

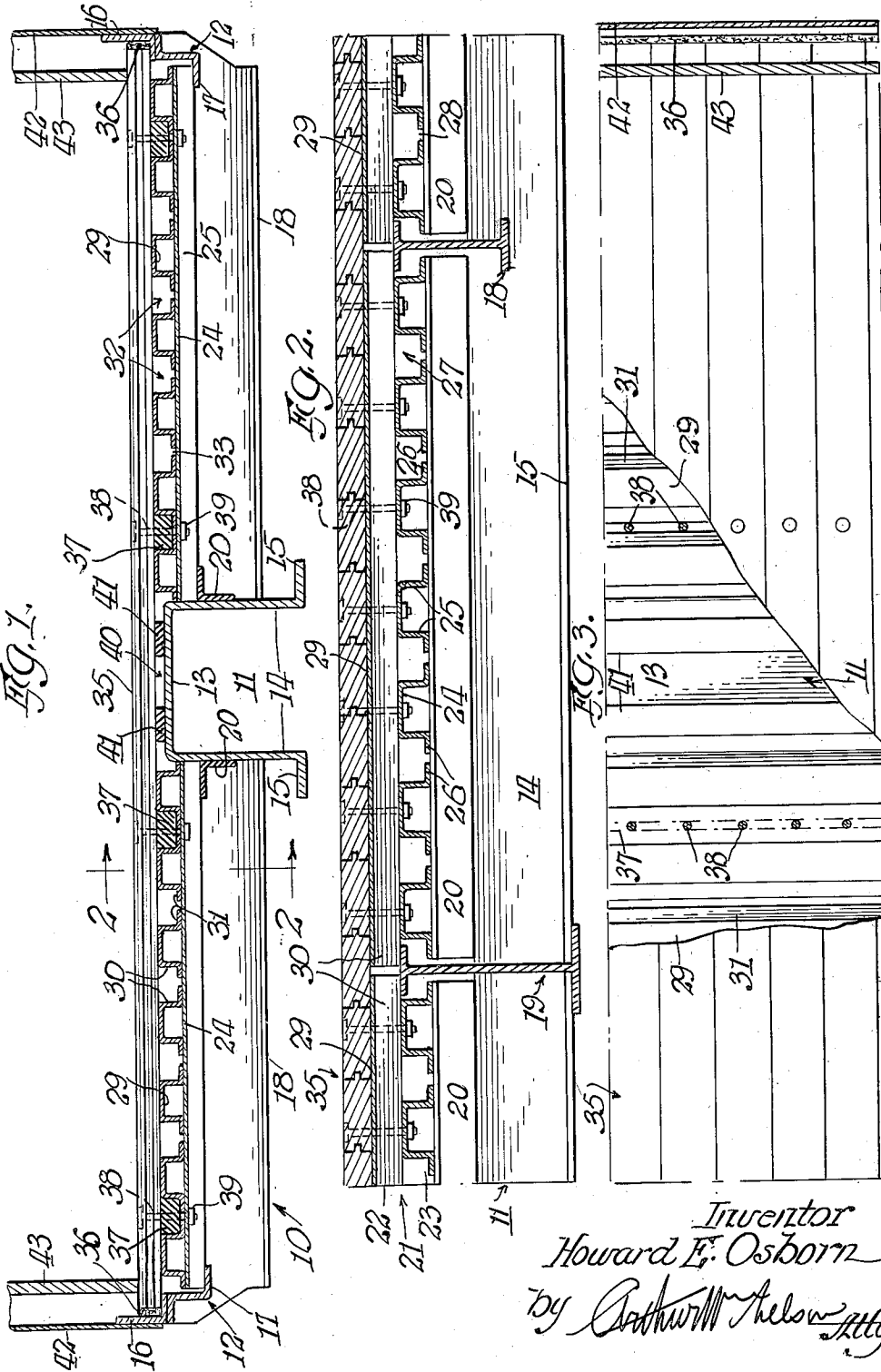
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FLOOR STRUCTURE FOR RAILWAY FREIGHT CARS

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FLOOR STRUCTURE FOR RAILWAY  
FREIGHT CARS

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11 Claims. (Cl. 105-422)

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This invention relates to improvements in floor structure for railway freight cars and it consists in the matters hereinafter described and more particularly pointed out in the appended claims.

In freight car use it is not unusual to subject the floor to a concentrated load of the order of say 15,000 lbs. A freight car with the conventional wood floor is composed of planks, which considered individually or as a group of several thereof, have small load carrying ability relative to the concentrated load which they are likely to be required to sustain.

Usually in a conventional wood car floor, the planks extend transversely of the car and are supported at the center upon the center sill and longitudinal floor stringers and at their ends upon side sills of the car underframe. Such a floor plank will have a span approximating 48 inches and without intermediate support will have a considerable deflection and poor load carrying ability.

In the conventional wood floor freight or box car, the most common cause for the failure of the floor is the use of power fork trucks for loading and unloading the car and which produces a highly concentrated load under each of the wheels thereof.

In the case of gondola cars, the most common cause for the failure of the wood floor thereof is the high impact loads due to crane loading and unloading of commodities of highly concentrated weight.

Due to vertical space limitation particularly in that region between the underside of the wood floor and the flanges of the wheels of the car, floor support members or stringers in said region must be of such depth that when the truck springs are compressed, ample clearance is present between said flanges and the bottom supports for the floor.

At other regions of the car the floor supports must be shallow enough not to interfere with the application and operation of the air brake equipment for the car.

One of the objects of the invention is to provide a floor structure for a railway car which is shallow in depth with a minimum of weight in relation to its capacity to support a concentrated load imposed upon it at any point in its area.

Also it is an object of the invention to provide a floor for a railway car which avoids the breaking of the planking of the floor by direct shear or otherwise, and which floor is supported from below at spacings or intervals under its entire

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area, which are less than the approximate area of contact of the tires of a lift truck frequently used in loading or unloading the car.

The above mentioned objects of the invention as well as others along with the advantages thereof will more fully appear as the specification proceeds.

In the drawing:

Fig. 1 is a transverse vertical sectional view through the floor structure of a railway car embodying the preferred form of the invention.

Fig. 2 is a fragmentary longitudinal vertical sectional view through the improved structure, as taken on the line 2-2 and on a scale enlarged over that of Fig. 1.

Fig. 3 is a fragmentary plan view of a portion of the floor structure shown in and on the scale of Fig. 1.

Referring now in detail to that embodiment of the invention illustrated in the drawing, 10 indicates as a whole the underframing of a railway freight car, which includes a center sill 11 and side sills 12-12. The center sill is herein shown as having an inverted channel cross section, with a web 13 at the top and sides 14-14, each terminating in a lateral flange 15. The side sills are shown as composed of angle bars 16 and secured thereto between certain cross bearers, later to be mentioned, are Z bars 17.

Extending laterally outward from each side of the center sill are longitudinally spaced cross bearers 18 and 19 respectively in the form of I beams and the outer ends of said cross bearers are operatively attached to the side sills. Attached to the outer face of the sides of the center sill are angle bar-like supporting members 20, each with its vertical flange facing downwardly and its horizontal flange facing outwardly. The top surface of the horizontal flange of each member 20 is disposed in the plane of the top surface of the intumed bottom flange of the Z bars before mentioned.

The supporting structure for the sub-floor, which is indicated as a whole by the numeral 21 in Fig. 2, is made up of upper and lower courses of structural members 22 and 23 respectively. As herein shown the members 23 of the lower course in each set at opposite sides of the center sill 11 are in the form of laterally extending channels each including a flat top web 24 and depending sides 25-25 and each of which terminates in an outwardly extending flat bottom flange 26. The ends of the flanges 26 of each member 23, in each set thereof, engage flatwise upon and are suitably attached, as for example,

by welding to the horizontal flanges of each angle member 20 and to a horizontal intumed flange of the Z bar 17 on the associated side sill 12. The members 23 are so arranged longitudinally of the car that the sides 25 of adjacent members 23 are spaced apart approximately the distance between the sides of each of said members. Thus, there is a channel 27 between adjacent members 23 and a narrow space 28 between the opposed edges of the flange 26 of adjacent members 28 which affords drainage from the channels between adjacent members 23. When the members 23 of the lower course are in position the top surfaces of the webs 24 thereof are disposed flush with those of the cross bearers 18 and 19 and said surfaces are disposed somewhat below the top surface of the web 13 of the center sill.

The members 22 in the upper course are also made of the same stock as the members in the lower course and are preferably, but not necessarily, of the same dimensions cross sectionally considered, differing in length only. These members 22 each include a flat top web 29 and depending sides 30—30, each of which terminate in a laterally extending flange 31. Said members extend longitudinally of the car, in areas between the side sills and center sill and are of such length that the ends of adjacent lengths engage upon and are suitably attached to the top flanges of the cross bearers 18 and 19 respectively.

When the members 22 of the upper course are in place, the bottom edges of their flanges 31 engage upon and are attached to the top web 24 of the members 23 in the lower course. The lateral spacing between the members 22 of the upper course is such that there are channel-like spaces 32 between the sides of adjacent members, which correspond to the distance between said side of each member. Thus there is a narrow space 33 between the opposed edges of the flanges 31 of adjacent channels. This disposes the top surface of the parts 29 of the members 22 above the top surface of the web 13 of the center sill, as best appears in Fig. 1.

The members 22—23 are fabricated from sheet metal and in practice said members are approximately  $1\frac{1}{2}$ " high. Thus, the courses 22—23 have combined height or depth of about 3".

The wood flooring of the car is indicated by the numeral 35 and it consists of tongue and grooved planks which extend transversely of the car. Each plank is of such length that the ends thereof engage upon the intumed horizontal flanges of the angles 16 of the side sills 12—12 and the spaces between the ends of said planks and the vertical flanges of said angles are filled with a plastic substance 36.

The inner and the outermost channels 32 in the upper course of the members 21 are occupied by wood filler strips 37—37, as appears in Fig. 1 and leakproof bolts 38 are passed through those parts of the plank that line up with the central portion of the webs 24 of the lower course members 23. As the channels formed by each of these members are open from below, nuts 39 may be applied to the ends of the bolts to draw them tightly into place.

As there is a space 40 present between the mid portion of the planks of the floor 35 and the top web 13 of the center sill, there is provided in that space a plurality of longitudinally extending laterally spaced wooden filler strips 41.

The outer sheathing and the inner lining of

the car body are indicated at 42 and 43 respectively in Fig. 1.

It is apparent that by means of the members 22—23, constituting the upper and lower courses thereof, an all over strength pattern is provided in the support which has a deflection compatible with the allowable deflection of the planks constituting the wood floor 35. Each course of members or beams 22—23 have supports independent of each other permitting a full deflection of each member in each course and each beam in either course has a connection with those in the other course. Thus the beams spread the load imposed upon any one area into adjacent areas, which add their resistance to that of the first area so that each beam functions to aid in restraining the beams at the critical point of concentrated load from deflection. With the structure described there are no beams or members in either course that do not contribute some portion of their strength regardless of where the load is concentrated.

As the complete depth of the supporting structures approximates only 3", it in no way interferes with truck spring movement or brake equipment on the underside of the car.

With a structure made as described ample support is provided for the wood flooring of the car so that it cannot break through under concentrated load weight and, therefore, the life of the flooring is greatly increased and damage to lading and resulting loss claims therefor is materially reduced, if not entirely eliminated.

I claim as my invention:

1. In combination with the underframe of a car embodying therein longitudinally extending center and side sills and transverse bearer members between said sills, a sub-floor structure including upper and lower courses of beams, with the beams of one course extending longitudinally of the car and with the beams in the other course extending transversely of the car, the transversely extending beams being supported at one end from the side sills and at their other ends from the center sill, the longitudinally extending beams being supported by said transverse bearer members, the beams in the upper course engaging upon and being secured to the beams in the lower course.

2. In combination with the underframe of a car embodying therein longitudinally extending center and side sills and transverse bearer members between said sills, a sub-floor structure including upper and lower courses of beams, with the beams in the lower course extending transversely of the car and with the beams in the upper course extending longitudinally of the car, the transversely extending beams being supported at one end from the side sills and at their other end from the center sill, the longitudinally extending beams being supported by said transverse bearer members and engaging upon and being secured to the transversely extending beams.

3. In combination with the underframe of a car embodying therein longitudinally extending center and side sills and transverse bearer members between said sills, a floor structure including upper and lower courses of beams, with the beams in the lower course extending transversely of the car and with the beams in the upper course extending longitudinally of the car, the transversely extending beams being supported at one end by the side sills and at their other end by the center sill, the longitudinally extending

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beams being laterally spaced apart to provide channels therebetween and being supported by said transverse beams and engaging upon and secured to the transversely extending beams in the lower course, filler members in certain of said channels, wood flooring planks extending transversely of the car and supported at their ends by said side sills and at their mid portions crossing said center sill and at points between said end and mid portions engaging upon and supported by the beams in said upper course and bolts passing through said flooring planks, fillers and beams in said upper and lower courses for operatively securing said parts together.

4. In combination with the underframe of a car embodying therein longitudinally extending center and side sills and transverse bearer members between said sills, a floor structure including upper and lower courses of beams, with the beams in the lower course extending transversely of the car supported by said side and center sills and with the beams in the upper course extending longitudinally of the car and having their top surfaces disposed, at least not below the top of the center sill, and which last mentioned beams are supported by said cross bearers and by the beams in the lower course, and a wood floor embodying planks that extend transversely of the car between the side sills and supported at their ends thereon and at their mid portion crossing the center sill, portions of the planks between the ends and the mid portion thereof engaging upon and supported by the beams in said upper course.

5. In combination with the underframe of a car embodying therein longitudinally extending center and side sills and transverse bearer members between said sills, a floor structure including upper and lower courses of metallic beams with the beams in one of the courses extending transversely of the car and supported from said side and center sills and with the beams in the other course extending longitudinally of the car and supported by said cross bearers, the said upper course of beams bearing upon and fixed to the said bottom course of beams, and means providing a floor surface between the side sills and engaged upon and supported by the beams in said upper course.

6. In combination with the underframe of a car embodying therein longitudinally extending center and side sills and transverse bearer members between said sills, a floor structure including upper and lower courses of beams composed of laterally spaced downwardly opening channel members defining upwardly opening channels therebetween, the channel members in the lower course extending transversely of the car and being supported by said side and center sills and with the channel members in the upper course extending longitudinally of the car and supported by said cross bearers and by the channel members in the lower course, the top surfaces of the channel members in the upper course being disposed in the same plane and a wood floor embodying planks extending between the side sills and supported at their ends from the side sills and at portions between said side and center sills engaging upon the top surface of the channels in the upper course, and means for securing said planks and the channel members in said upper and lower courses together in operative relation.

7. In combination with the underframe of a car embodying therein longitudinally extending center and side sills and transverse bearer mem-

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bers between said sills, a floor structure including upper and lower courses of beams composed of laterally spaced downwardly opening channel members defining upwardly opening channels therebetween, the channel members in the lower course extending transversely of the car and being supported by said side and center sills and with the channel members in the upper course extending longitudinally of the car and supported by said cross bearers and by the channel members in the lower course, the top surfaces of the channel members in the upper course being disposed in the same plane, and a wood floor embodying planks extending between the side sills and engaging upon the top surfaces of the channel members in said upper course, and bolts extending through parts of said planks, and through the beams of said upper and lower courses for operatively securing them together.

8. In combination with the under frame of a car embodying therein longitudinal center and side sills and transverse bearer members between said sills, the side sills each including upper and lower inwardly extending horizontal portions, means providing a horizontal portion on each side of the center sill, disposed in the plane of one of the horizontal portions on the side sills, a floor structure including upper and lower courses of laterally spaced beams on each side of the center sill, the beams in each lower course extending transversely of the car and engaged and supported at their end from the lower horizontal portions of the side sills and the horizontal portions on each side of the center sill, the beams in each upper course extending longitudinally of the car and engaging upon and supported by said transverse bearer members and upon the beams in the lower course, wood flooring planks extending transversely of the car, and at the mid portion crossing the center sill, the portions of said planks between said mid portions and the ends thereof engaging upon and being supported by the beams in the upper course.

9. In combination with the underframing of a railway freight car embodying therein longitudinal center and side sills and transverse bearer members connecting said sills, upper and lower courses of laterally spaced beams, the beams in the lower course extending transversely of the car and fixed for support at their ends to said center and side sills, the beams in the upper courses extending longitudinally of the car and fixed for support at their ends to said transverse bearer members and at points between said ends engaging upon and fixed to the beams in the lower course, a wood floor composed of planks extending transversely of the car and engaging at portions outwardly from the mid portions thereof upon and fixed to parts of the beams in the upper course thereof, said mid portion of said planks crossing the center sill.

10. In combination with the underframing of a railway freight car embodying therein longitudinal center and side sills and transverse bearer members connecting said sills, upper and lower courses of laterally spaced beams, the beams in the lower course extending transversely of the car and fixed for support at their ends to said center and side sills, the beams in the upper course extending longitudinally of the car and fixed for support at their ends to said transverse bearer members and at points between said ends engaging upon and fixed to the beams in the lower course, the beams in said upper and lower courses each being of a downwardly facing channel cross section, a wood floor composed of planks extend-

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ing transversely of the car engaging at portions outwardly from the mid portions thereof upon and fixed to parts of the beams in the upper course thereof, said mid portion of said planks crossing the center sill.

11. In combination with the underframing of a railway freight car embodying therein longitudinal center and side sills and transverse bearer members connecting said sills, upper and lower courses of laterally spaced beams, the beams in the lower course extending transversely of the car and fixed for support at their ends to said center and side sills, the beams in the upper course extending longitudinally of the car and fixed for support at their ends to said transverse bearer members and at points between said ends engaging upon and fixed to the beams in the lower course, the beams in said upper and lower courses each being of a downwardly facing channel cross

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section, filler means disposed between certain of the beams in the upper course, a wood floor composed of planks extending transversely of the car and engaged at their ends upon the side sills for a part of their support and engaged upon the parts of the beams and the filler means of the upper course, and means for securing said planks to said courses of beams.

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