C. F. JACOBS.

PROCESS OF UNITING METAL ELEMENTS.

APPLICATION FILED AUG. 21, 1909.

999,309. Patented Aug. 1, 1911.

Fig. 1.

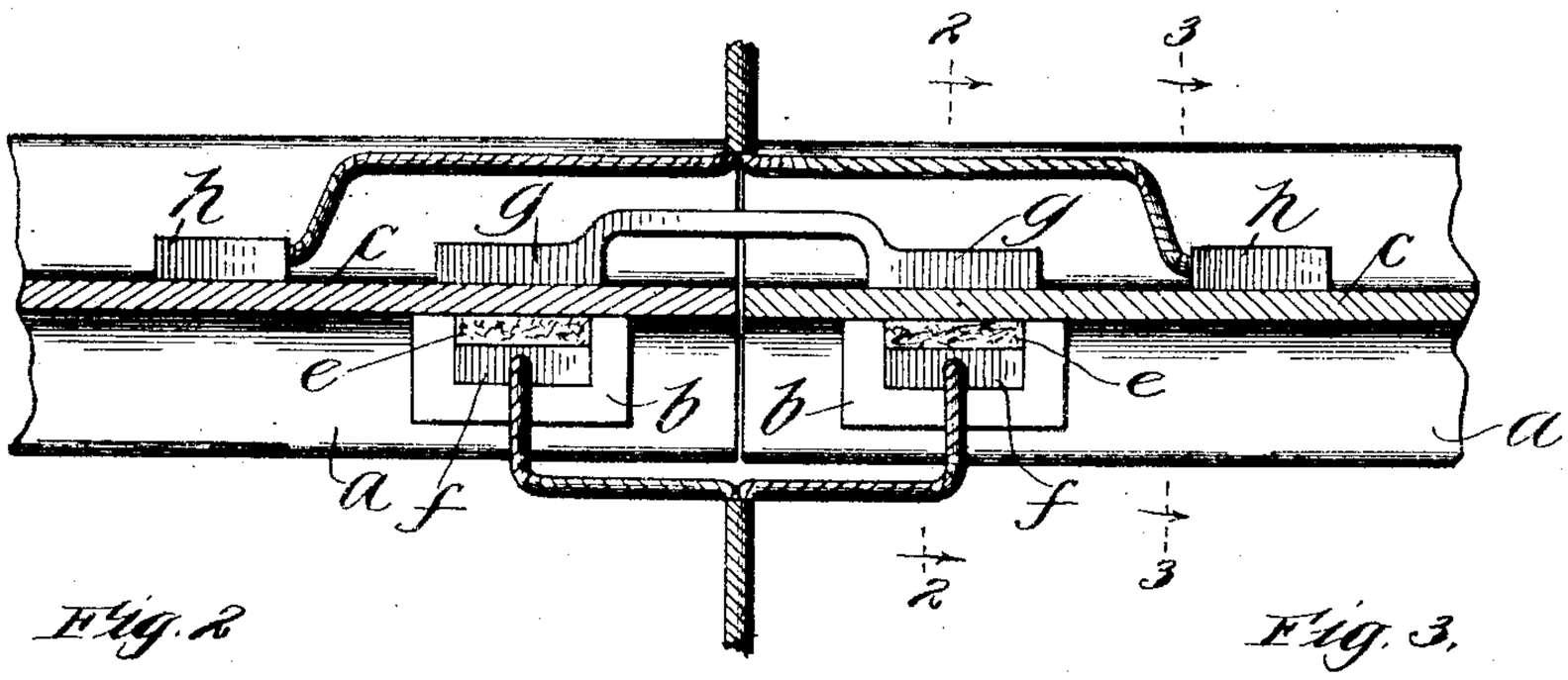


Fig. 2

Fig. 3.

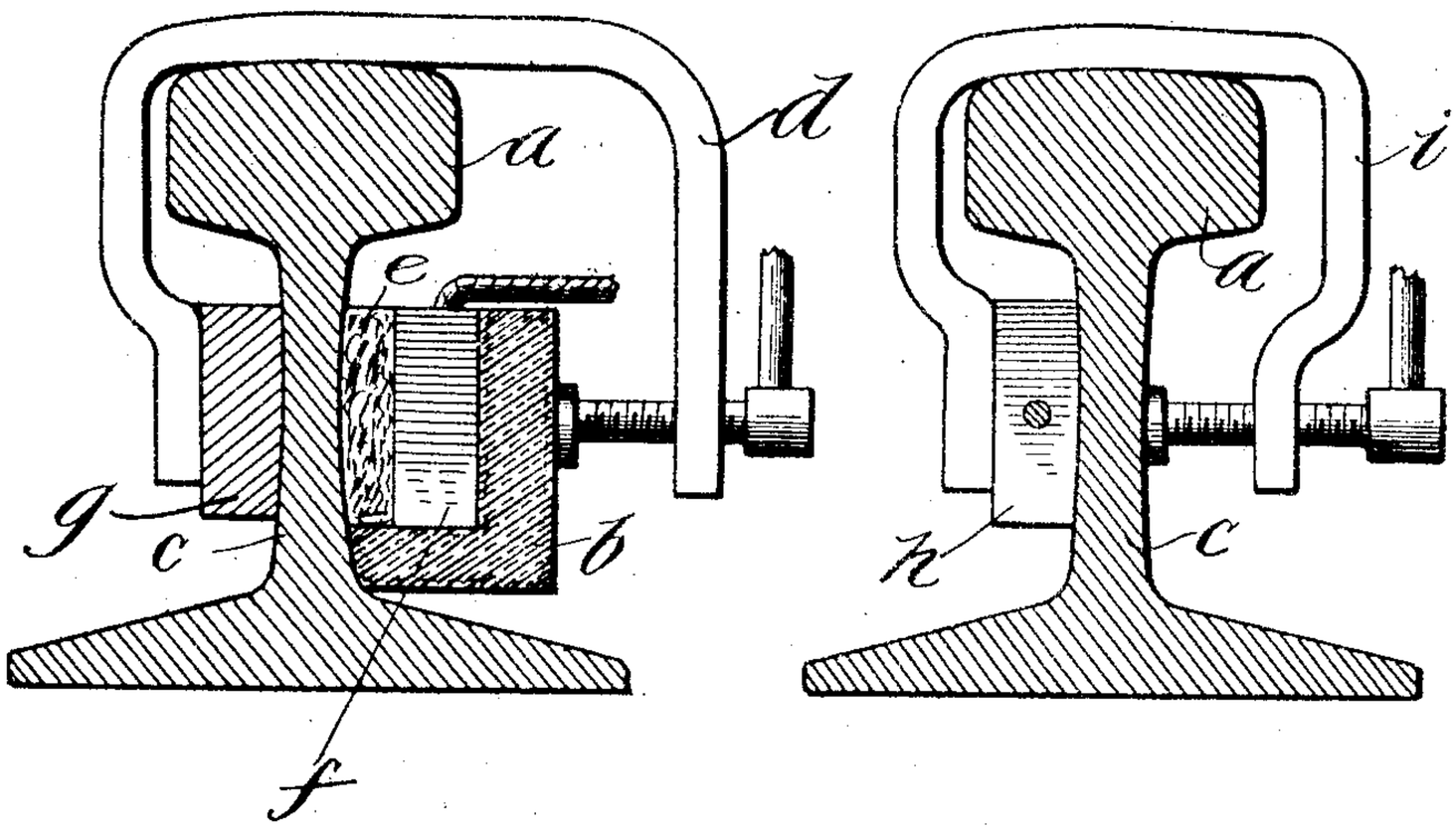
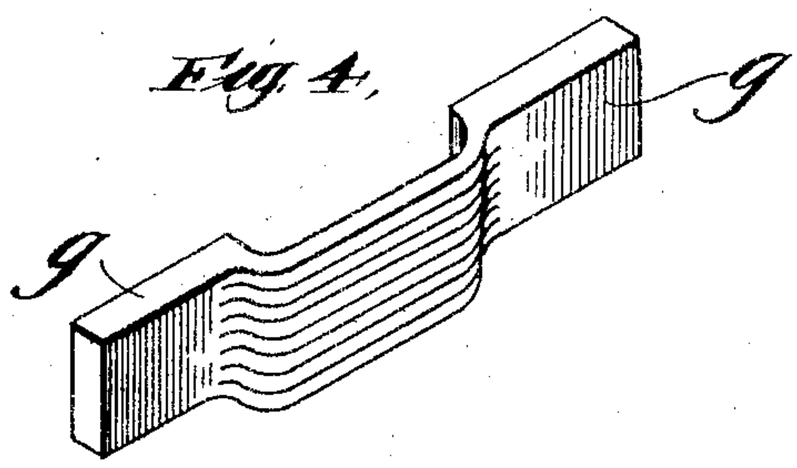


Fig. 4.



Witnesses:

G. A. Paulenschmidt

L. F. Stark

Inventor.

Charles F. Jacobs,

By G. L. Cragg Atty

UNITED STATES PATENT OFFICE.

CHARLES F. JACOBS, OF CHICAGO, ILLINOIS.

PROCESS OF UNITING METAL ELEMENTS.

999,309. Specification of Letters Patent. **Patented Aug. 1, 1911.**

Application filed August 21, 1909. Serial No. 513,967.

To all whom it may concern:

Be it known that I, CHARLES F. JACOBS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Processes of Uniting Metal Elements, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to the art of uniting metal objects, and finds a very important commercial use in bonding the adjacent ends of railway rail sections together, though it is to be understood that my invention is not to be limited to its use in connection with railway rails, except as may be specified in certain of the claims.

Two containers are employed in bonding rails, one to be located against the web of one rail and the other to be located against the web of the adjacent rail, the gap between the rails intervening between the containers. In the preferred apparatus, the containers are so constructed that each has an open side which is closed by the web of the rail against which the container is pressed or held, whereby such rail web forms, with the container, a receiving space for loose material that may have intimate contact with all portions of the web surface exposed to the interior of the container. The loose material employed is desirably of such a nature that it may permit of the passage of the electric current. A suitable flux may well serve the purpose, in which case the flux is brought to a molten condition either before or after it is placed in contact with the rail or other object and in such molten condition constitutes the loose material with which my invention is practiced, it being well known in the art that flux in a non-molten condition is not a serviceable current conductor. In a molten condition, although a serviceable conductor, it offers sufficient resistance to enable it further to be heated by the passage of the current, the heat being transferred from the molten or loose material to the metal object so that the heat of the metal object may be raised to such a state as to enable it to be joined to another metal object in accordance with the process of my invention. The loose material and the rail web are included in serial relation with a source of current, to heat the portion of the web that is exposed to the loose material to a sufficient extent to enable it to be united by fusion with a terminal of the rail bond. This terminal of the rail bond is applied to the web of the rail at a suitable time, preferably before the web of the rail is heated and when the container is pressed against the rail. The rail bond is located upon one side of the rail web and the flux or loose material upon the other side of the rail web, by which arrangement the heating of the rail web is not interfered with at all by the presence of the bond terminal, and the bond terminal is not subject to the direct heating action of the molten mass, as would be the case if it were immersed therein, but the rail bond terminal rather borrows its heat directly from the rail web. The bond terminal, furthermore, tends only to have the surface thereof that is pressed or held against the rail web melted, this being a further advantage as compared with the results secured by the immersion of the rail bond terminal within the molten mass, as in the latter event there is a tendency to melt all of the surfaces of the rail bond terminal to a greater degree than that surface thereof pressing against the rail web, which should alone be reduced to a melted state or a state of fusion. By means of my invention, each rail bond terminal may be clamped into position when the container is first placed against the rail web, inasmuch as the surface of the rail bond terminal pressing against the rail web is subject to the greatest heating action.

My invention, therefore, in its broad aspect, resides in locating the loose mass of material on one side of one of the metal objects to be joined by fusion and locating the other metal object upon the other side of the first metal object, in order that neither of the metal objects will interfere with the proper raising of the temperatures of both metal objects, and in order that other advantageous results which will now be apparent may be secured.

I will explain the method of my invention more particularly by reference to the accompanying drawing, showing one type of apparatus that may be employed in practicing the invention and also showing some metal objects in connection with which said apparatus is used.

In the drawings—Figure 1 is a sectional plan view of the adjacent end portions of two adjacent rail sections, clamping mechanism which is employed for holding the apparatus and rail sections in association not being indicated in this figure for the sake of clearness. Fig. 2 is a sectional view on line 2 2 of Fig. 1, showing some of the clamping mechanism that is employed. Fig. 3 is a sectional view on line 3 3 of Fig. 1, showing other clamping mechanism that may be employed. Fig. 4 is a perspective view of one form of rail bond terminal that may be employed in bonding the adjacent ends of adjacent rails together.

Like parts are indicated by similar characters of reference throughout the different figures.

I have indicated the adjacent ends of two T-rail sections *a a* and two containers *b b*, each having an open side that is closed by the rail web *c* against which it is placed, each container being held in position by means of some suitable form of clamping mechanism, such as that indicated at *d*, Fig. 2. As I have illustrated the containers *b*, they are composed of non-metallic material, on which account the receiving spaces thereof, in addition to holding the loose material or flux *e* that has contact with the web faces, also contain electrodes *f* located to the rear of the material *e*. I do not wish to be limited, however, to the use of containers composed of non-metallic material and to the use of electrodes that are distinct in their construction from the containers. Each clamping device *d*, in addition to holding a container *b* in place against one side of a rail web, may also hold a bond terminal *g* against the other side of the rail web immediately opposite the material *e*. The terminals or electrodes *h*, complemental to the terminals or electrodes *f*, may be clamped upon the same side of the rail webs *c* that are engaged by the bond terminals *g*, a clamping device for a terminal *h* being indicated at *i* in Fig. 3. The electrodes or terminals *f* are in parallel relation with each other and the electrodes or terminals *h* are in parallel relation with each other, these electrodes being included in a suitable circuit that will occasion the passage of current through the loose material *e* and the webs *c*, in order that the portions of the webs that are in line with the terminals *g* and the loose material *e* may become heated and may, in turn, sufficiently heat the terminls *g* to enable them to fuse with the webs. In order to promote the fusion between the webs and the terminals *g*, spelter, or suitable comminuted metal, may be interposed between the rail webs at said terminals.

While I have shown the containers *b* and the bonding terminals *g* as being applied to the webs of the rails, I do not wish to be limited to the portions of the rails that are to be united with the bond terminals.

While I have herein shown and particularly described one way of practicing my invention, I do not wish to be limited to all the details that have been specified, nor do I wish to be limited to the use of my invention in bonding the adjacent ends of adjacent rail sections together.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. The process of bonding the adjacent ends of adjacent rail sections together, which consists in causing loose fusible electric current-conducting material to be in contact with one side of each rail section, passing an electric current through said loose material and the rail sections to heat the loose material, heating the rails by said loose material, and holding the terminals of the rail bond against the sides of the rails opposite to those sides that are in contact with the loose material.

2. The process of bonding the adjacent ends of adjacent rail sections together, which consists in causing loose electric current-conducting material to be in contact with one side of each rail section, passing an electric current through said loose material and the rail sections to heat the loose material, heating the rails by said loose material, and holding the terminals of the rail bond against the sides of the rails opposite to those sides that are in contact with the loose material.

3. The process of bonding the adjacent ends of adjacent rail sections together, which consists in causing loose fusible current-conducting material to be in contact with one side of each rail section, passing an electric current through said loose material to heat the same, heating the rails by said loose material, and holding the terminals of the rail bond against the sides of the rails opposite to those sides that are in contact with the loose material.

4. The process of bonding the adjacent ends of adjacent rail sections together, which consists in causing loose current-conducting material to be in contact with one side of each rail section, passing an electric current through said loose material to heat the same, heating the rails by said loose material, and holding the terminals of the rail bond against the sides of the rails opposite to those sides that are in contact with the loose material.

5. The process of bonding the adjacent ends of adjacent rail sections together, which consists in causing loose material to be in contact with one side of each rail section, heating said loose material by an electric current, heating the rails by said loose ma-

terial, and holding the terminals of the rail bond against the sides of the rails opposite to those sides that are in contact with the loose material.

6. The process of joining metal objects, which consists in causing loose fusible electric current-conducting material to be in contact with one side of one metal object, passing an electric current through said loose material and metal object to heat the loose material, heating said metal object by the heated loose material, and holding the other metal object against a side of the first metal object opposite to that side that is in contact with the loose material.

7. The process of joining metal objects, which consists in causing loose electric current-conducting material to be in contact with one side of one metal object, passing an electric current through said loose material and metal object to heat the loose material, heating said metal object by the heated loose material, and holding the other metal object against a side of the first metal object opposite to that side that is in contact with the loose material.

8. The process of joining metal objects, which consists in causing loose fusible electric current-conducting material to be in contact with one side of one metal object, passing an electric current through said loose material to heat the same, heating said metal object by the heated loose material, and holding the other metal object against a side of the first metal object opposite to that side that is in contact with the loose material.

9. The process of joining metal objects, which consists in causing loose electric current-conducting material to be in contact with one side of one metal object, passing an electric current through said loose material to heat the same, heating said metal object by the heated loose material, and holding the other metal object against a side of the first metal object opposite to that side that is in contact with the loose material.

In witness whereof, I hereunto subscribe my name this 19th day of August A. D., 1909.

CHARLES F. JACOBS.

Witnesses:
G. L. CRAGG,
L. G. STROH.