(No Model.) 2 Sheets—Sheet 1.

E. THOMSON.

APPARATUS FOR ELECTRIC WELDING.

No. 347,141. Patented Aug. 10, 1886.

Fig. 1

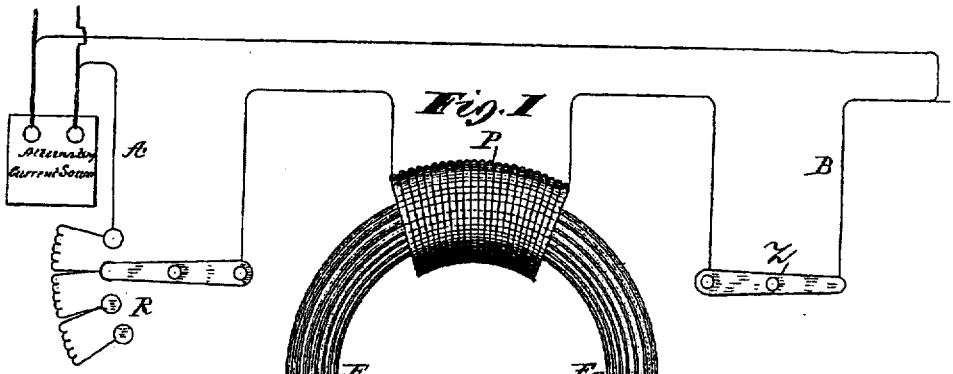


Fig. 2.

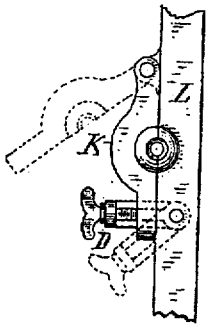


Fig. 3

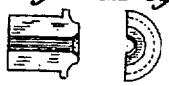


Fig. 4

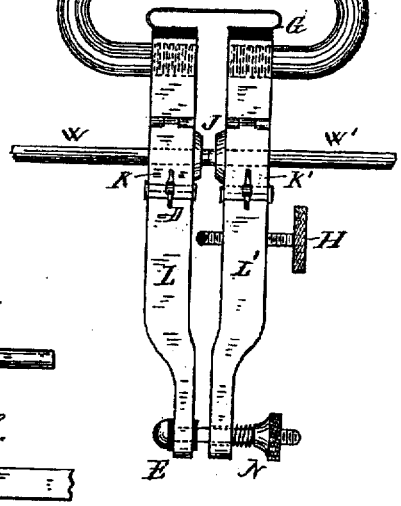


Fig. 5.

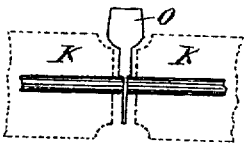
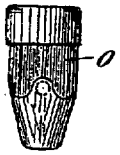


Fig. 7.

Fig. 8.

Fig. 6.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 9.

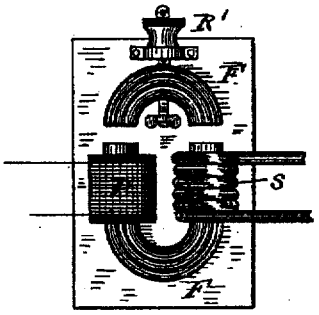

Fig. 10.

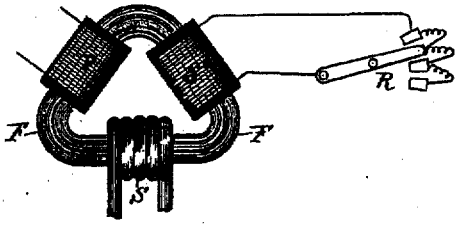

Fig. 11.

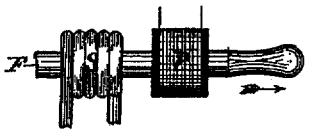

Fig. 12.

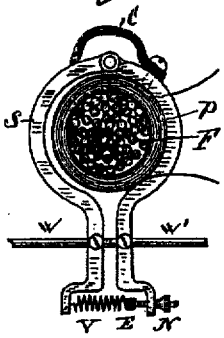

Fig. 13.

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UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF LYNN, MASSACHUSETTS.

APPARATUS FOR ELECTRIC WELDING.

SPECIFICATION forming part of Letters Patent No. 347,141, dated August 10, 1886.

Application filed March 29, 1886. Serial No. 197,078. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Apparatus for Electric Welding, of which the following is a specification.

My invention relates to an improved apparatus for the practice of a new process or art of welding by electricity, which forms the subject of a separate application for patent.

The object of my invention is to facilitate the operation and provide for its control.

It consists of a regulable source of current provided with an induction apparatus, to be presently described, and also of a means for easily clamping the pieces to be welded and of setting them in position.

Figure 1 shows my improved apparatus; Fig. 2, a clamp for quick work in clamping and unclamping pieces to be joined and that have been joined or welded. Fig. 3 shows the form of one of the removable clamping-blocks for wire; Fig. 4, another view of the same; Fig. 5, a stop for insuring proper placing of the pieces to be jointed. Fig. 6 is another view of the same. Fig. 7 is one example of the work that can be accomplished. Fig. 8 shows another example of the same.

A B, Fig. 1, are wires leading from a source of alternating electric currents to the coil of insulated wire P, wound around a ring-shaped iron core, F F, as shown. The coil P has a number of turns, depending on the electro-motive force and current supplied to it, its convolutions being usually numerous when used with average electro-motive forces and current strength. The connection of A and B to P is made so that a variable resistance, R, (or the equivalent may be substituted for it,) may be inserted in greater or less amount, so as to vary the force of the primary circuit-current in the coil P, and the switch Z permits of rupturing such circuit at will. Around the same iron core F F are also wound a few turns of heavy copper cable S, giving an almost inappreciable electrical resistance. The ends of the secondary coil are attached each to one of a pair of clamp-bearing arms or blocks, L L′, of good conducting metal, relatively placed and guided so as to have only a slight movement toward and from each other. For such purpose an insulated flexible plate, as at G, may be used in conjunction with an insulated pillar borne by L at E, and passing through a hole in L′. A nut, N, and compressed spring strung on said pillar permit said pillar to be used for drawing arms L L′ toward each other with a pressure depending on the position of the nut N. The clamps K K′ are placed opposite one another on arms L L′, respectively, and a screw, H, serves as needed to force arms L L′ apart and hold them so separated. The clamps K K′ are made so as to hold in place the replaceable divided dies or sleeves for holding wires or other pieces near the point of welding or juncture.

In order to manipulate the clamps rapidly, they are preferably made as in Fig. 2, where the body K is hinged to L and the free end arranged to be set or clamped by a movable clamp-screw in a swinging frame, D, as shown.

The dotted lines show the parts unfastened. The removable parts surrounding the wire or bar to be welded are like Figs. 3 and 4, and are made of copper or other good conductor in halves, the size of internal bore being nearly equal to the dimensions of the bar to be clamped, and such bore is somewhat countersunk, preferably at the end where the wires, W W′, to be jointed are abutted at J, Fig. 1. The wires or bars W W′ should be set projecting a little from the clamp-blocks when abutted, and to secure this I have devised a stop-plate, O, Fig. 5, for insertion between the clamping-blocks K K′, as indicated, such plate O having a thin portion against which the wires may be abutted, and a thicker portion immediately above for insertion between the clamp-blocks, so as to determine their distance apart during the insertion of the wires. The removal of O leaves the wires free to abut and yet project some little distance from the clamps.

Fig. 6 shows the stop-plate O on its flat side, while in Fig. 5 it is seen edgewise.

The operation of my apparatus is as follows: The wires or bars W W′, of iron, steel, German silver, brass, copper or its alloys, &c., having been inserted into the clamps by the aid of the plate O or without it, and the screw H, Fig. 1, turned back, so as not to in-

terfere with the approach of L L', under the action of the spring under the nut N, the switch Z is momentarily closed to permit alternating currents to flow in coil P. There results very heavy currents in S, which traverse the junction or abutted ends of W W', projecting from the clamps. The immediate result is partial fusion of such ends and union into one piece by the force of the spring under N. Suitable adjustments of current and elastic pressure are readily made to suit the size of bars or wires and their conducting-power, so as to fuse or electrically weld them. Joints of steel with steel or iron are thus easily formed, or with German silver or brass, or of brass with brass, or with iron, steel, or German silver, &c.

Other means of regulating the current given out by S may be used, some of which are indicated in Figs. 9, 10, 11, 12, and 13.

In Fig. 9 the iron core F is divided, and one portion is made movable toward and from the other, so as to more or less completely close the magnetic circuit of the core by a regulating-screw, R', or the like.

In Fig. 10 the core has another coil, S', wound on it, in the circuit of which a variable resistance, R, may be inserted as needed. This coil S', when on short circuit, will nearly neutralize any effect in S, but when on open circuit will give to S its full power, and with varying resistances in its circuits the current induced in S will vary. Its effect is similar to placing a closed tube of copper of greater or less dimensions around the core or parallel to the secondary S.

In Fig. 11 the core F is made movable in and out of the axis of S, to vary the current generating inductive currents in S.

In Figs. 12 and 13 the core F is surrounded by the primary coil P, as shown, and is of such diameter that a single band of copper, S, alone forms the secondary, and whose position as regards the coil P and core F may be changed from the maximum position shown to any other. In this case the halves of the band S can also replace the arms L L' by hinging them, as shown, and providing a flexible cable connection or shunt, C, around the hinge-joint. The wires W W', or bars to be jointed, are held abutted by clamp-screws, and are pressed together by an adjustable elastic spring, V, which is prevented from making connection between the separated ends of the band S by insulation, as at E.

Other methods of regulating the discharge of currents may be used, and my invention is not limited in such particular.

What I claim as my invention is—

1. In an apparatus for electric jointing or welding, a source of heavy currents and means for regulating the same, in combination with devices for holding the pieces to be welded and with a means of imparting a pressure tending to force such pieces together.

2. In an apparatus for electric jointing or welding, the combination, with devices for holding pieces to be welded, of a coil wound upon an iron core and connected with a source of electricity, a secondary coil or circuit of low resistance, connections from said secondary coil to the holding devices, and means for varying the magnetic inductive effects of the core upon the secondary, as and for the purpose described.

3. In an apparatus for electric jointing or welding, the combination, with devices for holding the pieces to be welded, of an induction apparatus wound with two coils, one of low resistance as compared with the other, connections from the low-resistance coil to the holding devices, and a source of electric current connected with the coil of comparatively high resistance.

4. The combination, with the clamping-blocks and means for connecting the same with a source of electricity, of a stop-plate, O, having a thin portion, against which the parts to be welded may be abutted, and a thicker portion, against which the clamp-blocks may abut, so as to determine their distance apart in the operation of inserting parts to be welded.

5. In an apparatus for electric welding, a regulable source of current of electricity and means of passing the same through the pieces to be welded and across their surfaces of contact, in combination with means for exerting a regulable pressure upon such surfaces, as described.

6. An apparatus for electric welding, consisting of a primary coil fed by alternating currents, means for regulating the effect of said currents upon the secondary coil in inductive relation thereto, clamps for holding the pieces to be joined, so as to contact with each other at the point of junction, and means for pressing said pieces together at the point of junction, as described.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 23d day of March, A. D. 1886.

ELIHU THOMSON.

Witnesses:
W. O. WAKEFIELD,
E. H. KITFIELD.