March 16, 1926. BEST AVAILABLE COPY 1,576,621

F. ANDERSEN

ELECTRIC ROTATING RESISTANCE FURNACE

Filed March 22, 1923

Fig. 1.

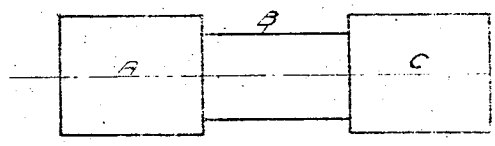


Fig. 2

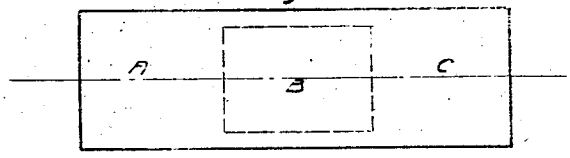


Fig. 3

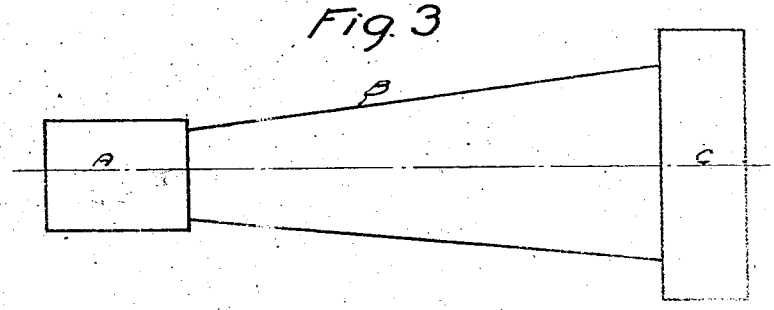


Fig. 4.

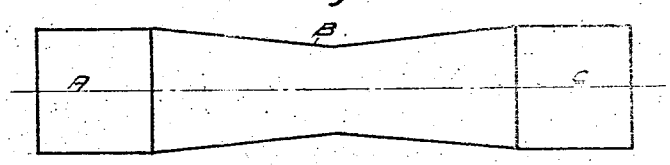
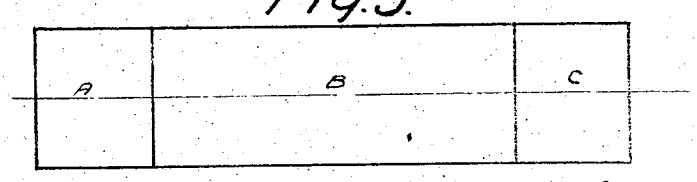


Fig. 5.



Inventor.
F. Andersen

By Marks & Clerk
Att'ys

Patented Mar. 16, 1926.

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UNITED STATES PATENT OFFICE.

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ELECTRIC ROTATING RESISTANCE FURNACE.

Application filed March 22, 1923. Serial No. 626,975.

To all whom it may concern:

Be it known that I, FRIDTJOF ANDERSEN, a subject of the King of Norway, and residing at Trollhattan, Sweden, have invented certain new and useful Improvements in Electric Rotating Resistance Furnaces, of which the following is a specification.

Zinc powder, also called zinc poussière, when subjected to heat and to a certain agitation or rubbing, may be caused, as known, to be converted into spelter or crude zinc to its greater part, whereby it has been shown that the conversion of the powder into liquid metal is performed in the simplest manner in an electrically heated resistance furnace having a rotating, rocking or oscillatory motion.

However, in order to obtain a suitable heating of the zinc powder and at the same time the best electric effect, the electric resistance body, constituting one or more resistors, must be formed and arranged in a special determined manner.

The present invention has for its object to establish a temperature in the furnace chamber or in different parts of the same suitable for the process by varying the electric resistance in different parts of the resistor in a manner known per se.

Especially at those parts of the resistor to which the connections for the supply of the current are made the electric resistance of the resistor must be quite different from the resistance in those parts of the resistor which are situated within the furnace or in the furnace chamber proper.

By duly arranging the sectional area of the resistor or by using a different composition of the resistor mass in the current-supplying part of the resistor, situated outside of or in the furnace wall, in relation to the part of the same situated within the furnace chamber proper it will be possible to obtain a heating effect of the zinc powder mass to be converted into liquid metal, which is advantageous from the point of view of the technics of heat as well as for the carrying out of the process.

As a common rule for the different electric resistance in the inner and outer parts of the resistor obtained by different cross sections or in any other manner, it may be stated that the electric resistance of the inner heat-producing part of the resistor must be proportioned in relation to the electric resistance of the outer part of the resistor at least as 2:1. No maximum limit for said difference of the electric resistance may be stated as said mutual proportion is determined by the existing mechanical arrangements and by the space afforded in the furnace in question.

For obtaining different electric resistances in different parts of a resistor having the same cross sectional area all over its length, a resistor mass may be used which in the parts where the higher resistance is required is composed of carbon powder leaving a relatively great amount of ashes, whereas in the parts where a lower resistance is required a resistor mass is used composed of carbon materials, as pure as possible, such as graphite, retort graphite and petroleum coke.

The transition from a better conducting part of the resistor to a less conducting part may either be made abruptly, whereby the heating of the furnace chamber or of the powder may be defined to a certain desired place, or by gradually decreasing or increasing the electric resistance along the length of the resistor it will be possible to obtain an evenly augmented change of temperature within the furnace chamber.

This change of temperature along the length of the resistor may be obtained by means of different cross sectional areas or by different compositions of the resistor mass, or by a combination of these two means.

In the accompanying drawing some constructional forms of resistors with different cross sections are shown.

In Figures 1, 2, 3, 4 and 5, A and C indicate the current-supplying parts of the resistor, whereas B indicates the heat generating part of the same.

In Figure 1, the part B has a less cross sectional area than the parts A and C.

In Figure 2 the resistor which has a uniform outer diameter along its whole length is formed with a recessed part B opposing a greater resistance than the end parts A and C.

In Figure 3 the intermediate part B has increased sectional areas from the end part

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A to C, so that a decreasing resistance is obtained in the intermediate part between A and C.

In Figure 4 the intermediate part B has a decreasing sectional area from the end parts A and C towards the middle of the intermediate part so that the greatest resistance will be obtained at the middle.

In Figure 5 the resistor has the same sectional areas along its whole length whereby its intermediate part B is formed by a material of greater resistance than the parts A and C.

By making the intermediate part B of another sectional area and also of another material than A and C the desired difference of resistance may be obtained.

If the relation between the cross sections of the end parts A, C and the intermediate part B is greater or equal to the proportion 2:1, the end and intermediate parts A, B, C apparently may consist of the same homogeneous material.

The proportion between the said cross sections in the combined case may be below the proportion 2:1 above mentioned.

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

1. A resistor for electric furnaces, in which the specific electric resistance of the material, constituting the current-supplying parts of the resistor, is lower than that of the material constituting the intermediate part of the resistor in the proportion of at least 1:2.

2. A resistor for electric furnaces in which the material of the current-supplying parts of the resistor is composed of pure carbon, whereas the material of the intermediate part of the resistor is composed of carbon leaving a great amount of ashes.

In testimony whereof I have signed my name to this specification.

FRIDTJOF ANDERSEN.