June 24, 1930. W. E. VAN DORN 1,766,857

METAL CAR END

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Fig. 4.

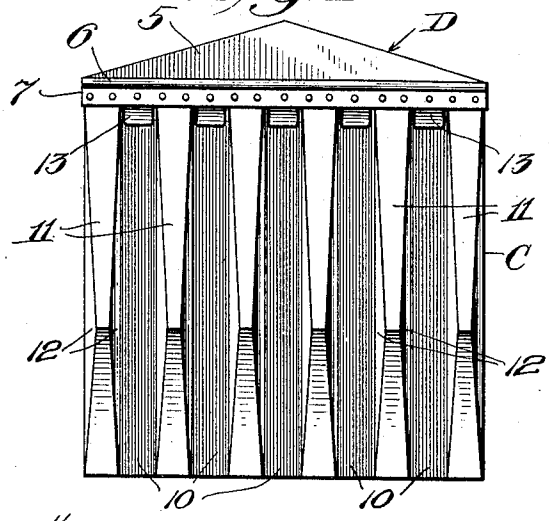


Fig. 6.

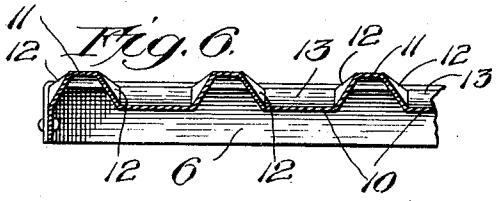


Fig. 1.

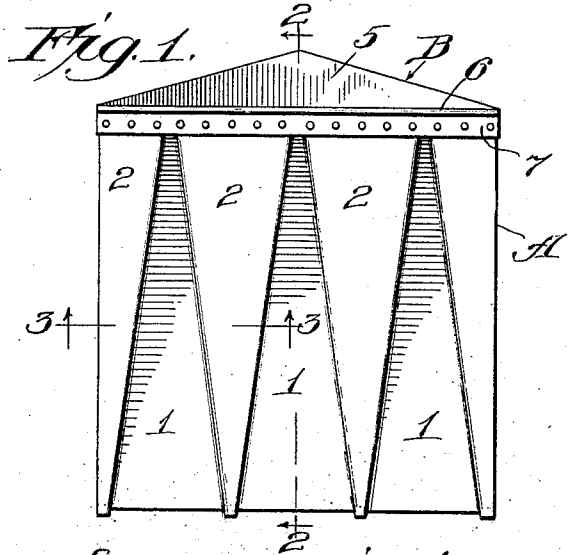


Fig. 3.

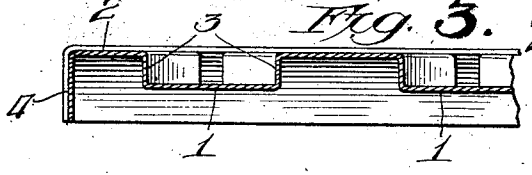


Fig. 5.

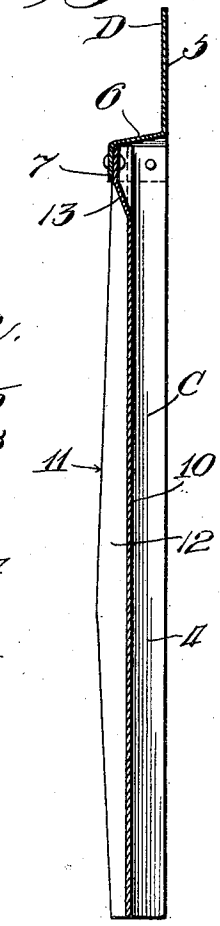
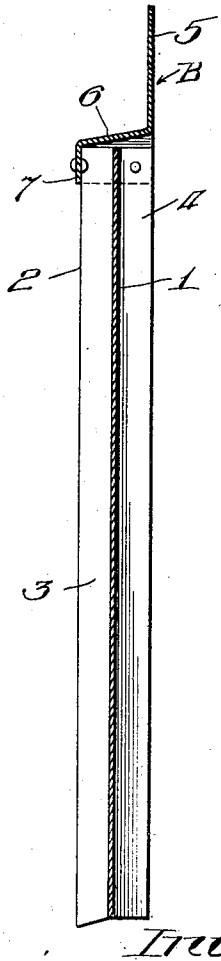


Fig. 2.



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METAL CAR END

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Fig. 7.

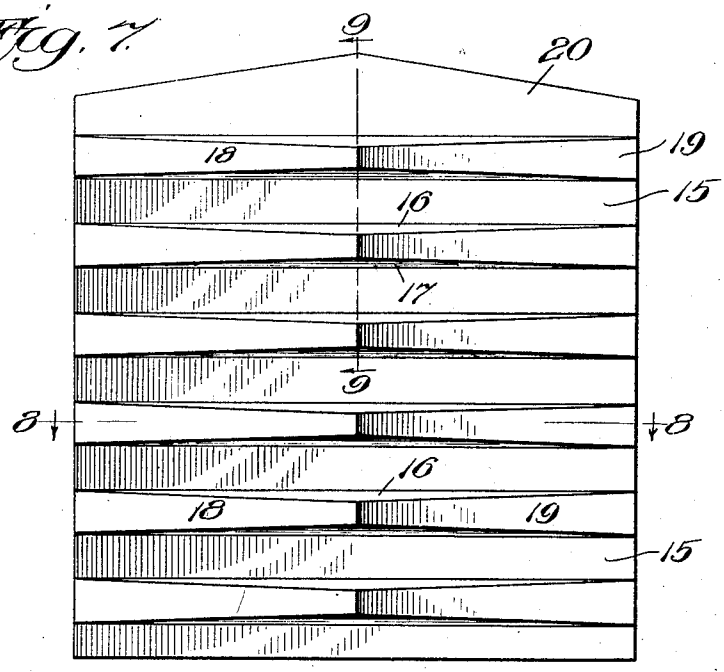


Fig. 9.

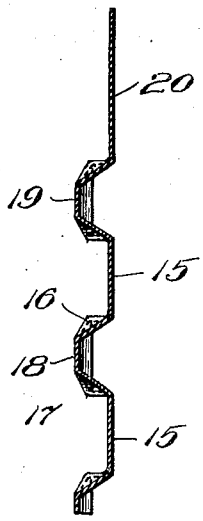


Fig. 8.

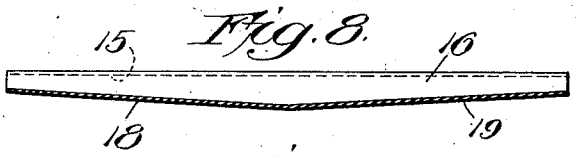


Fig. 10.

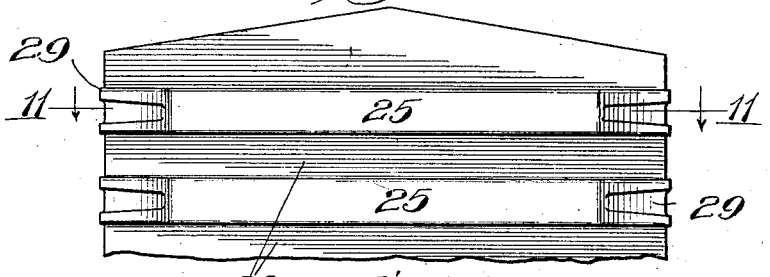


Fig. 11.

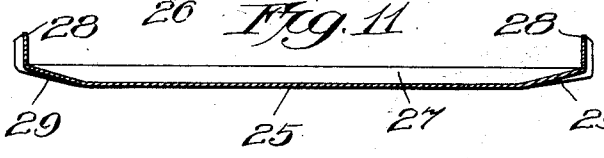
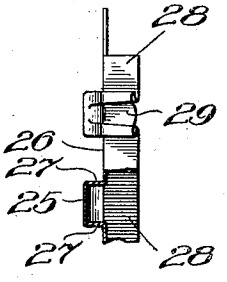


Fig. 12.



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Patented June 24, 1930 1,766,857

UNITED STATES PATENT OFFICE

WILLIAM E. VAN DORN, OF PASADENA, CALIFORNIA

METAL CAR END

Application filed November 12, 1928. Serial No. 318,850.

The present invention has for its object to produce a steel end for a freight car which shall possess a maximum strength for a given weight of material, and the process of manufacture of which is so simple that the end may be made at a lower cost than ordinary steel ends.

So far as I am aware steel ends for freight cars, whether intended to be assembled in all steel structures or to form the ends of wooden cars, have either been in the form of flat sheets or of sheets pressed to produce stiffening ribs. Where there are to be several ribs in the same sheet, the pressing must in commercial practice be done while the sheets are hot and even then the depth to which the ribs may be pressed and their number is limited by the amount of draw that the sheet or plate will stand. Furthermore, ribs with sharp corners and flat web portions, which are stronger for a given depth than the sinuous type, cannot be pressed even as deep as the latter type, where the number of ribs is the same. As a matter of fact, it is impossible to make a single sheet panel with several sharp cornered ribs, by the pressing process, that will be as strong as a pressed panel of the sinuous type made from a similar sheet and having the same number of ribs. Therefore, although car ends having several deep, sharp-cornered corrugations are the most desirable, it has heretofore been impossible to produce them.

Viewed in one of its aspects, the present invention may be said to have for its object to produce a steel car end having any desired number of sharp-cornered reinforcing ribs of any desired depth and made from a single sheet, if desired.

Not only are the number and the depth of the corrugations in a hot pressed sheet definitely limited; but the process is costly because of the necessity of highly heating comparatively thin plates and quickly operating on the sheets before they can become cold and because of the necessity of squaring, by shearing, the edges that become irregular during the drawing or pressing process.

Perhaps the main object of the present invention is to make it possible to produce a steel car end in the form of a single panel, if desired, by a cold process and having sharp-cornered ribs of any desired size and number, and having any one of a great variety of shapes, and without the necessity of shearing the edges to square them after the sheet has been transformed into a ribbed panel.

In accordance with my invention, I simply fold the sheet so as to produce areas displaced out of the normal plane and connected to those areas remaining in the original plane of the sheet by flat webs. Since the process is simply one of folding, it is evident that the ribs may be made of any desired depth, quite regardless of the thickness of the sheet. Furthermore, since the process is simply a folding one, it does not require the heavy presses that are needed in following the old practice. The aforesaid displaced areas may be flat and comparatively wide along the side marginal portions of the sheet. Therefore my improved ends lend themselves readily to simple and practical methods of attachment, whereby the ends will be securely held in place and the joints between the same and the car body be weather-proof. All the holes required in the ends may be punched while the latter are in the form of flat sheets, thus making the operation of punching the holes simpler and less costly than where this must be done after the ribs have been formed.

Viewed in one of its aspects, therefore, the present invention may be said to have for its object to produce a simple and novel steel ribbed car end that can be cheaply made and readily secured in place by weather tight joints.

A further object of the present invention is to produce a simple and novel steel end that will be effectively braced across the top to resist the outward thrust of the load in the car, without the use of extraneous bracing or frame.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in

the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is an elevation of a steel end arranged in accordance with my invention; Fig. 2 is a central vertical section, on a larger scale than Fig. 1, taken approximately on line 2—2 of Fig. 1; Fig. 3 is a section on line 3—3 of Fig. 1, on approximately the same scale as Fig. 2; Figs. 4, 5 and 6 are views similar to Figs. 1, 2 and 3, showing a second form of my invention; Fig. 7 is an elevation of a third form of end; Fig. 8 is a section taken approximately on line 8—8 of Fig. 7; Fig. 9 is a section taken on line 9—9 of Fig. 8, but on a larger scale; Fig. 10 is an elevation of a fragment of a fourth form of end; Fig. 11 is a section taken approximately on line 11—11 of Fig. 10; and Fig. 12 is an edge view of that portion of the end shown in Fig. 10, a portion being in section.

Referring to Figs. 1 to 3, it will be seen that the end is made in two sections, A and B, the section A being adapted to extend from the floor of a car to the eaves, while the section B is adapted to form the gable. The member A is made of a metal sheet folded along diagonal lines extending from top to bottom to transform it into long narrow approximately triangular sections 1 and 2 lying in two parallel planes spaced apart from each other; the sections alternating with each other and there being one more of the sections 2 that lie in the outer plane than there are sections 1 that remain in the normal or initial plane of the sheet. The sections 1 and 2 alternate with each other so as to bring one of the sections 2 at each side of the sheet. Furthermore, the parts are so disposed that the bases of the sections 1 are at the bottom whereas the bases of the sections 2 are at the top. Each of the sections 1 is joined to the two sections 2 between which it lies by means of ribs or webs 3 extending transversely to the plane of the sheet. It will thus be seen that the sheet may be said to have thereon a plurality of posts extending from the top to the bottom and decreasing gradually in width toward the bottom. The two side sections are flanged inwardly or rearwardly so as to produce vertical side edges and flanges 4 that are preferably considerably wider than the webs 3; the flanges being adapted to secure the end to the remainder of a car structure.

The member B comprises a triangular vertical plate 5, lying far inwardly from the normal plane of the sheet in the member A and having a wide approximately horizontal foot flange 6; the foot flange resting on the upper edge of the member A and having a skirt 7 that extends down outside of the upper marginal portion of the member A, both in front and at the sides. This skirt is riveted or otherwise rigidly secured to the wide upper marginal portions of the sections 2 and also at the upper marginal portions of the flanges 4.

It will be seen that as pressure is applied to the end from inside the car, the wide foot flange 6 will serve as a beam across the top of the end to resist this pressure; the outward pressure at the bottom being resisted by the car underframe to which the lower marginal portion of the end is riveted. Consequently the end is firmly supported at the top and at the bottom and, since the posts or struts consisting of the sections 2 and the webs 3 extend between the upper and lower lines of support and prevent the end from bulging, the end will be able successfully to resist any outward pressure to which it may be subjected in service.

In the construction shown in Figs. 4, 5 and 6, the end is also made of lower and upper sections C and D. The upper section is to all intents and purposes the same as the section B in the first form. The lower section C, however, has ribs differing somewhat from those in the first form. The panels or areas 10 that remain in the initial plane of the sheet are simply long narrow rectangles whose long axes are vertical. The raised areas 11, that is the flat surfaces lying outwardly from and more or less parallel to the normal plane of the sheet decrease gradually in width from the top and bottom toward an intermediate point, with the result that the webs 12 connecting these areas with the area 10 are not of uniform width or depth, but increase gradually in width as the width of the areas or sections 11 decreases. The result is that the end contains vertical stiffening ribs that increase in depth from the top and bottom toward an intermediate level. The point of greatest thickness or depth of the ribs is about two-fifths of the distance from the bottom.

Although the ribs are not of uniform cross-sectional shape or depth, they are produced by a mere folding of the sheet as in the other form.

If desired, the upper marginal portions 13 of the flat areas 10 may be folded outwardly so as to permit them to bear against and be secured to the skirt 13 of the top section D.

In the construction shown in Figs. 7, 8 and 9, the entire end, corresponding to the sections A and B of the first form, is made in one piece. The sheet is folded along transverse lines, leaving long narrow rectangular areas or sections 15 in a normal plane of the sheet and transverse ribs each composed of flat webs 16 and 17 and two flat outer faces 18 and 19 that rise gradually

from the sides toward the center. At the extreme top of the sheet is left a section 20 lying in the normal plane of the sheet and shaped to fit under the sloping roof of a box car.

In Figs. 10 to 12 there is shown an end formed by folding the sheet along parallel transverse lines to produce ribs each having a flat face 25 lying in a plane parallel with and spaced apart from the normal plane of the sheet represented by the areas 26, and joined to the areas 26 by means of webs 27. The marginal portions of the end, at the sides of the sheet, are bent back to form attaching flanges 28. In order to permit the sheet to be thus bent I flatten the ribs at the sides by pressing down or folding in the middle portions as indicated at 29, at the same time folding the corresponding portions of the webs 27. This makes it possible to form the flanges readily and, at the same time, stiffens the corners of the car body when the end is subsequently applied.

It will be seen that in all of the forms of ends illustrated there are effective stiffening ribs whose depth may be made as great as desired, regardless of this number. Furthermore, since the stiffening ribs are formed by merely bending sheets in a cold condition, which may be done in comparatively light power presses, the process of manufacturing the ends is simple and not as costly as are those in which sheets must have ribs pressed out therefrom, while hot, in large expensive hydraulic presses.

It will further be seen that all the forms of ribs illustrated permit the sheet to remain rectangular so as not to require trimming after the ribs are formed. This is true because a line following the surface of an end at right angles to the length of the ribs from one edge of the sheet to the other is of the same length no matter where drawn, even though the ribs be not of uniform cross-sectional shape throughout their lengths. Therefore, as long as this condition is maintained, the ribs may be varied in size, shape and location over an almost unlimited range.

While I have illustrated and described with particularity only a single preferred form of my invention, with a few modifications, I do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the definitions of my invention constituting the appended claims.

I claim:—

1. A car end comprising a metal sheet folded to transform it into flat areas lying in two parallel planes spaced apart from each other and connected together at their sides by flat webs extending transversely to said planes, said areas being in the form of long narrow triangles, and the triangles being so disposed that triangles having their bases at the bottom of the sheet alternate with those having their bases at the top.

2. A car end comprising a metal sheet folded to transform it into long narrow triangular sections lying in two parallel planes spaced apart from each other and connected by webs, the sections in the outer plane alternating with those in the inner plane, the sections in the outer plane having their bases at the top and the sections in the inner plane having their bases at the bottom.

3. A car end comprising a metal sheet folded to transform it into long narrow triangular sections lying in two parallel planes spaced apart from each other and connected by webs, the sections in the outer plane alternating with those in the inner plane, the sections in the outer plane having their bases at the top and the sections in the inner plane having their bases at the bottom, there being one more outer section than inner section, and the side marginal portions of the sections at the two sides being flanged inwardly past the plane of the inner sections.

4. A car end comprising a metal sheet folded to form sharp-cornered stiffening ribs extending entirely across the same from one edge to the opposite edge, the contour of a cross-section through the end on a plane transverse to said ribs varying as said plane is shifted lengthwise of the ribs but the peripheral length of said contour being the same regardless of the location of the plane.

In testimony whereof, I sign this specification.

WILLIAM E. VAN DORN.