

W. T. VAN DORN.
CORRUGATED PLATE.
APPLICATION FILED MAR. 9, 1914.

1,126,135.

Patented Jan. 26, 1915.

4 SHEETS-SHEET 1.

Fig. 1

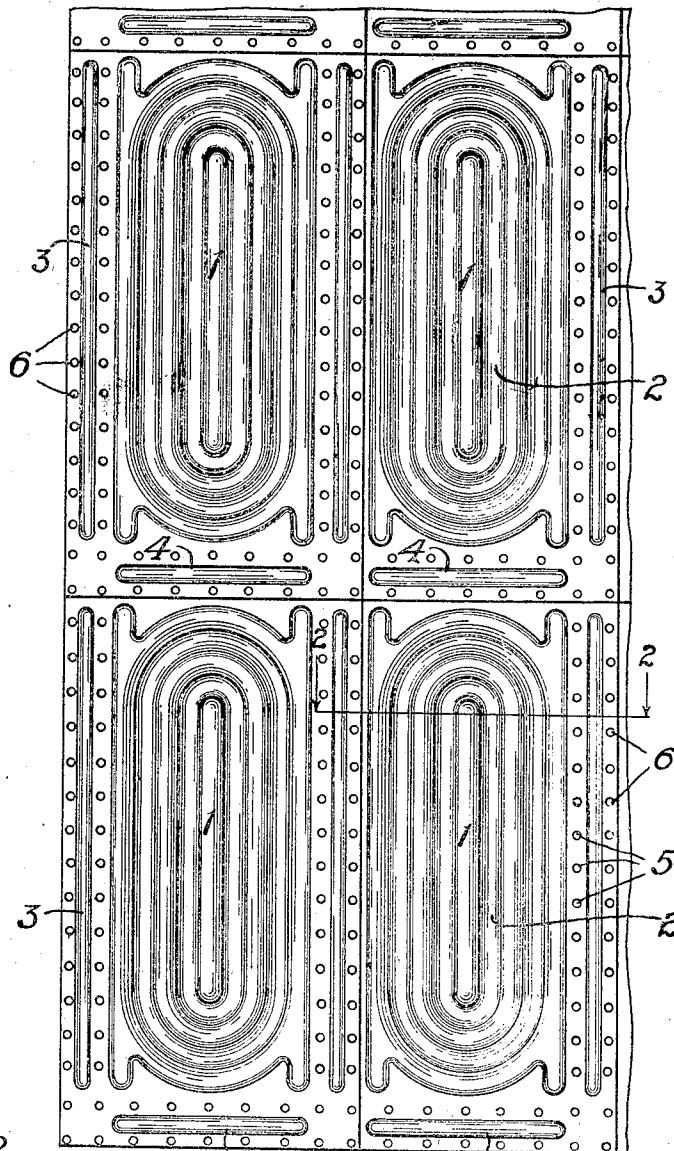


Fig. 2



WITNESSES

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~~4~~ SHEETS-SHEET 2.



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4 SHEETS-SHEET 3.

Fig. 5

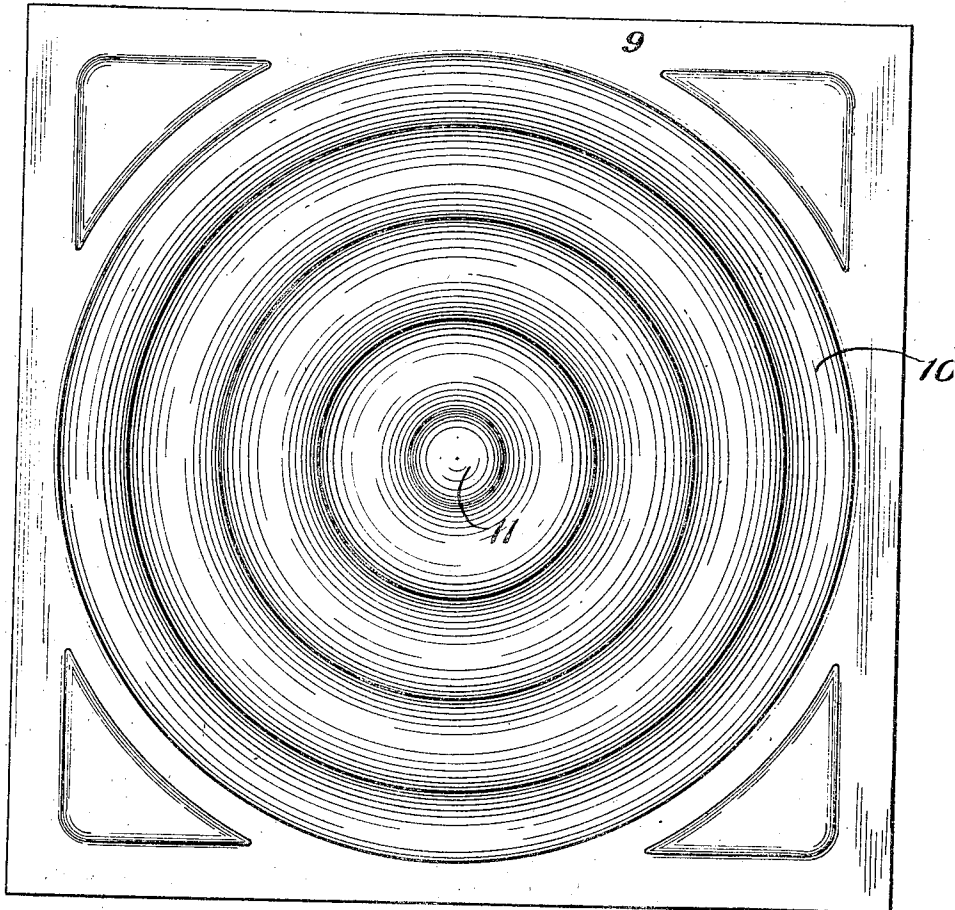


Fig. 6



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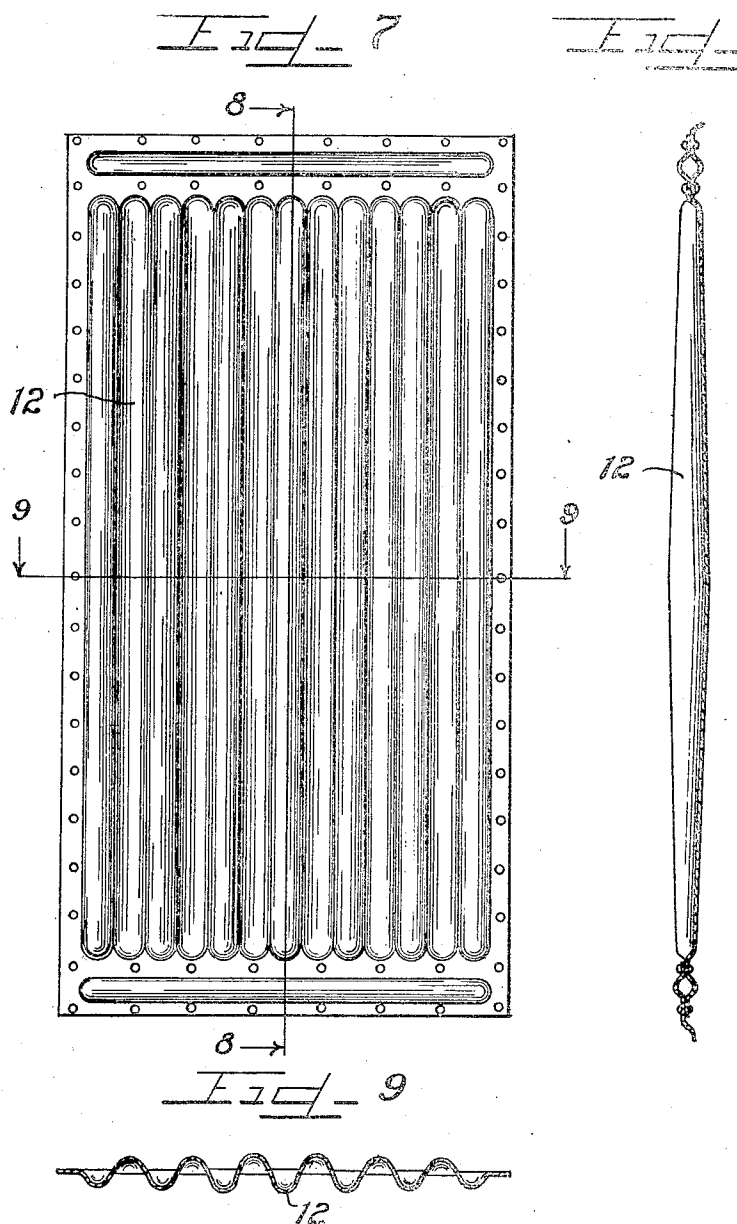
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4 SHEETS-SHEET 4.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM T. VAN DORN, OF CHICAGO, ILLINOIS, ASSIGNOR TO VAN DORN GIRDER PLATT
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CORRUGATED PLATE.

1,126,135.

Specification of Letters Patent.

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Application filed March 9, 1914. Serial No. 323,376.

To all whom it may concern:

Be it known that I, WILLIAM T. VAN DORN, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Corrugated Plates: and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

Sheet metal has been extensively used in the last few years in the construction of buildings for warehouse purposes and shops and also in the construction of cars. It is a well known fact that the metal when corrugated is much better adapted for use, the metal then acquiring a property of flexibility and increased strength, so that in the event of deformation thereof, rupture does not take place.

In the older type of car ends, where the metal is corrugated outwardly on one side only, the plate is consequently under an initial tensile stress, due to the deformation of the metal, and hence such plates are not well adapted to withstand a force applied on that side of the plate from which the corrugations are formed. In such a case the load applied on the plate on the side from which the corrugations are formed imposes a tensile stress on the fibers of the metal, while a load imposed on the opposite side is transmitted through the plate as a compressive stress. The defects of a plate so constructed are obvious, for, when used as a car end with the corrugations projecting outwardly, the plate is unable to withstand the impact stresses imposed on the plate from the interior of the car by a shifting of the contents, whereas with the plate mounted with the corrugations facing inwardly of the car, the end of the car is then easily battered in from the exterior by impact with foreign objects.

Due to the fact that in the present invention the corrugations are formed on each side of the plate irrespective of their depth, or variation in depth, or number, either or all of which may be varied to suit the conditions under which the plate is to be used, the plate acts admirably to withstand stresses imposed from either side. This may be attributed to the fact that the peculiar form of the corrugations causes com-

pression stresses to be set up in the plate when a load is imposed on either side thereof, and this feature in particular makes my device well adapted for use on cars.

This invention relates to corrugated sheet metal structures corrugated in a particular manner to afford a sheet of uniform strength, that is to say, the plate may be so constructed as to be capable of withstanding loads applied on either side equally well. This feature is attained, as already pointed out, by corrugating the plate on both surfaces, so that the corrugations extend outwardly from the normal plane of the plate on each side, and furthermore, are arched or dished so that a truss-like structure is obtained capable of withstanding enormous compression or crushing loads applied on either side thereof. A number of such sheet metal structures are formed so as to be readily adapted for connection to one another to afford the side walls or ends of a building or cars or for other purposes.

It is an important object of the invention to provide a reinforced corrugated plate in which the corrugations are disposed above and below the flat surface of the plate.

It is also an important object of the invention to provide a corrugated plate in which the corrugations are formed with the depth thereof increasing longitudinally from the ends of the corrugations toward the middle thereof, and having the depth thereof disposed above and below the flat surface of the plate.

It is also an object of this invention to provide reinforced corrugated structures of sheet metal in which the corrugations increase in depth toward the middle of the structure.

It is also an object of this invention to provide reinforced corrugated sheet metal structures wherein the corrugations extend outwardly from the normal plane of the plate on each side thereof and are dished in opposite directions to afford a structure capable of withstanding compression on either side.

It is a further object of my invention to provide a corrugated structure embracing straight and curved corrugations, the depth of which is variable, so that the corrugations and the structure as a whole form a load carrying means of substantially uniform strength from either side of the same.

It is furthermore an object of this invention to construct a reinforced corrugated structure wherein the depth of each of the corrugations is variable, and wherein the depths of different corrugations vary according to a different function.

It is finally an object of this invention to construct a corrugated structure apertured for attachment by riveting, and provided with corrugations extending between the respective rows of apertures.

The invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

In the drawings: Figure 1 is a front face view of a plurality of corrugated structures attached to one another for any purpose. Fig. 2 is a section taken on line 2—2 of Fig. 1. Fig. 3 is an enlarged front face view of a single corrugated structure. Fig. 4 is a section on line 4—4 of Fig. 3, showing the variation in depth of the corrugations and the means of attaching the structures one to another. Fig. 5 is a front elevation of a concentrically corrugated structure. Fig. 6 is a section through the structure shown in Fig. 5 taken normally there-through. Fig. 7 is an elevation of a modified form of structure. Fig. 8 is a section on line 8—8 of Fig. 7. Fig. 9 is a section on line 9—9 of Fig. 7.

As shown in the drawings: Each of the structures or panels shown in Figs. 1 to 4 inclusive is denoted as a whole by the reference numeral 1, and formed therein are a plurality of continuous straight and curved connected corrugations 2, as well as longitudinal corrugations 3, and transverse corrugations 4, said latter corrugations 3 and 4, being disposed between rows of apertures 5 and 6, respectively, for the reception of rivets when the panel is attached or connected to another panel or support.

Figs. 2 and 4 clearly illustrate the manner in which the corrugations increase in depth, a point of minimum depth being indicated by the reference numeral 7, and a point of maximum depth being indicated by the reference numeral 8.

As clearly shown in the sectional views 2 and 4, respectively, the upper corrugations 4, are stamped outwardly, whereas the lower are stamped inwardly, and likewise one of the corrugations 3, on one side of the panel is stamped inwardly and the other on the opposite side is stamped outwardly. Thus when the panels are secured to one another, the respective corrugations 3 and 3, and 4 and 4, curve away from one another, affording an inner and outer rib in the structure at the junction of the panels between the respective rows of rivets.

In Figs. 5 and 6, the corrugations increase in depth on each side of the plate toward the center of the panel and are sym-

metrical in this respect, as clearly shown in Fig. 6, which is any normal section through the panel. In this case the panel 9, is provided with corrugations of minimum depth, indicated by the reference numeral 10, and that of maximum depth by the reference numeral 11.

In the modification illustrated in Figs. 7 to 9 inclusive, I have shown a panel 12, with straight corrugations, each corrugation itself varying in depth, and successive corrugations having a greater variation in depth from near the edge to the center of the plate or panel.

In the particular form of corrugated plate shown in my invention, I have constructed the same so that the corrugations are disposed above and below the flat surface of the plate and the panel so constructed is substantially of uniform strength, assuming a symmetrically disposed load. In all previous types of corrugated structures, the metal has been pressed out only on one side and hence is materially weakened thereby, particularly with regard to withstanding a crushing load from that side from which the metal is pressed out. However, in my invention, due to the fact that the metal is corrugated in both directions relative the normal plane of the plate, the initial tensile stress imposed thereon is greatly reduced and furthermore such a disposition of the corrugations enables the plates to withstand compression from each side equally well.

Of course the particular variation in depth of the respective corrugations may be changed as desired in each case. For instance, the greatest depth may be made at the point of center of pressure, as where the panels are used for car ends of cars carrying grain or a like homogeneous contents. That is to say, the disposition of the corrugations need not be symmetrical about a central axis, but the corrugations may be formed to suit the particular conditions under which the panel is to be used.

I am aware that various details of construction may be varied through a wide range without departing from the principles of this invention. I therefore do not purpose limiting the patent granted otherwise than necessitated by the prior art.

I claim as my invention:

1. A plate normally flat at its edges which constitute supporting points and provided with a plurality of corrugations in its surface within said edges, said corrugations arranged to increase in depth symmetrically on both faces between said edges and at given points in the plate.

2. A plate normally flat at its edges which constitute supporting points and provided with corrugations formed on each side of the normal plane thereof and within said

edges, said corrugations arranged to increase in depth symmetrically on both faces between said edges and at given points in the plate.

- 5 3. A plate normally flat at its edges which constitute supporting points and provided with a plurality of corrugations extending outwardly on each side of the normal plane of the plate, the depth of said corrugations increasing on both sides of the plate from near the points of the support of the plate to the middle thereof.

- 10 4. A plate normally flat at its edges which constitute supporting points and provided with a plurality of concentric corrugations, the depth of said corrugations increasing on both sides of the plate from near the

points of support of the plate toward the middle thereof.

5. A plate normally flat at its edges which constitute supporting points and provided with a plurality of concentric corrugations extending outwardly on each side of the normal plane of the plate, the depth of said corrugations increasing on both sides of the plate from near the points of support of the plate to the middle thereof.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

WILLIAM T. VAN DORN.

Witnesses:

CHARLES W. HILLS, Jr.,
FRANK K. HUDSON.