May 20, 1930. J. C. MEEM 1,759,057

GIRDER

Filed May 7, 1927

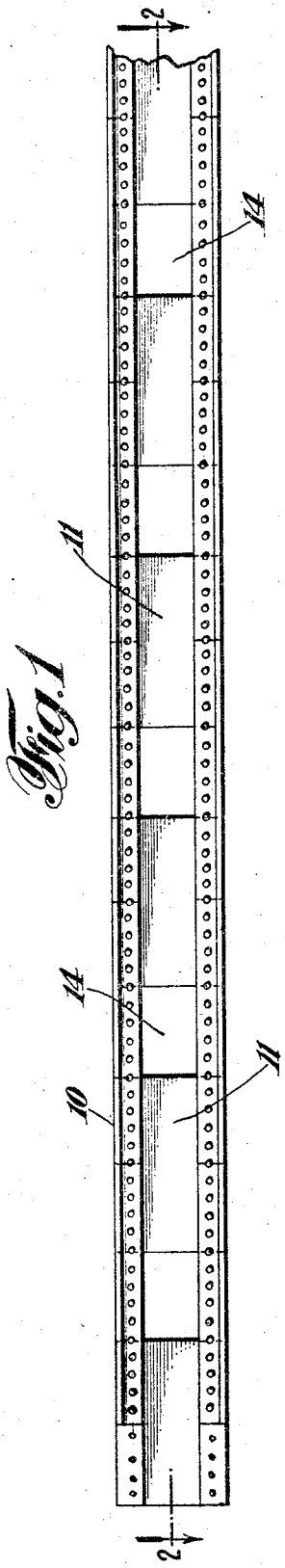


Fig. 1.

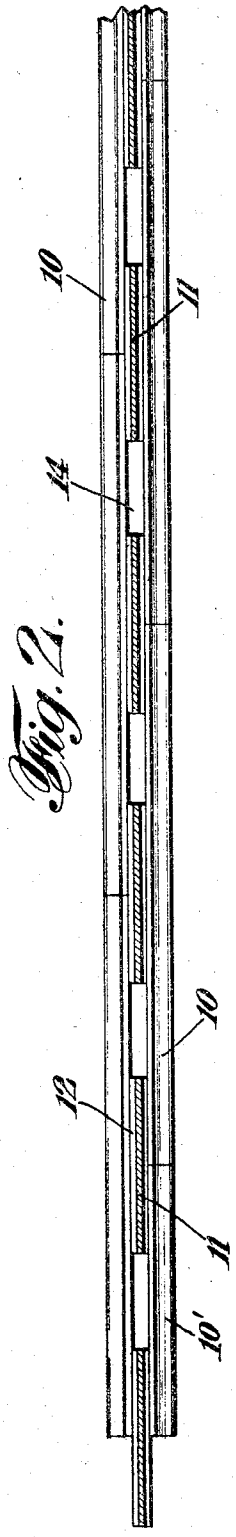


Fig. 2.

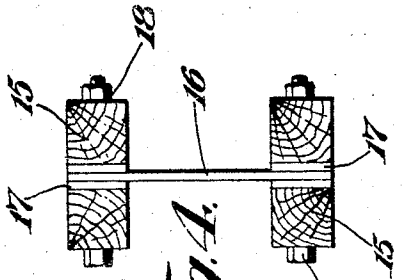


Fig. 4.

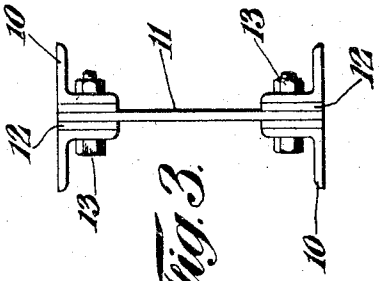


Fig. 3.

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Patented May 20, 1930 1,759,057

UNITED STATES PATENT OFFICE

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GIRDER

Application filed May 7, 1927. Serial No. 189,524.

This invention relates to an improved girder construction and more particularly to girders that are used for temporary supporting frame structures in excavating operations for subways, tunnels, mines and similar purposes.

The object of this invention is to provide an improved girder construction adapted to be assembled and disassembled in confined and restricted areas.

A further object of the invention is to provide a girder construction adapted to be increased or decreased in over-all length in accordance with the construction requirements within the subway, tunnel or mine.

Further objects and advantages will be apparent by reference to the following specification and drawings, in which

Fig. 1 is a side elevation of an assembled girder embodying the invention.

Fig. 2 is a sectional view on line 2—2 of Fig. 1.

Fig. 3 is an end elevation of Fig. 1, and

Fig. 4 is a modification of the invention.

In the embodiment of the invention shown in Figs. 1, 2 and 3, the girder is built up in sections which are carried to the excavation and thereafter assembled within the excavation and bolted, riveted or otherwise secured together. This invention is such that the girders forming the supporting frame in excavations can be economically constructed, easily handled and quickly assembled or disassembled.

The girder is constructed of equal lengths of chord angles 10 in the form of angle irons which are bolted or otherwise secured to web splices 11. The width of the web splices establishes the width of the girder. Between the chord angles 10 and on each side of the web splices are bolted spacers or chord splices 12 of approximately the same length as the web splices and of approximately the same width as the chord angles. A series of holes are provided equally spaced in the chord angles, web splices and chord splices for assembling bolts 13 which secure the sections in assembled relation to form the completed girder. The web splices and the chord splices are of short length and are bolted to the chord angles at intervals, leaving spaces 14 therebetween. The sections are assembled to form a light weight but strong girder construction which can be assembled in restricted areas without requiring any sections to be cut and fitted.

The assembling of the girder as illustrated in Figs. 1 and 2 is in a direction from left to right. Chord angles 10 are of standard or equal lengths and to obtain the proper spacings thereof the first lengths of oppositely disposed chord angles can be filled in with special chord angles 10′ of half the length of the standard chord angles 10, as clearly shown in Figs. 1 and 2 when it is necessary to use a full girder end construction. It will also be noted that in Figs. 1 and 2 the first web splice 11 extends beyond the chord angles for half its length so that, if desired, the special half length chord angles 10′ can be removed and replaced by the standard or equal length chord angles 10, permitting assembling of the girder in a direction from right to left, as shown in Figs. 1 and 2.

The improved girder of this invention is particularly useful when it is necessary to use cross or needle beams in restricted subway spaces and for longitudinal girders or runners in subways where the girders must be of the knock-down type for reassembling from rear to front as the excavation proceeds. This is especially true of subways and tunnels where girders of great strength are used as bridges or cantilevers for supporting the roof while the bench is being excavated and blasted out beneath.

The relation of the various sections of the girder may be varied to suit the specific construction. The ratio of the girder section modulus to the weight of the girder constructed in accordance with this invention is very large.

For a girder of 182 pounds per foot a section modulus of approximately 472 is obtainable when the chord angle is 15 feet long and 8 x 8 inches by one-half inch thick, the chord splices 5 feet long by eight inches by three-quarters of an inch thick and the web splices 5 feet long by 36 inches by five-eighths of an inch. The modulus of this same girder can

be approximately doubled by merely increasing the thickness of the chord angles one-half inch and the chord splices three-eighths of an inch. It will be thus seen that a small increase in the weight of the girder doubles the modulus. For chord angles of thirty feet or more in length the number of chord splices can be decreased and the web splices can be reduced in number, thus reducing weight without sacrificing proportionate strength.

In the embodiment of the invention shown in Fig. 4 a construction is illustrated wherein wooden beams 15 are substituted for the chord angles 10 and are secured in assembled relation with the web splices 16 and the chord splices 17 by means of bolts 18 passing therethrough. This form of structure is a light weight, low cost construction and is adaptable for many purposes.

The girders of this invention are especially adapted for frame work construction in subways, tunnels and mines but are not so restricted and can be used in any building construction requiring structural frames.

I claim:

1. A continuous girder construction comprising spaced web splices, chord angles, chord splices having substantially the same length as said web splices and substantially the same width as the said chord angles, and bolting means for securing said web splices, chord angles and chord splices in assembled relation, said chord angles abutting each other at the intermediate sections of certain web splices with at least one unbroken chord angle secured to the same end of the web splice.

2. A continuous girder construction comprising spaced web splices, chord members, chord splices having substantially the same length as said web splices and substantially the same width as the said chord members and bolting means for securing said web splices, chord members and chord splices in assembled relation, said chord members abutting each other at the intermediate sections of alternate web splices with at least one unbroken chord member secured to the same end of the web splice.

3. A continuous girder construction comprising web splices, chord members, chord splices having substantially the same length as said web splices and substantially the same width as the said chord members, and bolting means passing through a single straight row of registering holes in said web splices, chord members and chord splices, the single row of said holes extending parallel to said chord members.

4. A continuous girder construction comprising spaced web splices, a plurality of chord angles extending along each outer portion of said web splices, each chord angle comprising a plurality of sections which are relatively short compared with the length of the whole girder, the abutting ends of said sections being staggered, there being a web splice at each pair of abutting ends, and means for detachably fastening together said web splices and said chord angles.

5. A continuous girder construction comprising spaced web splices, a plurality of chord angles extending along each outer portion of said web splices, each chord angle comprising a plurality of sections which are relatively short compared with the length of the whole girder, the abutting ends of said sections being staggered, there being a web splice at each pair of abutting ends, chord splices of substantially the same length as the web splices and of substantially the same width as the chord angles, and means for detachably fastening together said web splices, chord splices, and chord angles.

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