Aug. 2, 1938. E. J. W. RAGSDALE ET AL 2,125,690

BOX SECTION BEAM

Filed Nov. 2, 1933

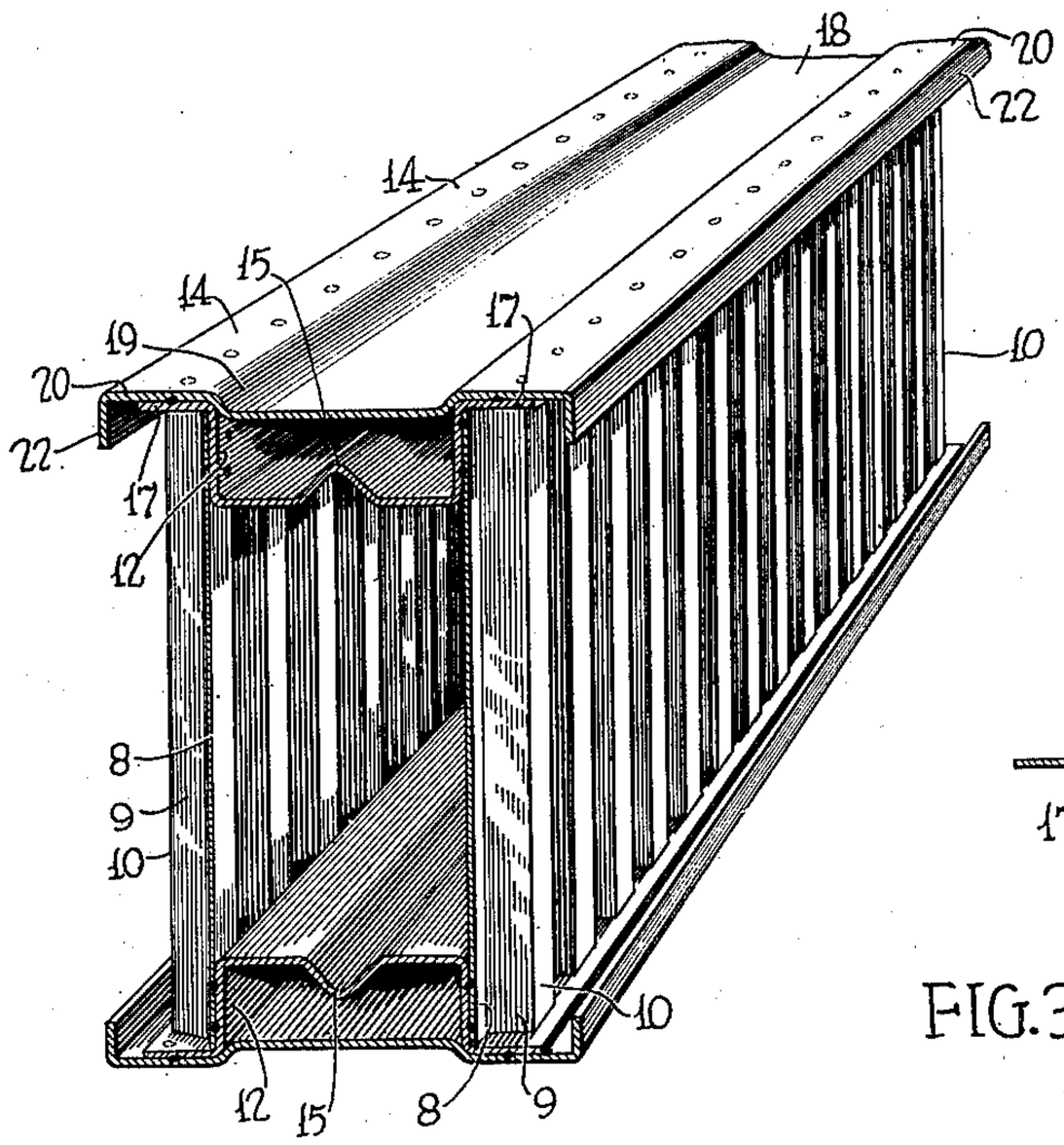


FIG.1

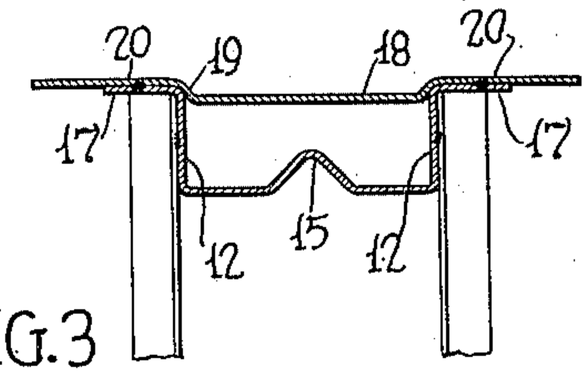


FIG.3

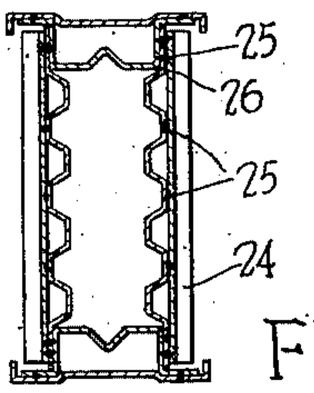


FIG.5

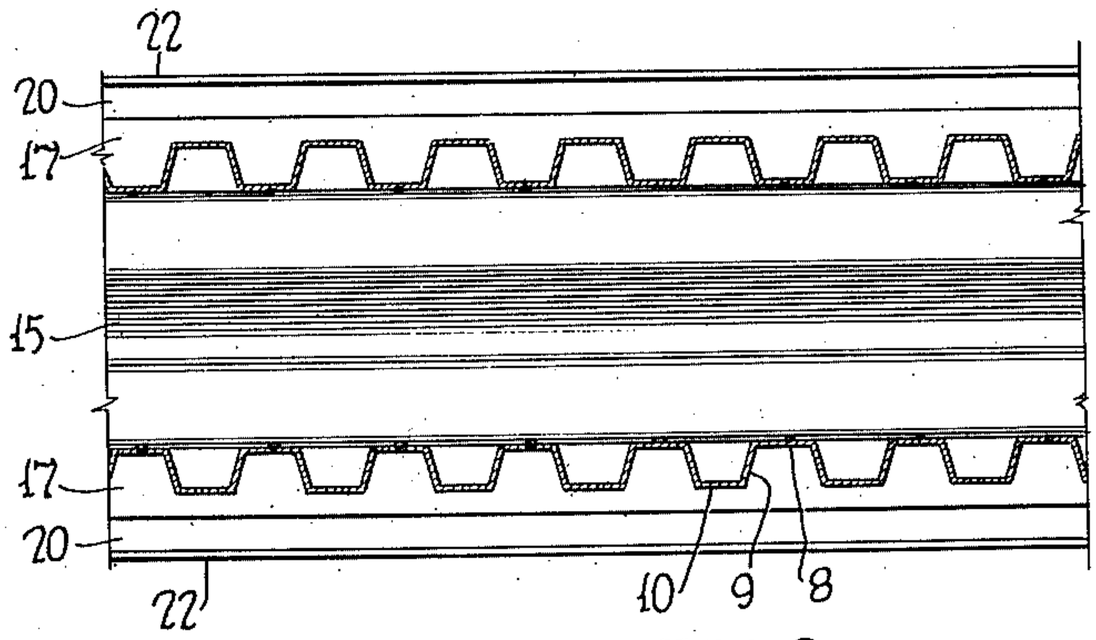
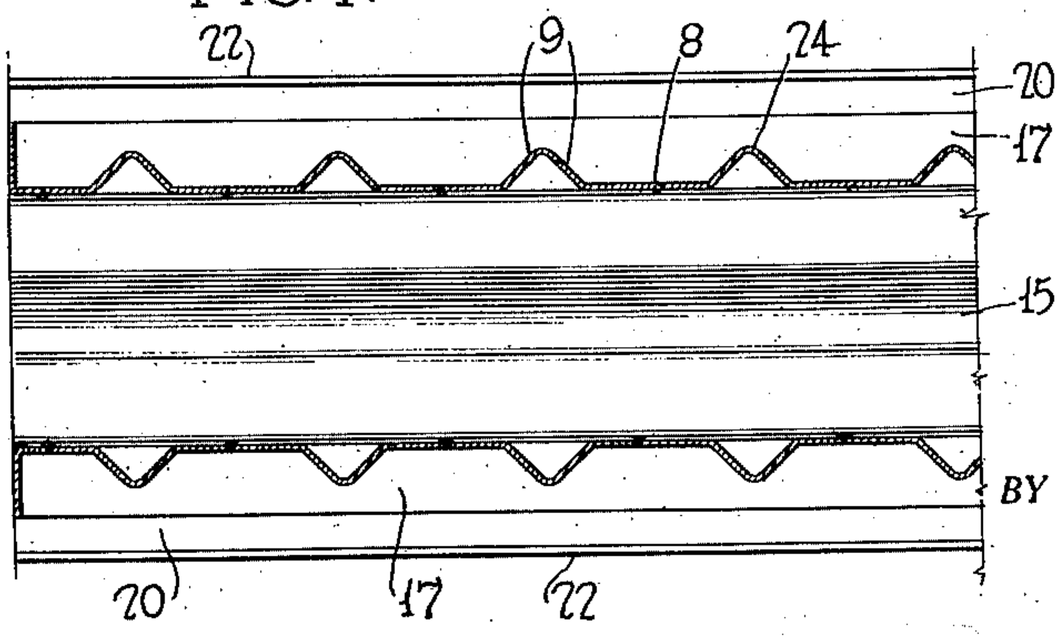


FIG.2

FIG.4.



INVENTOR.

EARL J. W. RAGSDALE.

ALBERT G. DEAN.

John P. Barker

ATTORNEY.

Patented Aug. 2, 1938

2,125,690

UNITED STATES PATENT OFFICE

2,125,690

BOX SECTION BEAM

Earl J. W. Ragsdale, Norristown, and Albert G. Dean, Narberth, Pa., assignors to Edward G. Budd Manufacturing Co., Philadelphia, Pa., a corporation of Pennsylvania

Application November 2, 1933, Serial No. 696,298

9 Claims. (Cl. 189—37)

Our invention relates to beams, girders, columns and the like and particularly to devices of this character to be constructed of sheet metal.

The object of our invention is to decrease the quantity of metal and consequently, the weight and cost of a structure of the above-indicated character, to facilitate its manufacture and assembly, to especially adapt it to spot welding, to give it substantially maximum strength in consideration of the amount and kind of material employed, to render it more effective in operation and to have it better cooperate with appurtenant parts, to have it simple and durable in construction, and to render it an improvement generally in its particular service.

More specifically, the invention relates to a box-section beam in which the webs are improved by constructing them of thin gauge sheet-metal and of corrugated contour, the chords are each locally or separately of box section, constituting sub-box sections of the box-section beam itself, edge flanges of novel character are provided on the chords and other improvements are effected.

Figure 1, of the accompanying drawing, is a perspective view of a beam or girder constructed in accordance with my invention.

Fig. 2 is a sectional view, taken normal to a horizontal plane, through a portion of the structure of Fig. 1.

Fig. 3 is a detail sectional view, similar to the top front portion of Fig. 1, of a modified form of the structure thereof, and

Fig. 4 is a view, similar to Fig. 2, showing a modified form of corrugated web structure.

Fig. 5 is a transverse section of a modification in which the web members are longitudinally corrugated.

Referring to Figs. 1 and 2, the webs are preferably constructed from thin-gauge stainless sheet steel, although not so limited, and of corrugated, ribbed or sinusoidal form having relatively sharply intersecting walls 8, 9 and 10, whereby to provide flat, relatively-great, surface areas for contact with the chords, and spaces between the walls 9 sufficient to receive welding tools.

This shape is easy to provide, by a stamping or continuous rolling process, from simple, flat sheets and constitutes a multiple, or series, truss structure of substantially the same strength as a flat sheet of the same material and of greater weight. Where large beams, or several of them, are to be employed in the same structure, it is readily seen that the aggregate saving is very great.

The chords comprise inner plates, of substantially channel-section, having flat sides 12 abutting the walls 8 of the webs, whereby they may be spot welded thereto, as indicated at points 14, local central portions 15 of reverse-opening channel-section and outwardly-extending edge flanges 17 over the ends of the web corrugations.

Outer plates of the chords include inbent portions providing channel-sections having transverse walls 18, side walls 19 and outwardly-extending flanges 20 which preferably extend substantial distances from the webs to facilitate spot welding to a floor layer or other structure.

In the form of our invention shown in Fig. 3, the flanges 20 are flat throughout, whereas, in the structure of Figs. 1 and 2 they are inturned to constitute strengthening extensions 22 which also facilitate welding in vertical planes or at right angles to the main flange portions 20.

The inner and outer plates of the chords render the latter of box-section of sufficient distance between all of its inner surfaces to accommodate constructing tools, such as spot-welding tongs.

In the form of our invention shown in Fig. 4, the structure is the same as those above described, except that the walls 8 are of greater area and the walls 9 are sloped together at sharper angles to substantially eliminate the walls 10 of the devices of the other figures, or, at least, to reduce them to short sections 24 of rounded or other contour.

The modification shown in Fig. 5 is similar to that of Figs. 1 and 2 except that the webs are longitudinally corrugated, and reinforced by vertical struts 24 of outwardly facing channel section, secured by spot welds 25 to the outwardly projecting ribs of the web and to the side margins 26 to which the chord is secured.

The composite multi-plate chords are preferably of relatively thin-gauge sheet-metal but, by reason of the box sections and extended surface areas thereof, they conduce to a great reduction in weight, in consideration of necessary strength, and facilitate welding to a high degree.

The structure is of extremely easy fabrication, is neat and compact, is easy to transport, is proof against thermal expansion and other weather effects and has other advantages over beam structures heretofore suggested.

While we have shown and described particular forms of our invention, changes may be effected therein without departing from the spirit and scope thereof, as set forth in the appended claims.

We claim as our invention:

1. A beam comprising a pair of bodily spaced corrugated webs, a chord member between said webs having a pair of side chord elements extending along the webs and beyond the edges of the webs, and a bridging chord member of flanged channel section fitted between the side chord elements across the edges of the webs with its flanges over-lapping the side chord elements, the

channel section of the bridging chord member spacing the webs apart through engagement of the side walls of the channel cross section with the side chord elements.

2. A light weight sheet metal beam comprising web members spaced apart throughout their bodies and corrugated throughout their length by corrugations of a cross section, small as compared with the transverse width between the outer web faces, through-running channel cross section members substantially coextensive with said web members having side faces connected to the bottoms of the corrugations of the web members, and having outwardly extending flanges lying substantially in the plane of the ends of the web corrugations and through-running chord members having outwardly projecting margins overlapping and secured to the outwardly extending flanges of said through-running channel cross section members and having shoulders spacing said web members apart, and means extending from the web members and secured to the web members transversely of the corrugations to stabilize said corrugations.

3. A light weight sheet metal beam comprising web members spaced apart throughout their bodies and corrugated throughout their lengths, through-running channel cross section members having side faces secured to the bottoms of the web corrugations and having outwardly projecting margins, and through-running chord members nested within the first mentioned through-running members and having outwardly projecting margins overlapping and secured to the outwardly projecting flanges of the through-running channel cross section members and spacing said web members apart, the width of the overlap between the channel cross section members and the chord members being substantially greater than the depth of the corrugations of the webs.

4. A beam comprising a pair of bodily spaced shallow transversely corrugated sheet metal webs, a chord member lying along the inner face and near the edge of each web and provided with outwardly extending flanges and a bridging chord member of flanged channel section fitted between the webs and overlying the ends of the corrugations and overlapping and secured to the outwardly extending flanges of the first mentioned chord member, and spacing said corrugated webs apart, the depth of the corrugations of the webs being substantially less than the width of said lap joint.

5. A light weight sheet metal beam comprising web members spaced apart throughout their bodies and transversely corrugated throughout their lengths by corrugations of a cross-section, small as compared with the transverse width between the outer web faces, through-running channel cross section members having side faces connected to the bottoms of the corrugations of the web members, and having outwardly extending flanges lying substantially in the plane of the ends of the web corrugations and through-running chord members having outwardly projecting margins overlapping and secured to the outwardly extending flanges of said through-running channel cross-section members and spacing said web members apart, the overlap being of a width substantially greater than the depth of said corrugations, said channel cross section members each having other branches extended at an angle to the general plane of the web members and between the web members, whereby the bottoms of the corrugations are internally stabilized.

6. A light weight sheet metal beam comprising web members spaced apart throughout their bodies and transversely corrugated throughout their lengths, through-running channel cross-section members having side faces connected to the bottoms of the corrugations of the web members and outwardly extending flanges, and through-running chord members having outwardly projecting margins overlapping and secured to the outwardly extending flanges of the through-running channel cross-section members and spacing said webs apart, the overlap between the channel cross-section members and chord members being substantially greater than the depth of the corrugations of the webs.

7. A light weight sheet metal beam comprising web members spaced apart throughout their bodies and longitudinally corrugated throughout their lengths by corrugations of a cross-section, small as compared with the transverse width between the outer web faces, through-running channel cross-section members having side faces connected to the bottoms of the corrugations of the web members and outwardly extending flanges lying substantially in the plane of the edges of the web corrugations, and through-running chord members having outwardly projecting margins overlapping and secured to the outwardly extending flanges of said through-running channel cross section members and spacing said web members apart, the overlap being of a width substantially greater than the depth of said corrugations, and an angular member having a face secured to the web corrugations and another face transverse of said corrugations, said angular member being secured adjacent its ends to the through-running channel cross-section members.

8. A beam comprising a pair of bodily spaced longitudinally corrugated webs, a chord member between said webs having a pair of side chord elements extending along the webs and beyond the edges of the webs and a bridging chord member of flanged channel section fitted between the side chord elements across the edges of the webs with its flanges overlapping the side chord elements, the channel section of the bridging chord member spacing the webs apart through engagement of the side walls of the channel cross-section with the side chord elements.

9. A beam comprising a pair of bodily spaced longitudinally corrugated webs, a chord member between said webs having a pair of side chord elements extending along the webs and beyond the edges of the webs and a bridging chord member of flanged channel section fitted between the side chord elements across the edges of the webs with its flanges overlapping the side chord elements, the channel section of the bridging chord member spacing the webs apart through engagement of the side walls of the channel cross-section with the side chord elements, said side chord elements being connected by an integral web extending between the corrugated webs and forming with the bridging chord member, a box section chord.

EARL J. W. RAGSDALE.
ALBERT G. DEAN.