

E. L. ABBOTT.
METAL PLATE.

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988,921.

Patented Apr. 4, 1911.

Fig. 1.

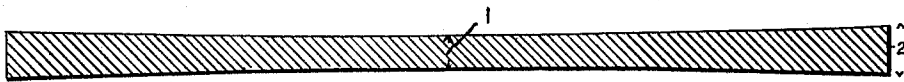


Fig. 2.



Fig. 3.

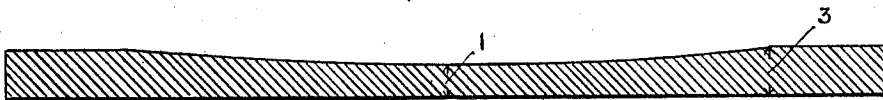


Fig. 4.

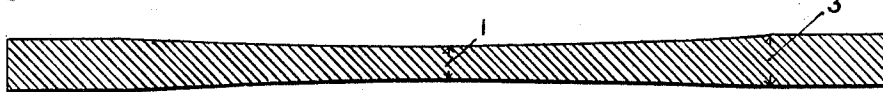
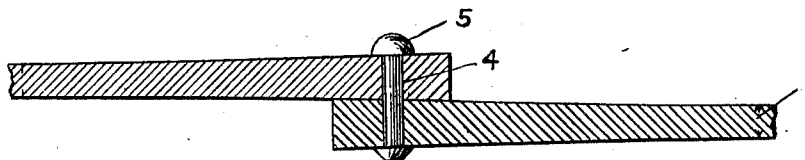


Fig. 5.



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UNITED STATES PATENT OFFICE.

EDWARD L. ABBOTT, OF WASHINGTON, DISTRICT OF COLUMBIA.

METAL PLATE.

988,921.

Specification of Letters Patent.

Patented Apr. 4, 1911.

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To all whom it may concern:

Be it known that I, EDWARD L. ABBOTT, a citizen of the United States, and resident of the city of Washington, District of Columbia, have invented certain new and useful Improvements in Metal Plates, of which the following, taken in connection with the accompanying drawings, is a full, clear, and concise description.

10 My invention relates to improvements in metal plates, and particularly to rolled steel plates intended to be joined by riveting, and used in the construction of tanks, cars, ships, boilers, girders, or other articles or recep-
15 tacles.

The objects of my invention are to provide a plate or sheet which when prepared for riveting or riveted shall be of substantially the same relative strength in all parts, and which shall be economical of material and weight in proportion to its strength. I
20 accomplish these objects by the methods and means described hereinafter and illustrated in the accompanying drawings, in which like letters of reference refer to like parts
25 throughout the respective views.

In the drawings, Figure 1 is a cross section of a plate embodying my invention. Figs. 2, 3 and 4 are cross sections of plates
30 showing modifications of my invention. Fig. 5 represents two plates riveted at their edges.

Referring to the figures:—1 represents the point of minimum thickness, preferably on
35 the median line of the plate.

2 represents the thickness at the extreme edge.

3 represents the thickness on the lap edge or rivet line, in the modification of my
40 improvement.

4 represents a rivet hole.

5 represents a rivet joining the two plates.

At present, during the rolling of steel
45 plates the rolls after some usage become worn in the center and also bend or yield, so that the plates when completed are thinner at the edges than along the median line. This is especially true in plates of less than
50 three-eighths ($\frac{3}{8}$) of an inch thickness; and this peculiarity is recognized by the trade, so that either an average thickness is accepted or an allowance for over weight is made when a minimum thickness is specified.

55 When ordinary plates of even thickness are assembled by riveting them together at

the edges, the full strength of the plate cannot be utilized, because by making the rivet holes the net section of the plate along the line of rivet holes is left considerably
60 less than elsewhere, and the strength correspondingly reduced at that point, as is shown when a plate structure such as a tank ruptures. In such case the rupture almost
65 invariably occurs in the form of a tear at or along the line of rivet holes,—the weakest point. Thus it is seen that relatively the plate is strongest along the median line and weakest along the rivet line; or, in other
70 words, for a given weight, thickness or strength along the rivet line there is excess of weight or material or strength along the median line. Now in the case of thin plates particularly, the strength or holding power
75 of the rivets depends upon and varies with the surface of the rivets in contact with the edges of the plates at the rivet holes. Thus it is that a relative thinning of the edge reduces the total value of the strength of
80 the plate, or, conversely, there exists an unnecessary and wasteful excess of material in the middle of the plate when the edge or rivet line has a definite strength value, or thickness.

It will be clear then that even where the
85 plates are of uniform thickness the edges are the weakest points, or if the latter are of sufficient strength, then the centers are unnecessarily heavy and thick; and the more, therefore, is this relative difference or dis-
90 proportion between the middle and edges apparent when the plate, either through the wear or bending of the rolls, becomes convex in the center, or, in other words, relatively thicker there than at the edges.
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My invention contemplates the rolling of the plates in such a way that the result shall be a plate thinner along the median line than at the edges. The amount of difference in the thickness will be determined
100 according to the needs of a particular instance, and should be the amount necessary to make the center of the plate of approximately the same strength as the rivet line after the rivet holes have been formed.
105 This, of course, varies with the dimensions, qualities, &c., of the plate, the size, location, &c., of the rivet holes, but is easily computed.

One of the objects attained by my inven-
110 tion is the capability of easy and efficient calking, the plates being constructed with

such a section as to readily admit of bending, riveting and calking an adjoining plate thereto however or in whatever way the margins may be lapped.

5 It will be evident that I may secure the desired result in either of the ways illustrated in Figs. 1, 2, 3 or 4: that is to say, I may make the plate concave on both upper and lower surfaces, the thinner portion being at the median line, and the thick-
10 est at the extreme edges, as shown in Fig. 1; or I may make it concave only on one side, as in Fig. 2: or concave on one or both sides for a portion of the width, having the rivet line margin or lap of even thick-
15 ness to the desired degree, as in Figs. 3 and 4.

I do not limit myself to any particular form, thickness, proportion or design of cross section, or dimension of plate. More-
20 over, the plate may be made curved or straight, both in length and breadth. It will also be understood that I do not limit myself to a plate adapted to be secured in any particular manner by lapping to another
25 and separate plate, or to itself, as by riveting, bolting or welding, since plates are and may be secured either by riveting, bolting, welding or otherwise, and it will be clear that my invention covers a plate that may be
30 so secured in any form or structure and in any way where the joint is ordinarily the weakest point or portion.

Where I have used the word "lap," I mean to indicate the margin or area in contact
35 with and overlapped by the contiguous plate where a plurality of plates are riveted or otherwise secured together, and where I have used the words "longitudinal line" or "median line," I mean the approximate
40 central portion or line running lengthwise of the original plate, as, for instance, particularly in a rolled plate, it may be cut into sections in such a way that the final width is actually greater than the final length. Or
45 plates may be rolled with a greater width than length in the first instance. Where I have used the words "concave surface" I mean that the surface is a curved depression, and it may be curved with a single
50 radius, or it may be curved with several different radii, or with progressively changing radii, thus distinguishing from a mere depression between the longitudinal edges; and where I have used the words "pro-
55 gressively increasing" or "progressively re-

ducing" I do not mean to be limited to a regular or uniform progressive increase or reduction, so long as the longitudinal edges remain thicker than the intermediate portion. Nor do I limit my invention to a par-
60 ticular mode of thickening as in a curve or plane from the center of the plate; or from any particular point or for any particular distance in from the longitudinal edges, as I may make my plate flat for a portion of
65 its central width, and progressively increase from the margin of the flat portion toward the longitudinal edges so long as the angle of increase is less than 45° from the plane of the intermediate portion. But
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What I do claim and desire to protect by Letters Patent, is:

1. A rolled metal plate having longitudinal edges with substantially parallel plane surfaces, and progressively reduced in thick-
75 ness between its longitudinal edges.

2. A rolled structural plate one surface of which is concave with several radii and progressively increases in thickness toward the longitudinal edges.
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3. A rolled metal structural plate having longitudinal edges that are thicker than the intermediate portion, which intermediate portion progressively tapers toward the mid-
85 dle portion.

4. A rolled metal structural plate progressively increasing in thickness toward its longitudinal edges.

5. A rolled metal plate having thickened longitudinal edges, both sides of which are
90 substantially plane surfaces, and an intermediate portion progressively reduced toward the median line.

6. A rolled metal structural plate having a concave surface and longitudinal edges
95 thicker than the intermediate portion.

7. A rolled metal plate having concave surfaces and edges the surfaces of which are substantially parallel and thicker than the intermediate portion.
100

8. A rolled metal structural plate thickening toward the longitudinal edges at such an angle as will readily admit of bending riveting and calking an adjoining plate thereto.

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Witnesses:

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