

J. M. ROHLFING.

CAR END FRAME.

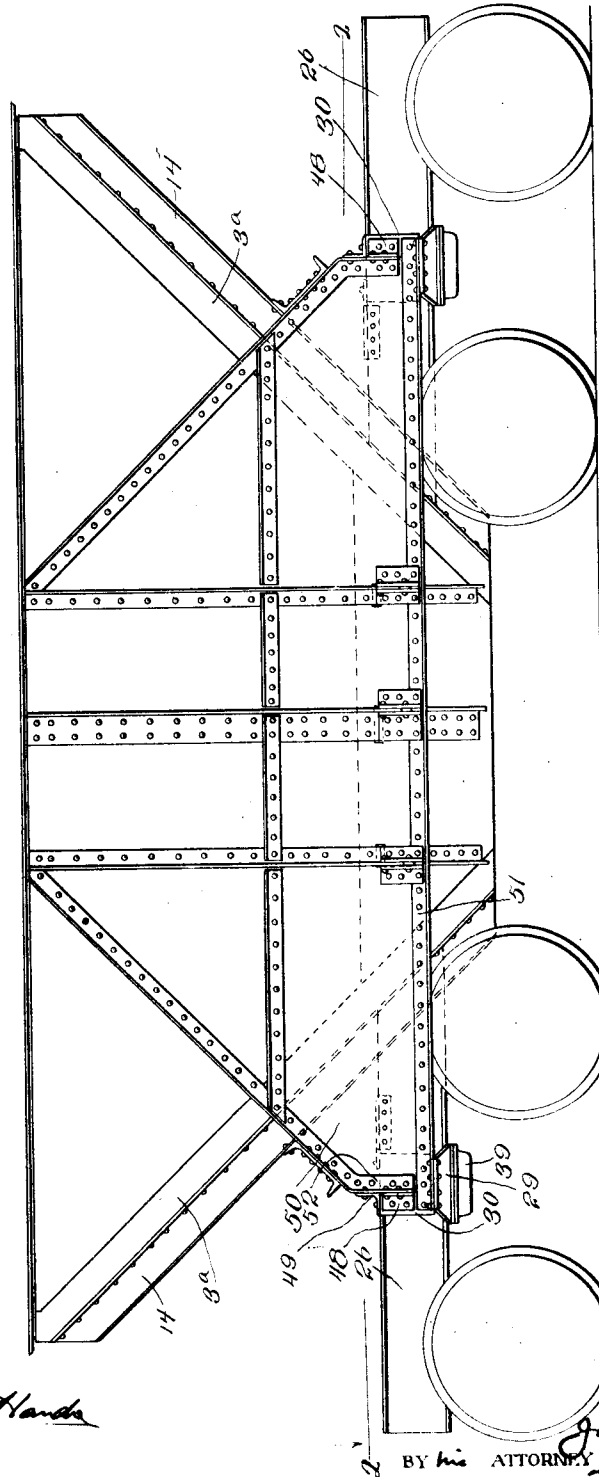
APPLICATION FILED MAR. 14, 1911.

Patented July 8, 1913.

1,066,531.

6 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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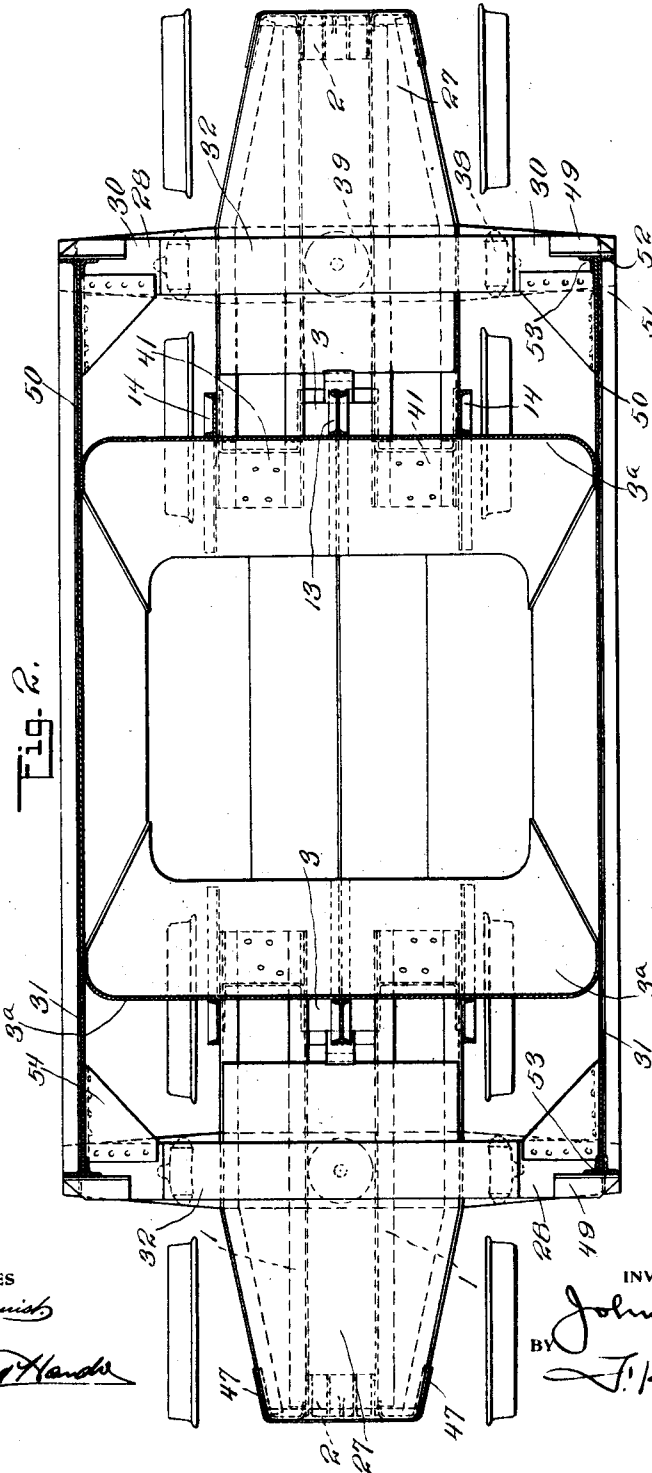


Fig. 2.

WITNESSES  
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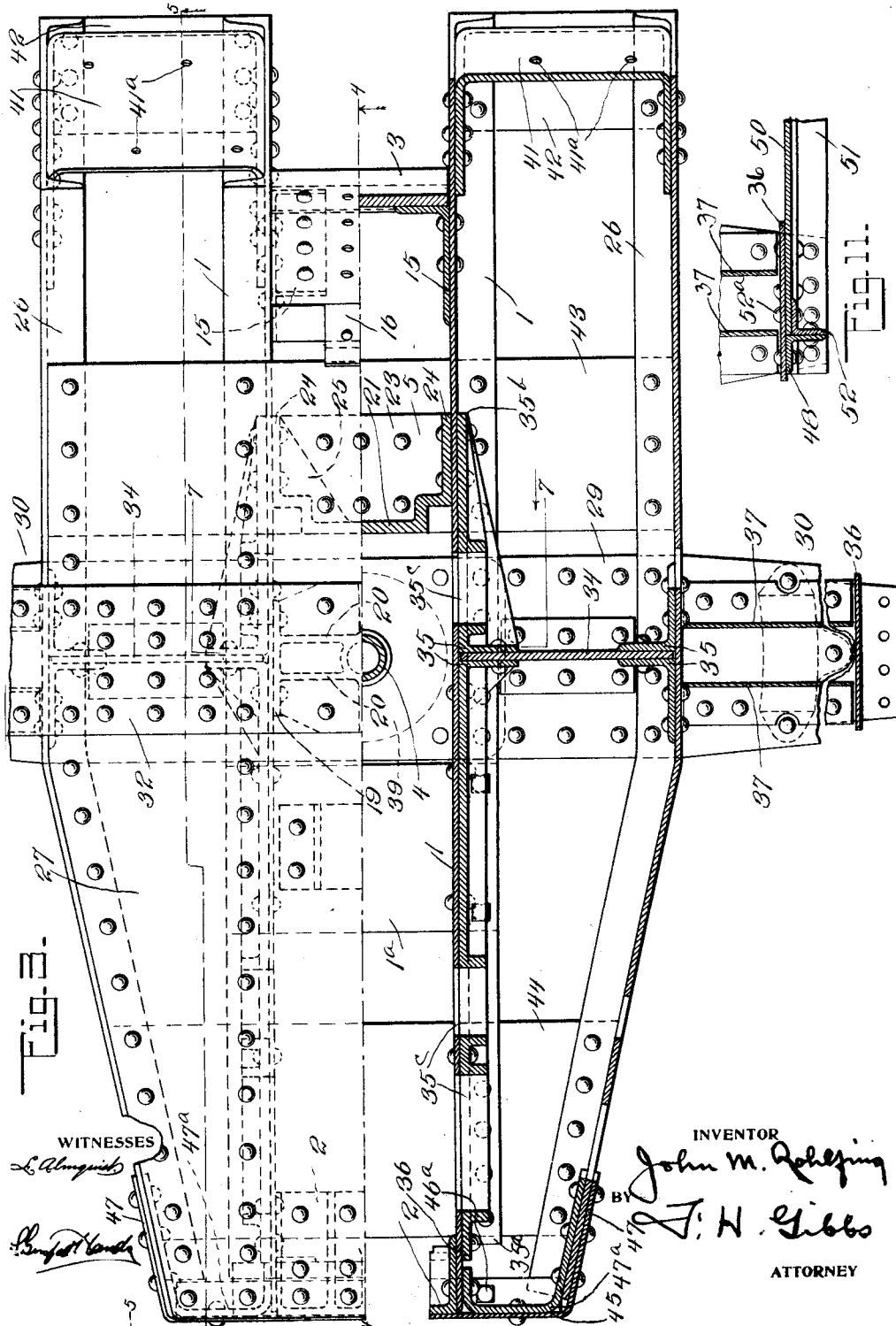
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6 SHEETS-SHEET 3.

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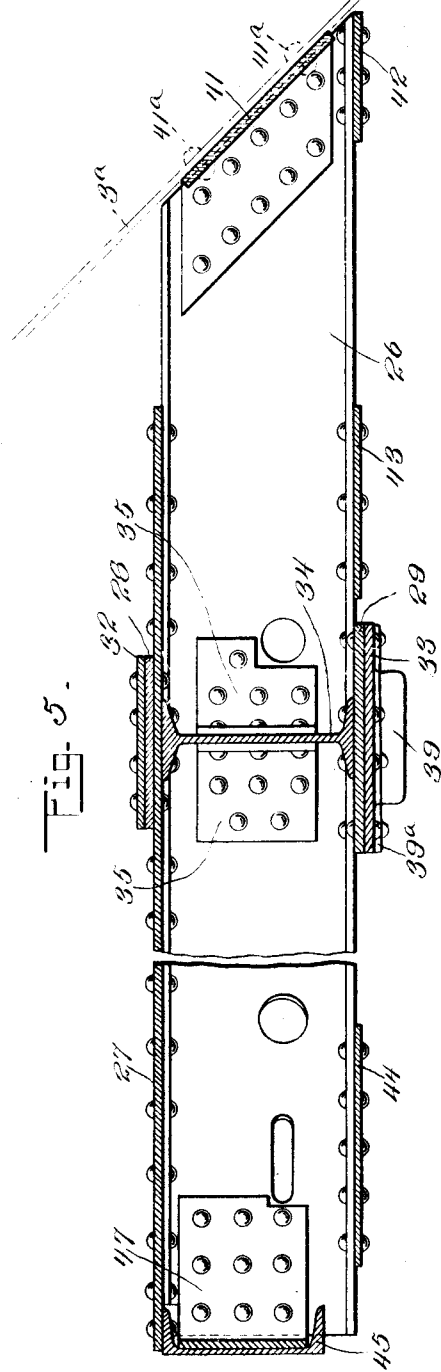
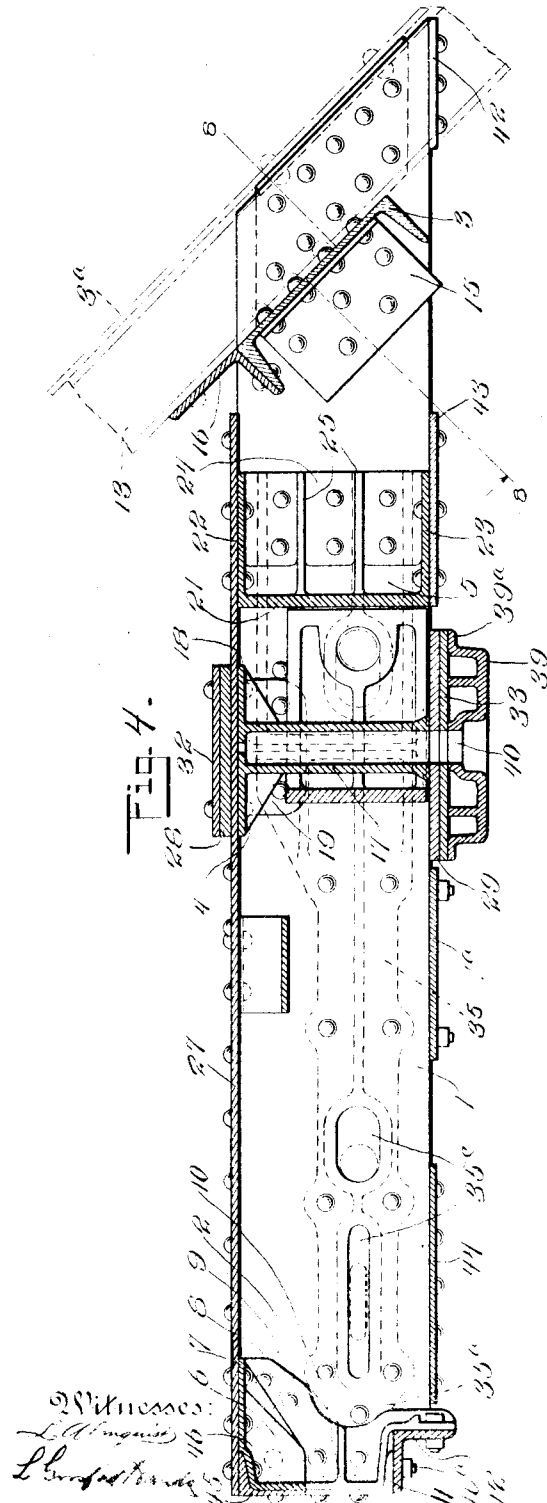


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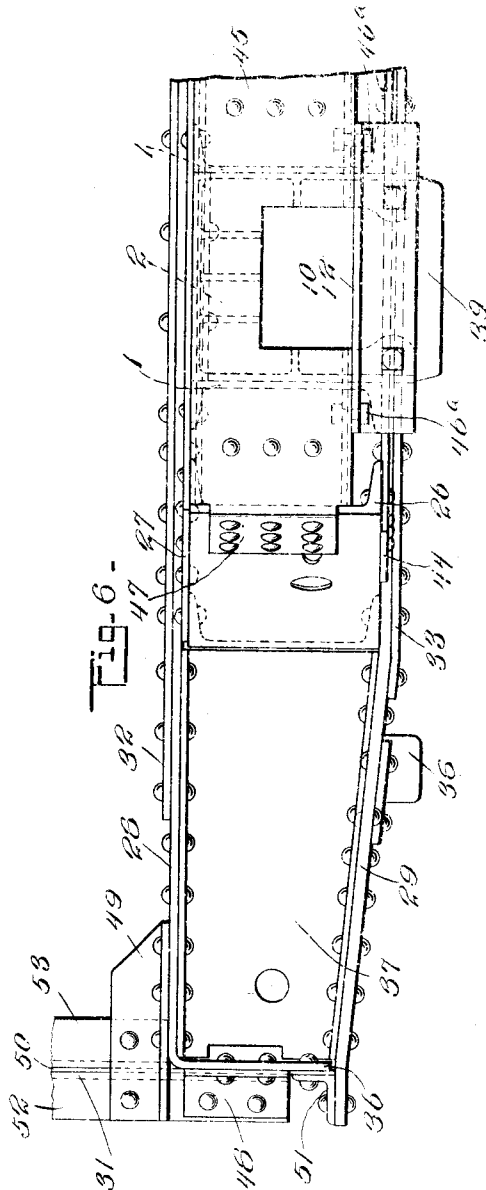
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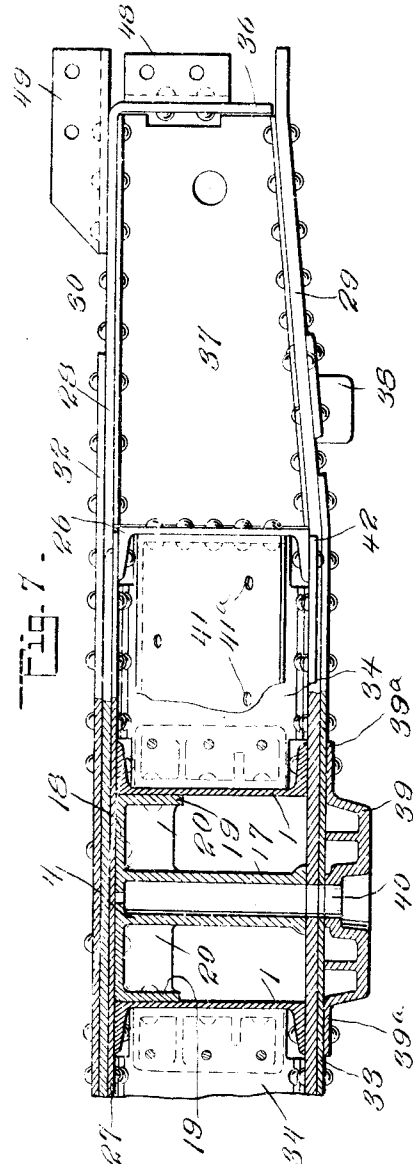
6 SHEETS--SHEET 5.



**WITNESSES**

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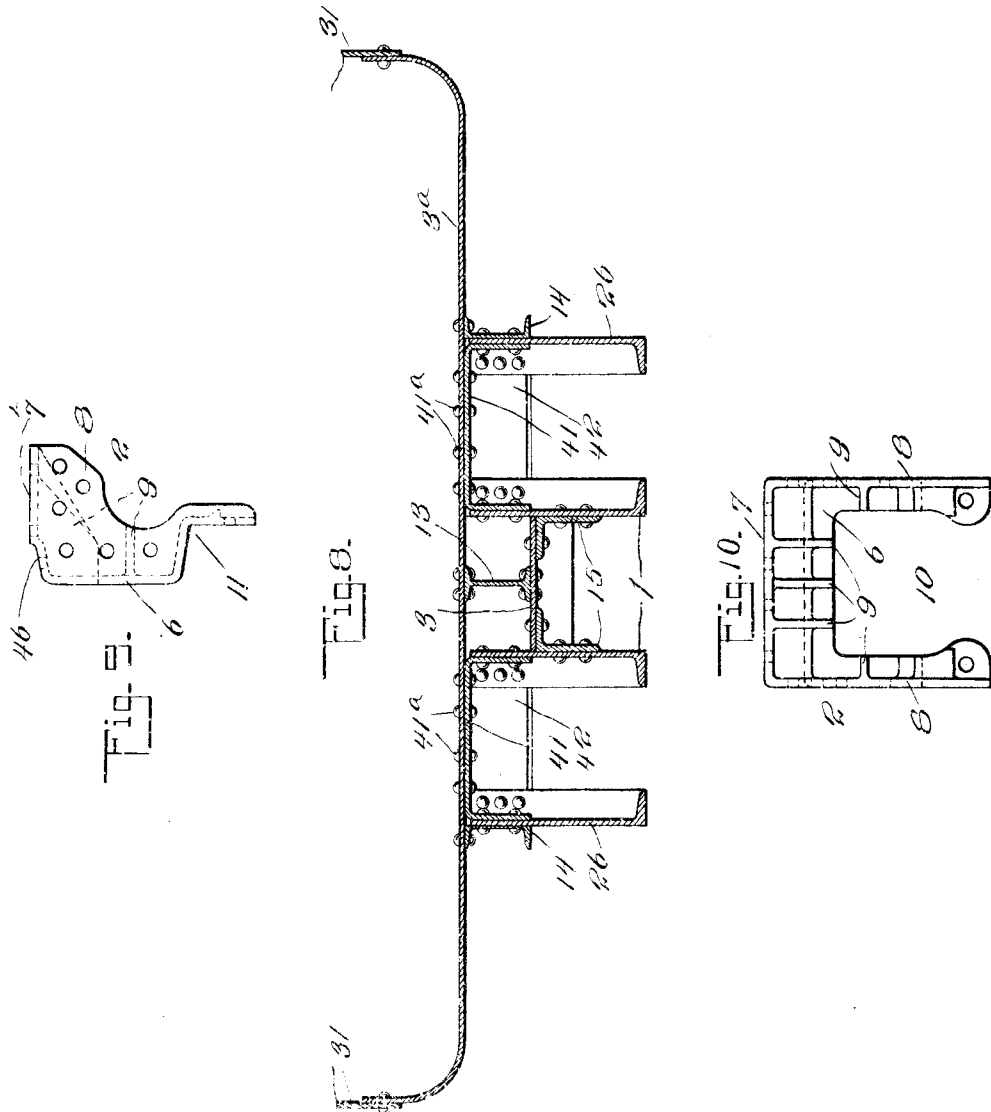
ATTORNEY

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6 SHEETS—SHEET 6.



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# UNITED STATES PATENT OFFICE.

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

## CAR END FRAME.

1,066,531.

Specification of Letters Patent.

Patented July 8, 1913.

Application filed March 14, 1911. Serial No. 614,490.

*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 Car End Frames, 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 side elevational view of a steel hopper car showing my improved form of end frames applied thereto. Fig. 2 is a horizontal longitudinal sectional view taken on the plane indicated by line 2—2 of Fig. 1. Fig. 3 is a top plan view of one of the end frames, one-half of the figure being shown in horizontal central section. Fig. 4 is a transverse vertical section taken on the plane indicated by line 4—4 of Fig. 3 and looking in the direction of the arrow. Fig. 5 is a transverse vertical section taken on the plane indicated by line 5—5 of Fig. 2 and looking in the direction of the arrow. Fig. 6 is a front end view of slightly more than one-half of the end frame. Fig. 7 is a rear end view of slightly more than one-half of the end frame, a portion of said figure being shown in vertical section on the plane of line 7—7 of Fig. 3. Fig. 8 is a detail sectional view illustrating the manner of connecting the inner end of the end frame to the adjacent end plate of the hopper, said view being taken approximately on plane indicated by line 8—8 of Fig. 4. Figs. 9 and 10 are respectively side and rear elevational views of the forward connecting casting. Fig. 11 is a fragmental horizontal central section on the same line as Fig. 3, showing details and the manner in which the side arms of the end plate, the bolster arms, are connected with the side girders of the car body.

This invention relates to the general arrangement and detail construction of a combined body bolster and end frame designed particularly for use in connection with all-metal cars, commonly known as "hopper cars", and includes also the means for connecting said end frames to said cars, whereby the necessity for longitudinal center sills is entirely eliminated and a maximum amount of unobstructed discharge door opening is secured.

Each of the end frames comprises a main body portion disposed longitudinally of the car and laterally projecting arms or bolster projections disposed transversely of the car. The side supporting girders of the car body are intended to be connected at their opposite ends directly to the opposite ends of the bolster so that said bolsters will receive directly the weight of the car body and of the lading which may be carried thereby.

The main body portion of each of the end frames is connected, by its inner end, to the adjacent portion of the car body. This last connection, however, is not intended to support any material portion of the weight of the car body, but is principally for the purpose of maintaining the body portion of the end frame in a substantially horizontal position. It is made sufficiently strong to withstand heavy buffing strains, and incidentally, adds considerable rigidity to the whole structure.

The principal object sought to be attained is the provision of a combined body bolster and end frame structure of minimum weight and of sufficient strength to withstand the severe buffing and pulling stresses to which cars of this character are subjected in practice, and further to provide an end frame which may be completed as an article of manufacture and which, when applied to a suitably designed car body, will be adapted to receive the entire weight of said car body and to have said weight bear upon ends of the bolster portion of said end frame structure.

The particular form and construction of the car body and the manner of reinforcing the side sills thereof, for transmitting

stresses from one bolster to the other is not intended to be included in the present application. These details are described and claimed in a separate application. The manner of connecting the end frames to a car body of any suitable design is, however, a part of the present invention and is claimed accordingly.

Since the end frames, and their connections with the car body, are identical at each end of the car, one only is illustrated and described in detail herein.

In the drawings 1—1 are longitudinal central channel sections. These members are spaced apart, one upon each side of the longitudinal median line of the structure and each has its web standing vertically and its flanges facing outwardly. They are rigidly connected at their forward ends by spacing and connecting casting 2 and at their rear ends by an obliquely disposed channel section 3. Connection is also made at a point approximately midway in their length, that is, at the intersecting line of the bolsters by a casting 4 and between said casting 4 and the channel section 3 is a casting 5 connected to each of said channels. Further connection is made by suitable top and bottom cover plates as hereinafter set forth.

The casting 2 (see Figs. 9—10) is formed with a front wall 6 and with top and side flanges 7 and 8, respectively. The flanges 7 and 8 are reinforced in their connection with the front wall by suitable vertical and horizontal corner brackets as 9. The front wall 6 is recessed as at 10, from its bottom edge upwardly, to accommodate a suitable form of drawbar, not illustrated. The lower portion of said wall is inset as at 11, to receive a drawbar supporting angle 12 which bridges the recess 10 and which is arranged with one of its flanges depending and bolted to the face of the wall 6 and with its other flange outstanding from the upper edge of said first flange in such manner as to provide a broad horizontal rubbing surface for the drawbar. The connecting channel section 3, at the rear end of the channel 1, has its flanges facing forwardly and downwardly so as to dispose its webs in a plane to correspond to the inclined plane of the adjacent hopper end plate 3<sup>a</sup>.

In cars of the type to which these end frames are to be applied, it is desirable to reinforce the end plates of the hopper by a series of stiffeners riveted to the under faces of said plates and extending from top to bottom thereof. The car illustrated in the drawings is supplied with three such stiffeners for each end plate; a central I-section 13 and spaced side channel sections 14—14.

The oblique connecting channel 3 is spaced

away from the adjacent ends of the channels 1—1 sufficiently to dispose the upper or rear face of its web in a position to engage, and be riveted to, the under or forward face of the bottom flange of the central hopper plate stiffener 13 (see Figs. 4—8). The opposite ends of the channel 3 are connected to the webs of the respective channels 1—1 by suitable angle brackets 15—15 placed beneath the web of said channel 3 and riveted thereto and to the webs of the channels 1—1.

An extension bracket 16 is fixed to the top flange of the channel 3 in such a manner as to form a continuation of the web of said channel and is riveted to the adjacent flange of the stiffener 13 for further strengthening the connection between the channel and said stiffener.

The central casting 4 is formed with a vertically disposed tubular body portion 17, designed and positioned to receive the usual king-pin, and with a top plate 18 which extends from one of the channels 1 to the other. At its opposite ends said top plate 18 is formed with a pair of depending flanges 19—19 lying with their outer faces flat against the opposing webs of the channels 1 and being riveted thereto. The upper surface of the top plate 18 lies in the horizontal plane of the upper surfaces of the top flanges of the channels 1. The under surface of the lower end of the body portion 17 lies in the horizontal plane of the under surfaces of the bottom flanges of the said channels. Strengthening ribs as 20—20 extend from the body portion 17 to the flanges 19 and to the over-hanging portions of the plate 18.

The casting 5 is formed with a front wall 21 and with rearwardly extending top and bottom flanges 22 and 23, respectively, and with rearwardly extending side flanges 24—24. The front wall 21 extends from one of the channels 1 to the other. The upper and lower surfaces of the top and bottom flanges 22 and 23 lie in the horizontal plane of the top and bottom surfaces respectively of the upper and lower flanges of the channels 1—1. The side flanges 24 lie with their outer faces flat against, and riveted to, the adjacent webs of the channels 1. Horizontally disposed corner brackets 25 are arranged to strengthen the connection between the front and side walls. A plate 1<sup>a</sup> extends from one of the channels 1 to the other and is bolted to the bottom flanges thereof at a point just in front of the bolster portion of the structure.

Longitudinal channel members 26—26, similar to the channels 1—1, are disposed one upon each side of said channels 1 and are spaced therefrom a distance approximately equal to the distance between the

two channels 1. Each of the channels 26 has its web standing vertically and its flanges facing inwardly toward the flanges of the adjacent channel 1.

5 A top cover plate 27, extending in length, from the forward end of the channels 1 and 26 rearwardly to a point just forward of the channel 3 and, in width, from one of the channels 26 to the other, is securely riveted  
10 to the upper flanges of each of the channels 1 and 26 and to the top flanges of the castings 2, 4 and 5, and serves to effectually bind all the said members against possible lateral distortion under the stresses to which  
15 they are subjected in use.

The bolster portion of the end frame is formed by relatively heavy top and bottom cover plates 28 and 29 respectively, disposed transversely of the structure and extending beyond the longitudinal channels 26 at each side thereof, so as to form lateral arms, or bolster extensions as 30—30. These extensions project to the vertical planes of the respective side girders 31—31 of the car body. Reinforcing plates 32 and 33 are  
20 arranged upon the upper and lower faces, respectively, of the plates 28 and 29. Each of the plates 32 and 33 terminates short of the ends of the extensions 30. The under  
25 surface of the top cover plate 28, where said cover plate lies above the body portion of the structure, rests flat upon the upper surface of the cover plate 27 and all of the plates, just described, are securely fixed in  
30 their several positions by rivets extending through said plates and through the adjacent portions of the flanges of the longitudinal channels 1 and 26. The rivets which  
35 connect the cover plate 27 to the top plate 18 of the central casting 4, are extended upwardly through the plates 28 and 32 and serve to bind all firmly together.

A bolster diaphragm plate 34, formed preferably of a rolled I-section, is disposed  
40 between the webs of each pair of channels 1 and 26 along the longitudinal median line of the bolster. These diaphragms are arranged with their webs standing vertically and the top and bottom flanges of each are  
45 cut away at their ends to accommodate the adjacent flanges of the channels. The webs of the diaphragm plates extend to the webs of the channels and are connected thereto by suitable angle brackets 35—35 fixed to  
50 the opposite sides of the webs of the plates and to the adjacent faces of the webs of said channels.

The angle brackets 35 which connect the diaphragms 34 to the channels 1 are preferably cast members and that portion of each which lies against the webs of said channels  
55 1 is extended; the forward members approximately to the forward ends of the

channels as at 35<sup>a</sup>, and the rearward members to a point adjacent the rear end of the casting 5, as at 35<sup>b</sup>, and each of said members is secured throughout its length by rivets to the webs of said channels so as to strengthen said webs for the better support of parts of the draft rigging. Registering  
65 apertures as 35<sup>c</sup> are formed through said extended portions and through the webs of the channels 1 for accommodating said draft  
70 rigging parts.

The top and bottom flanges of each of the diaphragm plates 34 are riveted to the adjacent portions of the top and bottom cover plates 28, 32 and 29, 33 respectively. The opposite end portions of the bottom cover plate 29 are bent upwardly, at the point of  
75 leaving the channels 26 so as to bring their extreme ends slightly above the horizontal plane of the under side of the body portion. The top cover plate 28 is continued horizontal practically throughout the entire  
80 width of the structure but is bent downwardly at its opposite ends so as to form vertically disposed end walls 36—36, the bottom edges of which approximately contact with the upper surface of the adjacent  
85 end portions of the bottom cover plate 29. The ends of the plate 29, however, project slightly beyond the walls 36 so as to serve as connecting means for the side girders of the car.

A pair of vertically disposed flanged bolster diaphragms 37—37 are placed between the top and bottom cover plates in each of the bolster extensions 30. These diaphragms are tapered toward their outer ends so as  
90 to conform to the incline of the adjacent portion of the bottom cover plate 29 and each is extended from the web of the adjacent channel 26 outwardly to the inner face of the wall 36. The webs of the two diaphragms of each pair are spaced apart equidistant upon opposite sides of the longitudinal median line of the bolster. Their flanges are turned outwardly and are riveted to the adjacent portions of the cover  
95 plates.

Suitable side bearing castings 38—38 are fixed to the under side of the bottom cover plate 29 upon each of the extensions 30. A center bearing plate 39 is arranged upon  
100 the under side of the bottom reinforcing plate 33 and is securely held in position by rivets extending through the outstanding flanges 39<sup>a</sup> of the plate 39 and through the plates 33 and 29 and the flanges of the channels 1—1. The usual central aperture  
105 40 is arranged directly beneath the bore of the tubular body portion 17 of the central casting 4, and suitable apertures are formed in the intervening portions of the plates 33 and 29 to permit passage of the king-pin  
110 125

through the aperture 40 and into the bore of the casting 17.

The stiffeners 14—14 which, as above described, are fixed to the under or forward faces of the inclined end plates of the hopper portion of the car, are so positioned and spaced from the opposite sides of the central stiffener 13 as to dispose their webs flat against the vertical outer faces of the webs of the adjacent portions of the respective channels 26. (See Fig. 8).

The rear ends of each pair of channels 1 and 26 are connected by obliquely disposed flanged plates 41, the flanges of which are bent forwardly and downwardly and are riveted to the opposing faces of the webs of said channels. The rivets connecting these flanges to the channels 26 are, in each instance, extended through the adjacent portions of the webs of the stiffeners 14 so as to connect the channels 26 rigidly to said stiffeners.

The upper or rear face of the body portion of each of the plates 41 is arranged in a plane corresponding with the angle of incline of the adjacent end sheet of the hopper and said body portions are securely fixed to said end plates as by rivets as at 41<sup>a</sup>. The ends of each of the channels 1 and 26 are beveled to correspond with the position of the plates 41.

The ends of each pair of channels 1 and 26 are further connected to each other by plates 42 which are riveted to the bottom flanges of said channels. Connection is made between all of the channels 1 and 26 by a plate 43 which extends from one of the channels 26 to the other, beneath said channels, and is riveted to the bottom flanges of all of said channels. The last mentioned plate is positioned immediately behind the bottom cover plate of the bolster portion of the structure, and its rear edge stands in a vertical plane directly beneath the rear edge of the top cover plate 27.

The forward ends of the longitudinal channels 26 are bent inwardly, at the point of leaving the bolster cover plates, so as to bring their forward ends relatively nearer the forward end of the adjacent channels 1, and the forward portions of all of the channels 1 and 26 are connected by a plate 44 which extends from one of the channels 26 to the other, beneath the channels 1 and 26, and is riveted to the lower flanges of each of said channels.

The end sill 45 of the structure is formed of a channel section which is disposed to lie with the rear face of its web flat against the forward face of the casting 2 and with its top and bottom flanges turned rearwardly. The top wall 7 of the casting 2 is depressed, as at 46, along its forward edge,

to accommodate the top flange of the end sill which projects beneath the adjacent portion of the cover plate 27. The bottom flange of the sill extends beneath the shoulder formed by the inset portion of the casting 2 and rests with its lower face upon the upper face of the outstanding flange of the drawbar supporting angle 12, to which it is secured by suitable bolts as at 46<sup>a</sup>. That portion of the web and lower flange of the end sill 45 which lies before the recessed portion of the casting 2 is also recessed or cut away to permit unobstructed passage of the drawbar.

The flanges of the end sill extend across the end of channels 1—1 and to the webs of the respective channels 26. The web of the end sill is extended, at its opposite ends, beyond the ends of the flanges thereof, and said extended portions are bent rearwardly so as to overlap, and be riveted to, the outer faces of the adjacent ends of the web portions of the channels 26, as at 47—47.

Reinforcing brackets 47<sup>a</sup>—47<sup>a</sup> are secured to the inner face of the web of the end sill channel 45, one between the opposing faces of the webs of each pair of channels 1 and 26, and the opposite ends of said brackets are turned rearwardly so as to lie flat against, and be riveted to, said webs.

It will be apparent from the foregoing that, while each of the end frames are properly considered as being composed of a main body portion with lateral bolster extensions, they may as well be considered as being composed of a bolster portion with members extending therethrough or laterally from one side adapted to engage the body of the car and from the opposite side for supporting the end sill.

Obviously, a variation in the form and construction of the side frames, or girders, of the car body will alter, to a greater or less degree, the exact arrangement of connecting means employed between the ends of the bolster extensions and the adjacent ends of the respective side girders, but such alterations are not material to the essential features of the present invention which, in this respect, reside generally in a substantial direct connection between the bolster extensions and the side girders of the car. The particular details of such connection are not important. The details of construction in the connection of the body portion of the end frames to the end plates of the hopper are, however, a part of the invention.

The specific connection between the bolster extensions and the side girders of the design of car body illustrated in the drawings is as follows: A short angle section is arranged with one of its flanges outstanding from, and with its other flange fixed to,

the outer surface of the end wall 36 of the bolster extension. The angle 48 is disposed in a vertical position and its outstanding flange lies in the vertical plane directly beneath the upstanding flange of an angle 49 which is fixed, by its remaining flange, to the top surface of the adjacent portion of the cover plate 28 and which extends outwardly above the angle 48. The adjacent end of the respective web plate 50 of the side girder of the car lies flat against the outer surface of the end wall 36 and extends to the inner vertical faces of the angles 48-49. The lower edge of the end portion of the web plate 50 rests upon the bottom cover plate 29. (See Figs. 1, 6 and 11.) A reinforcing angle section 51, with an upstanding flange fixed to the outer face of the bottom edge of the web plate 50 and with its other flange outstanding, extends to the extreme forward edge of the bottom cover plate 29 and is riveted, by its outstanding flange, to the upper face of said cover plate, beyond the end wall 36. The upstanding flange is fixed, by through rivets, to the lower portion of said end wall. A vertically disposed angle section 52 is fixed to the end portion of the plate 50 by rivets extending through one of its flanges, through said plate and through the end wall 36, as at 52<sup>a</sup>. The other flange of the angle 52 is fixed to the outstanding flange of the angle 48 and to the overhanging portion of the upstanding flange of the angle 49. An angle section 53 is arranged parallel with the angle 52 and is fixed to the inner face of said angle by rivets extending through the adjacent flange of each of said angles and through the intervening end portions of the plate 50. The lower end of the angle 53 rests upon the upper surface of the bolster cover plate 28 and is fixed, by its inturned flange, to the upstanding flange of the angle 49. A horizontally arranged gusset plate 54 is fitted in the corner or angle, formed by the meeting of the end of the bolster extension with the adjacent end of the respective side girder of the car body, and said gusset plate is secured to the bolster by rivets extending through the top cover plate 28 of said bolster and is secured to the web plate of the side girder by rivets extending through a flange of said gusset and through said plate, as clearly shown in dotted lines in Fig. 1 and in full lines in Fig. 2 of the drawings.

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

1. In an end underframe construction for cars, a bolster portion comprising top and bottom cover plates, a body portion comprising spaced members extending between

said cover plates, spaced members intermediate said first mentioned members, said last mentioned spaced members being disposed parallel throughout their length, said first mentioned spaced members being disposed parallel with said last mentioned spaced members within the zone of the bolster portion, but being bent toward said last mentioned spaced members at the point of leaving said bolster portion.

2. In a hopper car, a body portion having side and end walls and having an unobstructed discharge opening the entire length thereof between its end walls, an end underframe comprising spaced parallel and converging sill members, an end sill lapping the converging sill members in combination with a built up bolster comprising vertical members between said sill members, bolster extensions beyond the sill members adapted for attachment to side walls, and continuous top and bottom bolster cover plates lapping and connected with all of said bolster members.

3. In a hopper car, a body portion having side and end walls and having an unobstructed discharge opening the entire length thereof between its end walls, an end underframe comprising parallel spaced draft sills, side sills parallel with said draft sills at their inner ends and converging toward said draft sills at their outer ends, a bolster comprising a vertically disposed part between each draft sill and side sill and extensions from said side sills to car body side walls, and top and bottom bolster cover plates connected to all of said bolster parts.

4. In a hopper car, a body portion having side and end walls and having an unobstructed discharge opening the entire length thereof between its end walls, an end underframe comprising spaced draft sills and spaced side sills converging at their ends toward said draft sills, all of said sills terminating at and connected with said body end wall, a built up body bolster in the plane of and intersected by said sills, bolster extensions projecting beyond the side sills to a car body side wall, top and bottom bolster cover plates, an end casting connecting the draft sills, and an end sill outside of said casting connecting all of said sills.

5. In a hopper car, a body portion having side and end walls and having an unobstructed discharge opening the entire length thereof between its end walls, an end underframe comprising end wall bracing members, longitudinally extending sills lapping and connected to said bracing members and terminating at an end wall of the body, an intermitted built up body bolster intersected by said sills and extending later-

ally therebeyond in the plane of the sills, and top and bottom bolster cover plates connected with the intermitted bolster parts.

6. In a hopper car, spaced draft sills and converging side sills terminating at the body portion of the car, and end bracing members extending obliquely parallel with the end of the body and lapping some of said sills.

7. In a hopper car, an end underframe construction comprising parallel and converging longitudinal sills terminating at the body of the car, and obliquely disposed body bracing members connected directly to said sills and uniting them to the car body.

8. In a hopper car, an end underframe construction comprising parallel and converging longitudinal sills terminating at the body of the car, and an end sill having a vertical web portion connected with the parallel sills and lapping the converging end portions of the converging sills.

9. In a hopper car, an end underframe construction, comprising parallel and converging longitudinal sills terminating at the body of the car in combination with obliquely disposed body end braces lapped by and secured to the inner ends of said sills, an intermitted bolster disposed between and extending transversely beyond said sills for attachment to a body side wall, and a continuous top bolster cover plate extending over all of said sill and intermitted bolster members and having a vertical end portion attached directly to said side wall.

10. In a hopper car comprising a sloping end wall, draft sills and side sills terminating at said wall, obliquely disposed wall stiffening members lapping said sills and secured directly to said side sills and indirectly to said draft sills.

11. In a car end framing, parallel and converging draft and side sills, an end sill spanning the outer ends of said sills and lapping the sides of the side sills, and a strengthening casting spanning the draft sills back of said end sill and riveted thereto.

12. An end underframe for central dumping cars comprising a longitudinal portion narrower than the wheel tread of the car and connected with obliquely disposed reinforcing members on the car body in the plane of buffing stresses, bolsters projecting between and beyond said longitudinal portion intermediate its length and forming at its terminals the only direct support for the side wall of the car.

13. An end underframe construction for cars comprising an intermitted bolster, a platform, draft sills and side sills extending through said bolster intermediate the ends thereof, one end of said sills abutting and fixed to the hopper end walls of the

said car, and an end sill spanning all of said sills and extending rearwardly parallel with the side sills.

14. In combination with a suitably designed car body, an end underframe comprising a bolster, an end sill comprising a channel section, sills spaced narrower than the car tread extending through the bolster portion intermediate the ends thereof, and partially embraced by the webs of said end sill and adapted to support said end sill, the said spaced sills abutting and fixed to the inclined hopper end walls of the car body in the direct line of buffing stresses.

15. In combination with a suitably designed car body, an end underframe construction for cars, a bolster portion comprising top and bottom cover plates, sills spaced apart less than the tread of the car wheels and extending between the cover plates and intersecting the bolster portion and abutting and fixed to the inclined hopper end walls of the car body.

16. In combination with a suitably designed car body, an end underframe construction for cars comprising a bolster with top and bottom cover plates and intermitted fillers between said plates, draft and side sills forming a platform portion narrower than the tread of the car wheels and extending between the said cover plates, and an end sill lapping and extending parallel with said side sills.

17. The combination with a suitably designed car body, a bolster portion comprising top and bottom cover plates, an end underframe platform narrower than the wheel tread of the car and consisting of spaced sill members extending between the said cover plates intermediate the ends of said bolster portion, and a platform cover plate uniting said spaced sill members and extending between the bolster cover plates.

18. The combination with a suitably designed car body, a bolster comprising top and bottom cover plates, an end underframe narrower than the wheel tread of the car and consisting of a series of spaced parallel and converging sills extending between said bolster cover plates intermediate the ends of said bolster, a platform cover plate uniting said spaced sills and extending between the bolster cover plates, an end sill, the said cover plate with the converging sills and the end sill being adapted to form an end platform.

19. In an end underframe construction for cars, an end portion narrower than the tread of the car wheels comprising spaced parallel and converging sills extending longitudinally of the car, a bolster extending beyond said spaced sills and intermediate the longitudinal extent of the sills, por-

tions of the bolster being disposed intermediate said spaced sills, and a platform end sill lapping said converging sills.

5 20. An end underframe construction for railroad cars, comprising bolsters adapted to be connected directly to car side walls at their terminals, end sills, a series of longitudinal members including draft sills penetrating and extending through the bolsters  
10 intermediate their length and fixed to the end sill at one end with a car body at the other end.

21. In an end underframe construction for cars, an incased longitudinal end underframe portion attached to the end wall of  
15 the car body and narrower than the tread of the car wheels, and an incased bolster

portion projecting laterally therefrom and intermediate the length thereof and extending beyond the tread of the car wheels for  
20 direct attachment to car body side walls.

22. In an end underframe construction for cars, spaced end underframes longitudinally arranged and narrower than the wheel  
25 tread of the car, and lateral projections therefrom extending beyond the said wheel tread and adapted to be connected directly to side walls of the car.

In witness whereof I have hereunto set my hand in the presence of two witnesses. 30  
JOHN M. ROHLFING.

Witnesses:

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CHARLOTTE E. MITZE.