(No Model.)

C. L. COFFIN.

METHOD OF AND APPARATUS FOR ELECTRIC WELDING.

No. 423,733. Patented Mar. 18, 1890.

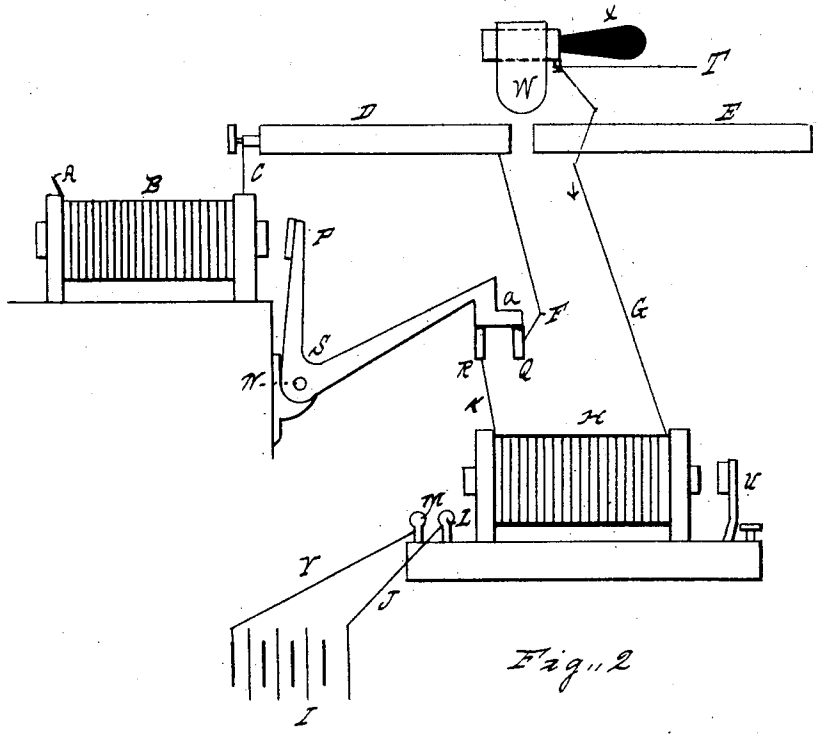


Fig. 2

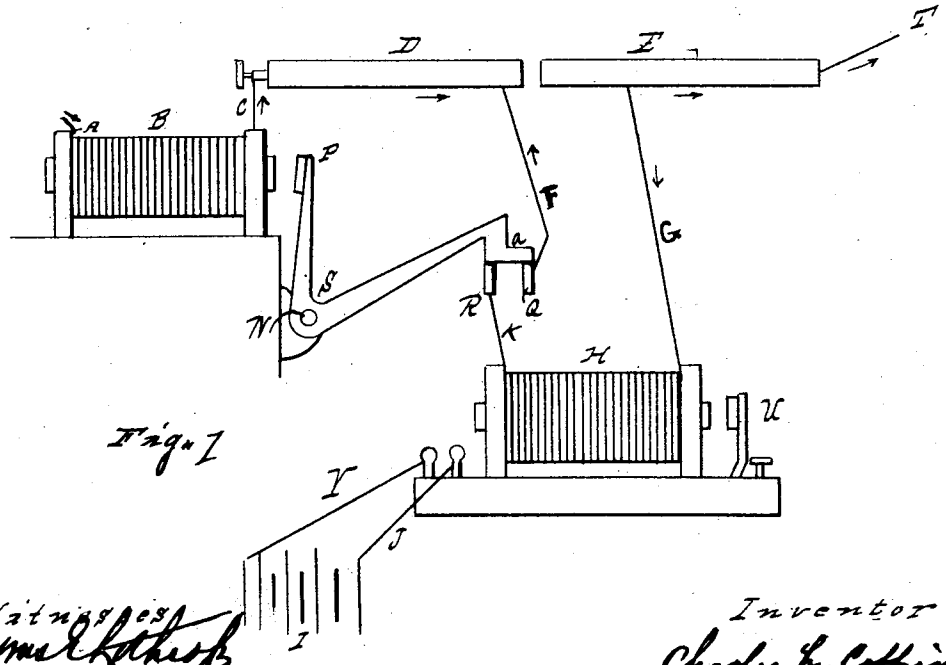


Fig. 1

Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES L. COFFIN, OF DETROIT, MICHIGAN.

METHOD OF AND APPARATUS FOR ELECTRIC WELDING.

SPECIFICATION forming part of Letters Patent No. 423,733, dated March 18, 1890.

Application filed November 19, 1889. Serial No. 330,826. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. COFFIN, of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Methods of and Apparatus for Electric Welding, of which the following is a specification.

My invention consists in a process of and apparatus for treating metals by electricity, hereinafter fully described and claimed.

The drawings are diagrams illustrating my invention, Figure 1 showing it applied to the process in which the arc is formed between the two edges to be welded together, Fig. 2 showing it applied to that process in which a voltaic arc is formed between the articles to be welded and an extraneous conductor.

D and E represent two pieces of metal to be welded together by passing a current of electricity through them, and thus heating their meeting edges by establishing a voltaic arc between them; but as they are not in contact it is ordinarily necessary to bring them together to establish the circuit and separate them to spring the arc, and this must be repeated whenever the arc breaks. To obviate this necessity is the object of my invention.

A represents an electrical conductor connected with one pole of a generator of electricity and connected with the bobbin of an electro-magnet B, the other end of which (represented by C) is connected with the piece of metal D.

T represents an electrical conductor, which connects the piece of metal E with the other pole of a generator. Were the circuit closed the current would pass through A B C D E T, as indicated by the arrows; but being open between D and E the current cannot pass unless some means of closing the circuit is provided. This I provide by the following means:

H represents an induction-coil, the primary of which (represented by the binding-posts M L) is connected with the conductors Y J from battery I, and whose secondary (represented by F G) is connected with the pieces of metal D and E to be welded.

U represents a vibrating circuit-breaker connected with the induction-coil. One of the connections of the secondary winding of the induction-coil H (the one marked K F) is connected with the two contact-plates R Q, by which the connection F is broken, except when plates R Q are connected to prevent the welding-current from passing through and destroying the secondary coil of the induction-coil H.

S represents a circuit-breaker consisting of a lever pivoted at N to the base on which electro-magnet B rests, and one end P is in proximity to the end of the core of said electro-magnet, while the other end *a*, which overbalances end P, rests normally on the contact-pieces R Q, thus closing the connection F.

In Fig. 2, W represents a conductor, with which is connected the conductor T and the connection G of the induction-coil, precisely as these are connected with the metal piece E in Fig. 1.

x is an insulating-handle by which conductor W may be manipulated.

The operation of my invention is as follows: A current being turned into conductor A remains inactive because it cannot cross the interval between D and E; but the action of the induction-coil H causes a spark to pass between D and E, thus affording a pathway for the main current, which instantly passes through A, B, C, D, E, and T, forming a voltaic arc between D and E, which rapidly brings the meeting edges of D and E to a welding heat. As soon as the circuit is thus established the current energizes the electro-magnet B, the core of which attracts the end P of bell-crank lever S and raises the end *a* of said lever away from contact-pieces R Q, so that the current cannot flow through the induction-coil. If for any reason the arc between D and E breaks, the circuit is broken, magnet B no longer attracts end P of lever S, and the end *a* of said lever again connects the contact-plates R Q, when a spark instantly passes between D and E, the circuit is re-established, and lever S again attracted by magnet B. When the connections are made, as shown in Fig. 2, the spark and arc pass between D and W instead of D and E.

I have illustrated an induction-coil as the means for passing a circuit-establishing spark between D and E; but any known electrical apparatus which is capable of performing the same function—viz., causing a spark between D and E—is for the purposes of my

invention an equivalent of the induction-coil. When the ends of D and E are sufficiently heated, they are welded by being pressed together, the current being stopped or not at will, and the weld may be finished in any known mode, as by hammering, rolling, &c.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The herein-described process of welding by electricity, consisting in connecting the articles to be welded with the poles of a generator of electricity in open circuit, closing the circuit by causing an electric spark to pass the break in the circuit, and bringing the articles together to form the weld when sufficiently heated.

2. The herein-described process of welding metals by electricity, consisting in connecting one of the articles with the poles of a generator of electricity, placing a conductor connected with the other pole of the generator in proximity to the edges to be welded, leaving the circuit open, and forming a path for heating-currents between one of said articles and said conductor by causing a spark from an independent source of electrical energy to pass the break in the circuit, whereby a voltaic arc is formed in the break in the circuit.

3. In the art of welding metals electrically, the combination, with two pieces of metal not in contact with each other, of electrical conductors connecting said metal pieces with the poles of a generator of electricity, an electro-magnet included in one of said conductors, a generator of high-tension currents connected with said metal pieces, and a circuit-breaker in the circuit of said high-tension generator, controlled by said electro-magnet, substantially as described.

CHARLES L. COFFIN.

Witnesses:
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