

F. THORNTON, JR.
 SPOT WELDING APPARATUS.
 APPLICATION FILED APR. 18, 1919.

1,327,792.

Patented Jan. 13, 1920.

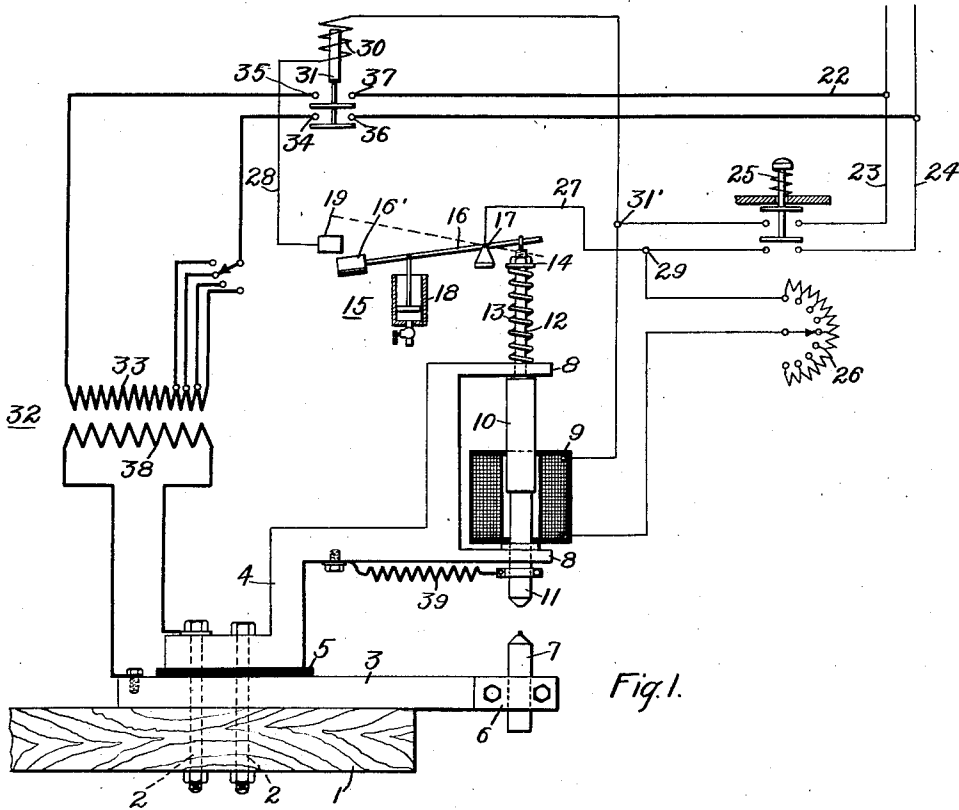


Fig. 1.

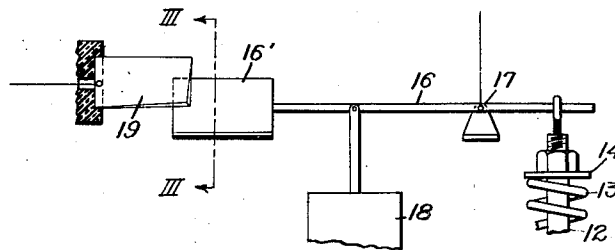


Fig. 2.

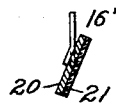


Fig. 3.

WITNESSES:
J. A. Helsel.
O. E. Bee.

INVENTOR
 Frank Thornton, Jr.
 BY
Wesley E. Barr
 ATTORNEY

UNITED STATES PATENT OFFICE.

FRANK THORNTON, JR., OF MANSFIELD, OHIO, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

SPOT-WELDING APPARATUS.

1,327,792.

Specification of Letters Patent.

Patented Jan. 13, 1920.

Application filed April 18, 1919. Serial No. 290,941.

To all whom it may concern:

Be it known that I, FRANK THORNTON, Jr., a citizen of the United States, and a resident of Mansfield, in the county of Rich-
land and State of Ohio, have invented a new
and useful Improvement in Spot-Welding
Apparatus, of which the following is a speci-
fication.

My invention relates to apparatus for
spot welding and it has, for its primary ob-
ject, the provision of apparatus of the above
designated character which shall be rela-
tively light in weight and compact of struc-
ture.

Another object of my invention is to pro-
vide spot-welding apparatus which shall
permit of the employment of electric cur-
rent to obtain both the necessary compres-
sive force upon the objects being welded and
the heating effect to fuse the objects at the
point where it is desired to unite them.

A still further object of my invention is
to provide spot-welding apparatus which
may be adjusted by skilled workmen and
thereafter operated, with a high degree of
efficiency, by unskilled workmen.

With these and other objects in view, my
invention will be more fully described, illus-
trated in the drawings, in the several views
of which corresponding numerals indicate
like parts, and then particularly pointed out
in the claims.

In the drawings, Figure 1 is a diagram-
matic view of spot-welding apparatus and
electric control circuits therefor which em-
body my invention; Fig. 2 is a side view, on
a larger scale, of a switch mechanism em-
ployed in the apparatus shown in Fig. 1,
and Fig. 3 is a sectional view taken substan-
tially along the line III—III of Fig. 2.

In practising my invention, I may employ
apparatus, such as shown in Fig. 1, which
comprises a base member 1 upon which may
be secured, by any suitable means, such as
nuts and bolts 2, a plurality of supporting
members 3 and 4, the supporting members
being preferably insulated from each other,
as indicated at 5. The member 3 may be
provided, at one end, with a removable
clamping member 6 adapted to secure an
electrode member 7 to the member 3. The
other supporting member 4 may be provided
with substantially parallel arms 8 so spaced
as to permit of supporting an electrical coil
9 upon the lower arm. The electric coil 9

may be provided with an armature 10 which
is preferably formed with a somewhat re-
stricted portion 11 at its lower end which
may function as an electrode and may also
have another restricted portion 12 at its
other end. The armature 10 may be posi-
tioned within the coil 9 by disposing the
electrode 11 in a suitable opening provided
in the lower arm 8, and the restricted por-
tion 12 may be extended through a similar
aligned opening in the upper arm 8, the arma-
ture being held in its uppermost position
by a spring 13 surrounding the end portion
12 and secured in such position by a nut 14.

A switch mechanism 15, which may be op-
erated by the coil 9, by means of its arma-
ture 10, comprises a lever 16, carrying a
switch blade 16', at one end, and may be
connected, at its other end, to the upper end
of the portion 12 of the armature 10 and may
be insulated therefrom. The lever 16 may
be pivoted, as indicated at 17, and may be
connected to a retarding device 18. A suit-
ably supported resilient contact member 19
is adapted to cooperate with the switch
blade 16'.

The switch mechanism 15 is best shown in
Figs. 1 and 2. The switch blade 16' may
comprise a metallic plate 20 and a non-con-
ducting plate 21 and may be mounted upon
the lever 16 at an angle thereto. Electrical
contact is made between resilient member 19
and the metallic plate 20 when the switch
blade 16' is moved upwardly, whereas down-
ward movement of the blade, from a posi-
tion above the member 19, will effect engage-
ment between said member and the non-con-
ducting plate 21.

The coil 9 may be connected across supply
mains 22 by leads 23 and 24 which may be
provided with a suitable switch 25 for open-
ing and closing the circuit of the coil 9. The
amount of energy supplied to the coil 9
from the mains 22 may be regulated by a
suitable rheostat 26. The switch blade 16'
and member 19 of the switch mechanism 15
may be connected in parallel with the coil 9
by a lead 27 which may be connected to the
member 16' and to one side of the circuit,
as indicated at 29, and by a lead 28 which
may be connected to the member 19 through
a coil 30 of a relay switch 31 and to the
other side of the coil circuit, as indicated at
the junction point 31'.

A heating circuit may be provided by em-

playing a transformer 32 having a primary winding 33, provided with voltage-control taps, which may be automatically connected in series with the supply mains 22 by the relay switch 31 through contacts 34, 35, 36 and 37. A secondary winding 38 of the transformer 32 may be connected, at one side, to the supporting member 4 and at the other, to the supporting member 3, in any suitable manner. A secondary circuit is thus provided which includes the electrode members 7 and 11, the electrode member 11 being connected to the supporting member 4 by a flexible lead 39.

In welding a plurality of metallic members together, the members may be disposed upon the stationary electrode member 7, and the circuit to the electric coil 9 may then be closed, through the switch 25, to energize the coil 9, the degree of energy being regulated by the rheostat 26. When the coil 9 is energized, the armature is drawn into the coil, thus compressing the spring 13 and causing the electrode 11 to compressively engage the members to be welded. The lever 16 is actuated by the movement of the armature 10 to cause the switch blade 16' to engage the resilient member 19. As before stated, electrical contact is made upon the up-stroke of the switch blade 16', thereby closing a circuit through the coil 30 of the relay switch 31 which, therefore, automatically connects the primary winding 33 of the transformer 32 to the supply mains 22. In accordance with the well known transformer action, an electromotive force is induced in the secondary winding 38 of the transformer which causes a current to flow through the electrodes 7 and 11 and the interposed work which cooperate to form a closed circuit.

The metallic members engaged by the electrodes are heated, on account of contact resistance, and the heated metal is united by the compressive force produced by the electrodes. The degree of compression may be regulated, if desired, by adjusting the rheostat 26 which controls the energy supplied to the coil 9. Furthermore, the length of time to which the members being welded are subjected to the heating effect of the current from the transformer may be varied by adjusting the retarding device 18 of the switch mechanism 15. The welding current is supplied while the switch blade 16' is in contact with the resilient member 19 on its up-stroke, the circuit being broken when the switch blade 16' passes the resilient member 19. The lever arm 16 is held in its upper position until the circuit energizing the

coil 9 is broken, the spring 13 being then permitted to raise the armature 10 and consequently to lower the lever arm 16.

Although I have described apparatus that is adapted for spot welding, it is obvious that minor changes may be made in the construction thereof and in the electric control therefor, and I desire that no limitations shall be imposed except such as are indicated in the appended claims.

I claim as my invention:

1. A spot-welding apparatus comprising a plurality of electrode members, electromagnetic means for forcing the members into engagement with interposed work, and an automatically actuated circuit-closer for closing a heating circuit including the electrode members.

2. A spot-welding apparatus comprising a plurality of electrode members, electromagnetic means for forcing the members into engagement with interposed work, means for automatically connecting the electrode members in a heating circuit, and means for automatically disconnecting the electrode members from the heating circuit.

3. A spot-welding apparatus comprising a plurality of electrode members, electromagnetic means for forcing the members into engagement with interposed work, means for automatically connecting the electrode members in a heating circuit, and means for automatically disconnecting the electrode members from the heating circuit at a predetermined time.

4. A spot-welding apparatus comprising a stationary and a movable electrode, an electric coil adapted to force the movable electrode toward the stationary electrode when it is energized, means for automatically connecting the electrodes in a heating circuit, and means for automatically disconnecting the electrodes from the heating circuit at a predetermined time.

5. A spot-welding apparatus comprising a stationary and a movable electrode, an electric coil adapted to force the movable electrode toward the stationary electrode when it is energized, means for varying the energy supplied to the coil, means tending to maintain the electrodes in spaced relation, means for automatically connecting the electrodes in a heating circuit, and means for automatically disconnecting the electrodes from the circuit at a predetermined time.

In testimony whereof I have hereunto subscribed my name this 31st day of March, 1919.

FRANK THORNTON, Jr.