

UNITED STATES PATENT OFFICE

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PYRO-METALLURGICAL PROCESS AND APPARATUS

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My invention relates to pyro-metallurgical apparatus including a smelting furnace, roasters and Cottrells, or other dust-collecting devices, and has for its principal object the arrangement of the Cottrells and roasters in relation to the furnace to provide improved distribution of Cottrell dust, and calcines from the roasters, in such manner that the different materials are properly mixed or averaged, and collected for supply to the furnace.

The invention was developed with especial reference to smelting copper ores, and the apparatus chosen for illustration therefore includes a reverberatory copper matting furnace of any known or suitable design; but the invention is not necessarily limited as to the type of furnace or the character of ore.

In study and experiments directed to increasing the efficiency of smelter plants of this class, I have discovered and demonstrated that improved results and especially a great increase in furnace tonnage with relatively low fuel ratio is obtained by securing a thorough distribution and mixture of the calcines from a plurality of roasters, and also similarly distributing the dust from a plurality of Cottrells or other dust collectors, and associating or mixing it with the calcines so that varying characteristics of the materials, such, for example, as different degrees of oxidation of the iron content in the calcines or Cottrell dust, either or both, may be compensated for by the thorough distribution, mixing or averaging of the different materials, and that further, by practically-continuously charging the mixed material into the furnace at frequent intervals along its length to maintain the charge bank therein at proper maximum, proper slag formation is greatly facilitated, and other improved results obtained, as sufficiently understood by persons skilled in this art.

To these and other ends, the invention, as embodied in an apparatus, comprises a suitable furnace, one or more receiving or storage bins, a plurality of Cottrells, or other dust collectors, and a plurality of roasters located above the furnace at suitable elevations to provide for proper supply and dis-

tribution of the different materials to different locations in the bin or bins, with means for quickly and frequently supplying the material from the bins to the furnace. While in a broader aspect of the invention various means may be provided for securing the proper supply or distribution of the various materials from Cottrells and roasters to the storage bins, gravity flow or supply is preferable for many reasons, and therefore the Cottrells and roasters are at sufficient elevation above the furnace to provide for gravity flow of the materials through conduits under control of valves to the bins, and for the gravity flow of the mixed and "averaged" materials from the bins to the furnace through a plurality of closely-spaced conduits, under the control of valves, so that while the charging of the furnace is actually intermittent the effect is practically that of continuous charging.

Considered as a method, the invention consists, as broadly described, in controllably supplying dust from a plurality of Cottrells and/or calcines from a plurality of roasters, and mixing or averaging the materials, collecting them and then supplying the mixed materials in properly distributed manner to the charge banks in the furnace.

The roasters for each furnace may be arranged in one or two rows; the distributing means or conduits are preferably arranged for supply or distribution of the calcines from each of the roasters to the storage bin or bins, both longitudinally and laterally with respect to the furnace; and for similar supply or distribution of the dust from each of the Cottrells, particularly with respect to the furnace length or length of the charge banks therein; and in a battery of furnaces provision may be made for lateral distribution of the respective materials for supply to one or more adjacent furnaces.

The characteristics and advantages of the invention are further sufficiently explained in connection with the following detail description of the accompanying drawings, which shows one representative embodiment. After considering this example, skilled persons will understand that many variations