

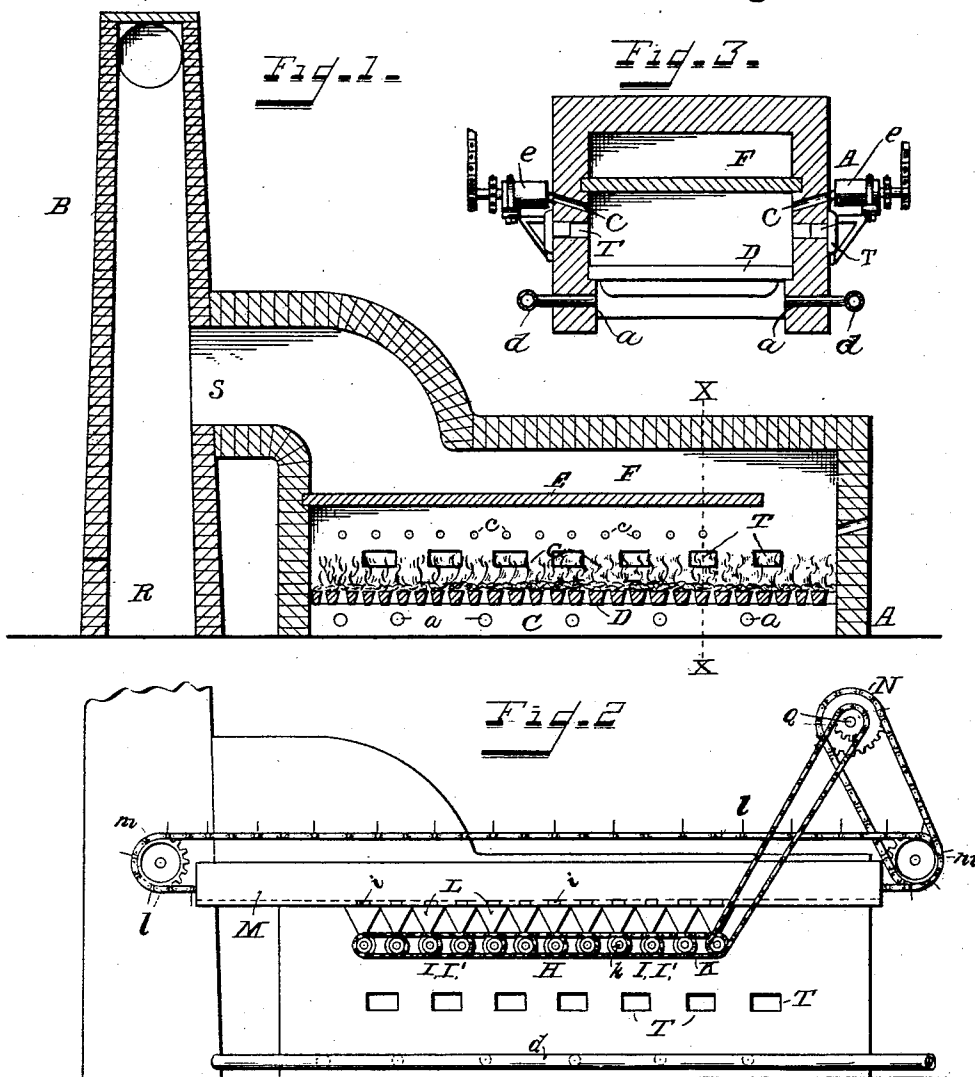
(No Model.)

2 Sheets—Sheet 1.

A. B. WALKER.
PROCESS OF AND APPARATUS FOR MANUFACTURING WHITE LEAD
PIGMENTS.

No. 588,042.

Patented Aug. 10, 1897.



Witnesses:

C. W. Miles
Oliver B. T. Kainer.

Inventor

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Attorneys.

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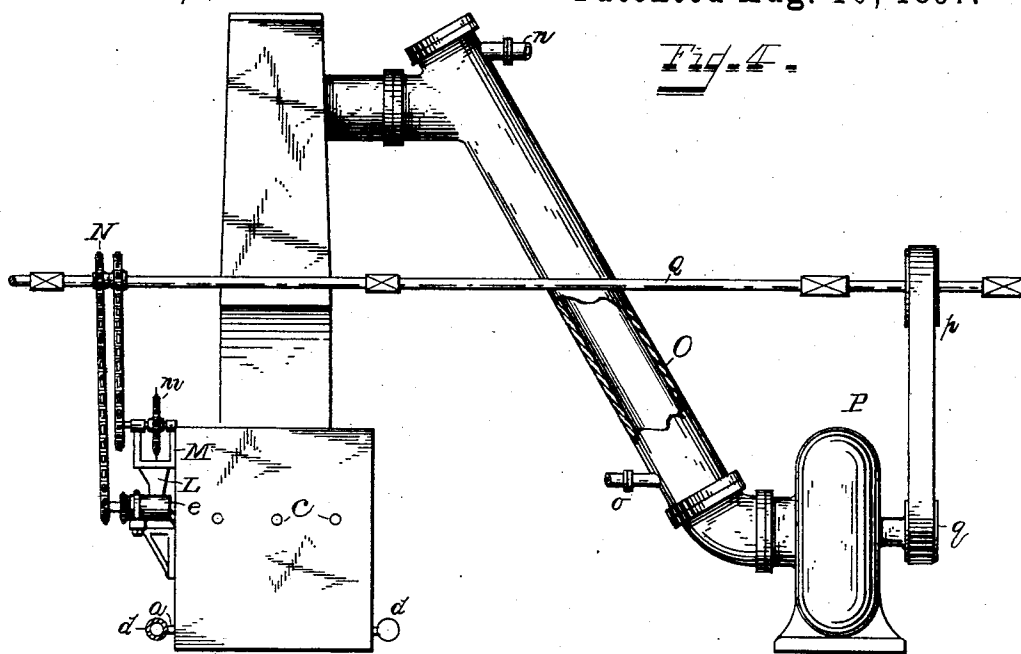


Fig. 4.

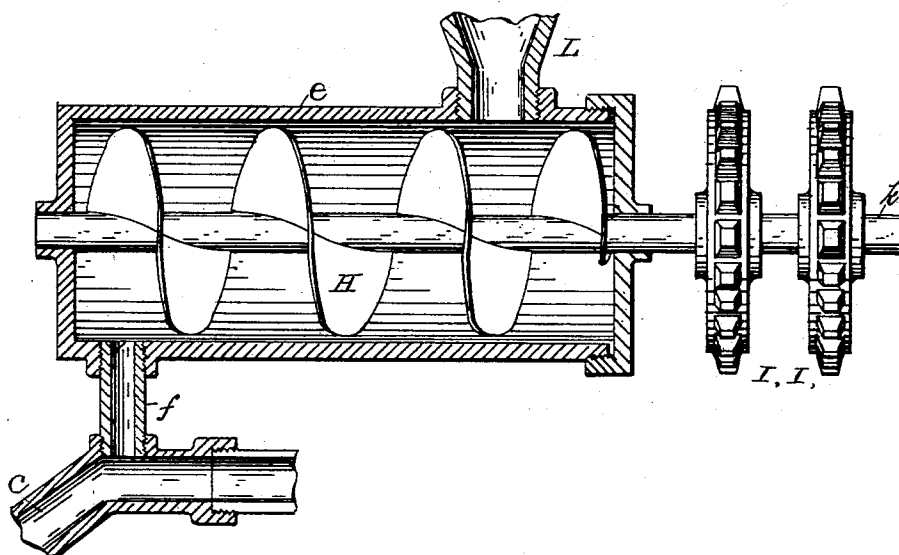


Fig. 5.

Witnesses

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UNITED STATES PATENT OFFICE.

ALFRED B. WALKER, OF CINCINNATI, OHIO, ASSIGNOR TO IVAN N. WALKER, OF INDIANAPOLIS, INDIANA.

PROCESS OF AND APPARATUS FOR MANUFACTURING WHITE-LEAD PIGMENTS.

SPECIFICATION forming part of Letters Patent No. 588,042, dated August 10, 1897.

Application filed December 5, 1895. Serial No. 571,130. (Specimens.)

To all whom it may concern:

Be it known that I, ALFRED B. WALKER, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in the Method of and Apparatus for Manufacturing White-Lead Pigments, of which the following is a specification.

One of the objects of my invention is to produce a sublimed lead pigment made direct from the ore.

Another object of my invention is to provide means for carrying on the process without the formation of lead-bearing slag and practically to convert all the lead of the ore into the pigment.

The features of my invention will be more fully set forth in the description of the accompanying drawings, making a part of this specification, in which—

Figure 1 is a central longitudinal section of my furnace. Fig. 2 is an outside elevation showing the feeding apparatus. Fig. 3 is a cross-section on line *x x*, Fig. 1. Fig. 4 is a front end elevation showing the furnace and cooling apparatus. Fig. 5 is an enlarged vertical section of the ore-feeding device, showing the driving-gear in elevation.

A represents the walls of the furnace; B, the uptake-flue stack; C, an air-diffusing chamber; D, the grate-bars; E, a reverberatory plate or arch.

F represents the oxidizing-chamber.

a represents air-supplying pipes for conducting air into the chamber C. They are supplied by a common pipe *d* and an ordinary fan or other air-supplying device.

c represents pipes tapping into the furnace between the reverberatory plate and the fuel-bed G, through which pulverized ore is fed into the caloric atmosphere by means of an air-blast.

H represents the force screw-feed for positively feeding the ore to pipe *c* through pipe *f*. I I' represent sprocket-wheels for driving the screw-feed. Each one of these feeding-pipes *c* is supplied by an independent screw-feed, and the series of these screw-feeds are driven by sprocket-chain K, and each one of the shafts *k* is provided with two sprocket-

wheels, so that the first shaft transmits power to the second and the second to the third, and so on through the series.

Each one of the feeding-cylinders *e* is supplied by a hopper L. In order that these hoppers may be charged properly, I provide a traveling belt or apron located above the series of hoppers, as shown in Fig. 2, and provided with a series of scrapers *l*.

M represents a box through which the apron and scrapers pass and into which the ore is placed. The scrapers force the pulverized ore through the orifices *i*, leading into the hoppers L. These hoppers are required to be kept full or partly full of pulverized ore, so as to prevent the air-blast from escaping outward. The traveling apron is driven by the sprocket-wheels *m m*.

N represents a sprocket-wheel for transmitting power to the individual series of feed-shafts *k*.

O represents a cooling-pipe through which the combined products of combustion and sublimate are carried from the uptake-flue. I have shown this pipe as simply a water-jacket pipe provided with the water-supply pipe *n*, and *o* the efflux-pipe.

P represents a fan for exhausting the products of the furnace and driving them into a separate screening-chamber. This chamber is not shown, as any well-known form of apparatus may be employed.

Q represents a shaft on which the sprocket-wheels N are mounted, transmitting power to the fan through pulleys *p q*.

T represents closed manholes for introducing fuel into the combustion-chamber.

I employ a reverberatory furnace for carrying on my process for several reasons. The air for supporting combustion is blasted into the diffusing-chamber C, and it becomes somewhat heated while coming in contact with the grate-bars and enters the fuel in better condition, and by employing the reverberatory plate E a short distance above the fuel-bed the radiant heat in a downward direction intensifies the heat in the combustion-chamber and maintains a high degree of heat sufficient to volatilize the ore, and the radiant heat in the upward direction assists

in the oxidation of the volatilized ore in the oxidizing-chamber F, this chamber F being the offtake leading from the combustion-chamber to the uptake.

5 R represents a downward extension from the uptake, into which the ash and unconsumed products of combustion drop. It will be observed that the exit-orifice S from the oxidizing-chamber enters the uptake-flue at
10 right angles, and this is preferred, because the products driven off from the furnace will be separated from the gases and precipitated into the bottom of the shaft R. This uptake is continued vertically some distance above
15 the mouth S of the offtake to further aid in separating and depositing the unconsumed products. The air supplied with the ore admitted through the pipes c assists combustion in the combustion-chamber, and the excess
20 of air furnishes the requisite oxidizing agent for the completion of the process in the chamber F. Hence by maintaining a high volatilizing heat in the reverberatory or combustion chamber and a lower heat in chamber F, I am enabled to convert practically all
25 the lead into the pigment. If there be any metallic lead remaining, it will be separated from the sublimate and deposited.

I have not shown manholes for removing
30 ashes from the fusing-chamber C, but they will be of ordinary construction and closed tightly during the operation of the furnace to prevent the escape of air.

By means of the process and apparatus
35 herein described I am enabled to produce a superior white-lead pigment and with greater economy than by the methods heretofore employed.

By the methods of making lead pigment hitherto employed, wherein a blast of air is applied directly under the fuel-bed, the temperature is raised to such a point that the volatilization of the lead is more rapid than the oxidation, and with the kind of furnaces used
40 hitherto there was not sufficient time and space given the products to oxidize, and hence a great part of the charge was converted into metallic lead and had to be subjected to a second treatment before it could be used as
45 a pigment. I have found that another objection where too high a temperature is employed is that a portion of the charge will be deposited as a crystalline form of basic lead sulfate, and hence lost. I avoid these ob-
50 jections by providing an air-chamber under the fuel-bed instead of applying the blast directly thereto, by means of which I am enabled to keep the temperature down to the desired degree. Then by supplying an excess
55 of air in the upper part of the combustion-chamber and holding the volatilized products in contact with the heated air during the passage of the same through the passage F, I am enabled to convert all the lead
60 into a pure white pigment in one continuous operation and in a single furnace. I believe I am the first to produce this result.

I claim—

1. The herein-described process of manufacturing white-lead pigment, which consists
70 in placing in the lower portion of a combustion-chamber a layer of fuel, maintaining said fuel in an incandescent condition by introducing air beneath and causing it to pass up in a diffused condition through said layer, in-
75 jecting air and finely-divided galena above said fuel-bed, the amount of air introduced being in excess of that necessary to fully oxidize the volatilized products, conducting the resulting fumes through an extended oxidiz-
80 ing-zone, and finally condensing and screening them, the process being carried out under such conditions that substantially all the galena introduced is converted into a white pigment, substantially as described. 85

2. The herein-described process of manufacturing white-lead pigment which consists in placing in the lower portion of a combustion-chamber a layer of fuel, maintaining said
90 fuel in an incandescent condition by introducing air beneath and causing it to pass up in a diffused condition through said fuel-bed, injecting above said fuel-bed air and finely-
95 divided galena, the amount of air introduced being in excess of that required to fully oxidize the volatilized products, holding the volatilized products in contact with the heated air a sufficient time to convert substantially
100 all the galena introduced into a white-lead pigment, and finally condensing and screening the same, substantially as described.

3. In a furnace the combination of a grate for supporting the fuel, an air-diffusing chamber under the grate supplied by an air-blast, a reverberatory plate dividing the furnace
105 into a volatilizing and an oxidizing chamber, means for introducing air and ore into said volatilizing-chamber above the fuel, and an uptake-flue connected with the exit of the oxidizing-chamber, substantially as specified. 110

4. In a furnace in combination with a grate for supporting the fuel, an air-diffusing chamber under the grate supplied by an air-blast, a reverberatory plate dividing the furnace
115 above the grate into a volatilizing and an oxidizing chamber, means for introducing air and ore into the combustion-chamber above the grate, and a vertical uptake-flue having a downward extension for the reception of the unconsumed products of combustion separated in the upper portion of said uptake, sub-
120 stantially as specified.

5. In combination with a reverberatory furnace, having a grate and an air-supplying chamber underneath the same, a combustion-
125 chamber above the grate having a reverberatory plate, a passage at one end of said plate connecting the combustion-chamber with the chamber F formed above said plate, a flue S at the other end of said plate leading to an off-
130 take, one or more air and ore supplying pipes tapping said combustion-chamber above the fuel-bed, means for positively feeding air and ore into said pipes, substantially as specified.

6. The combination with a reverberatory
furnace provided with a grate for supporting
a bed of incandescent fuel, and means for sup-
plying air through the grate to the fuel, of a
5 reverberatory plate elevated above the com-
bustion-chamber, means for introducing air
and ore into the upper portion of the com-
bustion-chamber, a supplemental oxidizing-
chamber located above the combustion-cham-
10 ber, and communicating therewith by a pas-

sage located at the extremity of the rever-
beratory plate, and a flue S leading from said
supplemental chamber substantially as de-
scribed.

In testimony whereof I have hereunto set 15
my hand.

ALFRED B. WALKER.

Witnesses:

W. R. WOOD,
WM. SIMONSON.