

H. H. NOBLE.
ELECTRICAL REDUCTION FURNACE.
APPLICATION FILED JULY 2, 1912.

1,057,082.

Patented Mar. 25, 1913.

Fig. 3.

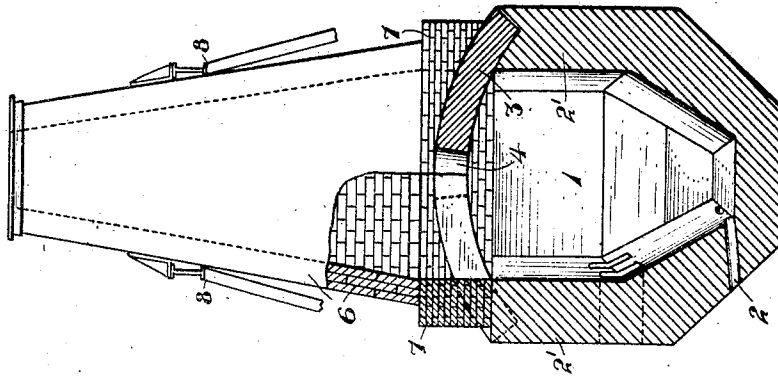


Fig. 1.

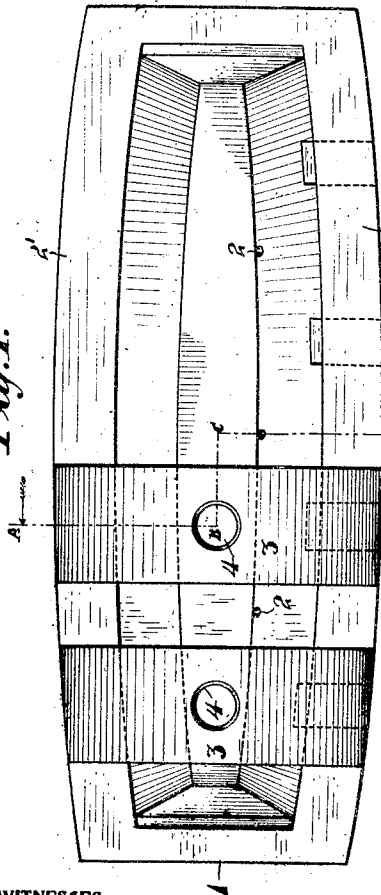
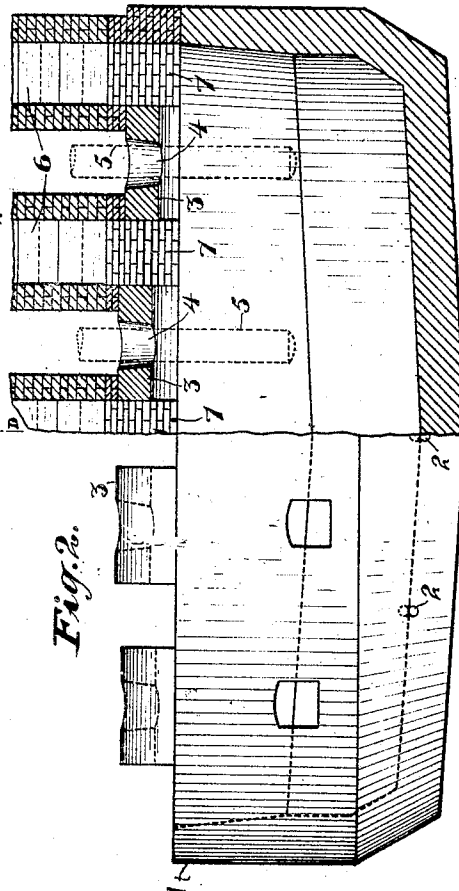


Fig. 2.



WITNESSES

F. C. Griedner
Harry A. Totten

INVENTOR

Hamden H. Noble
BY *M. A. Ocker*
his ATTORNEY

UNITED STATES PATENT OFFICE.

HAMDEN H. NOBLE, OF SAN FRANCISCO, CALIFORNIA.

ELECTRICAL REDUCTION-FURNACE.

1,057,082.

Specification of Letters Patent.

Patented Mar. 25, 1913.

Application filed July 2, 1912. Serial No. 707,160.

To all whom it may concern:

Be it known that I, HAMDEN H. NOBLE, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Electrical Reduction-Furnaces, of which the following is a specification.

The hereinafter described invention relates to improvements in electrical smelting or reduction furnace construction, and more particularly to a feed stack construction by the employment of which the highly heated generated expanded gases are quickly removed from the crucible thereof, thus maintaining cool the arch of the furnace and by so doing simplifying the operation of the furnace and preserving the arch of the crucible.

Heretofore electrical smelting and reduction furnaces have been constructed with a plurality of stacks supported above the roof and arranged in alinement in the longitudinal center thereof, and it has been the practice in reducing ores to permit the highly heated generated expanding gases from the crucible to rise through the material in the feed stacks which necessitated the feeding of the ore in comparatively large particles to the crucible to permit of interstices between the bodies thereof through which the gases were permitted to slowly rise. In this construction of stack, the ore as fed into the crucible did not completely fill the same, but left pockets adjacent the roof and arch thereof which confined the heated expanding generated gases immediately below the arch and crucible roof and the heat from the pocketed gases destroyed the same in a very short time, necessitating their replacement, which entails a great expense and considerable loss of time in the operation of the furnace.

The principal object of my invention is to construct the arch and feed stacks of a reduction furnace in such a manner that the roof is dispensed with and the highly heated generated expanding gases which ordinarily collect adjacent the zone of the arch or roof of the furnace, will, after being generated, freely rise through the feed stack, and by so doing freeing the arch or roof of the furnace from the injurious effect of the heated gases thereon and thereby materially prolonging the life of the furnace arch or roof.

Another object is to provide a feed stack

and roof construction which will permit of the crucible being fed with ore to its full capacity, thereby preventing the formation of gas accumulation pockets adjacent the arch or roof of the furnace.

The invention consists in providing a reduction furnace having the usual crucible covers through which the heating electrodes project, with ore feed stacks having approximately straight side walls and downwardly and outwardly diverging end walls, the side walls springing from the edges of the arch covers and the end walls being connected with the side walls of the crucible, thus forming stacks having a contracted mouth or feed opening and a discharge end of a width equal to that of the crucible, the enlarged end of the stack readily permitting of the escape of the gases from the full width of the crucible; and the wall construction of the stack being such as to prevent the descending ore clinging to the interior wall surface thereof.

To more fully comprehend the invention reference should be had to the accompanying drawing showing a completely constructed device for carrying out my invention, wherein,

Figure 1 is a top plan view of my improved furnace construction, disclosing the crucible arches on which the side walls of the stacks are adapted to rest, and the openings in the arches through which the electrodes enter, the stacks not being disclosed. Fig. 2 is a side elevation, partly in section, disclosing the crucible arches, and the feed stacks interposed between certain of the arches, with their side walls resting on said arches, and certain other of said arches before the stacks are built between the same. Fig. 3 is broken sectional view taken on lines A—B—C—D of Fig. 1, disclosing the shape of the end walls of the stack and the manner of mounting the same.

Referring more particularly to the drawings, the reference numeral 1 designates the crucible of a long and narrow type of furnace provided with the usual tap holes 2 through which the molten products are removed.

Resting on the top of the side walls 2' of the crucible and extending to the outer edges thereof are the spaced arched covers 3 provided in their centers with an opening 4 through which extend the heating electrodes 5, disclosed in dotted lines, the electrodes

receiving their power from any suitable source, and supported in position in any well known manner.

The ore to be treated is fed into the crucible through suitable feed stacks constructed of any suitable material and having a refractory lining, and formed with outwardly and downwardly diverging end walls 6 connected by base blocks 7 to the upper edge of the crucible side walls 2', and formed with approximately straight side walls 7, the lower ends of which are united to the side edges of the arched covers 3, and the weight of the stack being removed from the furnace by means of the supporting frame 8.

From the above construction it will be observed that a feed stack has been provided which extends the full width of the crucible and that the gases rising from the crucible will find ready access through the stack, and will not be confined in the crucible as in the previously constructed furnaces. It will also be observed that by providing a furnace with the above type of feed stack that the ore will be uniformly fed and distributed into the crucible for the full width thereof, and the ore when fed into the crucible will fill the same to the top thereof and gas pockets will not be formed between the ore and the furnace arch as is the case with the furnaces now in use.

It will be noted that the lower end of the stacks for the furnace extend from a point above that from which the arch covers 3

spring relative to the side walls 2' and that the said stacks entirely close the transverse spaces between the arch covers, the stacks and arch covers constituting the inclosing cover for the crucible of the furnace. The roof ordinarily employed for the furnace being dispensed with in the present case, thus overcoming the breaking down of the furnace which exists where the roof for the crucible is subjected to and weakened by the action of the highly heated expanded gases confined thereunder.

Having thus described the invention what is claimed as new and desired to be protected by Letters Patent is—

In an electrical reduction furnace, the combination with the side walls thereof, of a plurality of transversely disposed spaced arch covers supported by the side walls of the furnace, an outlet stack having its end walls united to the side walls of the furnace by base blocks located intermediate the ends of the arch covers, the side walls of said stack being connected to the arch covers of the furnace, the said arch covers being provided with openings through which the electrodes for the furnace enter into the crucible.

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

HAMDEN H. NOBLE.

Witnesses:

C. B. MORGAN,

F. B. LONGLEY.