

1,066, 44.

Patented July 8, 1913.

4 SHEETS—SHEET 1.

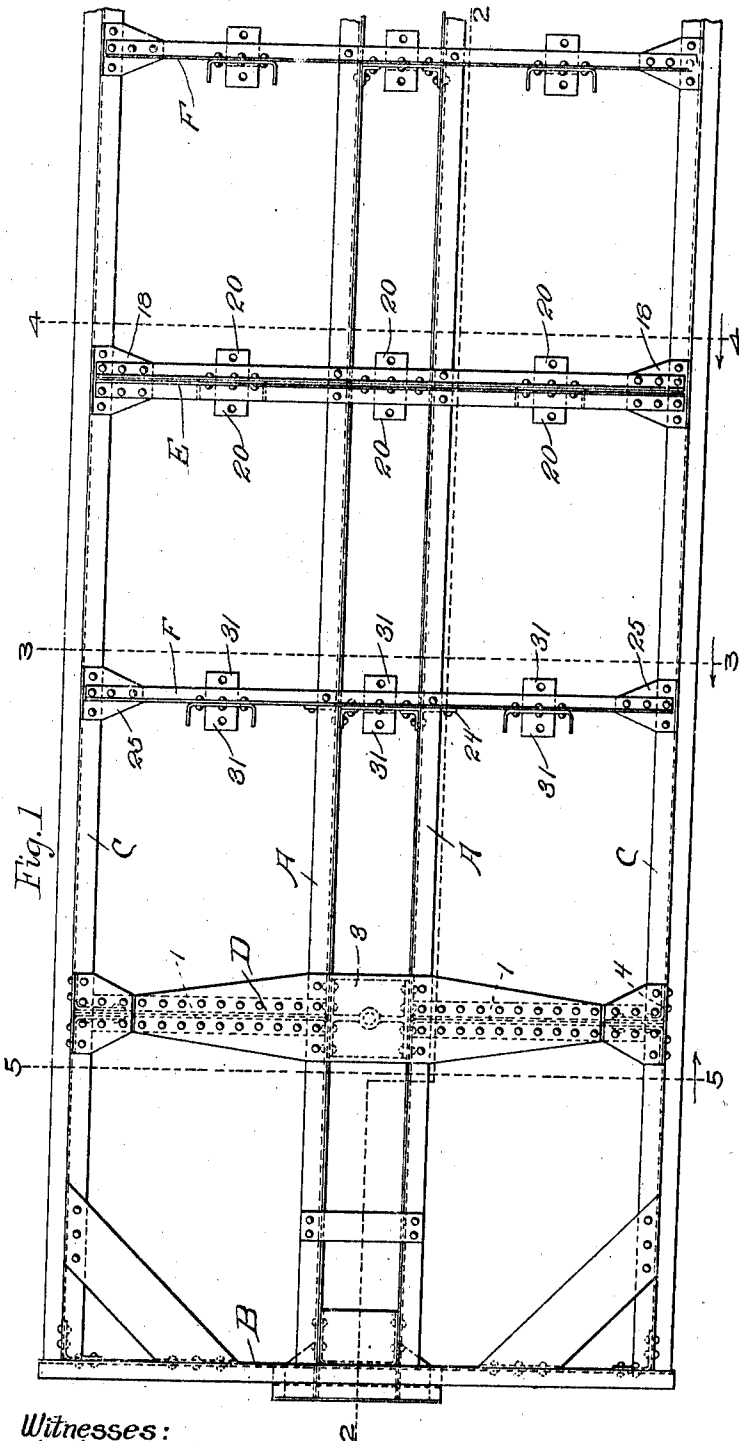


Fig. 1

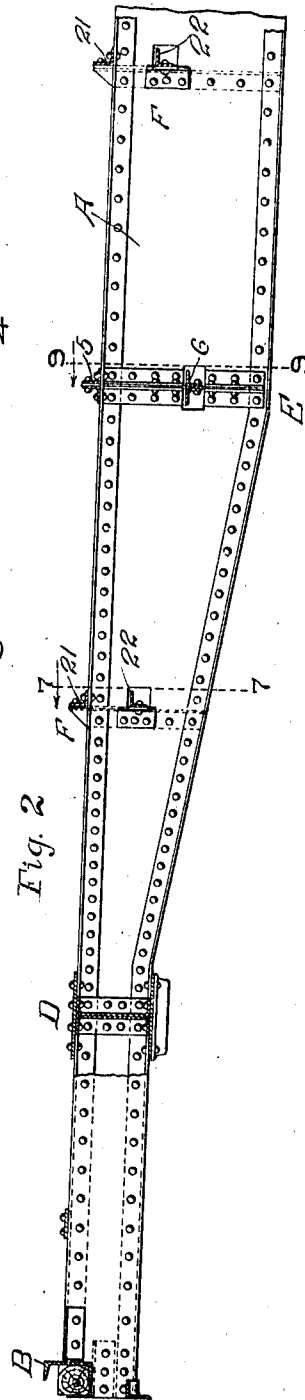


Fig. 2

Witnesses:
Edgar M. Kitchen

Inventor:
Victor M. Summa
by J. H. Gibbs atty.

1,066,544.

V. M. SUMMA.
CAR UNDERFRAME.
APPLICATION FILED MAR. 31, 1910.

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4 SHEETS-SHEET 2.

Fig. 3

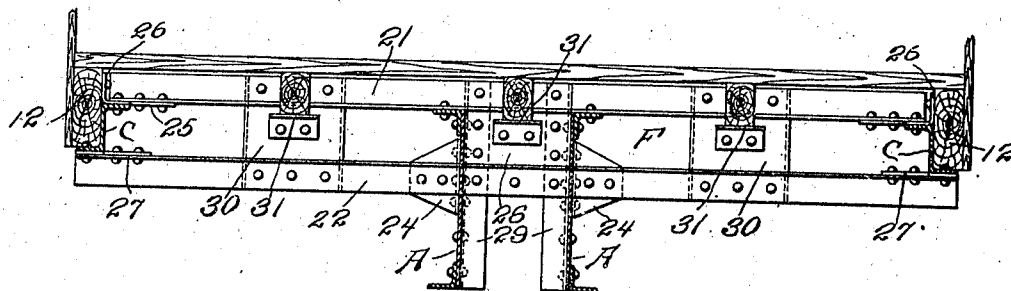


Fig. 4

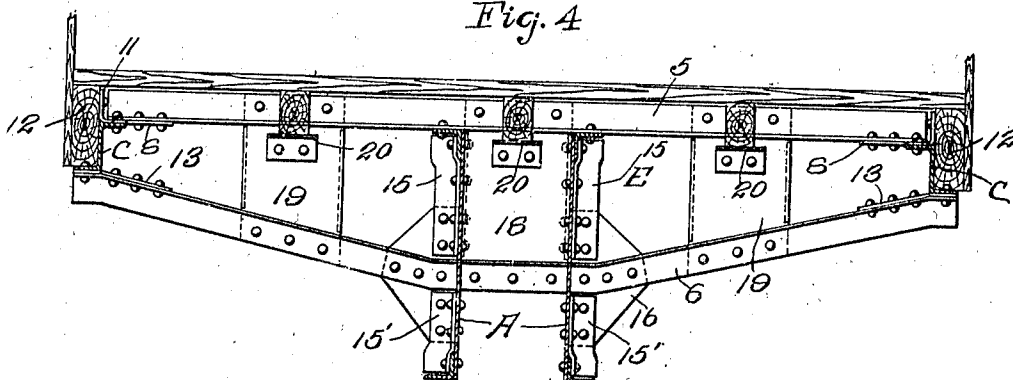


Fig. 5

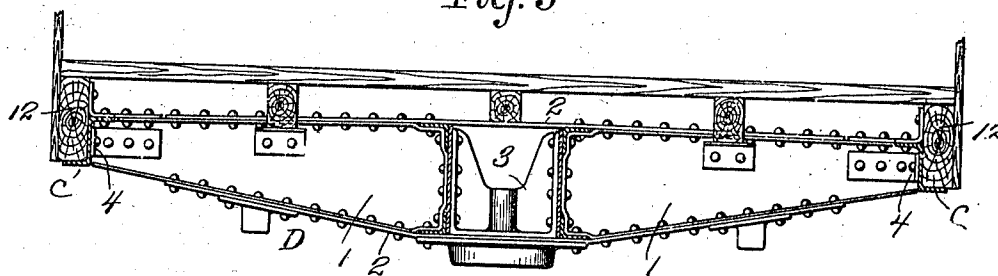
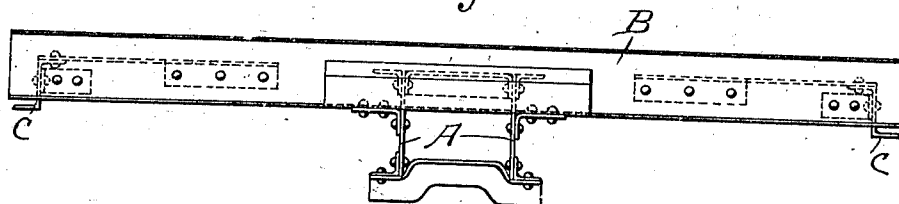


Fig. 6



Witnesses:

Edgar M. Ritchie

Inventor:

Victor M. Summa
by F. H. Gibbs
Att'y.

V. M. SUMMA.
CAR UNDERFRAME.
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4 SHEETS—SHEET 3.

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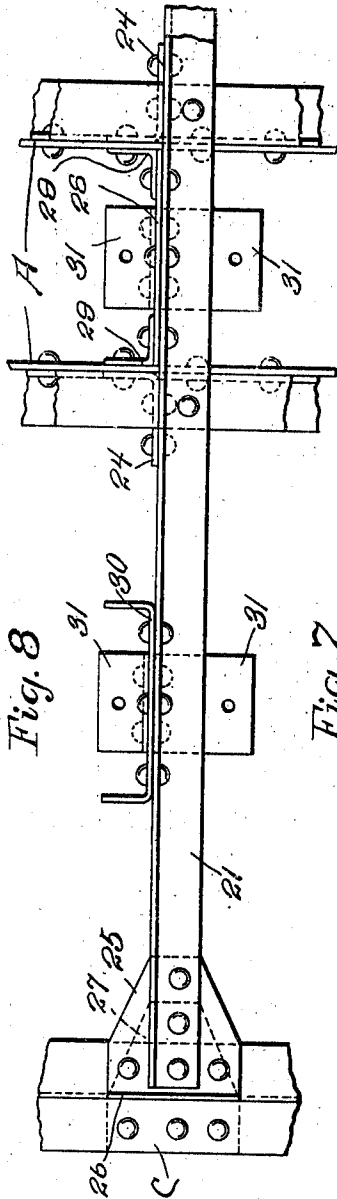


Fig. 8

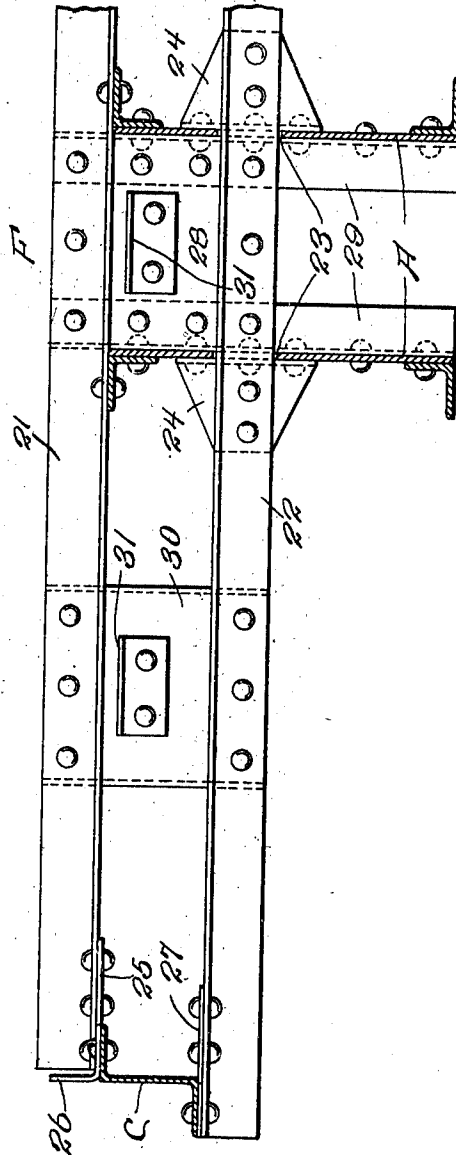


Fig. 7

Witnesses:
Albeisrod
Edgar M. Kitchin

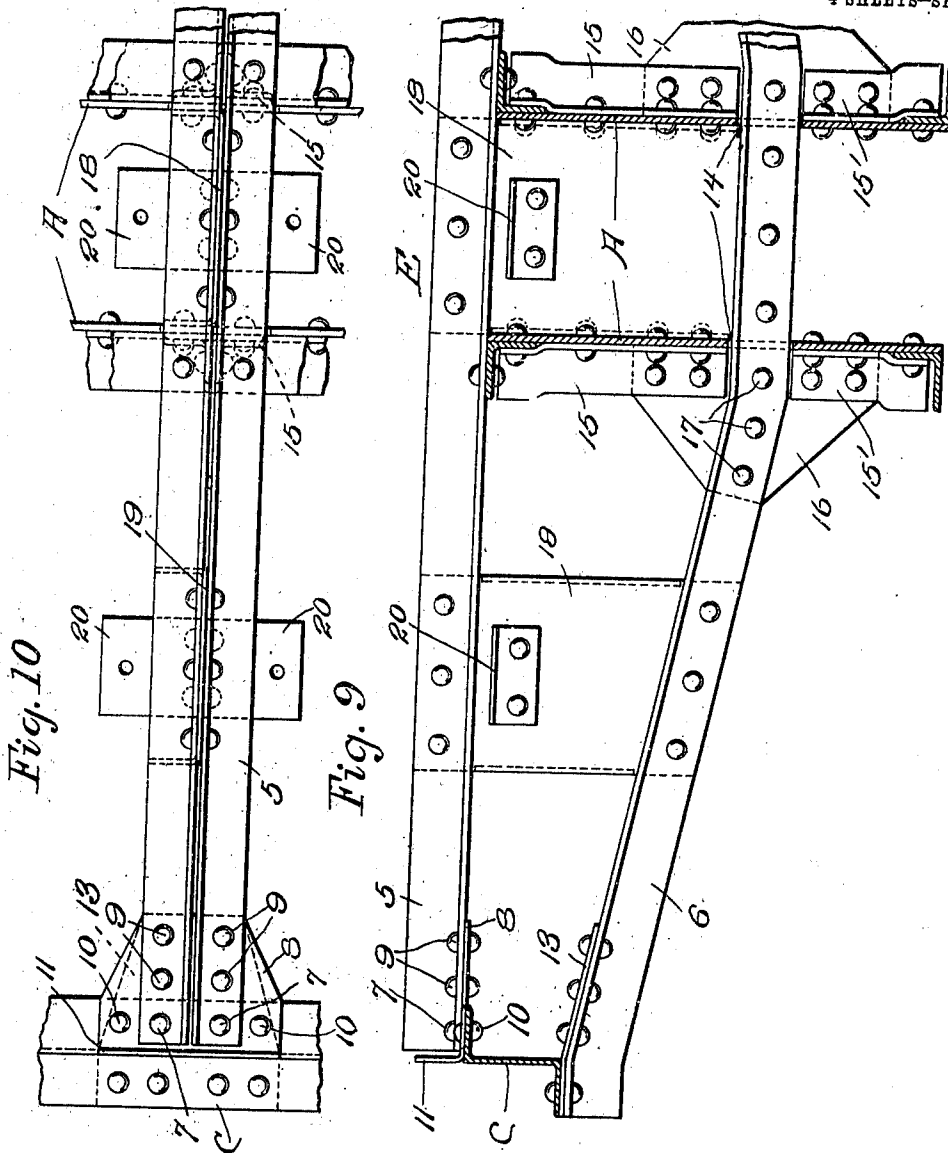
Inventor:
Victor M. Summa
by T. H. Gibbs
Att'y.

1,066,544.

V. M. SUMMA.
CAR UNDERFRAME.
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Patented July 8, 1913.

4 SHEETS—SHEET 4.



Witnesses:

Edgar M. Kitchin

Inventor:

Victor M. Summa

by *J. H. Gibbs*

Atty.

UNITED STATES PATENT OFFICE.

VICTOR M. SUMMA, OF ST. LOUIS, MISSOURI, ASSIGNOR TO AMERICAN CAR AND
FOUNDRY COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF NEW JERSEY.

CAR-UNDERFRAME.

1,066,544.

Specification of Letters Patent.

Patented July 8, 1913.

Application filed March 31, 1910. Serial No. 552,506.

To all whom it may concern:

Be it known that I, VICTOR M. SUMMA, residing at St. Louis, Missouri, and being a citizen of the United States, have invented certain new and useful Improvements in Car-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 top plan view of an underframe, approximately one half of the frame being broken away for the saving of space. Fig. 2 is a longitudinal vertical section taken on the plane indicated by line 2-2 of Fig. 1. Figs. 3, 4 and 5 are transverse vertical sections taken respectively on the planes indicated by lines 3-3, 4-4 and 5-5 of Fig. 1, looking in the directions indicated by the arrows. Fig. 6 is an end elevation thereof. Fig. 7 is a transverse vertical section taken on the plane indicated by line 7-7 of Fig. 2, and looking in the direction indicated by the arrow, parts being broken away, and the parts being seen on an enlarged scale. Fig. 8 is a fragmentary plan view of the parts seen in Fig. 7. Fig. 9 is a view similar to Fig. 7 taken on the plane indicated by line 9-9 of Fig. 2. Fig. 10 is a fragmentary plan view of the parts seen in Fig. 9.

Referring to the details: A. A are built up plate girder center sills extending throughout the length of the underframe and connected directly to the end sills B. Side sills C, C also connect the end sills B and are connected to the center sills by bolsters D and main cross bearers E and supplemental cross bearers F. Bolster D is of a built up type comprising pairs of flanged diaphragms 1, 1 fixed at their inner ends to the plates and angles of the girders A and outstanding therefrom and connected by top and bottom cover plates 2, 2, the usual cast filler 3 being disposed between the girders in the transverse planes of the underframe occupied by the diaphragm.

Sills C are preferably of the Z beam type and the diaphragms 1 are connected to the webs thereof by corner brackets 4, 4. Each cross bearer E comprises upper and lower stress members 5 and 6, each formed of a pair of angle bars with their vertical flanges disposed contiguous and riveted together, tension member 5 extending across and above girders A and the horizontal flanges of its angles are riveted to the horizontal flanges of the upper angles of the girders. The horizontal flanges of the angles of member 5 are riveted as at 7 to the upper flange of each side sill C, and are further secured thereto by an interposed gusset plate 8 which is secured by rivets 9, 9 to the horizontal flanges of the angles of member 5 and by rivets 10, 10 to the upper flange of the respective side sill C in addition to being retained by rivets 7. The outer portion of each gusset plate 8 is upturned to form an attaching flange 11 for the side nailing sill 12. The lower stress member 6 has its ends fixed to the lower flanges of the side sill C by gusset plates 13, 13 riveted to the outstanding flanges of the respective angles of member 6, and extending beneath and riveted to the lower flange of the respective sills C, some of the rivets connecting the gusset plate 13 with the flange of the respective sill C also engaging the horizontal flanges of the angles of member 6. The stress member 6 is depressed intermediate its length, and the angle bars comprising the member extend through apertures 14, 14 formed in the plates of girders A.

Fixed to the outer face of each of the plate girders A are angle bars 15, 15 disposed with their outstanding flanges spaced apart and secured together, and their inner flanges contacting with the outer face of the respective girder A. Bars 15 are disposed immediately beneath the members 5 and extend to the opening 14, and beneath said opening a similar pair of bars 15' is provided and similarly disposed. A gusset plate 16 is arranged between the outstanding flanges of each pair of bars 15 and extends across the respective opening 14 and between the outstanding flanges of the corresponding pair of bars 15', said plate being disposed with its flat faces vertical and extending laterally from the girder A be-

tween the angle bars of the compression member 6 and secured to the vertical flanges of said bars by rivets 17, the upper and lower portions of the gusset plate being suitably riveted to the outstanding flanges of the bars 15 and 15'. Thus the said bars 15 and 15' provide a stiffener for the respective girder A, and the lack of continuity of said bars is compensated in the splice provided by the gusset 16.

Arranged between the girders A in the transverse planes of the underframes occupied by each cross bearer E is a strut consisting of a channel 18 which also serves as a filler block and which has its flanges cut away near both of its ends for allowing the end portions of the web of the channel to extend between the angle bars comprising tension member 5 and compression member 6, the said web being suitably riveted to the vertical flanges of said angle bars. The flanges of the channel 18 fit snugly against the inner faces of the girders A and are secured thereto by the same rivets which engage the flanges of some of the bars 15.

Substantially midway between each girder A and the respective side sill C is a strut comprising a channel 19 whose flanges are cut away at the ends for allowing the end portions of the web of said channel to extend between the angle bars of the tension member 5 and compression member 6, said web being suitably riveted to the vertical flanges of said bars. Each of the channels 18 and 19 sustain nailing sill brackets 20, 20. Each cross bearer F comprises an upper angle bar stress member 21 and a lower angle bar stress member 22, the former extending across the top of and secured to the girders A, and the latter extending through apertures 23, 23 intermediate the width of the plate or web of the respective girders A. Stress member 22 is fixed to each girder A at the point of penetration thereof by angle connection 24. The outer ends of the stress members 21 and 22 are connected to the flanges of the respective side sills C. A gusset plate 25 is disposed between the respective end of member 21 and the upper flange of sill C, the outer portion of plate 25 being upturned as at 26 for forming an attaching flange for the longitudinal nailing sill 12. Member 22 is connected to sill C by gusset 27 interposed between the member and the lower flange of the sill. A plate 28 connects the members 21 and 22 at the middle and serves as a strut, said plate being provided with edge angles 29, 29 fixed to the respective girders A and said angles extending past the member 22 and down to the lower edge of the girders. At an intermediate point between each girder A and the respective side sill C the stress members 21 and 22 are connected by strut 30 comprising a channel having its web riveted to the

vertical flanges of the members 21 and 22, nailing sill brackets 31 affixed to and outstanding from plate 28 and struts 30.

The plate girders A have been illustrated and described in their preferred embodiment, but obviously need not be built up but may be otherwise constructed as may be found preferable.

It will be noted that the projection of the lower member of the cross bearers through the perforated webs of the center sills and the stiffening means extending vertically of said sills with the angle gusset plates 24 are all connected intermediate the top and bottom of the center sills, in such manner as to effectually brace the center sills against either outward or inward individual bending when the sill is subjected to buffing stresses. This connection so ties the spaced center sills that they are thereby compelled to work together as a column to resist such buffing stresses. Because the depth of the center sills is greater intermediate the bolsters than at the bolsters, and of varying depth, it is of great advantage to use with the same sills cross bearers of different depth disposed along the length of said sills. In this manner buckling of the sills is prevented. As each of the cross bearers intermediate the bolsters is securely fastened to the center sill webs between the top and bottom thereof and in different planes, the center sill is of substantially the same stiffness transversely as if cover plates extending the length of the sills were used, though the cost of manufacture is considerably less.

What I claim is:

1. In an underframe, the combination with a plate girder center sill of a cross bearer having a stress member extending through the plate of said girder, aligned stiffening bars fixed to said plate above and below the point of penetration by said stress member, and means extending past said stress member and connecting said stiffening bars.

2. In an underframe, the combination with a plate girder of a cross bearer comprising upper and lower stress members, one of said stress members extending through the plate of the girder, aligned stiffening bars fixed to the plate above and below the last mentioned stress member and terminating contiguous thereto, and means extending past said last mentioned stress member and connecting the stiffening bars.

3. In an underframe, the combination with a plate girder of a cross bearer comprising upper and lower stress members, one of said stress members extending through the plate of said girder, stiffening bars connected to said plate above and below and terminating at said last mentioned stress member, and means connecting said stiffen-

ing bars together and to the last mentioned stress member.

4. In an underframe, the combination with a plate girder of a cross bearer comprising upper and lower stress members, one of the said stress members extending through the plate of the girder, stiffening bars fixed to said plate above and below the last mentioned stress member and terminating contiguous thereto, and a gusset plate fixed at its ends to the stiffening bars and at its intermediate portion to the last mentioned stress member.

5. In combination, a plate girder, a cross bearer, a stress member extending through the plate of said girder, said member comprising a pair of spaced bars, stiffening bars fixed to the plate above and below the bars of the stress member, and a gusset extending between the bars of the stress member and fixed to the stiffening bars.

6. In combination, a plate girder, a cross bearer, a stress member extending through the plate of the girder and comprising a pair of spaced bars, pairs of spaced stiffening bars fixed to the girder above and below the bars of said stress member, and a gusset plate disposed between the bars of the stress member and between the stiffening bars, and secured to all of said bars.

7. In combination, a plate girder, a cross bearer, a stress member extending through the plate of said girder and comprising a pair of angle bars, stiffening angle bars fixed to said girder above and below the angle bars of the stress member and having outstanding flanges, and a gusset plate disposed between the flanges of the stiffening bars and between the bars of the stress member and attached to all of said bars.

8. In an underframe, the combination with a pair of plate girders, spaced apart, of a cross bearer comprising upper and lower stress members, one of said members extending through the plates of said girders, stiffening means fixed to the outer faces of said plates and extending past the last mentioned stress member, and a strut connecting the stress members between the girders and connected to the girders.

9. In an underframe, the combination with plate girder center sills of a cross bearer comprising an upper stress member extending across and secured to the upper edge of the girders, a lower stress member extending through the plates of the girders, and a strut connecting the stress members between the girders and comprising a channel having its flanges secured to the girders.

10. In an underframe, the combination with plate girder center sills of a cross bearer comprising upper and lower stress members, each formed of a pair of bars spaced apart, and a channel strut connecting said stress members and having the up-

per and lower portions of the flanges cut away, and the web of the channel extending between the bars of said stress members.

11. In an underframe, the combination comprising plate girder center sills, Z-shaped side sills, a cross-bearer formed of spaced pairs of connected angles overlying and underlying said side sills, with the lower pair of said angles extending through the web of said sill and channel struts connecting said upper and lower pair of angles between the center sill and the side sills.

12. In an underframe, the combination with plate girder center sills of a cross bearer comprising a stress member and extending across and attached to the upper edges of the center sills, a lower stress member extending through the plates of the girders comprising the center sills, a strut connecting the stress members between the center sills, and means outside the center sills connecting the stress members.

13. In an underframe having relatively Z-shaped side sills, a plate girder center sill comprising a vertical web with top and bottom flanges, a transverse truss connected respectively with the top and bottom flanges of said side sills and with its bottom flange penetrating the web of the center sill, and reinforcing members connected directly to said bottom flange and to the web of said center sill.

14. In an underframe having relatively Z-shaped side sills with their bottom flanges oppositely disposed, wood nailing strips on said bottom flanges, a plate girder center sill comprising a vertical web with top and bottom flanges, a transverse truss connected respectively with the top and bottom flanges of said side sills and with its bottom flange penetrating the web of the center sill, and reinforcing members connected directly to said bottom flange and to the web of said center sill.

15. In an underframe, the combination with center sills of a cross bearer comprising stress members extending across and connected to said center sills, channel struts connecting said stress members, and nailing sill brackets outstanding from said struts.

16. In an underframe, the combination with side and center sills of a cross bearer connecting the same and comprising upper and lower stress members, and a gusset plate at each end of one of the stress members connecting the same to the side sills, the outer portion of each of said gusset plates being disposed for being connected to a longitudinal nailing sill.

17. In combination, a Z bar side sill, a stress member of a cross bearer extending above the upper flange of the side sill and connected thereto, and a gusset plate disposed between said flange and said stress member and connected to the stress member

and flange, the outer portion of the gusset plate being upturned to form an attaching flange.

18. In an underframe, the combination with center sills of a cross bearer comprising upper and lower stress members, the lower stress member extending through the center sills intermediate the width thereof, a strut connecting the upper and lower stress members between the center sills, and angles connected to the edges of the strut and to the center sills, and extending from the upper stress member to the lower edge of the center sills.

19. In an underframe, the combination with center sills and side sills, the side sills being of Z cross section, of a bolster comprising diaphragms fixed to and outstanding from the center sills, top and bottom cover plates extending across the center sills and connecting said diaphragm, and an angle bracket plate fixed to the outer end of each diaphragm and fixed to the web of the respective side sill.

20. In an underframe, the combination with a plate girder center sill, of a cross bearer comprising continuous upper and lower rolled angles riveted together in pairs and forming stress members, the lower pair extending through the plate of said girder, and stiffening means for the girder connecting said stress members.

21. In an underframe, the combination comprising a plate girder center sill, and Z shaped side sills, of a cross bearer comprising upper stress member connected with the top flange of said Z shaped side sill, a bottom stress member connected with the bottom flange of said side sill, said bottom stress member comprising connected angle sections projected through the web of the center sill, sill stiffening members extending vertically of said sill, and gusset plates connecting the lower stress member with the web of said sill.

22. In an underframe, the combination comprising plate girder center sills, of a cross bearer having a stress member formed of connected angles extending through the webs of said sills, stiffening members connected to the webs of said sills and extending above and below the point of penetration by said stress member, and a gusset plate connected with the webs of said sills and with both angles of said stress member.

23. In an underframe a plurality of intersecting longitudinal and continuous transverse truss members, the longitudinal members having a plurality of tension and compression elements, with interposed plate portion and parts of said transverse truss members penetrating said plate portion at different distances from the bottom of said plate portion.

24. In an underframe having side sills

with top and bottom flanges, the combination with a center sill truss having top and bottom members and a vertical web, of a transverse truss having spaced top and bottom members connected respectively with the top and bottom flanges of said side sills, the bottom member extending through the web of the center sill and connected therewith to prevent distortion of said sill.

25. In an underframe a pair of spaced center sills, a cross-bearer comprising spaced tension and compression members, one of said members threaded through said sills and side sills connecting the ends of said members.

26. In an underframe a pair of spaced center sills, a cross-bearer comprising spaced tension and compression members, one of said members threaded through said sills, side sills connecting the ends of said members and struts connecting the members intermediate the sills.

27. The combination with spaced center and side sills having top and bottom flanges, of a trussed cross bearer comprising a continuous stress member disposed above said sills, and a continuous stress member disposed below said side sills and extending through and connected with each of said center sills, said stress members being connected directly to the top and bottom flanges of said sills.

28. In an underframe the combination of a center sill, a cross-bearer having a tension member resting on said sill and a compression member threaded through said sill, stiffening members extending vertically parallel with said sill, and connection plates secured to said stiffening members and said compression member.

29. In an underframe the combination of center sills and a cross-bearer, comprising a compression member extending through the webs of said sills, a tension member disposed above said sills, and a stiffening member fastened to one of said sills and extending from said tension member to said compression member.

30. In an underframe a pair of spaced center sills, a cross-bearer having a stress member extending through the webs of said sills and a second stress member spaced from said first mentioned stress member at their ends, a member bridging the space between said members and fastened to said sills and to the first mentioned stress member.

31. In an underframe a pair of spaced center sills, a cross-bearer having a stress member extending through said sill and a second stress member spaced from said first mentioned stress member, stiffening members co-extensive with the height of and connecting said sills to the said stress member extending through said sills.

32. In an underframe, a pair of spaced

center sills comprising perforated vertical web portions and side sills, in combination with a cross bearer of open truss formation having one member passing over said center sills and one member projected through the perforations in the center sills and stiffening means, connecting the webs of the center sills at each side of the perforations therein with the lower member of said truss, to prevent outward bending of said center sills during buffing stresses.

33. In an underframe, plate girder center sills deeper at their middle portion than at their ends, in combination with bolsters, and built up cross bearers of different depths be-

tween said bolsters, one member of each of said cross bearers extending through the webs of said center sills intermediate their top and bottom and another member of the cross bearers extending over the top of said center sills, and means connecting the webs of the center sills with the bottom members of the cross bearers to prevent spreading of said center sills intermediate the bolsters.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

VICTOR M. SUMMA.

Witnesses:

OSCAR HOCHBERG,
CHARLOTTE MITZE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."