(No Model.)

E. C. ATKINS.

COMBINED ROASTING AND SMELTING FURNACE.

No. 341,988. Patented May 18, 1886.

Fig. 1.

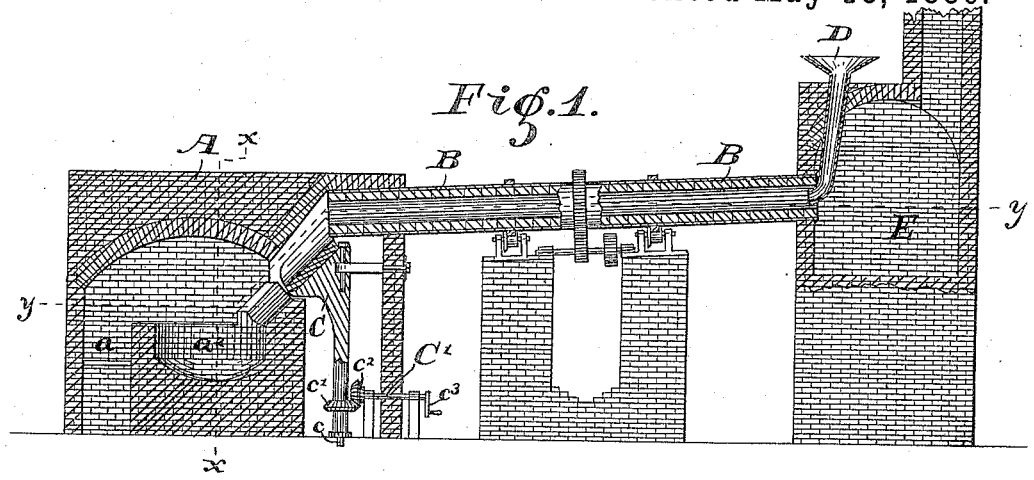


Fig. 2.

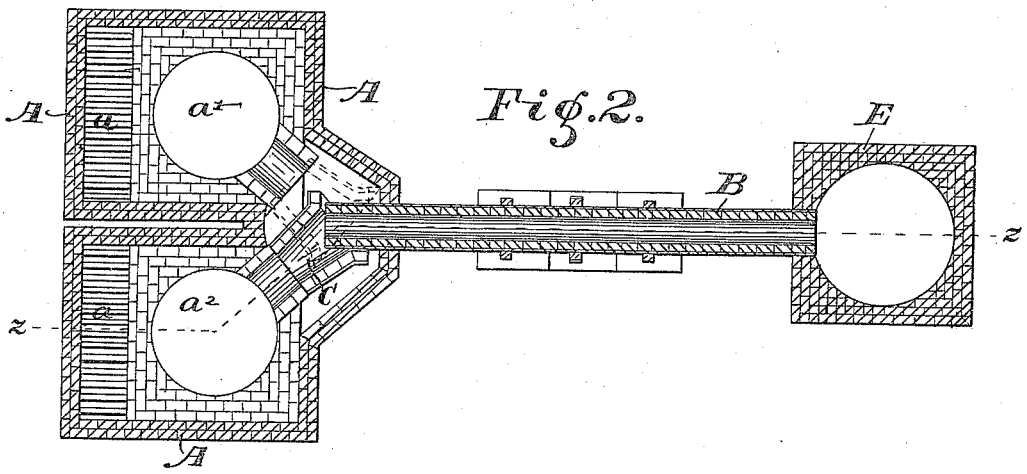
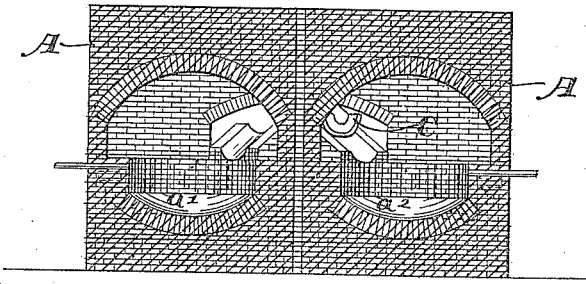


Fig. 3.



WITNESSES.

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ELIAS C. ATKINS, OF INDIANAPOLIS, INDIANA.

COMBINED ROASTING AND SMELTING FURNACE.

SPECIFICATION forming part of Letters Patent No. 341,988, dated May 18, 1886.

Application filed February 27, 1885. Serial No. 157,177. (No model.)

To all whom it may concern:

Be it known that I, ELIAS C. ATKINS, of the city of Indianapolis, county of Marion, and State of Indiana, have invented certain new and useful Improvements in Combined Roasting and Smelting Furnaces, of which the following is a specification.

The object of my said invention is to provide a means whereby a roasting and smelting furnace can be kept in continual operation and at the same time do its smelting perfectly.

Heretofore one of the disadvantages attendant upon the use of this kind of furnaces has been that the ore and slag has had to be run off before being perfectly smelted, and a considerable amount in value of the precious metal has been retained in and run off with the slag and thus lost.

By my invention, which consists in providing duplicate smelting-furnaces, in connection with a single roasting or desulphurizing furnace and an adjustable spout for changing the flow of ore from the latter from one to the other of the former at will, I obviate this disadvantage, as will be hereinafter more fully described.

Referring to the accompanying drawings, which are made a part hereof, and on which similar letters of reference indicate similar parts, Figure 1 is a longitudinal vertical section, on the dotted line *z z* in Fig. 2, of a furnace embodying my invention; Fig. 2, a horizontal sectional view looking downwardly from the dotted line *y y* in Fig. 1, and Fig. 3 a transverse vertical sectional view looking to the right from the dotted line *x x* in Fig. 1.

In said drawings the portions marked A represent the masonry inclosing the fire-spaces and smelting-hearths or crucibles of my improved combination furnace; B, the revolving roasting and desulphurizing furnace; C, the adjustable spout leading from the roasting-furnace to one or the other of the smelting-hearths or crucibles; D, the hopper leading into the roasting-furnace, and E the base of the smoke-stack.

The masonry A may be made to include two or more smelting hearths or crucibles, two, $a' a^2$, being shown. These smelting-hearths are so arranged in relation to the roasting-furnace and the adjustable spout leading therefrom that said roasting-furnace may, by means of said adjustable spout, discharge into either, as may be desired. Each smelting-hearth has in connection therewith a separate fire-space, *a*, both of said fire-spaces being arranged to discharge into the roasting-furnace. The masonry is so built over these fire-spaces and the smelting-hearths as to make a reverberatory furnace, thus insuring that the flames will shoot down upon the molten metal in the smelting-hearth, and thus act effectively upon it.

The roasting-furnace B is of the ordinary and well-known form, which consists of a long cylinder suitably mounted and provided with mechanism for keeping it in motion.

The spout C is mounted on the pivot-shaft *c*, centrally below the lower or discharging end of the roasting-furnace, and is adapted to receive the roasted ore as it comes from said furnace and convey it to one or the other of the smelting-hearths. It may be operated by means of two miter gear-wheels, $c' c^2$, and the shaft C' and crank c^3, or in any other desired manner.

The hopper D and smoke-stack base E are or may be of the ordinary or any desired construction, and, as they do not constitute any part of this present invention, will not be further described herein.

The operation of my said invention may be briefly recapitulated, as follows: The ore is first introduced into the roasting or desulphurizing furnace B through the hopper D, and during its passage down said furnace is roasted and freed from sulphur, arsenic, and such like substances in the usual manner, the sulphurous and arsenical fumes passing off into the smoke-stack, as is common, said furnace being rotated by suitable gears and shafts in the ordinary manner. The ore when it reaches the discharging end falls into the spout C, which is arranged to lead to one of the smelting-hearths and conveys it thereto. When one smelting-hearth, a', is full, the spout is moved by means of the gear described or otherwise around, so as to lead into the other smelting-hearth, a^2. While the second smelting-hearth, a^2, is being filled, the products of combustion from the fire-space, in connection with the first, a', are constantly acting upon the metal therein contained, and not being required to act upon a new supply of ore continually, as is the case where there is but one smelting-hearth, smelts

the ore much more thoroughly and effectively than in the last-mentioned case, and thus permits the precious metal to be more thoroughly separated from the slag and be precipitated to the bottom of the smelting-hearth. When the smelting is fully completed, the slag is drawn off through the tap leading from near the top of the smelting-hearth, and the metal is drawn off from the siphon or tap leading from near its bottom, (see Fig. 3,) and the spout C is moved back, so as to again discharge into this smelting-hearth a'. While it is being filled the process just described is going on in connection with the second smelting-hearth, a^2, and so on, as long as the furnace is kept in operation, the smelting-hearths being discharged into alternately. By this means the slag is much more effectively separated from the metal, and the waste is consequently much less than where a single smelting-hearth only is used.

As will be readily understood, there may be, instead of the two smelting-hearths shown, three or more employed, if desired, it being only necessary to follow the described arrangement to produce the required result with any number; but I do not desire to be understood as claiming a spout or conduit which is removable, and thus adapted to conduct from separated furnaces or points to others, but only such as are adjustable, and thus adapted to conduct from one furnace or point to either of two or more others.

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

1. The combination of two or more smelting-furnaces, a roasting-furnace, and an adjustable spout adapted to lead from the discharge of said roasting-furnace to either of said smelting-furnaces.

2. The combination of two or more smelting-furnaces, a revolving roasting-furnace, and an adjustable spout pivoted centrally below the discharging end of said roasting-furnace, and means for moving said spout on its pivot, whereby it is rendered capable of discharging into either of said smelting-furnaces.

3. The combination of the furnace A, having fire-spaces a a, smelting-hearths a' a^2, the revolving roasting-furnace B, adjustable spout C, mounted on pivot-shaft c, having gear c', and a shaft, C′, having corresponding gear c^2, and a crank, c^3.

4. The combination of two or more smelting-furnaces, a roasting-furnace, and an adjustable spout, the upper end of which is arranged to receive the ore as it comes from the roasting-furnace, and which may be adjusted so that its lower end shall discharge into either of the smelting-furnaces.

5. The combination of two or more smelting-furnaces, a roasting-furnace, an adjustable spout arranged below the discharging end of the roasting-furnace, and means for moving said spout, whereby it may be caused to discharge into either of the smelting-furnaces.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 17th day of February, A. D. 1885.

ELIAS C. ATKINS. [L. S.]

Witnesses:

C. BRADFORD,

CHAS. L. THURBER.