

Aug. 31, 1943.

H. C. FISCHER ET AL

2,328,441

STRUCTURAL MEMBER

Filed Oct. 9, 1942

2 Sheets-Sheet 1

Fig. 1

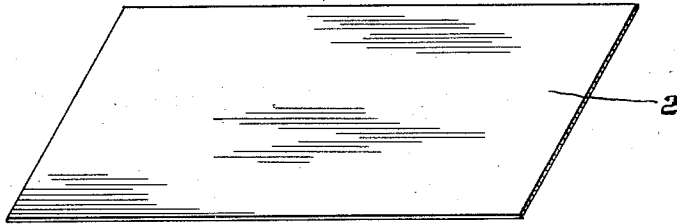


Fig. 2

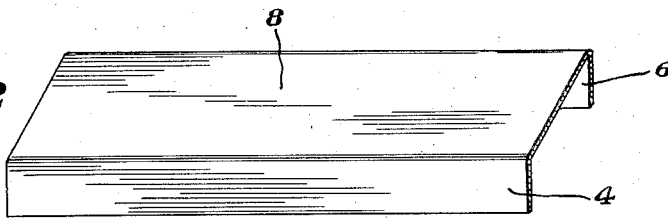


Fig. 3

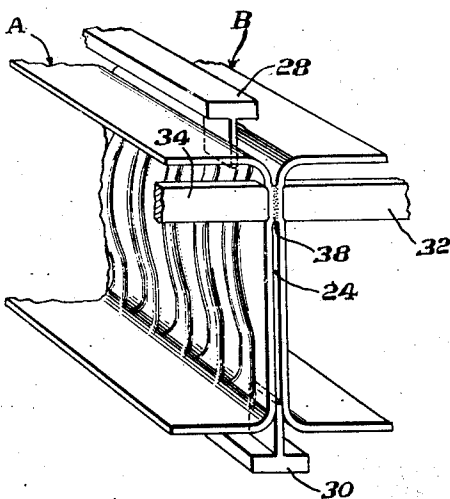
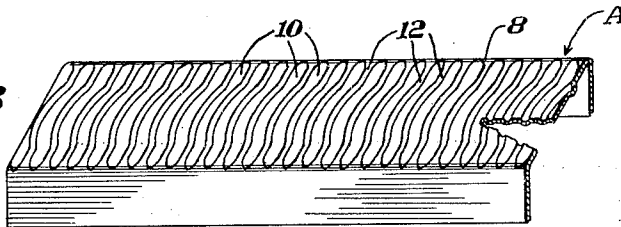
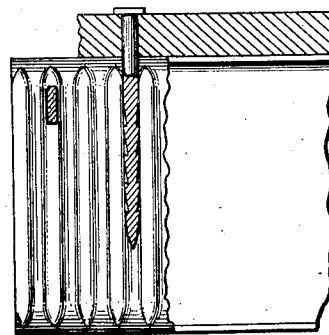


Fig. 4

Fig. 11



INVENTORS

Herbert C. Fischer
Allan H. W. Higgins
BY *Richard W. Higgins*
ATTORNEY

Aug. 31, 1943.

H. C. FISCHER ET AL

2,328,441

STRUCTURAL MEMBER

Filed Oct. 9, 1942

2 Sheets-Sheet 2

Fig. 5.

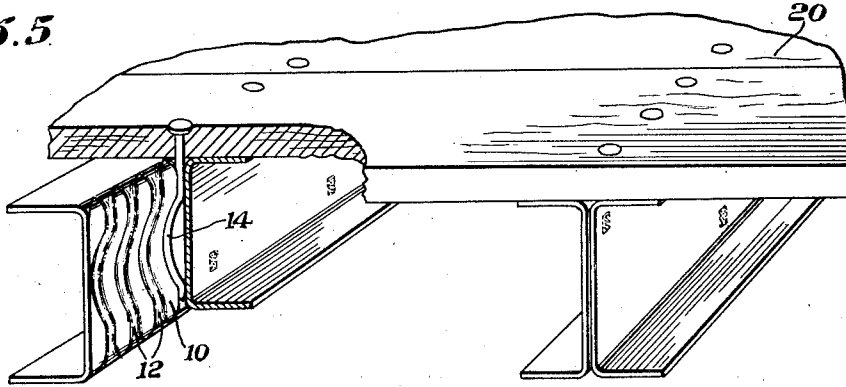


Fig. 6

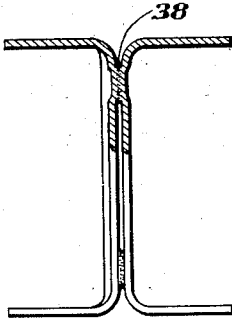


Fig. 7

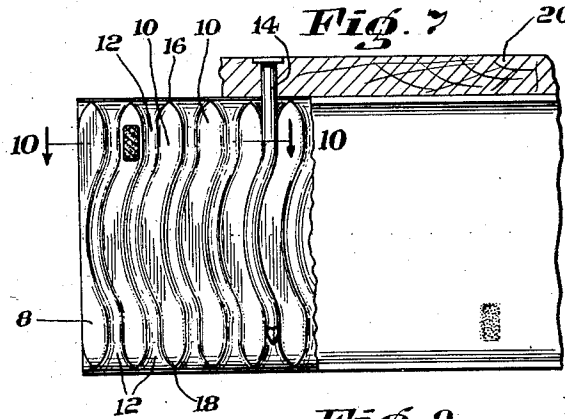


Fig. 8

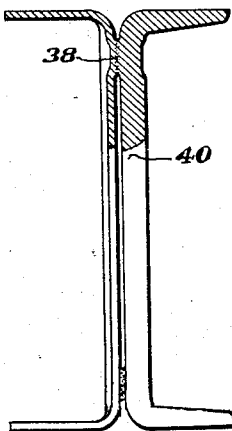


Fig. 9

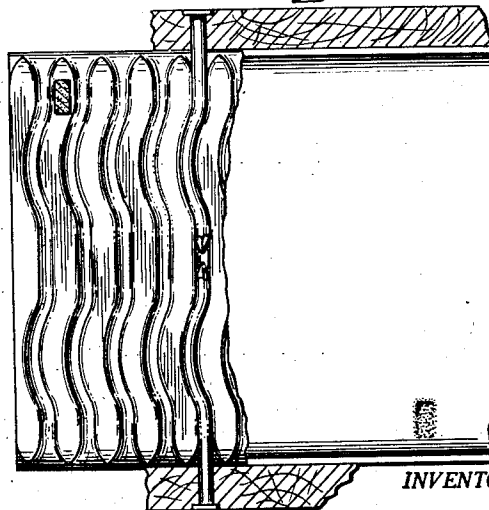
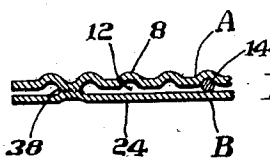


Fig. 10



INVENTORS

BY Herbert C. Fischer
Allen H. W. H.

Allen H.W. Higgins

Richard L. Lattin
ATTORNEY

ATTORNEY

UNITED STATES PATENT OFFICE

2,328,441

STRUCTURAL MEMBER

Herbert C. Fischer, Wellesley Hills, and Allan
H. W. Higgins, Boston, Mass.

Application October 9, 1942, Serial No. 461,412

3 Claims. (Cl. 189-34)

This invention relates to the construction of buildings, ships, airplanes, and the like, and has for its object to provide novel flanged structural elements of the type having alternate grooves and ribs, preferably sinuously curved, extending transversely from one margin of the web to the other for the reception of nails, screws and the like for attaching other building members, such as walls, floor joists, roofers etc. thereto.

In accordance with the preferred embodiment of our invention, the structural element is formed with a flange along one or both margins of its web and grooves and ribs are then formed in the web by cold rolling it, the depth of the grooves being somewhat less than the diameter of the nails which they are to receive. The element with its web thus formed is secured to a companion structural element having a plane-surfaced web with the webs of the two elements opposed to each other and slightly spaced apart by securing means interposed between their webs. The grooves in one web and the plane opposed face of the other web define nail-receiving voids having cross-sectional dimensions adequate to receive the nails.

Our experiments have shown that the structural member thus formed of combined elements is effective for securely holding the nails received by its voids despite the limited depth of the web grooves as compared with the nail diameter. Furthermore, our structural member has a high load-bearing strength, even though the grooves are formed by a cold rolling process which attenuates the web lengthwise of the flanges.

In the drawings—

Figs. 1, 2, 3 and 4 are detail perspective views showing our preferred mode of shaping and assembling a complete structural member embodying our invention;

Fig. 5 is a perspective view showing our structural members used in building construction to support flooring or planking;

Fig. 6 is an end elevation view of a member partly in section;

Fig. 7 is a side view of the member of Fig. 6 with the plane-webbed element broken away to show the alternate ribs and grooves in the web of the other element;

Fig. 8 is a side elevation view partly in section similar to Fig. 6 but showing a modification;

Fig. 9 is a face view similar to Fig. 7 but showing the modification of Fig. 8;

Fig. 10 is a detail horizontal section on the line 10-10 of Fig. 7, and

Fig. 11 is a face view of a ribbed and grooved element showing a still further modification.

Referring to Figs. 1-4, a structural element embodying our invention may be formed from a strip 2, of sheet metal, plastic or the like, of predetermined width and thickness as required for its load-bearing characteristics. The sheet, desirably in continuous form, is shaped by a cold rolling process, as will be described, after which it is cut to the length desired for individual structural elements.

Preferably, the first shaping operation consists in forming a flange along one or both sides of the sheet, as shown in Fig. 2 at 4 and 6, to enhance the load-bearing strength of the element. The sheet with its marginal flanges 4 and 6 bounding the web 8 continues in the cold rolling process through upper and lower rolls having mating protuberances and recesses which press the web 8 to shape it into alternate ribs 10 and grooves 12. As will appear from the drawings, the ends of the ribs 10 during their formation by rolling are provided with convexly curved tapering ends merging smoothly into the face of the web, thus providing outwardly flaring unobstructed entrances into the grooves 12 whereby fasteners are directly and smoothly guided into said grooves. As will appear, the depth of the bottom of the grooves below the tops of the ribs may be quite shallow as compared with similar structures in the prior art and, accordingly, the amount of attenuation of the web during the cold rolling process need not be such as to endanger weakening it.

The structural element thus formed, designated A, is placed (Fig. 4) with the face of its ribbed and grooved web disposed parallel to and opposite the web 24 of a companion structural element B which may be identical in construction with the element A except that the face of its web 24 is preferably plane surfaced. The opposed webs of the elements A and B are temporarily held at a predetermined distance apart, as by the temporary wedge members 28 and 30, and while so held the webs are spot welded together, employing electrodes 32 and 34. The electrodes are pressed against the back surfaces of the webs during the welding process with sufficient force to press the spots of metal together from both webs and cause them to blend into a unitary spacing means, designated 38.

When the welds have been allowed to cool the temporary wedge members 28 and 30 are re-

moved and the two structural elements are secured together by the spacing means 38 to form the complete structural member with the opposed faces of its component webs permanently held at a predetermined distance apart.

The alternate ribs and grooves in element A extend transversely from one margin to the other of its web in parallel sinuous curves adapted to receive and distort a nail driven lengthwise of the groove, as shown at 14 in Fig. 3, to secure the wooden piece 20 to the structural member. Preferably, the opposite extremities of each rib lying adjacent the margins of the web are tapered, as at 16 and 18, to assure that the nail driven into the wooden piece at any place lengthwise of the structural member finds its way into one of the grooves 12.

As shown in Fig. 10, the depth of the grooves 12 formed in the web 8 of the element A is somewhat less than the diameter of nail 14, to be inserted between the elements. By the spacer means 38, the face of web 24 is spaced from the bottoms of the grooves 12 in the web 8 by a dimension approximating the diameter of the nail, so that the nail is received therebetween, preferably with a snug friction fit.

We have found from use of our novel structural member that it is effective for securely holding the nails even though the grooves in the element A are shallow as compared with the nail diameter. It is a feature of our invention that the web having ribs and grooves has a high load-bearing strength, even though the grooves are formed by an attenuating process. Our structural member is therefore strong, and yet it is considerably less expensive to make than any prior device of a similar nature known to us.

The specific construction of either or both of the companion structural elements may be varied as required by individual building requirements. Thus, the two elements need not be of the same weight, as shown in Figs. 4 and 6, but one element may be of a heavier channel iron than the other, as shown at 40 in Fig. 8. The width of the structural member may be such that wooden pieces may be secured thereto at opposite edges by nails received in opposite ends of the grooves, as shown in Fig. 9. For some purposes the use of straight rather than sinuously curving grooves and ribs is effective, such, for example, as where screws are to be employed, as indicated in Fig. 11.

The flooring 20 has been referred to merely for illustrative purposes and our novel structural member can, of course, be used to secure and support all sorts of collateral building pieces. Except as the appended claims require, our invention is not to be limited to any such details nor to the specific shape or size of either structural element of the several pairs herein illustrated and described.

We claim:

1. A load-bearing structural member including in combination a structural element having a web and a flange disposed along at least one margin of the web, said web being formed of a

sheet material of uniform thickness transversely bent to provide upstanding hollow ribs and alternating grooves in a surface of the web extending transversely thereof, and a second structural element having an opposing plane face secured to said web to form with said grooves passages into which fasteners may be driven in said grooves to secure other building members to said elements, said ribs, on said web face opposed to said second structural element, presenting convexly curved tapering ends merging smoothly into the face of said web providing outwardly flaring unobstructed entrances to said passages whereby fasteners driven in at any point lengthwise between said elements are directly and smoothly guided into said grooves and are firmly held therein by said opposing plane face.

2. A load-bearing structural member including in combination a structural element having a web and a flange disposed along at least one margin of the web, said web being formed of a sheet material of uniform thickness transversely bent to provide upstanding sinuous hollow ribs and sinuous alternating grooves in a surface of the web extending transversely thereof, and a second structural element having an opposing plane face secured to said web to form with said grooves passages into which fasteners may be driven into and reversely bent by said grooves to secure other building members to said elements, said ribs, on said web face opposed to said second structural element, presenting convexly curved tapering ends merging smoothly into the face of said web providing outwardly flaring unobstructed entrances to said passages whereby fasteners driven in at any point lengthwise between said elements are directly and smoothly guided into and are bent and firmly held therein by said grooves and said opposing plane face.

3. A load-bearing structural member including in combination a structural element having a web and a flange disposed along at least one margin of the web, said web being formed of a sheet material of uniform thickness transversely bent to provide upstanding hollow ribs and alternating grooves in a surface of the web extending transversely thereof, and a second structural element having an opposing face secured to said web to form with said grooves passages into which fasteners may be driven in said grooves to secure other building members to said elements, said ribs, on said web face opposed to said second structural element, presenting convexly curved tapering ends merging smoothly into the face of said web providing outwardly flaring unobstructed entrances to said passages whereby fasteners driven in at any point lengthwise between said elements are directly and smoothly guided into said grooves and are firmly held therein by said opposing face.

HERBERT C. FISCHER.
ALLAN H. W. HIGGINS.