gondola railway cars and other open vehicles, comprising a sheet of metal or the like of sufficient length to span and overlap the sides of the car and reinforced against flexing, and members mounted on the under side of the unit arranged to engage the car sides to prevent movement of the unit laterally of the car, at least one of said members being adjustable lengthwise of the unit to adapt the unit to cars of different effective width.

6. A removable roof unit for gondola railway cars and other open vehicles, comprising a sheet of metal or the like of sufficient length to span and overlap the sides of the car and reinforced against flexing, and angle irons mounted on the under side of the unit and arranged to engage the car sides to prevent longitudinal movement of the unit, at least one of said angle irons being adjustable longitudinally of the unit to adapt the unit to cars of different effective widths.

7. A removable roof unit for gondola railway cars and other open vehicles, comprising a sheet of metal or the like of sufficient length to span and overlap the sides of the car, an inverted truss-reinforcement secured to the under side of the sheet to resist longitudinal flexing of the sheet, and members mounted on said reinforcement adjacent the ends of the sheet and arranged to engage the car sides to prevent longitudinal movement of the unit, at least one of said members being adjustable longitudinally of the unit to adapt the unit to cars of different effective widths.

8. A sectional roof structure for railway gondola cars or other open vehicles composed of an assemblage of individual units supported on the side walls of the vehicle and having their lateral edges connected, each unit comprising a sheet of metal or like material of sufficient length to span the width of the vehicle, a plurality of spaced reinforcing members disposed longitudinally of the sheet and secured to the under side of the latter, a king plate disposed transversely of the unit and intermediate of the ends of the latter, the king plate engaging the under side of the reinforcing members and the sheet and extending the full width of the unit, and a plurality of tension members connected to the reinforcing members adjacent their ends and taut across the lower edge of the king plate, the king plates of the assembled units being substantially aligned longitudinally of the car.

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