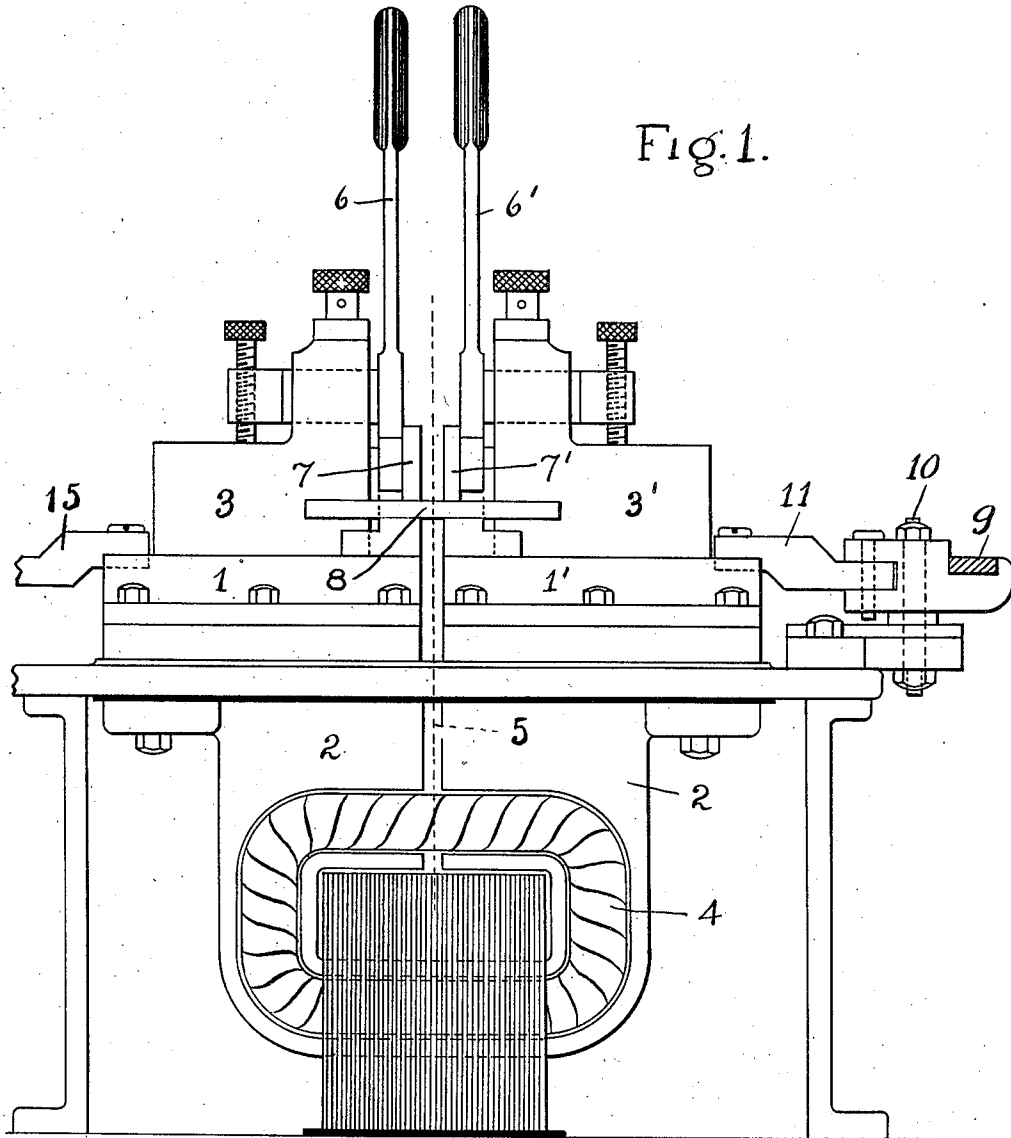


L. S. LACHMAN.
METHOD OF PRODUCING TAPERS IN METAL.
APPLICATION FILED FEB. 8, 1908.

953,041.

Patented Mar. 29, 1910.

2 SHEETS—SHEET 1.



WITNESSES:
Geo. Fawcett
Lillian Blond.

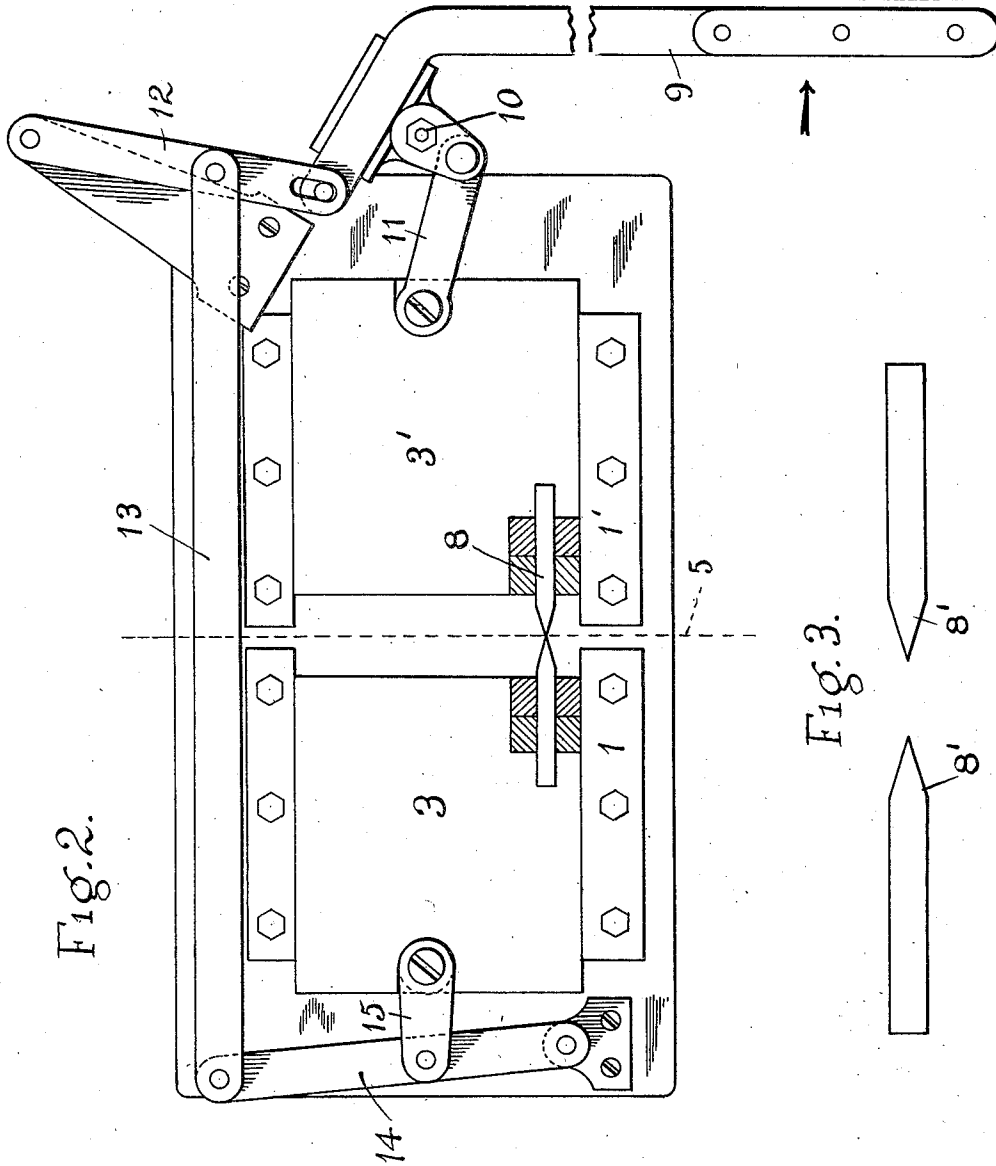
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WITNESSES:
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UNITED STATES PATENT OFFICE.

LAURENCE SYLVAN LACHMAN, OF NEW YORK, N. Y., ASSIGNOR TO UNIVERSAL ELECTRIC WELDING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

METHOD OF PRODUCING TAPERS IN METAL.

953,041.

Specification of Letters Patent.

Patented Mar. 29, 1910.

Application filed February 8, 1908. Serial No. 414,929.

To all whom it may concern:

Be it known that I, LAURENCE S. LACHMAN, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Methods of Producing Tapers in Metal, of which the following is a specification.

The present invention relates to the process of tapering a rod, bar or other piece of metal to a point by heating a section of metal to render the same plastic and then applying stretching or pulling force.

The special object of the invention is, among other things, to insure the production of a perfectly finished point.

Another object is to obtain, from a single bar, rod or piece of metal, two tapered pieces which shall be of identical taper.

The invention consists substantially in heating the piece of metal to plasticity by passing a heating current of electricity through the same and then stretching or pulling the metal of the heated section to taper the same down to a point, the cutting off of flow of heating current and the rate of drawing or pulling being so controlled that at the instant of separation the metal will be at a comparatively low temperature.

The invention consists further in stretching or pulling the metal equally in opposite directions to maintain the position of that portion of the metal which is of smallest section, as hereinafter more particularly described.

The invention further consists in the methods or processes and constructions of apparatus especially adapted for conducting such processes as hereinafter more particularly described and then recited in the claims.

In the accompanying drawings, Figure 1 is a side elevation of an apparatus that may be used in carrying out my invention. Fig. 2 is a plan of the same and illustrates more particularly a form of mechanism that may be employed for moving the two clamps or holders away from one another in opposite directions. Fig. 3 shows the two similar pointed pieces resulting from the application

of the process to a single rod, bar or piece of metal.

Referring to the drawings, 1, 1' indicate the guides for two platens or slides 3, 3' mounted upon and electrically joined to the terminals of the secondary 2 of a transformer which supplies heating current to said platens and to the clamp-holding blocks mounted on the latter. The platens 1 may be attached to flexible terminals of said secondary or may slide in contact with the terminals thereof as well understood in the art.

4 indicates the primary of the transformer and 5 is the line of separation or gap between the secondary terminals usually existing in this type of apparatus, so that the opposite work-holders or clamps on the clamp blocks 3, 3' will be located, respectively, at opposite sides of the gap and the heated section of work will be opposite said gap.

Operating levers for the clamping devices are indicated at 6, 6', while 7, 7' indicate the usual clamping jaws adapted to engage and firmly hold the section of work, as usual in the art of electric welding.

The piece of metal which is to be reduced or tapered to a point is indicated at 8, while the two separate pointed pieces resulting from the operation are indicated at 8', as shown in Fig. 3.

In carrying on the process according to my present invention, the bar or rod 8, if it be desired to form two identical similar pointed pieces from it, is clamped in the jaws of the apparatus so that its medial line will coincide practically with the line 5. If it be desired to produce two pieces of different lengths, the bar 8 would be shifted so the amount of rearward projection of the ends of the bar would be greater or less as desired. The heating electric current is then turned on, thus bringing the section of metal between the clamps to a plastic condition, a proper plasticity in the case of high carbon steel being shown by the color being a cherry red. In the case of softer metals, not so high a temperature would be required. When the metal has reached a proper degree of plasticity, a gradual stretching or

pulling force is applied to the heated section, preferably, through the clamps by which the heating current is conducted into the work and preferably by moving both
 5 clamps in opposite directions away from one another, thus starting a double taper toward the center, but before or practically as soon as the pulling operation begins the flow of the heating current is preferably
 10 entirely stopped, thus avoiding the liability to rupture of the heated section before it has been drawn down to a point. The rate of pulling is so graduated that at the final stage of rupture the metal will be at a comparatively low temperature, thereby
 15 producing an exceedingly fine sharp point. For the best results the metal should be permitted to cool so far that at the instant of rupture and immediately before rupture it will have resumed approximately its natural
 20 color or will have lost its appearance of incandescence. Such a double motion may be produced by the mechanism to be presently described and is, preferably, an equal motion of both clamps or holders, so that the portion
 25 of heated metal of smallest section will be maintained in coincidence with the line 5 of the gap in the transformer secondary. By this means the two tapers of equal degree are secured, whereas, if the motion were
 30 given to one clamp only, so as to carry the most reduced portion of the heated section to one side of the line 5, the tapers of the two portions would be of different degrees.
 35 As the tapering progresses and approaches the final stage of rupture of the metal, at which stage in the operation the metal is at a lower temperature owing to the electric current having been cut off previously to
 40 this stage being reached, the rate of movement of the clamp or clamps, in applying the stretching or pulling force, is preferably slowed down. The point at which the current
 45 should be cut off, in order to insure the proper degree of cooling when the end of the final stage is reached, can be varied within limits and also the extent to which the drawing action is slowed down, but after the
 50 metal has been brought to the desired degree of plasticity, the surest way is to cut off the current immediately and before or coincidentally with the beginning of the drawing or pulling operation.

In Fig. 2 the metal is shown at the termination of the final stage, which is practically coincident with the rupture of the metal at a section of such minute extent that, in the finished pieces, the taper will terminate in an extremely fine and well finished point,
 60 which, in the case of tool steel, can be made superior in finish and sharpness to anything that can be produced by an ordinary swaging operation.

The process can be applied to metal of

any cross section and may be used for producing an edge on a properly shaped piece
 65 of metal, said edge being, geometrically considered, a series of points. In my claims, therefore, while I use the term "point" it is to be understood that the invention in-
 70 cludes the drawing down or tapering of a piece of metal into a sharp edge.

The equal opposite movement of the two holders may be secured by any mechanism properly connected up, an example of which
 75 is shown in Fig. 2 wherein the clamping devices are shown in section. In this figure, 9 is the operating handle pivoted at 10 and connected by a link 11 with one of the clamp supporting blocks or platens, so that, by
 80 operating the handle in the direction of the arrow, tension or stretching or pulling force may be applied to the heated section. The extension of the operating handle is connected by a pin with lever 12 and the latter
 85 is positively connected by a connecting rod 13 to the opposite holder of its operating mechanism, through an intermediate lever 14 and link 15. By means of this connecting rod and intermediate lever connecting
 90 the holders a movement of said holders away from one another in opposite directions and at an exactly uniform rate is insured under all conditions.

What I claim as my invention is:

1. The improved method of tapering metal to a finished point consisting in passing a heating current of electricity through a section of the metal until the same assumes plasticity, stretching or pulling the metal,
 100 and cutting off the flow of current controlling the rate of pulling, so that at and near the final stage at which rupture takes place the metal will be at a comparatively low
 105 temperature.

2. The herein described method of tapering metal to a point consisting in heating a section of the metal to plasticity by passing an electric current through the same, and drawing or pulling the metal and graduat-
 110 ing the rate of pulling as the metal reaches the final stage of rupture, so that at and near the point of rupture it will have resumed approximately its natural color.

3. The improved method of tapering metal to a point consisting in electrically heating a section of the metal and stretching or pulling the metal at an equal rate in opposite
 115 directions so as to maintain the position of the portion of metal which is of the smallest section in fixed relation to the fixed portion of the structure, as and for the purpose described.

4. In an electric metal working apparatus, the combination of work-holders adapted to
 125 clamp the work at two points located respectively at opposite sides of the heated section thereof, and a rigid system of connecting de-

vices between said holders, whereby any movement of separation of one work-holder away from the other insures an opposite movement of the other work-holder at an
5 exactly uniform rate, as and for the purpose described.

Signed at New York in the county of

New York and State of New York this 4th day of February A. D. 1908.

LAURENCE SYLVAN LACHMAN.

Witnesses:

C. F. TISCHNER, Jr.,

LILLIAN BLOND.