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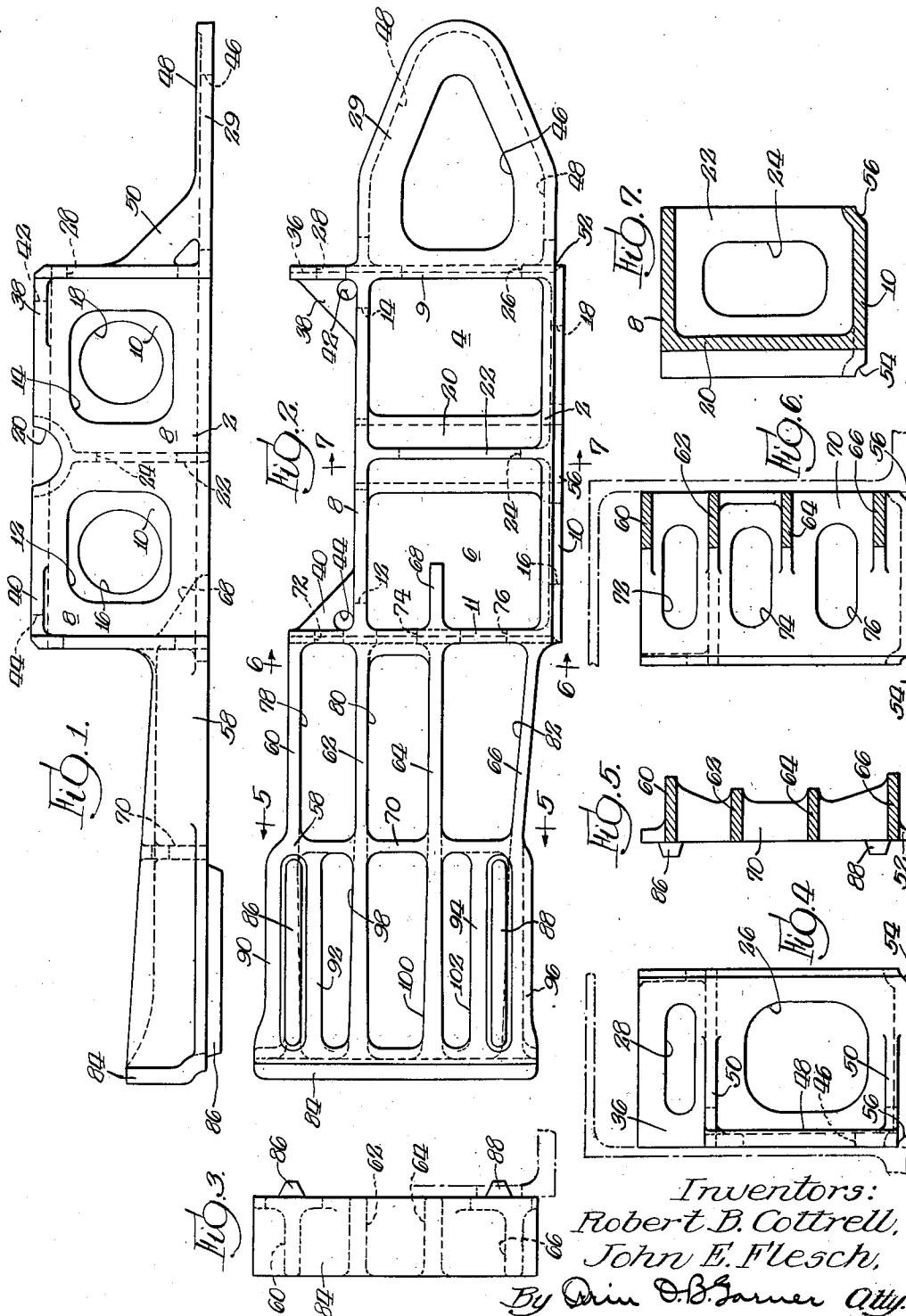
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CAR UNDERFRAME

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CAR UNDERFRAME

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Our invention pertains to railway car underframes and more particularly to a reinforcement of the center sill structure at the point where greater stresses occur therein, namely, where the draft attachments are associated with the sill and where the load is applied from the car body to the supporting truck.

As is well known in the art, it has long been customary to provide a reinforcement between the sills in the area mentioned, and this reinforcement has in the past most frequently been in the form of a steel casting designed substantially to fill the space above the center bearing and, therefore, commonly called a center filler. Such a center filler casting is shown in the Car Builders' Encyclopedia for 1937, page 1032, Figure 2496, wherein it may be noted that in addition to the center filler portion of the casting, which is of generally rectangular section, there are formed at one end of the casting stops or rear draft lugs designed as abutment means for the draft mechanism in the end of the car. At its opposite end the casting is tapered off in a tongue-like structure designed to prevent abrupt change of section as would otherwise occur if the casting were cut off square. This tongue-like projection provides additional means for riveting the casting to the sills and thus gradually diminishes the reinforcement offered by the casting to the sills instead of abruptly ending it.

Such conventional castings have heretofore been designed to be secured to the center sills by means of rivets, a large number of such rivets commonly being required, usually fifty or more. It is readily understood by those skilled in the art that great difficulty occurs in aligning rivet openings in the casting with the corresponding rivet openings in the car sills, the result being that common practice has been to make the openings somewhat smaller than ultimately required and to ream them after the filler casting has been placed between the sills in order that a proper tight fit might be secured for the hot rivets as driven and hammered. Such conventional castings are of necessity exceedingly heavy, a light structure being impossible due to the necessity of providing for the large number of rivet holes and of so spacing them as to provide adequate securing means therefor.

In the present effort of railways to provide lighter weight equipment, a variety of new designs of center filler structures have been promoted and among them have been built-up designs of structural steel parts designed to be welded together. Efforts have been made also

to produce relatively light weight castings by the use of high tensile steel while, at the same time, arranging for adequate riveting.

In our novel arrangement we have designed novel castings of such form as to permit their welding in the respective halves of the center sill prior to their assembly as a unit and to facilitate the welding of said castings into a single member after the two parts of the center sills have been assembled to form the said single unit. It is well known of course in the welding art to form a center sill of two Z-sections such as hereinafter described, but our manner of providing reinforcement for these center sills in the above mentioned areas is believed to be altogether novel and highly efficient.

An object of our invention is to design a form of center filler casting of light weight and maximum strength and efficiency suitable for use in relatively light weight cars and, at the same time, adapted to withstand the tremendous stresses normally exerted upon such a structure as a result of the usual buffing and pulling forces as well as the concentrated loading due to the standard car structure.

Our invention also contemplates a center filler structure designed to be cast in two pieces and welded to the respective halves of the center sill prior to their assembly as a unit.

A further object of our invention is to design a light weight filler casting structure while providing maximum strength in the directions to which the casting is subjected to greatest stresses by proper arrangement of ribbing and distribution of welding areas.

Our invention further comprehends a cast center filler structure of a form adapted to economical foundry production as well as to maximum welding efficiency.

Figure 1 is a top plan view of one half of our novel center filler and draft lug structure, it being understood that the two halves are similar except that one is the reverse of the other, the parts being made right and left;

Figure 2 is a side elevation of the casting structure shown in Figure 1;

Figure 3 is an end view of the casting shown in Figures 1 and 2, the view being taken from the left as seen therein and a fragmentary section of the center sill being shown in association therewith;

Figure 4 is an end view of the structure as seen from the right of Figures 1 and 2, there being also shown in Figure 4 a fragmentary section of the center sill;

Figure 5 is a sectional view of a steel casting, the section being taken in the transverse vertical plane substantially as indicated by the line 5—5 of Figure 2;

5 Figure 6 is another transverse vertical section taken substantially in the plane as indicated by the line 6—6 of Figure 2, this view also showing in part the associated center sill;

10 Figure 7 is a still further transverse vertical section through the casting structure taken substantially in the plane indicated by the line 7—7 of Figure 2;

15 Figure 8 is a top plan view of a car center sill structure reinforced with a center filler and draft lug casting structure made in accordance with our invention;

Figure 9 is a side elevation of the reinforced center sill structure shown in Figure 8;

20 Figure 10 is a sectional view through the center sill showing an end elevation of the casting structure incorporated therein, the section through the sills being taken substantially as indicated by the line 10—10 of Figure 9; and

25 Figure 11 is a similar view at the opposite end of the structure, the section being taken through the sills substantially in the plane as indicated by the line 11—11 of Figure 9.

Describing our novel structure in more detail, it will be apparent that, generally speaking, it comprises a skeleton-like framework comprised primarily of horizontal and vertical ribbing so arranged as to make maximum use of the metal section in the directions required for the respective forces applied to the various parts of the structure. The portion overlying the center bearing and generally indicated at 2 is of rectangular box-like structure substantially without side walls as indicated by the large openings 4 and 6 but including the top wall 8 and the bottom wall 10 and end walls 9 and 11, said top wall being cored out as indicated by the rectangular openings 12 and 14 and the bottom wall 10 likewise being cored out in circular openings indicated at 16 and 18. Integrally joining the top and bottom walls 8 and 10 is the semi-cylindrical center post 20 designed to receive the center pin, said member 20 being integrally formed with the vertical transverse center wall or rib 22 also cored out in the central portion thereof to form the opening 24 as best seen in Figure 7. The end walls of this central portion are also cored out as at 26 and 28 (Figure 4) adjacent the tapered end portion 29 and likewise as at 72, 74 and 76 (Figure 6) in the end wall adjacent the draft lug portion of the casting. The upper portion of the wall 9 shown at 36 (Figure 2) is reinforced by the vertical flange 38 integrally formed also with the top wall 8 as is likewise the vertical flange 40, said flange 40 acting as a reinforcement for the upper portion of the wall 11. Both of said flanges are cored out at their inner corners as shown at 42 and 44 to equalize the distribution of metal in those areas and thus to facilitate casting. The bottom lateral edges of the box-like central portion 2 are tapered off in a chamfer-like formation as best seen at 54 and 56 (Figure 7).

70 The tapered end of the casting generally indicated at 29 has its central portion cored out as at 46 and is beaded around the edge as at 48, 48, thus better accommodating the welding which secures it to the car sill as best shown in Figures 8 and 9. The juncture of the portion 29 with the box-like central portion 2 of the casting is reinforced by the horizontal ribs 50, 50 and it

may be further noted that the portion 29 is offset upwardly slightly from the bottom edge of the casting as at 52 in order to accommodate the welding along the bottom edge of said portion 29. As previously indicated the portion 29 is so designed as to diminish gradually the reinforcement which the said casting is to furnish to the sills proper after the two members have been welded to form a single integral structure.

The draft lug portion of the casting, generally indicated at 58, is comprised of four longitudinally extending ribs 60, 62, 64 and 66 spaced over the width of said draft lug portion from the top to the bottom thereof, said ribs thus providing a maximum area of welding surface in the direction required to absorb the longitudinal shocks delivered against the draft lugs in the normal operation of the car. The juncture of the longitudinal rib 64 with the wall 11 of the central portion of the casting is reinforced by the horizontal gusset 68. Approximately at their mid-point, the longitudinal ribs 60, 62, 64 and 66 are integrally joined by the wall 70 the form of which is best seen in the sectional view of Figure 5. It may be observed that the wall 11 is cored out to form a series of openings 72, 74 and 76 (Figure 6). It may be noted also that between the before mentioned ribs 60, 62, 64 and 66 are formed the quadrangular elongated openings 78, 80 and 82 thus conforming to the skeleton-like structure of the casting as a whole. Outwardly of the wall 70 the said longitudinal ribs are continued to the end of the casting where they are integrally formed with the end wall 84, said end wall being of solid rectangular shape as best seen in the end view of Figure 3, thus being adapted to form an abutment against which may be received the buffing shocks incident to the normal operation of the car. The outer vertical edge of the wall 84 is cut away in a chamfer-like manner to facilitate welding to the sill.

Outwardly of the wall 70 the top and bottom longitudinal ribs 60 and 66 are enlarged to form the longitudinal keys 86 and 88 having in section the form of a truncated cone, and around said keys are formed the flanges 90, 92, 94 and 96 for a purpose to be hereafter more fully described. At this end of the casting and between the longitudinal ribs are also cored out the elongated openings 98, 100 and 102, thus conforming to the skeletal form of the structure as a whole.

The manner of welding our novel center sill and draft lug castings together with the car sills is shown in Figures 8 to 11. As above noted, these novel castings are designed to be separately welded to the two halves of the sill prior to the welding of said sills along their edges to form the complete sill structure of the car body. It may be observed that a sill comprises similar halves 104 and 106 designed to be welded together along their longitudinal edges as at 108 to form the complete sill structure of U-section with the common wall 110, the side walls 112 and 114 and the lateral flanges 116 and 118. Prior to the welding together of the two halves of the sill as before mentioned along the edges indicated at 108, each may have one of our above mentioned novel castings welded therein.

The welding areas are shown in Figures 8 to 11, inclusive, wherein it may be observed that the tapered end portion 29 is welded entirely around its outer edge as at 121, 121 and that the inner edge of the opening 46 thereof is welded as indicated at 120. The inner edge of the vertical wall

9 is welded to the sill along its entire height as indicated at 122, 124 and the upper portion of said wall is also welded to the sill as at 126 and the bottom wall 10 is welded to the sill along its chamfer-like outer edge 56 as indicated at 128 as well as along its inner edge as at 130. The vertical edge of the wall 11 which abuts the sill is also welded thereto as at 132, 134, 136, 138, 140 and 142, the manner of welding the edges of the walls 9 and 11 to the sills thus providing maximum reinforcement for the concentrated vertical loads which are normally imposed upon the center bearing of the car structure. The upper and lower longitudinal ribs 60 and 66 are welded along their outer edges as indicated at 144 and 146 and the central openings 80 and 100 between the intermediate ribs 62 and 64 are welded around their entire perimeter as indicated at 148 and 150. Likewise the horizontal gusset 68 is welded to the sill as indicated at 151. The end wall 84 is welded to the sill along its outer edge as at 152.

It will be observed that the keys 86 and 88 are received in elongated slots 154 and 156 formed in the sill and that welding is applied entirely around said keys as at 158, 159 and 160, respectively, thus filling up the slots 154 and 156 and forming a solid metal section through the sills in the portions where the keys 86 and 88 project therethrough. The flanges 90, 92, 94 and 96 formed on the casting structure around the elongated keys 86 and 88 as previously described have a pre-determined width designed to close entirely the slots 154 and 156 in the sills, thus preventing the welding metal from being blown through said slots in the welding operation and facilitating the building-up of the solid metal section before mentioned.

Those expert in the art will observe that the draft lug end of our novel casting is formed to facilitate such welding as will unite said casting to the adjacent car sills in such manner as to offer maximum resistance to the longitudinal thrusts which are received upon the draft lugs in the normal operation of the car. It will further be observed that the elongated keys 86 and 88 are so positioned as to lend maximum reinforcement to the blows which are delivered against the draft lugs, said keys being placed adjacent the top and bottom edges of said draft lugs and thus being in a position to afford the utmost reinforcement to said lugs when off-center blows are delivered thereto as, for example, when a blow is delivered at the top edge thereof or at the bottom edge. It may also be noted that while we have shown welding for securing the draft lug end of the said casting to the said sills sufficient for ordinary operative conditions, at the same time we have provided additional welding area along longitudinal lines which may be availed of for car bodies designed for extra heavy service as, for example, in ore cars.

When our novel castings have been welded to the respective halves of the center sill, said halves may be welded together along their inner edges as previously indicated as at 108, thus bringing into abutment the inner edges of the box-like center bearing portions of our novel castings and permitting their welding along the edges of said abutting portions as at 161, 162 and 164. It may be noted that a clearance, A (Figures 10 and 11), is provided between the top edges of the castings as welded between the sills and the wall 110. The said clearance, A, is provided in order to permit a welding tool to be

inserted therein thus backing up the welding along the juncture at 108.

To those skilled in the art it will be apparent that our novel method of reinforcing the car underframing in the area where it is subjected to greatest stresses is eminently suited to modern car building methods wherein welding may be availed of in place of the heretofore commonly used riveting. It will be noted that our method eliminates the necessity for drilling holes for rivets both in the sills and in the reinforcing casting and, further, that the form of our novel casting permits the use of the most efficient welding methods and, at the same time, provides maximum reinforcement in the directions most needed.

It is to be understood that we do not wish to be limited by the exact embodiments of the device shown which are merely by way of illustration and not limitation as various and other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

We claim:

1. In a railway car underframe symmetrical rolled members adapted to be welded along abutting edges to form a center sill of inverted U-section with horizontal longitudinal flanges at its lower edges, and center filler reinforcing means in the form of symmetrical castings having box-like central portions adapted to be welded together along their abutting edges and having their bottom walls substantially flush with said bottom flanges, said central portions having their lateral longitudinal edges chamfered to form channels for the reception of welding metal, each of said castings comprising a skeletal end portion formed of inwardly projecting ribs and a plurality of outwardly projecting portions adapted to be received in associated openings in said sills and to be welded thereto, said skeletal portions being adapted to provide a maximum of welding along longitudinal lines, whereby said welding and said longitudinal ribs provide a maximum of resistance to longitudinal thrusts.

2. In a railway car underframe symmetrical rolled members adapted to be welded along abutting edges to form a center sill of inverted U-section with horizontal longitudinal flanges at its lower edge, center filler reinforcing means in the form of symmetrical castings adapted to be welded respectively to said rolled members prior to their union, said castings comprising box-like central portions with vertical walls adapted to be welded together along their abutting edges, and other spaced vertical walls adapted to be welded respectively to said rolled members, each of said spaced vertical walls being extended in an end portion having a depth diminishing gradually from said center portion outwardly, thereby affording a gradually diminishing section modulus when said end portion has been welded to said center sill, and an opposite end portion comprising a plurality of ribs adapted to offer maximum resistance to longitudinal thrusts when welded to said center sill.

3. In a railway car underframe symmetrical rolled members adapted to be welded along abutting edges to form a center sill of inverted U-section with horizontal longitudinal flanges at its lower edges, center filler reinforcing means in the form of symmetrical castings adapted to be welded respectively to said rolled members prior to their union, said castings comprising

box-like central portions with vertical walls adapted to be welded together along their abutting edges, and other spaced vertical walls adapted to be welded respectively to said rolled members, each of said spaced vertical walls being extended in an end portion having a depth diminishing gradually from said central portion outwardly, thereby affording a gradually diminishing section modulus when said end portion has been welded to the associated rolled member.

4. In a railway car underframe symmetrical rolled members adapted to be welded along abutting edges to form a center sill of inverted U-section, and reinforcing means in the form of symmetrical skeletal castings adapted to be welded respectively to said rolled members prior to their union, each of said castings comprising a box-like central portion with a transverse wall and a center post, said box-like portions having chamfered edges adapted to abut each other and form channels for the reception of welding material whereby said castings are united, each of said castings including an end portion comprising a plurality of substantially longitudinal ribs adapted to offer maximum resistance to longitudinal thrusts when welded to the associated rolled member, and tapering end means on each of said castings affording means for a welding connection to said rolled members.

5. In a railway car underframe symmetrical rolled members adapted to be welded along abutting edges to form a center sill of inverted U-section with horizontal longitudinal flanges at its lower edges, and center filler reinforcing means in the form of symmetrical castings having box-like central portions adapted to be welded together along their abutting edges and having their bottom walls flush with said flanges, said central portions having their lateral longitudinal edges chamfered to form channels for the reception of welding metal, each of said castings comprising an end portion having parallel longitudinal ribs and longitudinal key means adapted to project through an opening in the associated rolled member and to be welded thereto entirely around said key.

6. In a railway car underframe symmetrical rolled members adapted to be welded along abutting edges to form a center sill of inverted U-section with horizontal longitudinal flanges at its lower edges, and center filler reinforcing means in the form of symmetrical castings having box-like central portions adapted to be welded together along their abutting edges and having their bottom walls substantially flush with said bottom flanges, said central portions having their lateral longitudinal edges chamfered to form channels for the reception of welding metal, each of said castings comprising an end portion with horizontal ribs and a plurality of elongated lateral flanges adapted to project through corresponding openings in the associated rolled member and to be welded thereto.

7. In a railway car underframe symmetrical rolled members adapted to be welded along abutting edges to form a center sill of inverted U-section with horizontal longitudinal flanges at its lower edges, and center filler reinforcing means in the form of symmetrical castings having box-like central portions adapted to be welded together along their abutting edges and having their bottom walls substantially flush with said bottom flanges, said central portions having their lateral longitudinal edges chamfered to form channels for the reception of welding metal, each of said

castings comprising a skeletal end portion formed of inwardly projecting substantially parallel ribs and a plurality of outwardly projecting portions adapted to be received in associated openings in said sills and to be welded thereto.

8. In a railway car a center sill structure comprising symmetrical rolled members of Z-section adapted to be welded together along one edge to form an integral sill of inverted U-section, and center reinforcing means in the form of symmetrical castings adapted to be welded respectively to said Z-section members prior to their welding together and adapted thereafter to be welded to each other along abutting central box-like portions, each of said means comprising an end portion of tapering depth thus affording a gradually diminishing section modulus for said sill structure when said end portions have been welded to their associated structural members.

9. In a railway car underframe symmetrical rolled members adapted to be welded along abutting edges to form a center sill of inverted U-section with horizontal longitudinal flanges at its lower end, center filler reinforcing means in the form of symmetrical castings adapted to be welded respectively to said rolled members prior to their union, said castings comprising box-like central portions with vertical walls adapted to be welded together along their abutting edges, and other spaced vertical walls adapted to be welded respectively to said rolled members, each of said spaced vertical walls being extended in an end portion comprising a plurality of spaced parallel ribs adapted to offer maximum resistance to longitudinal thrusts when welded to said rolled members, and means on the opposite end of each of said walls affording a gradually diminishing section modulus when welded to the associated rolled member.

10. In a railway car underframe center sill reinforcing means in the form of skeletal castings, each of said castings comprising a box-like central portion adapted to be welded around its inner perimeter with the abutting casting, an end portion of gradually diminishing depth designed to afford a tapering off section modulus when welded to said center sill, and an opposite end portion comprising a plurality of substantially horizontal ribs adapted to offer maximum resistance to end thrusts when welded to said sill.

11. In a railway car underframe symmetrical rolled members adapted to be welded along abutting edges to form a center sill of inverted U-section, and reinforcing means in the form of symmetrical skeletal castings adapted to be welded respectively to said rolled members prior to their union, each of said castings comprising a box-like central portion with a transverse wall and a center post, said box-like portions having chamfered edges adapted to abut each other and form channels for the reception of welding material, whereby said castings are united, and end portions on said castings adapted to be welded respectively to said members along their entire perimeters and at intermediate areas.

12. In a railway car an integrally formed center sill reinforcing skeletal casting comprising a central box-like portion with a center post and cored out walls, and vertically arranged end portions adapted to be welded to a structural steel member forming the center sill of the car, one of said end portions having a depth diminishing gradually from said central portion outwardly, thereby affording a gradually diminishing section

modulus when said end portion has been welded to said structural member.

13. In a car underframe center sill reinforcing means in the form of a skeletal casting having a box-like central portion with cored out walls and an end portion including spaced inwardly projecting ribs adapted to be welded along their edges to one side of the associated sill, and outwardly projecting members adjacent top and bottom edges of said portion adapted to be received in associated openings in said sill and to be welded thereto thus affording maximum resistance to longitudinal thrusts adjacent said edges.

14. In a railway car an integrally formed center sill reinforcing skeletal casting comprising a central box-like portion with a center post and cored out walls, and vertically arranged end portions adapted to be welded to a structural steel member forming the center sill of the car, one of said end portions having a depth diminishing gradually from said central portion outwardly, thereby affording a gradually diminishing section modulus when said end portion has been welded to said structural member, the other of said end portions comprising a plurality of parallel ribs adapted to offer maximum resistance to longitudinal thrusts when welded to said structural member.

15. In a railway car an integrally formed center sill reinforcing skeletal casting comprising a central box-like portion with a center post and cored out walls, and vertically arranged end portions adapted to be welded to a structural steel member forming the center sill of the car, one of said end portions comprising a plurality of parallel ribs adapted to offer maximum resistance to end thrusts when welded to said structural member, and the other of said end portions comprising a tapering structure adapted to be united to said steel member by a welding operation, thus affording a gradually diminishing section modulus for said united members.

16. In a railway car a center sill structure comprising symmetrical rolled members of Z-section adapted to be welded along abutting edges to form an integral structure of inverted U-section with lateral longitudinal flanges, and reinforcing center filler and draft lug means in the form of two symmetrical castings designed to be

welded respectively to said Z-section members and to be welded to each other after the formation of said U-section member, said reinforcing castings each comprising one end portion having a plurality of spaced parallel ribs with openings therebetween affording access for welding and an opposite end portion in the form of a tapering arm adapted to be welded to the associated rolled member.

17. In a railway car underframe center sill reinforcing means in the form of skeletal castings, each of said castings comprising a box-like central portion adapted to be welded around its inner perimeter with the abutting casting, and an end portion of gradually diminishing depth designed to afford a tapering off section modulus when welded to said center sill.

18. In a railway car, a center sill structure comprising symmetrical rolled members adapted to be welded along abutting edges to form a center sill of inverted U section, and reinforcing means in the form of skeletal castings each comprising a central box-like portion and vertically arranged end portions adapted to be welded to the associated rolled member respectively, one of said end portions having a tapering formation adapted to afford a gradually diminishing section modulus when welded to the associated rolled member and the other of said end portions having a plurality of substantially parallel spaced ribs with openings therebetween affording clearance for welding and adapted to offer maximum resistance to end thrusts when welded to said associated rolled member.

19. In a railway car underframe, center sill reinforcing means in the form of symmetrical skeletal castings adapted to be welded to each other and to adjacent portions of the center sill structure, each of said castings comprising a box-like central portion with vertically arranged end portions, one of said end portions comprising a plurality of substantially parallel spaced horizontal ribs with openings therebetween affording welding clearance and the other of said ends being in the form of a tapering arm designed to effect a tapering off section modulus when welded to said sill.

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