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FUME ARRESTER.

APPLICATION FILED MAY 31, 1911.

1,031,089.

Patented July 2, 1912.

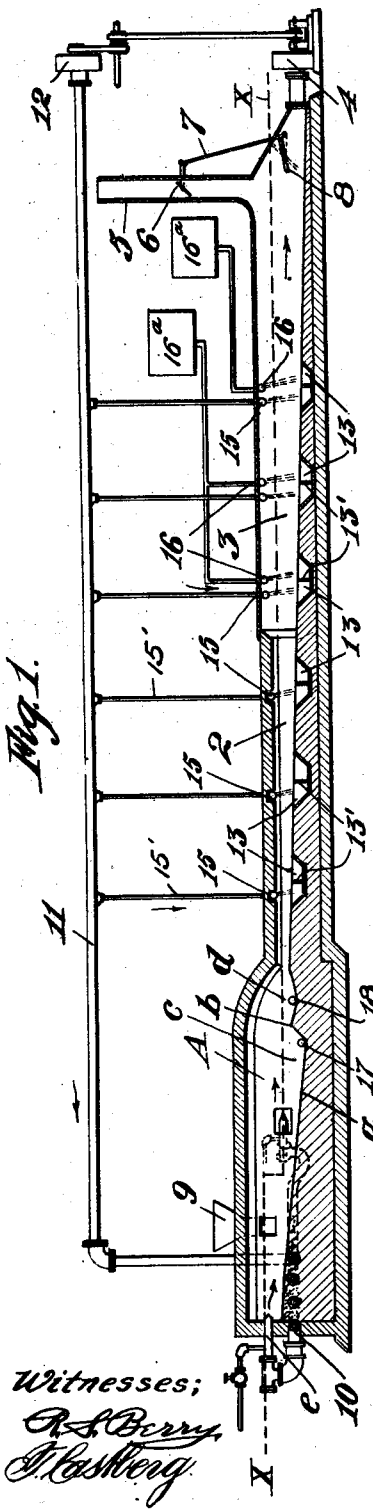

Fig. 1.

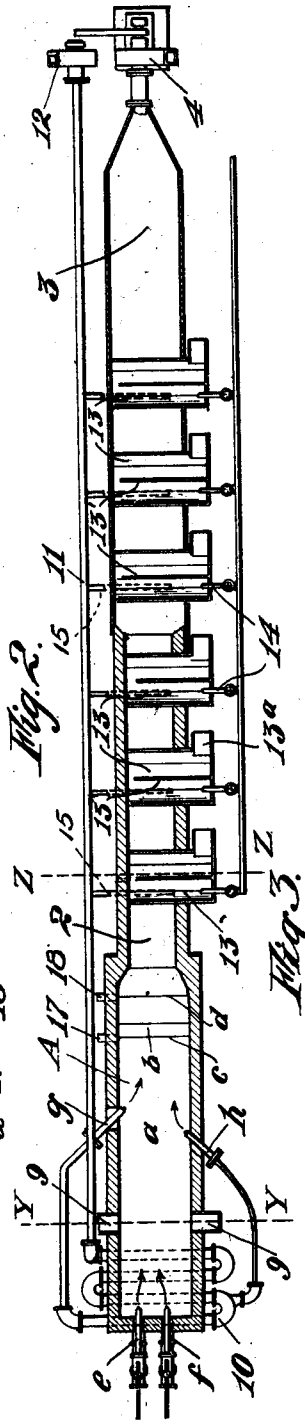

Fig. 2.

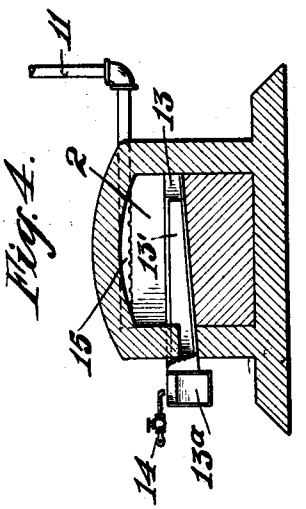

Fig. 4.

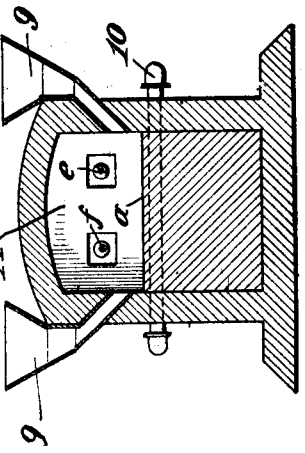

Fig. 3.

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UNITED STATES PATENT OFFICE.

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FUME-ARRESTER.

1,031,089. Specification of Letters Patent. Patented July 2, 1912.

Application filed May 31, 1911. Serial No. 630,322.

To all whom it may concern:

Be it known that we, LORENZO D. ROYCE, residing at Oakland, Alameda county, California, and LOUIS WALLERSTEIN, of the city and county of San Francisco, California, both citizens of the United States, have invented new and useful Improvements in Fume-Arresters, of which the following is a specification.

This invention relates to a smelting furnace and particularly pertains to certain details of construction therein by means of which the smoke and fumes generated in the furnace may be condensed and mineral particles separated therefrom.

It is the object of this invention to provide a smelting furnace of the above character which is simple in construction and efficient in operation.

Further objects will become apparent in the following description.

The invention consists of the parts and the construction and combination of parts, as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of the invention. Fig. 2 is a horizontal section on the line X—X, Fig. 1. Fig. 3 is a cross section on lines Y—Y, Fig. 2. Fig. 4 is a cross section on lines Z—Z, Fig. 2.

In the drawings we have shown the smelting furnace as consisting of an elongated horizontally disposed chamber A, the walls of which are constructed of brick work in any suitable manner.

The bottom of the chamber A slopes downward from its forward end to a point near its rear end, as indicated at *a*, then rises a short distance at an angle, as indicated at *b*, to form a depression *c* in the bottom of the chamber, and again slopes downwardly and upwardly from the elevated portion *b* to form a second depression *d* a short distance rearward of the depression *c*; the depression *d* being shallower than the depression *c*, as shown. The rear end of the chamber A opens at a point adjacent to the depression *d*, to a gradually diverging horizontally disposed stack 2, which is formed of brick-work in any suitable manner, and of a length approximately equal that of the chamber A. The stack 2 opens at its outer end to an enlarged horizontally disposed passage 3 which forms a continuation of the stack 2 and extends a considerable distance therefrom. The outer end of the passage 3 opens to a suction fan 4 of any suitable description by means of which a suction draft may be created through the chamber A, passage 3 and stack 2, as later described. An auxiliary vertically disposed stack 5 leads from the stack 3 at a point adjacent to its outer end, and mounted in the stack 5 is a damper 6 which is connected by a rod 7 to a similar damper 8 near the outer end of the passage 3. The dampers 6 and 8 are adapted to be actuated by means of the rod 7 in such manner as to close one damper and open the other simultaneously.

The ores to be smelted are delivered to the interior of the chamber A through a pair of feed hoppers 9—9, disposed on opposite sides of the chamber A a short distance from its forward end. The smelting of the ores delivered from the feed hoppers 9—9 is accomplished by means of a series of low pressure oil burners, in this case four in number, and indicated at *e—f—g—h;* the burners *e—f* being disposed in the forward end of the chamber A, while the burners *g—h* extend through the opposite side of the chamber, as shown in Fig. 2; the burners *g—h* being staggered in relation to each other.

It is manifest that while we have shown the burners as consisting of four in number, that as many more or less may be employed as the occasion may require. These burners are necessarily of a peculiar type in order to accomplish the results desired, which type of burner is fully disclosed in the Patent #633,761 issued to August Johnson under date of September 26, 1899. The air supplied these burners is delivered through a pipe 10, which is passed a number of times through the retort A beneath the bottom thereof at a point near its forward end, so that the air passing through the pipe 10 will be heated before being delivered to the burners. The upper face of the pipe 10 is approximately level with the floor of the retort and is covered with sand so as to regulate the temperature of the air in the pipe. The air is delivered to the pipe 10 through a supply pipe 11 which connects with a fan 12 of any suitable description, which insures a constant flow of air to the burners.

A series of troughs 13 are disposed at intervals in the bottom of the stacks or

passages 2 and 3; the upper edge of the troughs 13 being flush with the bottom of the passages. These troughs extend the width of the passages and pass through the side wall thereof, as shown in Figs. 2 and 4; the wall extending into the troughs a short distance so as to form a trap or water seal when the troughs are filled with water or other liquid, as later described. A partition 13' extends longitudinally in each trough from the outer end thereof to a point near its inner end; this partition acting as a baffle to retard the flow of liquids in the trough, which liquids are discharged through an overflow chute 13^a on the trough exterior to the walls of the passages 2—3 into any suitable receptacle, not shown.

The water or other fluid in the troughs 13 is delivered thereto exterior to the passages 2—3 from supply pipes 14 in any desired quantity, which may be regulated as desired. Arranged above each trough in the passages 2—3 adjacent to the ceiling thereof is a horizontally disposed perforated pipe 15, through which a current of cold air is discharged downward upon the surface of the water in the trough. Similarly arranged perforated pipes 16 are placed in the enlarged passage 3, through which jets of water or other liquids are discharged into the troughs thereunder. It is manifest that as many troughs 13 and the corresponding perforated pipes 15—16 may be employed throughout the length of the passages 2—3 as may be desired.

The operation of the invention is as follows: The ore to be smelted is delivered to the chamber A through the feed hoppers 9—9 and is acted upon by the intense heat of the flames delivered from the burners *e—f—g—h*, in such manner as to melt the ore and cause it to flow down the inclined bottom *d*, where it collects in the depression *c*; the scum or slag passing over the ridge formed at *b* and collecting in the depression *d*; the molten metal and scum or slag being drawn off through tap holes 17—18 in the usual manner. The flames passing from the chamber A enter the small end of the passage 2 and are subjected to the cooling action of the streams of cold air discharged through the pipes 15, which converts the flame into black smoke before it reaches the enlarged passage 3. The air discharged through the pipes 15 drives the flames against the water in the troughs 13, which acts to reduce the flames to smoke and at the same time generates a certain amount of steam, the moist vapors resulting therefrom mingling with the smoke discharged into the passage 3. The flames and smoke are drawn into the passages 2—3 by the suction of the fan 4 which creates a strong draft throughout the length of the passages. The smoke passing through the passage 3 is acted upon by the water and air discharged from the pipes 15 and 16 in such manner that the mineral particles therein may be deposited in the water in the troughs 13, from whence they are drawn off and precipitated in any suitable manner. If desired, chemicals may be discharged from either of the pipes 16 in the chamber 3, as a means of killing the fumes. The passages 2—3 are of such length and the air and water pipes 15—16 and water troughs 13 are of such number that the flames, smoke and fumes from the retort A will be completely condensed before reaching the fan 4, so that no poisonous gases will be discharged from the end of the stack. The vertical stack 5 is employed only in starting the fires; the damper 8 being then closed and the damper 6 opened. By tapering the passage 2—3, as shown, the cooling of the hot flames and gases is greatly facilitated; this gradual enlargement of the passages also allowing for the additional air delivered thereto from the pipes 15.

Having thus described our invention, what we claim and desire to secure by Letters Patent is—

1. In a fume arrester, the combination of a divergent flue into the smaller end of which the fumes are admitted, a larger elongated chamber connecting with and forming a continuation of said flue, a controlled draft device connecting with said chamber, transversely disposed water troughs in the bottom of the flue and continuation, with baffle plates and exterior discharge ends and water jet pipes located transversely above and discharging across the path of the fumes and into the troughs.

2. A fume arrester comprising a flue horizontally disposed and gradually increasing in diameter from the front to the rear, and a chamber forming a continuation of the larger end of said flue, a draft device and uptake at the end of the larger chamber, dampers in the draft passage and the uptake, and connections whereby one of said dampers may be closed and the other opened in unison, and water-containing troughs disposed across the bottom of the flue and said chamber.

3. A fume arrester comprising a flue horizontally disposed and gradually increasing in diameter from the front to the rear, and a chamber forming a continuation of the larger end of said flue, a draft device and uptake at the end of the larger device, dampers in the draft passage and the uptake, and connections whereby one of said dampers may be closed and the other opened in unison, and water-containing troughs disposed across the bottom of the flue and continuation, and extending to the outside of the wall, said wall dipping into the water to form a trap for the gases.

4. A fume arrester comprising a flue horizontally disposed and gradually increasing in diameter from the front to the rear, and a chamber forming a continuation of the larger end of said flue, a draft device and uptake at the end of the larger chamber, dampers in the draft passage, and the uptake, and connections whereby one of said dampers may be closed and the other opened in unison, and water-containing troughs disposed across the bottom of the flue and continuation, and extending to the outside of the wall, said wall dipping into the water to form a trap for the gases, baffle partitions in the troughs and air jets discharging into said troughs.

5. In a fume arrester, the combination of a divergent flue into the smaller end of which the fumes are admitted, a larger elongated chamber connecting with and forming a continuation of said flue, a controlled draft connecting with said chamber, transversely disposed water troughs in the bottom of the flue and continuation, with baffle plates and exterior discharge ends, and air jet pipes located transversely above and discharging into the troughs.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

LORENZO D. ROYCE.
LOUIS WALLERSTEIN.

Witnesses:
G. H. STRONG,
J. H. HERRING.