Oct. 7, 1952 K. W. FUGE 2,612,854

THREE-HINGED ARCH TRUSS

Filed July 3, 1948 3 Sheets-Sheet 1

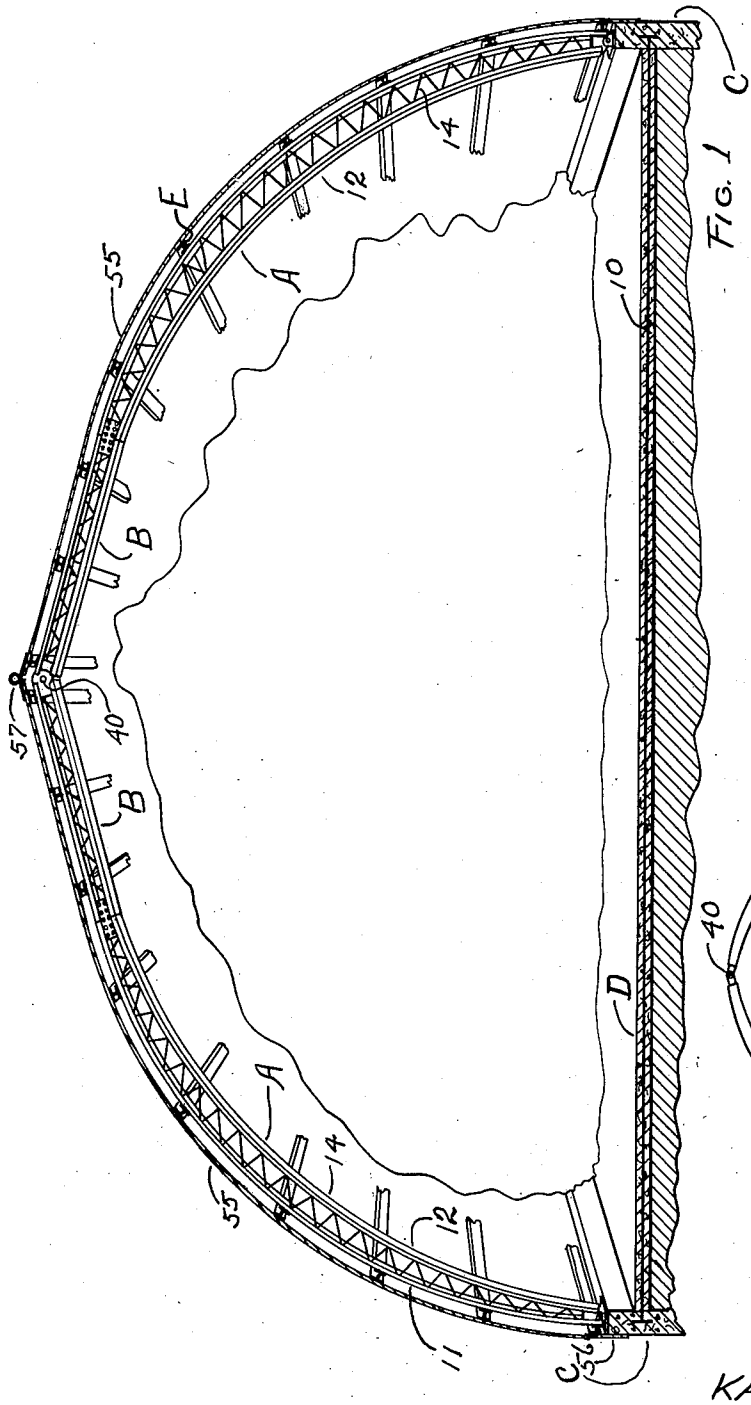

FIG. 1

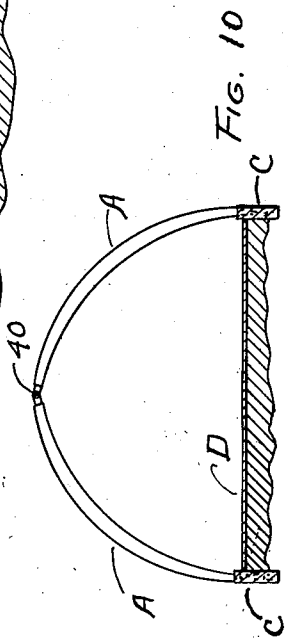

FIG. 10

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THREE-HINGED ARCH TRUSS

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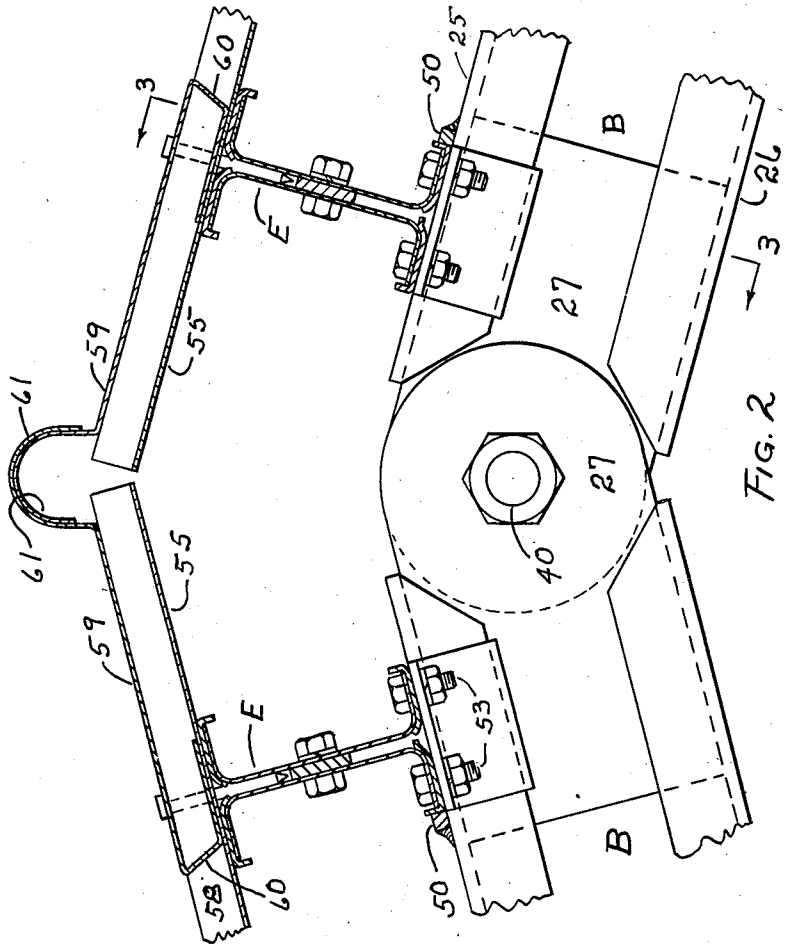

FIG. 2

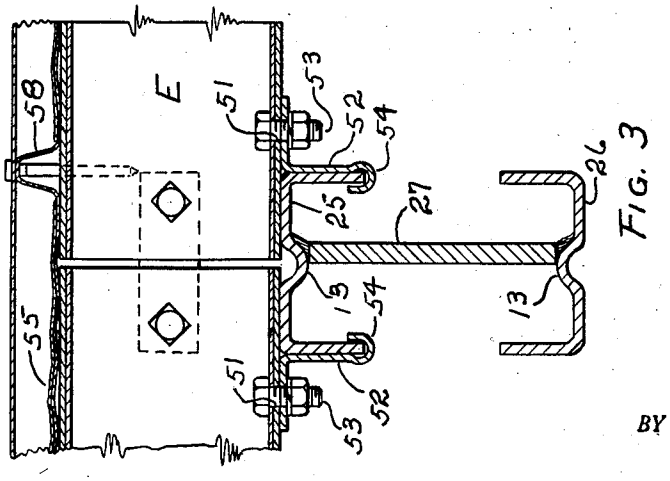

FIG. 3

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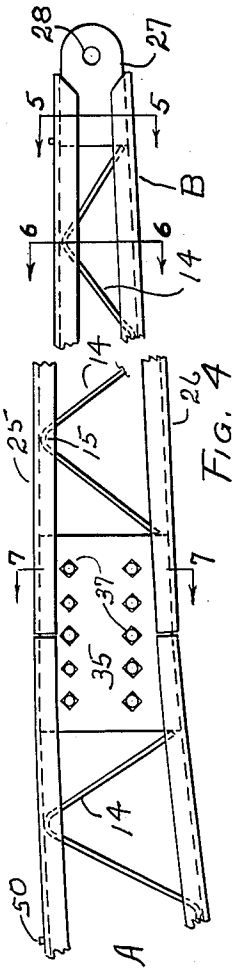


FIG. 4

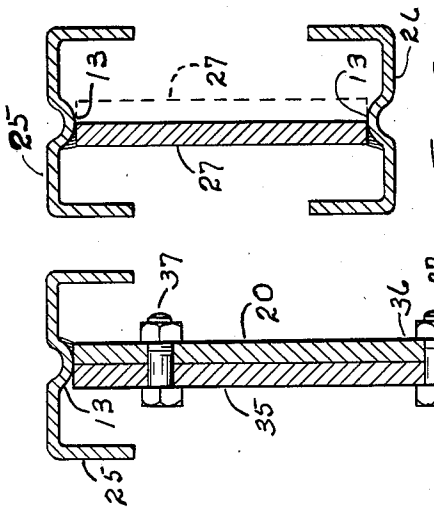


FIG. 5

FIG. 7

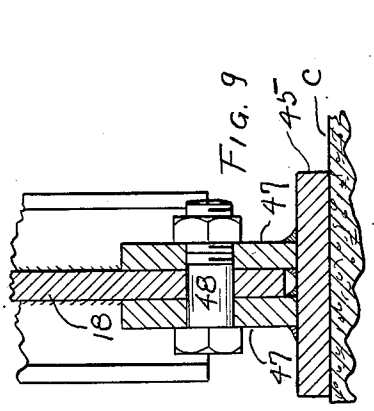


FIG. 9

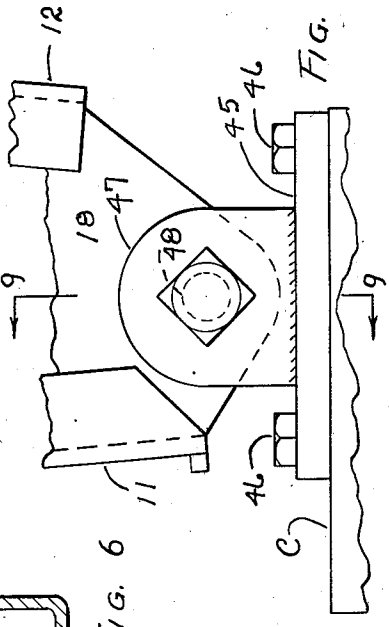


FIG. 8

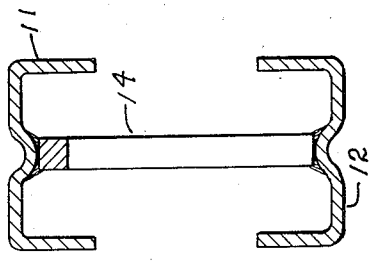
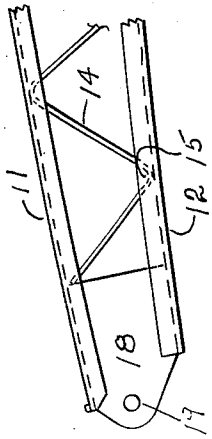


FIG. 6



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UNITED STATES PATENT OFFICE

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THREE-HINGED ARCH TRUSS

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Application July 3, 1948, Serial No. 36,856

1 Claim. (Cl. 108—1)

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The present invention relates to a novel building arch, and has for an object building a complete arch in four elements, two of the elements consisting of curved bridge type structures, and the two other elements consisting of straight bridge type structures which are considerably shorter than the curved structures, the straight elements being preferably detachably secured to the curved elements.

Each element of my improved arch comprises spaced apart channels with their flanges turned inwardly, and being secured together by zigzag brace bars with the ends of the brace bars in juxtaposition.

My improved arch when ready to erect at the building site, consists of two half sections, their upper ends being connected together preferably hinge-like and their bases then secured to the foundation preferably hinge-like, thus to form a three hinge arch.

A novel feature of my invention is the shape of the arches when assembled into two half sections, each section comprising one curved element and one straight element, the straight element being rigidly but preferably detachably secured to the curved element, whereby different length straight elements may be used for different width buildings, and whereby the straight elements may be dispensed with entirely; for example, in Figure 1 a forty foot span is illustrated, or in other words a forty foot width building is provided for, whereas in Figure 10 the straight elements are dispensed with and the two curved elements are fastened together at their upper ends, thus to form a twenty seven foot span.

Thus clearly I have provided means for simplifying the manufacture of my device by providing straight elements of different lengths which can be used with one length curved elements for several sized buildings.

In designing my arch truss all possible weight and wind pressures have been considered and a factor of safety provided which insures against injury to the building from any source at a minimum weight and cost. It will be understood that because of the hinged structure as already recited there will be no unnecessary stresses in the assembled arch.

To these and other useful ends not already recited, my invention consists of parts, combinations of parts or their equivalents and method of manufacture and assembling as hereinafter described and claimed and shown in the accompanying drawings in which:

Fig. 1 is an end view of my improved arch truss including a fraction of the roof or cover structure and sectioned directly in front of the arch and illustrating the fraction of the roof structure in perspective.

Fig. 2 illustrates an enlarged fractional view

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of the peak of the assembly as shown in Figure 1.

Fig. 3 is a transverse section taken on line 3—3 of Figure 2.

Fig. 4 illustrates fractionally, one side of a complete arch structure as illustrated in Figure 1.

Fig. 5 is an enlarged transverse sectional view taken on lines 5—5 of Figure 4.

Fig. 6 is an enlarged transverse sectional view taken on lines 6—6 of Figure 4.

Fig. 7 is an enlarged section taken on line 7—7 of Figure 4.

Fig. 8 is an enlarged view of the base of one of the arches illustrating its fastening to the foundation.

Fig. 9 is a transverse section taken on line 9—9 of Figure 8.

Fig. 10 is a diagrammatic drawing illustrating a modification.

In the figures A designates the right and left hand arches shown in full in Figure 1. B—B illustrates the straight portion of the arches. Thus a complete arch consists of two A members and two B members. C designates the side foundation walls of the building and D designates the floor of the building. Members C and D generally are concrete and have preferably spaced anchor bolts 10 for the length of the building for anchoring the side walls of the building together.

It will be understood that members C may be made from heavy timbers mounted on a suitable foundation and that member D may be otherwise designed. In any event spaced anchor bolts 10 are desirable in order to adequately support a building of the character. Members A and B are clearly illustrated in enlarged form in Figures 2 through 9. Members A comprise two channels or beams 11 and 12 with their flanges turned inwardly as clearly illustrated in Figures 5, 6 and 7. These channels are shaped as illustrated and formed preferably from flat stock, each having inwardly turned projections 13 as illustrated. These projections add to the strength of the channels and form an excellent surface to which the other parts of the arches are secured preferably by electric welding as follows:

Diagonal bars or braces 14—14 are positioned about as shown in Figure 4, consisting of preferably square in cross section, bars of steel of different lengths, their ends being welded to projections 13, and being in juxtaposition as shown. These braces 14 may be made from single pieces of a continuous length of steel by bending as at 15, they may be in single V shaped elements, or from single pieces of straight bars. Members 11 and 12 of elements A are curved and shaped about as shown in Figure 1.

At the bottom end of members A I secure an anchor plate 18 and weld this plate to projections 13 and on the longitudinal centers thereof. Plate

18 has an opening 19 for the reception of a bolt as will hereinafter appear. On the other end of members A I secure a plate 20 by electric welding (see Figure 7), the left side of this plate being in alignment with the centers of projections 13 for a purpose which will hereinafter appear.

Thus I have described arches A in their entireties. Members B, as illustrated in Figures 1 and 4 have straight channels or beams 25 and 26 which are shaped in cross section exactly like channels 11 and 12 and are secured together by means of brace members 14 similar to members A. On the upper ends of members B I secure preferably by electric welding, plates 27. The inner side of these plates are in alignment with the center of projections 13 for a purpose which will hereinafter appear. Plates 27 are provided with openings 28. On the other end of member B I secure a plate 35, preferably by electric welding. Plate 35, as shown in Figure 7 has its right side in alignment with the center of projections 13.

Each plate 20 and 37 has a number of openings 36 arranged in two rows as illustrated in Figure 4 for the reception of bolts 37. Therefore members A and B will be detachably held together by plates 20 and 35 with the beams in alignment, thus forming a complete arch as illustrated in Figures 1 and 4.

Members 18 as illustrated in Figure 9, are centrally positioned in the channels and welded to projections 13. Member 27 is offset as described so when the two arches are fastened together by means of a bolt 40 the bolts passing through openings 28, the inner ends of members 25 and 26 will be held in alignment. It will be seen that members 20, 35 and 27 form substantial fastenings with which to connect members A and B and the peak of members B together.

I provide base plates 45 which may be anchored to foundation members C by means of bolts 46 or otherwise. Members 45 are provided with spaced plates 47—47 adapted to closely embrace members 18 (see Figure 9). Members 45 and 47 are provided with openings as illustrated for the reception of bolts 48, whereby members 18 and 47 may be firmly held together and the bottom of the arch trusses firmly anchored to the foundations C.

I will now describe my preferred design of means for fastening the roof or covering to the arch truss and a means for fastening the ceiling to the arch truss. I prefer to use nail grip purlins designated in the drawings in their entireties by reference character E, preferably as illustrated in a copending application, Serial Number 767,420, filed August 8, 1947, Waterman et al. Members A and B have secured thereto preferably by electric welding spaced anchor blocks 50. Purlins E rest on blocks 50 as clearly illustrated in Figure 2, the blocks being suitably secured to members 11 and 25 at the factory so it is a simple matter to position the purlins and secure them to members 11 and 25 as follows:

Purlins E are supplied with openings 51 which are positioned as illustrated in Figure 3. I provide L iron clips 52—52 having openings which register with openings 51 for the reception of bolts 53. The lower lips of members 52 are provided with hooks 54 which are adapted to firmly hold the purlins to channels 11 and 25, thus the purlins will be firmly held in spaced relation on the arch truss and provide suitable means for supporting the roof plates 55, the plates being secured to the purlins preferably in a manner as described in the above referred to copending application. Roof members 55 are preferably a short distance apart at their tops, (see Figure 1) the upper edges having a roof plate or cap 57 which is shaped preferably as shown.

When the roof coverings 55 are joined together transversely by an inverted U shaped member 58 (see Figure 2) I provide two plates 59—59 which lie on the top of members 58 and are secured thereto and to the purlins by means of extra long nails, each member at its lower edge having a downwardly and inwardly extending extension 60 which are cut to fit between members 58 and having at their inner edges curved portions 61 which are adapted to lie together about as shown in Figure 2 so as to make the peak of the roof wind and water tight but permit independent expansion and contraction of roof covers 55.

When it is desired to cover all or a part of the arch truss on the inside, members E may be secured to beams 12 and 26 for supporting this covering in the same manner as members 55 are supported.

Thus it will be seen that my improved arch truss is simple, easily manufactured at low cost, strong and pleasing in appearance and easily erected by any man of ordinary intelligence.

Clearly minor detail changes may be made in the design shown without departing from the spirit and scope of my invention as recited in the appended claim.

Having thus shown and described my invention, I claim:

A structural support for a covering for buildings of the character described, comprising in combination, four structural elements, each comprising a pair of spaced apart channels formed from flat stock, with their flanges turned toward each other, each channel at its transverse center having inwardly pressed relatively small projections, braces secured to and forming a connection between projections, two of said elements being considerably longer than the other two, and being formed in easy curves in the same direction with the ends of the channels closer together than the center portion thereof, the other two elements being straight, plates secured to the projections of one end of said two long elements and to the projections on both ends of said straight elements with means for removably securing short and long elements together, and for securing the plates together on the other end of said short elements by means of a single bolt, for forming the apex of a building closure support, the other end of said long elements having plates secured to said projections, pads secured to a building foundation and having projections embracing said last plates and held thereto by means of single bolts.

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