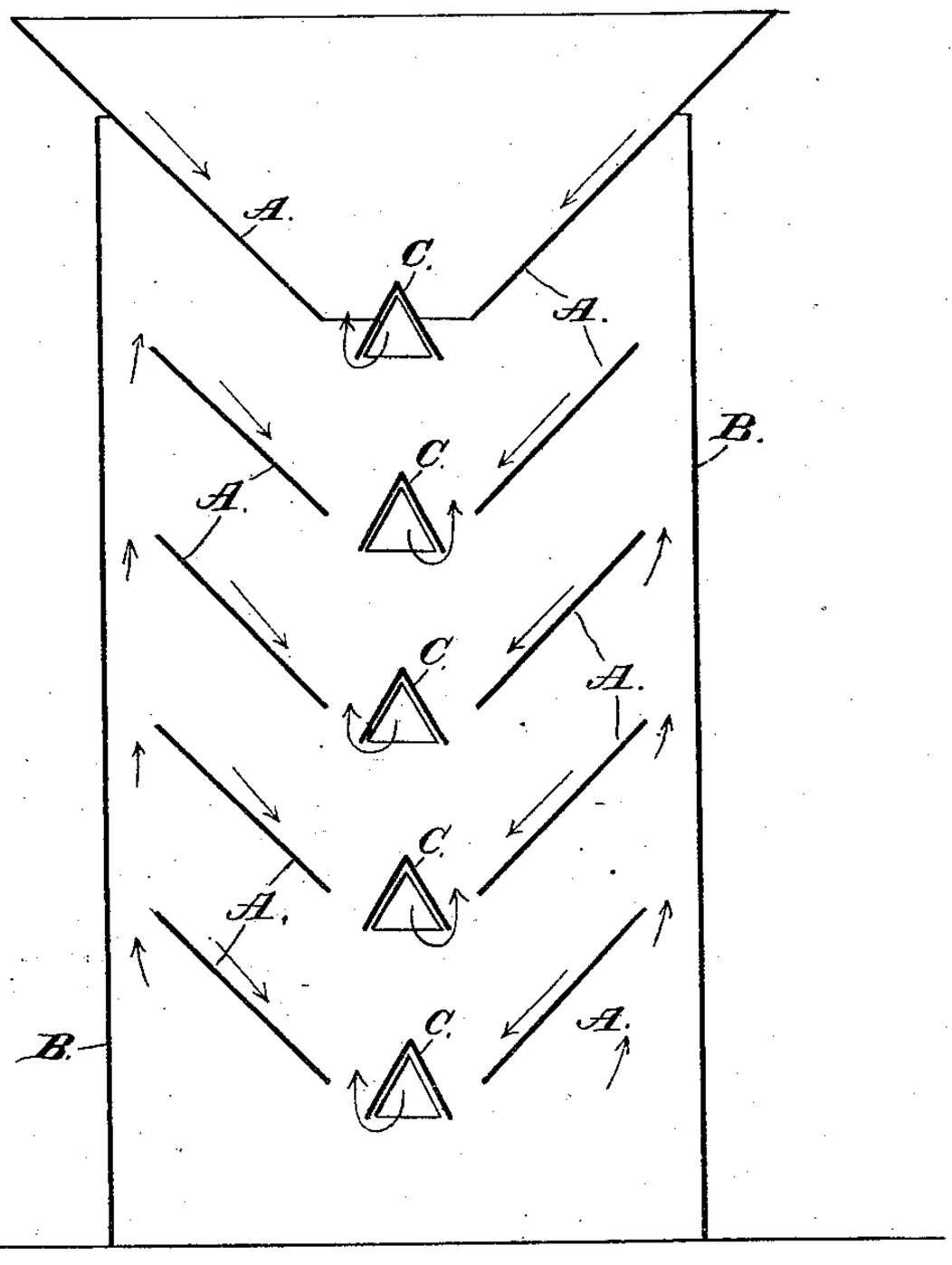
(No Model.)

C. HORNBOSTEL.

APPARATUS FOR ROASTING ORES.

No. 256,569. Patented Apr. 18, 1882.



Witnesses.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR ROASTING ORES.

SPECIFICATION forming part of Letters Patent No. 256,569, dated April 18, 1882.

Application filed June 17, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES HORNBOSTEL, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Apparatus for Roasting Ore and other Material, of which the following is a specification.

This invention relates to certain improvements in furnaces for roasting ores and for other similar purposes, and to an improved method of distributing a mass of ores, minerals, or other small particles through such furnaces in such manner as to cause a constant change in the position of the particles of such masses automatically, whereby the expense of handling is obviated, as more fully hereinafter specified.

The object of my invention is to provide in a roasting or other similar furnace certain means whereby the action of heat, gas, or air upon all parts of the materials under treatment may be insured by constantly exposing new surfaces of such material to the action of the heat, gas, or air, and also to effect the feeding and discharge of the material automatically, as more fully hereinafter set forth. This object I attain by causing the material to continuously descend by its own gravity slowly between suitable supports under such conditions as to be thoroughly subjected to the action of the heat, air, or gas in its course.

The object of changing the position of ores in roasting-furnaces and exposing new surfaces to the action of the heat, air, or gas has heretofore been effected either by spreading the ore over the hearth of the furnace, allowing the heat, gas, or air to pass over the surface of the body of the material, and working said material by hand with suitable rakes, hoes, or other implements, or by means of rotating cylinders kept in continuous motion by means of suitable machinery. The first-mentioned method is tedious, slow, and expensive, and depends materially upon individual care and dexterity. The second involves the use of machinery which is too expensive for general use.

In the accompanying drawing, the figure represents a vertical section of an apparatus such as employed by me in carrying out my invention. It consists of a series of narrow slats or plates, A, which may be constructed of brick, iron, or any other material sufficiently refractory to withstand the action of the heat, gas, or air applied. These slats or plates are arranged longitudinally across the interior of the furnace B, their ends being supported by being embedded in the end walls of the furnace, or secured to suitable upright supports located in the furnace. The said slats or plates are arranged together in pairs, one pair above the other, as indicated in the drawing, the slats or plates of each pair converging toward their lower edges, but not meeting, so as to form a series of open-bottomed angular troughs of any desired number, the upper edges of which do not extend to the sides of the furnace, so as to allow a free and thorough circulation of heat, gas, or air around them and their contents.

In order to more thoroughly subject the ore to the action of the heat, gas, or air, between the lower edges of each trough thus formed is located longitudinally a triangular frame, C, open at its bottom and having its apex upward. The said frames are set in triangular openings at the ends of the furnace, through which heated air or gas may be forced, for the purpose more fully hereinafter specified. The upper trough extends beyond the top of the furnace and forms a feeder for the reception of the material to be treated.

In the operation of my invention the ore or other material is fed into the upper trough, and by its gravity fills the succeeding trough, finally spreading itself out on the hearth of the furnace, which forms the support for the whole column. It will be perceived that by this means a vertical column of ore or other material is so disposed throughout the furnace as to be thoroughly submitted to the action of the heat, air, or gas, and that the particles will be subject to the continual change automatically, as the ores or materials below are withdrawn from the hearth when fully roasted by the replacement of material from above.

The triangular frames interposed between the lower edges of the plates not only serve to distribute the material more uniformly to the successive troughs, but they divide it and subject it more thoroughly to the action of the heat, air, or gases, and by introducing the heat, air, or gases through the triangular openings in which said frames are set, such heat, air, or

gases may be caused to flow under the edges of the frames and permeate the mass of material, and thus add greatly to the efficiency of the furnace.

In setting the troughs in the furnace the distance between the same will depend upon the character of the material to be operated upon. For instance, the specific weight, size, shape, and state of moisture of the mass of material has to be ascertained and taken into consideration, and the position of the slats or plates so regulated that while the material will freely and uniformly descend, it will not pass over the upper edges of the troughs.

Heretofore an apparatus for reducing ores has been invented in which the ore-chamber or interior of the furnace has been divided into a number of chambers by means of vertical partitions, through which extend horizontally a series of shelves in the form of an inverted letter V, which are so arranged that the shelves of each horizontal series will alternate with the shelves directly above and below, all in such manner that the ore introduced at the top of the ore-chamber will be divided in its downward passage, and subjected to heat from a fire-place in the lower part of the apparatus. Such construction and arrangements of parts, however, do not constitute my invention, and are not claimed by me.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a furnace for roasting ores and other materials, the combination of a series of open-bottomed troughs, arranged one above the other, and a series of open-bottom triangular frames located between the lower edges of the troughs, and adapted to receive and distribute air throughout the mass of material, and divide and direct the material to the successive troughs, and finally to the hearth of the furnace, substantially as described.

2. In a roasting-furnace, the herein-described series of open-bottom angular troughs extended across the furnace and arranged to leave air-spaces between their upper edges and the walls of the furnace, in combination with the frame C, arranged between the lower edges of the troughs, and adapted to receive heated air or gas at their ends, and to direct the same through their bottoms into the mass of material, whereby the air or gas will pass through the material and then through the air-spaces, as indicated, and also the material will be directed by said frames to the successive troughs, and finally to the hearth of the furnace, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES HORNBOSTEL.

Witnesses:
FREDK. A. BAKER,
W. O. COLLINS, Jr.