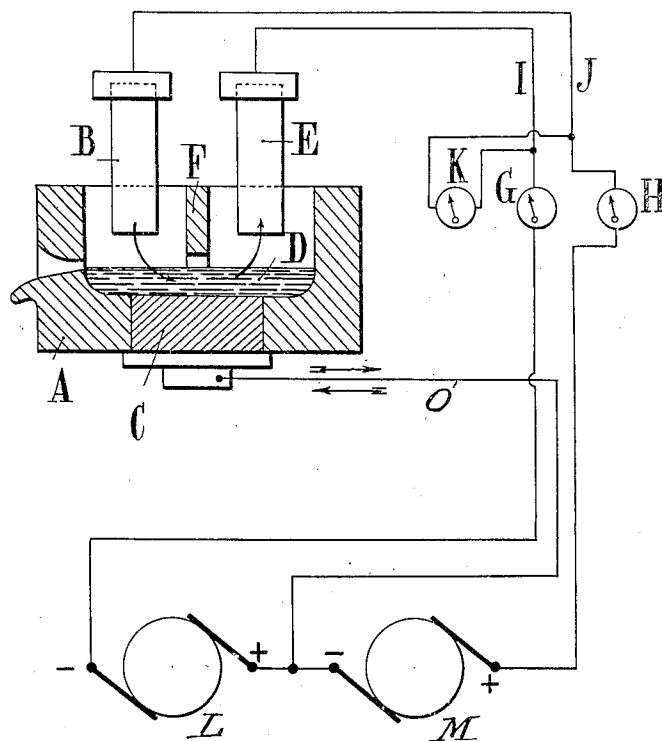


J. B. TRILLON.
ELECTRIC FURNACE.
APPLICATION FILED JULY 6, 1907.

932,835.

Patented Aug. 31, 1909.
2 SHEETS—SHEET 1.

Fig. 1



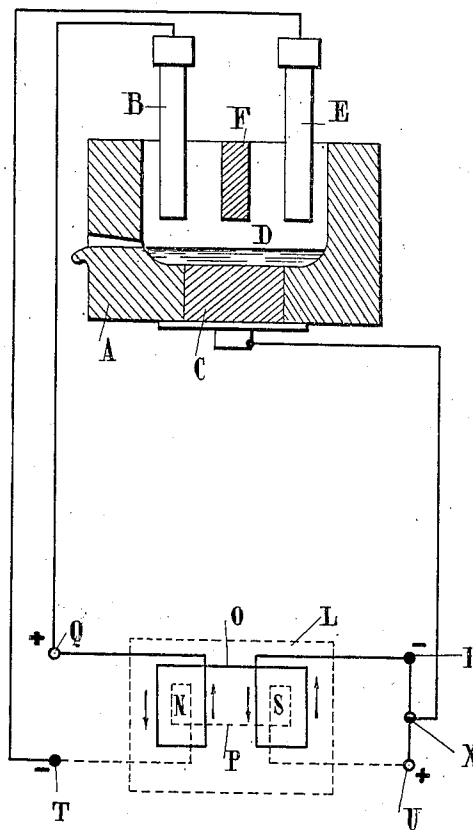
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932,835.

Patented Aug. 31, 1909.
2 SHEETS—SHEET 2.

Fig. 2



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ELECTRIC FURNACE.

932,835.

Specification of Letters Patent.

Patented Aug. 31, 1909.

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To all whom it may concern:

Be it known that I, JEAN BAPTISTE TRILLON, a citizen of the Republic of France, and resident of St. Jeoire, France, have invented new and useful Improvements in Electric Furnaces, which improvements are fully set forth in the following specification.

The electric arc furnaces which have received practical applications almost come under two categories: 1. Those with a single arc or several arcs working in parallel between two electrodes or two batteries of electrodes of opposite polarities; or between one or more electrodes forming one of the poles, and the sole of the furnace or the substances to be treated forming the other pole. 2. Those with two arcs in series formed for example between the conducting bath and two carbon electrodes of opposite polarity and adjustable separately.

In the first case the intensity of the current and the voltage at the terminals are easy to regulate, but this pressure cannot hardly in practice exceed 60 or 70 volts, so that it is necessary to have recourse to current intensities which are frequently considerable, which cause serious losses or fall of voltage in the line. In the second case, these losses are avoided for the greater part by the employment of a double voltage or tension, but great difficulties arise in maintaining the two arcs absolutely at the same regimen, and in preventing their interruption any variation in one of them reacting upon the other, and the interruption of one causing the extinction of the other. This is equally true when in place of arcs only the materials to be treated are to be rendered incandescent by the passage of the current.

The present invention has for its object a form of electric furnace termed a "three-wire electric furnace" by means of which it is possible to diminish the losses in the line by the employment of two or more arcs or hearths in series on the one hand, while on the other hand providing for an independent existence and regulation of each arc or hearth. This arrangement consists broadly in employing electrodes of opposite polarity for the normal supply and the return of the current, but with this peculiarity that the sole of the furnace or the conducting bath forming part of the circuit is connected electrically to an appropriately selected point of the generating circuit, by means of a conductor

which is not normally traversed by any current and which serves to reconduct the differential current to the generators in case the intensity of the arcs or hearths is unequal, or the total current in case one of the arcs is interrupted.

My invention is illustrated in the accompanying drawings, in which similar reference letters denote corresponding parts and in which Figures 1 and 2 show the diagrammatic views of an electric furnace fed, respectively, by a continuous and alternating current.

In this drawing A represents in section the furnace chamber formed in the ordinary manner of refractory materials, and provided if desired with a tapping hole. B is one of the movable electrodes operated mechanically or by hand in such a manner as to regulate the intensity of the corresponding arc by varying the distance between the extremity of the electrode and the sole of the furnace C or the conducting bath D. E is a second electrode arranged like the first and adapted to be displaced independently. The drawing also shows that the current, which in this example is produced by two dynamos arranged in series, enters at one of the electrodes, passes through the bath or the sole of the furnace and returns to the generator group L, M through the second movable electrode. Nevertheless, in case one of the arcs should be reduced or extinguished, the current is able to return either wholly or in part by the third conductor O, connecting the sole of the furnace to a point on the generating circuit located between the two dynamos. This sole may be composed of a metal plate or frame to which the conductors are fixed; it is covered with a refractory material which is a good conductor of electricity and a bad conductor of heat, such as an agglomerate of retort carbon or graphite. In cases in which the contact of the graphite with the metal or other product forming the bath at the bottom of the furnace presents difficulties, another form of contact may be adopted.

It should be understood that according to requirements the furnace may or may not be provided with an arch or cover with apertures for the passage of the electrodes; that the electrodes may be vertical or more or less inclined; that the furnace chamber may or may not be divided by an insulating and refractory partition F, forming a bridge above

the bath and preventing the current from passing from one electrode to the other through the charge to be melted or reduced, without passing through the liquid bath.

5 These various detail modifications do not in any way affect the principle of the invention, which consists broadly in the application to electric furnaces of the method of connection termed the three-wire arrangement.

10 The operation of the furnace is regulated by adjusting the two electrodes in accordance with the indications of the ammeters G, H, in such a manner that the two conductors I and J are traversed by equal currents as far as possible. A voltmeter K indicating the total voltage at the terminals may be connected between these two conductors.

In Fig. 2 the electric furnace is shown as 20 being fed by an alternating current. Here L denotes the inductor developed by an alternator which for simplicity's sake is shown as having two poles N and S, but which of course may have any number of poles. The inductor consists of two coils, one O marked 25 by full lines, and the other P marked by dotted lines. The coils end, respectively, at Q R and T U. In accordance with the law governing the alternating currents the terminals in question will, at a certain moment, 30 become instantaneously of a positive or negative polarity. If the terminal Q of the coil O is electrically connected with the electrode B of the furnace and the other terminal T of 35 the coil P to the electrode E, and if the terminals R and U are both at the point of X electrically connected with the sole of the furnace the same effects will be obtained as those described in the first instance when 40 continuous current is used.

An electric furnace constructed in the manner described above enables all operations of which arc or resistance furnaces are capable to be effected, and presents the following 45 advantages as compared with the constructions heretofore employed:

1. Relatively to furnaces with one arc or several arcs in parallel: (a) Considerable diminution of the cost of installing the line as only one return conductor is employed 50 for two arcs instead of two. (b) diminution of the line losses due to resistance, as a double voltage is employed, and normally only two conductors are traversed by the current.

2. Relatively to furnaces with two arcs in series: (d) great stability in operation; 55 avoidance of racing of the generators due to interruption of the current, if care be had to couple the said generators mechanically or to control them by one and the same 60 motor. (e) possibility of replacing worn-out electrodes in succession without interrupting the operation of the furnace. (f) finally the possibility of varying at will the 65 intensity of each arc or hearth and if necessary of causing the whole or a portion of the current to pass through one of the movable electrodes and the mass in fusion; the return taking place through the sole and the 70 third wire, either for the purpose of heating the bath to a greater extent at a given point, or of producing a more efficient distribution of the heat in the mass in fusion if it is deep.

I claim—

An electric furnace comprising at least 75 two independently adjustable electrodes of opposite polarity, and in which the sole and conducting bath form a part of the generating circuit and at least two hearths are 80 formed, and a third conductor between said sole and a selected point of the generating circuit to allow of the return of the electric current wholly or partly through said third conductor.

In testimony whereof I have signed this 85 specification in the presence of two subscribing witnesses.

JEAN BAPTISTE TRILLON.

Witnesses:

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D. VULLIN.