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METHOD OF MAKING BEAMS

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Fig. 1.

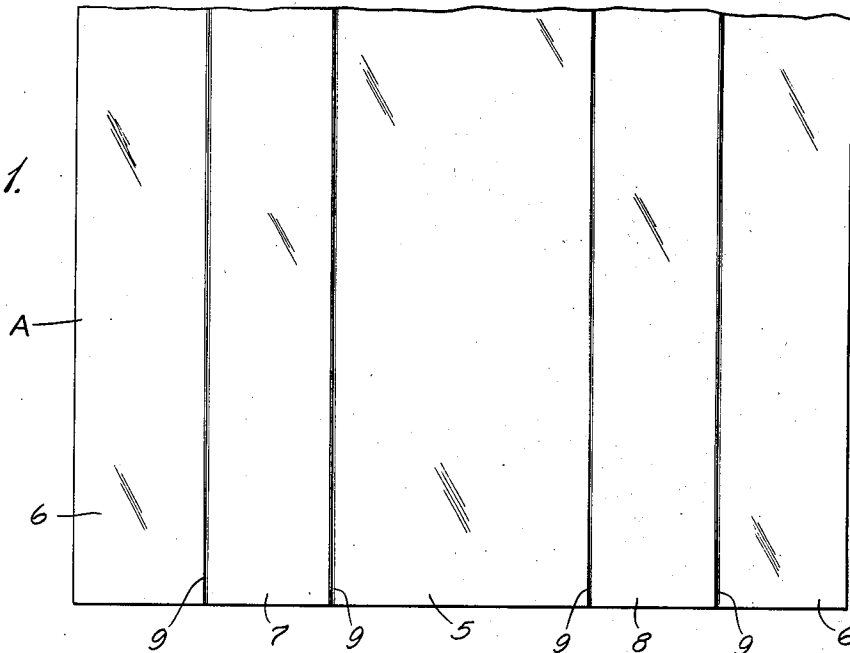


Fig. 2.

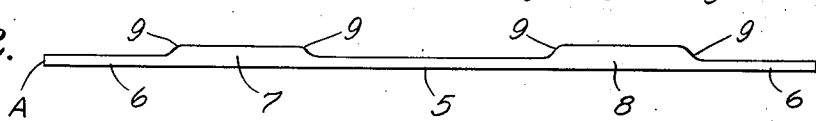
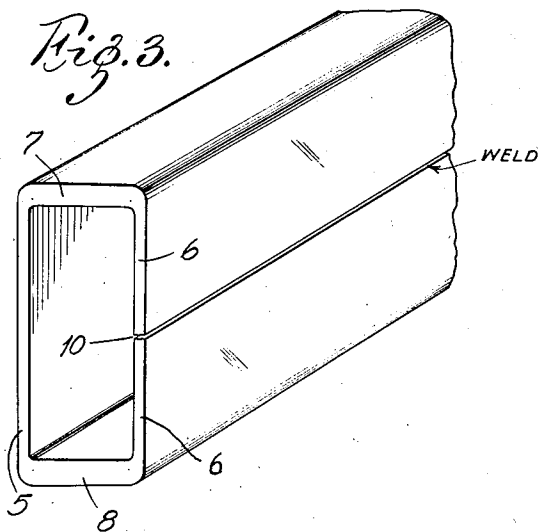


Fig. 3.



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METHOD OF MAKING BEAMS

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2 Claims. (Cl. 29—155)

My invention relates to methods of making beams.

Prior to this invention, beams of the box girder type have been made of four separate strips of metal of different thicknesses welded together at the four corners of the hollow beam. In this old practice, relatively thin metal has been used for the side walls of the beams, or girders, and thicker metal has been employed for the top and bottom walls, the object being to distribute the metal of various thicknesses in accordance with the stresses to which the beam or girder is subjected in service. However, the welds at the corners are relatively weak and uncertain factors located in lines where a relatively high degree of strength is required. The manufacture of such girders with a weld at each corner is an expensive procedure involving a careful assembly of the thick and thin metal and unusual care in the welding operations to be performed in long lines at the four corners of the girder.

It is practically impossible to predetermine the strength of a beam made in that manner. The metal of various thicknesses in the four walls of the hollow beam may be carefully distributed to apparently provide the desired resistance, but in actual practice, the strength at the welds cannot be accurately determined. As a consequence, beams made according to the old method are expensive and they are usually weak in the lines where a high degree of strength is required.

Therefore, one of the objects of the present invention is to produce a strong and simple beam of this type lacking the weaknesses and uncertainty heretofore involved in the welds at the corners of the beam.

In the preferred form of the invention, I carefully distribute the metal of different thicknesses to economically provide the desired strength, but instead of resorting to weak and expensive welds at the junctions of the thick and thin portions, I prefer to integrally unite them, and to form bends at the corners of the beam, or girder. More specifically stated, I may form a metallic plate having areas of different thicknesses, and bend the plate at the junctions of said areas to produce a beam wherein the metal is efficiently distributed for predetermined loads, without including the uncertainty of weak connections at lines subjected to severe stresses.

These results may be accomplished by a combination of rolling and bending operations, using one or more pieces of metal to form the beam. The varying thicknesses desired for compression, tension, etc. can be readily determined by those

skilled in the art, and a sheet, or plate, with different areas conforming to the calculations can be readily rolled and thereafter bent to form a unitary beam free of the undesirable welds. In actual practice, the meeting edges of the relatively thin metal may be conveniently united by one or more welds at the neutral axis of the beam, and the corners of the beam may be formed by strong and simple bends which integrally connect the sides of the beam to the tension and compression members.

With the foregoing and other objects in view, the invention comprises the novel method, construction, combination and arrangement of parts hereinafter more specifically described and shown in the accompanying drawing, which illustrates one form of the invention. However, it is to be understood that the invention comprehends changes, variations and modifications which come within the scope of the claims hereunto appended.

Fig. 1 is a top view of a portion of a metallic plate, or sheet, embodying features of this invention.

Fig. 2 is an end view of said plate, or sheet.

Fig. 3 is a perspective view of a portion of a beam formed by bending the plate shown in Figures 1 and 2.

To illustrate one form of the invention, I have shown a plate, or sheet A made of steel, iron, or any other suitable metal, preferably rolled to form areas of different thicknesses extending longitudinally of the plate. The rolled plate shown in Figures 1 and 2 has relatively thin middle and side portions 5 and 6, and thicker intermediate portions 7 and 8 between said middle and side portions. Bending lines 9 are formed at the junctions of thick and thin portions.

This metal plate can be readily formed by a simple rolling operation to provide the different areas of any desired widths and thicknesses, all of which are integrally united. The strong and simple unitary plate may be bent at the junctions of the thick and thin areas to form a hollow beam shown in Fig. 3 having relatively thin side members 5 and 6 and thicker top and bottom members 7 and 8. The meeting edges of the thin side members 6 preferably appear at the neutral axis of the beam where they may be welded together without impairing the strength of the beam.

Instead of resorting to weak, expensive and uncertain welds at the four corners of the beam, these corners are formed by strong and simple

bends integrally uniting the four walls at points where strength and certainty are desired.

To accomplish these results, and at the same time locate the weld at 10, along the neutral axis of the beam, the width of the relatively thin middle area 5 of the rolled plate may be approximately equal to the combined widths of the thin side portions 6. The thin middle portion of the plate is thus located at one side of the beam where it is integrally united with the thicker compression and tension members at the top and bottom of the beam, while the thin side members 6 are located at the opposite side of the beam with their meeting edges at the neutral axis.

The varying areas may be of any desired widths and thicknesses to form beams of various dimensions, wherein the metal is effectively distributed to provide the desired strength. The sides of the beam may be formed by uniformly thin webs, and in some cases it is desirable to form a tension member 8 at the bottom of relatively thick metal, a compression member 7 at the top of thinner metal, and side members 5 and 6 of still thinner metal, as shown in Fig. 3.

The strength of the beam can be accurately predetermined by calculations, and the metal can be distributed as desired for the conditions to which the beam will be subjected in service.

I claim:

1. The method of making beams which comprises forming a plate of rolled metal with relatively thin middle and side members extending longitudinally of the plate and thicker intermediate members between said middle and side members, the width of said thin middle member being approximately equal to the combined widths of said thin side members, bending said plate at the junctions of the thick and thin members to form integral connections at corners of the beam, the relatively thin members being at the sides of the beam and the edges of said rolled metal plate being approximately at the middle of one of said sides, and welding said edges to each other.

2. The method of making beams which comprises forming a plate of rolled metal with relatively thin middle and side members extending longitudinally of the plate and thicker intermediate members between said middle and side members, the width of said thin middle member being approximately equal to the combined widths of said thin side members, bending said plate at the junctions of the thick and thin members to form integral connections at corners of the beam, the relatively thin members being at the sides of the beam and the edges of said rolled metal plate being in one of said sides, and welding said edges to each other.

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