

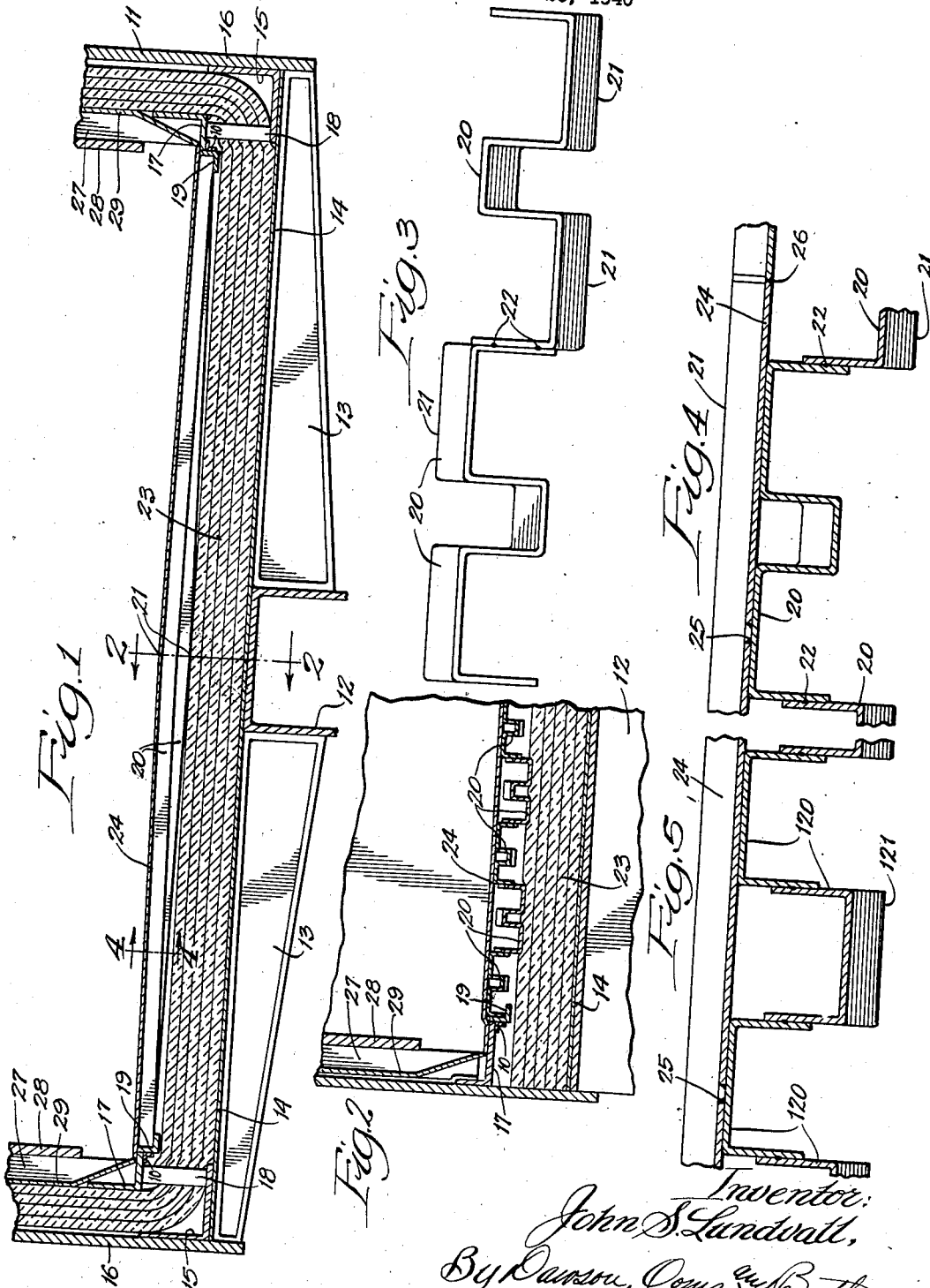
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FLOOR STRUCTURE FOR RAILROAD CARS

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FLOOR STRUCTURE FOR RAILROAD CARS

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This invention relates to an improved floor structure for railroad cars, and is particularly suitable for the construction of refrigerator cars.

One of the objects of this invention is to provide a beam which can be pre-fabricated from sheet metal to form a light, strong structural member.

Another object of this invention is to form a beam in channel form, inclined longitudinally from the middle to the two ends thereof.

Another object of this invention is to provide a novel form of beam, a plurality of which can be secured together with alternate beams inverted, to form a structural member of great strength.

Another object of this invention is to provide a metal floor supporting structure which can be supported from the side sills at the sides of the car, but which will nevertheless have sufficient strength to carry the cargo load without the use of intermediate stringers.

Another object of the invention is to provide a light-weight car floor structure of pressed metal beams so arranged as to give the maximum strength in relation to the weight of the materials used.

Another object of the invention is to provide a floor structure in which all of the parts may be welded together and to the supporting sills to compose an integral floor unit.

Another object of the invention is to provide a floor structure which can be simply and easily pre-fabricated from a few uniform parts.

A further object of the invention is to provide a floor structure in which the transverse floor beams are all identical and can be installed without special tools and without any cutting or shaping of the parts after their original fabrication.

Another object of the invention is to provide a fireproof and watertight floor construction which provides a desirable pitch for drainage of the floor area.

Other objects, advantages and capabilities of the invention will appear from the following description of a preferred embodiment thereof, taken in conjunction with the accompanying drawing, in which:

Figure 1 is a transverse sectional view through the floor of a refrigerator car equipped with the floor structure of this invention;

Fig. 2 is a fragmentary sectional view through the middle of the floor structure at one end of the car, taken on the line 2—2 of Fig. 1;

Fig. 3 is an end elevation of two adjacent floor

structure members, or floor beams of this invention, before the flooring is laid down;

Fig. 4 is a transverse section taken on the line 4—4 of Fig. 1 of one of the floor structure members, or floor beams, showing the flooring secured thereto; and

Fig. 5 is a view like Fig. 4 of a modified form of floor beam.

Referring to the drawing, the reference numeral 11 indicates a car which may be, except for the floor structure and floor supports therein, of conventional construction. Longitudinally of the car is a heavy beam 12 which runs through the length of the car and is secured in a familiar manner to the trucks upon which the car is borne. Transverse bolsters 13 are supported by the central longitudinal beam 12. These bolsters are channel beams or flanged plates of familiar construction in the shape of truncated triangles. These bolsters extend from the central longitudinal beam to the sides of the car where they support the side walls.

Overlying the central beam 12 and the bolsters 13 is the sub-floor 14 which is of heavy plank construction but may suitably be made of metal or other familiar materials.

The bolsters 13 not only support the sub-flooring 14, but also side beams 15 to which the siding 16 of the car 11 is secured in the customary manner. This construction is generally common in the railroad car art and may be varied in many ways.

Prior to this invention it was customary to support upon the sub-flooring 14 a series of longitudinal stringers supported upon their edges which ran the full length of the car to support cross beams and flooring upon them. These were either placed directly upon the sub-flooring 14, or, if the car were insulated, upon several layers of insulation overlying the sub-flooring. In either case the stringers were secured to the sub-flooring 14 and the bolsters 13.

This construction was extremely heavy and where the car was designed for refrigerator use and required insulation between the sub-floor 14 and the floor of the car, the installation of such insulation was almost impossible unless the stringers rested upon the insulation, when they compressed it to such an extent that its efficacy was greatly reduced. In addition, the longitudinal stringers intervening between the floor of the car and the sub-floor were conductor members which prevented the effective insulation of the car interior from the sub-floor, which was, of course, exposed to the weather.

In the flooring structure of this invention the use of longitudinal stringers between the sub-flooring 14 and the flooring of the car is entirely eliminated. The interior of the car and the flooring is entirely supported by side sills 17 which run the length of the car. These are preferably made of metal in the form of an angular beam, although the form thereof may be changed without affecting the principle of this invention. The side sills 17 may be supported upon the side beams 15 by vertical pillars 18. These may consist of single vertical pillars placed at intervals throughout the length of the car or may consist of a single beam placed on edge. These details may be varied without affecting the advantages to be derived from the invention.

In the preferred embodiment of the invention shown herein the side sills 17 support the angular rails 19, which in the drawing are shown secured to the side sills by welding the two together and supporting the joint with an angular strip 10 welded to both members. Obviously, the side sills 17 and the angular rails 19 may be formed from an integral beam.

Supported by the side sills 17 and the rails 19 are the floor supporting members or floor beams 20. These may be either of the preferred form shown in Fig. 3 or in the simpler modified form 120 shown in Fig. 5. Referring first to the simpler form of beam 120 shown in Fig. 5, a flat sheet of metal is pressed into a form which is substantially U-shaped in section but which is formed with the beam inclined from its two ends to the middle 21 as best indicated in Fig. 1. Thus, the beam is pitched from the middle to the two ends with a slight pitch. This pitch is normally designed to render the floor self-draining, but also to give the beam a form which will provide maximum strength when the beam is employed in the manner of this invention hereafter described.

In the more complex and preferred form of beam shown in Fig. 3, the sheet metal is pressed to form three adjacent substantially U-shaped portions, the middle one of which has a common wall with each of the adjacent portions and is inverted in relation thereto. This type of beam is also formed with an inclination from the ends of the beam to the middle 21 thereof as indicated in Figs. 1 and 3.

Obviously, the form of the beam can be modified by a further multiplication of the number of U-shaped portions which are to be pressed from a single sheet. The invention contemplates that this number may be varied according to the materials available and the strength required of the final unit.

The floor structure of this invention is fabricated by securing together a number of beams of this type, with alternate beams inverted. Two of the beams 20 are shown in Fig. 3 secured together by welds 22 and a number of them are shown secured together in the fragmentary sectional view of the car shown in Fig. 2. Because of the shape of the floor beam 20, which rises from its two ends to the ridge 21, inversion of the beams will place the ridge 21 of alternate beams in a position lower than the ends of the beam. The inverted beam will thus be inclined from its middle upwardly to the two ends. When adjacent beams are secured together by welding or bolts or other familiar methods of attachment the ends must be aligned as indicated in Fig. 1 so that the ends of each beam will rest within

the angular rails 19 and thus support the beams 20 from the side sills 17.

The floor structure thus composed of securing together alternate inverted beams of the forms shown in Fig. 3 and Fig. 5 provides maximum strength and rigidity for its weight.

The employment of these beams, extended the full width of the car and supported along the sides of the car by the side sills 17, eliminates the use of any stringers beneath the car floor. The space intervening between the sub-flooring 14 and the floor beams 20 can be filled with suitable insulation 23 which may be installed before the floor beams are laid into position.

The employment of floor beams of this type permits them to be overlaid with flooring of any suitable material, although in the preferred form of the invention shown the flooring consists of metal sheets or plates 24 which may be secured to the floor beams 20 by bolts are preferably by plug welding as indicated at the weld 25 in Fig. 4. Adjacent sheets 24 may also be welded together as indicated at 26 in Fig. 4.

It is apparent that the floor will rest only upon alternate floor beams as shown in Fig. 2. If metal flooring is employed the sheets may be of such a size as to extend beyond the ends of the floor beams 20 to enable them to be secured or welded to the side sills 17, thus making the flooring structure integral with the side sills throughout the car, and lending additional strength to the car itself.

The interior of the car may be suitably finished by the installation of the hollow interior walls composed of the risers 27, the sheathing 28 and the inner lining 29. The separation of the sheathing 28 and the inner lining 29 by the risers 27 forms air passages within the walls which serve as convection ducts for the ventilation and refrigeration of the cars.

If the car is to be used for refrigeration or the transportation of materials that yield moisture, suitable drainage means can be provided by which the water running down the pitch of the floor from the ridge 21 to the side sills will be led from the car.

In the use of this invention the sub-structure or under carriage of the car is made in the conventional manner with the longitudinal beam 12, the bolsters 13, the sub-flooring 14 and the side beams secured thereto. The pillars supporting the side sills 17 and the insulation 23 can then be installed and the car is ready for the installation of the floor structure of this invention.

In the installation of the floor structure of this invention the beams 20 or 120 can all be pre-fabricated as they are of uniform length and form. A number of the beams can then be placed adjacent to each other and welded into a unit and this unit of several beams can then be placed in the car and welded or bolted to the angular rails 19. The unit may, if desired, be first covered with the flooring and the flooring secured to the floor beams and the complete unit placed in position within the car and welded or bolted into final position.

Obviously, variations in the form and dimensions of the elements of the structure may vary this procedure without affecting the advantages and principles of the structure.

Although the invention has been disclosed in connection with the specific details of a preferred embodiment thereof, it is to be understood that such details are not intended to be limi-

tative of the invention except insofar as set forth in the accompanying claims.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A structural member comprising a plurality of channel beams of substantially uniform U-shaped cross-section throughout their length and each having its two end portions straight and meeting at the center at an obtuse angle, said beams being alternately inverted and the adjacent sidewalls thereof being secured together.
2. A structural member comprising a plurality of beams each having straight end portions meeting at the center at an obtuse angle, and each beam comprising a plate formed into a plurality of adjacent substantially U-shaped channels of uniform section throughout the beam length, each alternate channel being inverted and having a common side wall with the channel adjacent thereto, said beams being secured together by securing the side wall of each beam to the adjacent side wall of each adjacent beam, and each alternate beam being inverted.
3. A floor for a railroad car comprising a pair of side sills, a plurality of transverse floor beams supported thereby, each of said floor beams comprising a substantially U-shaped cross-section uniform throughout the beam length and having straight end portions meeting at the middle at an obtuse angle, and each alternate beam being inverted with respect to the adjacent beams and the side flanges of adjacent beams being secured together throughout their length, and flooring supported by said floor beams.
4. A floor for a railroad car comprising a pair of side sills and a flooring structure secured thereto, said flooring structure comprising a plurality of transverse floor beams secured together and supported upon said side sills, each of said floor beams comprising a substantially U-shaped cross-section uniform throughout the beam length and having straight end portions meeting at the middle at an obtuse angle, and each alternate beam being inverted with respect to the adjacent beams and the side flanges of adjacent beams being secured together throughout their length, and a plurality of metal flooring plates secured to said floor beams.
5. A structural building unit comprising a panel

thicker at its center line than at its two opposite edges and tapering from its center line to said two edges, the panel being formed by a plurality of beams running from one of said edges to the other and arranged side by side in the panel, each of said beams being formed of sheet material of U-shaped cross section, bent at its longitudinal center, and each alternate beam being inverted with respect to the adjacent beams and having its side flanges secured to the side flanges of the adjacent beams throughout their length.

6. A structural building unit comprising a panel thicker at its center line than at its two opposite edges and tapering from its center line to said two edges, the panel being formed by a plurality of beams running from one of said edges to the other and arranged side by side in the panel, each of said beams being formed of sheet material of U-shaped cross section, bent at its longitudinal center, and each alternate beam being inverted with respect to the adjacent beams and having its side flanges secured to the side flanges of the adjacent beams throughout their length, and a covering sheet secured to said beams at one face of the panel.

7. A structural member comprising a plurality of beams each having straight end portions meeting at the center at an obtuse angle and being of uniform section throughout its length, each beam comprising a plate formed to provide side flanges at its edges, alternate beams in the member being inverted and each beam having its side flanges rigidly secured to the side flanges of adjacent beams.

8. A structural building unit comprising a panel thicker at its longitudinal center line than at its two opposite ends and tapering from its center line to said two ends, the panel being formed by a plurality of beams running from one of said ends to the other and arranged side by side in the panel, each of said beams having straight end portions meeting at the center at an obtuse angle and being formed of sheet material having side flanges at its opposite sides extending throughout the length of the beam, alternate beams in the panel being inverted and each beam having its side flanges rigidly secured to the side flanges of the adjacent beams.

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