No. 795,541. PATENTED JULY 25, 1905.

J. C. PERRY, DEC'D.

W. S. PERRY, EXECUTOR.

APPARATUS FOR ELECTRIC WELDING.

APPLICATION FILED MAR. 23, 1901. RENEWED JAN. 7, 1905.

2 SHEETS—SHEET 1.

FIG. 1.

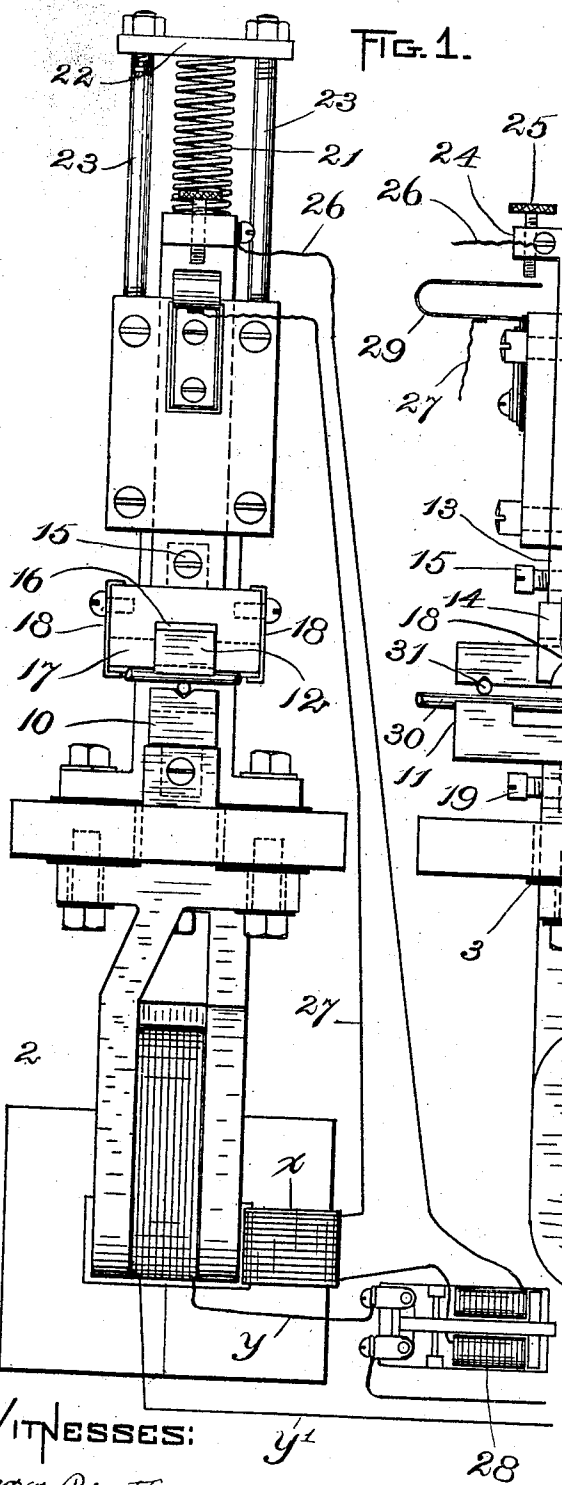
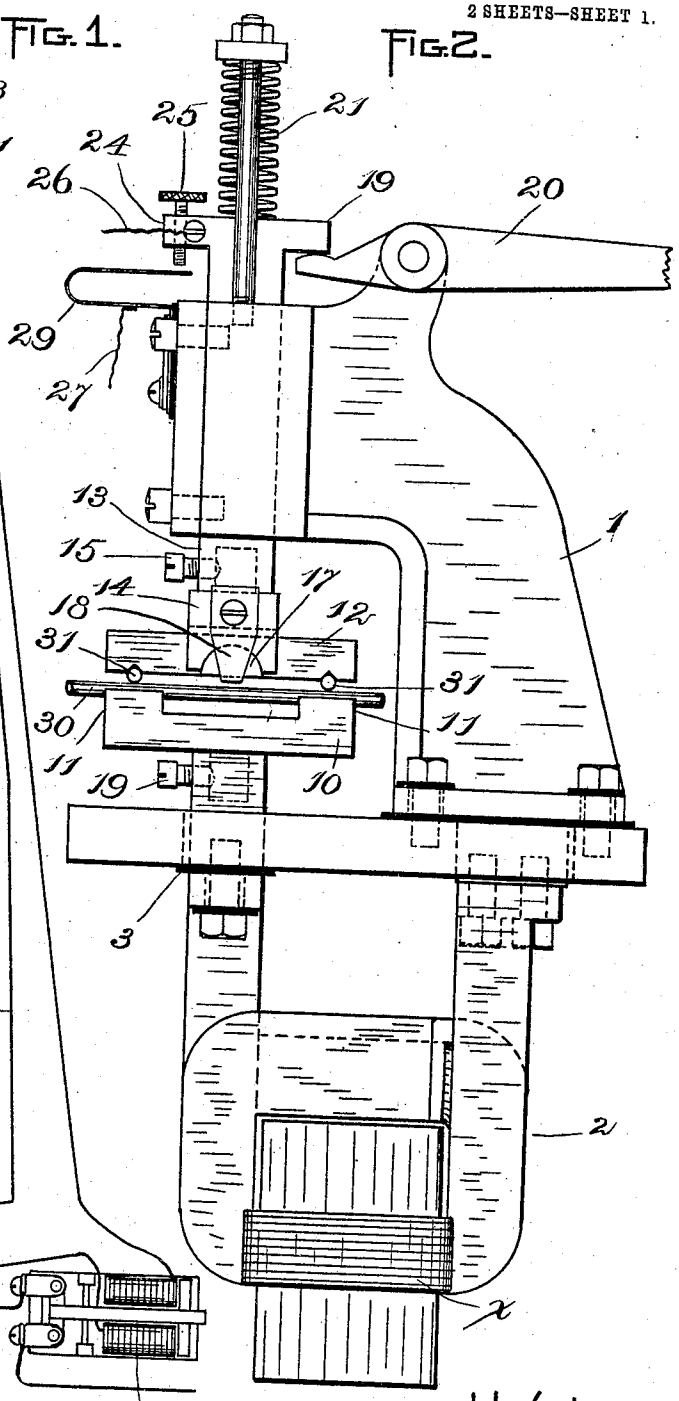


FIG. 2.



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2 SHEETS—SHEET 2.

FIG. 5.

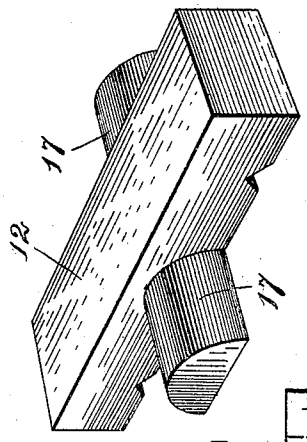


FIG. 3.

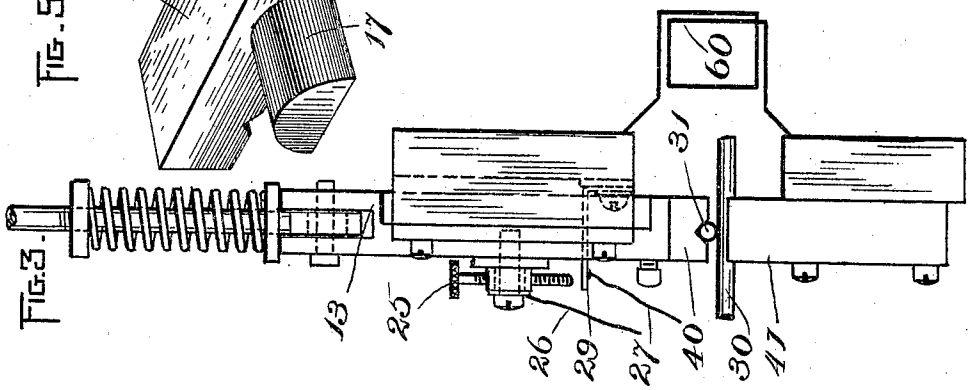
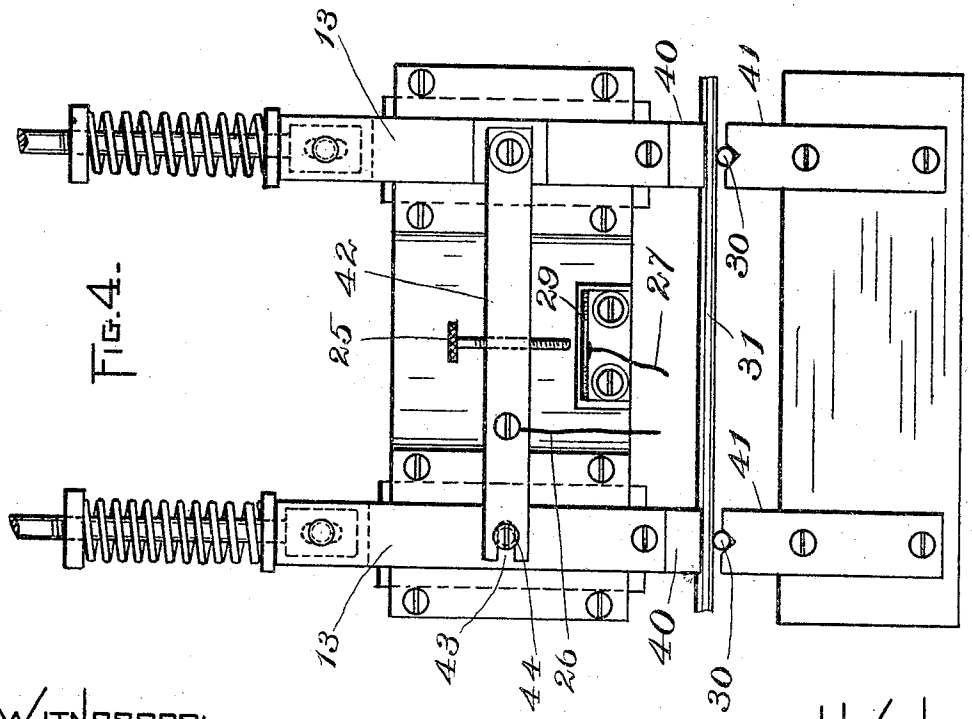


FIG. 4.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR ELECTRIC WELDING.

No. 795,541. Specification of Letters Patent. Patented July 25, 1905.

Application filed March 23, 1901. Renewed January 7, 1905. Serial No. 240,084.

To all whom it may concern:

Be it known that I, JOHN C. PERRY, of Clinton, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Electric Welding, of which the following is a specification.

This invention relates to an apparatus for making a plurality of welds simultaneously; and it consists in the novel features of construction and relative arrangement of parts hereinafter fully described in the specification, clearly illustrated in the drawings, and particularly pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this application, in which like characters are used to indicate like parts wherever they occur.

Figure 1 is a front elevation showing an apparatus constructed in accordance with my invention. Fig. 2 is a side elevation of the same. Fig. 3, in a side elevation, shows a modified form of an apparatus constructed in accordance with my invention. Fig. 4 is a front elevation of the same. Fig. 5 is a detail perspective view of one of the electrodes or pressure members.

Referring to Figs. 1 and 2, the framework 1 of the machine, the transformer 2, and insulating parts 3 may be of any preferred or desired construction and arrangement.

10 represents a lower stationary electrode formed with two jaws 11 11. This electrode is removably held in place by the screw 19. The upper electrode 12 is secured to the lower end of a plunger 13 and is arranged to reciprocate in the framework, as shown. The connection between the electrode 12 and the plunger 13 is of such a character as to permit the rocking of the electrode for purposes hereinafter described.

14 represents a head secured in the end of the plunger by a screw 15. Electrode 12 rests in a recess 16 in the end of the head, the recess being deep enough to permit the rocking of the electrode in the recess. The electrode 12 upon its side is formed with trunnions 17. (Shown in dotted lines in Fig. 1 and in full lines in Figs. 2 and 5.) These trunnions are arranged in complemental recesses in the lower end of the head 14 and are prevented from dropping out of the recesses by spring-clips 18. (See Fig. 1.) By this construction electrode 12 can rock, permitting one end to rise and the other to drop, thus allowing the electrode to automatically adjust itself to the varying conditions present at each welding-joint during the time of weld. The upper end of the plunger 13 is formed with a projecting ear 19, arranged to be engaged by a lever 20, whereby the plunger may be lifted against the pressure of the spring 21 and whereby the plunger may be lowered to seat the electrodes upon the parts to be welded before the application of the welding-current. The spring 21, as shown, is arranged between the upper end of the plunger and a plate 22, carried by rods 23, secured to the framework. The action and function of this spring are to force the electrodes together and the parts between them as the material softens at the joints or places of weld in order to secure the predetermined amount of upset before the welding-curren is broken.

24 represents an ear upon the plunger 13, carrying an adjustable contact-screw 25. A wire 26 from said ear leads to an electromagnet 28, whose wiring is in series with the wiring of a secondary coil x on the core of the transformer 2.

27 represents a wire running from a spring 29 to the coil x, completing the circuit of the electromagnet.

y y' represent the primary circuit. The electromagnet 28 is arranged to break the primary circuit of the transformer, and therefore cut off and stop the action of the welding-current when the contact-screw 25 engages the spring 29, thus closing the circui of the magnet.

It is obvious that any suitable mechanica circuit-breaker may be substituted for the magnetic circuit-breaker here shown and described. The parts are so arranged by the adjustment of the screw 25 that when the proper amount of upset has been reached, or, in other words, the electrode 12 has descended to a predetermined point, the screw 25 engages the spring 29, thus automatically closing the magnet-circuit and breaking the primary circuit of the transformer to stop the action of the welding-current. The electrodes are seated against the wires 30 31, as stated,

by means of a lever 20, although any other desired means for lowering electrode 12 into engagement with the wires or parts to be welded may be employed. Thereafter the current is applied, and as the material softens the electrodes are forced together by the action of the spring to a predetermined point, and thereafter by the action of the magnet 28 the primary circuit of the transformer is broken and the welding action stopped.

The object of my present invention is to provide means for making a plurality of welds without the use of separate transformers, plungers, and circuit-breakers for each weld or joint. This is a very great advantage in manufacturing welded fabrics having a large number of closely-positioned welds or cross-joints, as it enables me to do away with a multiplicity of parts, such as duplications of transformers and their accessory connections, and at the same time enables me to make welds that are satisfactorily uniform. So far as I am aware in those cases where automatic multiple welding has been attempted prior to my invention substantial uniformity of the welds has not been accomplished except by the use of independent transformers and their accessory devices for each weld, for the reason that any imperfection in any particular joint being welded would retard the action in that joint or joints, so that the welding action of the other joints would be completed before the welding of said joints had practically commenced. Many other difficulties of kindred nature have rendered this multiple welding with a single transformer and single circuit-breaker impractical prior to my invention. For illustration, and referring to Figs. 1 and 2, assuming the electrode 12 to be like the electrode 10 and having no rocking motion or adjustment and assuming the electrode to be seated against the wires 30 31 or the parts to be welded, it will be seen that upon the application of the welding-current if for any reason, such as the presence of dirt or other unusual resistance, the parts at the left-hand side of the electrode did not soften sufficiently to let the electrode 12 approach the lower electrode, while at the same time the parts 30 31 on the right-hand side were sufficiently softened to permit the described action, the electrode 12 could not descend by the action of the spring 21 sufficient to bring the contact-screw 25 into engagement with the spring 29 to break the welding-current. The result would be that the softened parts 30 31 at the right would be melted and burned out, while the parts 30 31 at the left would not be welded at all. Such were some of the difficulties encountered in multiple welding with one transformer prior to my invention. By the construction shown in the drawings, however, with particular reference to Figs. 1, 2, and 5, if the parts 30 31 at the right softened ahead of the parts 30 31 at the left the electrode 12 by means of the trunnions 17 will adjust itself automatically to this condition, the right-hand end of the electrode will drop as the parts under it soften. Then as the parts 30 31 under the left-hand end soften that end of the electrode will also drop or be forced down by the action of the spring 21. When the downward movement is sufficient to bring the screw 25 into contact with the spring 29, the welding-current is broken and the electrode is raised by means of the lever 20 or any other desired means. By means of this self-adjustment of the electrode 12 an equal upsetting pressure is maintained at each weld, and the point at which the primary circuit of the transformer is broken or the welding-current stopped depends upon the average movement of the two ends of the electrode as the two welds are made, the movement of the plunger being in all cases the same, whether the two ends of the electrode descend equally or unevenly. Sometimes one weld will be a little heavier than the other, owing to the presence of dirt, &c., between the wires at one point of welding, the wires at the other point being clean. It will be seen that by the adjustability of the electrode if the parts on one side do not soften at all through some defective condition the movement of the other side of the electrode will be sufficient to permit the required travel of the plunger 13 to break the circuit before any damage results, although in such case the weld or welds that were made would be proportionately heavier just as the defective or incomplete weld or welds were defective or incomplete. In this invention the primary current is broken automatically when a predetermined amount of upset has been obtained, and this breaking of the welding-current is due to the average of the amount of upset of the several welds instead of depending upon the amount of upset of one weld.

In Figs. 3 and 4 a separate electrode 40 is provided for each point of weld, the electrode 40 or the upper electrode being movable and the lower electrode 41 being stationary. A contact-screw 25, instead of being carried by the plunger 13, is carried by an insulated bar 42, pivoted at one end upon one plunger and formed with a fork 43 at its opposite end engaging a headed pin upon the other plunger 13, as shown in Fig. 4, for the purpose of permitting the downward movement of one plunger with relation to the other and at the same time give to the contact-screw 25 a movement that is the average of the two plungers, so that if both plungers descend alike the circuit to the magnet will be closed at a predetermined point, while if one plunger descends ahead of the other for any reason the movement of the screw 25 will not be affected, the bar 42 giving the screw 25 the same amount of motion whether the plungers descend equally or unequally. The

principle of this modification is the same as that of the mechanism of Figs. 1 and 2. While the electrodes are independent and the movement of one does not affect the other, yet the point at which the welding-current is cut off depends upon the average of the amount of upsetting motion of the two electrodes shown or the number of electrodes employed, as in the case of the construction in Fig. 1 and Fig. 2, where the electrode tilts or rocks instead of a bar 42. In Fig. 3 the secondary circuit 60 is shown diagrammatically, the other parts of the transformer not being shown.

Various modifications will suggest themselves to those skilled in the art both in the mechanism employed and the arrangement of the circuits without at all departing from the spirit and scope of my invention. I believe myself to be the first to make multiple welds by the use of two or more automatic pressure members, devices, apparatuses, or mechanisms having provisions for automatically equalizing upsetting-pressure, whether said welds are employed to make fabric, as in the form of work selected for illustration in this application, or whether butt-welds are made or other form of welds for other kinds of work or purposes.

By "pressure mechanisms" I wish to be understood as including not only an adjustable electrode having two or more welding parts, as shown in Figs. 1 and 2, but two or more otherwise independent electrodes or plungers connected by an equalizing bar or part or any mechanism by which the described function may be accomplished.

I desire to claim this invention in the broadest possible legal manner.

Having thus explained the nature of my invention and described a way of constructing and using the same, though without attempting to set forth all the forms in which it may be made or all the modes of its use, what I claim, and desire to secure by Letters Patent, is—

1. In combination with the coöperative elements of an electric-welding apparatus, a plurality of pressure members, each arranged to exert upsetting-pressure to form an independent weld, and means for automatically equalizing the upsetting-pressure applied simultaneously to the said members.

2. In an electric-welding apparatus, in combination, a plurality of electric-welding jaws, means whereby the breaking of the welding-current is controlled by the average amount of upset of a plurality of welds.

3. In combination with the coöperative elements of an electric-welding apparatus, means arranged to apply upsetting-pressure at a plurality of independent welding-points to form independent welds, and means whereby the upsetting-pressure at said separate points will be kept substantially equal, irrespective of the relative speed at which the welds are made.

4. In an electric-welding apparatus, in combination, means for welding at a plurality of separate points, automatically-acting means whereby the breaking of the welding-current is controlled by the average amount of upset at a plurality of said welding-points.

5. In combination with the coöperative elements of an electric-welding apparatus, a plurality of electric-welding jaws, a plurality of plungers carrying movable welding-jaws, connections between said plungers, and circuit-breaking means carried by said connections, whereby the movement of said connections to break the welding-circuit is controlled by the average amount of movement of the plungers.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOHN C. PERRY.

Witnesses:
A. D. HARRISON,
H. L. ROBBINS.