June 4, 1929. E. D. CODDINGTON 1,715,694

PROCESS OF FABRICATING STRUCTURAL STEEL

Filed March 5, 1927

Fig. 1.

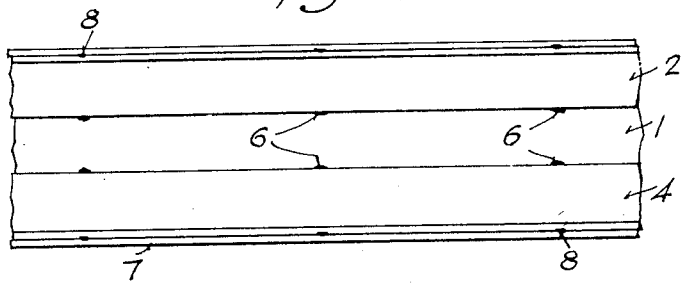


Fig. 2.

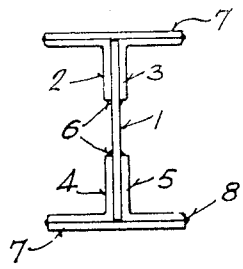


Fig. 3.

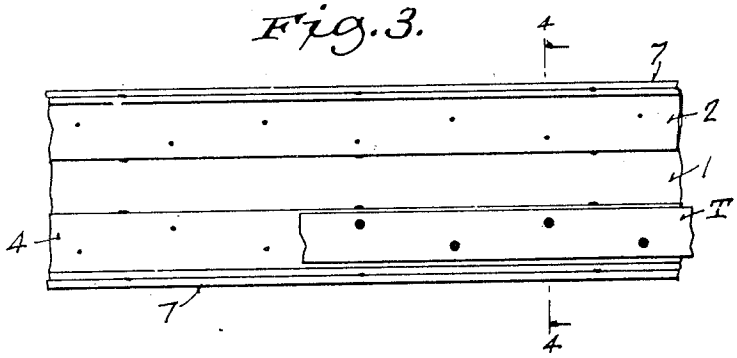


Fig. 4.

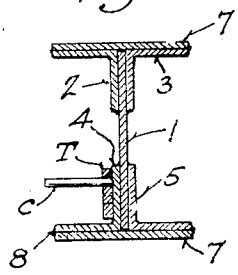
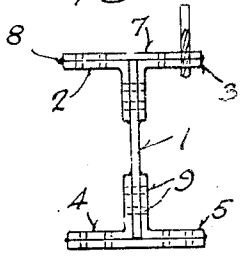


Fig. 5.
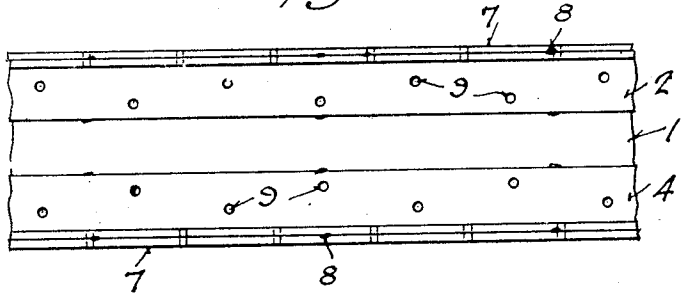


Fig. 6.



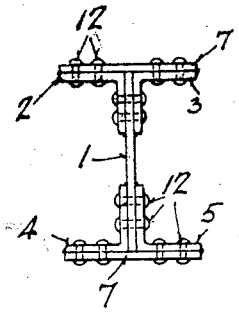


Fig. 7.

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UNITED STATES PATENT OFFICE.

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PROCESS OF FABRICATING STRUCTURAL STEEL.

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This invention relates to an improved method of fabricating structural steel to produce columns, girders, beams, or any other similar or diverse structural steel products constituted of plates, angles, channels or various other structural steel elements or shapes.

Fabricated steel girders, beams, and the like are built up from suitable structural steel elements such as plates, angles, channels, or the like, the elements being assembled in proper relation and being riveted together in the final product.

Heretofore in the construction of fabricated steel products of this kind it has been necessary, first, to prepare drawings to show the details of each of the elements both as to shape and size and also to show the exact position of each rivet hole. From these drawings templets are prepared and the templets are used in marking off or laying out the work, the laying out involving the center punching, or marking of each element of the beam or girder so as to indicate definitely the position of each rivet hole to be formed. Considerable time and labor is expended at this stage of the old process. The next step in the old process is the punching of the holes in the elements, each element being handled separately and having its holes punched therein in accordance with the layout thereon. The elements after being properly punched, are now assembled in proper relation and when assembled are held assembled by being bolted together by means of the usual bolts, nuts, and washers. The punching process outlined necessitates that the rivet holes of the assembled product be reamed, and this is the next step in the conventional method. Of course, as the holes are reamed, the nuts must be taken off and the bolts must be taken out and after the reaming both must be replaced, and this is an operation that consumes considerable more time and labor. After the reaming, the product is ready for riveting, but there is another loss of time and labor due to the fact that the bolts and nuts must be taken out as the riveting progresses.

One of the principal objects of the present invention resides in the provision of a novel method of fabricating elements, beams, girders, or other steel products whereby the amount of time and labor expended in the fabricating of the product will be greatly reduced and the cost lessened while enhancing rather than detracting from the strength, durability, and other desirable qualities of the product. In particular, the present invention proposes to reduce the laying out process to a minimum and to eliminate the necessity of punching, in some instances, and of reaming, bolting and unbolting in all cases.

In carrying out the present invention structural steel elements of proper shape and size are selected and are assembled to have the form of the desired product, the several elements being temporarily clamped in assembly, or being held in assembly and in any other suitable manner, as for instance, by placing the elements in a form to build up the assembly. With the elements assembled and temporarily held together, they are next tacked by spot welding at spaced points. At this point it is to be noted that the welding proposed is merely for the purpose of holding the elements in assembly during the subsequent operations and until they are riveted. In other words, the elements are not permanently welded together, but are merely tacked together at spaced points. However, this tacking aids in some degree the strength of the final structure of the product. After the welding templets are employed to mark out or center punch the beam, girder, or the like, so as to indicate the exact location of the holes to be provided for the rivets. There is substantial advantage in laying out at this time, by reason of the fact that one center punch or one mark often serves to indicate the position of the rivet holes for the plurality of the elements embodied in the assembly. A marked saving is thus effected by reducing the time and labor expended in marking or center punching. After the assembled beam, girder, or the like has been laid out, the holes are drilled therein with a high speed and high capacity drilling machine. The drilling is carried through the assembled elements and one drilling operation may form a rivet hole through several structural steel elements. Inasmuch as the rivet holes are formed by drilling and are formed with the elements in proper alinement, reaming is unnecessary. The beam,

girder, or the like, is now ready for riveting which is carried out without any bolting or unbolting, as the elements are held assembled by the spot welding. In fact, the bolting and unbolting has been eliminated from the entire method.

In fabricating light structural steel members, some of the advantages of applicant's method may be realized by assembling the angles or plates, or other elements of a member or product, tacking them together by spot welding, punching the holes therein in the proper places, reaming the holes if necessary, and then applying the rivets in the hole so punched. In this way the necessity of bolting and unbolting is eliminated. However, the method outlined in conjunction with heavy work is especially advantageous, as it not only obviates the use of bolts and nuts, but also makes it possible to replace two operations, that is, punching and reaming by a single drilling operation. In both instances time and labor is saved by simplifying the laying out processes.

In the accompanying drawing the method is illustrated by showing how a fabricated column or beam is constructed in accordance therewith.

Figure 1 of the drawing is a fragmentary view in side elevation showing the elements of the beam or column assembled and tacked together by spot welding.

Figure 2 is a view in end elevation of the elements shown in Figure 1.

Figure 3 is a fragmentary view in side elevation showing how the beam or column is laid off.

Figure 4 is a view in section on line 4—4 of Figure 3.

Figures 5 and 6 are views in side and end elevation respectively showing how the assembled elements of the beam or column are drilled.

Figure 7 is a view in end elevation showing the final product.

As shown in Figures 1 and 2 the beam or column is made up of a plate or web 1 and angles 2, 3, 4 and 5 assembled with the plate as shown. The angles are temporarily fastened or tacked to the web 1 by spot welds 6, the spot welds being at spaced points along the angles and serving to tack the angles to the web. Any suitable number of cover plates 7 may be provided and are tacked or temporarily secured to the angles by means of spot welds 8.

After the plate or web, the angles and the cover plates having been assembled and tacked together as shown, the holes which are to be drilled to receive the rivets are laid out and for this purpose a templet T may be employed, the templet being placed against the angles and cover plates, as shown in Figure 4, to afford the basis of proper marking or center punching. A center punch C is shown to illustrate how the holes may be laid out.

After the holes have been laid out in this manner they are drilled and as indicated in Figures 5 and 6, a single operation serves to provide the rivet holes 9 through the angles and the web and a single operation also serves to drill the rivet holes 10 through the cover plates and angles. There is thus economy effected in laying out the holes and also in forming the same. Moreover, as the holes are formed by drilling, reaming is unnecessary. The final step in the method consists in applying the rivets 12 as shown in Figure 7. As the various elements of the product are tacked together by the spot welding immediately after assembly it is not necessary to bolt and unbolt the elements. In fact, all bolting and unbolting is eliminated and this is a marked saving in time and labor as this operation must be carried out several times when fabricating structural steel elements in accordance with present practices.

It is to be understood that the structural steel product shown is merely one example by which the method is illustrated and the present method is not limited to the fabrication to this particular structural steel product but may be used to advantage in fabricating any of the various structural steel products. In particular, it is to be noted that if cover plates are not needed they may be omitted. The point to be understood, however, is the universal utility and the universal capacity for advantageous use that is inherent in the present method.

The invention claimed is:

1. The herein described method of fabricating structural steel products which consists in assembling the elements of the product, tacking the elements in assembly by welding, then forming rivet holes through the assembled elements, and finally riveting the same.

2. The herein described method of fabricating structural steel products which consists in assembling the elements of the product, tacking the elements in assembly by welding, drilling the rivet holes through the assembled elements, and permanently securing the elements in assembly by riveting.

3. The herein described method of fabricating structural steel products which consists in assembling the elements of the product, tacking the elements in assembly by welding, laying off the assembly to indicate where the rivet holes are to be formed, then drilling the rivet holes through the assembled elements and permanently securing the elements in assembly by riveting.

4. The herein described method of fabricating structural steel products such as beams, columns, girders, and the like, which consists in assembling the elements of the product, temporarily welding the elements

in assembly by spot welding at spaced points, drilling rivet holes through the assembled elements, and permanently securing the elements in assembly by riveting.

5. The herein described method of fabricating structural steel products such as beams, columns, girders and the like which consists in assembling a web, angles and cover plates, tacking the angles to the web by spot welding, tacking the cover plates to the angles by spot welding, drilling rivet holes through the assembled angles and web, drilling rivet holes through the assembled cover plates and angles, and riveting the angles to the web, and the cover plates to the angles.

6. The herein described method of fabricating structural steel products such as beams, columns, girders and the like, which consists in assembling a web and angles, tacking the angles to the web by spot welding, forming rivet holes through the assembled angles and web, and riveting the angles to the web.

7. The herein described method of fabricating structural steel products which consists in assembling the elements of the product, temporarily securing the elements in assembly, tacking the elements in assembly by welding, drilling the rivet holes through the assembled elements, and permanently securing the elements in assembly by riveting

In witness whereof, I hereto affix my signature.

EDWIN D. CODDINGTON.