June 18, 1963 W. R. ATTWOOD 3,094,197

BUILDING CONSTRUCTION ELEMENT

Filed April 30, 1958

FIG.1.

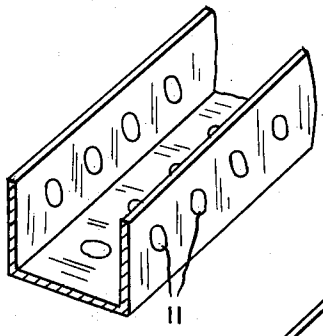


FIG.2.

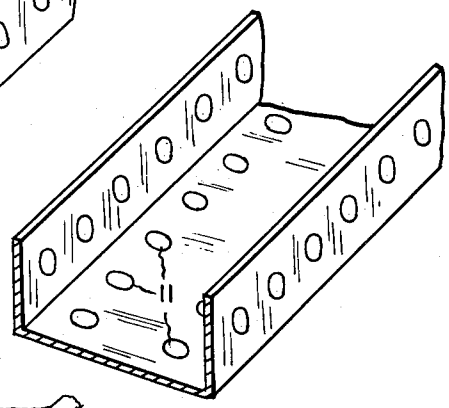
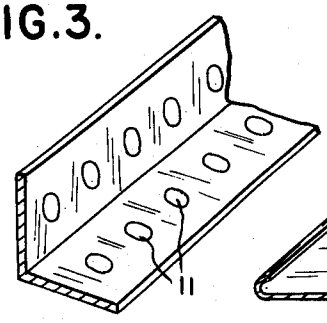


FIG.3.



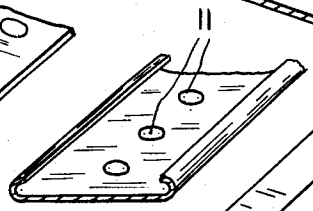


FIG.8.

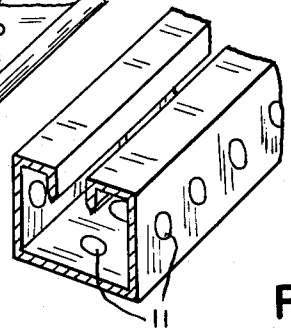


FIG.4.

FIG.7.

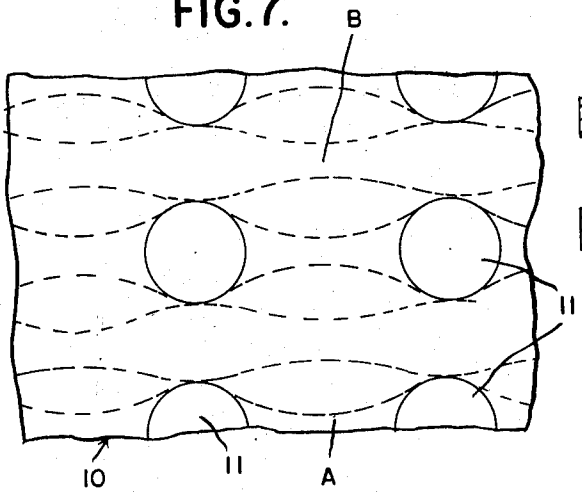


FIG.5.

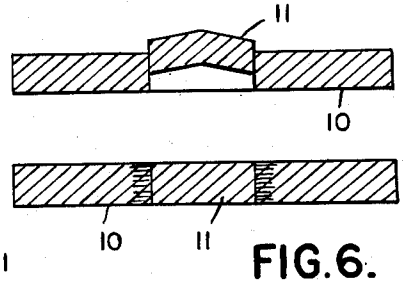


FIG.6.

INVENTOR.

Warren R. Attwood

BY

Hauke & Horstey

ATTORNEYS

United States Patent Office 3,094,197 Patented June 18, 1963

3,094,197

BUILDING CONSTRUCTION ELEMENT

Warren R. Attwood, 4118 S. Wayne Road, Wayne, Mich.

Filed Apr. 30, 1958, Ser. No. 731,997
5 Claims. (Cl. 189—34)

The present invention relates to structural elements for use in building or analogous construction and specifically for metal members to be used in constructing framework or other load supporting structures and to a process of producing such elements.

Among the objects of the invention is to provide a structural element that may be connected to other structural elements by bolting two or more of the elements together directly or by using suitable connecting brackets or the like.

Another object of the invention is to provide a metal construction element which itself will be provided with a plurality of potential bolting locations for the insertion of bolts or screws without materially weakening the strength of the element.

Still another object is to provide a metal structural element in which a bolt hole may be made at any one of a plurality of locations, without the necessity of using a drill or punch, while maintaining substantially the full strength of the element.

Other objects will readily occur to those skilled in the art to which the invention pertains upon reference to the following description and the accompanying drawings in which

FIGURES 1 to 4 and 8 show in perspective several forms of structural elements embodying the present invention.

FIGURE 5 is a diagrammatic sectional view through a portion of one of the elements of FIGURES 1 to 4 in an intermediate stage of its preparation.

FIGURE 6 is a similar view to that of FIGURE 5 but shows the final position of the parts.

FIGURE 7 is a view in plan of a portion of one of the elements shown in FIGURES 1 to 4.

In the drawings, FIGURES 1 to 4 and 8 show portions of structural members each having at least one flat side, FIG. 8 showing a strip having rolled edges, FIGS. 1 and 2 showing open channels, FIG. 3, an angle member, and FIG. 4 showing a special form of channel member in which the channel walls are turned in at right angles and their edge portions again turn in at right angles to produce a rectangular section member having a longitudinal slot bordered by inturned flanges.

In all of these forms, the structural element consists of a member having one or more flat sides or faces. In these forms having two or more flat sides or faces and with two adjacent faces at an angle to each other, while the angle is indicated as a right angle, a greater or smaller angle may be used without departing from the spirit of the invention.

As stated above, each of the elements is provided with means, by taking advantage of which, bolt holes may be produced at any one or more of a plurality of locations. This means is a special form of "knockout" such as is indicated in FIGURES 5, 6 and 7.

In these figures, a piece of the sheet metal is indicated at **10**. In the process of preparing the knockout, a disc **11** of the desired diameter is first punched in such fashion as to almost but not completely removed it from the surrounding matrix metal. In punching up the disc **11**, a special punch having a rather flat V-shaped end is used; that is, the punch end shows a low ridge across it, the planes on either side of the apex being flat and show an angle to the horizontal, the term "horizontal" referring

to a plane normal to the axis of the punch. This also slightly elongates the disc.

After the disc **11** is punched up to about the position shown in FIG. 5, it is then by suitable means forced back into the plane of the matrix metal and at the same time flattened into such plane. This operation of returning and flattening the disc **11** results not only in the disc being held against accidental displacement, but, more important, it pre-stresses the matrix metal in the manner indicated by the areas A and B of FIGURE 7.

In this figure, the matrix metal over approximately the areas A is indicated as put into a compression stress, while over approximately the areas B, it is put into tension.

The pre-stressing of the metal in the manner indicated results in a more equable distribution of the load resistance when a member such as shown in FIGURES 1 to 4 is put under longitudinal compression, and the compression strength of the member is substantially equal to that of a similar continuous member.

While the above description of the preferred embodiment of the invention specifically mentions the use of a punch having a V-shaped end, it is within the purview of the invention to utilize a punch having a conical end and thus production stresses in the member other than the linear stresses described.

Further, while the knockouts are shown and described as circular "discs," other shapes may be found desirable and are contemplated.

I claim:

1. A metallic structural element comprising a load transmitting member having at least one flat portion, a plurality of spaced knockouts disposed in the plane of said flat portion, said knockouts pressing against the adjacent metal of said member at all times and producing stress in the metal intermediate said knockouts.

2. A metallic structural element comprising a load transmitting member having at least one flat portion, a plurality of spaced knockouts disposed in the plane of said flat portion, said knockouts pressing at all times against the adjacent metal of said member and producing compression stresses, portions of the metal intermediate some knockouts and producing tension stresses in the metal intermediate other of said knockouts.

3. A metallic structural element comprising an elongated load transmitting member having at least one flat portion in which is provided a longitudinally extending series of knockouts disposed in the plane of said flat portion, said knockouts at all times pressing against the adjacent metal of said member substantially in the longitudinal direction thereof and effecting compression stresses in the metal between the knockouts of said series and tension stresses in the metal adjacent to and parallel with said series.

4. A metallic structural element comprising an elongated load transmitting member having at least two flat portions angularly disposed with respect to each other in which said flat portions are provided with longitudinally extending series of knockouts disposed in the plane of said flat portions, said knockouts at all times pressing against the adjacent metal of said member substantially in the longitudinal direction thereof and effecting compression stresses in the metal between the knockouts of said series and tension stresses in the metal adjacent to and parallel with said series.

5. A metallic structural element comprising a load transmitting member having at least one flat face portion, a plurality of rows of spaced knockouts disposed in the plane of said flat portion, said knockouts pressing against the adjacent metal of said member at all times in directions parallel with said rows and producing compression

stresses in the metal intermediate the knockouts of each row and producing tension stresses in the metal intermediate said rows.

References Cited in the file of this patent

UNITED STATES PATENTS

1,096,548	Maison	May 12, 1914
1,491,325	Thomas	Apr. 22, 1924
1,801,006	Jacoby	Apr. 14, 1931
2,347,411	Hefler et al.	Apr. 25, 1944
2,605,868	Cripe	Aug. 5, 1952
2,632,533	MacKenzie	Mar. 24, 1953
2,733,786	Drake	Feb. 7, 1956
2,798,284	Mudd	July 9, 1957

FOREIGN PATENTS

205,848	Australia	Jan. 29, 1957