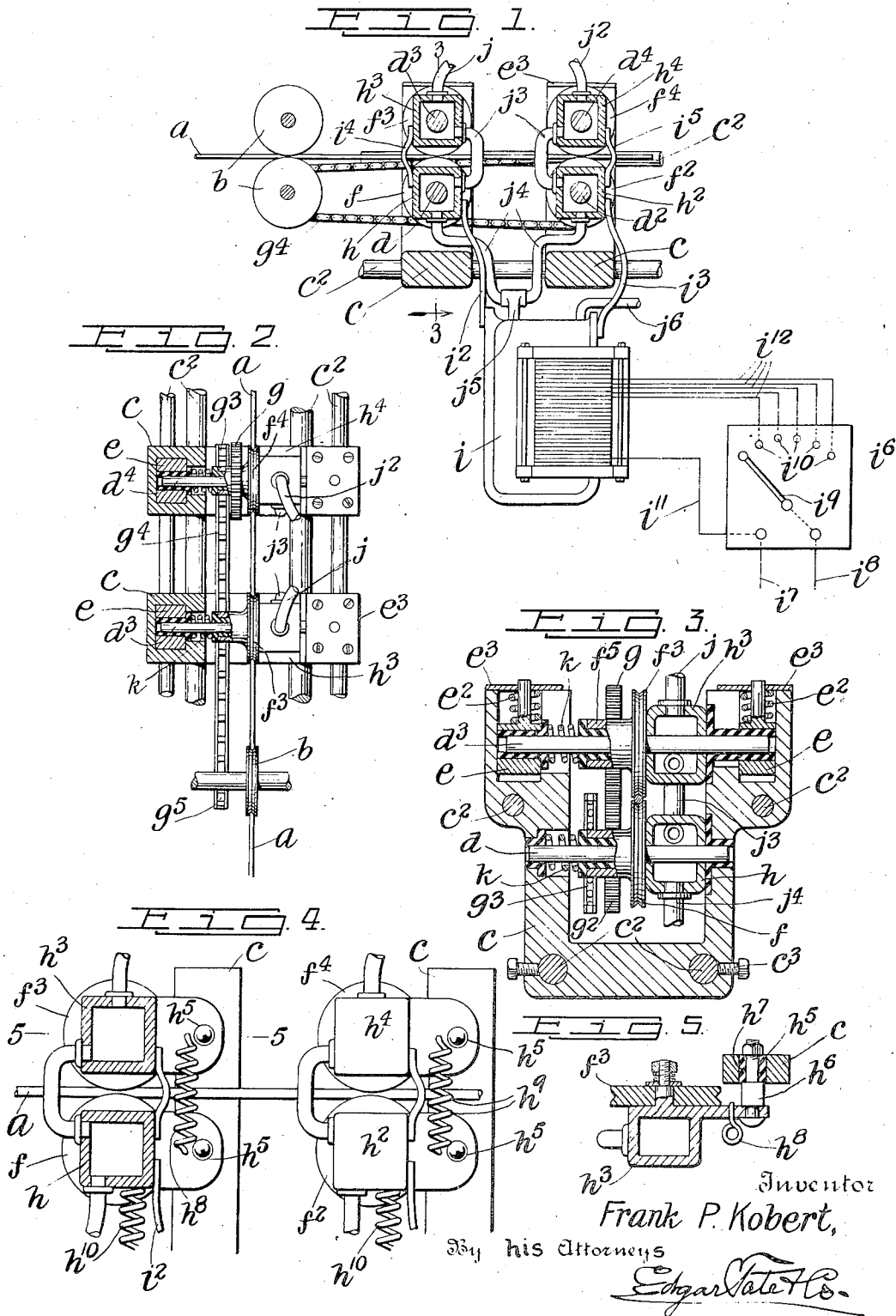


ELECTRIC HEATING APPARATUS FOR METAL WORKING MACHINES.

1,333,080.

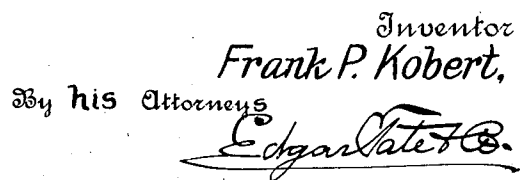
2 SHEETS--SHEET 1.



ELECTRIC HEATING APPARATUS FOR METAL WORKING MACHINES.

1,333,080.

2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

FRANK P. KOBERT, OF AMITYVILLE, NEW YORK.

ELECTRIC HEATING APPARATUS FOR METAL-WORKING MACHINES.

1,333,080.

Specification of Letters Patent.

Patented Mar. 9, 1920.

Application filed April 5, 1917, Serial No. 159,852. Renewed August 8, 1919. Serial No. 316,205.

To all whom it may concern:

Be it known that I, FRANK P. KOBERT, a citizen of the United States, and residing at Amityville, L. I., in the county of Suffolk and State of New York, have invented certain new and useful Improvements in Electric Heating Apparatus for Metal-Working Machines, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to electric heating apparatus for metal working machines such as forging machines, electric riveting machines, electric welding machines and other apparatus of this class, and the object of the invention is to provide improved means for heating the metal or workpiece fed into the machines in order to facilitate the operation of such machines; and with this and other objects in view the invention consists in an electric heating apparatus of the class specified, constructed and operating as hereinafter described and claimed.

In a prior application filed by me November 18, 1916, Serial No. 132,003, I have shown, described and claimed a process and machine for making certain articles of manufacture, and the machine being what is known in the art as a heading, re-heading, upsetting and forging machine, and the electric heating apparatus forming the basis of this application is taken from the said prior application and involves the electric heating apparatus shown and described in said prior application and certain improvements that have been added thereto.

The invention forming the basis of this application is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which:—

Figure 1 is a diagrammatic and sectional side view of my improved electric heating apparatus;

Fig. 2 a plan and sectional view thereof;

Fig. 3 a section on the line 3—3 of Fig. 1 and on an enlarged scale;

Fig. 4 a view similar to Fig. 1 but showing only a part of the apparatus and showing the same on an enlarged scale with parts in section, and showing also a modification;

Fig. 5 a section on the line 5—5 of Fig. 4; 55

Fig. 6 a view similar to Fig. 1 but showing another modification;

Fig. 7 a partial section on the line 7—7 of Fig. 6; and,

Fig. 8 a plan view of a part of the construction shown in Fig. 6 and showing a modification. 60

As hereinbefore stated my invention is designed for heating material fed into machines of the class specified, and this material may be in any suitable form, or may consist of rods, bars, rolled wire, sheet metal or the like, and in Figs. 1 to 4 inclusive, the workpiece or metal to be heated or operated upon is shown at *a* in the form of a wire or rod, and in Figs. 6 to 8 inclusive, in the form of a sheet *a*². 65 70

All the forms of construction shown involve feed rollers *b* which are mounted in connection with the machine in the usual manner and are operated in the usual manner, and in themselves, or independently, form no part of this invention, except as hereinafter described. 75

The operative construction shown in Figs. 1 to 3 inclusive, with the exception of a water-cooled transformer shown in Fig. 1 and method of mounting the operative parts is the same as that shown and described in the application hereinbefore referred to, and in the practice of my invention, as shown in said figures, I provide two upright yoke-shaped supports *c* which are mounted on suitable rods or bars *c*² which form a part of the framework of the machine, but the method of mounting the supports *c* is immaterial, and said supports may be mounted in connection with, or formed in connection with the framework of the machine in any desired manner. 80 85 90 95

The supports *c* are adjustably mounted on the rods *c*² and may be locked in any desired position of adjustment by set screws or similar devices *c*³ as shown in Fig. 3.

Mounted in and insulated from the supports *c* are shafts *d* and *d*² and other shafts *d*³ and *d*⁴ are mounted above the shafts *d* and *d*² respectively, and in blocks or bearing members *e* vertically movable in the top portions of the supports *c*, and from which said shafts *d*³ and *d*⁴ are insulated, as clearly shown in Fig. 3. The blocks or bearing members *e* are normally depressed by 100 105

springs e^2 which are held in place by plates e^3 secured to the top portions of the supports c .

Rotatably mounted on the shafts d , d^2 , d^3 and d^4 respectively are roller or disk-shaped electrodes f , f^2 , f^3 and f^4 , said electrodes being provided with sleeve portions f^5 , and mounted on the sleeve portions of the electrodes f^2 and f^4 are intermeshing gears g and g^2 , and mounted on the sleeve of the electrode f^2 is a sprocket wheel g^3 around which passes a chain g^4 which also passes around a sprocket g^5 on the shaft of the lower feed roller b . The periphery of the roller or disk-shaped electrodes are V-shaped in form as shown in said figures, whereby the wire or rod fed therebetween may be readily heated.

Mounted on the shafts d , d^2 , d^3 and d^4 at one side of the roller electrodes are contact casings h , h^2 , h^3 and h^4 which form a means for transmitting the current from a transformer i to the roller electrodes as well as means for cooling said electrodes, as herein-after described.

The transformer i is provided with the usual leads i^2 and i^3 , the lead i^2 being connected with the casing h , while the lead i^3 is connected with the casing h^2 , and the casings h and h^3 and h^2 and h^4 are respectively put in electrical communication by means of metal strips i^4 and i^5 .

A suitable switch board i^6 is provided, with which is connected the main circuit wires i^7 and i^8 , one of which connects with a switch arm i^9 which is adapted to make contact with a plurality of contacts i^{10} , and the circuit wire i^7 is connected with the transformer by means of a wire i^{11} and wires i^{12} are connected with the contacts i^{10} and with the transformer. By means of this switch construction the degree of heat may be regulated by operating the switch arm to increase or decrease the voltage, whereby the volume of heat in various kinds and classes of metal or workpieces may be regulated to produce the desired result.

Water circulating pipes j and j^2 are connected with the contact casings h^3 and h^4 respectively, and other pipes j^3 connect the casings h^3 and h^4 with the casings h and h^2 respectively, and the casings h and h^3 are provided with discharge pipes j^4 which communicate with a pipe j^5 which is coiled in the transformer i and passes out there-through as shown at j^6 , and by means of the pipes j to j^6 inclusive water may be passed through the contact casings h to h^3 inclusive, to cool the roller electrodes, and said water is also passed through the transformer i to cool the same.

I also provide springs k which are mounted on the shafts d to d^4 inclusive, as shown in Figs. 2 and 3, and adapted to operate in connection with the sleeve end portions of

the roller electrodes to hold them in firm contact with the contact casings h to h^4 inclusive, whereby the current from the transformer may readily be transmitted from the contact casings to said roller electrodes.

The operation of heating a wire or rod which is fed between the roller electrodes by means of the feed rollers b will be readily understood from the foregoing description when taken in connection with the accompanying drawing and the following statement.

As is usual in machines of the class described the wire or rod a is fed step by step into the machine by means of the rollers b and in the practice of my invention said wire is fed between the roller electrodes f — f^4 and the rollers f^2 and f^4 also aid in, or serve to feed said metal when heated into the machine by reason of the connection thereof with one of the feed rollers, or the shaft thereof, and the gears g — g^2 as hereinbefore set out, and when the wire or rod is idle or held against movement between the roller electrodes the same is heated to the desired extent and then fed into the machine, as will be readily understood. This heating is a continuous or continuous-intermittent operation. By reason of the adjustable mounting of the supports c , the roller electrodes or the separate pairs thereof may be adjusted toward and from each other, whereby the amount or length of a wire or rod to be heated may be varied, as will be readily understood, and the water pipes or connections j to j^4 inclusive, are made flexible to permit of the adjustment of the supports c , as above specified, and the leads i^2 and i^3 of the transformer i are also of such construction as to permit of the above adjustments.

The construction shown in Figs. 4 and 5 is practically the same as that shown in Figs. 1 to 3 inclusive, except that the roller electrodes f — f^4 are rotatably mounted in connection with the contact casings h — h^4 , and said contact casings are pivotally mounted to the supports c as shown at h^5 in Figs. 4 and 5 of the drawings, and this connection is formed by a pin or bolt h^6 which is insulated from the supports c as shown at h^7 in Fig. 5, and in the construction shown in Figs. 4 and 5, the contact casings h and h^3 are normally held together by a spring h^8 and the contact casings h^2 and h^4 are similarly held together by a spring h^9 and other springs h^{10} are mounted beneath the contact casings h and h^2 and serve to support the separate pairs of casings, and hold them in their desired position, and by means of the above described mounting of the casings h — h^4 with the contact rollers f — f^4 it will be noted that the separate pair of roller electrodes are movable independently of each other and each roller in each pair is movable in-

independently of the other roller in each pair, and by means of this construction, or this mounting of the roller electrodes, said electrodes will adapt themselves to the work-
 5 piece or material fed therebetween, and to any variations in said material as will be readily understood.

The operation of feeding the workpiece or material into the roller electrodes as shown in Fig. 4 will be the same as that shown in Fig. 1, but in this construction the second pair of electrodes are not geared in connection with or driven by the feed rollers, and while I have not shown the mounting of the supports *c*, it will be understood that the same may be mounted as in Figs. 1 to 3 inclusive or otherwise.

In Figs. 6 and 7 I have shown another modification in which tubular electrodes *m*, *m*², *m*³ and *m*⁴ are substituted for the roller electrodes *f*—*f*⁴ whereby a sheet or strip of metal may be heated prior to the working or forming thereof to facilitate such operation.

Passed through and insulated from the tubular electrodes *m*—*m*⁴ are pipes *n*, *n*², *n*³ and *n*⁴ which form means for passing water through the tubular electrodes to cool the same and on which said electrodes are free to rotate, and mounted on the opposite ends of said electrodes are contact plates *o* having elongated apertures *o*² through which the pipes *n*—*n*⁴ are adapted to pass, and outwardly of said contact plates the pipes *n*—*n*⁴ are provided with collars *n*⁵ having ears *n*⁶ arranged as shown in Figs. 7 and 8. Mounted between or insulated from the collars *n*⁵ and contact plates *o* are springs *o*³ which serve to force the contact plates *o* against the ends of the tubular electrodes *m*—*m*⁴ to insure the contact therebetween.

Connected with the ears *n*⁶ on the collars *n*⁵ are springs *o*⁴, as clearly shown in Fig. 7, which serve to hold the tubular electrodes together, or in firm contact with the material fed therebetween as will be readily understood.

The tubular electrodes are arranged in pairs as *m* and *m*³, *m*² and *m*⁴, each pair having a contact plate *o* at the opposite ends thereof, and the leads *i*² are connected with the contact plates *o* in one pair, while the leads *i*³ are connected with the contact plates *o* of the other pair, as will be readily understood on a consideration of Figs. 6 and 7 of the drawings.

With this construction the sheet of metal *a*² to be heated is fed between the tubular electrodes *m*—*m*⁴ by means of the feed rollers *b* in the same manner as the wire or rod *a* is fed between the roller electrodes *f*—*f*⁴, and said tubular electrodes may be adjusted toward and from each other in the same manner as the roller electrodes *f*—*f*⁴.

65 The construction shown in Fig. 8 of the

drawing is exactly the same as that shown in Figs. 6 and 7 except that the periphery of the tubular electrodes is composed of a plurality of annular projection portions *m*⁵ forming corresponding annular recessed portions *m*⁶ and the annular projecting portions *m*⁵ on the tubular electrodes in one pair are arranged in line with the annular recessed portions of the tubular electrodes of the other pair, as clearly shown in Fig. 8, and while I have shown certain details of construction for heating material prior to the working or forming of the same, my invention is not limited to the details of construction herein shown and described, and changes therein and modifications thereof may be made, within the scope of the appended claims, without departing from the spirit of my invention or sacrificing its advantages.

As hereinbefore stated the invention described and claimed herein is adapted for use in connection with metal working machines of any kind or class, and such machines as shown in said prior application, and it will be understood that the material such as *a*—*a*² as shown in the accompanying drawing when heated is fed into suitable forming or fashioning elements in the usual or any preferred manner, and as this feature forms no part of my invention the same has not been shown or described herein.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In an electric heating apparatus for metal working machines, means for feeding material into the machine, means for heating said material as it is fed into the machine comprising two pair of rollers each of said rollers forming an electrode, means for holding said rollers into firm contact with the material fed therebetween, means for cooling said rollers, and means for gearing one pair of said rollers in connection with said feeding means.

2. In an electric heating apparatus for metal working machines, a pair of main feed rollers mounted to feed material into the machine, and electric heating devices mounted rearwardly of said feed rollers and by which the material is heated as it is fed into the machine, said devices comprising two pair of contact rollers, the rollers of each pair being in an open electric circuit, and tensional means for bringing the rollers of each pair into firm contact with the material passed therebetween.

3. In an electric heating apparatus for metal working machines, a pair of main feed rollers mounted to feed material into the machine, and electric heating devices mounted rearwardly of said feed rollers and by which the material is heated as it is fed into the machine, said devices comprising two

pair of contact rollers, the rollers of each pair being in an open electric circuit, and tensional means for bringing the rollers of each pair into firm contact with the material
5 passed therebetween, said contact rollers being also water-cooled.

4. In an electric heating apparatus for metal working machines, a pair of feed rollers, and heating devices mounted rearwardly
10 of said feed rollers and comprising two pair of contact rollers, the rollers of each pair being in an open electric circuit, tensional means for bringing the rollers of each pair into firm contact with material passed there-
15 between, and means for gearing one pair of said contact rollers in connection with said feed rollers.

5. In an electric heating apparatus, for metal working machines, main feed rollers
20 mounted to feed material into the machine, and heating devices mounted rearwardly of said feed rollers and comprising two pair of contact rollers, the rollers of each pair being in an open electric circuit, tensional means
25 for bringing the rollers of each pair into firm contact with material passed therebetween, means for gearing one pair of said rollers in connection with the feed rollers, and means for adjusting the other pair of
30 said rollers toward and from said first named pair.

6. In an electric heating apparatus for metal working machines, main feed rollers
35 mounted to feed material into the machine, and heating devices mounted rearwardly of said feed rollers and comprising two pair of contact rollers, the rollers of each pair being in an open electric circuit, tensional
40 means for bringing the rollers of each pair into firm contact with the material passed therebetween, means for gearing one pair of said rollers in connection with the feed rollers, means for adjusting the other pair of
45 said rollers toward and from said first named pair, and means for regulating the degree of heat applied to the material passed between said rollers.

7. A heating apparatus, comprising two pair of tensionally controlled electrodes be-
50 tween which material to be heated is passed, and means for adjusting the separate pairs of electrodes toward and from each other whereby the amount of material passed therebetween to be heated may be varied.

8. A heating apparatus comprising two pair of tensionally controlled electrodes be-
55 tween which material to be heated is passed, contact casings mounted adjacent to each of said electrodes, tensional means for holding the electrodes into firm contact with
60 said casings, the contact casings of each pair being in electrical communication, and means for circulating water through said contact casings to cool said electrodes.

9. A heating apparatus for metal working

machines, comprising two pair of tensionally controlled electrodes, feed rollers for feed-
ing material between the separate pairs of electrodes, contact casings mounted adjacent
70 to each of said electrodes, tensional means for holding the electrodes into firm contact with said casings, the contact casings of each pair being in electrical communication, means for circulating water through said
75 contact casings to cool said electrodes, and means for adjusting the separate pairs of electrodes toward and from each other, whereby the amount of material passed therebetween to be heated may be varied.

10. A heating apparatus, comprising an
80 electric transformer, and two pair of electrodes in electrical connection therewith and between which material to be heated passes, means for regulating the degree of heat applied to the material passed between said
85 electrodes, and means for water-cooling said electrodes and said transformer.

11. An electric heating apparatus of the class described comprising two frames ad-
justably mounted on suitable supports, 90 shafts mounted centrally and transversely of each of said frames and insulated therefrom and on which are mounted rotatable electrodes and contact casings, correspond-
95 ing shafts mounted over said first named shafts and capable of vertical movement, rotatable electrodes and contact casings mounted on said last named shafts, and tensional
100 means for holding the rotatable electrodes on each of said shafts into firm contact with said contact casings.

12. An electric heating apparatus of the class described, comprising two frames ad-
justably mounted on suitable supports, 105 shafts mounted centrally and transversely of each of said frames and insulated therefrom and on which are mounted rotatable electrodes and contact casings, correspond-
110 ing shafts mounted over said first named shafts and capable of vertical movement, rotatable electrodes and contact casings mounted on said last named shafts, ten-
sional means for holding the rotatable elec-
115 trodes on each of said shafts into firm contact with said contact casings, an electric transformer placed in electrical connection with said contact casings, means for circu-
lating water through said contact casings to cool said rotatable electrodes, and means
120 for water-cooling said transformer.

13. A heating apparatus comprising sup-
ports adjustably mounted independently of
each other, electrical conducting members
pivotaly connected with and insulated from
said supports, rotatable electrodes mounted
125 in connection with said electrical contact members, and tensional means for holding said electrodes in firm contact therewith.

14. A heating apparatus comprising sup-
ports adjustably mounted independently of 130

each other, a pair of electrical conducting members mounted in connection with each of said supports, the conducting members in each pair being pivotally mounted, tensional means for moving the conducting members in each pair together, rotatable electrodes mounted in connection with said conducting members, tensional means for holding said electrodes in firm contact there-
 10 with whereby material passed between the electrodes of each pair of said conducting members may be heated, and means for cooling said electrodes.

15 15. A heating apparatus of the class described, comprising a plurality of rotatable electrodes, electrical conducting members mounted adjacent to the faces of said electrodes, tensional means for holding said conducting members in firm contact with
 20 said electrodes, and means for holding said electrodes in contact with material passed therebetween.

16. A heating apparatus of the class described, comprising a plurality of rotatable
 25 electrodes, electrical conducting members mounted adjacent to the faces of said electrodes, tensional means for holding said conducting members in firm contact with said electrodes, means for holding said electrodes
 30 in contact with material passed therebetween, and means for cooling said electrodes.

17. A heating apparatus of the class described, comprising a plurality of rotatable electrodes the periphery of said electrodes
 35 being provided with a plurality of annular enlargements.

18. A heating apparatus of the class described, comprising a plurality of rotatable electrodes the periphery of said electrodes
 40 being provided with a plurality of annular enlargements, a plurality of rotatable electrodes arranged in pairs the periphery of said electrodes being provided with a plu-

ality of annular enlargements forming a plurality of annular recesses, the annular
 45 enlargements on one pair of electrodes being in line with the annular recesses of the other pair.

19. In an electric heating apparatus for metal working machines, feeding devices
 50 mounted therein and heating devices mounted rearwardly of said feeding devices and comprising two pair of contact and heating rollers between which the material is passed,
 55 means for water-cooling said rollers, and means for regulating the degree of heat applied to the material passed between said rollers.

20. A heating apparatus for metal working machines, comprising a plurality of ad-
 60 justably mounted supports, a pair of roller electrodes mounted in connection with each of said supports, the electrodes in each pair being independently pivoted to said supports and adapted to move transversely of
 65 the material passed therebetween, and means whereby the electrodes in each pair may be collectively moved transversely of said material.

21. A heating apparatus comprising a
 70 plurality of roller electrodes between which material to be heated is passed, supports mounted longitudinally of said material and adjustable toward and from each other and
 75 with which said electrodes are connected whereby the amount of material passed between said electrodes to be heated may be varied.

In testimony that I claim the foregoing as my invention I have signed my name in
 80 presence of the subscribing witnesses this 4th day of April 1917.

FRANK P. KOBERT.

Witnesses:

C. E. MULREANY,

H. E. THOMPSON.