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W. O. SHELDON

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METAL LUMBER

Original Filed April 17, 1929

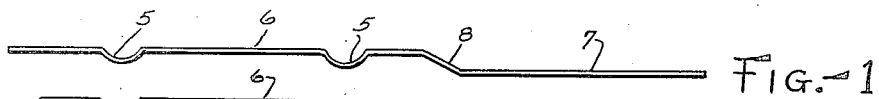


FIG. 1



FIG. 2

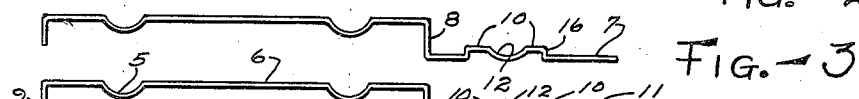


FIG. 3



FIG. 4

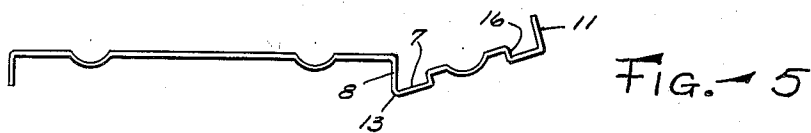


FIG. 5

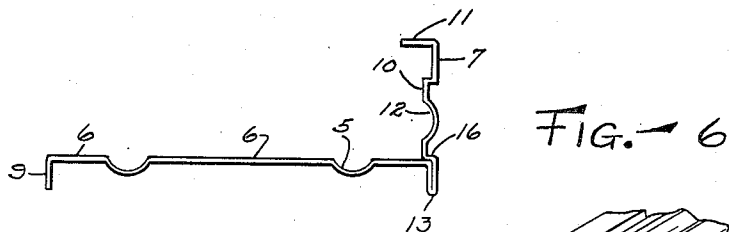


FIG. 6

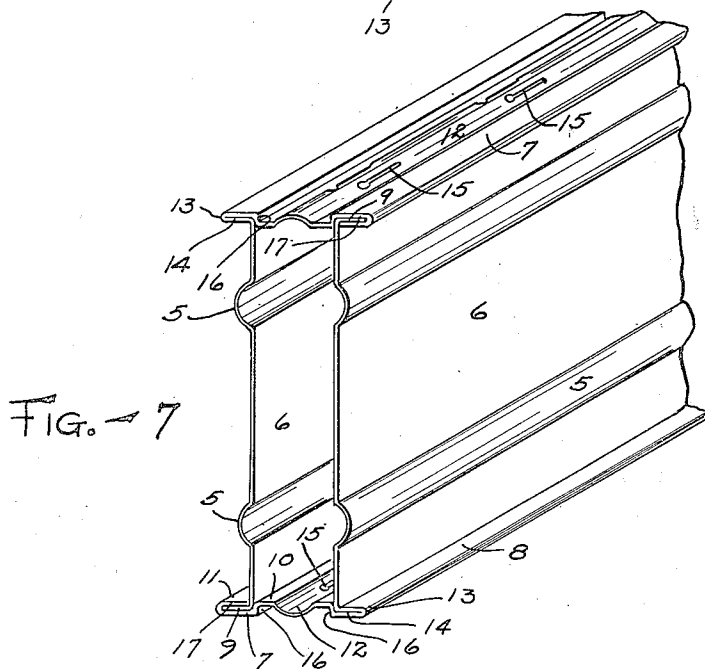


FIG. 7

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METAL LUMBER

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Original application April 17, 1929, Serial No. 355,934. Divided and this application August 20, 1930, Serial No. 476,520

3 Claims. (Cl. 189—37)

My invention relates to metal lumber, the present application being a division of my pending application Serial No. 355,934, filed April 17, 1929, and to such product 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 by any suitable operations.

My invention contemplates the formation of the finished product by stamping or bending a 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 is provided with a strengthening fold or seam at the vertex of the angle and 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 secured together by seaming, welding or both; 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 drawing, 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 duplicate metal elements having edge portions of each 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 duplicate 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 of identical outline to result in the finished beam. The proposed operations will now be explained.

The first five views of the drawing shows 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 flange is provided upon the metal sheet by bending the edge 9 of the material at right angles thereto, and the portion 8 at the angle of the sheet is bent at right angles thereto, while the edge 11 of the portion 7 is bent at right angles to the latter, as shown in Fig. 5, and in the final product.

A curved bead 12 is provided between beads 10,

and in the finished product will be convex in external outline. This provides a strengthening bead which adds greatly to the resistance of the completed beam to lateral strains, without increasing the weight of the product. A fold 14 is also formed in the material, as it appears in Figs. 6 and 7, such fold resulting from bending the metal sheet upon itself at the point 13, into surface contact therewith whereby the double thickness of contiguous material is provided to produce the very strong flanges 14 of integral material.

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 Figs. 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 duplicate members will be arranged in parallelism, and the composite sheets 7 will also be parallel, the strengthening folds 14 of the two members being diagonally opposite in the completed beam. The down-turned edge 9 of each duplicate 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 to provide an interlocking seam at the overlapped edges 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, represents 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 the 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, and completes the interlocking connection between the bent edge or flange 9, between said shoulder and the overlapped edge 11. 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 overlapped portions of material having surface contact throughout their outline and positioned at the angle of each 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 complementary member to form a three-ply interlocking fold at the junction of the two duplicate 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, though the interlocking connection afforded at these folds serves to provide strong attachment without welding.

As shown clearly in Fig. 7 of the drawing, the before mentioned externally projecting folds or seams 14 appear in the finished product in pairs. The diagonally positioned integral seams 14 being in parallel planes, and the three-ply folds whereby the two duplicate members are secured together, being in a common plane with the integral seams, respectively, these flat folds serve well to extend the area of the flat support of the entire beam at its base, and also above to receive strong pressure upon it. These folds 14 are therefore substantially flat and are always formed of material pressed upon itself, though the integral folds require no additional securing means.

If the product recited in the former pages of this specification is produced by passing a sheet through a rolling machine, the views shown in Figs. 1 to 6 of the drawing will indicate a suggestive order of operation emphasizing the character of the final product, two of which are to be secured together to result in the desired hollow beam.

The flattened contiguous plates forming the strengthening fold 14 by bending the material upon itself at 13, renders especially desirable the shoulder 16 which is offset from the main sheet, as shown in Fig. 3, at just the proper distance from the point 13, to position such shoulder in direct engagement with the angle resulting from the first bend above referred to in shaping the side portion 7 relative to the main sheet 6. This positive strengthening of the completed beam at the corner thereof by the formation of this shoulder 16 adjacent the integral sheet fold 14 has a value that can hardly be over estimated. One of such folds is shown in Fig. 6, and two of them in Fig. 7, as will be evident.

My production of a hollow beam which includes outwardly projecting and folded edges at all its corners is peculiar in that it requires welding, if used at all, though not essential, as before explained, at but two of such corners. Such hollow beam has remarkable value in providing relatively light weight products which have unusual rigidity because of the details of construction such as 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" 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 gauge material, and is especially rigid though hollow. Further, my product is made from metal sheets resulting in exact duplicates which may obviously

be formed as a single continuous length and severed, and therefore capable of production at great speed.

While the finished beam shown in Fig. 7 of the drawing shows the beads 5 and 12 as substantially similar, it is evident that beads of different outline may be provided without varying the advantages gained in the final product. Also, other beads may be provided in the various walls of the beam resulting from 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.

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

1. An elongated continuous metal plate L-shaped in general outline in cross section, the elongated portions of the L being integral, the material of one portion overlapping the other in face contact at the angle of the L to form an outwardly extending flat fold of two-ply material at the angle of the portions of the L, and further bent inwardly at the vertex of such angle to form an offset strengthening shoulder for contacting the other portion.

2. A hollow metal beam, comprising a pair of like sheet metal sections, each section being bent lengthwise to provide a broad wall and a narrow wall at rightangles thereto, the narrow wall having outwardly offset seats near opposite ends and

the integral edge portion of the broad wall being bent into face engagement with the adjacent seat to close the same and provide a reinforcing fold of double thickness at the angle between the walls, the free edges of the broad wall being bent at right angles to provide a seating flange to engage the open offset seat in the short wall of the opposite section, and the free edge portion of the short wall beyond said open seat being overturned upon the seating flange of the broad wall of the opposite section for locking the sections together.

3. A hollow metal beam, comprising a pair of like sheet metal sections, each section being bent lengthwise at rightangles to provide angularly disposed walls, one wall having outwardly offset seats near its opposite edges providing spaced outwardly facing shoulders and the integral end of the other wall being bent into face contact with the adjacent seat of the first wall to provide a strengthening fold of double thickness at the angle between the walls and with the second wall braced against the adjacent shoulder of the first wall, the free end of the second wall having a laterally extending flange engaging in the other seat of the first wall of the opposite section and with the second wall engaging the adjacent shoulder thereof, the free edge of the first wall being overturned against the flange of the opposite second wall to interlock the flange in the seat and hold the sections together.

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