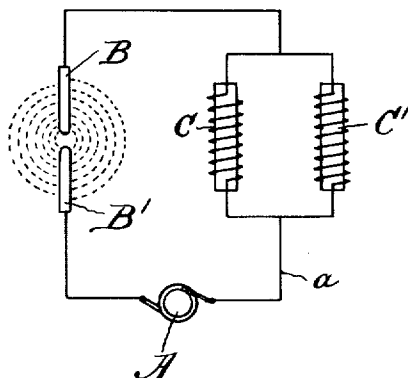


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METHOD OF INCREASING THE WORKING FACTOR ($\cos. \varphi$) AND THE STABILITY OF ELECTRIC
FURNACES.

1,011,018.

APPLICATION FILED APR. 16, 1910.

Patented Dec. 5, 1911.



Witnesses

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UNITED STATES PATENT OFFICE.

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METHOD OF INCREASING THE WORKING FACTOR ($\cos. \phi$) AND THE STABILITY OF ELECTRIC FURNACES.

1,011,018.

Specification of Letters Patent.

Patented Dec. 5, 1911.

Application filed April 18, 1910. Serial No. 555,954.

To all whom it may concern:

Be it known that I, KRISTIAN BIRKELAND, a subject of the King of Norway, residing at Christiania, Norway, have invented certain new and useful Improvements in the Method of Increasing the Working Factor ($\cos. \phi$) and the Stability of Electric Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a method of increasing the working factor ($\cos. \phi$) and the stability of electric furnaces.

Many attempts have hitherto been made to increase the power factor—the ratio between the amount of work and the product of current and tension of current in electric furnaces working with induction or choking coil inserted in series with the furnace. These attempts, however, have not always turned out satisfactorily.

A simple method to increase the working factor consists in arranging the points of the electrodes farther apart. Thereby the watt component of the alternating current will be increased relatively to the wattless component thus also correspondingly increasing the power factor. At the same time, however, the tendency of the arc to go out will be increased and accordingly the inertia (stability) of the furnace becomes less.

The present invention has for its object a very simple and very effective means of increasing the power factor and the inertia.

It consists in inserting in series with the furnace instead of one single induction coil, two or more induction coils connected in parallel which may be made either alike or be differently made. Said induction coils are given such dimensions that together they will not let through more current to the furnace than did the single coil.

On account of the small differences which the several coils have to one another, even if they are made practically perfectly similar to one another the effect of the differences of self induction of the coils, is that the current in each coil does not pass exactly simultaneously through the zero-point of the resultant current curve; should the

furnace for a moment be on the point of being extinguished, the complete interruption of the current cannot easily occur for that reason, and the points of the electrodes can be set farther apart without the inertia becoming too low, the working factor being at the same time increased.

The drawing is a diagrammatic representation of an electric furnace embodying my invention, wherein A designates the generator, B, B' the electrodes forming the terminals of an electric circuit a . Between one of the terminals and the generator are included two induction coils C, C', which are connected together in parallel, and both are in series in said circuit.

It is quite clear that the resulting current will have zero points, and that the arc may be liable to become extinguished at these points. The danger may, however, be more or less dominating according to the nature of the apparatus used. It is clear, that the danger is less, the more rapid the current curve rises from the zero point, that is to

say, the greater the time constant $\frac{L}{W}$ is; (L being the coefficient of self induction and W the resistance of the circuit) and in fact this constant is greater for several induction coils connected in parallel. It should also be remarked that in an arc of the nature in question there will always exist oscillations (Hertzian waves): of high period; such oscillations are mainly created in those parts of the coils nearest the arc. By using two coils instead of one, it is therefore clear that these oscillations are increased, because the places of origin of them are increased.

I claim:

1. The method of increasing the power factor ($\cos. \phi$) and the inertia of electric furnaces, which comprises dividing the current from an alternating source into a plurality of parts in parallel and out of phase and supplying the resulting current of said parts to one of the electrodes.

2. The method of increasing the power factor ($\cos. \phi$) and the inertia of electric furnaces, which comprises dividing the current into a plurality of parts out of phase and supplying the resultant current of said parts to the electrodes.

3. An electric circuit having two elec-

trodes, a generator for alternating current,
and a plurality of induction coils in the cir-
cuit between the generator and one of the
electrodes, said induction coils connected in
5 parallel, and in series in the circuit.

In testimony that I claim the foregoing

as my invention, I have signed my name in
presence of two subscribing witnesses.

KRISTIAN BIRKELAND.

Witnesses:

HENRY BORDEWICH,

NANA PEDERSON.