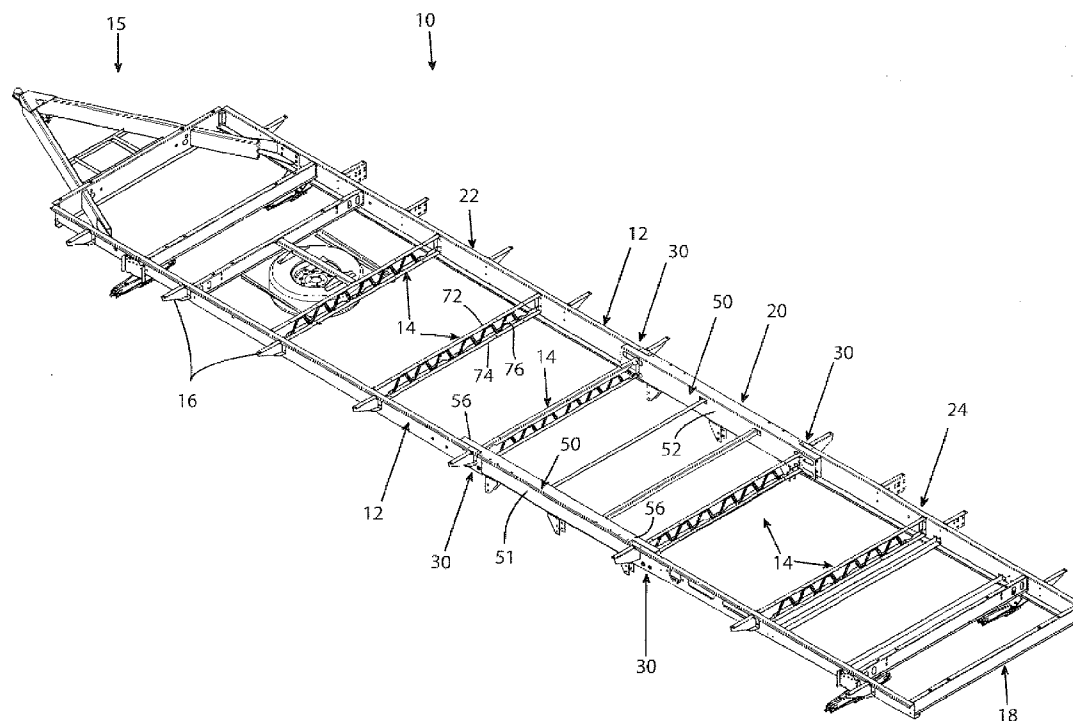




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(19) **United States**(12) **Patent Application Publication**
Garceau(10) **Pub. No.: US 2013/0257029 A1**(43) **Pub. Date: Oct. 3, 2013**(54) **TRAILER FRAME**(71) Applicant: **Norco Industries, Inc.**, Compton, CA
(US)(72) Inventor: **Bernard F. Garceau**, Vandalia, MI (US)(21) Appl. No.: **13/906,856**(22) Filed: **May 31, 2013****Related U.S. Application Data**(62) Division of application No. 13/294,685, filed on Nov.
11, 2011, now Pat. No. 8,491,010.**Publication Classification**(51) **Int. Cl.**
B62D 63/06 (2006.01)(52) **U.S. Cl.**CPC **B62D 63/06** (2013.01)USPC **280/789**(57) **ABSTRACT**

A trailer frame including an axle section having two spaced longitudinal frame members connected by at least one cross member, the longitudinal frame members each having a first end and a second end; a rear section attachable to the axle section; and a dimple assembly joining the axle section to the rear section, the dimple assembly including a dimple pattern formed on each frame member of the axle assembly, the dimple pattern on the axle assembly defining a first dimple axis, and a dimple pattern formed on one end of the rear section and nestable within the dimple pattern formed on the axle section, the dimple pattern on the rear section defining a second dimple axis offset relative to the first dimple axis to create a camber between the axle section and the rear section when the first dimple is nested within the second dimple pattern.



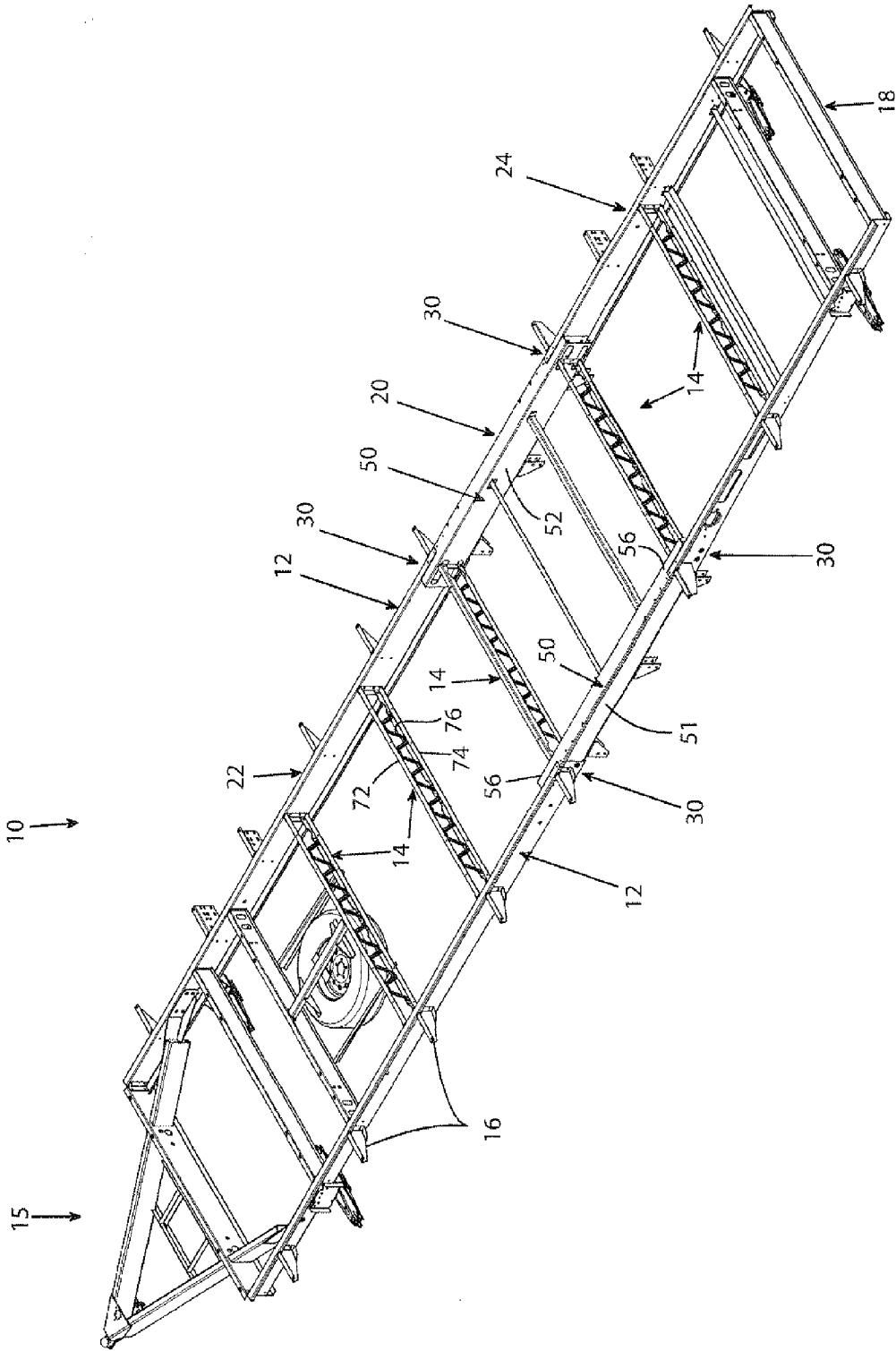


FIG.1

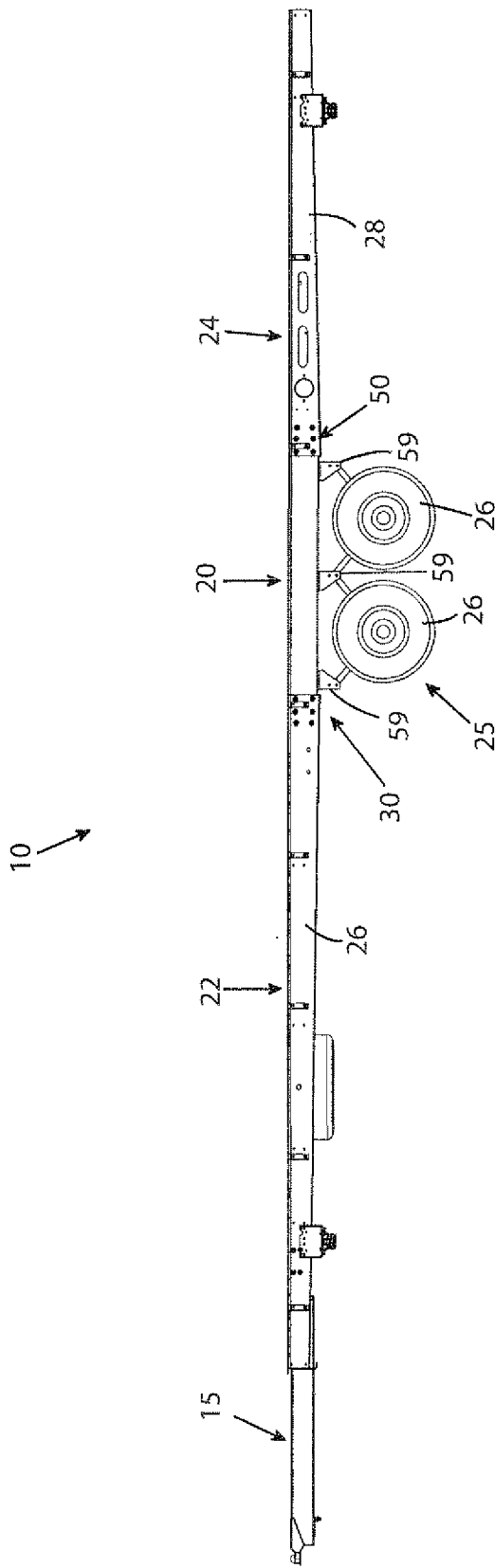
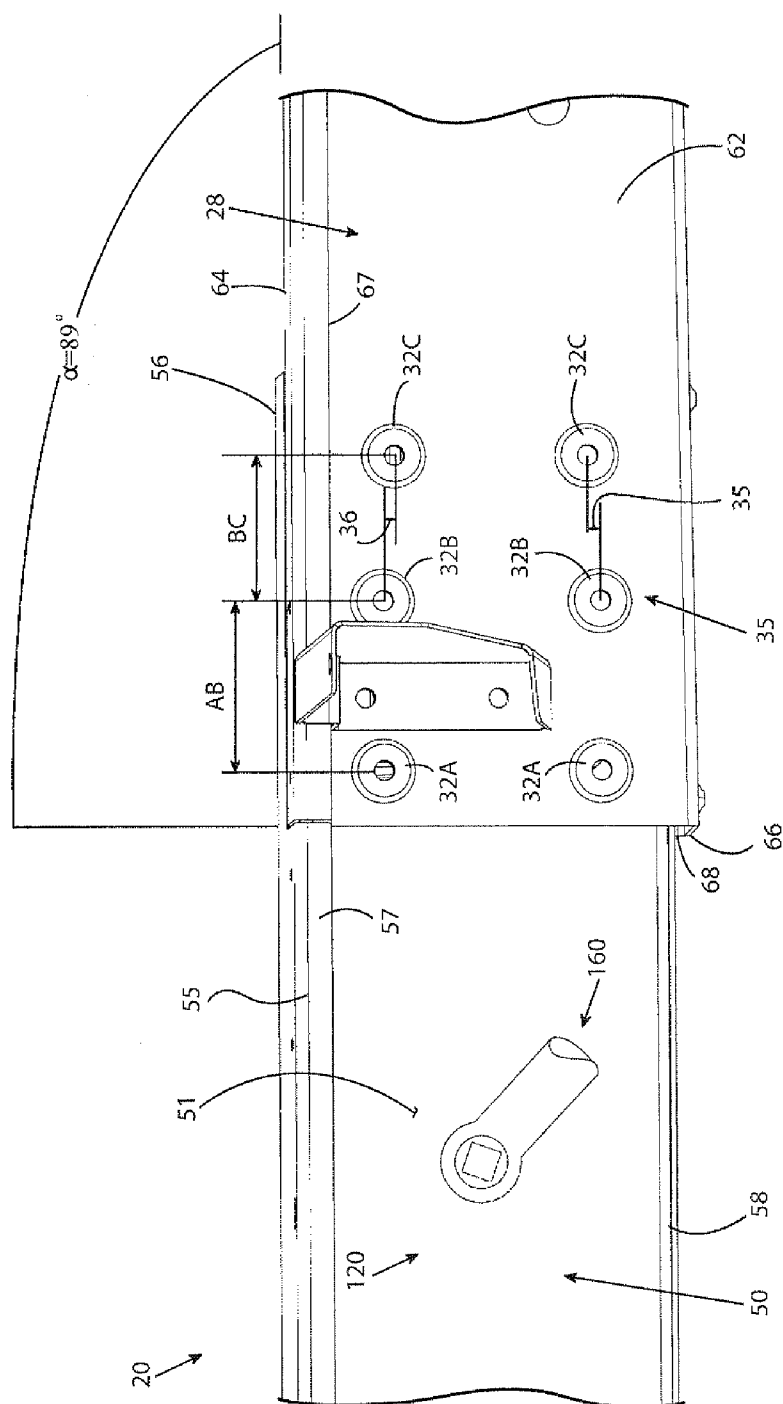


FIG. 2

3
G
F

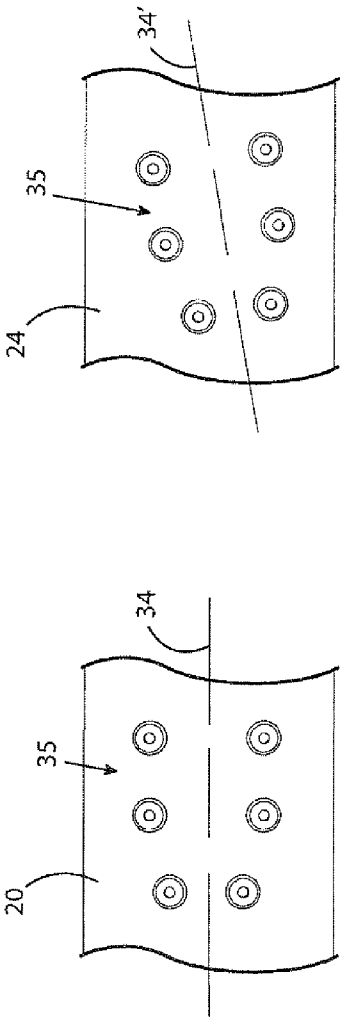


FIG. 3A

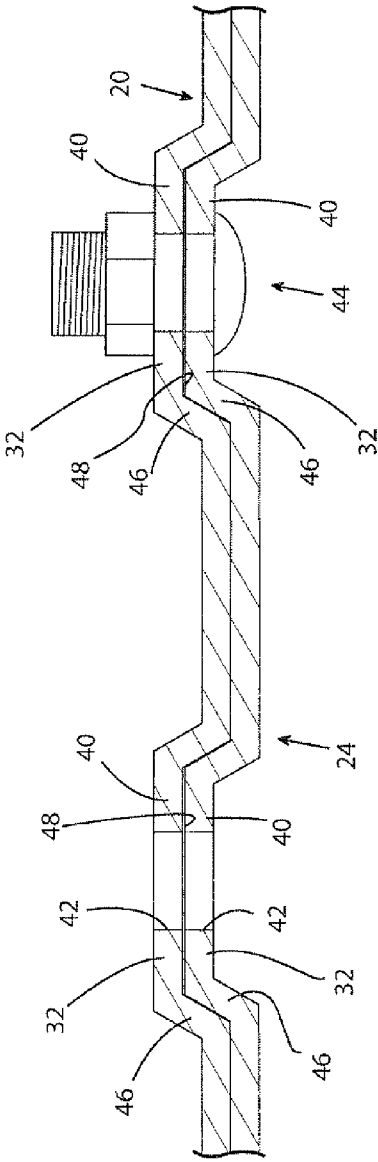


FIG. 4

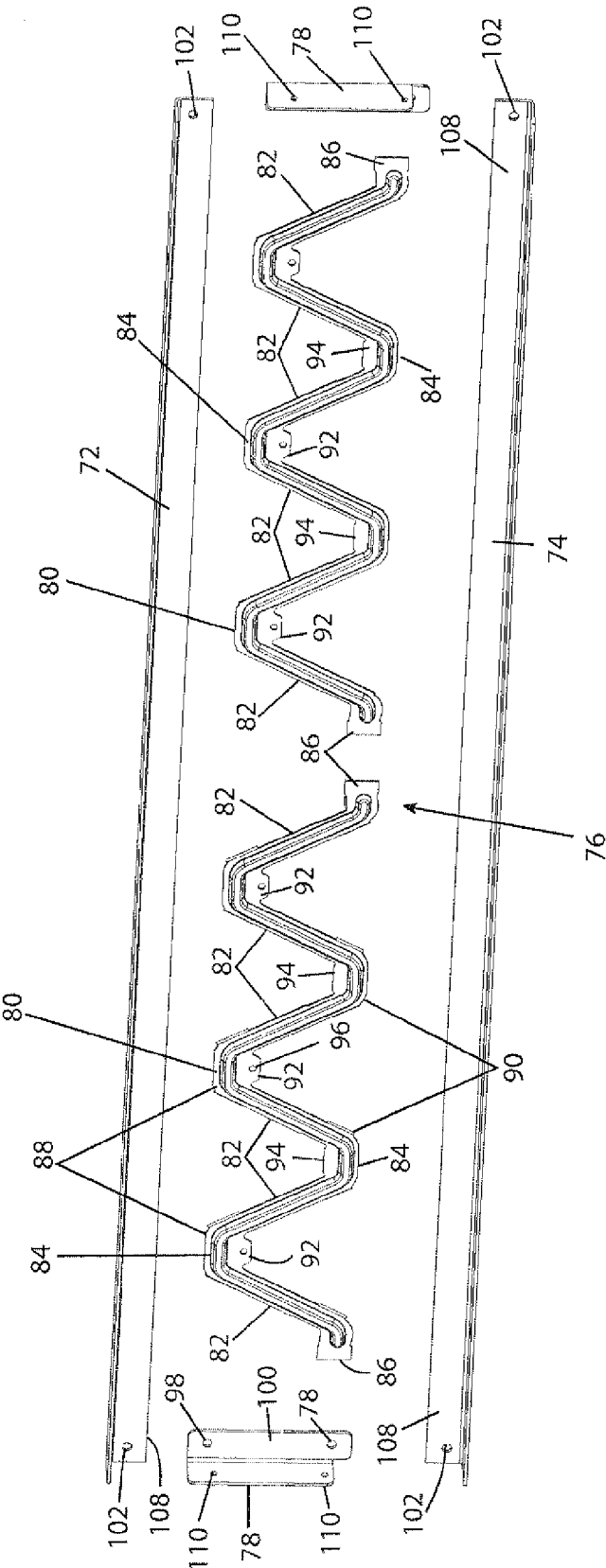


FIG. 5

FIG. 8

TRAILER FRAME

TECHNICAL FIELD

[0001] This application is a divisional of co-pending U.S. application Ser. No. 13/294,685 filed Nov. 11, 2011 which is hereby incorporated by reference.

[0002] The present invention generally relates to trailer frames, and more particularly to bolt-together trailer frames. More particularly, the present invention relates to a trailer frame having an enhanced axle section. Most particularly, the present invention relates to a trailer frame where the camber between an axle section and an adjacent section is set by a dimple pattern.

BACKGROUND OF THE INVENTION

[0003] Typically trailer frames are manufactured by welding frame members together. Typical frame members include I-beam, flat, L-shape, U-shape or tubular rail sections. The frames generally have a ladder construction with axle units connected to the side frame members of the ladder near the center or rearward portion of the frame. These trailer frames are used for boat trailers, car trailers, recreational vehicles, horse trailers, utility trailers, and the like.

[0004] Since the entire frame, including the axle is pre-assembled, shipping may be difficult with only a few assembled frames being shipped at any time. In most cases, frames are built on a made to order basis to avoid maintaining pre-assembled frames in inventory.

[0005] It is desirable to have camber within the frame typically at the rearward end of the frame to accommodate loads placed on the frame. When loaded, the frame will deform. To level the load on the frame, existing manufacturers heat the frame to cause it to deform and create camber. Existing frames are ladder frames having a pair of I-beams that extend the length of the frame. To create positive camber at the rear of such a frame, for example, a weld is placed along the top side of the frame members between the axles and the rear end of the frame to draw the rear end up. Once positive camber is created, water is thrown onto the weld to rapidly cool it and lock the camber in place. Since relying on the heat of the weld to create camber is imprecise, additional welding may be used to adjust the camber to a suitable amount. This method of creating camber alters the material properties of the metal at the weld and may make the frame more susceptible to failure. Alternatively, the frame members may be pounded or otherwise mechanically deformed to achieve the desired camber. It will be appreciated that the variables involved in either method prevent any consistency in the amount of camber achieved for each trailer frame.

SUMMARY OF THE INVENTION

[0006] The present invention generally provides trailer frame including an axle section having two spaced longitudinal frame members connected by at least one cross member, the longitudinal frame members each having a first end and a second end; a rear section attachable to the axle section; and a dimple assembly joining the axle section to the rear section, the dimple assembly including a dimple pattern formed on each frame member of the axle assembly, the dimple pattern on the axle assembly defining a first dimple axis, and a dimple pattern formed on one end of the rear section and nestable within the dimple pattern formed on the axle section, the dimple pattern on the rear section defining a second dimple

axis offset relative to the first dimple axis to create a camber between the axle section and the rear section when the first dimple is nested within the second dimple pattern.

[0007] The present invention further provides a trailer frame having an enhanced axle section is provided. The axle section has a pair of boxed frame rails. Each frame rail includes a first frame half and a second frame half that are joined together to define a central cavity. At least one cross member extends between the pair of boxed frame rails to join them together.

[0008] The present invention further provides a trailer frame including an axle section having two longitudinal frame members on each side of the axle section that are connected by at least one cross member, the two longitudinal frame members each include a first end and a second end that each have a plurality of axle dimples, and the axle section having a means for securing at least one axle; a front section having a front cross member and two longitudinal frame members on each side of the front section, the two longitudinal frame members each include a first end fixedly secured to the front cross member and a second end having a plurality of front dimples in nested engagement with the plurality of axle dimples on the first end of the axle section; and a rear section having a rear cross member and two longitudinal frame members on each side of the rear section, the two longitudinal frame members each include a first end fixedly secured to the rear cross member and a second end having a plurality of rear dimples in nested engagement with the plurality of axle dimples on the second end of the axle section, wherein camber of the trailer frame is preset in at least one of the following: the plurality of dimples on the rear section and the plurality of dimples on the front section.

[0009] The present invention still further provides a torsion suspension assembly for a trailer frame including an elastomeric element, the elastomeric element defining a central bore and plural pin receiving bores located on a circle spaced radially outward from the central bore, a cylindrical journal received in the central bore in the elastomeric element, an outer end cap and an inner end cap, wherein the outer and inner end caps are adapted to enclose at least a portion of the elastomeric element, each end cap having at least one pin extending inward therefrom, wherein the pins from the outer and inner end caps are received in respective pin receiving bores, each pin extending an extent such that a portion of the pin on the outer end cap overlaps a portion of the pin on the inner end cap within the elastomeric element, each end cap defining an axle mount bore having a non-circular shape, and an axle mount having a non-circular cross section insertable through the axle mount bores in the end caps and rotatably received in the cylindrical journal.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a top perspective view of a trailer according to the invention.

[0011] FIG. 2 is a side elevational view of a trailer according to the invention.

[0012] FIG. 3 is an enlarged side elevational view showing details of a joint in a trailer according to the invention.

[0013] FIG. 3A is a schematic view showing an axle section having a dimple pattern defining a dimple axis and a rearward section having a dimple pattern offset relative to the dimple pattern on the axle section to define an offset dimple axis, where the offset has been exaggerated for purposes of illustration.

[0014] FIG. 4 is a sectioned top plan view showing further details of a joint in a trailer according to the invention.

[0015] FIG. 5 is an exploded view showing details of a cross member in a trailer according to the invention.

[0016] FIG. 6 is a partially sectioned view of an axle section of a trailer frame having a torsion disk suspension assembly mounted thereon.

[0017] FIG. 7 is an exploded view of a torsion disk suspension assembly according to the invention.

[0018] FIG. 8 is a sectioned view of the torsion disk suspension assembly.

DETAILED DESCRIPTION OF THE INVENTION

[0019] A trailer frame 10 according to the invention is depicted in the accompanying drawings. Trailer frame 10 is divided into plural sections. The sections are connected by a dimple assembly 30. The dimple assembly 30 may be used to set the camber between sections as described more completely below.

[0020] Trailer frame 10 may be assembled from plural rails or side frame members 12 and one or more cross members 14. A tongue assembly 15 may be attached to facilitate coupling of trailer frame 10 to a vehicle. The configuration of tongue assembly 15 may vary depending on the vehicle to which tongue assembly 15 is attached or the application for trailer frame 10. Likewise, floor supports or outriggers 16 may be attached to side frame members 12 as needed for a particular application. Trailer frame 10 may include a bumper assembly 18.

[0021] Trailer frame 10 includes multiple sections that are joined together. For example, trailer frame 10 may include an axle section 20, a forward section 22 and a rearward section 24. It will be appreciated that frame 10 may include fewer or more sections. In the example shown, axle section 20 is located between forward section 22 and rearward section 24. As shown in FIG. 2, axle section 20 includes an axle assembly 25, which may be a sprung unit or a torsion unit, having one or more axles with wheels 26 operatively supported thereon.

[0022] Two sections are attached to each other by a dimple assembly 30. As best shown in FIGS. 3 and 4, dimple assembly 30 may include one or more dimples 32 formed on each frame member that nest within each other to connect frame members from each section. Dimples 32 may have any shape including, geometric shapes, oblong, or irregular shapes. The circular shape shown is just one example. One or more dimples may be used to define a dimple pattern, generally indicated at 35. The dimple pattern 35 defines a dimple axis 34 which generally represents a major direction of dimple pattern 35. Dimple pattern 35 may, thus, be used to control the orientation of sections relative to each other. For example, dimple pattern 35 on one frame member may be offset relative to the dimple pattern 35 on another frame member, such that when the frame members are joined by nesting one dimple pattern in the other, the frame members of respective sections are placed in a desired orientation. For example, dimple pattern 35 on one frame member may have a dimple axis arranged at an angle relative to a dimple pattern 35 on another frame member to create positive/negative camber between adjacent sections. According to another aspect of the invention, the spacing between dimples 32 may be varied in the vertical and horizontal directions to optimize the loading of dimples 32 as well.

[0023] Any number of dimples 32 may be used and in any configuration. The examples provided are, therefore, not lim-

iting. Increasing the size or number of dimples increases the surface over which the load is spread, and therefore, larger or greater numbers of dimples 32 may be used to handle greater loads. Smaller or fewer dimples may be used for smaller loads. In the example shown, dimple pattern 35 includes three columns (A,B,C) of dimples 32. Columns A,B,C may include more than one row of dimples 32. For example, as shown, two rows of dimples 32 may be used. The dimples 32A, 32B in first and second rows are arranged parallel to each other. The third column C of dimples 32 may be offset relative to columns A,B. For example, dimples 32C in third column C may be located closer to the center of a side frame member at 36. Also, the spacing (BC) between dimples in columns B and C may be reduced in comparison to the spacing (AB) between columns A and B, as shown. In the example shown, the centers of the dimples in column C are located 0.25 inch inward relative to corresponding dimples 32 in column B. Also, the centers of dimples 32 in column C are spaced 0.5 inches closer to the centers of dimples 32 in column B when compared to the spacing between columns A and B. An exemplary spacing may be 3.5 inches between columns A and B and 3.0 inches between columns B and C. The rows of dimples 32 in columns A and B may be vertically spaced 2.5 inches on center, while the dimples 32 in column C are vertically spaced 2.0 inches on center. It will be appreciated that the spacing between individual dimples 32 in column C do not need to be uniform with each dimple 32 having a different offset depending on the application or desired loading to be achieved. In the depicted example, finite element analysis shows that placing the dimples in third column C closer to the center and nearer to the dimples 32B drives the load toward the top and bottom flanges minimizing deflection of the side wall of the frame members.

[0024] With reference to FIG. 4, dimples 32 may have an outwardly opening frusto-conical section. Dimple 32 may be stamped into the section such that a base 40 is located inward of the outer wall of the frame member. As shown, base 40 may be circular and define a central opening 42 that receives a fastener 44, such as a Huck® bolt or the like. A dimple wall 46 extends axially and radially outward from base 42. When assembled, the load transfer between dimples 32 occurs at walls 46 of each respective dimple 32. As best seen in FIG. 4, which shows two frame members fastened together at dimples 32, with the fastener 44 removed on the left to show greater detail of the dimples 32, a small gap 48 may lie between each base 42 of dimples 32.

[0025] As shown in FIGS. 1 and 2, dimples 32 may be formed on any surface to join frame members together. For example, a planar surface such as the upstanding sidewall of a frame member may be used. Dimple size may vary depending on the surface to which the dimple 32 is applied, the number of dimples used, and the amount of loading on the dimple 32. In the example shown, dimples 32 are located on an upstanding side wall of the axle section 20 and an adjacent forward section 22 and rearward section 24. Axle section 20 has dimple patterns 35 at each end that mate with dimples 32 on the forward and rear sections 22, 24. It will be appreciated that each section 20, 22, 24 of trailer frame 10 may have various lengths and cross-sections.

[0026] In the example shown, axle section 20 includes axle rails 50 on either side connected by one or more cross members. Axle section may be constructed in any known manner. According to another aspect of the invention, an enhanced axle section 20 is provided. Enhanced axle section 20 has axle

rails 50 having a box-like cross section. This cross-section may be formed in a number of manners including by welding an inner sidewall to a c-shaped channel. Alternatively, as best seen in FIG. 6, each axle frame member 50 may be formed from a pair of frame halves 50A, 50B. First frame half 50A may have a c-shaped section with top and bottom walls 53, 54 extending inward from an outer sidewall 51. Outer sidewall 51 and top and bottom walls 53, 54 may be formed as a single unit, for example by stamping, or constructed by joining individual components together. The second frame half 50B is also c-shaped having an outer side wall 52 with an upper lip 55 that fits over top wall 53 and extends beyond inner side wall 51 to match the width of the front and rear section frame members that attach to axle section 20. A downward extending tab 57 may be formed on the end of lip 55 to form a channel like section and add strength to lip 55. Second frame half 50B also includes a lower lip 58 that extends outward to overlie bottom wall 54. The first and second halves 50A, 50B may be joined by welds at the seams between top wall 53 and lip 55 and bottom wall 54 and lower lip 58. Each frame member 50 defines a cavity that is open at either end. As discussed below, the cavity 170 may be used to house suspension components. A suspension opening 171 may be provided in one or more of side walls 51, 52 to facilitate mounting of suspension components.

[0027] The box-like construction of axle rail 50 makes it resistant to torsional forces and less prone to racking when compared to existing I-beam frames. In addition, the box-like construction may be used to house and incorporate suspension components. For example, a torsion disk suspension may be inserted at either end of the axle section 20. Alternatively, suitable suspension mounts 59 (FIG. 2) may be provided for traditionally sprung axles.

[0028] As discussed, a dimple assembly 30 may be used to join one or more frame sections to axle section 20. In the axle section 20 shown, dimples 32 forming dimple patterns 35 at one or more ends of axle section 20 are stamped into outer sidewall 51 of first frame half 50A before attaching second frame half 50B. The dimple assembly 30 is mated to corresponding dimples 32 on forward and rearward sections 22, 24. While attachment of these sections is shown on outer sidewall 51, it will be appreciated that attachment may occur at the interior side 52 as an alternative.

[0029] Forward section 22 and rearward section 24 may include rails 26, 28 that have any cross-section, and may have cross-sections that are different from each other depending on the application. In the example shown, the cross-section of the rails 26, 28 of the forward and rearward sections 22, 24 are the same. Rails 26, 28 include an upstanding side wall 62 having a top wall 64 extending laterally outward and a bottom wall 66 extending laterally inward from the upper and lower extremities of sidewall 62. This cross-section may be referred to as a Z-shaped section. A first flange 67 may extend downward from an outer extremity of top wall 64 and a second flange 68 may extend upward from an inner extremity of bottom wall 66. Flanges 67, 68 form channel like sections at respective upper and lower extremities of rails 26, 28 improving the strength and torsional rigidity of the forward and rearward sections 22, 24.

[0030] As in the axle section 20, dimples 32 may be formed on the side wall 62 of forward and rearward sections 22, 24. To set the camber between adjacent sections, the dimple pattern on each section may be offset relative to the dimple pattern 35 on axle section 20. In the example shown, the

dimple pattern 35 on the axle section 20 is fixed and the orientation of the dimple pattern 35 on forward and rearward sections 22, 24 is varied to create camber. It will be appreciated that the dimple pattern 35 on axle section 20 may be varied as well. The dimples 32 may be formed in any known manner including stamping.

[0031] As discussed above, for some applications, it is desirable to create camber between adjacent sections. Positive or negative camber in this context is a deviation from horizontal or zero camber. When a load is placed on a trailer frame, the frame deflects under the load. To maintain the load in a level configuration, it may be necessary to impart camber to the front or rear section.

[0032] The present invention overcomes the failings in the art by pre-setting the camber between adjacent sections through the dimples 32. A desired camber angle α in many applications has an absolute value of 0 to about 2 degrees, or in other words between about -2 degrees and about +2 degrees of camber. This range is not limiting, however, as greater amounts of camber may be set using a dimple pattern 35 according to the invention.

[0033] In the example shown, positive camber is created at the rearward section 24 relative to axle section 20 by shifting the dimples 32 on rearward section 24 downward relative to the position of the dimples 32 on axle section 20. As shown in FIG. 3A, the dimple pattern 35 on rearward section 24 defines a dimple axis 34' having a downward angle such that when the dimples 32 of rearward section 24 are aligned with dimples 32 on axle section 20, the rearward section 24 is angled upward relative to axle section 20 (FIG. 3). In the example shown, the dimple pattern 35 on axle section 20 is fixed or constant and the dimple pattern 35 on the forward or rearward sections 22, 24 is offset to create the desired camber. In this way a single axle section 20 may be mass produced and camber specifications met by stamping the dimple pattern into the forward or rearward sections 22, 24. It will be appreciated, however, that camber may be created by offsetting the dimple pattern 35 on axle section relative to one or both of the forward and rearward sections 22, 24 or by applying an offset to dimple patterns 35 on both the axle section 20 and forward or rearward sections 22, 24. Any angle may be achieved in this manner.

[0034] The camber angle over the length of the section causes the end of the section to be at a different height than the adjacent section. Often, customers will specify a desired change in height rather than a specific camber angle. The specified change in height may be used to calculate the camber needed at the dimples 32. In the example shown, a camber of about 1 degree may be used to achieve a one inch increase in the height of the rearward section 24 at its outer end.

[0035] According to another aspect of the invention, trailer frame 10 includes cross frame members 14 that have a truss-like form. In particular, cross frame member 14 includes a top cross member 72 a bottom cross member 74 and a web section 76. Cross member 14 may further include end members 78 that extend between the top and bottom cross members 72, 74 at their outer extremities. As best shown in FIG. 5, top and bottom cross members 72, 74 may be formed from angle iron. Angle iron may be extruded or otherwise formed to any length needed for a given trailer application. The web section 76 may be constructed of individual members that connect the top cross member 72 and bottom cross member 74, or, as shown, be constructed from one or more, pre-formed patterned members 80. Using plural patterned members 80

allows any length cross member 72 to be created without the need for a large die to create the web 76 and with less labor than assembling a web with individual trusses.

[0036] In the depicted example, each patterned members 80 include plural trusses 82 that extend at an angle relative to cross members 72, 74. Trusses 82 may be joined at the upper and lower extremities by a land 84 to form a wave-form shaped patterned member 80. To facilitate connection of patterned members 80 to each other and to ends 78, tabs 86 may be provided at the lateral extremities of patterned members 80. Top tabs 88 may be provided at the upper extremity of the patterned member to facilitate attachment of web section to top cross member(s) 72. Bottom tabs 90 may be provided to facilitate attachment of web section 76 to bottom cross member 74. Upper and lower peak tabs 92, 94 may be provided to span the interior portion where trusses 82 come together. As shown, one or more of tabs 92 may be provided with openings 96 for fasteners. As shown, the patterned member 80 may be formed as a single unit, as by stamping or in a mold. To accommodate different lengths, multiple patterned members 80 may be used within a given cross frame member 14. As shown, a pair of patterned members 80 may be joined to each other to form a web 76.

[0037] Attachment of the web 76 to top cross member 72 and bottom cross member 74 may be accomplished in any known manner including fasteners or welds. In the example shown, welds are applied at each land 84 to join top cross member 72, bottom cross member 74, and web 76. Ends 78 may, likewise, be attached in any known manner. In the example shown, fasteners (not shown) extend through openings 98 formed on an inward extending tab portion 100 of end 78, and corresponding end openings 102 formed on a downward extending leg 104 of top cross member 72 and an upward extending leg 108 of bottom cross member 74. Side openings 110 may be provided on ends 78 to attach cross frame member 14 to side frame members in trailer frame 10 with fasteners.

[0038] In accordance with another aspect of the invention, trailer frame 10 may include a torsion disk suspension 120. Torsion disk suspension 120 generally includes a suspension cartridge 121 that is inserted within the cavity 170 defined by a longitudinal frame member 50 in axle section 20. During assembly, the suspension cartridge 121 is inserted at either end of frame member 50 and aligned with a suspension receiver 58. A suspension mount may pass through receiver 58 and through suspension cartridge 121 to support it within frame member 50.

[0039] According to one embodiment, suspension cartridge 121 includes an elastomeric element 122 with plural pin receiving bores 124 arranged around a central axle bore 126. It will be appreciated that elastomeric element 122 does not need to have a circular disk shape and therefore reference to a disk suspension should not be limiting terms of the shape of the elastomeric element, which may have any shape capable of providing elastomeric material surrounding plural pin receiving bores.

[0040] Suspension 120 may further include an outer cap 130 and an inner cap 132, which may be received in respective openings defined in the outer sidewall 51 and inner sidewall 52 of axle rail 50. The caps 130, 132 enclose elastomeric element 122. Outer cap 130 has one or more outer pins 136 extending inward therefrom, and inner cap 132 has inner pins 138 extending inward therefrom. Pins 136, 138 are received in respective pin receiving bores 124. As best shown in FIG.

6, pins 136, 138 extend inwardly an extent sufficient to overlap one another. In the example shown each cap 130, 132 is provided with three pins 136, 138. The pins 136 and 138 are spaced about a pin circle to form an alternating arrangement of outer pins 136 and inner pins 138 about the elastomeric element 122.

[0041] An axle mounting assembly 140 may be received in axle bore 126 and includes a journal 142 having a cylindrical outer surface 144 and a square bore 146. Outer end cap 130 and inner end cap 132 have corresponding square bores through which a square sectioned axle mount 150 is received. A portion of axle mount 150 extends outwardly from outer sidewall 51 and may be secured by a castle nut 152. An axle assembly 160 is supported on axle mount 150. Axle assembly may include an axle arm 162 that has a corresponding axle mount receiver 163 that conforms to axle mount such that torque created at axle 165 is transmitted to the elastomeric element through axle mount 150. Axle arm 162 extends downward and rearward from torsion suspension 120 such that any vertical movement of the axle 165 creates a torsional moment at the suspension 120. In particular, vertical movement of axle 165 causes outer end cap 130 to rotate, which in turn causes outer pins 136 to rotate within elastomeric element 122. Compression of the elastomeric element between pins 136 and 138 absorbs shock and creates a return moment that urges the axle 165 toward the road surface.

[0042] The foregoing written description uses examples to disclose the invention, including the best mode, and also to enable one of ordinary skill in the art to practice the invention, including making and using many devices or systems and performing any incorporated methods. The patentable scope of the invention is, however, defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims provided that the structural elements are within the literal language of the claims or include equivalent structural elements that are insubstantially different from the literal language of the claims.

What is claimed is:

1. A trailer frame comprising:

- a axle section having two longitudinal frame members on each side of the axle section that are connected by at least one cross member, the two longitudinal frame members each include a first end and a second end that each have a plurality of axle dimples, and the axle section having a means for securing at least one axle;
- a front section having a front cross member and two longitudinal frame members on each side of the front section, the two longitudinal frame members each include a first end fixedly secured to the front cross member and a second end having a plurality of front dimples in nested engagement with the plurality of axle dimples on the first end of the axle section; and
- a rear section having a rear cross member and two longitudinal frame members on each side of the rear section, the two longitudinal frame members each include a first end fixedly secured to the rear cross member and a second end having a plurality of rear dimples in nested engagement with the plurality of axle dimples on the second end of the axle section,

wherein a camber of the trailer frame is preset in at least one of the rear section and the front section by offsetting at least one of the axle dimples, front dimples, and rear dimples.

2. The trailer frame of claim 1, wherein the rear dimples are offset relative to the axle dimples.

3. The trailer frame of claim 1, wherein the front dimples are offset relative to the axle dimples.

4. The trailer frame of claim 1, wherein the two longitudinal frame members on each side of the rear section and the two longitudinal frame members on each side of the front section include rails having a z-shaped cross section.

5. The trailer frame of claim 1, wherein the means for securing at least one axle includes at least one torsion suspension assembly supported on outer and inner frame members on each side of the axle section.

6. The trailer frame of claim 5, wherein the torsion suspension assembly includes

an elastomeric element housed between the longitudinal frame member, the elastomeric element defining a central bore and plural pin receiving bores located on a circle spaced radially outward from the central bore, a cylindrical journal received in the central bore in the elastomeric element,

an outer end cap supported on an outer frame member and an inner end cap supported on an inner frame member, wherein the outer and inner end caps are insertable through the outer and inner frame members enclose at least a portion of the elastomeric element, each end cap having at least one pin extending inward therefrom, wherein the pins from the end caps are received in respective pin receiving bores, each pin extending an extent such that a portion of the pin on the outer end cap overlaps a portion of the pin on the inner end cap within the elastomeric element, each end cap defining an axle mount bore having a non-circular shape, and an axle mount having a non-circular cross section insertable through the axle mount bores in the end caps and rotatably received in the cylindrical journal.

7. A torsion suspension assembly for a trailer frame comprising:

an elastomeric element, the elastomeric element defining a central bore and plural pin receiving bores located on a circle spaced radially outward from the central bore, a cylindrical journal received in the central bore in the elastomeric element,

an outer end cap and an inner end cap, wherein the outer and inner end caps are adapted to enclose at least a portion of the elastomeric element, each end cap having

at least one pin extending inward therefrom, wherein the pins from the outer and inner end caps are received in respective pin receiving bores, each pin extending an extent such that a portion of the pin on the outer end cap overlaps a portion of the pin on the inner end cap within the elastomeric element, each end cap defining an axle mount bore having a non-circular shape, and

an axle mount having a non-circular cross section insertable through the axle mount bores in the end caps and rotatably received in the cylindrical journal.

8. An enhanced axle section in a trailer frame, the axle section comprising: a pair of frame rails, each frame rail including a first frame half and a second frame half that are joined together to define a central cavity; and at least one cross member extending between the pair of frame rails to join them together.

9. The enhanced axle section of claim 8, wherein the cross member includes a top rail and a bottom rail and a web section between the top and bottom rail, wherein the web section includes plural patterned members.

10. The enhanced axle section of claim 9, wherein each frame rail defines a suspension opening; the axle section further comprising a suspension cartridge insertable within the cavity and alignable with the suspension opening.

11. The enhanced axle section of claim 10, wherein the suspension cartridge includes a torsion disk suspension.

12. A trailer frame comprising: a first frame member and a second frame member, wherein the first frame member and the second frame member each have a dimple pattern comprising at least one dimple formed thereon, and wherein said dimple pattern on the first frame member defines a first dimple axis and the dimple pattern on the second frame member defines a second dimple axis offset relative to the first dimple axis to create a camber between the first frame member and the second frame member when the first dimple pattern is nested within the second dimple pattern.

13. The trailer frame of claim 12 further comprising a fastener attaching the dimple pattern on the first frame member to the dimple pattern on the second frame member.

14. The trailer frame of claim 13, wherein the fastener is a Huck® fastener.

15. The trailer frame of claim 12, wherein each dimple pattern includes plural dimples

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