

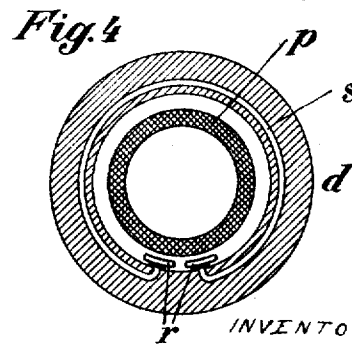
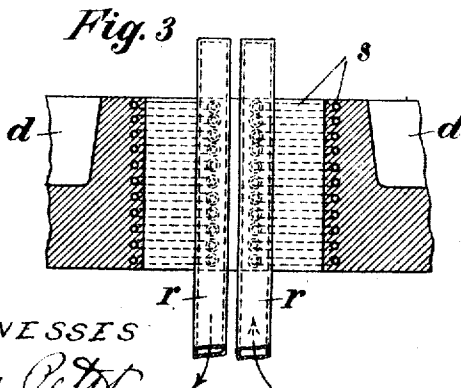
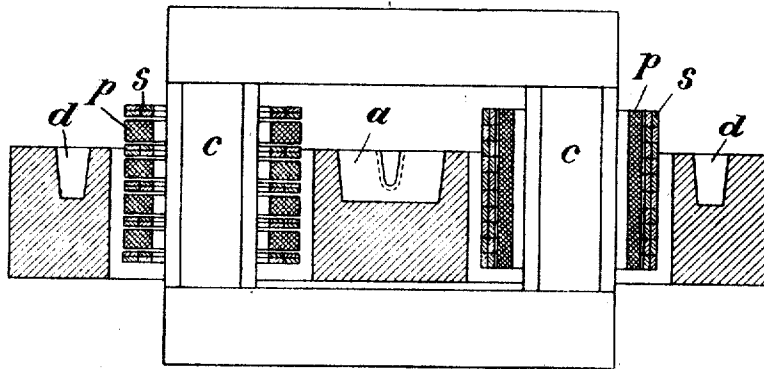
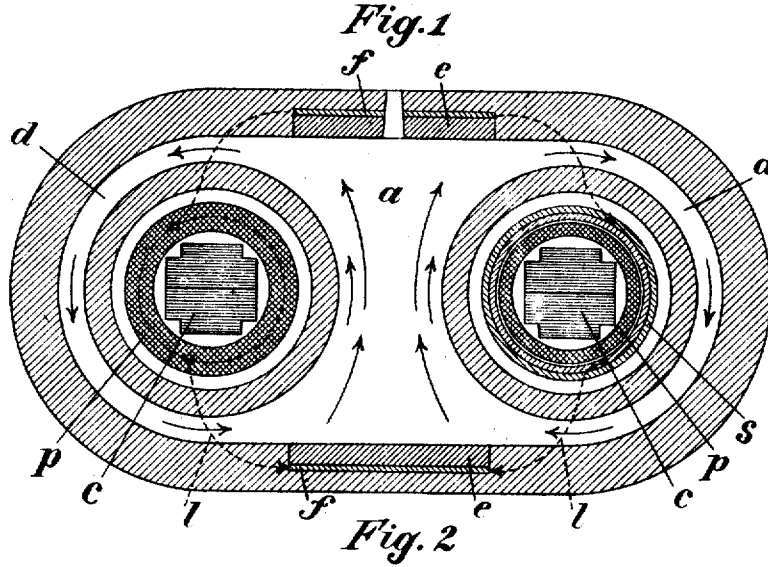
H. ROCHLING & W. RODENHAUSER.
ELECTRIC FURNACE.

APPLICATION FILED SEPT. 7, 1906.

939,095.

Patented Nov. 2, 1909.

2 SHEETS—SHEET 1.



WITNESSES
M. Petz
Geo. H. W. Wey

INVENTORS
Hermann Röchling
Wilhelm Rodenhausen
Richard Co
ATTYS

H. RÖCHLING & W. RODENHAUSER.
ELECTRIC FURNACE.
APPLICATION FILED SEPT. 7, 1908.

939,095.

Patented Nov. 2, 1909.
2 SHEETS—SHEET 2.

Fig. 5

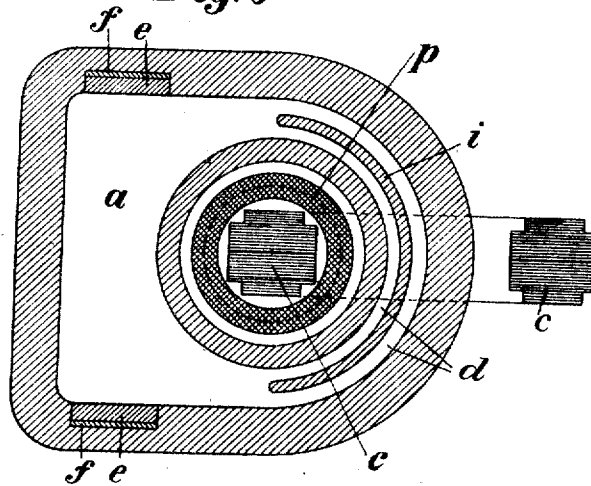


Fig. 6

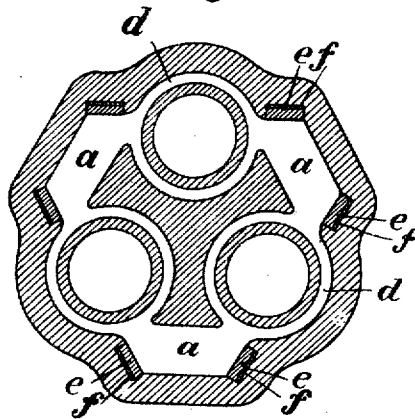
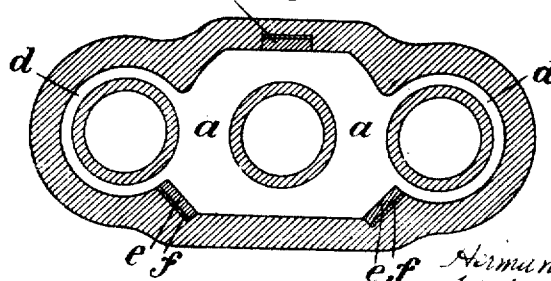


Fig. 7



WITNESSES

W. Petit

W. J. Greenough

INVENTORS

Hermann Röchling
Wilhelm Rodenhausen
By Richard & Co

ATT'YS.

UNITED STATES PATENT OFFICE.

HERMANN RÜCHLING AND WILHELM RODENHAUSER, OF VÖLKLINGEN, GERMANY,
ASSIGNORS TO THE GRÖNDAL KJELLIN COMPANY LIMITED, OF LONDON, ENGLAND,
A CORPORATION OF GREAT BRITAIN.

ELECTRIC FURNACE.

939,095.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed September 7, 1906. Serial No. 333,686.

To all whom it may concern:

Be it known that we, HERMANN RÜCHLING, manufacturer, and WILHELM RODENHAUSER, engineer, subjects of the German Emperor, residing at Völklingen-on-the-Saar, in the Empire of Germany, have invented new and useful Improvements in and Relating to Electric Furnaces, of which the following is a specification.

10 The present invention relates to an electric furnace for converting iron into steel, melting metals, obtaining metals from their ores, and for deoxidizing and removing gases from molten iron and steel.

15 The furnace, in accordance with the present invention, in which the heating of the molten material is effected by means of induced currents, differs from known induction furnaces in that the electric energy
20 supplied to the primary winding is transmitted by induction to two or more groups of secondary circuits, and thereby renders possible the use of large undivided surfaces and masses of metal without endangering
25 the uniform heating thereof.

Various forms of an electric furnace embodying this invention are represented in the accompanying drawings, in which:—

30 Figures 1 and 2 are horizontal and longitudinal section respectively of a double phase furnace; Figs. 3 and 4 are vertical and horizontal sections respectively of a special development of the secondary winding; Fig. 5 is a horizontal section of a single
35 phase furnace; and Figs. 6 and 7 are horizontal sections of different forms of polyphase furnaces.

Similar letters of reference refer to similar parts in all views.

40 The furnace represented in Figs. 1 and 2 contains two groups of secondary circuits, the first group of which is formed by the material to be melted itself, said material being placed for this purpose in an annular
45 channel around the primary winding P. One or more of these annular channels surrounds each leg of the transformer, there being a channel for each leg. This smelting channel is widened at one or more places.

50 The furnace may be so arranged that by dividing the transformer of a single phase furnace, or by using a plurality of transformers in a polyphase furnace the widening of the channel, or so-called smelting

hearth, *a*, lies between the transformers. To
55 raise the temperature in the smelting hearth, the current of the secondary circuit is short circuited through the charge at this point. For this purpose one or more copper wire
60 windings S are arranged between or over the primary windings P of each of the transformer legs. The secondary winding S may also be located outside of the primary P, and furthermore, in order to economize
65 room, it may be conducted through pipe coils embedded in the masonry of the furnace, water being passed through the pipes to cool the furnace wall and the primary coil. The secondary winding *s* of the two
70 groups of circuits is suitably subdivided to prevent the tendency of the charge to whirl. From the secondary winding the current is led as directly as possible to one or more
75 pole plates E on opposite sides of the smelting hearth and in such manner that the direction of the current from pole plate to
80 pole plate corresponds to that directly induced in the material in the smelting channel. The pole plates are connected to terminal plates *c* which are made of carbonaceous material or metal or fire resistant
85 conductors or any suitable mixture of these, or on the other hand the pole plate may be molded in a mass which has the property of being at the same time both fire resistant
85 and good conducting, so that at this point the furnace wall serves as a conductor by which the secondary circuit is led to the material in the melting channel.

The use of two groups of secondary
90 circuits makes possible the melting of large undivided surfaces and masses of material with an exceedingly uniform heating thereof and at the same time serves to prevent
95 the great dispersion of the lines of force which would take place if only the first group consisting of the melting channel circuits were employed.

We claim as our invention:

1. In an electric transformer furnace, in
100 combination a magnet core (*c*) piercing the furnace and having a primary and a secondary winding (*p* and *s*), the smelting room in the furnace being formed by annular
105 channel (*d*) surrounding the magnet core.

2. In an electric transformer furnace, in combination a magnet core (*c*) piercing the furnace and having a primary and a second

ary winding (*p* and *s*), the latter being formed by a water pipe, serving as a cooling means for the furnace material, the smelting room in the furnace being formed by an annular channel (*d*) surrounding the magnet core.

3. In an electric transformer furnace, in combination a magnet core (*c*) piercing the furnace and having a primary and a secondary winding (*p* and *s*), the smelting room in the furnace being formed by an annular channel (*d*) surrounding the magnet core, a portion of the channel (*a*) being widened to form a smelting hearth and terminal plates (*e, f*) arranged within the sides of said smelting hearth, adapted to electrically connect the secondary winding with the material within said smelting hearth.

4. In an induction furnace, a magnet core, a primary winding therefor and a melting channel surrounding said core, in combination with a secondary winding on said core and means for conveying the current induced in said secondary winding to the melting channel to heat the material therein.

5. In an induction furnace, a magnet core, a primary winding therefor and a melting channel surrounding said core, in combination with a secondary winding on said core and means for completing the circuit of the current induced in said secondary winding through the material in the melting channel.

6. In an induction furnace, a magnet core, a primary winding therefor and a melting channel surrounding said core, in combination with a secondary winding on said core, terminal plates embedded in the sides of said melting channel and means to connect said plates to the secondary winding whereby the current of the latter is completed through the material in the melting channel.

7. In an induction furnace, a magnet core,

a primary winding therefor and a melting channel surrounding said core, in combination with a secondary winding on said core, terminal plates embedded in the sides of said melting channel, a fire resistant conductor forming a protective facing for each of said plates, and means to connect said plates to the secondary winding whereby the current of the latter is completed through the material in the melting channel.

8. In an induction furnace, a magnet core, a primary winding therefor and a melting channel surrounding said core, in the material in which channel the main current is induced, in combination with a secondary winding surrounding said core in which a current is induced by the electro-magnetic leakage of the furnace and means for conveying the current induced in said secondary winding to the melting channel to raise the temperature of the materials therein.

9. In an induction furnace a primary coil inducing a current in the material to be melted and a leakage field coil arranged with relation thereto and means for conducting the current induced in said leakage field coil to the melting channel to heat the material therein.

10. The combination with an electric transformer furnace having a main field and a leakage field, of a conductor arranged in the leakage field of the said furnace and means for leading the current induced therein to the melting channel to heat the material therein.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HERMANN RÖCHLING.
WILHELM RODENHAUSER.

Witnesses:

BESSIE F. DUNLAP,
LOUIS VANDORN.