

Jan. 29, 1929.

1,700,147

A. E. SMALL

METHOD OF CORRUGATING METALLIC PLATES

Filed Dec. 2, 1926

2 Sheets-Sheet 1

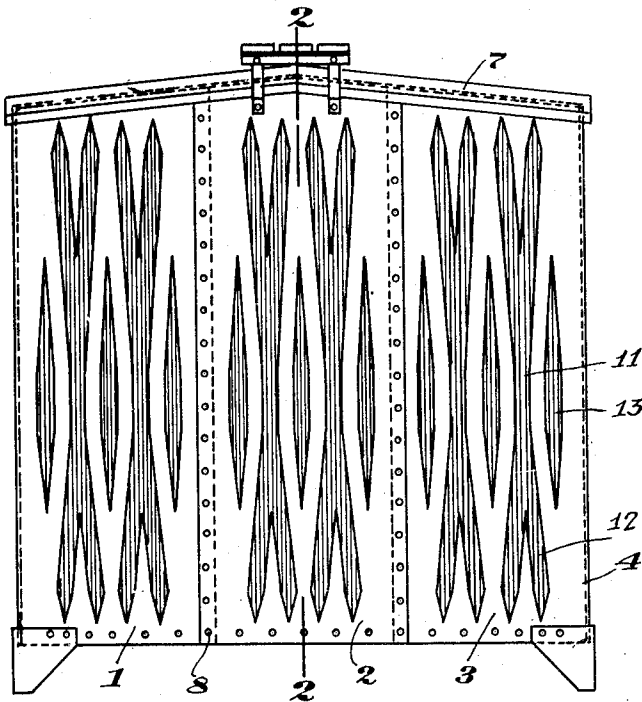


Fig. 1

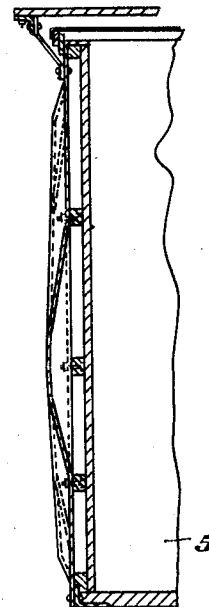


Fig. 2

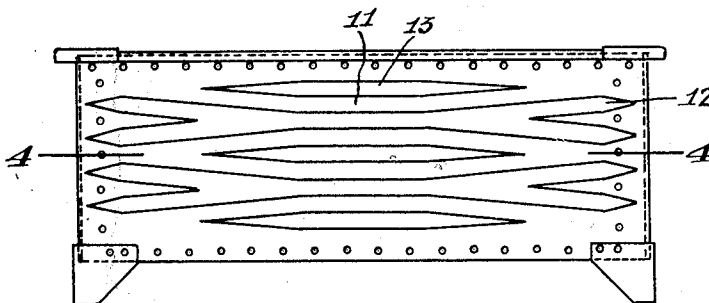


Fig. 3

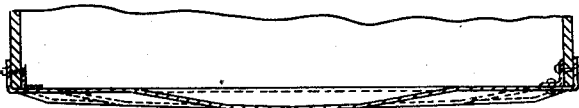


Fig. 4

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2 Sheets-Sheet 2

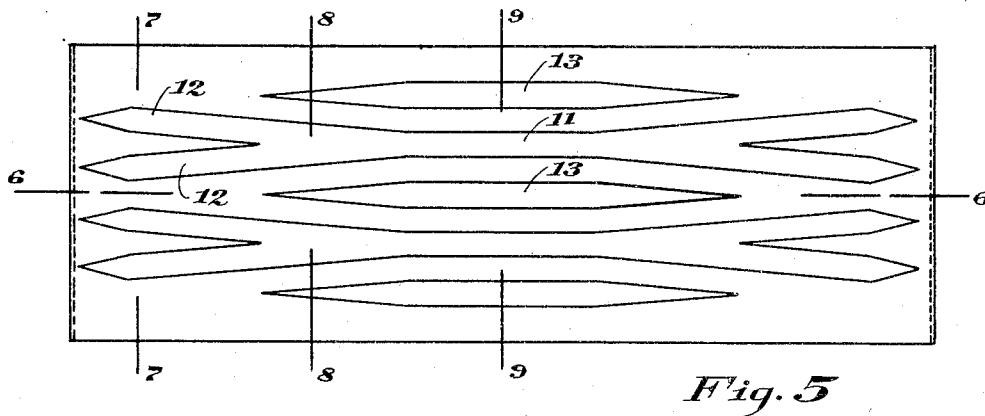


Fig. 5

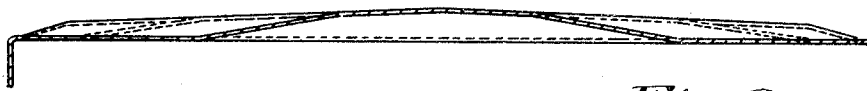


Fig. 6

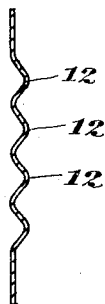


Fig. 7

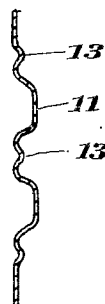


Fig. 8

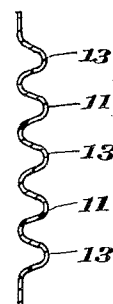


Fig. 9

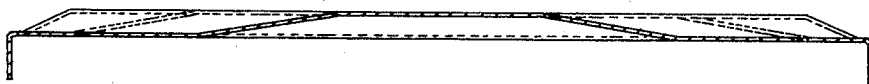


Fig. 10

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UNITED STATES PATENT OFFICE.

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METHOD OF CORRUGATING METALLIC PLATES.

Application filed December 2, 1926. Serial No. 152,254.

My invention relates to means of reinforcing a metallic plate by forming integral corrugations, embossments or ribs therein and resides in the particular and peculiar configuration and relation of the corrugations to obtain certain desired results.

An object of the invention is to form and arrange a plurality of corrugations in a metallic plate so as to obtain a desired proportion between strength, rigidity and resiliency.

Another object of the invention is to obtain this result with the least amount of raw material and to provide a finished article of the least possible weight consistent with strength requirements.

Another object of the invention is to obtain the desired strength, rigidity and resiliency by forming a metallic plate with integral embossments, each embossment comprising a central portion which divides to form constant width diverging end portions at each end of the embossment and also forming corrugations in the same metallic plate between the central portions of the embossments.

Another object is to provide such a corrugated metallic plate which can be formed by pressing it (when heated, if necessary) between dies which move toward each other in one direction only.

The construction may be used wherever a strong, resilient panel is desired, but is especially adaptable for railway car structures, such as end walls, side or end doors, hopper doors, floors, roofs, etc.

It is well known that the end walls of railway cars are more likely to be broken or otherwise injured than the side walls. This is due to the inertia thrusts and pressures caused by the shifting of the cargoes when the train starts or stops. These thrusts may be local, tending to distort the end in some particular spot, as, for example, when a piece of piping or lumber shifts lengthwise imparting a blow against the end wall of the car; or there may be a general tendency to break out the end wall as a whole or tear it away from the framing. For the purpose, therefore, of greater strength and durability, car ends have been constructed of metal plates corrugated or formed with ribs to impart the desired strength, rigidity and resiliency. My construction is especially adaptable to end walls for railway cars (of any type) because it has the strength to resist the continuous pounding of the shifting loads there-

on and has the resiliency necessary to absorb these numerous shocks without distortion. Distortion of an end wall might bend the brake mast, thereby causing interference with the operation of the hand brake mechanism. Furthermore, such distortion might reduce the end ladder clearance beyond that prescribed by the Interstate Commerce Commission. When made of several plates secured together the end wall can be made stronger where greater strength is required. A wooden inside lining is required in a railway house car for blocking the lading to and for compliance with the requirements of the bureau of explosives of the American Railway Association. Such a wooden lining can be easily applied to my construction.

While I have described my configuration and arrangement of corrugations as used to reinforce the plates of an end wall of a railway car, similarly reinforced plates may be used as a side door for a railway car by providing a frame around its outer edges, or such a reinforced plate may be used as an end door of an automobile railway car by providing the necessary hinges, latches and the usual attachments; also it may be used to reinforce a metallic plate when used as a drop door of a hopper car by providing the hinges and other usual raising and locking mechanisms.

In the drawings:

Fig. 1 shows a railway box car with my device applied thereon.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 shows a railway gondola car with my device applied thereon.

Fig. 4 is a section on line 4—4 of Fig. 3.

Fig. 5 is a detail of a plate reinforced by my arrangement of embossments.

Fig. 6 is a section on line 6—6 of Fig. 5.

Fig. 7 is a section on line 7—7 of Fig. 5.

Fig. 8 is a section on line 8—8 of Fig. 5.

Fig. 9 is a section on line 9—9 of Fig. 5.

Fig. 10 shows a modified form wherein the embossments and corrugations are of the same depth and are of constant depth.

The end wall structure comprises a panel composed of one or more metallic plates with my particular configuration and arrangement of embossments formed therein. In Figs. 1 and 2 the embossed plates 1, 2 and 3 extend from top to bottom of the end wall and may be formed with integral flanges 4 along the vertical edges of the outer plates

which overlap and are secured to the side wall 5 of the car by any suitable means. The top edges of the plates are secured beneath the fascia board 7 and the meeting edges of the plates overlap and are secured together by rows of rivets 8 and the lower edges of the plates are secured to the end sill 9.

Figs. 3 and 4 show a form of my invention applied to a gondola type of railway car wherein only one plate is used to form the end panel which extends from side to side of the car and may be provided along the vertical edges with flanges which overlap and are secured to the side walls by any suitable means. The top edge of the plate is secured to a top chord, while the lower edge is secured to the end sill.

The plate is provided with a plurality of parallel embossments, each embossment comprising a central portion 11 which divides and diverges to form a plurality of constant width end portions 12 at each end of the embossment. The ends of the embossments may be shallower than the central portion.

The metallic plate is also provided with minor corrugations 13 positioned between the central portions of the embossments and terminating into the plate between the embossments. When the central portions of the embossments are relatively deep the minor corrugations preferably correspond in depth to the adjacent central portions 11 of the embossments, but if the embossments are of constant depth then the minor corrugations 13 are preferably also constant in depth and of the same depth as the embossments.

The end portions of the embossments terminate into the plate adjacent its edge in line with each other and preferably adjacent the frame member (sill, plate, stile or post) to which the plate is attached. The ends of the minor corrugations terminate into the plate adjacent the dividing place of the central portions of the embossments. The end portions of each embossment and the adjacent end portions of adjacent embossments are preferably spaced apart distances equal to their widths so as to form a sinuous configuration; furthermore, the central portions of the embossments and the minor corrugations are preferably spaced apart distances equal to their widths to form a sinuous configuration.

The accompanying drawings illustrate the preferred form of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof within the scope of the claims will occur to persons skilled in the art.

I claim:

1. In a railway car structure, a metallic plate having a plurality of varying width embossments formed therein, each embossment comprising a central portion which di-

vides to form constant width diverging end portions at each end of the embossment, said metallic plate also formed with corrugations positioned between said central portions and terminating into the plate adjacent the dividing place of said central portions.

2. In a railway car structure, a metallic plate having a plurality of varying width embossments formed therein, each embossment comprising a relatively deep central portion which divides to form shallower constant width diverging end portions at each end of the embossment, said metallic plate also formed with corrugations positioned between said central portions and terminating into the plate adjacent the dividing place of said central portions.

3. In a railway car structure, a metallic plate having a plurality of varying width embossments formed therein, each embossment comprising a relatively deep constant depth central portion which divides to form shallower constant width and varying depth diverging end portions at each end of the embossment, said metallic plate also formed with corrugations positioned between said central portions and terminating into the plate adjacent the dividing place of said central portions.

4. In a railway car structure, a metallic plate having a plurality of varying width embossments formed therein, each embossment comprising a relatively deep constant depth central portion which divides to form shallower constant width and varying depth diverging end portions at each end of the embossment, said metallic plate also formed with constant depth corrugations positioned between said central portions and terminating into the plate adjacent the dividing place of said central portions.

5. In a railway car structure, a metallic plate having a plurality of varying width embossments formed therein, each embossment comprising a central portion which divides to form constant width diverging end portions at each end of the embossment, said metallic plate also formed with corrugations corresponding in depth to the adjacent central portions, said corrugations positioned between said central portions and terminating into the plate adjacent the dividing place of said central portions.

6. In a railway car structure, a metallic plate having a plurality of varying width embossments formed therein, each embossment comprising a central portion which divides to form constant width diverging end portions at each end of the embossment, said metallic plate also formed with corrugations positioned between said central portions and terminating into the plate adjacent the dividing place of said central portions, said end portions being spaced apart distances equal to their width.

7. In a railway car structure, a metallic plate having a plurality of varying width embossments formed therein, each embossment comprising a central portion which divides to form constant width diverging end portions at each end of the embossment, said metallic plate also formed with corrugations positioned between said central portions and terminating into the plate adjacent the dividing place of said central portions, said end portions being spaced apart distances equal to their width, and said central portions and said corrugations being spaced apart distances equal to their width.

8. In a railway car structure, a metallic plate having a plurality of varying width embossments formed therein, each embossment comprising a relatively deep constant depth central portion which divides to form shallower constant width and varying depth diverging end portions at each end of the embossment, said metallic plate also formed with constant depth corrugations corresponding in depth to the adjacent central portions, said corrugations positioned between said central portions and terminating into the plate adjacent the dividing place of said central portions, said end portions being spaced apart distances equal to their width, and said central portions and said corrugations being spaced apart distances equal to their width.

9. In a railway car structure, a metallic plate having a plurality of varying width embossments formed therein, each embossment comprising a central portion which divides to form varying depth diverging end portions at each end of the embossment, said metallic plate also formed with varying width corrugations positioned between said central portions and terminating into the plate adjacent the dividing place of said central portions.

10. In a railway car structure, a metallic plate having a plurality of embossments formed therein, each embossment comprising a central portion which divides to form a plurality of end portions at each end of the embossment, said metallic plate also formed with corrugations positioned between said

central portions and terminating into the plate.

11. In a railway car structure, a metallic plate having a plurality of relatively long embossments formed therein which increase in width toward their opposite ends, and a plurality of relatively short embossments positioned alternately therebetween which decrease in width toward their opposite ends.

12. In a railway car structure, a metallic plate having a plurality of relatively long embossments formed therein which increase in width toward their opposite ends and terminate into the plate, and a plurality of relatively short embossments positioned alternately therebetween which decrease in width toward their opposite ends and terminate into the plate.

13. In a railway car structure, a metallic plate having a plurality of relatively long embossments formed therein which increase in width toward their opposite ends, and a plurality of relatively short embossments positioned alternately therebetween which decrease in width toward their opposite ends, the opposite ends of said longer embossments being divided by an oppositely projecting embossment formed therein.

14. In a railway car structure, a metallic plate having a plurality of embossments formed therein terminating within the plate which merge together between their opposite ends to form a plurality of fewer embossments, said plate also formed with a plurality of shorter embossments positioned alternately between said corrugations.

15. In a railway car structure, a metallic plate having a plurality of embossments formed therein terminating within the plate which merge together between their opposite ends to form a plurality of fewer embossments, said plate also formed with a plurality of shorter embossments positioned alternately between said corrugations which decrease in width toward their opposite ends and terminate into the plate.

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