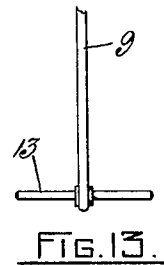


APPLICATION FILED FEB. 7, 1912.

3 SHEETS--SHEET 1.



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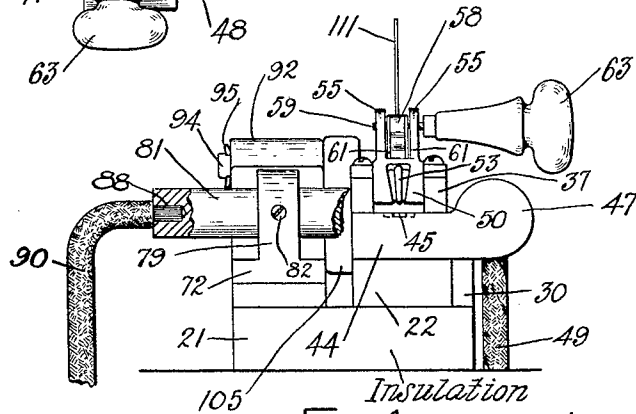
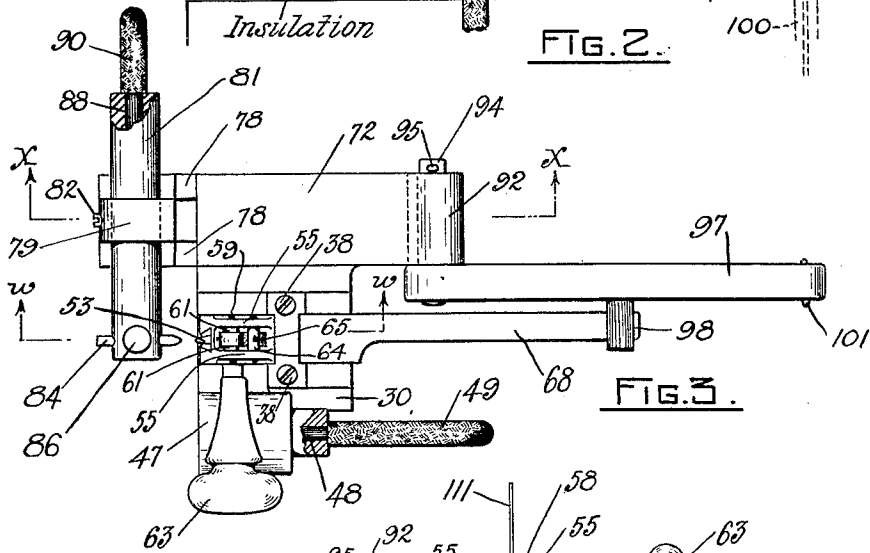
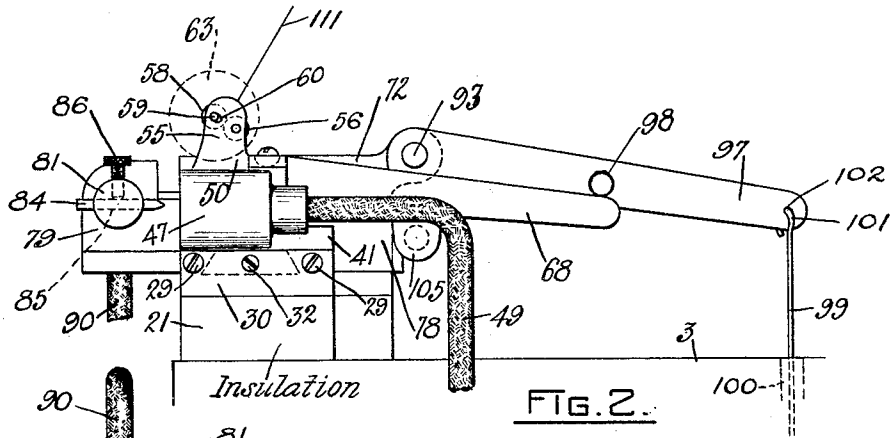
WELDING MACHINE.

APPLICATION FILED FEB. 7, 1912.

1,056,850.

Patented Mar. 25, 1913.

3 SHEETS-SHEET 2.



WITNESSES.

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FIG. 4.

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3 SHEETS—SHEET 3.

UNITED STATES PATENT OFFICE.

FREDERICK A. STEVENS AND SAMUEL E. BOUCHARD, OF PROVIDENCE, RHODE ISLAND.

WELDING-MACHINE.

1,056,850.

Specification of Letters Patent.

Patented Mar. 25, 1913.

Application filed February 7, 1912. Serial No. 675,984.

To all whom it may concern:

Be it known that we, FREDERICK A. STEVENS and SAMUEL E. BOUCHARD, citizens of the United States, residing at Providence, 5 in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Welding-Machines, of which the following is a specification.

10 Our invention relates to electric welding machines, and is particularly adapted to concentrate the heat in a small area to an intense degree, whereby the heat is not radiated or conducted to adjacent areas which 15 would be injured by the action of heat.

The primary objects of our invention are to concentrate a maximum of heat at the welding point; to prevent the heat from extending upon the work at any material 20 distance from the heated point; to control at will the supply and quantity of electric current moving to the electrodes; and to attain these ends in a structure which shall be simple to operate, inexpensive to construct, and certain in operation. 25

To the above ends essentially but not exclusively our invention consists in such parts and combinations of parts as fall within the scope of the appended claims.

30 In the accompanying drawings wherein lies reference characters indicate like parts throughout the views, Figure 1 is a side elevation of our novel machine showing the electrical circuits partially in diagram, Figs. 35 2 and 3, side and plan elevations respectively of the portions of the machine above the bench, Fig. 4, a front elevation of the machine with parts broken away, Fig. 5, a side elevation partially in section on line 40 *w w* of Fig. 3, Fig. 6, a section of the same on line *x x* of Fig. 3, Fig. 7, a section on line *y y* of Fig. 5, Figs. 8 and 9, plan and transverse sectional views of that portion of the surface of the work-supporting block 45 upon which the work rests, Figs. 10 and 11, plan and side elevations of the work supporting block of modified construction, Fig. 12, a perspective view of a certain piece welded by this machine, and Fig. 13, a detailed view of the treadle shown at an angle 50 of 90 degrees from that shown in Fig. 1.

Our machine may be mounted or supported upon a bench or table or any other form of support best adapted for carrying 55 the operative parts. In the form herein shown, the frame or support consists of an

ordinary horizontal bench or table 3 fixed to a wall 4 or carried by legs not shown. Fixed to the bottom of the bench 3 is a hanger 5 with a stud 7 upon which is pivoted intermediate its length a lever 9 preferably carrying upon its upper end an anti-friction roller 12, and having fixed in its bottom a transverse rod 13 forming a foot-rest. Upon a pin 15 fixed in the hanger is 65 pivotally mounted at one end a curved arm or cam 16, to whose opposite end is fixed one end of a spring 18, having its lower end fixed to a pin 20 in a portion of the hanger 9 near the stud 7. Fixed to the upper face 70 of the bench 3 at the forward end of the same is a body of the machine comprising a base block of insulating material 21 upon which is fixed by a screw 23 or otherwise a second block 22 provided in its upper face, 75 in the present instance, with a way 25 engaging a tongue portion 26 of a block 27. Fastened to the end of the block 22 by screws 29 is a plate 30 having an opening 31 through which extends a screw 32 entering 80 a threaded opening 34 in the tongue portion 26 to form a transverse adjustment of the block 27, if such an adjustment be required. It will be understood that the block 27 may, if preferred, be permanently fixed to and 85 from a part of the block 22, and thus form an immovable portion of the frame; and the block 22 may, if preferred, be cast in one piece with the base 21. The block 27 is provided in its upper portion with a rectangular opening 36, forming interspaced vertical 90 ears 37, to whose upper portions is fixed by screws 38 a transverse shaft 39, having a semicircular bearing surface, as at 40, upon its bottom. A rearwardly extending portion 95 41 of the block 27 is provided with an opening 42, through which loosely extends a vertical helical spring 43, which rests upon the block 22.

Fixed to the forward part of the block 27 100 is a die 44 of copper or of other electrically conductive material, provided upon its forward upper margin with a die cavity 45 having any desired contour conforming to the shape of the parts to be operated upon. 105 Upon one end of the die 44 is an extension 47 provided with an opening 48 to receive the end of an electric cable, wire, or conductor 49. The socket construction 47 and 48 is not exclusive, since the particular 110 means of connecting the end 49 with the extension 47 is a matter of preference. A jaw

50 is located above the die 44 and is provided with a groove 51 semicircular in cross-section adapted to receive the surface 40 of the shaft 39. Fixed to the upper jaw 50 are two interspaced ears or bearings 55, in which is mounted a feed roll 56. Coöperating with the latter is a roll 58 whose shaft 59 is loose in the openings 60 in the ears, which openings are of sufficiently greater diameter than the diameter of the shaft as to permit the movement of the roll 58 toward and away from the roll 56. The roll 58 is pressed into contact with the roll 56 by two springs 61, whose lower ends are fastened to the jaw 50 and whose upper ends press against the shaft 59. Upon the outer end of the shaft 59 is an operating handle 63. Fixed in the ears 55 above the rolls is a transverse guide pin 64 provided with an opening 65. The portion of the jaw 50 extending rearwardly from the bearing 39 forms a lever arm 68. The arm or block is provided in the rear of the bearing 39 with a cavity 69 in which registers the end of the spring 43, which normally presses the lever arm 68 upwardly.

Integral with the top of base 21, or attached thereto by a screw 71 or otherwise, is a block 72 forming a part of the body of the machine, and located parallel with the block 27, and provided with a longitudinal cavity 74, in which is a helical spring 75, pressing with one end against the end of the cavity 74. In the longitudinally disposed way 76 in the block 72 are rods or guides 78, having integral with their forward ends a head 79. Loose in an opening 80 in the head 79 is a horizontally disposed rod 81 of copper or other electrically conductive material, which is held in any desired adjustment longitudinally or axially by means of a set screw 82 located in a threaded opening 83 in the head 79. The rod 81 constitutes a part of an electrode which is completed by a copper pin 84 which loosely passes through an opening 85 in the rod 81, and is held therein in adjusted position by a set screw 86. The end of this pin is in longitudinal alinement with the cavity 45. Fixed in a socket 88 in the opposite end of the rod or tube 81 is the end 90 of an electric cable, wire, or conductor. The block 72 has upon its rear upper end an extended portion 92, provided with an opening 93, in which is a pin 94, in one end of which is a spring pin 95, and to whose opposite end is fixed a lever 97, provided intermediate its length with a lateral pin 98, against which contacts the upper edge of the lever arm 68. A rod or link 99 extending through an opening 100 in the bench 3 is provided at one end with a hook 101 passing through an opening 102 in the end of the lever 97, and provided upon its lower end with a second hook 103 engaging a pin 104 upon an intermediate portion of the cam or lever 16.

A depending lug 105 upon the rear end of

the lever 97 is provided with a lateral pin or projection 106, pressing against a yoke 107 which connects the rear ends of the rod 78 and presses the same against the end of the spring 75. Any upward movement of the arm 97, therefore, releases the yoke or bar 107, and permits the spring 75 to draw the head 79 and its electrode 84 toward the electrode 44 and in contact with the work resting upon the latter.

The downward movement of the arm 97 not only propels the head 79 away from the remainder of the machine, but also through the pin 98 depresses the end of the lever 68 thereby compressing spring 43 and elevating or opening the jaw 50, thereby facilitating the introduction of work upon the surface of the electrode die 44. The elevation of the rod 97 on the other hand permits the elevation of the arm 68 under the pressure of the spring 43, and closes the jaw 50 tightly down upon the work upon the die or in the die cavity 45, at the time of the closest approach of the electrode 84 to the work and to the solder.

If preferred, the dies may be made in two parts rather than in a single large block, a smaller portion of the block being independent of the larger portion and seated in the latter, such smaller portions being indicated as 108 in Figs. 10 and 11. By making the dies in two parts as just suggested, it is possible to remove a worn die and substitute another. The cavity 45 while convenient is not essential in operating upon some articles.

The machine may be used for welding or soldering one small piece or article to another piece. In the present instance, a die is shown particularly adapted to receive the end piece 109 of a pair of spectacles to which it is sought to fuse or solder an eye wire 110, a portion of which is shown broken away in Fig. 12. For various reasons it is desirable that in applying the fusing heat at the junction of the parts 109 and 110 to be united that the heat should be concentrated at that point. In this machine is employed a wire of solder 111, wound upon a reel 112, mounted to rotate upon an arm 113 on a standard 114, mounted on the bench 3, as shown in Fig. 1. The wire 111 passes through the opening 65 in the guide pin 64, or through any other guiding means and intermediate the rolls 56 and 58, and thence through the tube 53 to a point adjacent the die cavity 45, whereby the end will be within the heated area intermediate the electrode pin 84 and the die 44. This solder wire is usually employed, but when fusion without solder is desired, the solder wire is withdrawn upwardly through the tube and away from the heated area by turning the handle 63. The yielding pressure of the roll 58 against the solder wire 111 resting against the roll 56 makes it possible to feed the

solder wire in either direction by turning the handle 63.

The electrical circuit for supplying current to the electrodes, in the present instance, consists of the conductor or wire 90 including the resistance coil 116, and terminating at the point 117. Adjacent the point 117 is a pivoted switch 118 adapted to contact with the point 117, and to whose pivoted end, as at 119, is attached the wire 120. The wire 94 completes the circuit. In the drawing this wiring is shown diagrammatically. In the resistance coil 116 is the usual core 122 vertically disposed, and having attached to its upper end a cord 123, passing over a roller 124, mounted in a bracket 125, fixed to the bench 3, and having its end attached to a pin 126 near the upper end of the lever 9. Attached to the last mentioned pin is a cord 127, having incorporated intermediate its length a helical spring 129, and attached to an intermediate portion of the switch 118. Obviously the electrical circuit might be continuous and still operate the machine, but great advantages are apparent in incorporating a switch in the circuit. It will be observed that the rearward movement of the lever 9 by the foot will, through the cord 127 and spring 129, close the switch 118 upon the point 117, thence completing the circuit and supplying current to the machine, and the same movement will elevate the core 122 through the cord 123, thence admitting an increased quantity of current. The continued movement of the lever 9 when an alternating current is used in the same direction diminishes the resistance gradually up to the point desired by the operator. In operating the mechanism of our machine, the described movement of the lever 9 to some point such as that indicated in broken lines in Fig. 1, elevates the arm 16, and through that the link 99 and lever arm 97. The last described motion occasions the engagement of the end piece 109 or other article by the jaw 50. Meanwhile the operator has placed the eye wire 110 or other article into contact with the forward end of the piece 109 the electrode 84 having been drawn forward into contact with the wire 110 by the spring 75. The heat thus generated in the parts operated or near their joint is sufficient to fuse the end of the solder wire 111 which has been fed into contact with the heated parts at their joint. Obviously the solder may in any form be applied to the joint manually without any feeding mechanism by placing the solder loosely upon the joint. When the rearward pressure upon the treadle is relaxed, the spring 18 forces the lever 9 back into original position, depresses the arm 97, and opens the switch 118.

What we claim is,—

1. In a machine of the type set forth, the combination in an electric circuit, of an elec-

trode, means for clamping work to the electrode, a second electrode movable toward and away from the first electrode, and means coöperating with the clamping means for operating the second electrode.

2. In a machine of the type set forth, the combination in an electric circuit, of an electrode adapted to support work, rocking means for alternately clamping and releasing the work, a second electrode movable toward and away from the first electrode, and means coöperating with the rocking means for reciprocating the second electrode.

3. In a machine of the type set forth, the combination in an electric circuit, of a work supporting electrode provided with a marginal cavity adapted to form a seat for the work, means for pressing the work into the seat, a second electrode movable toward and away from the first electrode into contact with the work, and means coöperating with said clamping means for operating the second electrode.

4. In a machine of the type set forth, the combination in an electric circuit, of an electrode comprising a block and a second block removably mounted in the first block, the second block being provided with a cavity adapted to receive the work, means for automatically clamping the work in its seat, a second electrode movable toward and away from the first electrode into contiguity with the work, and means for actuating the second electrode.

5. In a machine of the type set forth, the combination in an electric circuit, of an electrode adapted to support work, a second electrode movable toward and away from the first electrode, means for actuating the second electrode, and means for feeding solder to the work.

6. In a machine of the type set forth, the combination in an electric circuit, of an electrode adapted to support the work, means for automatically clamping the work to the support, a second electrode movable toward and away from the first electrode to raise the temperature of the work, means coöperating with the automatic means for reciprocating the second electrode, and means adjacent the automatic means for feeding solder to the work.

7. In a machine of the type set forth, the combination of a work supporting electrode, a second electrode movable toward and away from the first electrode, rocking means for alternately clamping and releasing the work an electric circuit connecting the electrodes, a switch in the circuit, means for reciprocating the movable electrode, and means actuating the reciprocating means for operating the switch.

8. In a machine of the type set forth, the combination with a work supporting electrode, of a second electrode movable toward

and away from the first electrode, means for reciprocating the movable electrode, an electric circuit connecting the electrodes comprising a resistance coil and a switch, a
5 core movable into and out of the resistance coil, and means reciprocating the core for operating the switch, and the electrode reciprocating means.

9. In a machine of the type set forth, the
10 combination of a work supporting electrode, a second electrode movable toward and away from the first electrode, means for actuating the movable electrode, an electric circuit connecting the electrodes, and means in the
15 circuit for automatically regulating the quantity of current passing to the electrodes.

10. In a machine of the type set forth, the combination of a work supporting electrode, rocking means for alternately clamping and
20 releasing the work, a second electrode movable toward and away from the first electrode, means cooperating with said rocking means for actuating the movable electrode and breaking the circuit.

25 11. In a machine of the type set forth, the combination of an electrode to support the work, automatic means adjacent the electrode for clamping the work upon the electrode, a second electrode movable toward
30 and away from the first electrode, an electric circuit connecting the electrodes, a resistance coil in the circuit, a core longitudinally movable in the coil to vary the resistance, and means operating the core for operating
35 the electrode actuating means and the clamping means.

12. In a machine of the type set forth, the combination with the body, of an electrode seated in the body, a jaw pivotally mounted
40 in the body above the electrode provided with an arm, a head, a second electrode mounted in the head, a frame fixed to the head and slidably mounted in the body adjacent the first electrode, a lever pivotally
45 mounted in the body above the frame, a lug upon the lever provided with a portion adapted to bear against the end of the frame, yielding means in the body for pressing the frame into contact with the lug, a projection
50 upon the lever in the path of the arm, and means for vibrating the lever.

13. In a machine of the type set forth, the combination with the body, of an electrode seated in the body, a jaw pivotally mounted
55 in the body above the electrode, provided with an arm, a head, an electrode mounted in the head, a frame fixed to the head and slidably mounted in the body adjacent the first electrode, a lever pivotally mounted in the body above the frame, a lug upon the
60 lever provided with a portion adapted to bear against the end of the frame, yielding means in the body for pressing the frame into contact with the lug, a projection upon
65 the lever in the path of the arm, yielding

means pressing the arm against the projection, and means for vibrating the lever.

14. In a machine of the type set forth, the combination with the body, of an electrode seated in the body, uprights upon the body
70 in the rear of the electrode, a bearing mounted in the uprights, a jaw above the electrode provided with a groove in its upper portion to receive the bearing, and provided in its lower face with a cavity, a spring in the body extending into the cavity, such jaw
75 being provided with an arm, a head, an electrode mounted in the head, a frame upon the head and slidably mounted in the body adjacent the first electrode, a lever pivotally
80 mounted in the body adjacent the frame, a lug upon the lever provided with a portion adapted to bear against the end of the frame, a projection upon the lever in the path of the arm, and means for vibrating
85 the lever.

15. In a machine of the type set forth, the combination with the body, of an electrode seated in the body, a head, an electrode mounted in the head, a frame fixed to the head and slidably mounted in the body adjacent the first electrode, yielding means in the body engaging the frame for moving the second electrode toward the first electrode, a lever pivotally mounted in the body, a lug upon the lever provided with a portion engaging the frame, and means for vibrating the lever.

16. In a machine of the type set forth, the combination with the body, of an electrode seated in the body, a head, an electrode mounted in the head, a frame fixed to the head and slidably mounted in the body adjacent the first electrode, means in the body pressing upon the frame for moving the electrode in one direction, means in the body pressing upon the frame for moving the head in the opposite direction, interspaced bearings in the frame above the electrodes, and feed rolls mounted in the bearings.

17. In a machine of the type set forth, the combination with the body, of an electrode seated in the body, a jaw pivotally mounted in the body above the electrode provided with an arm, a guide upon the jaw above the electrode, a head, a second electrode mounted in the head, a frame upon the head and slidably mounted in the body adjacent the first electrode, a lever pivotally mounted in the body above the frame, means upon the lever adapted to contact with the frame when the lever is moved, a spring in the body in contact with the frame, a projection upon the lever in contact with the arm, bearings in the body above the jaw, a guide upon the jaw, a feed roll mounted in the bearings above the guide, and a second feed roll yieldingly mounted in the bearings adapted to cooperate with the first mentioned roll.

18. In a machine of the type set forth, the combination with the body, of an electrode seated in the body, a jaw pivotally mounted in the body above the electrode provided with an arm, a head, a second electrode mounted in the head, a frame fixed to the head and slidably mounted in the body adjacent the first electrode, a lever pivotally mounted in the body above the frame, a lug upon the lever provided with a portion adapted to bear against the end of the frame, spring means in the body for pressing the frame in one direction, spring means in the frame for upwardly pressing the arm, a projection upon the lever in contact with the arm, hangers upon the body, a shaft in the hangers, an operating lever pivotally mounted intermediate its length upon the shaft, an arm pivotally mounted at one end of the hanger at a point above the path of the operating lever and movable downwardly into the path of the operating lever, yielding means for forcing the free end of the lever into the path of the operating lever, and a rod connecting an intermediate portion of the pivoted lever with the end of the first mentioned lever.

19. In a machine of the type set forth, the combination with the body, of an electrode seated in the body, a frame slidably mounted in the body adjacent the first electrode, spring means in the body for advancing the frame in one direction, a lever pivotally mounted in the body above the frame, a lug upon the lever provided with a portion adapted to bear against the end of the frame

to impel the latter in the opposite direction, means for vibrating the lever, a head upon the frame comprising a block engaging the ends of the frame provided with a transverse opening, a rod loosely mounted in the opening, a set screw in the block engaging the rod, said rod being also provided with a transverse opening, an electrode in the opening projecting toward the first electrode, and means for adjusting the electrode.

20. In a machine of the type set forth, the combination with a body comprising a bed provided with a transverse groove, and a block upon the bed provided with a tongue slidable in the groove, of a plate fixed to the bed and extending across the end of the groove, adjusting screws mounted in the plate and engaging the block, a second block adjacent the first mentioned block, a frame slidably mounted in the last mentioned block, a head upon one end of the block, an electrode in the head, a spring in the last mentioned block bearing against a portion of the block opposite the head, a lever mounted in the last mentioned block, a lug upon the lever provided with a portion adapted to contact with the end of the frame, and means for vibrating the lever.

In testimony whereof we have affixed our signatures in presence of two witnesses.

FREDERICK A. STEVENS.
SAMUEL E. BOUCHARD.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."