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REVOLVING ELECTRICAL FURNACE WITH RESISTANCES ARRANGED DIAMETRICALLY.

APPLICATION FILED APR. 11, 1911.

1,044,928. Patented Nov. 19, 1912.

Fig. 1.

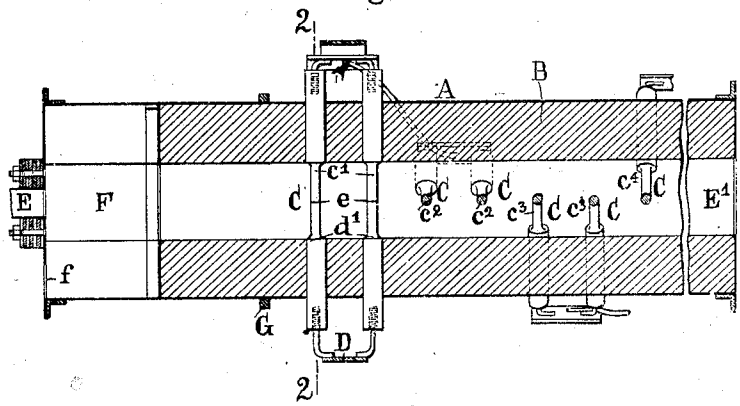


Fig. 2.

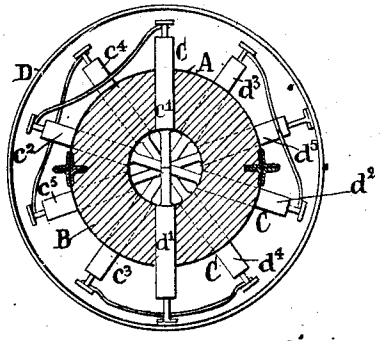


Fig. 3.

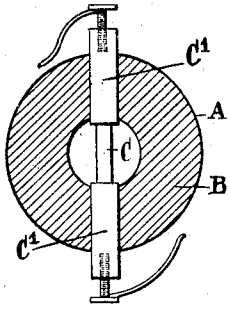
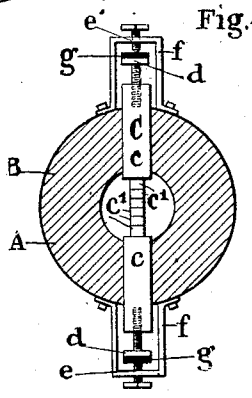


Fig. 4.



WITNESSES

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REVOLVING ELECTRICAL FURNACE WITH RESISTANCES ARRANGED DIAMETRICALLY.

1,044,928. Specification of Letters Patent. Patented Nov. 19, 1912.

Application filed April 11, 1911. Serial No. 620,413.

To all whom it may concern:

Be it known that I, OTTOKAR SERPEK, a subject of the Emperor of Austria-Hungary, and residing at Paris, France, have invented a certain new and useful Revolving Electrical Furnace with Resistances Arranged Diametrically, of which the following is a specification.

The present invention relates to a revolving electrical furnace intended principally for the manufacture of aluminium nitrid, this furnace being heated by resistances which are both independent of the material to be treated and arranged diametrically of the furnace, passing through its refractory casing and being connected up upon the exterior.

The accompanying drawing shows by way of example a suitable construction of this furnace.

Figure 1 is a longitudinal section. Fig. 2 is a cross section upon line 2—2 of Fig. 1. Figs. 3 and 4 are similar sections showing modified constructions of the resistance.

The metallic casing of the furnace is shown at A, while B is the internal refractory lining; they are both perforated at suitable points to allow the passage of the resistances C. Each of the latter is, in the example represented by Figs. 1 and 2 formed in two sections *c* and *d*, which make contact at *e*. The portion of the resistances inclosed in the wall of the furnace is of much larger section than that in the central part, so that it is the latter portion especially which is brought to high temperature; this reduces to a minimum the losses of heat. These resistances are arranged diametrically, that is, across the interior of the furnace transversely to its length, each resistance being set around or advanced in relation to the preceding one by a certain angle; for example, the first being c' d' the second may be c^2 d^2 and so on. Instead of advancing each resistance in relation to the preceding one, they may be arranged in pairs or in groups of any number, the resistances of each group being parallel and the groups being advanced in relation to one another.

Current is led to the end resistances by two copper rings or crowns D in connection with brushes or the like; between these points the resistances may be connected in parallel or in series in any suitable manner. Preferably, however, the resistances are coupled in pairs, the two resistances of a pair being placed in parallel and the several pairs being then arranged either in series or in parallel. In this way the advantage is gained that if one of the resistances should fail there is no sudden stoppage of the current, but the latter can still pass through the other resistance of the pair; there is thus time to stop the machine before damage is done.

The supply of nitrogen or of nitrogenous gases takes place at E, and the charging with solid substances—carbon and bauxite or other aluminous ore—as well as the escape of the gases takes place at E′. At the other end of the furnace is arranged a space F in which the manufactured product accumulates and from which it may be discharged periodically through a gate *f*.

The furnace is provided with journal-rings or races G bearing upon rollers in the usual manner.

This diametrical arrangement of the resistances allows the ready replacement of any one of them that may have deteriorated. Moreover, as has been said the connections being made externally may be arranged in parallel or in series in order to utilize to the best advantage the electrical supply at hand for the purpose in view. This arrangement has also the advantage of leaving completely free the ends of the furnace, which permits me to set the latter among other apparatus into which the material would pass in a continuous manner, as illustrated, for example, in my Patent No. 996,032. It would be sufficient in this case to dispense with the chamber or space F, which would be useless, the furnace being connected directly to the apparatus of which it forms part.

When the resistances are each in two parts by arranging their joint at the center of the furnace, one prevents the formation within the body of the materials or near the refractory lining of small arcs which might arise from imperfect contact at the joint; consequently these arcs cannot be-

come a cause of irregular working or deterioration of the furnace but on the contrary these arcs being formed in the atmosphere of the furnace assist in heating the latter. The resistances may even be drawn apart intentionally so as to produce a series of arcs distributed all along the furnace; in this way the furnace may be caused to act as a resistance furnace, as a multiple-arc furnace, or as both simultaneously. If the furnace is of larger diameter and it is desired to produce the arcs, the points of formation of the arcs may be moved away from the center so as to approach the substances under treatment.

The resistances may also be composed of three parts, that of the middle being of smallest diameter forming the resistance proper, the two outer ones serving only for the passage of current and the middle part may be made in various ways. In Fig. 3 I have shown in cross section through one of the resistances, a furnace provided with resistances formed in this manner. The central part C is the resistance body properly so-called; the two outer parts C′ C′ are of larger section, made of carbon as usual, and they serve merely for the passage of the current. The central part may have either a homogeneous structure or a heterogeneous one, the latter being obtained by agglomerating together blocks or elements of any kind in the form of a compact bar. When the central bar is of homogeneous structure, it may be of any suitable material, preferably an agglomerate of nitrid and of carbon having 60 to 80 per cent. of nitrid with 40 to 20 per cent. of carbon. This agglomerate may be made by working up and baking together nitrid and tar in quantities such that after the baking the proportions are as indicated above. Another mode of manufacture consists, as stated above in giving to the central bar a heterogeneous structure, by agglomerating together blocks or elements of any kind in the form of a compact bar. These heterogeneous resistance-bodies may be made in any convenient manner; for example, as follows:—A certain number of blocks, rings or elements of any kind are prepared, of the composition indicated above in the case of homogeneous bars, for example; these are agglomerated together before baking by coating them with tar, and then compressing them into the shape of bars, which are afterward submitted to baking. To increase still further their resistance, there may be inserted between consecutive blocks of aluminium nitrid, powdered magnesia or other suitable material, which becomes agglomerated in the tar which separates the elements. The blocks or elements may be of any shape, cylindrical or other, and their contact-surface be plane or irregular; thus the bar might be prepared by agglomerating together the pieces of a homogeneous bar which had previously been broken. The resistance offered by the bar to the passage of the current becomes naturally increased in the regions of contact of the different blocks or fragments; consequently the resistance of the heterogeneous bar thus formed is much more considerable than that of a homogeneous bar of the same dimensions.

Another construction of the diametrical resistances consists in forming their active central portion by the juxtaposition of a certain number of independent sections connected together by the pressure resulting from a simple clamping device; the intensity of pressure can be regulated so as to vary by the well known method the resistance and therefore the consumption of energy and the heat developed in the parts where sections are in contact. The clamping device for varying at will the degree of compression and therefore the resistance of the juxtaposed sections c', Fig. 4, may be of any suitable kind. For example, one may employ for this purpose simple screws e having their nuts in brackets f secured to the external wall of the furnace and bearing against the heads of the current connections d.

The elements forming the central bar, whether agglomerated or sectional, may be all of the same nature or may consist of blocks or sections of different composition. The shape of the section of the different parts composing the resistances may be any suitable one, solid or hollow. In the latter case, the fitting and replacement of the electrodes is facilitated, because the different parts have only to be threaded over a rod and the latter removed after the parts have been secured together by the desired pressure.

It is quite evident that the invention is not limited strictly to the arrangement indicated, which may comprise any modification consonant with the principle of the invention. This furnace may likewise be utilized for the manufacture of nitrids other than that of aluminium and in general for that of any product for which it is suitable.

I claim as my invention—

1. A revolving electric furnace, adapted to receive the material at one end and discharge it at the other, as the furnace rotates, and having resistances extending across the interior of the furnace transversely to its length and electrical connections outside of the furnace.

2. A revolving electric furnace, having resistances extending across the interior of the furnace, and external contact rings electrically connected to the ends of said resistances, substantially as described.

3. A revolving electric furnace, having re-

sistances extending through the walls of the furnace and across the interior thereof, with electrical connections outside the furnace, the portions of each resistance embedded in the walls being of larger section than the portion of such resistance within the interior of the furnace.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

OTTOKAR SERPEK.

Witnesses:

CHARLES DONY,

EUGENE LEGRIS.