(No Model.)

F. L. BARTLETT.

PROCESS OF REFINING FUME.

No. 480,686. Patented Aug. 9, 1892.

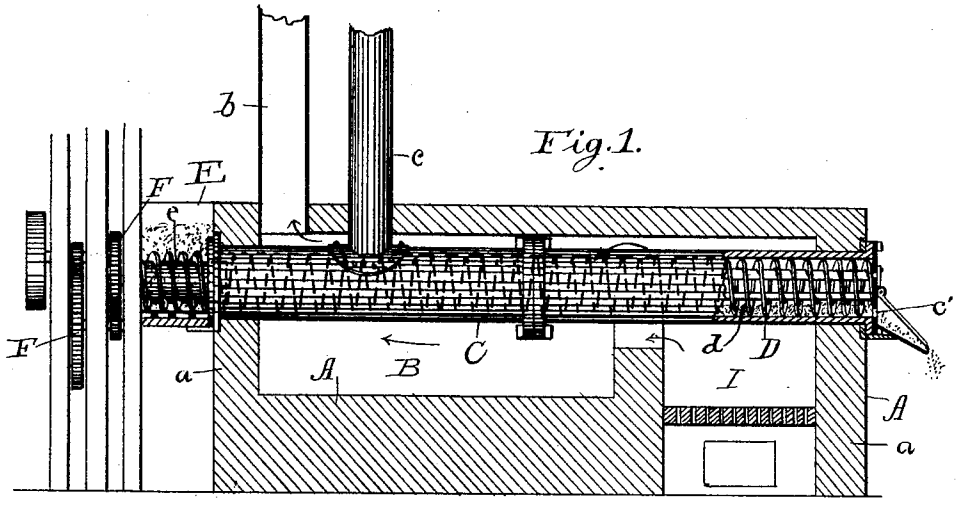

Fig. 1.

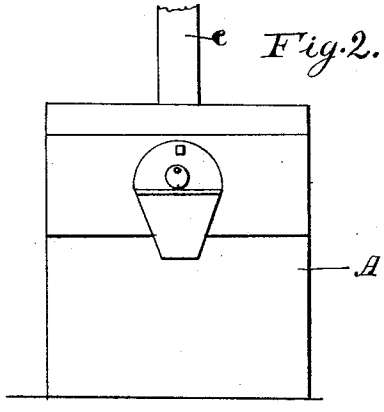

Fig. 2.

Witnesses:
Wilbur F. Lunt
F. P. Wing

Inventor:
Frank L. Bartlett
by S. M. Bates
his Atty.

UNITED STATES PATENT OFFICE.

FRANK L. BARTLETT, OF PORTLAND, MAINE, ASSIGNOR TO THE AMERICAN ZINC LEAD COMPANY, OF SAME PLACE.

PROCESS OF REFINING FUME.

SPECIFICATION forming part of Letters Patent No. 480,686, dated August 9, 1892.

Application filed June 16, 1890. Serial No. 355,622. (No model.)

To all whom it may concern:

Be it known that I, FRANK L. BARTLETT, a citizen of the United States, residing at Portland, in the county of Cumberland and State of Maine, have invented certain new and useful Improvements in Process of Refining Fume; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the manufacture of paint-pigment from low-grade zinc ores and to the refining of impure sublimed fume of zinc and lead; and the invention relates particularly to an improvement in the process of refining fume described and claimed in Letters Patent No. 406,868, granted to me July 16, 1889. The process of refining set forth in said Letters Patent consisted in passing the fume to be refined through a heated tube in the presence of air and continually stirring and scraping it from the walls of said tube during its passage through the same. In the process described air was admitted at one end of the tube and allowed to flow through it from one end to the other, acting as it passed along on all the particles of the fume. The effect of this process on fume containing sulphur compounds, carbonaceous matters, volatile metals, as arsenic, cadmium selenium, &c., acids, &c., was to whiten and condense it, at the same time freeing it from all foreign substances and leaving it in the form of a pure compound of lead, zinc, sulphur, and oxygen, which analysis shows to contain zinc oxide and oxysulphate of lead. In practical operation the process described in said Letters Patent gave satisfactory results and produced a pigment which approached to pure white lead in whitness and body; but I have discovered since making application for said Letters Patent that if the air is excluded from the heated tube and the roasting process allowed to continue in an atmosphere of sulphurous gas, which is given off from the fume in its passage through the tube or by admission of sulphurous-acid gas from any convenient outside source, the resulting product is rendered much whiter, denser, and more perfect.

In the accompanying drawings I show an apparatus designed to carry my improved process into effect.

Figure 1 represents a part elevation and part longitudinal section, and Fig. 2 is an end view.

A represents a furnace having a hearth I at one end. A chamber or flue connecting with the hearth leads horizontally from one end of the furnace to the other. A chimney-flue *b* leads from the chamber B at the end of the furnace opposite the hearth. Suspended longitudinally in the chamber B is a tube C, preferably of cast-iron, its ends extending through the end walls *a* of the furnace. There is a free space surrounding the tube, so that the hot gases may circulate freely around it. Leading from the end where the fume is fed in is an outlet-pipe *c* for carrying off the gases which come from the heated fume. Extending through the tube and fitting it loosely, except at the lower side when it fits accurately, is a coreless helical screw D. This screw is made of cast-iron and has strengthening-bars *d*, cast with the screw and extending longitudinally through it. Connecting with the feed end of the screw is a hopper E where the fume is fed in, and the screw continues along the bottom of the hopper and through the open end of the tube. When the screw passes through the end of the tube, it is provided, for the purpose of excluding the air as much as possible, with a core *e*, having as large a diameter as the thread of the screw will admit. The outlet end of the tube C is closed, except a small opening *c'* just sufficient to allow the fume to pass as it is fed through by the action of the screw. The screw is slowly rotated by the gears F.

In working my process I feed the fume to be refined into the hopper E, taking pains to keep the hopper filled above the top of the screw, so that the air will be prevented from entering to any extent with the fume. The screw is slowly rotated and the fume fed slowly through the tube. A fire of coke or

coal is kept burning in the hearth and the tube becomes heated throughout its entire length to a temperature preferably less than 1,000° Fahrenheit. The fume as it passes through the tube is gently stirred and turned over and over, so that each particle receives the same degree of heat, the fume which adheres to the walls of the tube being kept scraped off by the action of the screw. The loose sulphur compounds are driven off, forming sulphurous gas and oxysulphate of lead, with oxide of zinc incorporated with it in such a manner as to be inseparable by any mechanical means and from which is eliminated all of the impurities mentioned, these latter being volatilized and carried off through the pipe *c*. The refined product falls out in a small stream through the opening in the end of the tube. Care should be taken that this opening is so small as to be filled at all times with the fume and to exclude the air from the interior of the tube.

I claim—

The herein-described process of refining fume, which consists in passing it through an externally-heated tube or chamber in the presence of an atmosphere of sulphurous gas, stirring said fume and scraping it from the walls of said tube or chamber during its passage through the same, the air being excluded from said tube, substantially as described.

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

FRANK L. BARTLETT.

Witnesses:
R. S. BARNES,
FRANK F. DENNIS.