

H. NATHUSIUS.
ELECTRICAL FURNACE.
APPLICATION FILED AUG. 25, 1908.

Patented Apr. 27, 1909.

920,078.

Fig. 1.

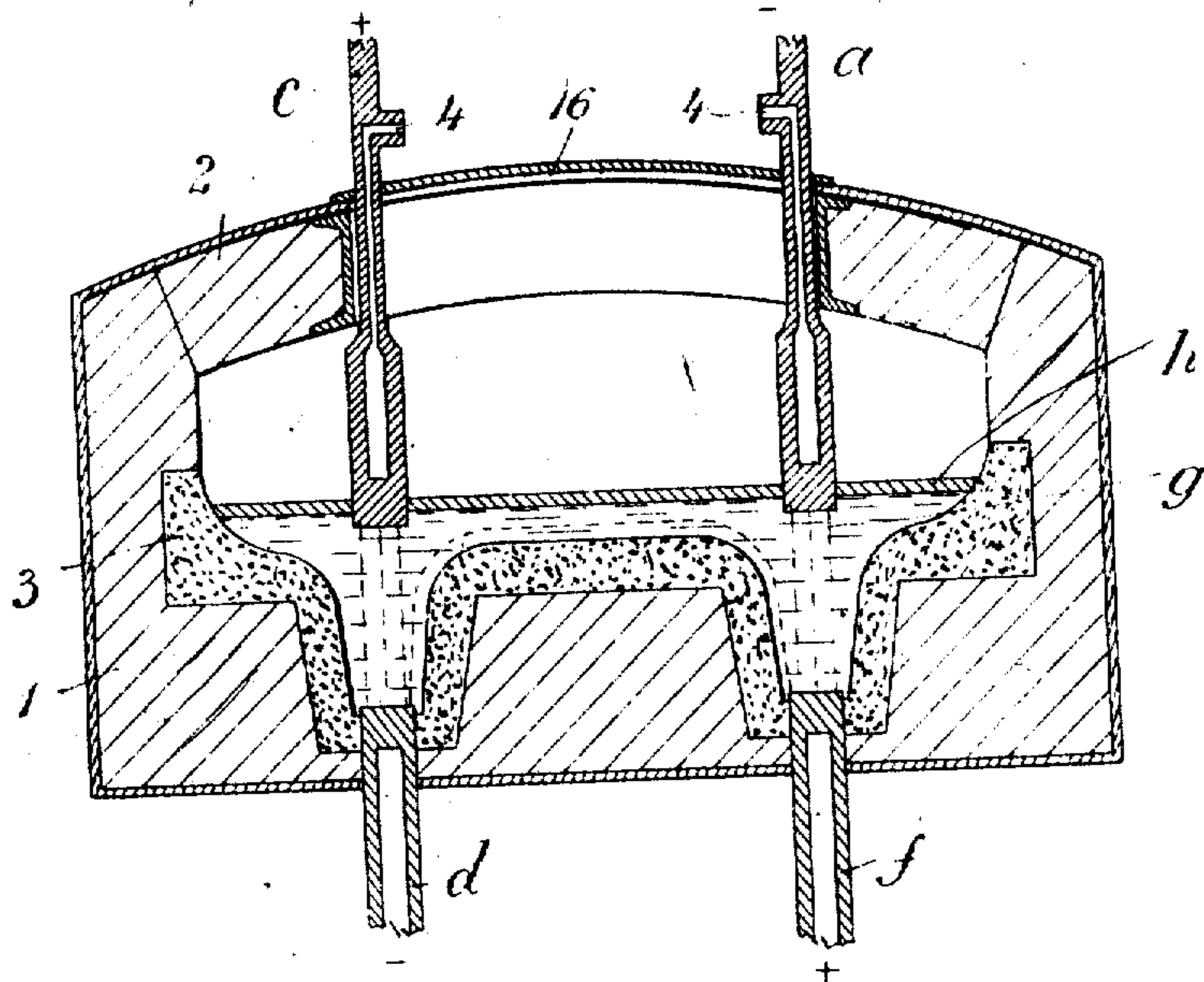
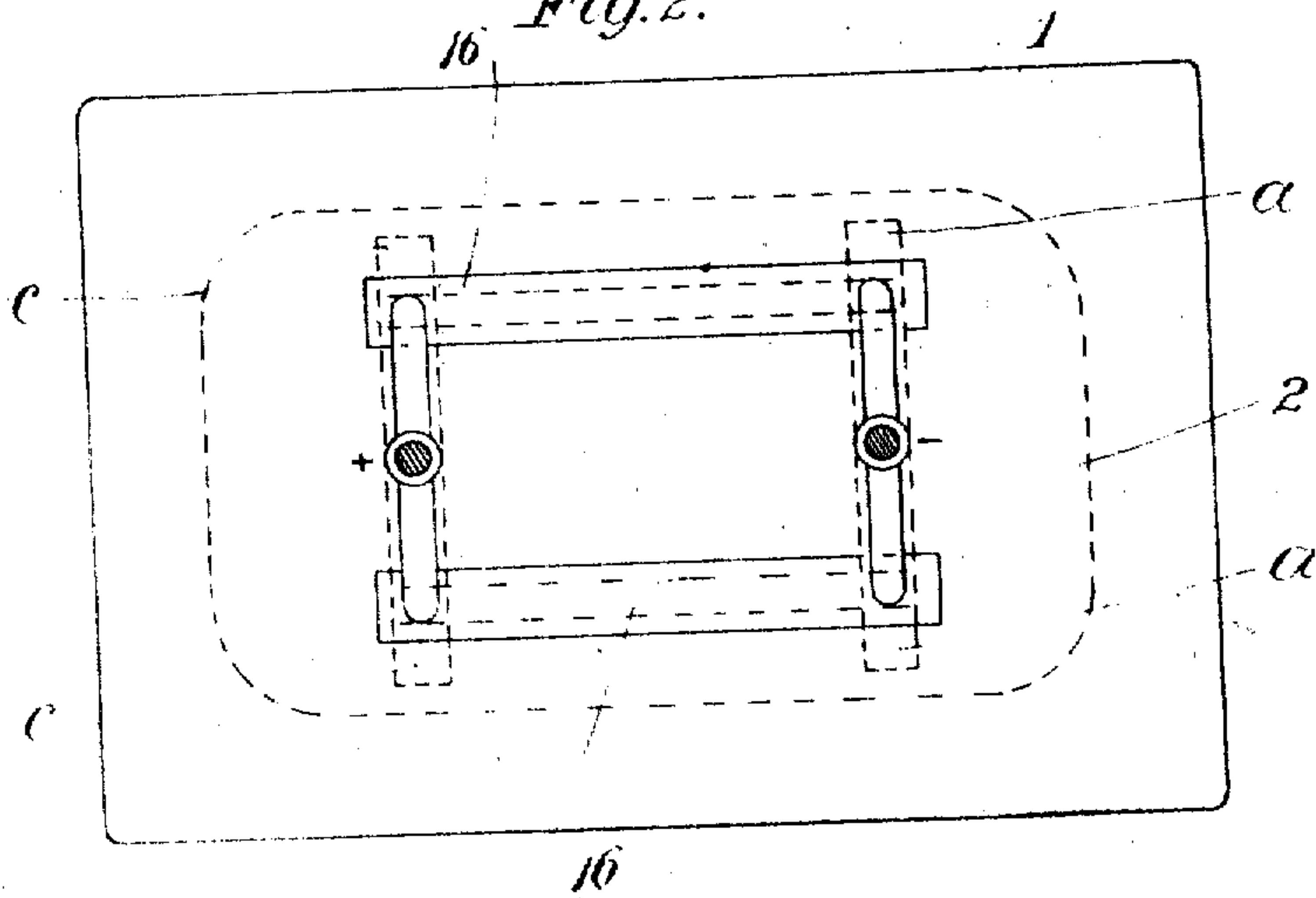


Fig. 2.



Witnesses:
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by
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UNITED STATES PATENT OFFICE.

HANS NATHUSIUS, OF FRIEDENSHÜTTE, NEAR MORGENROTH, GERMANY.

ELECTRICAL FURNACE.

No. 920,078.

Specification of Letters Patent.

Patented April 27, 1909.

Original application filed May 8, 1908, Serial No. 431,158. Divided and this application filed August 25, 1908. Serial No. 450,213.

To all whom it may concern:

Be it known that I, HANS NATHUSIUS, a subject of the King of Prussia, residing and having a post-office address at Friedens-
shütte, near Morgenroth, Germany, have
invented a new and useful Improvement in
Electrical Furnaces; and I do hereby de-
clare the following to be a full, clear, and ex-
act description of the same.

The present application is a division of an
application Ser. No. 431,158, filed 6th May
1908, for Letters Patent of the United
States.

This invention relates to an electric fur-
nace of the kind described in my previous
specification Ser. No. 431,158 of 6th May
1908 which is destined for refining and manu-
facturing steel. As is well known, the
manufacture of good steel depends on a good
and uniform heating of the steel bath and on
the obtainment of a slag which should be as
hot and as fluid as possible and therefore
very suitable for reaction. Existing fur-
naces do not comply with these require-
ments, as on the one hand, owing to the use
of a small melting hearth, the steel bath has
only a small surface of contact with the slag
cover, further the expulsion of gases from
the steel bath takes place only with diffi-
culty and, moreover, in carrying out the
necessary work in the surface of the bath,
such as the frequent removal of the slag by
means of long iron rods, the stirring of the
metal bath by means of wooden or steel bars,
the distribution of the required additions on
the surface of the bath etc., difficulties are
met with, because to enable such work to
be carried out, the electrodes which in the or-
dinary furnaces generally rest only on the
slag cover, must be raised, whereby, while
the work in question is being carried out, the
bath is cooled, as no current is passing
through it. The carrying out of the above
work while the current is passing is however
difficult and complicated, as the tools may
come into contact with the electrodes and
sometimes displace them, and the bath is
liable to get dirty owing to the broken off
pieces of the electrodes falling into it, apart
from the fact that contact with such elec-
trodes is dangerous to the life of the attend-
ants.

The above disadvantages are obviated in
the furnace according to the specification

Ser. No. 431,158 of 6th May 1908 by elec-
trodes of alternate polarity being arranged
on the circumference of the melting hearth,
so that the electric current is forced to pass
through and around the material contained
in the melting hearth.

According to this invention the electrodes
projecting from the top into the furnace, are
guided in parallel slots made in the cover of
the furnace, so that they can be brought
nearer together or farther apart from each
other, whereby the resistance may be in-
creased or reduced, so that accordingly a
greater or smaller heat can be produced.

In the accompanying drawings: Figure 1
shows diagrammatically a construction of
the furnace according to this invention in
vertical section, while Fig. 2 shows the same
construction in plan.

1 is a furnace covered by an arch 2, the
hearth 9 of which is made of some suitable
refractory material 3. In the construction
illustrated, two vertical electrodes *a* and *c*
pass through the arch 2, while into the bot-
tom space of the melting hearth penetrate
the cooled electrodes *d* and *f*. The electrode
a is connected to the negative pole of a suit-
able source of electricity, and the electrode *c*
to the positive pole. The position as re-
gards the two bottom ones is a reversed one,
the electrode *f* being connected to the posi-
tive pole, while the electrode *d* is connected
to the negative pole. Owing to this arrange-
ment of electrodes, the current is forced first
to pass from the upper electrode *a* through
the upper portion of the steel bath to the
electrode *c*. Secondly, from the bottom
electrode *f* to the electrode *d*, whereby the
liquid steel situated at the bottom is also
maintained hot. Moreover, owing to the
current being forced to pass from the elec-
trodes *a* and *c*, to the electrodes *d* and *f* at
the bottom, the bath itself is, so to say, com-
pletely surrounded by electric currents of
suitable heating power.

The electrodes *a* and *c* are preferably not
made of carbon, but of some other material
which, when the furnace is intended for man-
ufacturing steel can be steel, but also some
other material. These electrodes are hollow
in order to enable them to be cooled by cir-
culation of water which may be introduced
through the pipe 4. The bottom electrodes
are for the same purpose hollow and the

means for cooling these electrodes are the same as shown and described in my specification, Ser. No. 431,158 of 6th May 1908.

5 The upper electrodes are made adjustable in suitable slots 16 arranged in the cover 2 of the furnace, in such manner that they can be brought nearer to, or farther apart from each other, whereby the resistance is increased or reduced, so that accordingly a greater or
10 smaller heat can be produced. If the electrodes are made of steel, they can be dipped into the bath itself, when the furnace is intended for refining steel, which is impossible in the case of carbon electrodes as in that way carbon would get into the steel. Finally,
15 the metal or other electrodes do not wear as quickly as carbon electrodes, they are better

conductors and do not cause any impurities in the bath like the latter owing to pieces chipped off etc.

I claim:

In an electric furnace, a hearth, a cover therefor provided with slots, electrodes arranged to be guided by said slots, and additional electrodes to cause electric current to
25 pass through and around material contained in the hearth.

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

HANS NATHUSIUS.

Witnesses:

ERNST KATZ,

ERNST BLEISCH.