

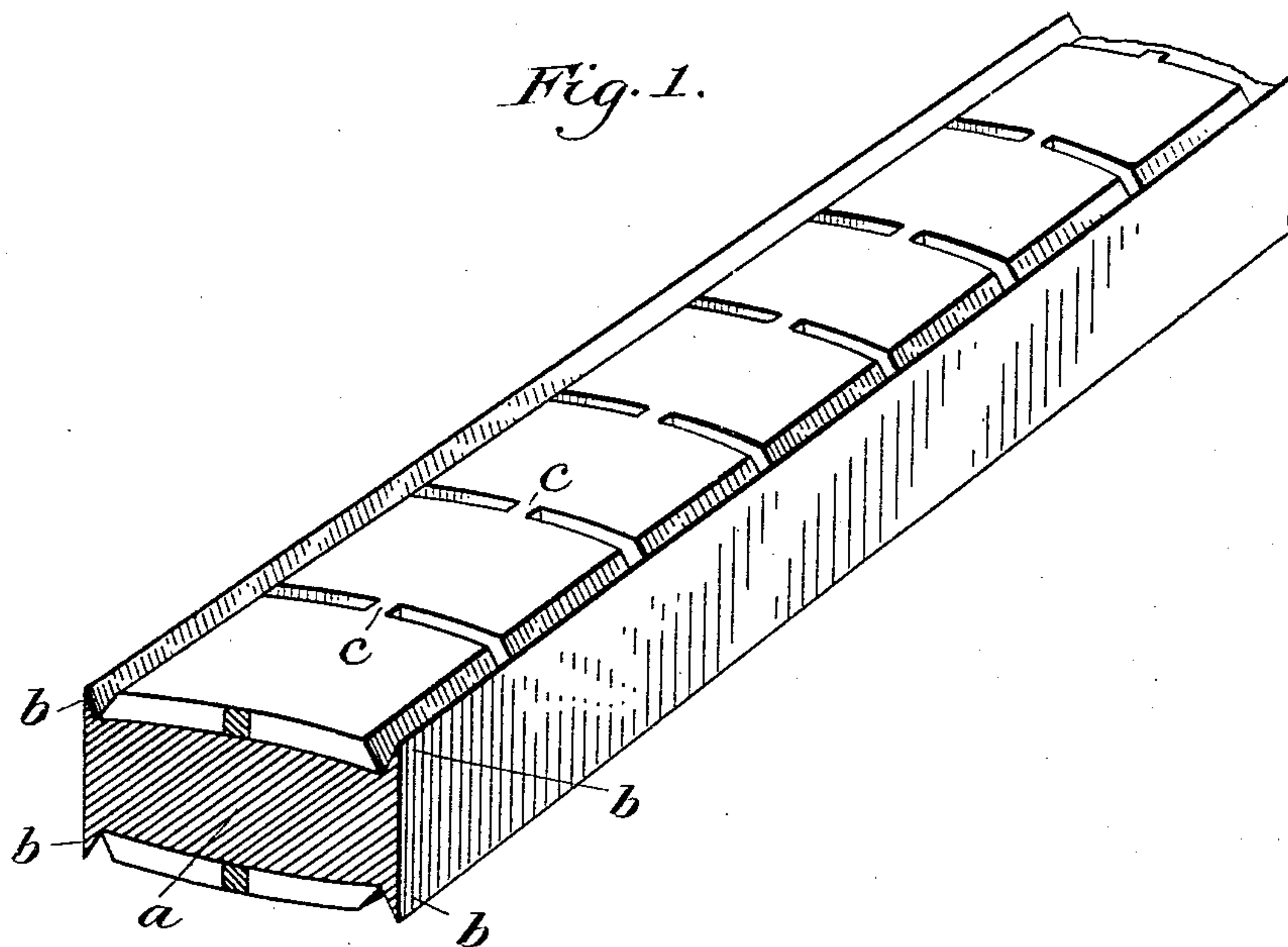
No. 685,758.

Patented Nov. 5, 1901.

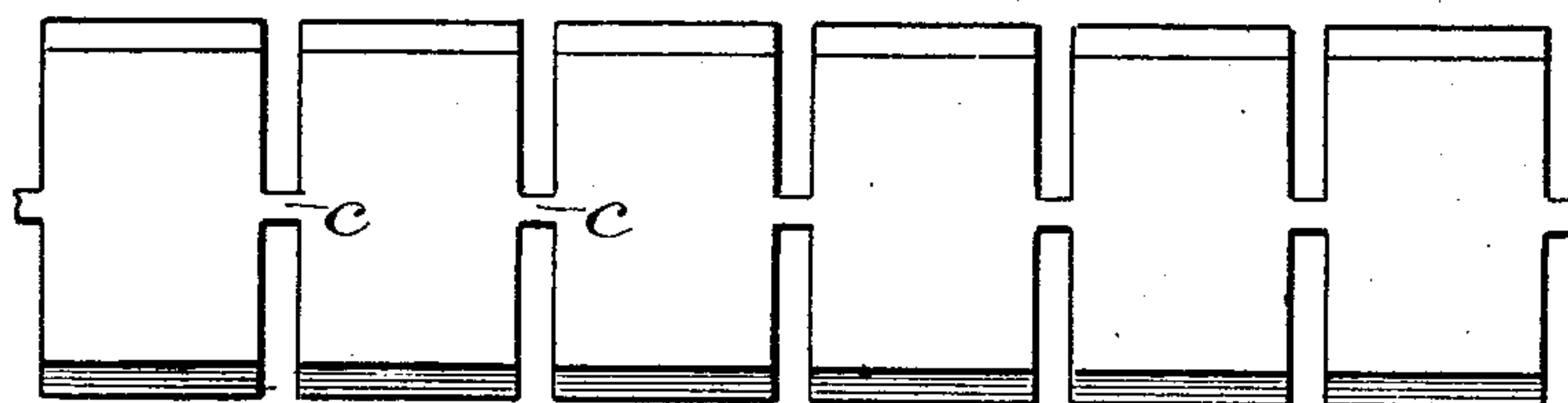
W. GRIFFITH.  
UNITING OR WELDING METALS.

(Application filed Apr. 2, 1901.)

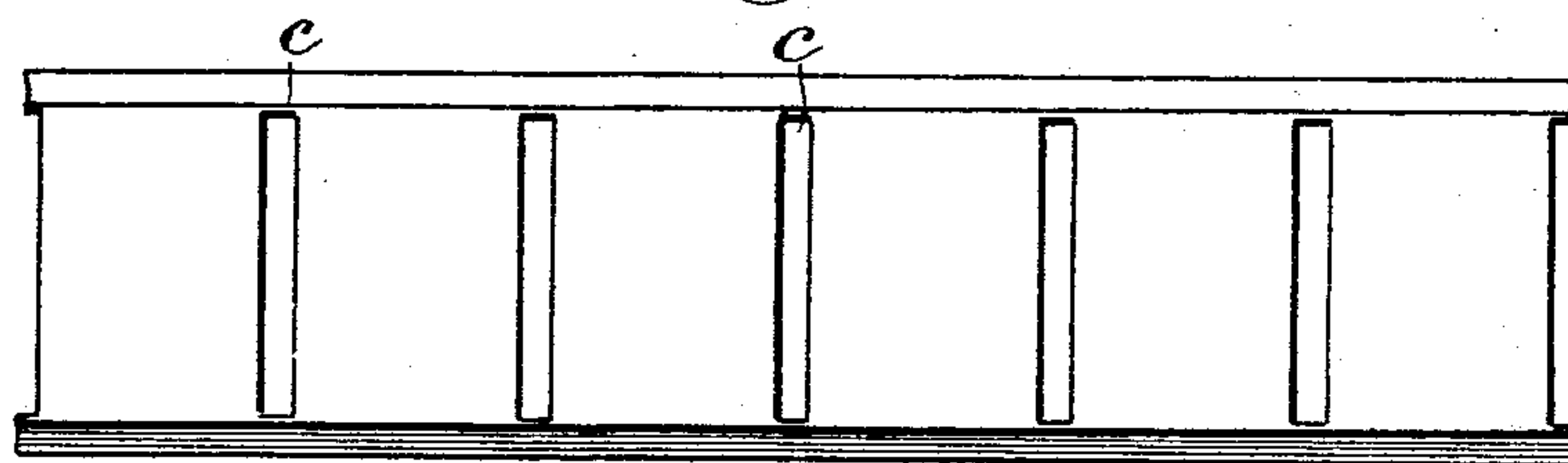
(No Model.)



*Fig. 2.*



*Fig. 3.*



WITNESSES

*A. M. Steen,*  
*L. A. [Signature]*

INVENTOR

*William Griffith*  
*by James H. Baker*  
*his Attorney*

# UNITED STATES PATENT OFFICE.

WILLIAM GRIFFITH, OF PITTSBURG, PENNSYLVANIA.

## UNITING OR WELDING METALS.

SPECIFICATION forming part of Letters Patent No. 685,758, dated November 5, 1901.

Application filed April 2, 1901. Serial No. 54,042. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM GRIFFITH, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Uniting or Welding Metals, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a perspective view of a billet of steel and plates or blanks of copper or other metal placed thereon preparatory to welding. Fig. 2 is a plan view of the copper blank, and Fig. 3 is a like view of a modified form of blank.

Like symbols of reference indicate like parts wherever they occur.

The object of my invention is to unite copper, alloys thereof, and other metals with other metals of a greater fusing-point, so as to produce metal bars, plates, or other forms having one or all faces of copper or other metal than the body of the article.

I will now describe my invention as it may be applied to the union of a billet, ingot, bar, or other shape of steel and copper, which after having been united may be rolled or forged into any desired shape.

The billet of steel *a* is preferably first passed through suitable rolls, so formed as to channel the billets, leaving on each corner a projecting flange *b*, the channels extending on both sides of the billet or bar almost its full width. The billet having been channeled on one or more of its sides is freed from oxid and scale by an acid-bath or by other suitable means. It is then after being dried in a suitable oven placed in a bath or a solution of one of the salts of copper or other suitable salt of metal, which bath may be formed by dissolving sulfate of copper in weak sulfuric acid, although I do not desire to limit myself to the same, and the billet is allowed to remain in the bath until its surface is coated with a deposit of copper or an alloy thereof, which is generally accomplished in from one-half an hour to an hour. After being removed from the solution the bar or billet is passed to a table ready to receive the copper plates. These copper plates are preferably formed in sections, the dividing-lines between

the sections being at such distance from each other as it is designed to cut the billet after it has been passed through the welding-rolls, and they are placed on the copper-plated surface of the billet within the channels, and the billet, with the copper plates thereon, is passed through rolls, which turns the bead or flange *b* down against the copper, which fixes the copper immovably to the billet. The billet is then passed to a heating-oven, where the metals are heated to a temperature somewhat below the fusing temperature of the softer metal. After the metals have been sufficiently heated the billet having the copper plates fixed to the faces of the same is passed through suitable welding-rolls, which welds the copper plates perfectly to the coppered surface of the billet. The advantage of forming the copper plates in short sections is that a more perfect weld is obtained, and at the same time there is a great saving of copper, the copper plate not extending over that portion of the billet which is wasted by the cutting of the billet into lengths or slabs, and there is also no waste in the trimming of the plates or sheets to which the billet is rolled. At the same time to prevent the displacement of the copper, which might occur with short detached plates, I prefer to allow a connecting strip or strips *c*, of copper, to remain between each section, these strips being sufficient to retain the sections in a united strip or sheet. This may be done by perforations. The two metals having been welded together in the manner described, the billet may be rolled to any desired shape or thickness and cut at any step in the rolling operation into sections determined by the shape and size of the copper plates.

Although I have described my improved method as applied to billets or bars, it is equally applicable to sheets or other forms of steel.

In the drawings I have shown the plates of copper as having beveled edges; but I do not desire to limit myself to this shape.

My improved method may be used for welding many kinds of metal together, such as steel with copper and all alloys thereof and also steel with zinc, aluminium, bronze, and other metals.



In place of the channels I have shown I may employ any kind of space or recess surrounded wholly or at intervals with flanges or projections, which may be pressed against  
5 the plates of copper.

The advantages of my invention will be apparent to those skilled in the art.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—  
10

1. The herein-described process of uniting or welding different kinds of metal, which consists in cleansing one of the pieces of metal, forming one or more recesses in the same,  
15 coating one or more of its recessed faces with a metal or alloy having a lower fusing-point, then placing in the recess a metal which will weld to the metallic coating, securing the metal in the recess by pressure, then applying

heat to the metals, and finally uniting by  
pressure; substantially as described. 20

2. The herein-described process of uniting or welding metals of different kinds, which consists in cleansing one of the kinds of metal, coating the same with a metal of a lower fusing-point, applying in sections a metal which  
25 will weld to the coating, heating the metals, placing the metals under pressure, and cutting the metals into sections on the lines of separation between the sections of the applied  
metal; substantially as described. 30

In testimony whereof I have hereunto set my hand.

WILLIAM GRIFFITH.

Witnesses:

JAMES K. BAKEWELL,  
JAMES W. PRESCOTT.