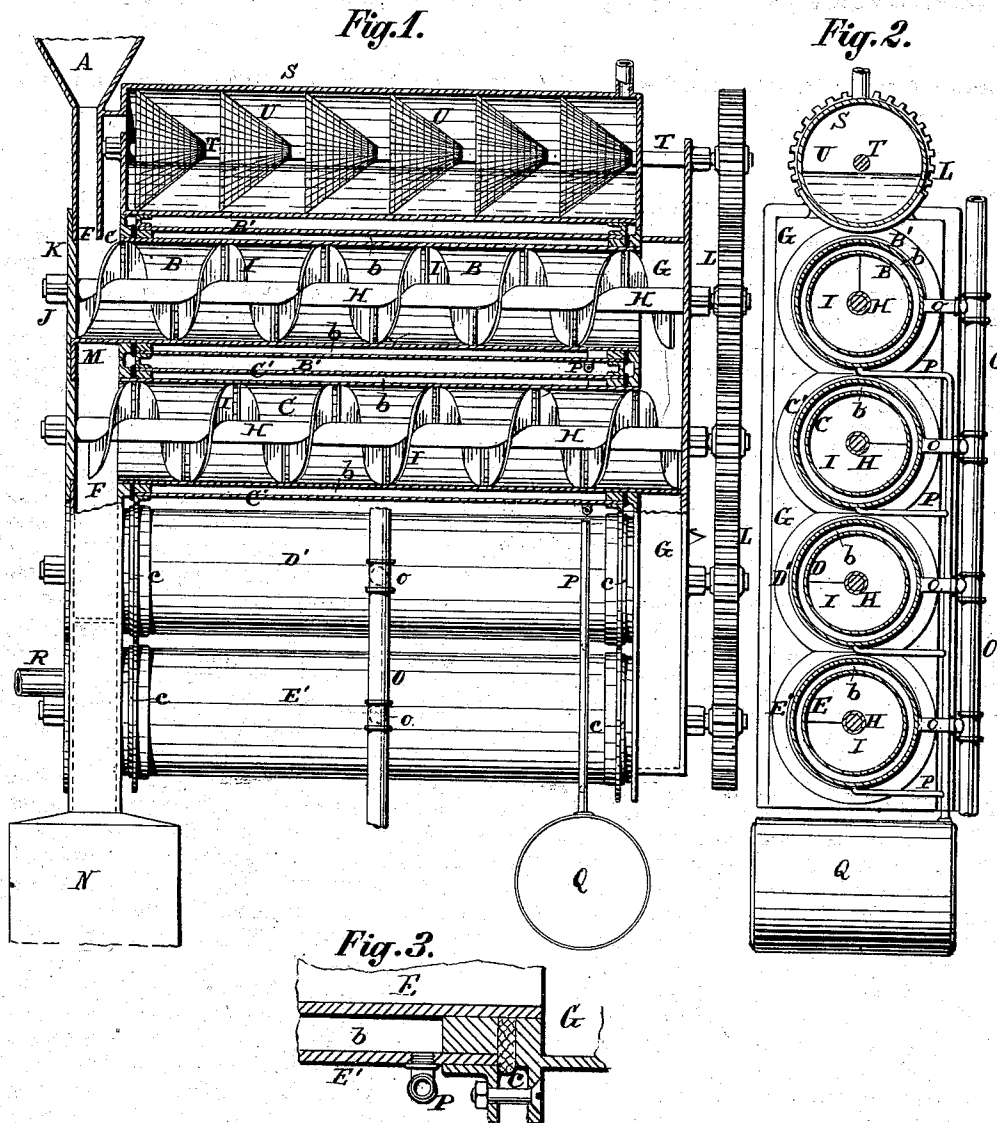


E. L. MORSE.
Apparatus for Drying White-Lead.

No.155,539.

Patented Sept. 29, 1874.



ATTEST:

Robert Burns.
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INVENTOR:

Edmund S. Morse
By. Knight Bros. Atty.

UNITED STATES PATENT OFFICE.

EDMUND L. MORSE, OF ST. LOUIS, MO., ASSIGNOR OF ONE-HALF HIS RIGHT TO THE SOUTHERN WHITE LEAD AND COLOR WORKS, OF SAME PLACE.

IMPROVEMENT IN APPARATUS FOR DRYING WHITE LEAD.

Specification forming part of Letters Patent No. **155,539**, dated September 29, 1874; application filed May 8, 1874.

To all whom it may concern:

Be it known that I, EDMUND L. MORSE, of St. Louis, St. Louis county, Missouri, have invented certain new and useful Improvements in Machines or Apparatus for Drying White Lead, &c., of which the following is a specification:

The first part of my invention consists in the combination of a vertical series of horizontal steam-jacketed cylinders, through which the material is passed by means of sectional screw-conveyers, which serve to cut the material, and at the same time push it forward. These cylinders may be more or less in number, and open at the ends to vertical trunks, into which the sectional conveyers extend, and through which the material passes downward from the discharging end of each cylinder (except the bottom one of the series) to the receiving end of the cylinder beneath it, the material passing through the cylinder from right to left alternately, and an air-blast passing through the series of cylinders in a direction opposite to that of the material to be dried. The second part of my invention consists in the combination, with a vertical series of horizontal cylinders, of vertical trunks placed at the ends of the cylinders to conduct the material from one cylinder to the other, and a closed receiver for the accumulation of the dried material, and to prevent the escape of air. The third part of my improvement consists in a cylinder partly filled with liquid, and having rotating therein a shaft carrying cones, spirals, or disks of plate metal or gauze, which turn in the liquid, and so present wet surfaces to the air-blast passing off from the drying-cylinders, as it passes through this cylinder. The object in this is the retention of any small particles of lead, that might otherwise be carried off with the escaping air-blast.

In the drawings, Figure 1 is partly in side elevation and partly in vertical axial section. Fig. 2 is a transverse section at line *xx*, Fig. 1. Fig. 3 is an enlarged detail section.

A is the hopper, into which the wet lead is fed. This hopper discharges into the cylinder B, which forms the upper one of a vertical series of similar cylinders that may be more or less in number, (four are shown in the draw-

ing.) The cylinder B is surrounded by an outer cylinder, B', concentric therewith, so as to form an annular steam space or jacket, *b*, between the cylinders. This cylinder and the similar ones, C C', D', and E', of the series are secured and supported at the ends by hollow standards or trunks F G, with which they are in communication at both ends. Through the center of each cylinder passes a rotating shaft, H, carrying a screw-conveyer, I. This screw is preferably made in semicircular sections *i*, so placed in the shaft as to make a jog in the spiral, which has the effect of slicing up and mixing the material as each section would cut the mass in a fresh place. The shafts H have journal-bearing in boxes J secured to the removable plates K fixed in apertures in the outer sides of the trunks opposite the end of each cylinder, so that by the removal of the plates or heads K the screw-shafts may be drawn out, and access had to the interior of the cylinders. The shafts have spur-wheels L engaging together, as shown, so that the shafts have alternately (in the series) rotation in opposite directions to cause the material to be conveyed alternately to the right and left in the cylinders. The trunks F and G have transverse divisions M to arrest the descent of the material at the bottom of the cylinder that it is proper for it to enter. At the lower end of the trunk F is a close receiver, N, into which the dried material drops. O is a steam-pipe, having branch pipes *o* communicating with the annular steam-spaces *b* between the cylinders. P is a waste-pipe, connecting with the spaces *b* at the bottom, and conveying away the water of condensation, and discharging it into a close receiver, Q. R is a pipe, through which an air-blast is conveyed into the lower end of trunk F. This blast is preferably a hot blast; but a cold blast would answer the purpose, as it would become heated in its passage through the steam-heated cylinders. The blast is shown as passing through the cylinders in the opposite direction to the material being dried, this being its proper course, so that the dry air shall come in contact with the dried lead, and the air dampened by contact with the wet lead shall

be at once discharged. The dampened air escapes from the upper end of the trunk F into a cylinder, S, in which rotates a shaft, T, carrying a number of gauze-cones, U, partly immersed in liquid, as shown. The object of this is to arrest any escaping dust of white lead that may be suspended in the air-blast.

In the use of the machine in drying other materials this apparatus S T U might be dispensed with.

The upper cylinder B, and perhaps one or more of the others, should be of copper, or cop-lined, or faced with some metal which would cause no discoloration of the lead, and the conveyer-screws and shafts working in the wet lead should be also composed or coated in like manner. In short, all the metallic surfaces with which the wet lead comes in contact should be of metal that will impart no discoloration thereto.

Fig. 3 is an enlarged section, illustrating the joint between the cylinders and the trunks. In this a rubber gasket, c, is used, having a bearing on the trunk and the two cylinders, so as to make a steam-tight joint.

The operation is as follows: The wet lead or other material enters the hopper A, and passes into the end of the cylinder B in proximity thereto. It is then conveyed to the other end of the cylinder, and descends the trunk G to the division M, and is carried through the cylinder C to the trunk F, from which it goes to the cylinder D within D', and so on to the closed receiver N. The air-blast enters the trunk F at its lower end and passes through

the cylinders E D C B in the order named, and then passes through that S, where it comes in contact with the gauze cones or plates U, and is allowed to escape.

It will be observed that the white lead or other material is subjected to the action of the air while being stirred by the conveyers, whereas in all processes for drying white lead previously in use, within my knowledge, the material has been left at rest upon copper or other trays while subjected to the drying action of the air.

I claim—

1. The combination of the steam-cylinders B B' C C', &c., sectional conveyers I extending into the trunks F and G, and pipe R, serving to introduce an air-blast, which is confined to a passage through the cylinders in a direction opposite to the passage of the material.

2. The combination of steam-cylinders b B' C C', &c., trunks F and G, and close receiver N, the latter allowing the accumulation of the dried material and preventing the escape of the air, substantially as herein set forth.

3. In combination with the blast-pipe R, trunks F and G, cylinders B B' C C', &c., and screw-conveyer I, the cylinder S, and rotating plates or cones U, substantially as set forth, and for the purpose stated.

EDMUND L. MORSE.

Witnesses:

SAML. KNIGHT,
ROBERT BURNS.