

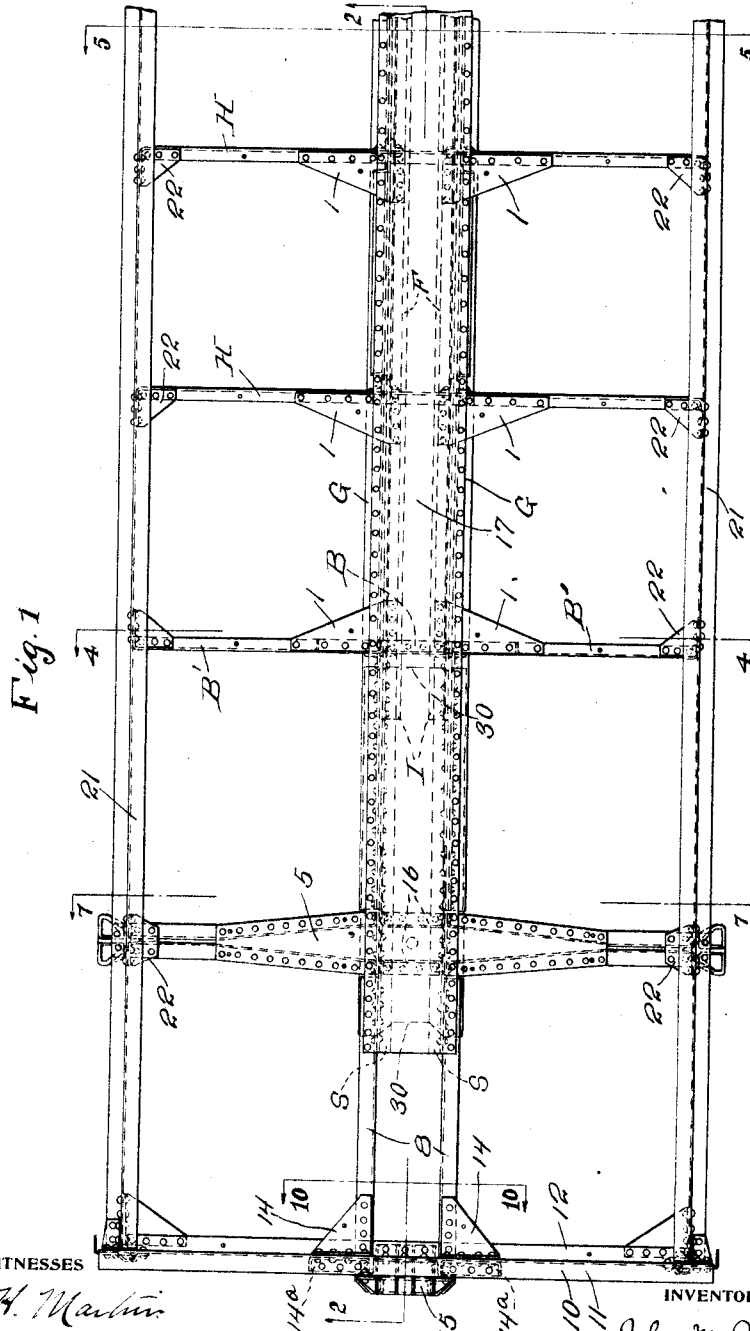
J. M. ROHLFING.  
UNDERFRAME.

APPLICATION FILED MAY 7, 1912.

1,066,532.

Patented July 8, 1913.

5 SHEETS—SHEET 1.



WITNESSES

*H. H. Martin*  
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INVENTOR

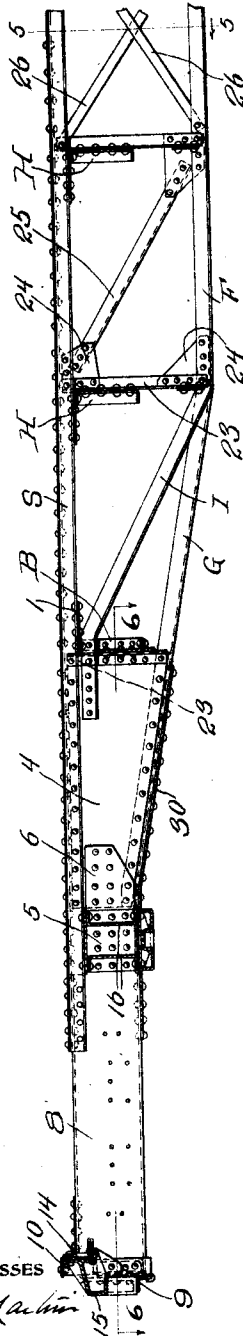
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Patented July 8, 1913.

5 SHEETS—SHEET 2.

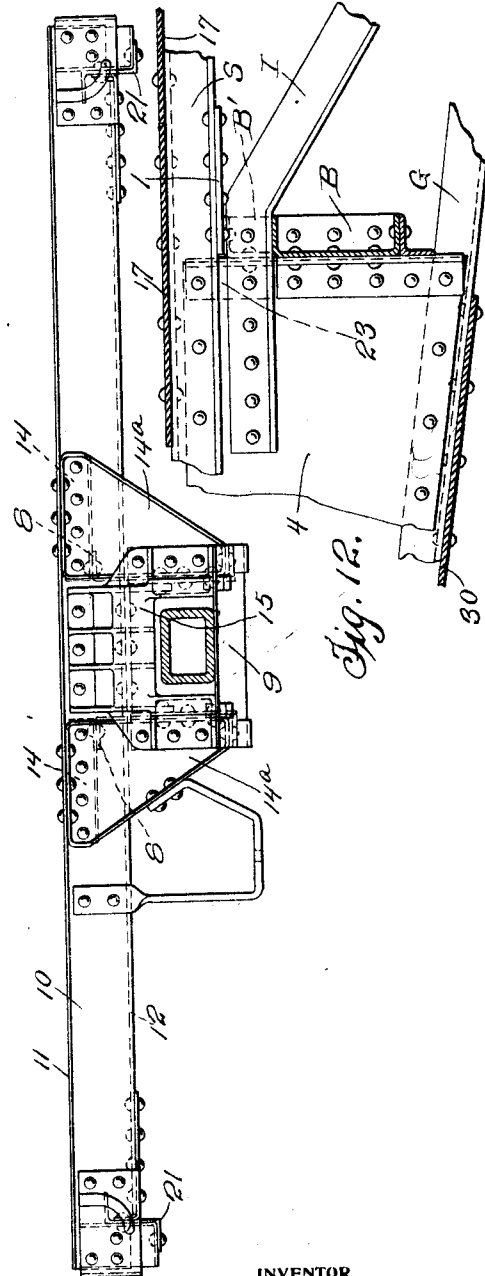
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Fig. 2



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Fig. 3



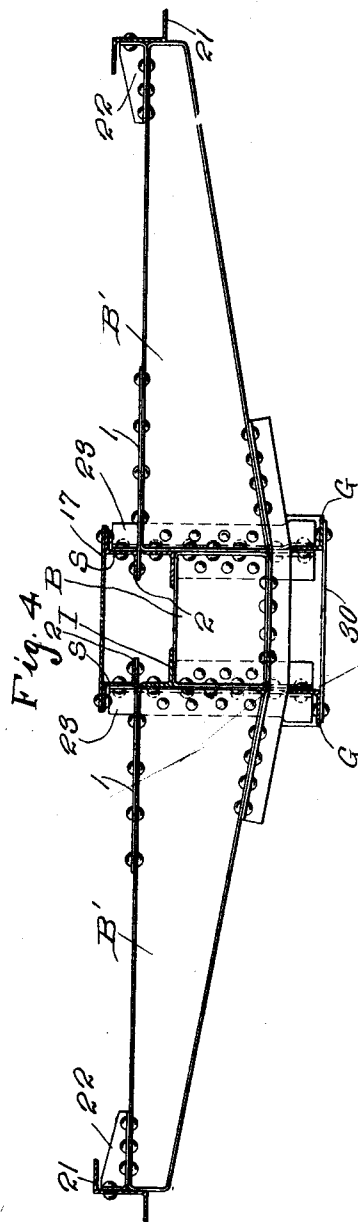
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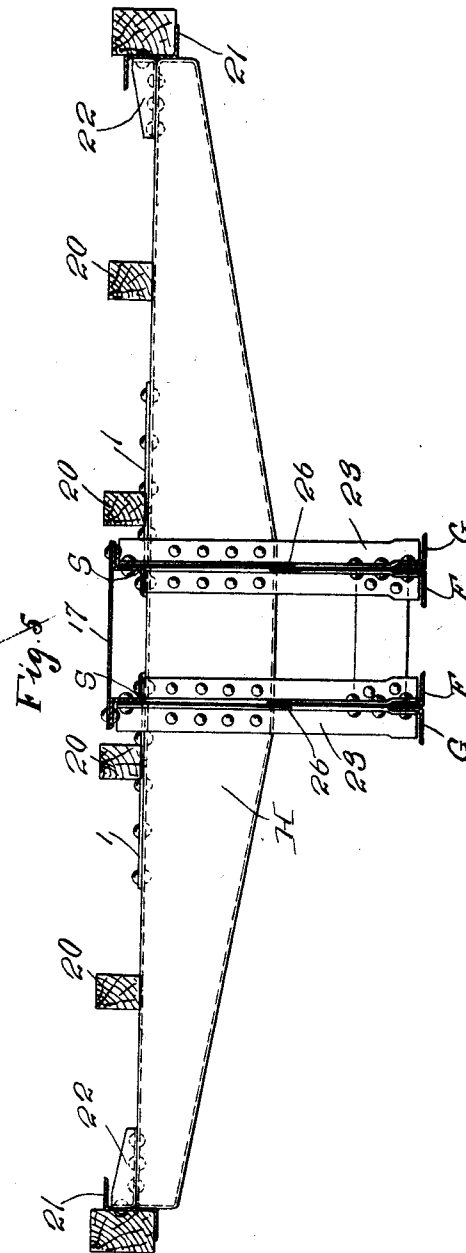
5 SHEETS—SHEET 3.



WITNESSES

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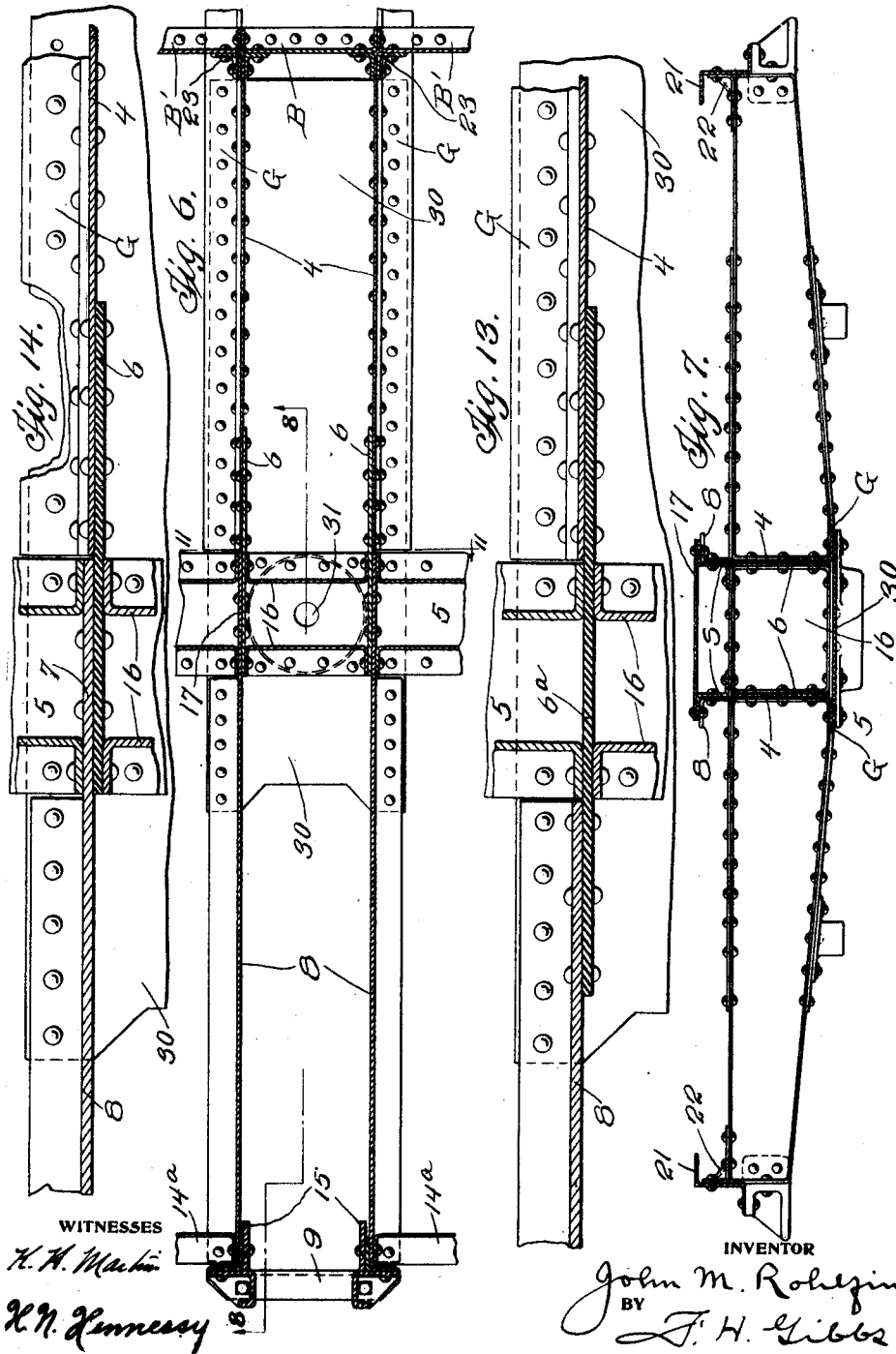
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5 SHEETS—SHEET 4.



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5 SHEETS—SHEET 5.

1,066,532.

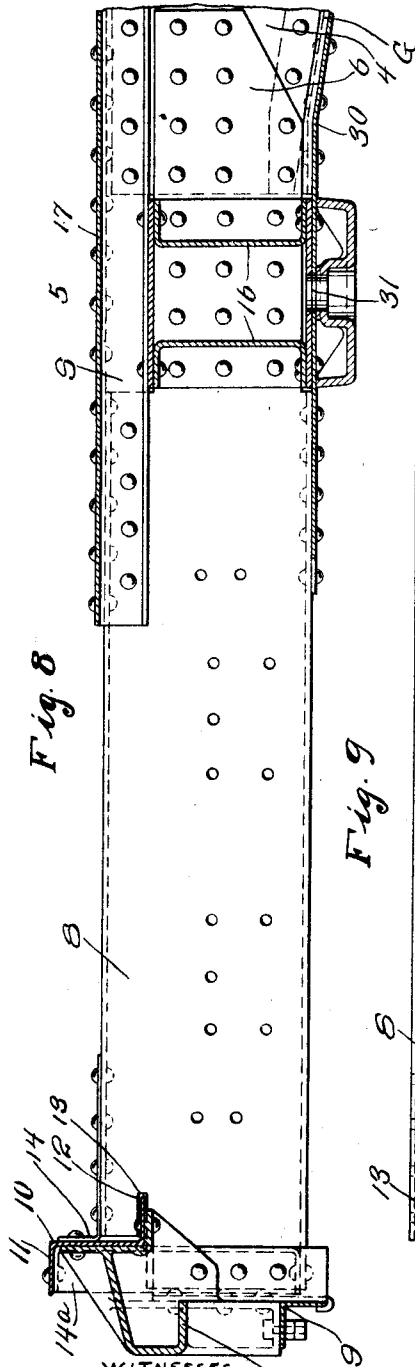


Fig. 8

Fig. 9

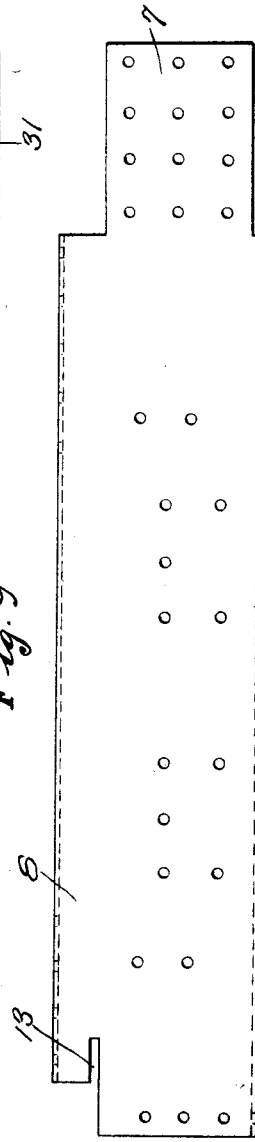
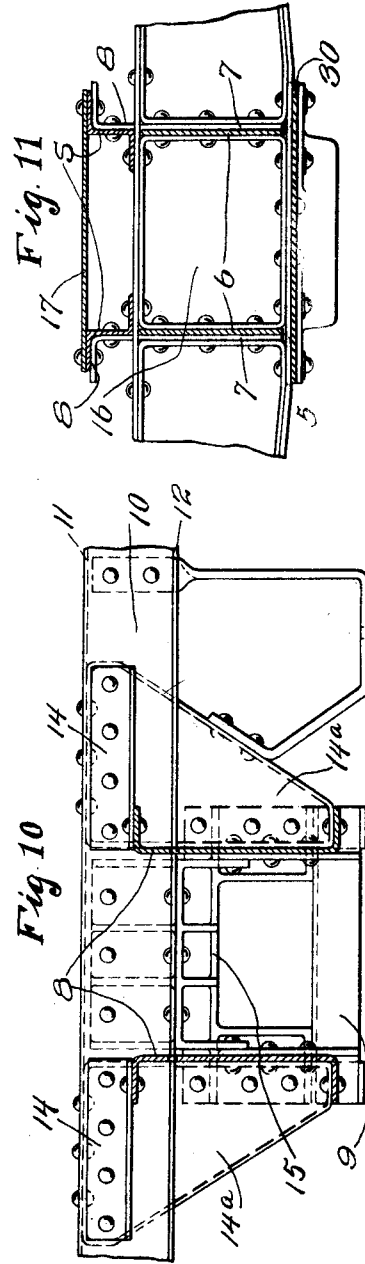


Fig. 11

Fig. 10



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# UNITED STATES PATENT OFFICE.

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FOUNDRY COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF NEW JERSEY.

## UNDERFRAME.

1,066,532.

Specification of Letters Patent.

Patented July 8, 1913.

Application filed May 7, 1912. Serial No. 695,728.

*To all whom it may concern:*

Be it known that I, JOHN M. ROHLFING, residing at St. Louis, Missouri, and being a citizen of the United States, have invented certain new and useful Improvements in Underframes, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and to use the same, reference being had to the accompanying drawings, which illustrate the preferred form of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof will occur to persons skilled in the art.

In said drawings: Figure 1 is a plan view of half of a car underframe equipped with the present invention. Fig. 2 is a vertical longitudinal sectional view of half of the car, the section being taken on line 2—2 of Fig. 1. Fig. 3 is an end view showing the end sill in full. Fig. 4 is a transverse sectional view; the section being taken on line 4—4 of Fig. 1, and illustrates the first cross bearer back of the bolster. Fig. 5 is a transverse sectional view; the section being taken on line 5—5 of Fig. 1, and illustrates the formation of all cross bearers intermediate those next adjacent the bolsters. Fig. 6 is a horizontal sectional view; the section being taken on line 6—6 of Fig. 2. Fig. 7 is a transverse sectional view; the section being taken on line 7—7 of Fig. 1, illustrating the body bolsters in elevation. Fig. 8 is an enlarged reproduction of the left hand portion of Fig. 2 showing the parts immediately adjacent the bolster considerably enlarged, the section being taken on line 8—8 of Fig. 6. Fig. 9 is a detached elevational view of a pressed channel draft sill used with one form of the invention, in which the draft sill extends through the bolsters. Fig. 10 is a fragmentary transverse sectional view taken on line 10—10 of Fig. 1, showing the parts considerably enlarged. Fig. 11 is a fragmentary sectional view taken on line 11—11 of Fig. 6 and showing the central portion of the parts shown in smaller size in Fig. 7. Fig. 12 is an enlarged fragmentary detailed sectional view through the first cross bearer back of the bolster showing in enlarged detail the parts immediately under "Fig. 2"

of Fig. 2 comprising the first cross bearer back of the bolster of Fig. 2 and fragments of the parts adjacent thereto. Fig. 13 illustrates a modification showing means for connecting draft sills to center sills by means of continuous splice plates extending through the bolsters, to which splice plates are connected the draft sills and the short web of the center sills; this last modification being designed to facilitate removal of the draft sills of the underframe. Fig. 14 is a greatly enlarged fragmentary detail of the parts shown in Fig. 6 adjacent the bolster.

The object of the invention is to provide a simple, light and strong underframe, which is designed especially for the purpose of resisting buffing shocks and is made up of relatively solid web parts between the end sills and first cross bearer, thus extending through the bolsters and of open truss formation between the first cross bearers.

Experiments have demonstrated that open trussed underframes in which the truss is open throughout their length between the bolsters will not withstand the enormous stresses incident to service; in consequence of which underframes of the open truss type, unless formed of sections of metal so heavy as to be too expensive to manufacture, cannot be successfully used.

As it is desirable in car construction to not only provide underframes which are sufficiently strong to resist service stresses, but also to produce such underframes of as light weight as possible, consistent with wear and tear of service, I have designed the present underframe, which may be said to be of the composite type, comprising plate girder formation to the first cross bearer back of the bolster and of open truss type between said first cross bearers.

Referring to the parts: The bottom members of the underframe between the bolsters consist, at each side of the central line, of a pair of angles F—G placed back to back, that is, with their vertical legs extending parallel or closely juxtaposed and with their outstanding flanges projecting in opposite directions for the middle portion of their length. From the second cross bearer—H—back to the bolster these angles diverge, the outer angle —G— being continuous from bolster to bolster, while the inner angle —I— is deflected upwardly as shown in

Fig. 2 and passes over the filler —B— which is preferably of pressed box formation between the central longitudinal sills, while the diaphragms —B'— of the first cross bearer are deeper than said filler and extend to a higher plane, as best shown in Fig. 4 of the drawings so that the tops of the diaphragms —B'— may be connected to the top members —S— of said center sills by means of discontinuous tie plates 1 which are secured by through rivets through the top flanges of the diaphragms —B'— and through the inwardly extending flanges 2 of the Z shaped top members —S— of the center sill.

As will be noted in Fig. 12 and in Fig. 2 the angle section —I— passing over the filler —B— is connected by through rivet to the inner flange of the first cross bearer diaphragm —B'— and extends thence forwardly and is riveted to the short sill plate 4 which extends from said first cross bearer to the bolster 5 which bolster comprises the usual pressed diaphragms with top and bottom cover plates, the top plate extending over the inward extension 7 of the draft sill and the bottom plate extending below the center sills, as best shown in Fig. 11.

Extending from a line somewhat back of the bolster is a splice plate 6 which passes through the bolster and is shown in the sectional view Fig. 14 and laps the rearward extension 7 of the draft sill 8, through rivets connecting the outstanding flanges of the diaphragms of the bolster and the bolster filler with said rearward extension 7 of the draft sill and with said splice plate 6, thereby firmly securing these parts together.

The draft sill is preferably formed of pressed sheet metal with top and bottom flanges; the bottom flange extending continuously from the carry iron 9 to the bolster flanges, while the top flange of the draft sill extends forwardly from the bolster to the end sill 10, which end sill is preferably of Z section with vertical web and horizontal flanges 11 and 12, the latter flange extending into the slot 13 formed in the draft sill, as best shown in Figs. 8 and 9.

The draft sills are connected by means of angle plates 14 with said end sill 10. The horizontal flanges of said angle plates are riveted directly to the top flanges of the draft sills and the vertical flanges of said plates are riveted through the web of the end sill, as best shown in Figs. 8 and 10.

Connected with the vertical web of the end sill on the outer side thereof are triangular connection plates 14' with edge angles which plates are connected through their vertical flanges with the webs of the draft sills, which draft sills extend beyond the end sill, and through their horizontal flanges with the horizontal bottom flanges of said

draft sills, and the flanges 11 of the end sills thereby stiffening the end portion of said draft sills and providing suitable supports for the striking casting 15.

It will be observed that the top members S of the center sill extend from the rear part of the draft sills at one end of the car to a corresponding position at the opposite end; said members —S— passing over the cover plate of the body bolsters and lapping the bolster fillers 16, while the continuous cover plate 17 is connected by through rivets with the horizontal flanges of said members —S—, it being understood that the trusses referred to are parallel and are connected by said top sill cover plate, which latter is co-extensive with the Z sections —S—.

Each of the cross bearers is provided with tie plates 1, which extend below the bottom flange of the Z section —S— and said tie plates are secured thereto by rivet connection.

Connected with the top flanges of the diaphragms of each of the cross bearers are suitable nailing strips 20, said nailing strips being preferably of wood and extending slightly above the plane of the sill cover plate 17 so that flooring carried by the strips will clear the rivets connecting the said cover plate to the top member of the center sills. Corresponding nailing strips are carried by the side sills 21, which latter are preferably of Z section secured to pressed fillers 22, which fillers are riveted through their vertical flanges to the said sills 21 and through their horizontal flanges to the top flanges of the diaphragms of the cross bearers and preferably to all of said cross bearers.

At all of the cross bearers the top and bottom chords of the girder formed by the center sills and their top cover plate, are connected by vertical angles 23 which angles are connected directly to the vertical flanges of the bottom angles and to the webs of the Z sections —S—, gusset plates 24 being connected to the contiguous vertical webs and flanges of said Z sections and angles for the purpose of securing them together. Connected to these gusset plates are diagonal braces 25 coöperating with the vertical and horizontal members of the underframe to form a central truss; this provision of gusset plates may be carried throughout the underframe if desired wherever diagonal members are connected with said horizontal members, but at the middle part of the underframe crossed diagonal members 26 are shown, which diagonal members comprise suitable rolled sections or straps which are connected directly to the vertical flanges of the bottom angles —B— and to the webs of the upper Z sections —S—.

As described the draft sills extend through the bolster bar, in some instances, 139

it may be desirable to remove the draft sills for replacement in which case it is desirable to terminate the draft sills at the bolsters and connect the draft sills to the short sill plate 4 by means of separately formed splice plates 6<sup>a</sup> as shown in Fig. 13, which splice plates are connected to the bolster diaphragm and filler flanges by through rivets and lap the webs of the draft sills and short sill plates 4 as shown in said figure.

To stiffen the underframe, between the bolster and first cross bearers back of such bolsters, the angles —G— are connected by a relatively heavy plate 30, shown in full lines in Fig. 6, in dotted lines in Fig. 1, and in section in Figs. 2 and 8. This plate extends from a line adjacent the first cross bearer and laps the draft sills, to the lower flanges of which it is connected by through rivets, thus serving as a connector for the lower parts of said draft sills and also for the bolster filler 16, bolster diaphragms and bottom cover plate of the bolster. As will be seen in Figs. 6 and 8, this plate is perforated at 31 for the passage of the usual center bearing pin and the center bearing is riveted directly through the plate 30. Thus it will be evident that said plate serves as a stiffening member for the draft sills, center sills and for the bolster, tying these parts securely together.

Including the top sill cover plate 17, bottom plate 30, splice plates 6, rearward extension 7 of the draft sill, or in the alternative construction the sill plates 17, 30 and splice plate 6<sup>a</sup>, with the Z sections —S— and angles —G— will be evident that a very stiff box-girder is provided in the immediate vicinity of the bolster, to which the draft sills are connected in such manner as will best resist stresses incident to buffing, and where draft rigging of suitable capacity is used to do its share in absorbing buffing shocks there will be practically none of these shocks transmitted to the lower middle portion of the underframe. In consequence of this the said lower middle part may be formed of such light sections as will carry the superposed weight of the car and its lading without the necessity of providing heavier sections to resist buffing stresses.

I claim—

1. In a car underframe, end sills, bolsters and a plurality of cross-bearers between said bolsters, of a pair of spaced draft sills, short plate girder sills from the bolsters to their next adjacent cross-bearer and an open truss girder between said cross-bearers.

2. In a car underframe, end sills, bolsters and a plurality of cross-bearers between said bolsters, of a pair of spaced draft sills, short plate girder sills from the bolsters to their next adjacent cross-bearer and an open truss girder between said cross bearers, the

upper chord of said open girder lapping said short plate girder sills.

3. In a car underframe, end sills, bolsters and a plurality of cross-bearers between said bolsters, of a pair of spaced draft sills, short plate girder sills from the bolsters to their next adjacent cross-bearer and an open truss girder between said cross bearers, the upper chord of said open girder lapping said draft sill.

4. In a car underframe, end sills, bolsters and a plurality of cross-bearers between said bolsters, of a pair of spaced draft sills, short plate girder sills from the bolsters to their next adjacent cross bearer and an open truss girder between said cross bearers, the upper chord of said open girder connecting the draft sills to the plate girder sills.

5. In a car underframe, end sills, bolsters and a plurality of cross-bearers between said bolsters, of a pair of spaced draft sills, short plate girder sills from the bolsters to their next adjacent cross-bearer and an open truss girder between said cross bearers, one chord of said open girder lapping the bolsters.

6. In a car underframe, end sills, bolsters and a plurality of cross-bearers between said bolsters, of a pair of spaced draft sills, short plate girder sills from the bolsters to their next adjacent cross bearer and an open truss girder between said cross bearers, one chord of said open girder connecting draft sills at opposite ends of the underframe.

7. In a car underframe, end sills, bolsters and a plurality of cross-bearers between said bolsters, of a pair of spaced draft sills, short plate girder sills from the bolsters to their next adjacent cross-bearer and an open truss girder between said cross-bearers, one chord of said open girder being divided and being connected to the upper and to the lower portion of said short plate girder.

8. In a car underframe, end sills, bolsters and a plurality of cross-bearers between said bolsters, of a pair of spaced draft sills, short plate girder sills from the bolsters to their next adjacent cross-bearer and an open truss girder between said cross bearers, and a bottom cover plate connected with said bolsters and extending to the cross bearer next adjacent each bolster.

9. In a car underframe, end sills, bolsters and a plurality of cross-bearers between said bolsters, of a pair of spaced draft sills, short plate girder sills from the bolsters to their next adjacent cross-bearer and an open truss girder between said cross-bearers, the upper chord of said open girder lapping the bolsters and bottom sill cover plates lapping said draft sills and extending inwardly between said bolsters nearly to said next adjacent cross-bearers.

10. In a car underframe, end sills, bolsters and a plurality of cross-bearers between said

bolsters, of a pair of spaced draft sills, short plate girder sills from the bolsters to their next adjacent cross-bearer and an open truss girder between said cross-bearers, a top sill cover plate lapping said draft sills at each end of the underframe and short sill cover plates at each end lapping said draft sills and said short plate girder sills.

11. In a car underframe, end sills, bolsters and a plurality of cross-bearers between said bolsters, of a pair of spaced draft sills, short plate girder sills from the bolsters to their next adjacent cross-bearer and an open truss girder between said cross-bearers, said short plate girder sills forming parts of box girders extending at each side of each bolster.

12. In a car underframe, end sills, bolsters, a plurality of cross-bearers and a composite open truss center sill with a plate portion extending at each side of each bolster and extending to a cross-bearer.

13. In a car underframe, a combination comprising bolsters, a center sill of partly open truss construction between said bolsters, continuous cross bearers extending through said truss and cross bearers comprising spaced diaphragms and fillers located within the sill.

14. In a car underframe, the combination comprising bolsters, a center sill of partly open truss formation between said bolsters; said sill comprising tension members and compression members, and cross-bearers, some of the tension members extending over certain of said cross-bearers and some of the tension members extending under certain of said cross-bearers.

15. In a car, a center sill, partly composed of box girders and partly composed of open lattice girders intermediate the box girders, the lattice girders comprising tension members, a plurality of cross-bearers above said tension members and a plurality of cross-bearers spacing apart the said tension members.

16. In a car, a center sill partly composed of box girders, with intermediate portions of open lattice girder formation, bolsters connected with said box girders, and cross-bearers, some of which extend through said lattice girder and some of which are intermitted at said lattice girder.

17. In a car underframe including a bolster, a center sill formed partly of spaced box girders and partly of open lattice girder formation with parts of the lattice girder lapping the box girders and bolster.

18. In a car underframe, a center sill formed partly of spaced box girders and partly of open lattice girder formation with parts of the lattice girder lapping the box girders, and bolsters connected with the box girders and lapped by extensions of the lattice girder.

19. In a car under frame, a center sill

formed partly of spaced box girders and partly of open lattice girder formation with parts of the lattice girder extending beyond the box girders, and built up bolsters comprising parts of the box girder portions and connected to lapping extensions of the lattice girder portion.

20. In a railway car, a combination comprising a central longitudinal girder formed with box girder end portions and intermediate open lattice formation, a center bearing plate cooperating with each box girder portion, a bolster extending laterally from and comprising an intermediate portion of each box girder portion, said bolster being overlapped by an extension of the lattice girder portion and cross-bearers extending through and laterally from said lattice portion.

21. In a railway car, a combination comprising a central longitudinal girder formed with box girder end portions and intermediate open lattice formation, a center bearing plate cooperating with each box girder portion, a bolster extending laterally from and comprising an intermediate portion of each box girder portion, said bolster being lapped by an extension of the lattice girder portion, and intermitted cross-bearers, and fillers in alignment therewith within the lattice portion connected to the box girder portion.

22. In a railway car, a combination comprising a central longitudinal girder formed with box girder end portions and intermediate open lattice formation, a center bearing plate cooperating with each box girder portion, a bolster extending laterally from and comprising an intermediate portion of each box girder portion, said bolster being lapped by an extension of the lattice girder portion and continuous and intermitted cross-bearers extending transversely of said longitudinal girder.

23. In an underframe, a center sill comprising an open lattice girder terminating in a box girder at each end, bolsters within the box girder portion and a top cover plate throughout the major portion of the sill lapping said bolsters.

24. In an underframe, a center sill comprising an open lattice girder terminating in a box girder at each end, bolsters within the box girder portion and a top cover plate throughout the major portion of the sill extending over and beyond said bolsters.

25. In an underframe, a center sill comprising an open lattice girder terminating in a box girder at each end, bolsters connected with the box girder portion and a top cover plate throughout the major portion of the sill extending in a higher plane than said bolsters and connected with draft sill portions beyond said bolsters.

26. In an underframe, a center sill com-

- prising an open lattice girder terminating in a box girder at each end, bolsters connected with the box girder portion and a top cover plate throughout the major portion of the sill connected with compression members of the lattice girder including compression and tension members and extending with said compression members over and beyond the bolsters.
27. In a car underframe, comprising end sills, bolsters and cross-bearers disposed between bolsters and a center sill having solid web portions between each end sill and the next adjacent cross bearer, and open web portions between said cross-bearers.
28. In a car underframe, a center sill comprising an open truss between cross-bearers and a box girder between the cross-bearers and adjacent end sill.
29. In a car underframe, a center sill comprising an open truss between cross-bearers and a box girder between the cross-bearers and adjacent end sill, said box girder including a build-up bolster.
30. In a car underframe, including end sills, bolsters, and cross-bearers between said bolsters, a relatively light open work center sill between certain cross-bearers and relatively heavy members forming a continuation of said center sill extending to the end sills.
31. In a car underframe, including end sills, bolsters and cross-bearers between said bolsters, a relatively light open work center sill between certain cross bearers, relatively heavy members forming a continuation of said center sill extending to the end sills, and plates connecting and overlapping both the open work center sill and the heavy member.
32. In a car underframe, a center sill comprising members spaced apart vertically and horizontally, the ends of certain of the members in the lower plane connected with certain of the members in the upper plane, vertical connectors and a cross bearer connected with said connectors and with the members in the upper plane.
33. In a car underframe, a center sill comprising members disposed in an upper plane, and members having their major portion disposed in a relatively lower plane, and having diverging end portions, and a sill plate connecting said end portions.
34. In a car underframe, a center sill comprising members disposed in an upper plane and members having their major portion disposed in a relatively lower plane and having diverging end portions, and a sill plate connecting said end portions with one of the members in said upper plane.
35. In a car underframe, a bolster, a cross bearer, a center sill comprising members spaced vertically, certain of the lower members overlapping said cross-bearer and certain other of said lower members underlapping said cross-bearer.
36. In a car underframe, a bolster, a cross-bearer, a center sill comprising members spaced vertically, the upper members overlapping said cross-bearer and bolster, and certain of the lower members underlapping said cross-bearer and extending to said bolster, and certain other of said lower members overlapping said cross-bearer.
37. In a car underframe, a center sill comprising horizontally spaced Z-shaped compression members and horizontally spaced tension members, said tension members each comprising a pair of angles fastened together for a part of their length and spaced apart for a part of their length, and struts connecting the tension members with the compression members.
38. An underframe comprising spaced center sills including vertical web plates, top chords, bottom chords and vertical connectors for said top and bottom chords, of continuous flanged cross bearers extending through and connecting said spaced center sills and connected to said top chord.
39. An underframe comprising spaced center sills comprising web plates and truss girders, of continuous flanged cross bearers connecting said center sills and secured by direct rivet connection with the upper chords of said truss girders.
- In witness whereof I have hereunto set my hand in the presence of two witnesses.
- JOHN M. ROHLFING.
- Witnesses:  
OSCAR HOCHBERG,  
FREDERICK H. GIBBS.