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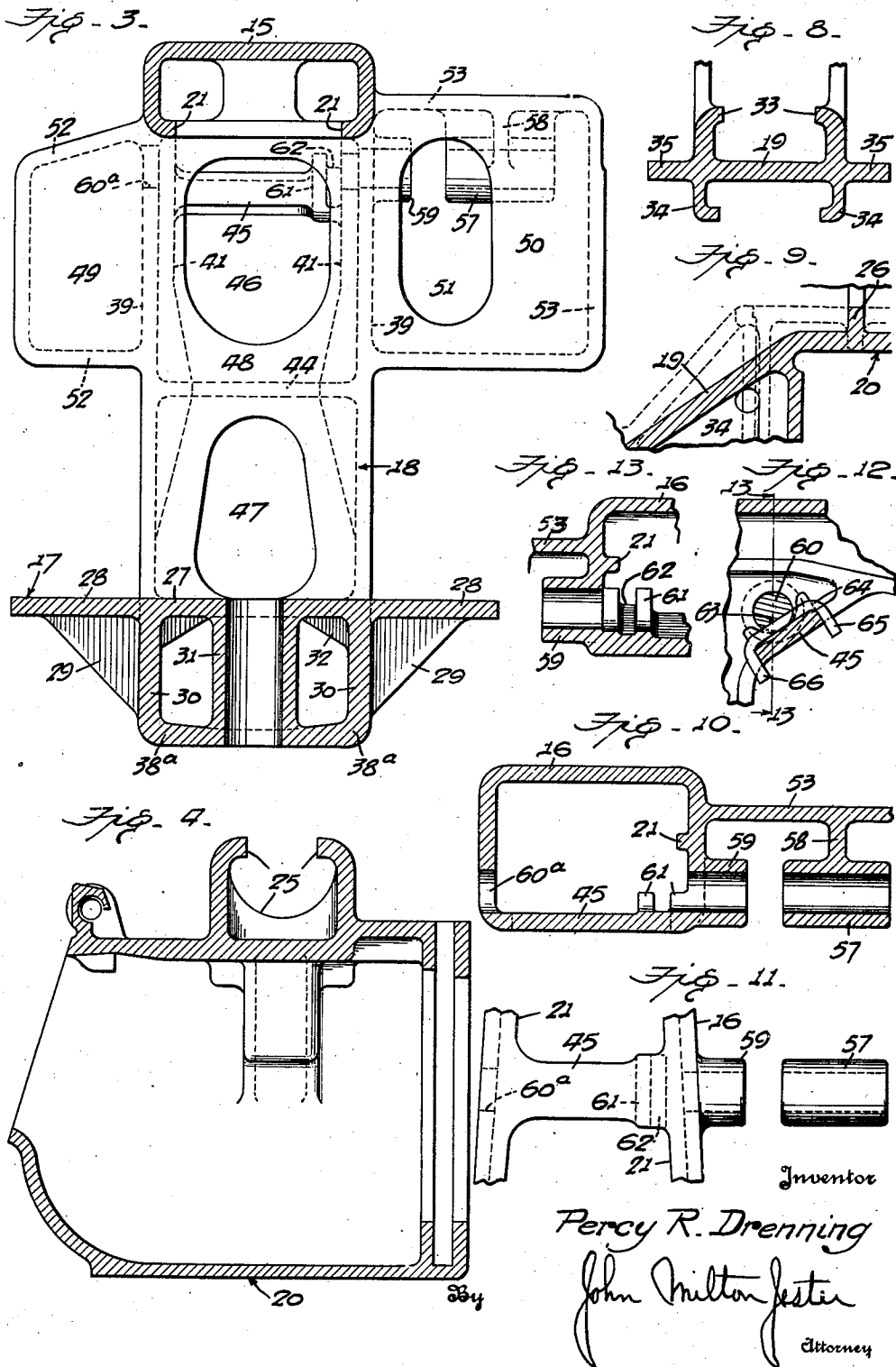
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TRUCK SIDE FRAME

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TRUCK SIDE FRAME

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This invention relates to truck side frames and has special reference to a side frame particularly though not necessarily intended and adapted for use in a truck of that type in which the usual spring plank is omitted.

An important object of the invention is to provide a side frame embodying compression and tension members connected by spaced parallel pedestals or column guides, the compression and tension members merging into and being formed integrally with journal boxes, the entire frame being of the cast steel type.

Another object of the invention is to provide a side frame in which the neutral axes of the compression and tension members intersect at points above the centers of the journal boxes, this being the logical construction from an engineering viewpoint to insure great strength and rigidity with minimum weight.

Another important object is to provide a side frame in which the pedestals or column guides which define the window opening for the reception of the bolster and the supporting springs therefor are provided with inclined or diagonal knees at their junctures with the compression and tension members, these knees taking the reaction strain of the load sustaining beam at the bottom of the window opening exerted against the tension members, and the knees at the junctures of the column guides with the compression members affording a brace against the vertical forces reacting thereupon.

A further important object is to provide a spring seat member to which the tension members connect in such manner as not to increase the tension on the underside of the beam but to carry its tension into the upper part of the beam where compression alone exists, this feature being accomplished by continuing the horizontal portion of the tension member through the spring seat beam on the neutral axis thereof.

Another object of the invention is to provide a side frame in which the compression and tension members are channel shaped in cross section with the open sides disposed toward each other, thereby facilitating casting and reducing the number of cores or core parts necessary.

Still another object is to provide a side frame in which the compression and tension members have their greatest width at the top and bottom, respectively, of the window opening defined between the column guides, the width decreasing gradually from the center toward the journal boxes but the arrangement being nevertheless such that adequate strength will be assured

throughout particularly by virtue of gussets or diagonal tie members or braces in the side webs or flanges.

A more specific object of the invention is to provide a side frame having novel bracket means for supporting the brake hangers, this bracket means being of a nature to permit the use of a simple positive retaining means for the pivots of the brake hangers, the pivot means being easily removable and replaceable when necessity arises.

Another specific object is to provide a side frame in which the column guides or pedestals are provided at their inner and outer sides with projections which will increase the bearing area engaged by the bolster so that the bolster will be properly squared in the truck or, conversely, the side frames squared with respect to the bolster so that unusual or excessive relative movement will be prevented notwithstanding the elimination of the usual spring plank.

Another specific object of the invention is to provide a side frame in which the column guides are peculiarly and specifically formed to accommodate special retaining means for the bolster to prevent longitudinal displacement of the latter, the column guides being moreover provided with transverse tie means which will positively operate to prevent distortion and to give the necessary strength.

The invention also contemplates a detailed side frame construction as regards the peculiar cross sectional configuration of the various elements, tie means, web arrangement and other mechanical details which will operate to give unusual strength while at the same time the weight may be decreased to the minimum safe point.

An additional object is to provide a side frame which will be as simple as the ordinary type to construct or cast, which will be consequently comparatively simple to make and which will at the same time be highly efficient and a general improvement in the art.

To the attainment of the foregoing and other objects and advantages, the invention preferably consists in the details of construction and the arrangement and combination of parts to be hereinafter more fully described and claimed, and illustrated in the accompanying drawings in which:

Figure 1 is a view half in side elevation and half in vertical longitudinal section showing a side frame constructed in accordance with my invention,

Figure 2 is a partial sectional view taken on the

line 2—2 of Figure 1 with the remainder in top plan.

Figure 3 is a vertical cross sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a vertical cross sectional view through one of the journal boxes taken on the line 4—4 of Figure 1.

Figure 5 is a detail horizontal section take on the line 5—5 of Figure 1.

Figure 6 is a cross section through one of the tension members taken on the line 6—6 of Figure 1.

Figure 7 is a cross section through one of the compression members taken on the line 7—7 of Figure 1.

Figure 8 is a detail section on the line 8—8 of Figure 1.

Figure 9 is a fragmentary vertical section taken on substantially the line 9—9 of Figure 2.

Figure 10 is a cross section through the brake hanger mounting taken on the line 10—10 of Figure 1.

Figure 11 is a fragmentary elevation thereof, view being indicated by the line 11—11 of Figure 1.

Figure 12 is a fragmentary view partly in elevation and partly in section taken at the upper end of one of the column guides where it joins the compression member and giving a detail of the brake hanger pivot retaining means.

Figure 13 is a cross section on the line 13—13 of Figure 12 with the retaining means omitted.

Referring more particularly to the drawings I have shown the side frame as of the cast steel type in which the journal boxes are integral. Generally speaking, the frame comprises a top beam 15 from which extend compression members 16, a bottom beam 17 constituting the spring seat, pedestals or column guides 18 joining the top and bottom beams 15 and 17, respectively, tension members 19 which lead from the bottom beam 17, and journal boxes 20 located at the outer ends of the compression and tension members 16 and 19.

The compression member or top beam 15 is preferably of uniform width between the column guides and the compression members 16 which extend therefrom have their maximum width at the column guides and decrease gradually in width toward their ends where they merge into the journal boxes. If preferred, the top beam 15 together with the compression members or portions 16 may be simply termed the compression member and, likewise, the bottom beam or spring support 17 together with the members 19 may be considered as a single tension member, it being immaterial which exact nomenclature is followed. The members 15 and 16 are of inverted channel shape in cross section as clearly shown in Figures 3 and 7 and have their vertical flanges directed toward each other at their open lower portions as shown at 21 for the sake of stiffness, it being moreover preferable that the vertical flanges be connected by ties 22 which are located intermediate the column guides or pedestals and the journal boxes. Instead of saying that the members 15 and 16 are channel shaped with open bottoms it could be stated that they are formed with elongated openings 23 and 24 separated by the ties 22. The compression members 16 also slope downwardly from the column guides toward the journal boxes and their extremities are preferably notched out as shown at 25. There is nothing distinctive about the construction of the journal boxes themselves. However, the

boxes are provided at the top and beneath the compression members 16 with upstanding webs or ribs 26 which extend transversely with respect to the side frame and which have upwardly inclined portions merging into the vertical flanges at the junctures of the compression and tension members 16 and 19.

The lower beam member or support 17, shown in detail in Figures 1, 2 and 3 is of general inverted channel shape in cross section and includes a top wall 27 formed with lateral extensions 28 projecting beyond the outer and inner sides of the side frame and constituting a support for a nest of suitable bolster supporting springs. These extensions 28 are braced by triangular webs 29 which merge into the undersides thereof and into the sides 30 of the bottom beam 17. Located at the center of the member 17 is a vertically extending spool-like member 31 which serves as a load or force transmitting element and which greatly strengthens the structure. Interiorly of the member 17 are triangular webs or gussets 32 which merge into the underside of the top 27 and into the sides 30 for stiffening purposes.

The compression members 19 extend from the junctures of the bottom beam 17 with the column guides or pedestals 18 and are of channel shape in cross section with the open sides up, the edges of the open sides being preferably inwardly directed or formed with flanges 33 for stiffening purposes. The members 19 have their bottom walls merging into the inner edges of the journal box roofs as clearly indicated at the left end of Figure 1, and the inturned flanges 33 merge into the inturned flanges 21 on the compression members 16, as clearly disclosed at this same point. Beneath the outer ends of the tension members 19, where they join the journal boxes are gussets 34, and the outer sides are formed with triangular webs or gussets 35 which merge into the inner faces of the journal boxes. For additional stiffness, the vertical flanges or sides of the tension and compression members 16 and 19 are connected by downwardly diverging ties 36 which are disclosed as being at substantially the same points as the horizontal ties 22 which connect the vertical sides or flanges of the compression members 16.

Attention is directed to the fact that the compression members 16 taper or are reduced in width as they approach the journal boxes. To compensate for loss in area due to the reduction in width, each side wall of the compression member 16 as it approaches the journal box is increased in thickness beginning at the point 16^a and tapering inwardly to the point 16^b. From the point 16^b to the point 16^c, which latter is directly over the center of the journal, the thickness is uniform, and from point 16^c the thickness gradually diminishes to the point 16^d at the extremity of the compression member. This is clearly illustrated in Figure 5 of the drawings. This is important for the reason that it is well known that the shear lines of the compression and tension members at the journal box have different directions due to the angularity of these members. It is therefore logical that as the shear of both members concentrates at this point, added section in the webs or side walls must be provided.

It will be noted that the tension members 19 do not spring from the bottom or lowermost corners of the bottom beam 17 but rise or emerge from the same at points spaced considerably above the bottom as clearly indicated in Figure 1, the bottom walls of these tension members being cut away

in a V, as shown at 37, with the material at the sides of the V merging into the inner faces of the sides or vertical flanges 30 of the bottom beam beneath the webs 32. The sides 30 are shown as extending below the points at which the bottoms of the tension members 19 merge into the bottom beam 17, the extreme lower edges of the sides 30 continuing past the spool structure 31 and being spaced beyond the same with the lower edges formed with inwardly directed flanges 38. The metal at the inner corners of the bottom of the central portion of the bottom beam 17 is preferably thickened as shown at 38^a, this thickened portion continuing along the juncture of the flanges 38 with the sides 30.

The column guides 18 are shown as of channel shape in cross section, the side flanges 39 extending away from the window opening 40 and having their edges intumed or directed toward each other as shown at 41. These side flanges merge into the sides of the compression and tension members 16 and 18 as well as the top and bottom beams 15 and 17 and where the side flanges merge into the compression and tension members they are widened to define knees 42 and 43, respectively, which will serve to brace the tension and compression members 19 and 16. Furthermore the side flanges are connected by a transverse tie or web 44 which will prevent buckling, collapsing or other distortion. Moreover there is a tie 45 connecting the intumed edges 41 of the side flanges of the column guides at the knees 42. The confronting faces of the column guides are formed with openings 46 and 47 which are spaced apart, thus leaving a solid portion or tie 48 connecting them. These openings are partly for the purpose of reducing the weight, and the upper opening 46 performs the additional function of accommodating a transverse retaining member, not shown, carried by the bolster for preventing it from having excessive longitudinal movement or movement transversely of the truck or side frames. The bolster and the retaining means are illustrated in my copending application for patent for Truck bolsters filed September 8, 1931 Serial No. 561,781.

As a side frame constructed in accordance with the present invention is particularly designed and adapted for use in a truck in which the usual spring plank is omitted, it is highly desirable to provide an increased bearing surface on the side frame where it is engaged by the bolster so that the bolster cannot have any excessive angular movement with respect to the side frames but will be maintained always in properly squared relation thereto. To accomplish this I form the column guides at their outer sides with extensions 49 and at their inner sides with other extensions 50, both being flush with the inner faces of each of the column guides. The extension 50 may have an opening 51 for the purpose of decreasing the weight and both extensions have marginal flanges 52 and 53, respectively, for stiffening purposes. Moreover the top and bottom flanges 52 are inclined where they merge into the sides of the frame as shown at 54 and 55 in Figures 1 and 2, while the corresponding flanges 53 are widened and curved as at 56 in Figure 2 where they merge into the inner sides of the frame.

An important feature of the invention is the construction of the extensions 50 so that they will have integral means thereon constituting brackets for supporting the usual or any preferred brake hangers. In carrying out this feature I provide a

tubular bearing member 57 located beneath the top flange 53 of each extension 50 and joined thereto by a web 58. I also form the side flange of the column guide toward the extension 50 with a tubular boss 59 which is in alignment with the bearing 57 and which likewise constitutes a bearing for the reception of a pin 60 which serves as the pivot for the brake hanger, not shown. On the tie 45 are spaced saddle members 61 receiving the pin but separated to form a groove or notch 62 registering with a groove 63 cut in one side of the pin, the space 62 and groove 63 accommodating securing means for the pin, this securing means being somewhat in the nature of a cotter and being here disclosed as formed from a suitable length of rod 64 having one end initially bent over at right angles as shown at 65 and having its other end adapted to be bent over at right angles as shown at 66. The outer face of the frame is formed with an opening 60^a alining with the bearing 57 and boss 59 so that the pin 60 may be inserted from the outside and passed through the hole 60^a, the boss 59 and the bearing 57, the pin being so positioned that the groove 63 therein will come opposite the space 62 between the saddle elements 61. The pin or cotter 64 is then inserted within the mating grooves 62 and 63 and its end 66 turned down whereupon the pin 60 will be incapable of longitudinal or rotative movement, thus relieving wear at all points except upon the pin itself and the brake hanger, either of which could be easily replaced when necessary.

Attention is invited to the feature that the neutral axes of the compression and tension members, shown by the dot and dash lines 67 and 68, respectively, intersect at the points 69 above the centers of the journal boxes. The numerals 70 and 71 designate the points at which the neutral axes of the compression and tension members intersect the vertical strain lines shown by the dot and dash lines 71. The location of all these points of intersection is of great importance as it must be remembered that a side frame must be considered as a beam, the various parts of which must cooperate to give the proper truss effect so that the load will be distributed in order that the frame will be capable of withstanding the strains to which it is subjected in service.

From the foregoing description and a study of the drawings it will be apparent that I have thus provided a novel side frame embodying various detailed characteristics as regards the location of the neutral axes, their points of intersection, and the general arrangement whereby the frame will have unusual strength and rigidity coupled with minimum weight. Ample provision has been made at all the critical points to effect bracing. The knees provided at the junctures of the compression and tension members with the vertical column guides are of great importance as they will transmit and distribute the vertical forces of the load and thereby avoid any possibility of failure of the frame at these danger points. In fact every contingency has been anticipated and provided for accordingly so that the frame should have maximum efficiency.

While I have shown and described the preferred embodiment of the invention, it should be understood that the disclosure is merely an exemplification of the principles involved as the right is reserved to make all such changes in the details of construction as will widen the field of utility and increase the adaptability of the device provided such changes constitute no departure from

the spirit of the invention or the scope of the claims hereunto appended.

Having thus described the invention, I claim:

1. A truck side frame comprising top and bottom beam members, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the ends of the bottom beam and merging into the outer ends of the compression members, vertical column guides joining the top and bottom beams at the junctures of the compression and tension members therewith, journal boxes at the ends of the compression and tension members where they merge, said compression and tension members being of channel shape in cross section with their open sides toward each other and having their sides provided with inwardly directed flanges constituting stiffening means, and upwardly converging ties connecting the compression and tension members and located closer to the journal boxes than to the column guides.

2. A truck side frame comprising top and bottom beam members, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the ends of the bottom beam and merging into the outer ends of the compression members, vertical column guides joining the top and bottom beams at the junctures of the compression and tension members therewith, journal boxes at the ends of the compression and tension members where they merge, said top beam and compression members being of inverted channel shape in cross section with their open sides down and having their sides provided with inwardly directed flanges constituting stiffening means, and said tension members being of channel shape in cross section with their open sides up and formed at their edges with inwardly directed flanges merging into the flanges on the edges of the sides of the compression members at points above the journal boxes.

3. A truck side frame comprising top and bottom beam members, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the ends of the bottom beam and merging into the outer ends of the compression members, vertical column guides joining the top and bottom beams at the junctures of the compression and tension members therewith, journal boxes at the ends of the compression and tension members where they merge, said top beam and compression members being of inverted channel shape in cross section with their open sides down and having their sides provided with inwardly directed flanges constituting stiffening means, said tension members being of channel shape in cross section with their open sides up and formed at their edges with inwardly directed flanges merging into the flanges on the edges of the sides of the compression members at points above the journal boxes, and upwardly converging ties joining the compression and tension members at points spaced inwardly from the journal boxes.

4. A truck side frame comprising top and bottom beam members, the bottom beam providing a spring seat, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the ends of the bottom beam and merging into the outer ends of the compression members, vertical column guides joining the top

and bottom beams at the junctures of the compression and tension members therewith and merging into the top wall of the top beam, and journal boxes at the ends of the compression and tension members where they merge, the column guides being channel shaped in cross section with their open sides disposed away from the vertical center line of the side frame and provided at their open edges with inwardly directed flanges connected by transverse ties, the confronting faces of the column guides being equidistant throughout from the top beam to the spring seat.

5. A truck side frame comprising top and bottom beam members, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the ends of the bottom beam and merging into the outer ends of the compression members, vertical column guides joining the top and bottom beams at the junctures of the compression and tension members therewith and having their confronting webs merging into the top wall of the top beam, and journal boxes at the ends of the compression and tension members where they merge, the column guides being channel shaped in cross section with their open sides disposed away from the vertical center line of the side frame and provided at their open edges with inwardly directed flanges, the column guides having their upper and lower ends sharply angularly extended toward the journal boxes and defining knees for bracing the tension and compression members, said compression members being provided at the lower edges of their inner sides with flanges extending across the knees and merging into said confronting webs of the column guides, said flanges converging as they approach the column guides.

6. A truck side frame comprising top and bottom beam members, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the ends of the bottom beam and merging into the outer ends of the compression members, vertical column guides joining the top and bottom beams at the junctures of the compression and tension members therewith, journal boxes at the ends of the compression and tension members where they merge, the column guides being channel shaped in cross section with their open sides disposed away from the vertical center line of the side frame and provided at their open edges with inwardly directed flanges, the column guides having their upper and lower ends extended toward the journal boxes and defining knees for bracing the tension and compression members, and transverse ties located intermediate the top and bottom beam members and independent thereof connecting the sides of the column guides at points near the centers thereof.

7. A truck side frame comprising top and bottom beam members, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the ends of the bottom beam and merging into the outer ends of the compression members, vertical column guides joining the top and bottom beams at the junctures of the compression and tension members therewith, and journal boxes at the ends of the compression and tension members where they merge, the column guides being channel shaped in cross section with their open sides disposed away from the vertical center line of the side

frame and provided at their open edges with inwardly directed flanges, the column guides having their upper and lower ends extended toward the journal boxes and defining knees bracing the tension and compression members, the column guides being formed with projections at their upper portions projecting beyond the outer and inner faces of the side frame.

8. A truck side frame comprising top and bottom beam members, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the ends of the bottom beam and merging into the outer ends of the compression members, vertical column guides joining the top and bottom beams at the junctures of the compression and tension members therewith, and journal boxes at the ends of the compression and tension members where they merge, said bottom beam projecting below the points at which the tension members merge therewith, and the bottom webs of the tension members fading out into the side walls of the bottom beam intermediate the top and bottom thereof.

9. A truck side frame comprising top and bottom beam members, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the ends of the bottom beam and merging into the outer ends of the compression members, vertical column guides joining the top and bottom beams at the junctures of the compression and tension members therewith, and journal boxes at the ends of the compression and tension members where they merge, said bottom beam projecting below the points at which the tension members merge therewith, the inner ends of said tension members merging into the sides of said bottom beam near the center thereof.

10. A truck side frame comprising top and bottom beam members, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the ends of the bottom beam and merging into the outer ends of the compression members, vertical column guides joining the top and bottom beams at the junctures of the compression and tension members therewith, journal boxes at the ends of the compression and tension members where they merge, said bottom beam having a laterally widened top, sides and a central spool portion connecting the top and bottom, and said tension members being of channel shape in cross section with their lower ends notched and merging into the sides of the bottom beam above the lower edge thereof.

11. A truck side frame comprising top and bottom beam members, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the ends of the bottom beam at the neutral axis thereof and merging into the outer ends of the compression members, vertical column guides having straight and parallel inside faces joining the top and bottom beams at the junctures of the compression and tension members therewith and continued upwardly across and merging into the top wall of the former and journal boxes at the ends of the compression and tension members where they merge.

12. A truck side frame comprising top and bottom beam members, compression members in-

clining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the ends of the bottom beam and merging into the outer ends of the compression members, vertical column guides flanged outwardly at their junction with the compression members and flanged outwardly at their junction with the tension members, journal boxes at the ends of the compression and tension members where they merge, said top beam and compression members being of inverted channel shape in cross section with their open sides down and having their sides provided with inwardly directed flanges constituting stiffening means, and transverse ties connecting the flanges of said compression members at points intermediate the column guides and journal boxes.

13. A truck side frame, comprising top and bottom beam members, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members having their webs leading from an interior point of the side walls of the bottom beam, said juncture being intermediate of the top and bottom flanges of this beam, the web and upwardly projecting flanges of this tension member diverging upward and outward and merging into the outer ends of the compression members, vertical column guides joining the top and bottom beams at the juncture of the compression and tension members therewith, and journal boxes at the ends of the compression and tension members where they merge, the column guides being channel shape in cross section with their open sides disposed away from the vertical center line of the side frame and provided at their open edges with inwardly directed flanges, column guides having their upper and lower ends extending towards the journal boxes and designing these for bracing said tension and compression members, the column guides being formed with projections at their upper portions projecting beyond the outer and the inner faces of the side frame.

14. A truck side frame, comprising top and bottom beam members, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members with their bottom walls originating from the intermediate portions of the side walls of the bottom beam and merging into the outer ends of the compression members, vertical column guides joining the top and bottom beams at the junctures of the compression and tension members therewith and journal boxes at the ends of the tension and compression members where they merge.

15. A truck side frame, comprising top and bottom beam members, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the bottom beam and merging into the outer ends of the compression members, vertical column guides joining the top and bottom beams at the junctures of the compression and tension members therewith, journal boxes at the ends of the tension and compression members where they merge, the compression members being of inverted channel shape in cross section with their open edges connected by ties spaced from the journal boxes, the side walls of each compression member as they approach the journal box increasing in thickness from a point beyond but adjacent each tie to a point above the inner edge of each journal box, from which point

this thickness continues uniform to the center line of said journal box, thence diminishing to the end of said compression member.

16. A truck side frame, comprising top and bottom beam members, compression members inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the bottom beam and merging into the outer ends of the compression members, vertical column guides joining the top and bottom beams at the junctures of the compression and tension members therewith, journal boxes at the ends of the tension and compression members where they merge, the compression members extending entirely across the top of the journal boxes and having their side walls increasing in thickness to points spaced above the inner edges of the journal boxes, then continuing at this maximum thickness to points substantially above the centers of the journal boxes and thence decreasing toward the outer edges of the journal boxes.

17. A truck side frame, comprising top and bottom beam members, compression members of inverted channel shape in cross section inclining downwardly and outwardly from the ends of the top beam, upwardly diverging tension members leading from the bottom beam and merging into the outer ends of the compression members, vertical column guides joining the top and bottom beams at the junctures of the compression and tension members therewith, journal boxes at the ends of the tension and compression members where they merge, the compression members decreasing in width as they approach the journal boxes and having their side walls increasing in thickness toward points spaced above the inner sides of the journal boxes, continuing at the maximum thickness to points substantially above the centers of the journal boxes and decreasing toward the ends, the thickening of the side walls compensating for the loss in area due to the reduction in width, the lower edges of the compression members having inwardly extending flanges fading out at the points of beginning of the maximum thickness of the side walls.

18. In a truck side frame, top and bottom beam members, downwardly and outwardly diverging compression members extending from the ends of the top beam member, upwardly and outwardly diverging tension members of channel formation having their open sides up, said tension members having their bottom portions merging into the ends of the bottom beam at the neutral axis thereof, vertical column guides connecting the top and bottom beam members at the juncture of the compression and tension members therewith, said tension and compression members merging into each other at their outer ends, and journal boxes at the outer ends of the tension and compression members and located beneath the latter.

19. In a side frame, having top and bottom cords, the ends of said cords connected at journal boxes, spaced column guides defining a bolster opening, the tension cord providing a spring seat at the bottom of the opening and having a web at the neutral axis of the seat, the continuity of the web of the tension cord being interrupted within a downward projection of the bolster opening.

20. In a side frame, having top and bottom cords, joined at their ends to journal boxes, spaced column guides defining a bolster opening, the tension cord being horizontal at the bottom side

of this bolster opening and also forming there a spring seat, the web of the tension cord joining this spring seat substantially on its neutral axis.

21. In a side frame, top and bottom cords connected at their ends by journal boxes and spaced apart at their intermediate portions by spaced column guides defining a bolster opening and a bottom beam beneath the same, the web of the tension cord originating at the neutral axis of the bottom beam.

22. In a side frame, top and bottom beams, compression members continuing from the ends of the top beam, and tension members continuing from the ends of the bottom beam, the tension members being of channel shape in cross section and having their bottom webs originating at the neutral axis of the bottom beam.

23. In a side frame, top and bottom beams connected by column guides, compression members continuing from the ends of the top beam, and tension members continuing from the ends of the bottom beam, the tension members being of channel shape in cross section and having their bottom webs originating at substantially the neutral axis of the bottom beam, the tension members having their upper edges formed with inwardly directed flanges converging toward and merging into the top of the bottom beam at the juncture of the column guides therewith.

24. In a side frame, top and bottom beams connected by column guides, compression members continuing from the ends of the top beam, and tension members continuing from the ends of the bottom beam, the tension members being of channel shape in cross section and having their bottom webs originating at substantially the neutral axis of the bottom beam, the webs of the tension members being formed beneath the column guides with openings defining diverging flanges merging into the sides of the bottom beam.

25. In a side frame, top and bottom beams connected by column guides, compression members continuing from the ends of the top beam, and tension members continuing from the ends of the bottom beam, the tension members being of channel shape in cross section and having their bottom webs originating at substantially the neutral axis of the bottom beam, the webs of the tension members being formed beneath the column guides with openings defining diverging flanges merging into the sides of the bottom beam and fading out adjacent the center thereof.

26. In a side frame, top and bottom beams connected by column guides, compression members continuing from the ends of the top beam, and tension members continuing from the ends of the bottom beam, the tension members being of channel shape in cross section and having their bottom webs originating at substantially the neutral axis of the bottom beam, the webs of the tension members being formed beneath the column guides with openings defining diverging flanges merging into the sides of the bottom beam, and triangular webs located above said flanges and merging into the sides and top of the bottom beam.

27. In a side frame, top and bottom beams connected by column guides, compression members continuing from the ends of the top beam, and tension members continuing from the ends of the bottom beam, the tension members being of channel shape in cross section and having their bottom webs originating at substantially the neutral axis of the bottom beam, the sides of the

bottom beam being prolonged outwardly beyond the column guides and merging into the webs of the tension members.

of its bottom and having its inner faces formed with flanges extending from said transverse portion and fading out at the points of mergence of said prolongations into the tension members.

28. In a side frame, top and bottom beams 5 connected by column guides, compression members continuing from the ends of the top beam, and tension members continuing from the ends of the bottom beam, the tension members being of channel shape in cross section and having their 10 bottom webs originating at substantially the neutral axis of the bottom beam, the sides of the bottom beam being prolonged outwardly beyond the column guides and merging into the webs of the tension members, the bottom beam having 15 its lower edges provided at their inner faces with flanges diverging outwardly and fading out at the underside of the webs of the tension members.

31. In a side frame, top and bottom beams 5 connected by column guides, compression members continuing from the ends of the top beam, and tension members continuing from the ends of the bottom beam and converging toward the compression members, the tension members 10 having portions other than vertical originating at the neutral axis of the bottom beam.

32. In a side frame, top and bottom beams connected by column guides, compression members continuing from the ends of the top beam, 15 and tension members continuing from the ends of the bottom beam and inclining toward the compression members, said tension members having webs originating at the neutral axis of the bottom beam. 20

33. In a side frame, top and bottom beams connected by column guides, compression members continuing from the ends of the top beam, tension members continuing from the ends of 25 the bottom beam and inclining toward the compression members, said tension members having webs originating at the neutral axis of the bottom beam, and said bottom beam having its lower portion projecting outwardly beyond the points of origin of said webs and merging there- 30 into.

34. In a side frame, top and bottom beams connected by column guides, compression members continuing from the ends of the top beam, tension members continuing from the ends of the 35 bottom beam and inclining toward the compression members, said tension members having webs originating at the neutral axis of the bottom beam, and said bottom beam having its lower edge horizontal and projecting outwardly 40 beyond the column guides and merging into the tension members.

35. In a side frame, top and bottom beams connected by spaced column guides, compression members continuing from the ends of the top 45 beam, and tension members continuing from the ends of the bottom beam, said tension members having web portions originating at the neutral axis of the bottom beam beneath the column guides, the sides of the bottom beam projecting 50 laterally beyond the points of origin of said webs and merging into the tension members.

PERCY R. DRENNING.

29. In a side frame, top and bottom beams connected by column guides, compression members continuing from the ends of the top beam, 20 and tension members continuing from the ends of the bottom beam, the tension members being of channel shape in cross section and having their bottom webs originating at substantially the neutral 25 axis of the bottom beam, the sides of the bottom beam being prolonged outwardly beyond the column guides and merging into the webs of the tension members, the bottom beam having a transverse portion at its bottom and having its 30 lower edge formed with flanges extending from said transverse portion and fading out at the junctures of said prolongations with the undersides of the tension members.

30. In a truck side frame, top and bottom 35 beams, compression members continuing from the ends of the top beam and tension members extending from the ends of the bottom beam, said tension members being channel shaped in cross section and originating at substantially the neutral 40 axis of the bottom beam, the bottom webs of the tension members being formed with openings beneath the column guides defining flanges merging into the sides of the bottom beam adjacent the center thereof, the upper edges of the tension 45 members being formed with inwardly directed flanges merging into the top of the bottom beam at the juncture of the column guides therewith, triangular webs above said first named flanges merging into the sides and top of the bottom 50 beam, the bottom beam being prolonged outwardly beyond the column guides and merging into the tension members, the bottom beam further having a transverse portion at the center