(No Model.) 2 Sheets—Sheet 1.

C. L. COFFIN.

PROCESS OF WELDING METALS ELECTRICALLY.

No. 428,459. Patented May 20, 1890.

Fig. 2

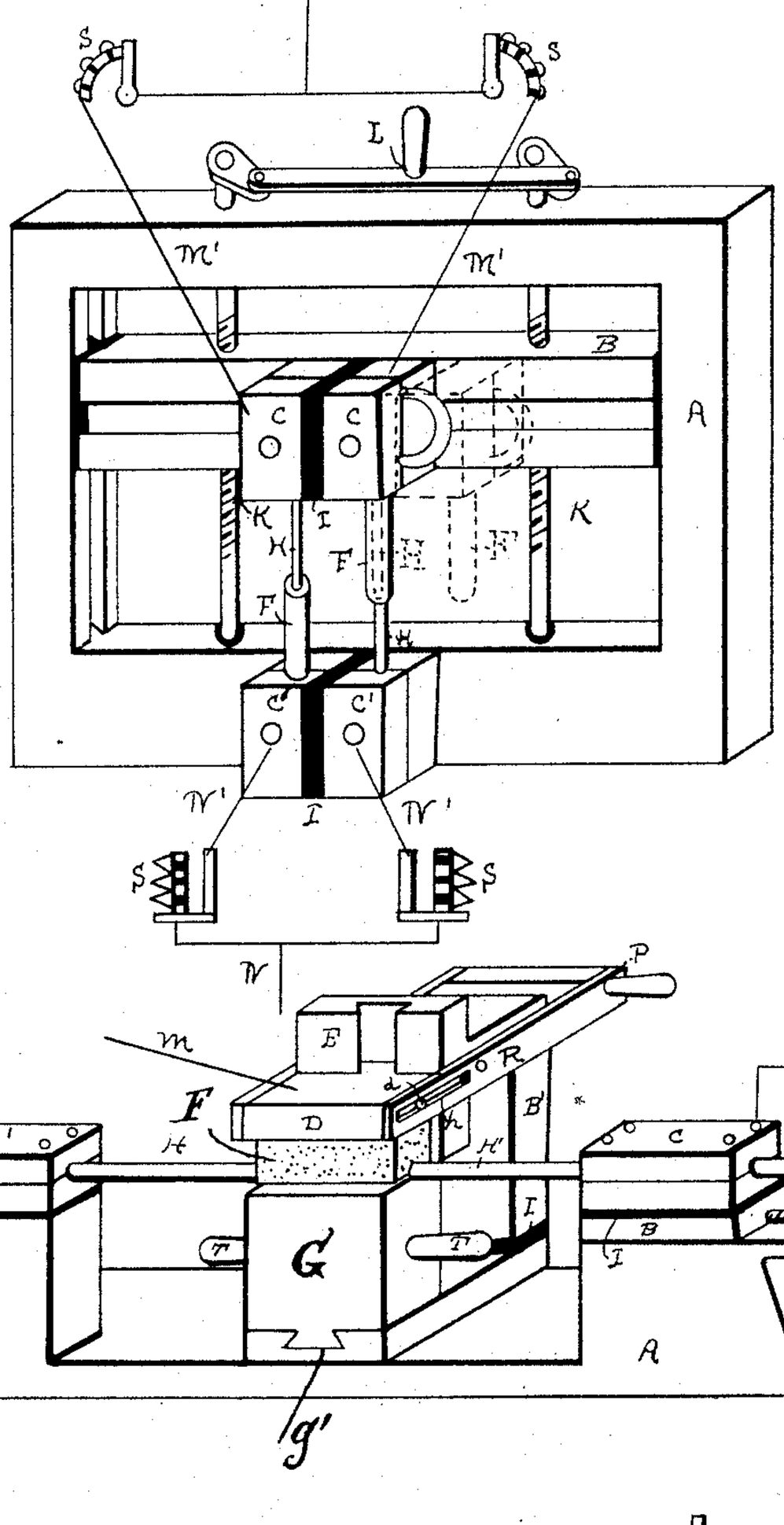

Fig. 1

WITNESS

Gertrude H. Anderson

Elliott J. Woodard

INVENTOR

Charles L. Coffin

(No Model.) 2 Sheets—Sheet 2.

C. L. COFFIN.

PROCESS OF WELDING METALS ELECTRICALLY.

No. 428,459. Patented May 20, 1890.

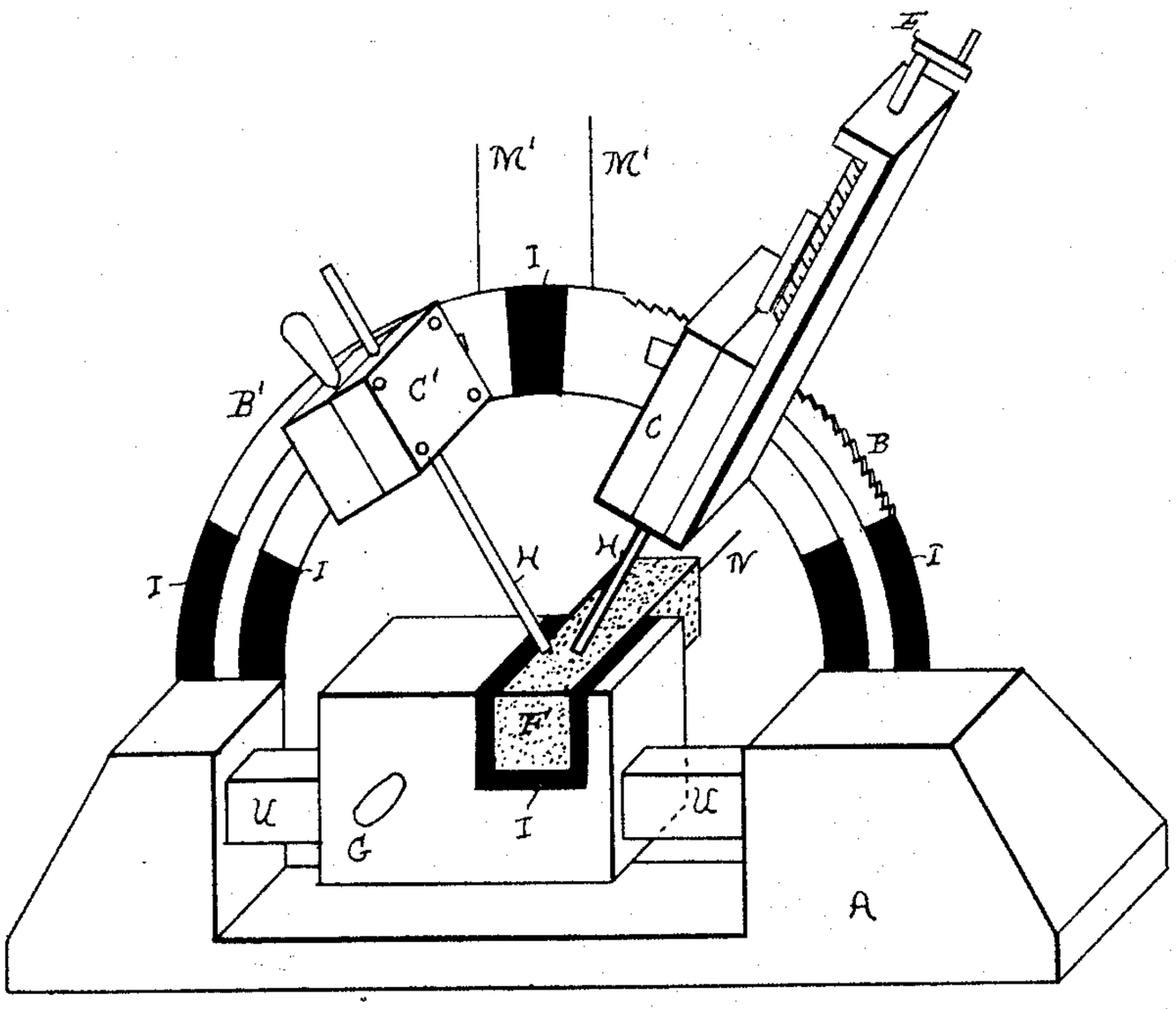

Fig. 1.

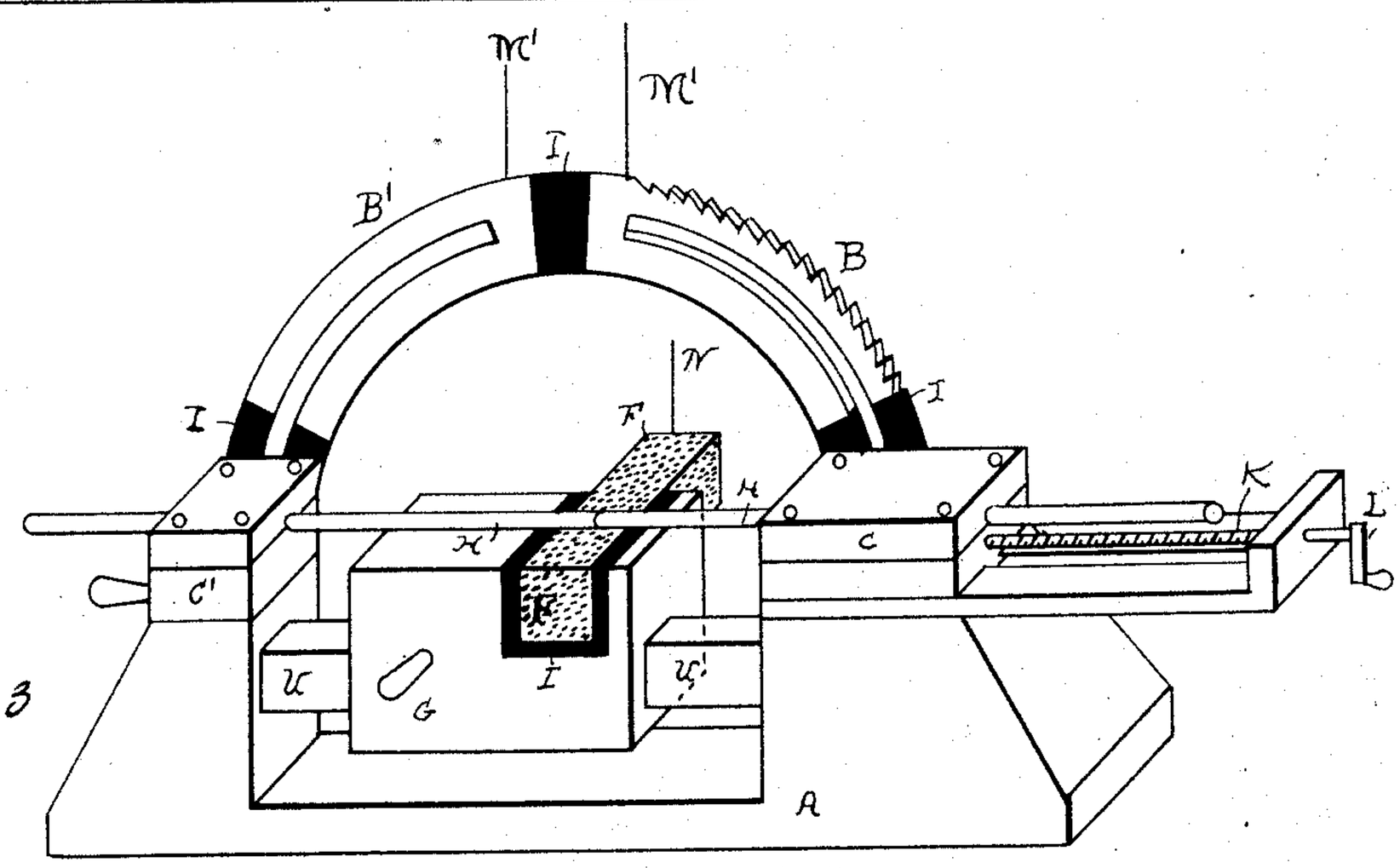

Fig. 3.

Witnesses
Gertrude M. Anderson
Elliott J. Stoddard

Inventor
Charles L. Coffin.

UNITED STATES PATENT OFFICE.

CHARLES L. COFFIN, OF DETROIT, MICHIGAN.

PROCESS OF WELDING METALS ELECTRICALLY.

SPECIFICATION forming part of Letters Patent No. 428,459, dated May 20, 1890.

Application filed March 7, 1890. Serial No. 342,975. (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 a Process of Welding Metals Electrically, of which the following is a specification.

My invention consists in a process of welding metals electrically, hereinafter fully described and claimed.

In the accompanying drawings, in which I have shown various apparatus adapted to carry my process into effect, Figure 1 is a perspective view of an apparatus for carrying my invention into effect; Fig. 2, a perspective view of a modified form of apparatus adapted for the same purpose; Fig. 3, a perspective view of another modification of apparatus for the same purpose, and Fig. 4 another view of the same modification of apparatus for said purpose.

In Fig. 1 A represents the base of the machine, and B represents a movable block on one end of the machine, which may be moved by a screw-shaft K, provided with a crank L. C represents a clamp secured on but insulated from block B, adapted to clamp and hold any article desired to be welded. C′ represents a similar clamp secured to but insulated from the frame, and H H′ represent the articles to be welded—for example, metal rods. N represents a conductor connected with one pole of a generator of electricity, which is branched, as shown by N′, and connected with the two clamps C C′. A resistance-switch S is interposed in one or both of the branches N′, to enable the operator to equalize the resistance. G represents an anvil slidingly secured on the frame, as by the dovetail groove *g*, and preferably having handles T T, by which it may be moved under the rods H H′ or drawn away from them. B′ represents a block secured to the frame A, but insulated therefrom. E represents a head having a vertical dovetail groove therein carried on block B′. P represents a frame pivoted at R to head E and provided with a slot *p*, into which projects pins *d*, secured to a cross-head D, provided with a dovetail projection to engage with the dovetail groove in head E. F represents a conductor, preferably a block of carbon, secured to cross-head D and connected with the other pole of the generator by a conductor M, secured either to conductor F or cross-head D. The operation of this mechanism is as follows: The articles to be welded (as metal rods H H′) are clasped in the clamps C C′, the anvil G is drawn out from under conductor F, and conductor F is lowered by raising the outer end of frame P, which passes the slots *p* to permit the pins *d* to descend until conductor F lies between the two rods H H′. The rods H H′ are then adjusted so that their ends bear against block F, and a heating-current is passed through conductors M and N, rods H H′, and conductor F. This raises the ends of rods H H′ to a welding heat, when the outer end of frame P is depressed, raising the block F from between H H′. The rods H H′ are then moved forward until they come in contact, and are pressed together to form the weld. The weld may be completed by running the anvil G under the rods and hammering the weld on the anvil.

In the arrangement shown in Fig. 2 A represents a frame, in which B is a movable cross-head operated by screw-shafts K and crank L, in which is formed a dovetail groove O. C C represent two clamps insulated from each other and from cross-head B and provided with a dovetail projection by which they engage with cross-head B, so as to be capable of a vertical motion with said cross-head and a lateral sliding motion on said cross-head. C′ C′ represent two similar opposing clamps secured to the frame A, but insulated from said frame and from each other. H H represent two articles to be welded—in the illustration iron rods—secured in the diagonal clamps C C′, and F F represent conductors, preferably carbon, secured in the other diagonal clamps C C′. M represents a conductor connected with one pole of a generator of electricity, which is branched, as shown at M′, and connected with the two clamps C C, a resistance-switch S being interposed in one or both of said branches. N represents an electrical conductor connected with the other pole of the generator and similarly branched, as shown at N′, to connect with the two clamps C C′. A resistance-switch S is interposed in one or both of the branches N′. The operation of this mechanism is as follows: The parts being in

the position shown in the drawings, in which each article to be welded is in contact with an opposing carbon F, a heating-current is passed through the conductors M N, clamps C C′, carbons F F, and rods H H′. Thereby the rods H become heated at their points of contact with the carbons. As soon as the rods H are raised to a welding heat at their ends, they are slightly separated from the carbon by the screw-shaft K. The clamps C are slid horizontally along cross-head B, as indicated in dotted lines, until the rods H register with each other, when the weld is completed by pressing the rods H together.

In the mechanism shown in Figs. 3 and 4, A represents a base having thereon a semicircle B B′, to which the clamps C C′ are connected by a sliding connection. At the center and ends of the semicircle B B′ is insulating material I, so that the two quadrants which compose said semicircle are insulated from each other and from the base, and the clamps C C′ are insulated from quadrants B B′ when in the position shown in Fig. 3. G represents an anvil sliding on the bar U and carrying therein, but insulated therefrom, the carbon block F. K and L represent a screw-shaft and crank by which the clamp C may be moved on its base. H H′ represent the two articles to be welded—for illustration, iron rods. M′ M′ represent branch conductors similar to conductors M′ M′ in the other figures, by which the quadrants B B′ are both connected with one pole of a generator of electricity, and N represents a conductor by which carbon block F is connected with the other pole of a generator. I represents insulating material in all the figures. The operation of this mechanism is as follows: The rods H H′ being clamped in the clamps C C′, said clamps are raised, as shown in Fig. 4, until they leave the insulation I, and are in electrical contact with the quadrants B B′, respectively, in which position the ends of rods H H′ are allowed to rest upon the carbon block F. A heating-current is now turned through the conductors, by which the ends of rod H are heated through their contact with the carbon F. When the ends of rod H are brought to a welding heat, the current is shut off, (which may be done by lowering clamps C C′ to the position shown in Fig. 3,) the clamps are lowered, and the ends of rods H H′ forced together to form the weld. The anvil G may now be brought under the weld and the rods hammered to complete the weld. Instead of leaving the ends of rods H H′ in contact with the carbon F and passing a heating-current through them, the ends of said rods may be slightly separated from the carbon after the current is established, thus forming a voltaic arc between each rod and the carbon, by which the end of the rod is brought to a welding heat.

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

1. The herein-described process of welding metals electrically, consisting in making contact between the two parts to be welded and an electrical conductor, passing heating-currents through the articles to be welded and said conductor, removing the articles to be welded from contact with the conductor when brought to a welding heat, and pressing them together to form the weld.

2. The herein-described process of welding metals electrically, consisting in making contact between the two parts to be welded and an electrical conductor, establishing an electric current through the articles to be welded and said conductor, slightly separating the ends of the articles to be welded from said conductor, thus forming a voltaic arc, and pressing the articles to be welded together to form the weld.

CHARLES L. COFFIN.

Witnesses:
GEO. H. LOTHROP,
GERTRUDE H. ANDERSON.