March 5, 1929. W. F. ZABRISKIE 1,704,235

METALLIC JOIST

Filed March 5, 1928

Fig. 1

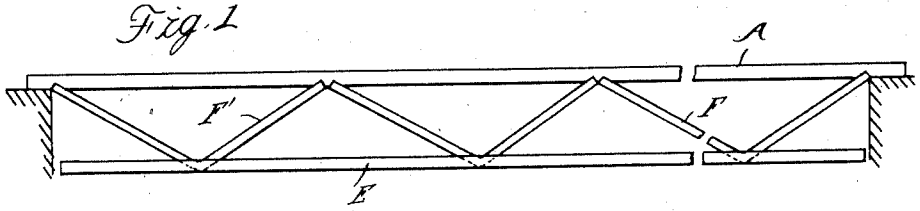
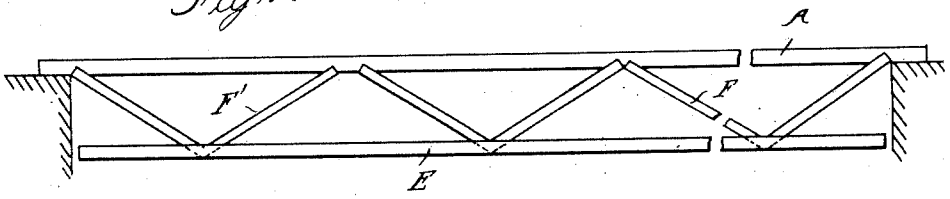


Fig. 2



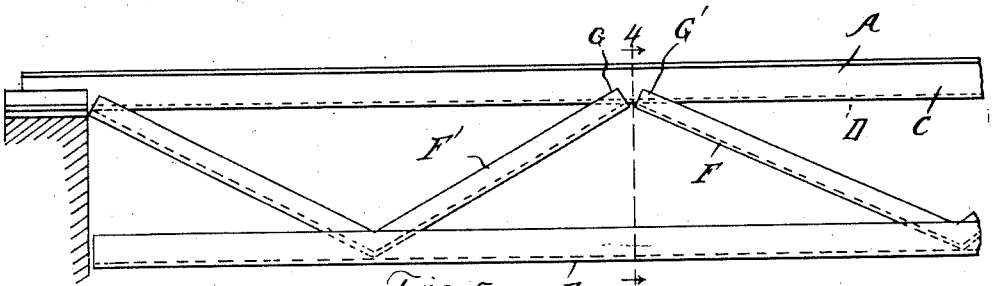
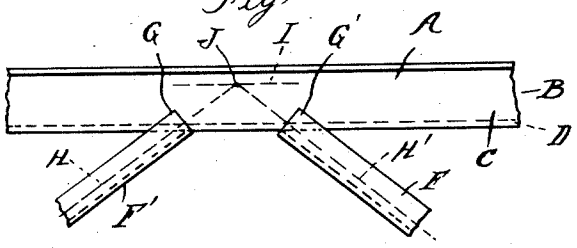


Fig. 5

Fig. 3.



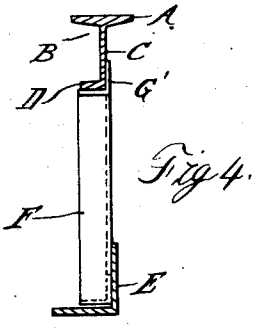


Fig. 4.

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Patented Mar. 5, 1929. 1,704,235

UNITED STATES PATENT OFFICE.

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METALLIC JOIST.

Application filed March 5, 1928. Serial No. 259,226.

The invention relates to metallic floor joists of that type comprising an upper chord member formed from a straight bar of structural shape and of greater strength than required for compression stresses only, said bar being reinforced by a lower chord member connected thereto through the medium of a zig-zag bent bar or webbing welded at the several points of contact. The principal advantage of this type of structure is that joists of considerable range of span can all be made from bars of the same cross section, the only variation being in length and the number of bends or diagonal portions in the webbing; also on account of the intrinsic strength and rigidity of the upper chord member the spacing between points of attachment of the webbing is increased so as to diminish the number of welds necessary. Still a further advantage is that the projecting ends of the upper chord member may be used for engaging the supports for the beam and are of sufficient strength and rigidity to take care of slight variations in length of span without alteration in the webbing or lower chord member. This is accomplished by permitting a slight spacing between the portion of the upper chord member resting on the support and the point of attachment of the first of the diagonal web members. However, it has been found that there are some objections to the following of this practice such as increase in deflection and vibration of the floor.

It is one of the objects of the present invention to obtain a construction which avoids any spacing between the point of support and the first of the diagonal web members and which at the same time permits of a limited variation in length of span in joists composed of the same structural elements.

It is a further object to employ a lower chord member which is extended in a straight line beyond the point of attachment to the outermost diagonal web members to be equal in extent to the ceiling and to form a support therefor.

With these objects in view the invention consists in the construction as hereinafter set forth.

In the drawings;

Figures 1 and 2 are diagrammatic side elevations showing my improved joist as adapted for slightly different lengths of span.

Figure 3 is an enlarged side elevation illustrating the method of attaching the web members for variation in length of span while using the same members.

Figure 4 is a cross section thereof.

Figure 5 is an elevation of a portion of the joist.

The upper chord member A is formed of a metallic bar of structural shape which is illustrated as a T-head B, a web C, a lower flange D projecting on one side of the web. The opposite side of the web is unobstructed at its lower edge to permit of attaching the webbing thereto. E is a straight bar preferably of angle section which constitutes the lower chord of the truss and F is the webbing also preferably formed of angle bars.

With joists of this type as heretofore constructed it has been usual to form the end diagonal web members as bent extensions of the lower chord member while intermediate these end diagonals a suitable number of intermediate diagonals are formed from another bent bar. With such a construction there will be a fixed length between the points of attachment of the end diagonals to the upper chord member so that any variations in length of span will change the relation of these points to the supports for the beam. With my improved construction the lower chord member is as previously described, a straight bar throughout its length and the end diagonals of the webbing are formed of separate bars. These are, however, bent to be integral with an oppositely angling diagonal but are separate from the bar forming the intermediate portion of the webbing if such is necessary. Thus, where there are slight variations in length of span the end webbing member F′ may be spaced slightly from the adjacent webbing member F in its attachment to the upper chord member A and in so doing the end diagonal of the member F′ may be attached to the member A immediately adjacent to the support for the beam. This spacing between the web members is not detrimental for the reason that the depth of the web C is sufficient to extend considerably below the neutral axis of the chord member A. This will provide welding surfaces for the spaced web members so located that extensions of the center of gravity lines thereof will intersect in a point lying within the vertical dimension of the chord member A

and preferably at or below the neutral axis of said member. There is, of course, a limit to the distance which these web members may be spaced from each other but that is large enough to provide a considerable variation in length of span. Any further variation must be obtained by changing the angles of the diagonal bars.

As shown in detail in Figure 3 the web member F' has its vertical flange overlapping the web C of the chord member A to form a welding bearing G. In the same manner the web member F overlaps the bar A to form a welding bearing G'. These bearings G and G' are spaced from each other by a considerable distance but the extension of the center of gravity lines of said web members indicated by the dotted lines H and H' will intersect the neutral axis of the bar A indicated by the dotted line I in a point J or at least in a point which will fall within the vertical dimension of said bar. It will be understood that the placing of the members F, F' nearer to each other would be in no way detrimental but it is desirable not to space them further than as indicated in Figure 3.

In addition to the advantages already given my improved construction has the further advantage that the bar A may be cut to exact length thereby avoiding any waste of material in an unnecessary overlapping of the support. Also the bars E may be cut to exact lengths while the web members F and F' may be made of standard lengths.

As shown in Figure 5, the end web member F' is of somewhat greater cross-section than the intermediate web members F. Such construction is advantageous in certain cases as the end web member is subjected to higher stresses than those nearer the center of the span and by reason of the fact that it is separate from the center web member, such a change in section may be readily accomplished.

What I claim as my invention is:

1. A metallic joist comprising a top chord member formed of a structural shape, a bottom chord member and a plurality of web members each having reversely inclined diagonals extending between and secured to said top and bottom chord members, the points of attachment of the adjacent ends of said web members to said top chord member being variably spaced to compensate for limited variations in the length of span but remaining substantially within the limits where their respective center of gravity lines intersect in a point lying within the vertical dimension of the top chord member.

2. A metallic floor joist comprising a top chord member formed of a structural shape having a T-head, a vertical web and a bottom flange on one side only of said web, a bottom chord member and plurality of web members each formed of a bar bent to form oppositely inclined diagonals, said web members extending between and welded to said top and bottom chord members, and the points of attachment of their adjacent ends to the web of the top chord member being below the neutral axis thereof and variably spaced to remain substantially within the limits where their center of gravity lines intersect in a point lying within the vertical dimension of said top chord member.

3. A metallic floor joist comprising a top chord member formed of a structural shape having a greater strength than required for compression only to increase resistance to bending in a vertical plane, a bottom chord member and a plurality of web members connecting said bottom chord to said top chord member, the adjacent ends of said web members being variably spaced from each other in their points of attachment to said upper chord member to compensate for limited variations in length of span but within the limits where their center of gravity lines intersect in a point lying within the vertical dimension of said top chord member.

4. A metallic floor joist comprising a top chord member formed of a structural shape having greater strength than required for compression only to increase resistance to bending in a vertical plane, a bottom chord member and a plurality of web members each having reversely inclined diagonals connecting said bottom chord to said top chord member, the adjacent ends of said web members being variably spaced from each other in their points of attachment to said upper chord member to compensate for limited variations in length of span but within the limits where their center of gravity lines intersect in a point lying within the vertical dimension of said top chord member and the outermost of said web members being of a greater cross-section than the intermediate web members.

In testimony whereof I affix my signature.

WILLIAM F. ZABRISKIE.