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MANUFACTURING OF METAL LUMBER

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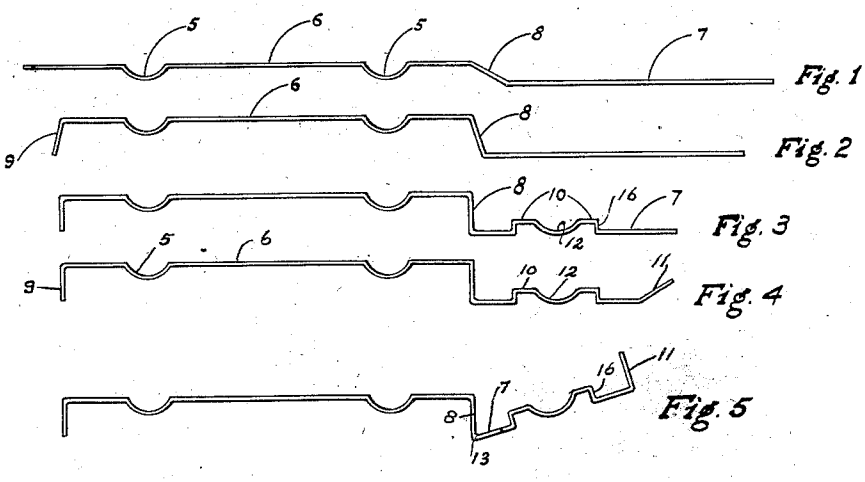

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

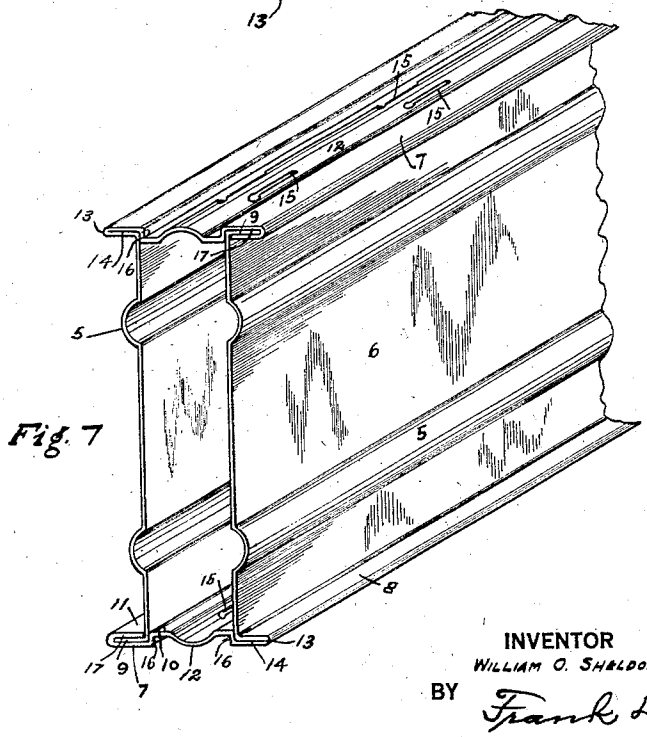

Fig. 7

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MANUFACTURE OF METAL LUMBER

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This invention relates to metal lumber of the character such as may well be used for metal studding, purlins, stringers, joists, beams, etc., all of which may be formed of light gauge material, and may be of steel, iron, or other metal plates to be formed in the desired outline on a press or by brake, but preferably by the rolling process.

My invention contemplates the formation of the finished product by first stamping or bending a continuous metal plate into a long angular product, two of which will be secured together to form a hollow beam or similar substitute for lumber of the usual type; and has for its object to provide a metal lumber element of great strength and rigidity, and yet permitting light gauge material in its construction.

It is a further object of my invention to provide an elongated hollow metal element formed of duplicate angular members, each of which may be formed by one continuous operation such as by guiding a flat sheet metal plate through a series of bending operations.

As a still further object I intend to direct each metal sheet through successive operations which shall be separately performed, but by a single "run" through the machine.

A further object of my invention is the provision of hollow members formed of duplicate elements that are spot welded together; and also for providing certain walls thereof with small holes to accommodate wires to be secured to the element by either following the wall by guiding back and forth through the openings, or passing through the wall permanently to the other side of the element.

Other objects of my invention will be hereinafter described and for the purpose, reference is here made to the following description, the appended claims and the accompanying drawings, in which,—

Figure 1 is an edge view of the end of a metal plate after the first step of bending operations has been performed;

Figure 2 is a similar view showing the effect of a further bending operation at each side of the plate;

Figure 3 is a similar view showing the result of the formation of spaced beads in the offset edge of the plate;

Figure 4 is a similar view showing an upwardly bent edge of the beaded portion;

Figure 5 shows the upwardly bent offset portion;

Figure 6 shows the offset portion further bent upwardly to indicate an intermediate portion bent upon itself, and

Figure 7 is a perspective view of a purlin formed of two elements, both similar to that shown in Fig. 6, joined together at their edges, by a final bending or seaming of the edges.

The product of my invention is a metal lumber in the sense that I make hollow members of metal sheets, such members designed to serve as beams, joists, purlins, etc., as a substitute for lumber more usually of wood.

It is a special purpose of my invention to build hollow metal members of two or more metal elements having edge portions that may be readily secured together by seaming, welding or both, resulting in a member, usually of general rectangular cross outline, capable of supporting great weight as beams and similar elements, though formed of iron, steel or other metal plates which will not be ordinarily subject to decay as are wooden members of the same outline and size.

Since I shall form my metal beams of a plurality of plates, I shape each plate of continuous length which is passed through a forming machine which may be a rolling machine designed to perform a series of steps or operations successively, whereby the flat sheet metal may enter such machine at one end in smooth condition, and leave from the opposite end in complete condition for being secured with another seamed plate to result in the finished beam. The proposed operations will now be explained.

The first five views of the drawings show the metal sheet in edge view representing the successive bends or seams longitudinal of the sheet formed in the various stages of passage through the machine. As the sheet enters the machine, which is assumed to be a rolling machine, the two concave troughs 5 are first provided in the sheet 6, and the side portion 7 is bent from the main portion

by the oblique offset 8. This is the initial operation as the sheet enters the machine.

A further step results in bending the edge 9 of the material downward obliquely while the offset portion 8 more nearly approaches the position at right angles to the main sheet 6. As the portions 8 and 9 are bent to right angular position, upwardly-formed beads 10 are formed in the portion 7, for a purpose later to be made clear. In the next step of formation, the edge 11 of the portion 7 is bent upwardly, and at an oblique angle at first, as shown in Fig. 4.

Between the beads 10, there is formed a curved bead 12 of larger radius which in the finished product will be convex in external outline. The oblique portion 11 is now further bent to a position at right angles to the remainder of the portion 7, and at this stage the entire side portion formed from the edge 7 as it appears in Figs. 1 and 2, is bent obliquely to the offset connection 8 at the point 13, as shown in Fig. 5, such bending of the edge 7 being continued until the latter is at right angles to the sheet 6, and a fold 14 is thus formed, as now appearing in Fig. 6. One of the members for the hollow beam is now complete.

When it is desired to guide wiring through apertures of certain walls of the beam, the openings 15 may be formed in the bead 12, either before or after assemblage with another member of the beam. Sometimes it may be desirable to form such openings in the bead 12 in the form of the sheet as shown in Fig. 3 or 4. Other openings for the same purpose may be made in either of the beads 5 in the same manner. The main function of these beads 5 and 12, together with the offsets 10, is the strengthening of the beam which obviously results from such formation.

Duplicate members of the form shown in Fig. 6 are now assembled at opposite edges to form the beam shown in Fig. 7. In assembling these members, the plates 6 of the two members will be arranged in parallelism, and the composite sheets 7 will also be parallel, the folds 14 of the two members being diagonally opposite in the completed beam. The down-turned edge 9 of each member will remain in the position shown in Fig. 6, but the edge 11 of each member will be bent down over the edge 9 of the other member as will be seen in Fig. 7. The right hand upper corner of the hollow beam, as well as the left hand lower corner, as shown in Fig. 7, represent the corners of the cross section view of the final product.

The openings 15 may be formed in the beads 12 or 5 in pairs, as shown in Fig. 6, so that, when it is desired, wires or metal straps may be passed through a pair of such openings and used for the purpose of attaching the hollow metal beam to other elements, such as lathing, plaster board, or beaver board. The arrangement in pairs will make such arrangement very feasible.

The provision of the beads 10 in the operation whose result appears in Fig. 3, provides definitely-spaced shoulders 16 which, in the final beam shown in Fig. 7, will serve as positive stops to oppose any tendency of the walls 6 to collapse. The first view of such function is shown in Fig. 6 where the shoulder 16 appears as resting upon the plate 6 after the fold 14 has been formed. The other shoulder of this plate 7 adjacent the portion 11, serves to oppose inward movement of the wall 6 at the point where the edge strip 9 is bent out. These two beads 10 extend into the cavity between the side walls 6, and at the same time make possible the formation of the bead 12 without forming undesirable external portions outside the common level of the plates 7.

The folds 14 are integral portions of the two members, and serve as very strong external projecting seams further strengthened by the shoulders 16. The opposite edge of the plate 7 is bent over as the edge 11, to form a corresponding fold; but instead of extending at an angle away from the plate integrally, merely bends around the bent edge 9 of the plate 6 of the complemental member to form a three-ply fold 17 at the junction of the two metal members. The finished beam therefore, comprises two of the folds 14 diagonally positioned, and two diagonal, three-ply folds 17 for securing the members together. It is readily feasible to weld the members at these three-ply folds.

If the operations recited in the description appearing in the former pages are performed by passing the sheet through a rolling machine, the successive steps will occur in particular portions of the machine, and in the order indicated from Fig. 1 to Fig. 6 of the drawings, when one member or section for a beam or other hollow element is completed and leaves the machine prepared for attachment with another duplicate member. The rolling operation, when the operations are performed by rolling, is therefore continuous and more or less automatic.

My method of manufacturing a hollow beam which includes outwardly projecting and folded edges at all its corners is peculiar in that it requires welding at but two of such corners. This emphasizes the value of the order of steps which I have illustrated and described, and which I claim in this application, as well as the finished product.

The formation of the two folded edges 14, makes obvious the necessity of the "offset" step which results in the connecting strip 8, so that the upturning operation of the complete plate which I designate by the numeral 7, thereby results in the fold 14, as first shown in Fig. 6. The resulting product will therefore be seen to comprise a very strong element

though formed of light gage material, and is especially rigid though hollow. Further, the greater part of the steps of my method will be operated upon a metal sheet resulting in exact duplicates, and therefore capable of operation at great speed. Only the final securing steps require operations different from the method of forming the duplicate elements.

While the finished beam shown in Fig. 7 of the drawings shows the beads 5 and 12 as substantially similar, it is evident that beads of different outline may be provided without varying the order of steps shown in the first six views. Also, other beads may be provided in the various walls of the beam prior to securing the two elements together, that the arrangement of the slots in portions of such walls may be varied, and that other changes may be made in the details of my construction without departing from the inventive idea herein disclosed. I desire to cover in the appended claims all modifications that fall well within the spirit and scope of my invention.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent, is—

1. The method of forming a hollow metal lumber unit by shaping an elongated sheet into an L-shaped section by offsetting one edge portion of the sheet from the main portion thereof connected thereto by an intermediate portion at an angle to both edge portions, bending the said offset portion at an angle to the main portion and into contact with the face of said intermediate portion to form a strengthening fold, bending the extreme side edges of said section at an angle thereto, and securing two of said sections together by seaming each side edge of one section over the corresponding edge of the other.

2. The method of forming a hollow metal lumber unit by shaping an elongated sheet into L form in cross section having an integral connecting fold between the portions of the L, by offsetting one portion of such elongated sheet from the main portion thereof while connected together by an intermediate connecting portion, bending the offset portion into contact with the connecting portion to form a strengthening fold at their union, and securing two of said integrally connected sections together by folding the extreme side edges of one section over the corresponding edge of the other section.

3. The method of forming a hollow metal lumber unit by shaping an elongated metal sheet into an L-shaped section by offsetting one edge portion of the sheet from the main portion thereof integrally connected thereto by an intermediate portion at an angle to both edge portions, bending the said offset portion into contact with the face of said intermediate portion to form a strengthening fold, bending the extreme side edges of said L section at an angle thereto, and securing two of said L sections together by seaming their corresponding edges together.

In witness whereof, I have hereunto set my hand this 13th day of April, 1929.

WILLIAM O. SHELDON.