A. S. DWIGHT.

APPARATUS FOR ROASTING AND SINTERING ORES.

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1,102,982. Patented July 7, 1914.

Fig. 1.

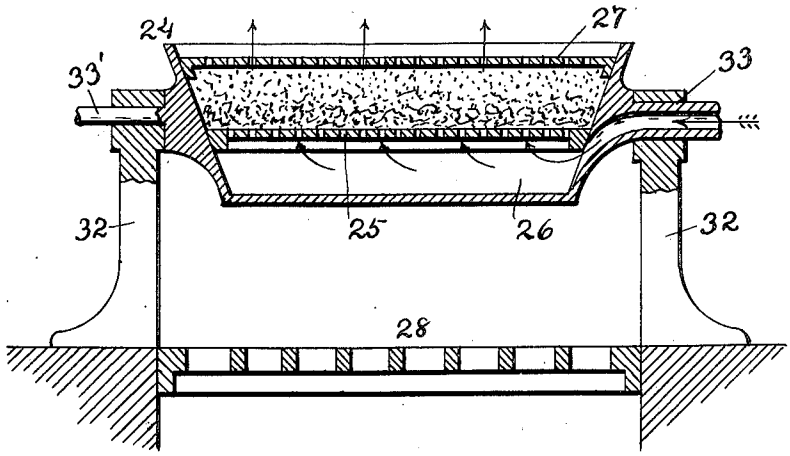
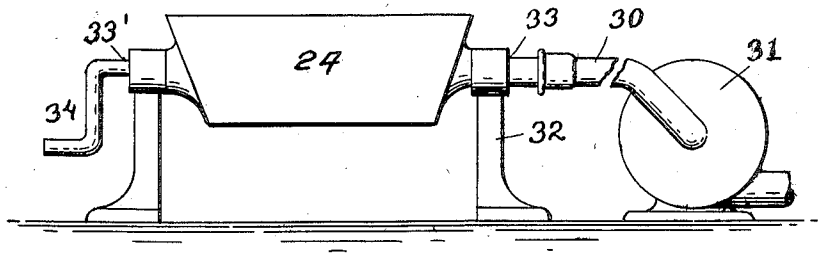


Fig. 2.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR ROASTING AND SINTERING ORES.

1,102,982. Specification of Letters Patent. Patented July 7, 1914.

Original application filed April 17, 1907, Serial No. 368,675. Divided and this application filed February 2, 1910. Serial No. 541,506.

To all whom it may concern:

Be it known that I, ARTHUR S. DWIGHT, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus for Roasting and Sintering Ores, of which the following is a specification, reference being had therein to the accompanying drawing.

The invention described in this case (which is a division of application No. 368,675, filed by me on the 17th day of April, 1907, and renewed January 21, 1910) relates to improvements in apparatus for treating metal bearing substances that are, initially, in a finely subdivided condition, particularly ores of the metal sulfid class, the apparatus being well adapted for carrying out the process which is presented in Patents, Nos. 882,517 and 882,518, issued on the 17th day of March, 1908, jointly to myself and Richard L. Lloyd. In the said patents were illustrated and described a number of devices for supporting and transporting masses of ore to be treated, and for conducting the treatment in such manner that an agglomerating or sintering of the ore could be obtained more thoroughly and completely than had been obtained by any apparatus or process heretofore known to us.

In the accompanying drawings, Figure 1 is a sectional view of a receptacle embodying my present invention for holding the ore while being treated for the purpose of desulfurizing and sintering or agglomerating its particles. Fig. 2 is an end elevation of an apparatus in which the holder shown in Fig. 1 constitutes an element.

In the drawings, I have shown an apparatus embodying my improvements which is, it is to be understood, typical in character, and in respect to which I may make numerous modifications without departing from the essential features of the invention.

In the treatment of ores according to the process described in the before-mentioned patents, it is of practical importance that the resulting product should be in a condition to be easily handled for subsequent treatment, as in the blast furnace, and I have found that the most desirable form and condition for the sintered product is a relatively thin cake or biscuit of sintered or agglomerated ore, porous in character and easily broken in pieces convenient for handling. It is also of practical importance to construct the apparatus so that it not only insures that the sintered ore shall be in the form described, but that the finished product may be easily and quickly removed from the apparatus after the sintering process is completed.

The apparatus which constitutes the subject matter of the invention presented in this case, secures the desirable results above specified.

Referring to the drawings 24 designates an ore receptacle or holder which is in the form of a relatively shallow tray or pan. The side walls of this receptacle are preferably inclined, flaring outward toward the top, to facilitate the discharge of the sintered ore product when the receptacle is inverted.

25 designates a perforated partition parallel with the bottom of the receptacle, and dividing the latter into two parts, a lower chamber 26, and a chamber or portion above the grate for containing the mass of ore which rests upon the grate. The chamber 26 is an air chamber and has communicating with it a duct 30 leading to some air forcing apparatus, such as is typified by the fan 31, which serves to induce currents of air or other combustion supporting gaseous medium to pass through the ore mass supported upon the grate and cause an active combustion to take place within the ore mass, in the manner now well known in this art and fully described in the patents already referred to. The direction in which the air passes through the grate and the body of ore supported thereon may be either upward or downward, there being advantages incident to each direction of air movement. When a pressure system of air supply is employed, the air is forced by the fan into the chamber 26 and passes upward through the mass of ore and out at the top of the holder where the products of combustion may escape into the surrounding atmosphere or be collected and led away, as found most practical. When the direction of air movement is as just described, it is found desirable to employ some restraining device, such as a perforated plate 27, for holding the particles of ore of the mass being treated, in a quiescent state. This restraining plate is dis-

tinct from the holder 24 and is preferably shaped to fit the latter at the proper distance below its upper rim or edge as indicated in Fig. 1 for which purpose it may be flanged at its edges as represented. It will of course be removed from the holder before the sintered ore is discharged. The advantages and importance of thus restraining the ore are pointed out in the aforesaid patents, and need not be repeated in this case.

The holder 24 is represented as being provided with a pair of trunnions 33, 33′, mounted in standards or supports 32 in such way that the receptacle or holder may be tilted for discharging the mass of ore after it has been properly sintered. I have represented a grizzly 28, arranged below the receptacle 24 and adapted to receive and break up the cake of sintered material as it is discharged. This grizzly serves as a screen or sifter allowing any fine or unsintered ore to pass through while retaining the larger pieces of sintered ore that are in size and condition suitable for further metallurgical treatment.

In the apparatus herein described when used as represented in Fig. 1, that is, with an updraft through the body of material being treated, such material may be ignited in any well known manner as by placing upon the partition or grate 25 a small amount of already ignited and burning ore, or of burning coke or coal, and then spreading the material to be treated thereon, and starting the draft as is common in roasting and sintering ores, especially when using the well known Huntington and Heberlein pots or containers.

In the embodiment of my invention herein illustrated, the tilting receptacle 24 is represented as being supported in stationary standards, 32, although their being stationary is not a feature essential to my invention. I have represented the trunnion 33′ as being provided with a crank handle 34 by which the ore holder may be tipped. This means of controlling the movements of the receptacle is merely shown as typical of devices for controlling the movements of the holder for discharging it and for bringing it again into position for use. The trunnion 33 is represented as being hollow and communicating on one side with the air chamber 26 below the grate, and on the other side with the conduit 30 leading to the fan 31. By this arrangement the air connections are not broken or interfered with when the receptacle is tilted to discharge the ore.

In the treating of ore as herein described wherein a restrained ore mass is uniformly sintered from surface to surface, it is found that parts of the sintered mass will extend more or less into the perforations in the grate or perforated partition 25 upon which the ore mass rests, thus uniting the sinter cake thereto; and it is often a matter of some difficulty to remove such sintered mass, especially when, as in the apparatus herein illustrated, the holder has side walls. But by supporting the said holder so that it may be tilted or inverted, as shown and described herein, it is easily possible to remove the sinter cake from the holder and at the same time to clear the grate surface on which it rested from the small protruding masses of sintered material which may have entered the perforations therein.

What I claim is:

1. In an apparatus for roasting or sintering ore, a holder or receptacle for the ore, having an open top and a perforated support upon which the ore rests, said holder being supported so it may be tilted for discharging, in combination with a perforated restraining device flanged at its edges and arranged to rest upon the top of the ore mass in the holder, and means for causing air to pass upward through the perforated support of the holder and the ore supported thereon, substantially as described.

2. In an apparatus for sintering or agglomerating metalliferous ores, a receptacle for the ore having a bed pervious to air for holding the ore, and a passageway below said bed, whereby air or similar supporter of combustion may be caused to pass through said bed and passageway, and a sifter for the ore after being dumped from said receptacle.

3. In an apparatus for sintering metalliferous ore, a receptacle for the ore having a support pervious to air for holding the ore and a passageway below the support whereby a supporter of combustion may be caused to pass through the passageway and support, the receptacle being invertible to permit dumping of the sintered product, and a screen for the ore in position to receive the ore as it is dumped from the said receptacle.

4. In an apparatus for forming relatively thin cakes of sintered ore from a mass initially containing a metal-bearing material and a combustible, the combination of a holder tiltable about a fixed axis of support and arranged to support a layer or stratum of the said mass, means for causing currents of air to pass transversely through the stratum, and means for positively restraining the ore particles from agitation at that surface of the stratum where the air escapes, the sinter cake being separated from the holder after it is thoroughly sintered by tilting the holder.

5. In an apparatus for forming relatively thin cakes of sintered ore from a mass initially containing a metal-bearing material and a combustible substance, the combination of a tiltable holder having inclosing sides, an open top, and a perforated partition, the said partition being disposed between an

upper chamber adapted to hold a thin layer of the said ore mass, and a lower air or gas chamber, and serving to restrain the lower surface of the said mass which rests thereon, means connected with the said lower chamber for causing currents of air to pass transversely through the layer of the ore mass, and means for positively restraining the particles of the ore mass from agitation at its upper surface.

6. In a sintering apparatus, an open top ore holder relatively widely horizontally extended and shallow, having four upright ore and sinter-confining walls flaring outwardly toward the said open top, and having supporting trunnions on which it can be tilted to discharge the cakes or masses of sinter, means for directing a confined body of air to the surface of the ore which is initially ignited, and means at the opposite surface of the ore permitting the escape of gases of combustion, for restraining the particles of ore from agitation among each other until sintering is completed.

In testimony whereof I affix my signature, in presence of two witnesses.

ARTHUR S. DWIGHT.

Witnesses:

IRENE A. RIVIÈRE,

C. M. STANLEY.