

[54] HOLLOW STRUCTURAL MEMBERS

[75] Inventor: Ralph O. Kaufman, Sr., Titusville, Pa.

[73] Assignee: Cyclops Corporation,
Universal-Cyclops Specialty Steel
Division, Pittsburgh, Pa.

[22] Filed: Apr. 26, 1971

[21] Appl. No.: 137,555

Related U.S. Application Data

[60] Division of Ser. No. 864,927, Sept. 10, 1969, Pat. No. 3,606,580, which is a continuation-in-part of Ser. No. 823,924, May 12, 1969, abandoned.

[52] U.S. Cl. 52/731, 52/732, 52/729

[51] Int. Cl. E04c 3/07

[58] Field of Search. 52/728-732, 632, 108

[56] References Cited

UNITED STATES PATENTS

2,918,977	12/1959	Fedan	416/233
2,713,774	7/1955	Heintzmann	52/632
782,495	2/1905	Eichfeld	52/732
521,320	6/1894	Polson	52/732
674,379	5/1901	Hard	52/731
2,711,231	6/1955	Spangler	52/729
3,170,201	2/1965	Nofziger	52/731

3,102,306 9/1963 Hatchinson 52/632

FOREIGN PATENTS OR APPLICATIONS

236,609	3/1964	Austria	52/731
604,504	9/1060	Canada	52/632
405,551	8/1934	Great Britain	52/730
413,711	7/1934	Great Britain	52/731

Primary Examiner—Frank L. Abbott

Assistant Examiner—Henry E. Raduazo

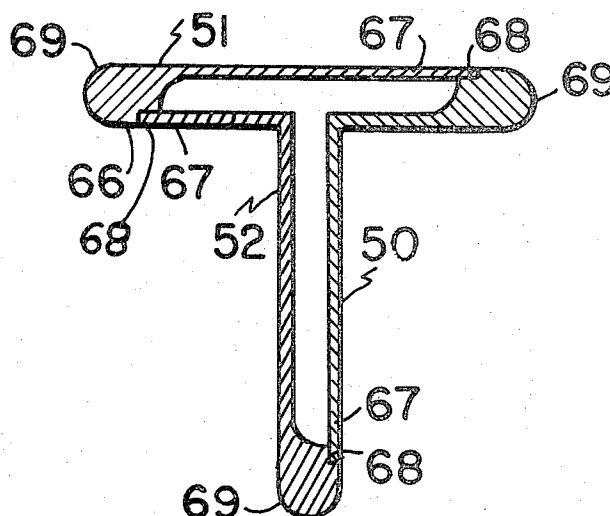
Attorney—Webb, Burden, Robinson & Webb

[57]

ABSTRACT

A hollow structural member comprising at least two connected wrought metal components, each component having a specially formed edge configuration and a plain formed remaining portion. The hollow structural member is formed by connecting the plain formed remaining portion of a first component with the specially formed edge configuration of a second component and connecting the plain formed portion of the second component with the specially formed edge configuration of the first component or a third component, etc., these connections being inward from the outer extremities of the special formed edge configurations and being along a recess in an enlarged mass portion of the special formed edge configuration.

3 Claims, 6 Drawing Figures



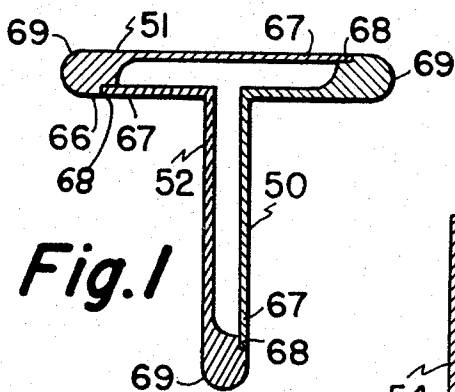


Fig. 1

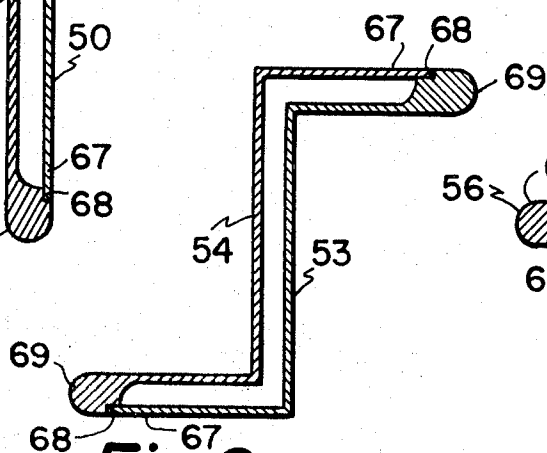


Fig. 2

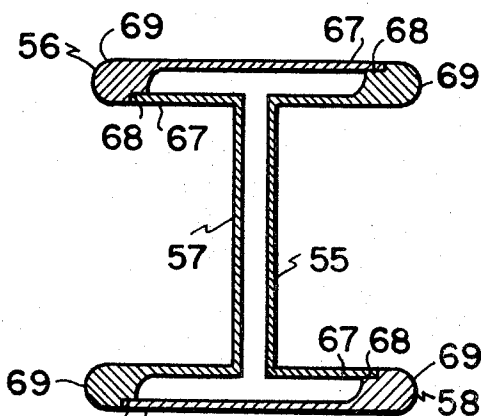


Fig. 3

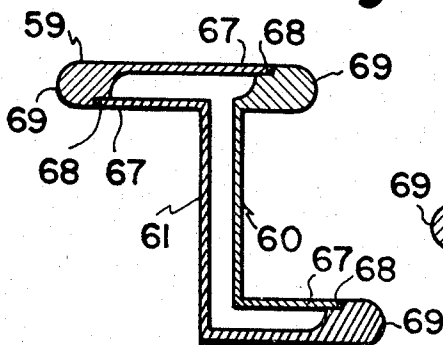


Fig. 4

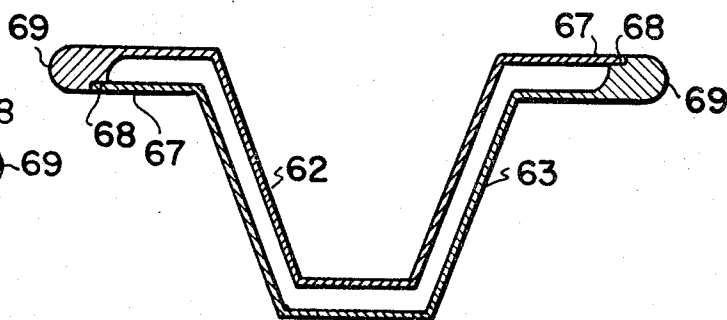


Fig. 5

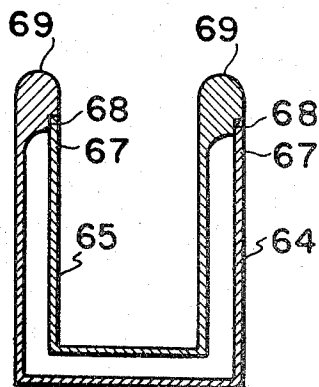


Fig. 6

INVENTOR.
 Ralph O. Kaufman, Sr.
 BY
 Webb Bunden Robinson & Webb
 HIS ATTORNEYS

HOLLOW STRUCTURAL MEMBERS

This application is a division of U.S. Pat. No. 3,606,580, issued Sept. 20, 1971, which, in turn, is a continuation-in-part of my application Ser. No. 823,924, filed May 12, 1969, now abandoned. This invention relates to hollow structural members. As a result of unique shape, weight, chemical and physical property requirements, there is needed structural members other than the standard solid structurals known heretofore. Standard structurals made by forging, casting, cold drawing, extruding, cold rolling and machining are often too expensive as well, especially where additional operations are necessary to accomplish a particular desired configuration.

My structural members are hollow and, therefore, the weight thereof is greatly minimized, thereby permitting greater material flexibility. In addition, my structural members permit manufacture in a simple, efficient and high yield manner, thereby minimizing costs. Since the individual components which make up my hollow structural members are of relatively thin cross section, they may be formed into intricate shapes so that the final assembled product has configurations which normally are not achievable by standard processing methods.

My hollow structural members consist of wrought metal components having a special formed edge configuration including an enlarged mass portion and a recess therein and a plain formed remaining portion. These components are blanked from precision rolled elongated shapes and after forming are positioned and joined in a manner that the plain formed remaining portion of one component cooperates with the recess in the enlarged mass area of the specially formed edge configuration of another component to form a direct and continuous connection and all the components are so positioned and joined to form the hollow structural member. No two adjacent connections are along the same face of the member.

In the accompanying drawings, I have shown my presently preferred embodiments of my invention in which:

FIG. 1 is a section through a hollow T-shaped structural member;

FIG. 2 is a section through another shaped structural member;

FIG. 3 is a section through an I-shaped structural member;

FIG. 4 is a section through another structural member;

FIG. 5 is a section through still another structural member; and

FIG. 6 is a section through a U-shaped structural member.

Each of the hollow structural members, illustrated in FIGS. 1-6, is constructed by precision rolling a wrought metal bar into an elongated shape having a specially formed edge configuration which includes an enlarged mass portion and a recess therein and a plain formed remaining portion. The elongated shape is then blanked to the desired size and this operation may merely entail squaring off the ends of the elongated shape where the elongated shape is of the approximate desired length. After blanking, the components are formed by known techniques into the desired shapes.

The components are then assembled so that a plain formed remaining portion 67 cooperates in a direct and

continuous manner with the recess 68 in the enlarged mass portion of a specially formed edge configuration 69 of another component. The components are then joined by brazing, welding or other known techniques. The recess 68 in the enlarged mass portion is formed inward of the extreme end thereof so that edge damage does not effect the connection. Each connection occurs along an enlarged mass portion for additional support and ease of handling the components during joining. Further, the components are formed and positioned so that adjacent connections are on different faces of the structural members and in this way no single shear plane can pass through more than one connection. As described in my parent application, Ser. No. 864,927 directed to hollow airfoils, the hollow structurals can be tapered by blanking the components into trapezoidal shapes prior to joining them.

Specifically, a T-shaped structural, FIG. 1, is formed of three components 50, 51 and 52. Two of the components 50 and 52 are bent at 90° and are positioned so that the bent portions flare outwardly in opposite directions along the same plane. These flared out portions are joined by straight component 51. Each component 50, 51 and 52, has a specially formed end configuration 69 including an enlarged mass having a recess 68 therein and a plain formed remaining portion 67. The positioning of the components, the connection thereof and the location of the connection with respect to the edges of the member and to other connections, are all in accordance with my invention as described heretofore.

A two component hollow structural with each component having double reversed 90° bends is illustrated in FIG. 2. Components 53 and 54 are double reverse bent and then positioned and joined in accordance with the invention.

An I-shaped structural is constructed by employing four components 55, 56, 57 and 58, see FIG. 3. The two components 55 and 57 which form the web of the I-shaped structural are each bent at each end and positioned so that the outwardly bent sections are oppositely directed along a same plane from those of the other component. Components 56 and 58, respectively, form the base of the I-shaped structural and are connected to the outwardly flared sections of the web components 55 and 57 in accordance with my invention.

The individual components can be bent immediately adjacent the specially formed edge configuration, as shown in FIG. 4, to form a modification of the structural member illustrated in FIG. 2. Component 60 is so bent and then joined with components 59 and 61 in accordance with my invention.

The components need not be bent at 90° as illustrated in FIG. 5 wherein a two component, 62 and 63, system forms a structural shape in which each component is formed with four acute angle bends therein. Again, the positioning and connecting of the components 62 and 63 is in accordance with the invention.

A simple U-shaped, hollow structural support can be formed of two components 64 and 65, see FIG. 6, by forming two bends of 90° in each component and joining them in accordance with the invention.

The components employed in my structural members can be extruded or otherwise formed as well as precision rolled. Where precision rolling is employed, sheet stock as well as bar stock can be utilized. My structural

members may be further modified by internal supports for stiffness or filler materials to give strength or heat transmitting properties to the overall structural member.

I claim:

1. A hollow structural member comprising three connected wrought metal components, each of said components having a specially formed edge configuration including an enlarged mass portion and a recess therein inwardly located from the extreme end thereof and a relatively thin remaining portion so formed that the relatively thin remaining portion of each component mates with and is connected in a direct and continuous manner to the recess of the enlarged mass portion of the specially formed edge configuration of another component, two of said components having opposing 90° bends, said three components being joined to form a hollow T-shaped structural member, and each adjacent connection being on different faces of the structural member.

2. A hollow structural member comprising two connected wrought metal components, each component having two 90° bends in the same direction, a specially formed edge configuration including an enlarged mass portion with a recess therein inwardly located from the extreme end thereof and a relatively thin remaining portion so formed that the relatively thin remaining

portion of each component mates with and is connected in a direct and continuous manner to the recess of the enlarged mass portion of the specially formed edge configuration of the other component, the two components being joined to form a U-shaped hollow structural member, and each adjacent connection being on different faces of the structural member.

3. A hollow structural member comprising four connected wrought metal components, two of said components each having 90° bends in the same direction, said two components positioned so that said 90° bends are oppositely directed, the remaining two components being straight and connecting to the bent components, each of said components having a specially formed edge configuration including an enlarged mass portion and a recess therein inwardly located from the extreme end thereof and a relatively thin remaining portion so formed that the relatively thin remaining portion of each component mates with and is connected in a direct and continuous manner to the recess of the enlarged mass portion of the specially formed edge configuration of another component, the four components being joined to form an I-shaped hollow structural member, and each adjacent connection being on different faces of the structural member.

* * * * *

30

35

40

45

50

55

60

65