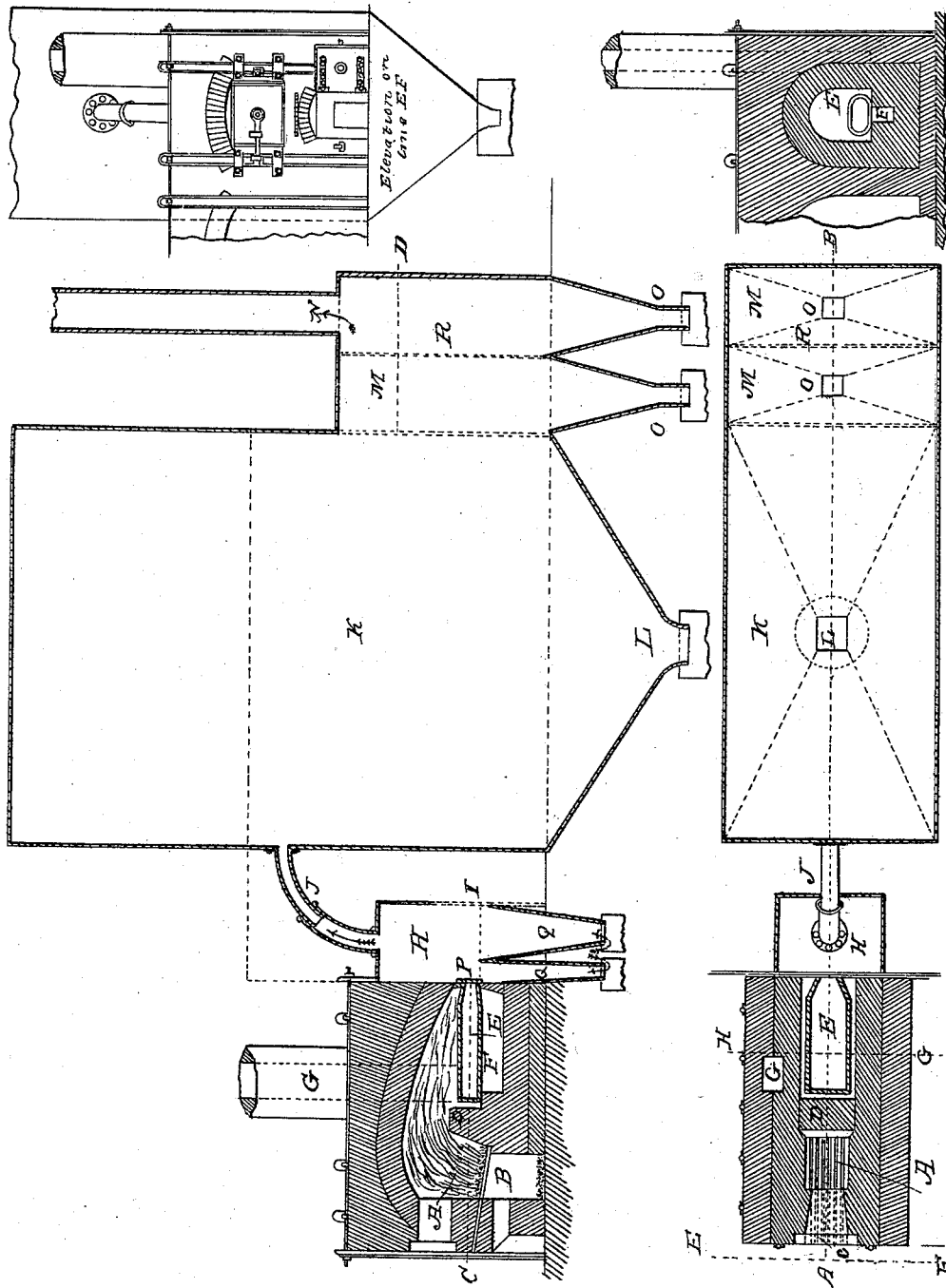


LECLAIRE & BARRUEL.
Making White Zinc.

3 Sheets—Sheet 1.

No. 7,351.

Patented May 7, 1850.



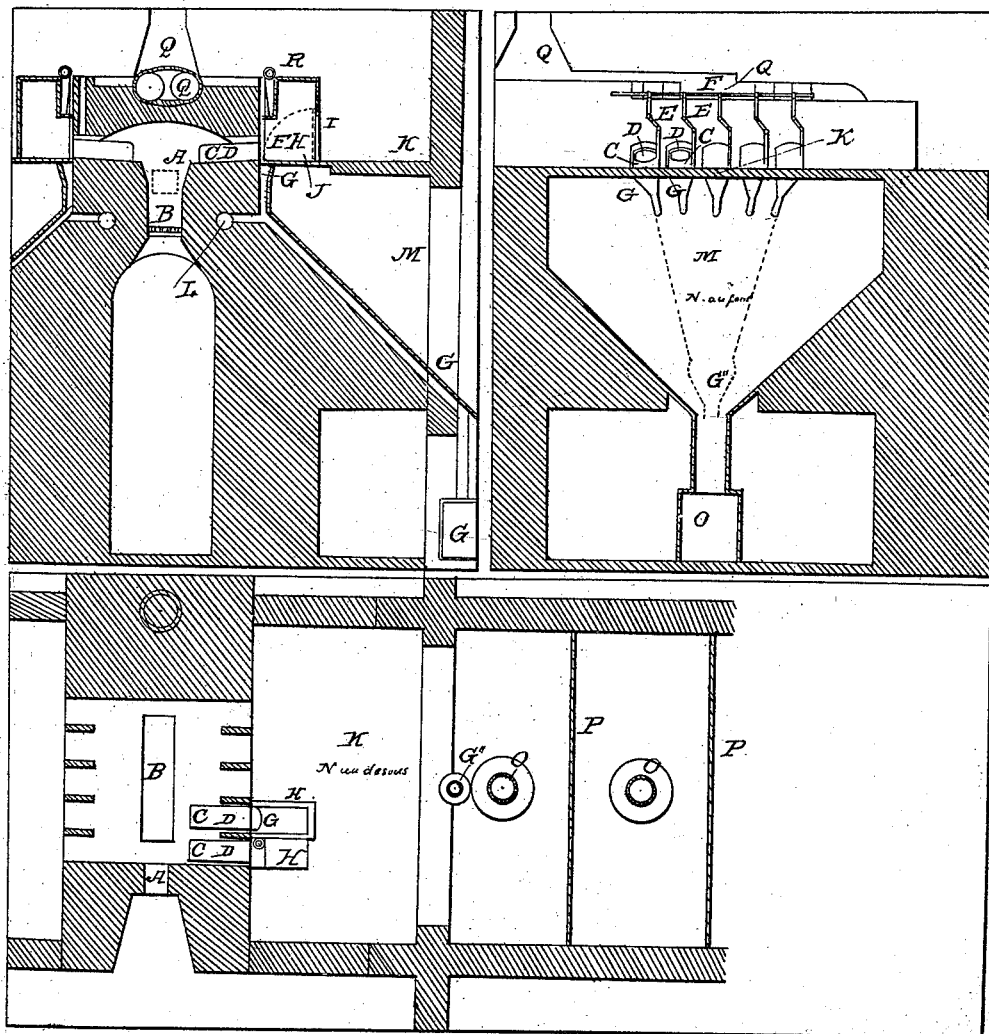
LECLAIRE & BARRUEL.

3 Sheets—Sheet 2.

Making White Zinc.

No. 7,351.

Patented May 7, 1850.



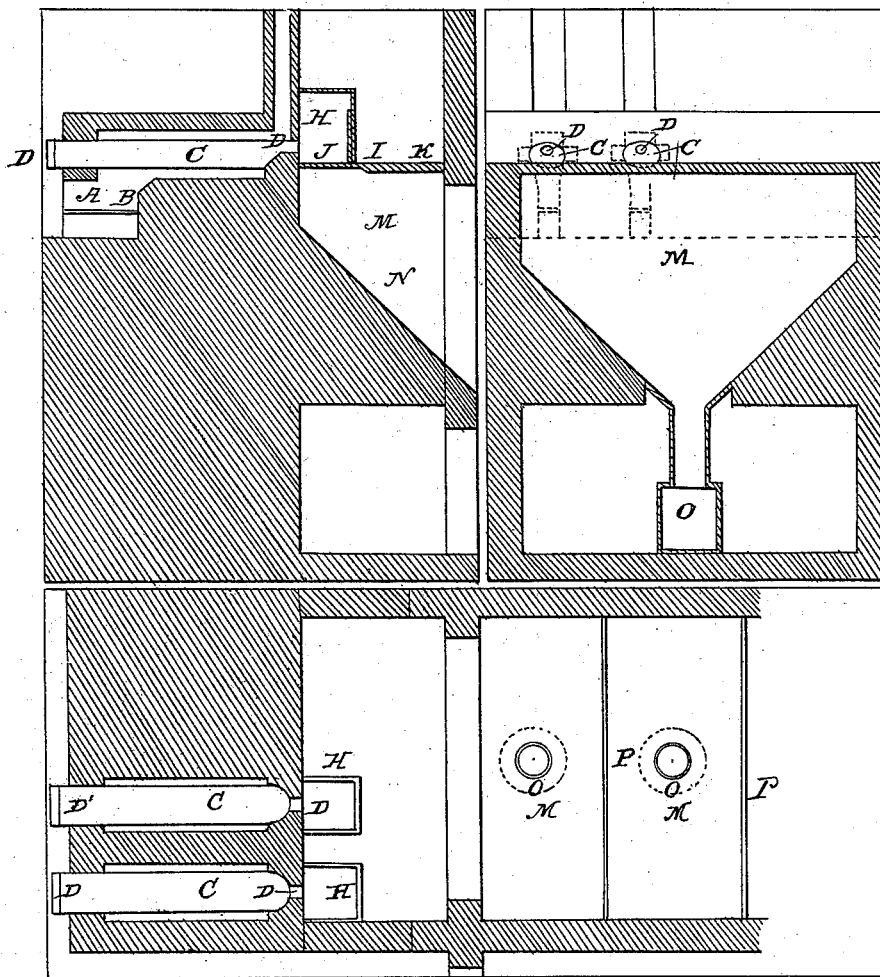
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3 Sheets—Sheet 3.

Making White Zinc.

No. 7,351.

Patented May 7, 1850.



UNITED STATES PATENT OFFICE.

E. J. LECLAIRE AND J. J. E. BARRUEL, OF PARIS, FRANCE.

IMPROVEMENT IN MANUFACTURE OF THE OXIDE OF ZINC.

Specification forming part of Letters Patent No. 7,351, dated May 7, 1850.

To all whom it may concern:

Be it known that we, EDMÉ JEAN LECLAIRE and JEAN JOSEPH ERNEST BARRUEL, of Paris, in the Republic of France, have invented a new Mode of Manufacturing Zinc-White; and we do hereby declare that the following is a full, clear, and exact description of it, namely:

The object of the present invention is a complete reform in the art of painting, by substituting unalterable and harmless paints for those having lead and copper, which are poisonous substances, for a basis, and which are liable to speedy alteration, and never produce perfectly clear tints. This reform is effected by the discovery of methods of obtaining, on a large scale, the white and yellow of zinc and barytes, zinc-green and antimonial red, which products, used as such, or combined with other harmless and unalterable colors employed in painting, form a complete scale of colors with all the intermediate grades. The substitution of zinc-white for white lead gives a paint of a smooth white surface at small expense, and without the many previous manipulations required in using white lead and other paints hitherto employed. Zinc-white can be obtained on a commercial scale—that is, at a cost of production which will admit of its general use—only by the process of distilling the metal or the ore. There are several different kinds of furnace, by either of which this may be effected. Among them we will name the following: First, a reverberating furnace in which ovens or retorts are placed, as will be hereinafter described, or even without the addition of retorts; secondly, a furnace similar to that used for the reduction of zinc, termed “Silesian furnace,” or resembling a glass-furnace with some modifications, as will be hereinafter mentioned; thirdly, a furnace similar to those used in distilling coal in gas-works, with modifications to be mentioned below. As none of these furnaces have heretofore been used for manufacturing zinc-white, the application of them to this purpose is one of the component parts of this invention. But the mere formation of the zinc-white is but one step. We must collect it without entering the oxidation and receiving chambers, which it would be very difficult if not impossible to enter on account of the great heat and the zinc-white float-

ing in the atmosphere of their chambers, and also on account of the danger of impairing the whiteness of the product. To obviate these serious difficulties which would render the manufacture of zinc-white on a large scale impossible, we have isolated the retorts so that we can carry on or stop the working of each by itself without interfering with the others, can instantly open or cut off the communication of each one with those near it, or with all, and with the chamber of oxidation, and can keep the orifice of the retorts clear without checking the process or entering the chamber. This operation and its component parts might perhaps be performed in a manner different from that described, but the results would be the same; and these results—namely, the isolation and independent working of the retorts with relation to each other and to their connection with the receiving apparatus while the retorts are being cleaned, filled, or replaced—constitute the first part of this invention, which includes likewise the different methods that may be employed for producing the same results.

The methods above described have not been previously described or made use of for the manufacture of zinc-white or any other product, and are consequently new. The peculiarities of this invention are therefore more particularly stated, as follows: First, the power of isolating the retorts at pleasure, so that the manipulations required for each one may be entirely independent of those applied to the others; secondly, the power of instantly disconnecting each of the retorts from the oxidizing-chamber when required; thirdly, the uninterrupted cleansing of the mouth of the retorts, which would otherwise be obstructed, so as to check the formation of the oxide of zinc or zinc-white; fourthly, the method of collecting the manufactured white without entering the receptacle in which it is formed. All of these results are obtained without the necessity of entering the oxidizing-chamber. It may therefore remain hermetically closed.

The examination of the accompanying plates will render the importance of these principles or peculiarities more obvious, and will illustrate different methods of carrying them into execution. These plates are referred to as

part of the following description of the process, and of a reverberating furnace suitable for carrying it into operation.

The first plate represents the ground plan and a transverse section of this furnace. A is the grate; B, the ash-pit; C, door for the introduction of fuel; D, shoulder, (French antel;) E, retort; F, flue for the return of the flame; G, chimney; H, box, of masonry or iron, shaped like a sentry-box; I, door of the box H; J, passage communicating with a chamber closed hermetically above; K, receptacle for the product of distillation; L, a duct for receiving the product of the distillation which falls into casks or other receivers; M, a chamber in which metallic cloths are arranged so as to admit the air and retain the products; N, a chimney for the passage of atmospheric air; O O, ducts for the reception of the products which pass between the first cloths; P, scrapers—an iron rod so arranged as to be moved across the opening of the retort to prevent it from being choked up; Q Q, ducts formed of sheet-iron or zinc, intended to receive the heavier products of the distillation, and to admit the atmospheric air necessary for the oxidation of the metallic vapor; R, metallic and other cloths, three or four in number.

Process of manufacture.—The furnace, with the retort, having been raised nearly to a white heat, a quantity of zinc, in ingots, or of old zinc, is placed in the retort, where it melts, and, being transformed to metallic vapor, burns upon coming in contact with the air and becomes protoxide of zinc. This oxide of zinc passes with the air into the chamber K. The air passes through the cloths and into the chimney N. The product, on the contrary, falls through the ducts into the receptacles arranged to contain it. The product is drawn into the chamber K by the current of air caused by the chimney N. This chimney creates a draft, which carries the oxide into the chambers. It is necessary to provide for the motion, either by hand or by machinery, of the rods or scrapers P, in order to prevent the choking up of the orifices of the retorts. It is likewise necessary to keep the door I closed during the operation, opening it only for the purpose of charging or replacing the retorts. The zinc not oxidized and the lumps of oxide too heavy to pass into the chamber M fall into the ducts Q Q, and are received in casks.

Modifications which may be made in this furnace.—The return-flue for the flame F may be dispensed with and the smoke pass through the chimney, which would then be placed at the extremity of the furnace, as in ordinary reverberating furnaces. The retort may be supported throughout its whole length by a plate of refractory earth, or only be supported at the ends and laterally, which would aid in giving the flue a diameter less than that of the section of the retort. Instead of one retort, a number may be used, and they may be even isolated one from the other by divisions of re-

fractory earth. The retorts may also be entirely discarded, and the bed of the furnace arranged in such a manner that the zinc may be placed directly upon it. To carry this modification into effect, the return-flue for the flame, as well as the chimney, must be discarded. The flame will then pass into the chambers with the products. The smoke will pass out through the chimney. In order to increase the ventilation, the chimney N may be heated, or a ventilator may be substituted for it. The product, instead of being collected in the manner shown in the drawings, may be gathered in a humid state—that is, condensed in water by which, however, the quality of the oxide is more or less impaired, besides which the water dissolves a certain portion. Instead of letting the flame pass at first above the retort, it may be carried in one or more flues under it, and thence allowed to pass over it. The grate might in this case be placed below the furnace, or even outside of it, as is the case in reverberating furnaces. The arrangement of the furnace might also be modified by placing a number of retorts round a central grate, as in glass-furnaces.

Plate 2 represents the ground-plan, section, and elevation of an arrangement of this kind; and Plate 3 represents a furnace in which the grate is placed below the retort in the manner above alluded to. The same letters in these designs (Plates 2 and 3) have reference to the corresponding parts, namely: A is door of the furnace; B, grate; C, retorts of refractory earth or other material capable of resisting the effects of a high temperature. They are five in number, but the number may be increased or diminished; D, opening of the retorts to allow a passage to the products. E E, rods of iron or other metal, arranged in such a manner that by a vibratory lateral movement each of them keeps traversing the orifices of the retort for the purpose of removing the deposit which would otherwise choke it up. These rods are called "scrapers," being used to scrape the opening of each retort. F is a horizontal bar, to which each scraper is attached in such a manner that an alternating motion communicated to the bar carries each of the scrapers in the same direction, causing them to traverse the orifice of each retort. This bar is moved either by hand or by any appropriate machinery. G G are tubes intended to receive the heavier particles of zinc, whether calcined or not, which collect opposite to the orifice of each retort, and all connecting by means of a small pipe with a tub, G', from which the products are carried on to a receiver, G'. It will be understood that these tubs or basins can only receive the solid products which have not undergone distillation, or that portion of the products which has accumulated near the opening of the retort forming a body of too much weight to be carried on to the oxidizing-chamber by the current of air. H is a small iron case, the use of which is to isolate

the retorts one from the other, and having the shape of a sentry-box. It is placed upon a frame. It is fixed to the wall, but it may be arranged so as to be taken off at pleasure, either by means of a crane or by causing it to run upon a frame, a bar, a rail, or any other means. The front is open and turned toward the orifice of the retort in such a manner that the products of the distillation pass into the box. The ground plan shows a box removed and another in its right position. I is the farther end of the box, shutting and opening at pleasure. J is a trap-door in the upper flooring, K. This trap can be raised or lowered by means of an iron chain passing through the farther end of the box I, so that it can be elevated or let down without opening the box. This may be effected in any other manner. Instead of a trap to be raised and lowered, it might be arranged so as to run in slides to open and close at pleasure. The box might also be arranged upon the plan shown in the drawings first above referred to. K is a hanging floor, upon which the boxes are placed, and which is separated from the chamber of oxidation. Currents of cold air may be carried into this portion intended for the manipulations of the retorts, or into the floor, which should be hollow in order to render the temperature of this chamber more supportable. L is a pipe for a draft of hot air, communicating with the pipe of the tubs, from which it carries off the white which may happen to fall into these tubs, back again into the chamber of oxidation. Instead of a current of hot air, a current of cold air might be carried across the box, or both methods might be combined, as required. M is a chamber, called the "oxidizing-chamber," the metallic vapor being oxidized on leaving the retort by coming in contact with atmospheric air. N is the chamber of oxidation, and a receiver in which cloths are placed for sifting the products. The bottom is formed by a series of channels or inclined planes, upon which are deposited the products formed, and which, by the effect of their own gravity, slide upon the inclined planes, and in this manner reach the receiver placed in a chamber immediately underneath. These channels are furnished with cocks or valves for closing or admitting at will the passage of the products. They might be collected without loss by means of vessels or receivers of any kind filled with water, and communicating with two pipes—one immersed in the water and intended for the conveyance of the zinc-white formed in the chamber of oxidation with which it would be connected, and the other not being immersed, intended to be employed in producing a vacuum in the first pipe—and by that means drawing into it the products which would then be deposited in the water. O is a receiver for the accumulation of the white produced. P, cloths placed at intervals, in order to allow a passage to the atmospheric air and to gather

the products formed, sifting them at the same time. Q is a suction-pipe for the purpose of drawing the air through the sifting-cloths, and to keep up the supply required for the oxidizing-chamber and receiver, and to carry into them the products of the manufacture. It will be understood that this draft of air may be obtained by any other method of exhaustion or inflation, such as a ventilator, air-pump, blower, &c. R is another pipe, placed over the orifice of each retort, terminating in a funnel, which draws in that part of the products which may escape from the retort while it is being charged and made ready during its separation from the chamber of oxidation, and carries them between the cloths above mentioned or between another system of cloths, to be arranged afterward. The draft may be produced by any means suitable, either heating the sides or by some kind of ventilation. The pipe remains closed while the retort is brought into action, and empties its contents into the oxidizing-chamber. In the sample design ventilation is produced by means of the waste heat of the furnace. It will be perceived that the isolation of the retorts may be effected by other means. For instance, the floor K might be so arranged as to allow of its being raised or lowered, as required, so as to isolate the retorts from the chamber of oxidation when necessary. It might be divided into portions corresponding with the number of retorts, so that only that portion of the floor of the retort or retorts to be isolated from or connected with the chamber of oxidation would require to be elevated or depressed.

The retorts might be separated one from the other by any species of dividing-surface, so as to render each one independent of the others, or a certain number of them might be connected together. In the same manner, the suction-tube R might be of a sufficient diameter and consequent power of suction or inflation to carry off all the products as soon as they were formed. They would be carried from thence into the collecting-chamber or into a receiver destined to contain them.

It is evident that the methods which we have described and similar ones may be made use of; but they would of course be based upon the principles which we have laid down and which constitute more especially the subject of the present invention.

Plate 2 represents an arrangement of furnaces carried out upon the plan adopted for the distillation of coal in gas-works. This plate represents the ground-plan. The section and elevation of the furnaces and the chamber of oxidation, and all the additional parts, are likewise delineated. A greater or less number of furnaces might be placed together laterally, and in each might be placed one, two, or more retorts. The same letters in these drawings refer to the same parts as those before explained, the only difference being that the arrangement of the furnace enables the oper-

ator to charge the retorts from the chamber in which the grate is placed, and for this purpose the retort is open at both ends D D. The charge is put in through the opening D, which is then hermetically closed during the whole period of the distillation. The boxes might, in case of need, be dispensed with, as well as the flooring K, if this arrangement should be adopted, which, however, is not without objections.

As will be observed, the arrangements shown in Plates 2 and 3 only differ from those given in Plate No. 1 in the construction of the furnaces, all the other parts being the same, and applicable in all cases, so that the peculiar arrangement described in either of these plans may be applied to the others.

Manner of proceeding in case the manufacture is carried on in the furnaces represented in Plates Nos. 2 and 3.—The zinc in ingots is introduced into the retorts, previously heated to nearly a white heat, and the retort being charged, the trap-door of the flooring is raised after having closed the opening of the box, so that the opening of the retort is in direct communication with the oxidizing-chamber. The zinc assumes the form of metallic vapor, oxidizes by contact with the atmospheric air proceeding from the tube, and from thence is drawn into the chamber by the effects of the draft continually kept up by the pipe R, and is there stopped by the cloths, which allow the atmospheric air to pass through. It then settles upon the channels or ducts, from which it falls into the receiver destined to contain it. The distillation from one retort being concluded, the trap-door of the flooring is lowered, a new charge is put in, and the process carried on as before explained. The same method may be employed as well as that in Plate 1 in making use of the suboxide of zinc or the raw ore. If the ore is used, it is placed in the same manner in the retorts, either with or without previous roasting, but mixed with an equal weight of coal coke or dust, as used in the manufacture of zinc. If zinc-blend is employed without previous roasting, an addition should be made to the mixture of a certain amount of peroxide of manganese, carbonate of lime, or oxide of iron, proportioned

to the quantity of sulphur contained in the blend. In the form shown on Plate 3 the charge is passed through the opening D of the retort, which is afterward closed and luted hermetically.

Application.—The application of the zinc-white does not require any especially care, and it moreover possesses the advantages of not requiring to be ground. It suffices to mix the zinc-white, which is in a state of very fine powder, with oil, and to apply then in the usual manner. As it dries more slowly than the carbonate of lead, a drier may be used with it, consisting of a metallic peroxide, selected among those suitable for the purpose by its low price and its not being liable to be changed by the action of deleterious gases. Thus we have chosen the peroxide of manganese, combined with linseed-oil, prepared according to the following formula: Put one hundred kilograms of linseed-oil into a boiler, and immerse in it four kilograms of peroxide of manganese contained in an iron-wire basket. Let the oil boil for twelve hours, and cool twelve hours. Go four times through the process. The drier is then ready for use.

Uses.—The zinc-white and the other colors based upon it may be applied to all styles of painting, for coloring paper, bleaching cloths, lace, and other materials, and in general for all purposes for which lead and other colors with a basis of lead or copper are used.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The use of a draft of air through the suction-tubes Q Q, described above, for oxidizing the metal and carrying forward the products, and the arrangement of tubs or basins for the reception of the heavier portion of the products, as described herein.

2. The arrangement of the oxidizing-chamber in combination with the receiving-chambers, so as to allow the products which they contain to be gathered without entering the chambers.

E. J. LECLAIRE.
J. J. E. BARRUEL.

Witnesses:
JOHN BARTLY,
GOINLEAUX.