

(No Model.)

2 Sheets—Sheet 1.

E. V. GARDNER.

PROCESS OF TREATING WHITE LEAD.

No. 448,516.

Patented Mar. 17, 1891.

FIG. 3.

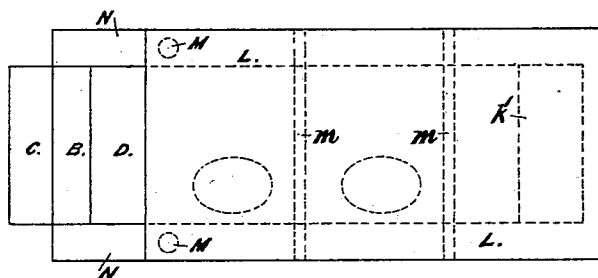


FIG. 1.

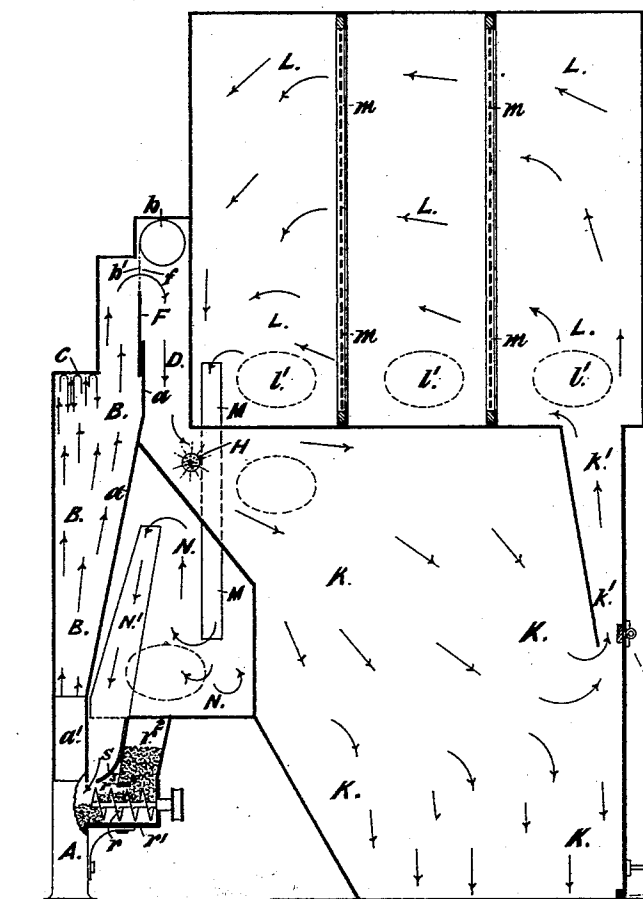
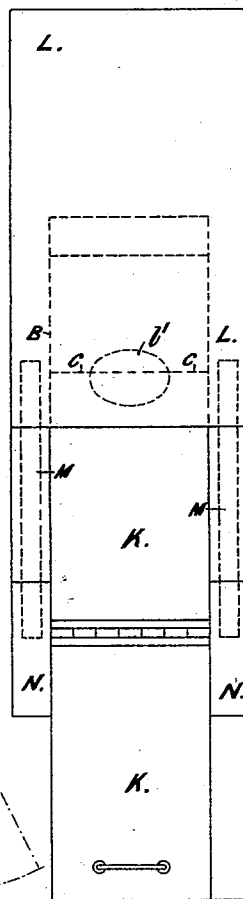


FIG. 2.



Witnesses.

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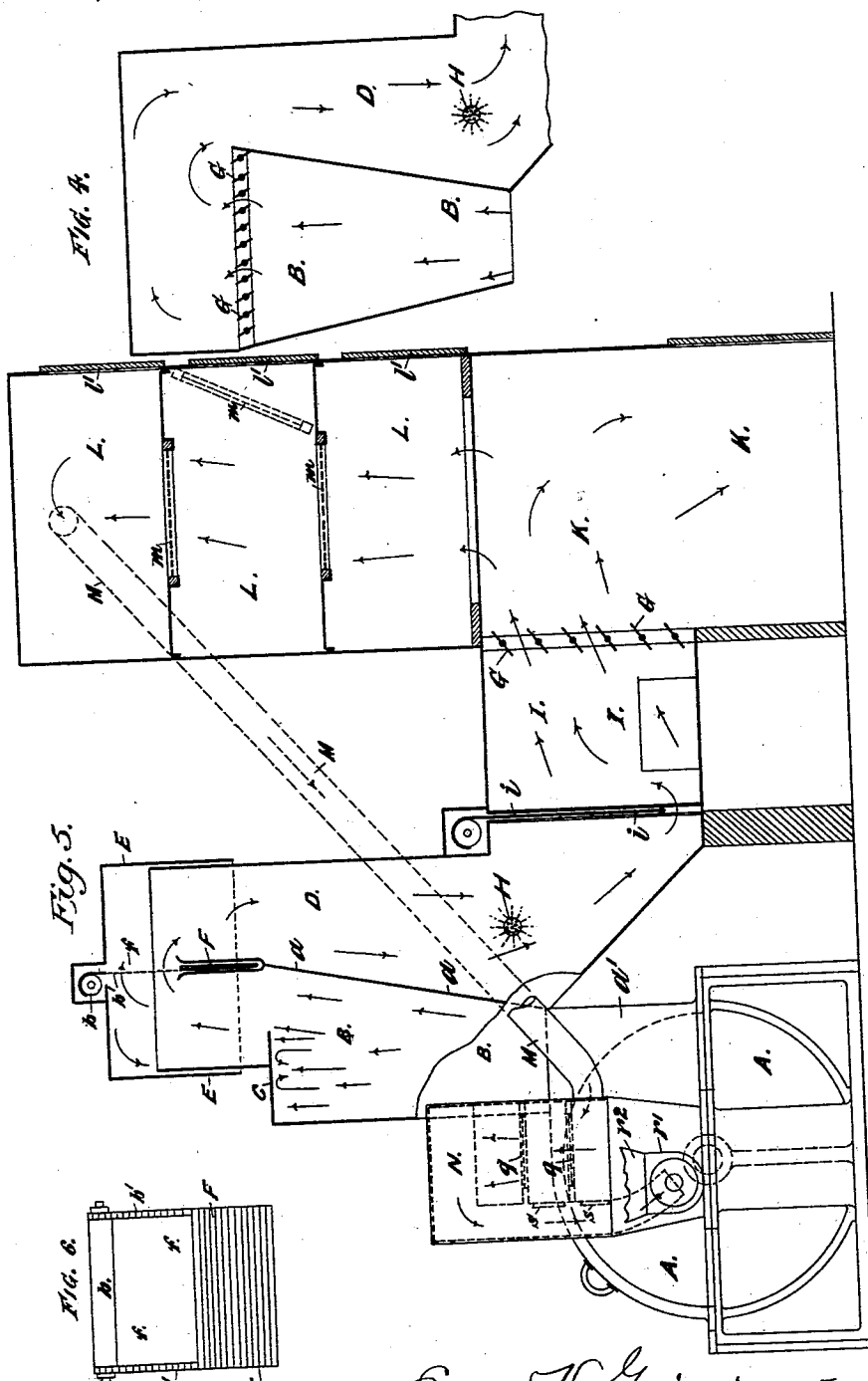
2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

EDWARD VINCENT GARDNER, OF LONDON, ENGLAND.

PROCESS OF TREATING WHITE LEAD.

SPECIFICATION forming part of Letters Patent No. 448,516, dated March 17, 1891.

Application filed October 9, 1890. Serial No. 367,567. (No specimens.) Patented in England February 12, 1889, No. 2,487.

To all whom it may concern:

Be it known that I, EDWARD VINCENT GARDNER, a subject of the Queen of Great Britain, residing at Berner's College, Oxford Street, London, in the county of Middlesex, England, have invented new and useful Improvements in Processes for Treating White Lead, (for which I have obtained patent in Great Britain, No. 2,487, dated February 12, 1889,) of which the following is a specification.

This invention relates to treating white lead in order to reduce it to impalpable powder, and to bring it into such a condition as shall be suitable for ordinary users.

Heretofore it has been the practice in making white lead to reduce the powder by a wet process, which is well known. This process necessitates the subsequent drying of the material, an operation which is both slow and costly; and it is the purpose of my invention to produce white lead in the form of impalpable powder direct from the raw, rough, or granular white lead by a dry process by which obviously the stages of the wet process—namely, the wetting and drying of the material—would be rendered unnecessary and saved.

It is well known to those skilled in the art of manufacturing white lead that it possesses qualities quite peculiar to itself, and in the practical treatment of it I have discovered and found by experiment that the reduction thereof to impalpable powder and the separation of such impalpable powder and its collection from the heavier and not fully reduced particles cannot be effected and is not governed by any known method of or hitherto designed complete apparatus for reducing and separating other materials—such as flour, middlings, crushed ores, and minerals, and the like—which are reduced to pulverent state and treated by and with currents of air, and the usual knowledge as regards such methods and apparatus have no direct practical and useful bearing upon the treatment of white lead, and I have also discovered and demonstrated that to render the white lead reduced to powder by dry disintegrating process capable of being handled and used in the ordinary way in the arts it must be

treated to the action of steam or heated fluid sprays in the manner and for the purpose described.

According to this invention, white lead after it is produced from the blue lead, and in a more or less granular and flaky condition, is reduced to powder in a disintegrating-machine, (preferably of the rotary centrifugal kind having beaters revolving at proper speed,) and then carried upward on a current of air against an obstruction in such manner as to separate the portion not reduced to an impalpable powder from the impalpable portion, after which it is then passed into a second chamber in which the pressure is lower than the first, and wherein the whole of the material is subjected to the action of steam or spray of water or other heated air or gas. From here it passes to a chamber or chambers, wherein it deposits and collects while the air, separated from the impalpable powder, makes a return-circuit to the ascending palpable and impalpable particles.

To clearly explain the nature of my invention, I will describe it by the aid of the drawings which accompany this specification.

The drawings illustrate one example of apparatus designed in accordance with and for carrying out the improvements according to the invention.

In the drawings, Figure 1 is a sectional elevation of the apparatus. Fig. 2 is an end view. Fig. 3 is a plan. Fig. 4 is a modified arrangement of a part of the apparatus. Fig. 5 is a modified form of the apparatus shown in Figs. 1, 2, and 3. Fig. 6 is a view of the shutter F, herein referred to.

With reference to the drawings, A is a disintegrating or pulverizing machine, preferably of the rotary type, having beaters revolving at a high rate of speed.

a' is the delivery-mouth of the machine.

B is a vertical upcast, having a horizontal obstruction or shoulder C therein.

D is a return or downcast shaft.

F is a pendent shutter, having an aperture therein and adapted to roll up upon a roller b, and by means of which the flow of air and material from the chamber A to D is controlled.

H designates spraying devices through

which steam or heated gas or a fine spray of water or a combination thereof is introduced into the machine.

K is a chamber in which the greater portion of the finished material is deposited.

L is another collecting-chamber, having sieves *m* therein, by which most of the remaining matters suspended in the air are arrested, such chamber being in communication with the chamber K by the conduit *k'*. A suitable temperature to which the air or other gas may be heated is from about 100° to 150° Fahrenheit.

The process and the operation of the apparatus and effects produced thereby are as follows:

The rough white lead is fed to the disintegrating-machine A by the feed device herein after described, and this machine being of a high-speed rotary type having beaters a current of air is induced into it at a suitable point, as hereinafter specified, with the result that, first, the white lead is mostly reduced to impalpable powder, and, second, is delivered from the discharge mouth or orifice *a'* of the machine at a high velocity and upon a current of air. The crushed material on the air-current being so discharged from the machine is forced up the chamber or shaft B, by which action the heavier and not fully-reduced particles of white lead rise vertically and in a line coincident with the mouth *a'* of the machine, and the obstruction or shoulder C being disposed directly above, and also in a line coincident with the mouth *a'* they strike such shoulder, and, being repelled by the sudden interruption of their flight, they fall back into the machine through the delivery-mouth *a'*, and are therefore again subjected to its disintegrating action, and those portions not reduced to the impalpable form, owing to the regulation of the aperture through which the current flows to the shaft D, and the retardation of velocity thereof due to the increasing area of the shaft B, also fall back into the machine, while the lighter and impalpable powder is carried up by the current of air past the shoulder C and up into the head of the shaft B, and is deflected through the aperture *f* in the shutter F, and then downward on the other side of the partition *a* through the shaft or chamber D. In this chamber at the points H the material is subjected to the action of and completely enveloped by steam or other heated fluid spray introduced and directed into the material by suitable spraying devices. The effect of this treatment is that the air which has become adherent to the surface of the particles of white-lead powder in the process of disintegration or blowing, or in both, is removed from them, and the material brought to such a condition that it will settle properly, and is freed from any tendency to and will not readily fly about and escape, and is, moreover, capable of being freely and easily handled. The finished pro-

duct is also rendered more compact and close. The white lead so treated now flows with the air into the chamber K, wherein and upon the floor of which it is deposited, from whence it can readily be removed by hand or suitable mechanical means through suitable doors. The lighter particles, however, pass from here up through the conduit *k'* into the finishing-chamber L, and through the sieves *m* therein, whereby the particles are arrested and fall to the bottom. The material may be removed from this chamber through suitable doors *l'* by hand or by suitable mechanical contrivances. The sieves *m* may be cleaned periodically by any suitable means or in any suitable way. The white lead and practically all solid matter will now have been deposited or extracted from the air, and the air so rid of such matter is carried from the chamber L back into the machine through the pipes M, chamber N, and conduits N'. The chamber N serves as a final depositing and finishing chamber for any small quantities of dust or matter not arrested in the chamber L, the pipes or conduits being so arranged in same, as shown, that the current is carried to the bottom and then rises up and flows into and down the conduit N'. The supply of white lead to the machine is effected by the worm *r* and barrel *r'*, to which it is fed through the box *r²*, while the return-air passes through the conduit N', which has its delivery end or mouth adjoining or in juxtaposition to the delivery end of the feed-worm *r*, as shown in Fig. 1. A block *r³* is provided between the feed-box and air-conduit N' to prevent the return-air from acting upon or affecting the lead as it is being delivered into the feed-barrel *r'* from the feed-box *r²*, and a spring-directing plate *s* is provided in the conduit N' for directing the return-air directly into the machine-case and preventing it acting upon the feed.

The chamber N may be provided with sieves if absolute removal of solids from the air is required.

With respect to the air on which the white lead is carried from the machine, such current of air may in cases where the reduction of white lead is carried on separately to the subsequent treatment herein described, be produced by any suitable blowing apparatus.

The pendent shutter F is so arranged that its lower end overlaps the partition *a*, or an extension thereof, and slides up and down in suitable guides, and is suspended from a roller *b* by suitable flexible bands, chains, or cords *b'*, such bands or cords being wound on and off the roller, as described, by revolving the roller from the outside of the case; or in lieu of this shutter suitable louver-plates capable of adjustment (such as those shown at G in Fig. 5) may be used. By this means the position of the opening above the partition *a* for the passage of the lead and air can be easily regulated, and thus the height to which

the finely-divided particles must be raised in order to pass over the partition may be conveniently controlled.

If desired, the steam or other fluid spray or combination thereof may be introduced at any other suitable part of the apparatus.

I sometimes employ in lieu of the shoulder C of the shaft B an obstruction composed of a series of louver baffle-plates, as shown in Fig. 4, (or they may be employed in addition to the shoulder,) and dispose them horizontally across the mouth of the shaft and so as to be capable of being separately opened, or set at any desired angle from the outside of the machine, thereby regulating the area of the passage or openings between them. This serves to arrest and throw back to the machine the grosser particles, while the finer particles only are carried onward by the current, as before described, and this is good means of separating the finer from the grosser particles of the ground or powdered material.

In the modification shown in Fig. 5 the shafts B and D are provided with a telescopic head E, as well as the shutter F, by which a double means of adjusting the height of the shutter F is provided, and also in this arrangement a second shutter *i* and louver-boards G are provided for the purpose of regulating the current and effecting the deposition of lead powder. This shutter and louvers divide the main depositing-chambers into two—namely, I and K—a finishing-chamber L, having sieves *m*, being also provided, as in the first-described apparatus. Also, in this example the box N is shown provided with sieves *g*, such sieves and also all others being rendered accessible by providing suitable doors on the case of the machine.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The process herein described of treating white lead, which consists in disintegrating the same, forcing the palpable and impalpable particles to ascend in and with a body of air, suddenly interrupting the upward flight of the palpable particles and causing them to descend, continuing the flight of the impalpable particles, and separating the air therefrom by subjecting the same to the spraying action of a fluid, substantially as set forth.

2. The process herein described of treating white lead, which consists in forcing the palpable and impalpable particles of disinte-

grated white lead upwardly in a vertical plane in and with an ascending body of air, suddenly interrupting the upward flight of and repelling the palpable particles, deflecting the ascending air and impalpable particles, causing the latter to descend, and depositing and collecting the same, and causing the air separating from the deposited and collected powder to make a return-circuit to the ascending palpable and impalpable particles, substantially as set forth.

3. The process herein described of treating white lead, which consists in disintegrating the white lead, forcing the palpable and impalpable particles upwardly in a vertical plane in and with an ascending body of air, obstructing the upward flight of the coarse and fine particles, repelling the ascending palpable particles, deflecting the impalpable particles and depositing and collecting the same, continuously returning the repelled coarse particles downwardly, and redisintegrating the same and forcing such redisintegrated portions upward with the ascending palpable and impalpable particles, substantially as described.

4. The process herein described of treating white lead, which consists in forcing disintegrated particles of white lead upwardly in and with an ascending body of air, causing the heavier and grosser particles to rebound downward, deflecting and carrying the lighter and finer particles forward and in their transit separating the adherent air from the surface of the particles by subjecting the same to the action of a heated fluid spray, and depositing and collecting the impalpable powder, substantially as set forth.

5. The process herein described of treating white lead, which consists in causing the disintegrated particles to rise vertically in and with an ascending body of air, dividing the heavier and grosser particles from the lighter or finer particles, separating the adherent air from the surface of the lighter or finer particles by causing the same to descend through fine sprays of heated fluid, and returning the air to the ascending particles, substantially as set forth.

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

EDWARD VINCENT GARDNER.

Witnesses:

FRED J. DOWNING,
JOSEPH LAKE.