(No Model.) 2 Sheets—Sheet 1.

H. LEMP.

ADJUSTABLE ELECTRIC CLAMP.

No. 458,177. Patented Aug. 25, 1891.

FIG. 1.

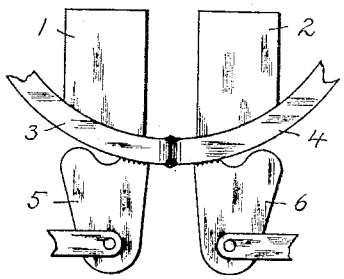


FIG. 2.

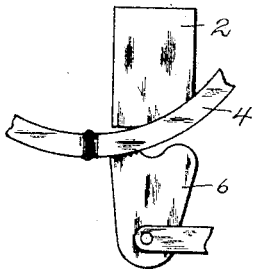


FIG. 4.

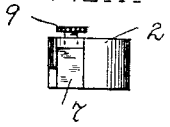


FIG. 3.

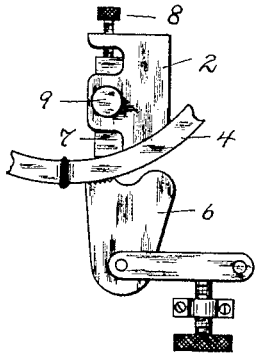


FIG. 5.

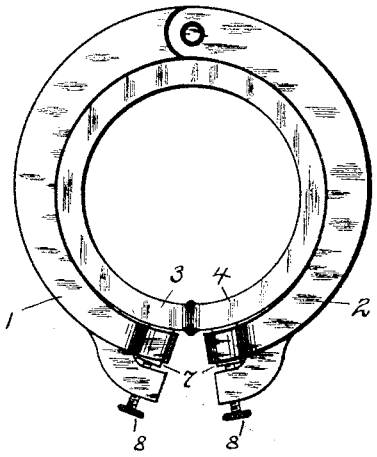
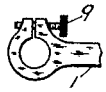


FIG. 6.



WITNESSES.

H. J. Wightman

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INVENTOR.

H. Lemp

(No Model.) 2 Sheets—Sheet 2.

H. LEMP.

ADJUSTABLE ELECTRIC CLAMP.

No. 458,177. Patented Aug. 25, 1891.

Fig. 7.

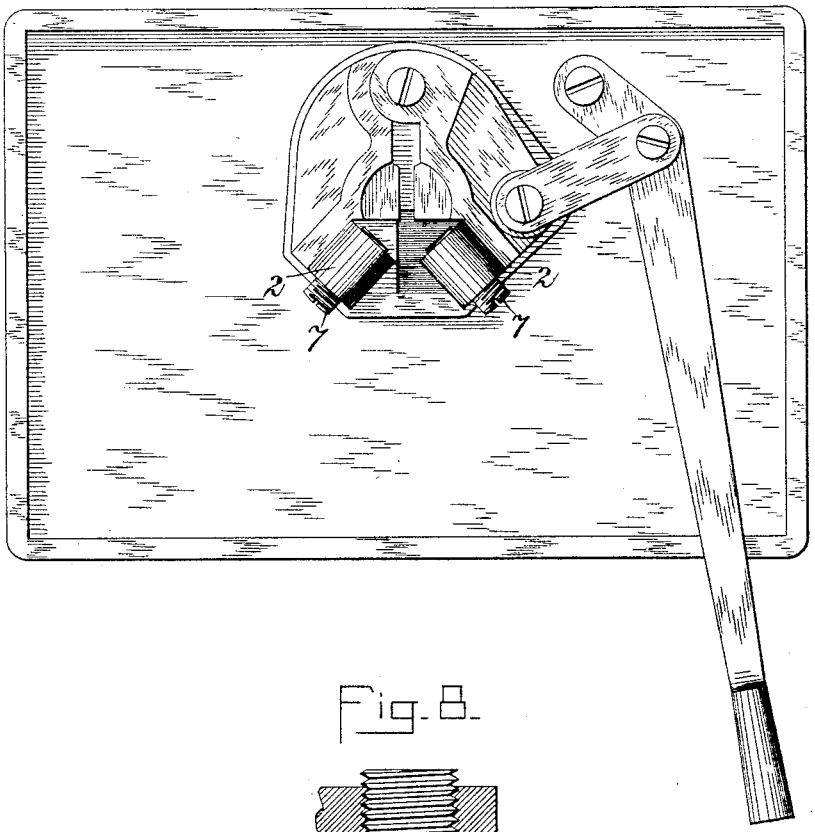
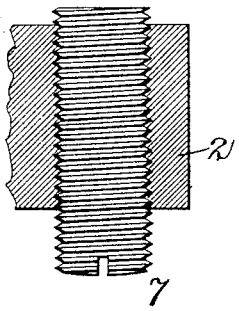


Fig. 8.



WITNESSES:
H. P. Maxim.
C. A. Hodgdon

INVENTOR:
Hermann Lemp
By H. H. Sweet
Atty.

UNITED STATES PATENT OFFICE.

HERMANN LEMP, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE THOMSON ELECTRIC WELDING COMPANY, OF MAINE.

ADJUSTABLE ELECTRIC CLAMP.

SPECIFICATION forming part of Letters Patent No. 458,177, dated August 25, 1891.

Application filed October 9, 1890. Serial No. 367,489. (No model.)

To all whom it may concern:

Be it known that I, HERMANN LEMP, of Lynn, in the county of Essex and State of Massachusetts, have invented a new and useful Improvement in Adjustable Electric Clamps, of which the following, taken in connection with the accompanying drawings, is a specification.

My present invention relates to improvements in electric-welding and metal-working apparatus, and particularly to those parts of the apparatus which supply the work-pieces with the heavy heating electric currents.

My invention consists in a novel construction of the conducting-jaws or holding devices, in which the parts that are subjected to excessive wear and oxidizing or burning effects are susceptible of adjustment and may be easily and cheaply replaced by any person. I use for the adjustable portion of these devices material that is readily procurable in the market, and which needs little or no further working to adapt it to the requirements of my invention. As is well known by those skilled in the art, it is essential for the economical operation of electric-welding machines that the very best electrical contact possible be secured between the conducting-jaws and the pieces of metal to be operated upon. The scale, dirt, oil, &c., which are generally on the surface of iron or steel, offer considerable resistance to the flow of the heavy currents. If this is not removed before placing the work into the holding-clamps, then the heavy currents will generate heat at the points of contact and burning of the clamp-surfaces results. To prevent this oxidizing or burning effect it is necessary to thoroughly clean the work-pieces before they are placed in circuit. Now in practice I find it more economical to omit the cleaning of the pieces and to supply clamping devices that are adjustable and that may be easily replaced when very much worn or burned away. I have found also that the surface of actual contact between the metal to be welded and the clamping devices may be quite small, provided there is an abundance of metal immediately back of the contact-surfaces to convey away the heat generated at these points.

My invention will be more fully set forth and explained in connection with the accompanying drawings.

Figure 1 illustrates the clamping devices of an electric-welding machine with the work-pieces in place and the weld completed. Fig. 2 represents a part of the above-described welding-clamps after having been in use for welding tires, &c., for a comparatively short time. Figs. 3, 4, 5, 6, 7, and 8 illustrate electric clamps embodying my invention.

In Fig. 1, 1 and 2 represent cast copper blocks, the terminals of a source of current. The iron pieces 3 and 4 are held firmly in electrical connection with 1 and 2 by means of the clamp-dogs 5 and 6. If a current be passed from 1 to 2 through the work-pieces, the larger part of the current will enter the bars at that part of the conducting-block nearest the weld, owing to the resistance of the iron bars being greater than that of the copper blocks, and to the well-known fact that an electric current takes the path of least resistance. This causes a greater heating of the scale at this point than elsewhere, and a consequent burning and roughening of the clamps at this place.

Fig. 2 is a good illustration of the appearance of an electric-welding clamp of the form under consideration after it has been subjected to the continued action of an electric current, in the manner above described. It is evident that the continuance of this action would in a short time so reduce the contact area as to render the clamps useless, necessitating the substitution of a new contact-piece specially constructed for the purpose. Now to obviate this difficulty I construct my conducting clamps or jaws in such a manner that the parts subjected to injurious heating effects are adjustable, and I use for the adjustable pieces bars or rods of commercial sizes so that it is only necessary to cut from such bars or rods the required lengths and to place the pieces in position, adjusting them from time to time, as required.

Fig. 3 shows an electric-welding clamp constructed according to my invention. 2 is the conducting-block, and 7 the adjustable piece of conducting material. 8 and 9 are screws for adjusting and holding the contact-pieces in the desired position.

Fig. 4 is a view of the contact end of the same clamp. It will be seen that the copper block 2 is recessed on one side to receive the bar of conducting material which fits snugly into the recess and makes good electrical connection therewith. The rod 7 projects very slightly beyond the face of the block 2 and is the sole means of delivering current to the bar 4; but the block 2 is sufficiently near the end of 7 to conduct away the excess of heat. This construction enables the conductor 7 to carry many times more current without injuriously heating the contact-surfaces than would otherwise be the case. As the face of 7 becomes worn away, the screw 9 is loosened, and by a turn of 8 the conductor is again brought into position and firmly held there by tightening 9. As before mentioned, the rod 7 is of a standard size of good conducting metal. I prefer for this purpose hard rolled copper, silicon bronze, or aluminium bronze.

The application of my invention to a ring-welder is shown in Fig. 5. Frames 1 and 2, to which are connected the terminals of a source of current, are pivoted and insulated at the back, and their free ends are constructed as shown in Fig. 6. 8 represents the adjusting-screw for forcing the conductor into position. In some cases I prefer to tap out the hole in the conducting-frame and insert therein a screw of hard copper or other suitable metal for a contact-piece. Figs. 7 and 8 illustrate this construction, 7 being the adjustable-piece, 2 the conducting-block, and 4 the work. This is a very convenient arrangement, as a turn of this screw 7 is all that is required to adjust it as desired. Although this construction does not allow of so easy and simple renewal of contact-pieces as the former, it has the advantage of fewer parts.

Having thus described my invention, what I claim as novel, and desire to secure by Letters Patent, is—

1. In electric clamps, the combination of holding devices for gripping the work-pieces, and adjustable contact-pieces of good conducting material for conveying current to the work-pieces, substantially as described.

2. In electric clamps, the combination of holding devices for gripping the work-pieces, and replaceable contact-pieces of good conducting material for conveying currrent to the work-pieces, substantially as described.

3. An electric metal-working clamp having adjustable and replaceable contact-pieces of good conducting material, such as copper, substantially as set forth.

4. An electric metal-working clamp having adjustable and replaceable contact-pieces, consisting of screw-shaped pieces of conducting material.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 4th day of October, A. D. 1890.

HERMANN LEMP.

Witnesses:
JOHN W. GIBBONEY,
H. PERCY MAXIM.