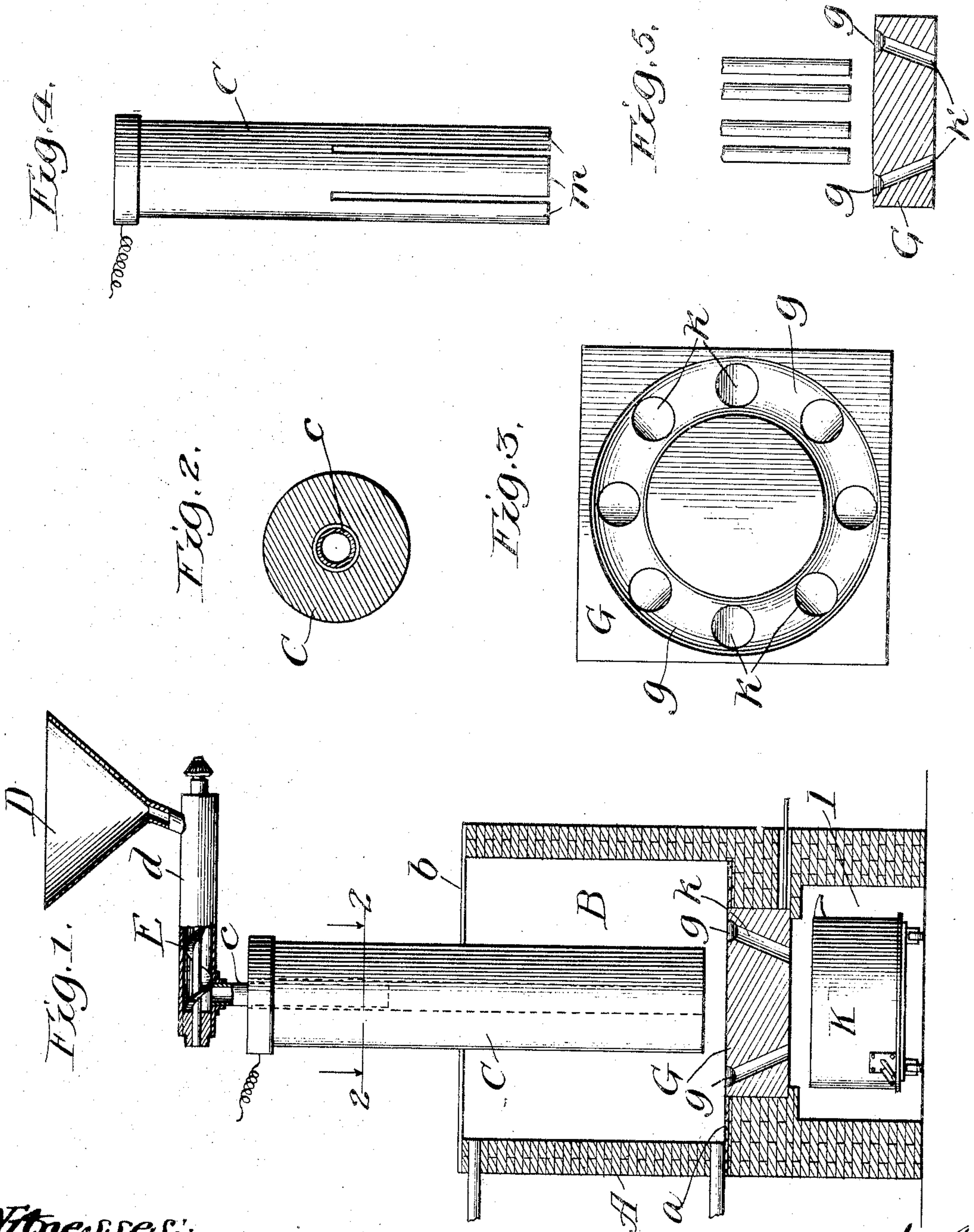


No. 873,890.

PATENTED DEC. 17, 1907.

W. R. PARKS.  
ELECTRIC SMELTING FURNACE.  
APPLICATION FILED APR. 11, 1907.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

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## ELECTRIC SMELTING-FURNACE.

No. 873,890.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed April 11, 1907. Serial No. 367,527.

*To all whom it may concern:*

Be it known that I, WILLIAM R. PARKS, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric Smelting-Furnaces, of which the following is a full, clear, and exact specification.

My invention relates particularly to the relative construction of the electrodes of an electric furnace and more especially to the peculiar formation of the negative electrode thereof and its object is to enable an electrode furnace to be utilized for smelting ores by providing a continuous feed to the region between the electrodes where the lines of electric energy are so disposed as to thoroughly melt and separate the metal from the earthy minerals, and by providing a means of escape of the molten metal from the negative electrode to the fore-hearth. This I accomplish by the means hereinafter fully described and as particularly pointed out in the claims.

In the drawings:—Figure 1 is a vertical central section through an electric smelting furnace embodying my invention. Fig. 2 is a transverse section of the upper electrode taken on dotted line 2, 2, Fig. 1. Fig. 3 is a plan view of the lower electrode. Fig. 4 illustrates a modified form of a positive electrode capable of use in my invention, and, Fig. 5 illustrates yet another modification of the same.

In the drawings A represents a furnace comprising a structure having heavy brick sides; a hearth *a* made very thick centrally below the combustion-chamber B of the same, and a suitable top or roof *b* for the furnace consisting of metallic plate, the margins of which rest upon the side-walls of the furnace.

Projecting centrally down through a suitable opening in the top or roof *b* is a longitudinally adjustable vertical tubular positive electrode C, which is adjustably supported in any suitable manner so as to bring its lower terminal within operative distance of the lower electrode. The positive wire may be secured to the upper end of electrode C in any suitable manner. I prefer, however, to provide the same with a metallic band with which said positive wire may be connected.

In order to supply the materials to be treated to the space between the upper and

lower electrodes, I provide a suitable hopper D above the plane of the upper end of said positive electrode into which the ore to be smelted is dumped. From this hopper the ore gravitates into a horizontally disposed trough or conduit *d* where, by means of a revolving spiral conveyer E the ore is conveyed to a vertical feed-pipe *c* depending from the other end of said trough down into the bore of the said positive electrode. The column of ore fed through this pipe into the bore of the said electrode C, gravitates onto the lower electrode and its base spreads out in every direction between the same and the lower terminal of said upper electrode.

The lower electrode G consists of a square or other suitable shaped slab of carbon or other suitable material, which is, preferably, set into the floor of the combustion chamber B until its upper surface is on the same plane thereof. In its upper surface a gutter *g* is made which is, preferably, circular and concentric with the axis of the superimposed positive tubular electrode. The molten ore, which is melted between the electrodes flows into this gutter while the furnace is in active operation, and is free to drain from said gutter through one or several downwardly extending drain-openings *k* into a fore-hearth K which is removably placed in the tunnel or pit I made in the base of the furnace centrally below said lower electrode. The drain-openings extend clear through the negative electrode and, preferably, are inclined inwards from said gutter towards the center of the electrode so as to converge the discharge therefrom. The number of these drain openings is immaterial so long as they are sufficient to carry off the molten metal and slag fast enough to prevent their clogging up the furnace above the lower electrode and short circuiting the current. The gutter might also be of such depth and disposition to accomplish this result, due regard being had for the height of the area inclosed by the same, between which and the circular lower terminal of the positive electrode the lines of electric force extend.

If desired the upper electrode C may have its lower end provided with several equidistant longitudinal slits, so as to provide said upper electrode with several lower terminals *m, m, m*, as shown in Fig. 4. Instead, however, of a tubular positive electrode, I consider it within the scope of my invention



to provide several independent positive electrodes, substantially as shown in Fig. 5. In this case I prefer to have the arcing terminals of said positive electrodes arranged concentric with the center of the negative electrode.

I am aware that the lower or negative electrode of an electric furnace has sometimes been made with a slight depression in its center, or dished out to form a suitable receptacle for the molten metal. My invention, however, appertains to the forming of a gutter in said negative electrode to direct the flow of the molten metal to the series of which are arranged concentric to the axis of the upper or positive electrode.

What I claim as new is:—

1. In an electric furnace, the combination with a positive electrode, a negative electrode having a circular gutter in its upper surface concentric with the axis of said positive electrode, and having drains leading from said gutter arranged equi-distant from the center of said gutter.

2. In an electric furnace, the combination with a tubular positive electrode, of a negative electrode having a circular gutter in its upper surface concentric with the axis of said positive electrode, and having drains leading from said gutter arranged equi-distant from the center of said gutter.

3. In an electric furnace, the combination with a tubular positive electrode, of a negative electrode having a circular gutter in its upper surface concentric with the axis of said positive electrode and having a series of drains leading from said gutter arranged equi-distant from the center of said gutter.

4. In an electric furnace, the combination with a tubular positive electrode, of a negative electrode having a circular gutter in its upper surface concentric with the axis of said positive electrode, and having a series of drains leading from said gutter the lower openings of which converge toward the axis of said negative electrode.

5. In an electric furnace, the combination with a positive electrode, of a negative electrode having a circular gutter in its upper

surface concentric with the axis of said positive electrode, and having a series of drains leading from said gutter the lower openings of which converge toward the axis of said negative electrode.

6. In an electric furnace, the combination with a tubular positive electrode, of a negative electrode having a circular gutter in its upper surface concentric with but of greater diameter than said positive electrode and having drains leading from said gutter.

7. In an electric furnace, the combination with a tubular positive electrode, of a negative electrode having a circular gutter in its upper surface concentric with but of greater diameter than said positive electrode and having a series of drains leading from said gutter.

8. In an electric furnace, the combination with a tubular positive electrode, of a negative electrode having a circular gutter in its upper surface concentric with but of greater diameter than said positive electrode and having a series of drains leading from said gutter the lower openings of which converge toward the axis of said negative electrode.

9. The combination in an electric furnace with a tubular positive electrode having a series of terminals at its arcing end, of a negative electrode having a circular gutter in its upper surface concentric with the axis of said positive electrode, and having a series of drains leading from said gutter.

10. The combination in an electric furnace with a tubular electrode having a series of terminals at its arcing end, a negative electrode having a circular gutter in its upper surface concentric with but greater in diameter than said positive electrode and having a series of drains leading from said gutter the lower openings of which converge toward the axis of said negative electrode.

In testimony whereof I have hereunto set my hand this fifth day of April, A. D., 1907.

WILLIAM R. PARKS.

Witnesses:

KIRSTEN NIELSEN,  
MINERVA EGAN.