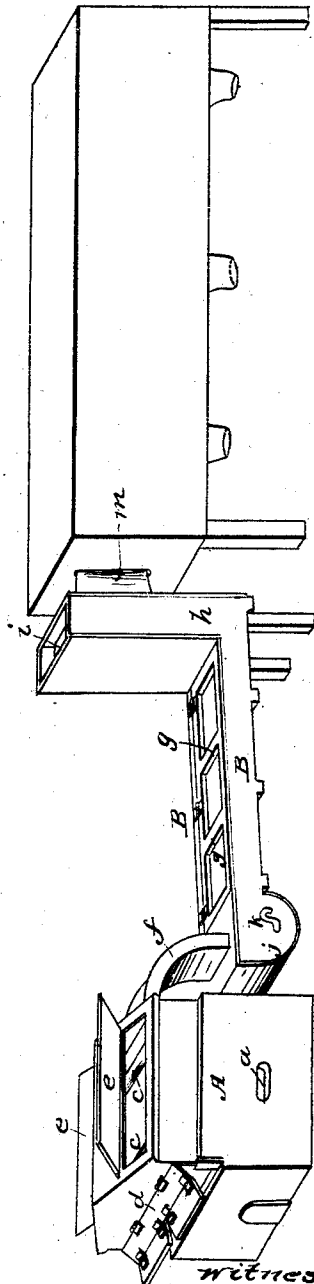


I. M. MILBANK.
Making White Zinc.

No. 27,142.

Patented Feb. 14, 1860.

Fig. 1.



Witnesses.
R. H. Hawley
C. H. H. H. H.

Fig. 2.

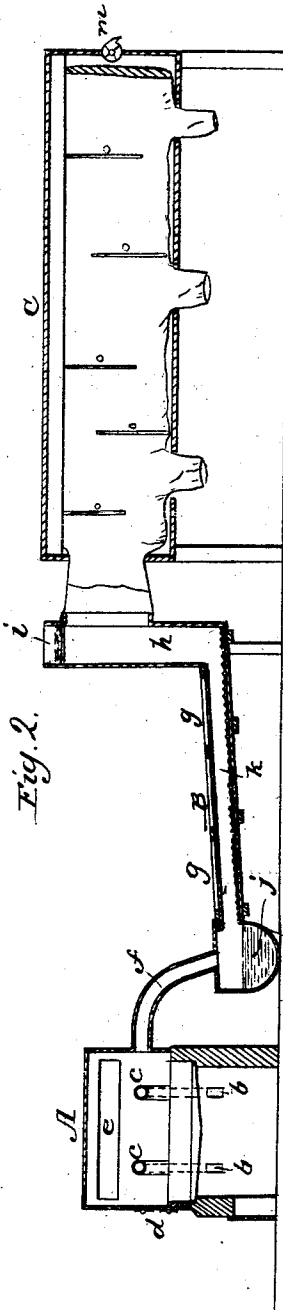


Fig. 4.

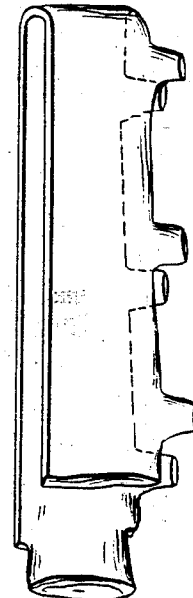
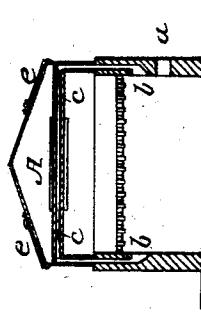


Fig. 3.



Inventor.
I. M. Milbank

UNITED STATES PATENT OFFICE.

ISAAC M. MILBANK, OF GREENFIELD HILL, CONNECTICUT.

IMPROVEMENT IN APPARATUS FOR MANUFACTURING OXIDE OF ZINC.

Specification forming part of Letters Patent No. 27,142, dated February 14, 1860.

To all whom it may concern:

Be it known that I, ISAAC M. MILBANK, of Greenfield Hill, Fairfield county, and State of Connecticut, have invented a certain new and useful Method for the Purpose of Manufacturing Oxide of Zinc, the design being to manufacture this article by sublimation, to purify, cool, and collect or save the oxide or volatile products arising therefrom, introducing the use of water in the process.

My invention is intended to include the manufacturing of any volatile metal for which it may be found applicable, and the following is a full and clear description of the same.

In the accompanying drawings, Figure I represents a perspective view of the whole apparatus, A being the furnace for burning the ores or metals; *f*, the chute; B B, the duct, and C the room or apartment in which is placed the collecting or saving apparatus. The furnace A must be built of brick or any other suitable material, except the upper portion, which should be constructed of metal, sheet-iron being well adapted to the purpose, an easy access to the interior of the furnace, and a convenient mode of disturbing the contents thereof at intervals during the process being desirable. Both these considerations are secured in the furnace here represented.

d represents a double or jointed door or doors on the front of the furnace. The whole may be opened at once, if required. The smaller doors are intended to be used chiefly to allow of the raising or disturbing occasionally the crust or slag formed in the sublimation of the ores, thereby facilitating the escape of the oxide from the mass. The smaller doors should be lined with fire-brick or other suitable material to protect them from the heat.

E E are two doors or openings in the top to admit of a ready ingress to any part of the interior when desired, and also for the purpose, in connection with doors in front, *d*, of suddenly admitting cold air on the burning mass, whereby it is more or less cracked or opened by the sudden change of temperature, allowing the oxide more readily to escape; *a*, the opening into the ash-pit for the admission of the blast or current of air necessary to sustain the proper ignition, the air to be supplied by a fan or blower in the usual mode. The fur-

nace must be kept closed while at work, but atmospheric air being necessary for oxidation, it is admitted by two or more perforated pipes placed inside the furnace, (marked *c c*.) These pipes are connected with the flues *b b* in Fig. III, which open into the ash-pit, whence is derived sufficient air for perfect oxidation. These perforated pipes, however, are not entirely essential. The fumes of zinc arising in the process of distillation become perfectly oxidized if the air be allowed to enter the upper part of the furnace directly from the flues *b b*. If admitted in this way, it will be better to place one or more similar flues at the back of the furnace also, the object being to supply the air to the fumes of zinc as uniformly as possible, whether the perforated pipes be employed or not. The atmospheric air, however, passing from the flues into the pipes becomes heated, and, coming in contact in that condition with the vapors, a more desirable oxide is produced than when the contact is effected with cold air.

The volatile products of distillation and impurities arising from the burning or sublimation of the ores or metals in the furnace A are carried through the chute *f* by force of the blast of air introduced into the furnace at *a* directly upon the body of water accumulated in the receptacle of the duct at J. At this point the principal part of the impurities becomes deposited in the water, while the oxide or vapor passing through the duct B is sufficiently cooled and still further purified, and, having absorbed a small percentage of moisture, its density is increased, becoming thereby more easily collected, and at the same time the product is materially improved. This density does not depend merely upon the water taken up by the oxide, but its specific gravity is augmented beyond this by coming in contact in its hot state with the water used in the process. The moisture absorbed by the oxide and the steam produced by the hot fumes coming in contact with the water at J, flowing together into the collecting apparatus at C, prevents all danger of burning the fabric of which it may be composed. It is necessary that the fumes or vapors be impelled upon the water in their heated condition. If too much cooled, the product will become absorbed by the water, and consequently depos-

ited. In my invention, therefore, the fire and water are brought as closely together as is practicable.

B B, Fig. I, represent the duct, which must be broad and shallow in its construction and placed at an angle of about ten to fifteen degrees. The bottom should be constructed of metal, sheet-zinc being probably the most suitable. It should be well supported underneath by cross-ties of wood, to keep the bottom as level as possible. The top *g g* should also be of metal secured to a frame-work of wood for support. To shield the top from the heat produced during the process of manufacture, any coarse fabric may be laid over it and constantly kept wet. The top should be movable, to allow of the removal from time to time of any oxide that may accumulate on the under surface. Hinging it off is a very convenient mode of attaining this object. The sides of the duct may be made of wood lined on the inside with tin or sheet-iron. On the bottom of the duct inside must be laid a wire-cloth, for the purpose of diffusing the water used in the process. I have found a wire-cloth to be very effectual to this end. It is necessary thus to spread the water over the surface in its flow toward the lower end of the duct in order to reap more perfectly the full benefit of its cooling qualities. This is further assisted by the current of oxide and of the water passing in opposite directions. If the water be allowed to pass over the bottom of the duct without the diffuser, it will run in one or more distinct streams, whereby its cooling capacity would be nearly lost. It is obvious, therefore, that by using the water-diffuser a very much less quantity of water is required. In some cases in manufacturing this might be an important consideration. Even by the employment of the diffuser a considerable supply must necessarily be procured and disposed of; but too free a use of water must be avoided, it being necessary and desirable that a moderate amount of steam should pass with the oxide into the collecting apparatus. The cooling effect of too great a supply of cold water would defeat this object. The steam diminishes the volume of gas arising from the furnace, secures the collecting apparatus against fire, and improves the product.

The water is introduced at *i*, Fig. I, but it is not at all necessary to supply it at that particular point. The water is allowed to accumulate at the lower end of the duct in the receptacle J to a level with the diffuser, and the supply being constantly kept up, suitable means must be used to relieve the accumulation. For this purpose a lead or other pipe, *k*, Fig. I, may be inserted. This, it will be perceived, is so arranged as to keep the water at its proper level, and at the same time to leave no opening through which the product might escape. The receptacle *j* must be furnished with the means of access to its interior for the purpose of removing the impurities deposited therein as required.

C, Fig. I, represents the room or apartment in which is placed the collecting apparatus. This must be composed of some textile material that will sufficiently admit of the escape of the gas and steam flowing into it, and at the same time retain the oxide. A suitable cotton fabric or cloth properly arranged is all that is required. The collecting apparatus is to be made in the shape of a continuous shallow channel or passage-way, placed vertically in the receiving-room C, the sides being only a few inches apart. It must be connected with the upper end of the duct at *m*, where it of course receives the product. The channel from this point must be carried to the farther end of the room C. Making a short turn there, it is continued back parallel with the first tour, to nearly the opposite end of the room, as indicated in Fig. IV, the end at that point being left open to facilitate the escape of the steam and gas.

It is necessary so to shape the collecting apparatus that conductors or receivers may be passed through the floor of the apartment, as shown in Fig. II, *l l l*, that the product may be collected in a room below. To retard in a measure the current impelled into the collecting apparatus, in order to equalize as far as possible the outward pressure, and thus derive a more perfect filtration from its entire surface, the sides may be stitched together sufficiently to produce this result; or slips of wood may be made to answer the purpose well, secured inside, as indicated in Fig. II, *o o*. This gives a zigzag and retarding motion to the current.

Several advantages are secured by the collecting or filtering apparatus here proposed, as compared with the round bags generally used for the collection of the products of distillation arising from the sublimation of the ores of zinc. These consist in the ability to place a greater extent of filtering-surface in the same space, in the much less cost of the apparatus, and in the greater rapidity and facility with which heat, gas, &c., escape from a shallow receiver, as herein described.

The apartment C, Fig. I, must be tight, with an arrangement to admit more or less air, as required, at the front end. Being thus inclosed, the constant supply of heat from the furnace prevents all condensation of the steam, which is essential to this process. An outlet, however, being requisite to carry off the steam, gas, and heat, an exhaust is placed at the farther end of the apartment, or so arranged, for convenience, to draw from that point these vapors, leaving the oxide dry.

Fig. II represents a longitudinal cut section of the whole apparatus, A being the furnace; *e e*, the openings or doors on the top of the furnace; *e e*, the end view of the perforated pipes; *d*, the double doors on the front; *b b*, the flues opening into the ash-pit; *f*, the chute; *j*, the receptacle by which the impurities are arrested; B B, the duct; *k*, the diffuser laid on the bottom of the duct; *i*, the reservoir whence

is supplied the water used; C, the apartment in which is placed the collecting apparatus; *o o*, slips of wood secured inside the filtering-channel to retard the progress of the internal current; *l l l*, those portions of the channel passed through the floor, and into which the product is shaken down for collection, and *m* the exhaust placed at the farther end of the apartment.

Fig. III represents a transverse cut section of the furnace; *e e*, the doors or openings on top; *c c*, the perforated pipes; *b b*, the flues connecting with the ash-pit, and *a* the opening through which the blast of air is introduced.

Fig. IV represents a perspective view of the collecting apparatus.

In the accompanying drawings one furnace and one collecting-channel only are represented; but in carrying on the manufacture of the oxide of zinc it would be entirely competent to equip the apartment with as many channels as it could reasonably contain, and commensurate with the number of furnaces employed. It would be preferable, specifically, to connect with each furnace one or more of the collecting-channels; but this is not absolutely necessary. If it should be desirable to manufacture the yellow oxide of zinc, which can readily be done with the furnace here presented by simply shutting off the supply of air from the flues, then it would be advantageous to be able to use for this purpose a portion of the furnaces with their definitely-connected channels.

In the manufacture of oxide of zinc by the mode herein set forth, a much less outlay for

the construction of the necessary works is required than by the plan now in use. Besides this, while the product is improved, the yield from the ores is believed to be materially increased.

I am aware that a process has been used, and is now in use, for the collection of the volatile products of distillation arising from the ores of zinc, consisting of extended closed or tight bags or chambers, composed of fibrous or porous material, by which the oxide is retained and foreign vapors are allowed to escape. By my method tight or closed collectors are not used. Instead a shallow continuous channel, made of suitable porous or textile material, with an opening at one end, is placed in the apartment C, as already described, to receive the product. I therefore entirely disclaim the use of the closed or tight bag process for the collection of the oxide of zinc, or for any other volatile metal.

What I claim as my invention, and for which I desire Letters Patent to be granted to me, is—

The combination and arrangement of the furnace A with metal top, accessible openings *d* and *e e*, and the flues *b b*, in connection with the perforated pipes *c c*, the chute *f*, the receptacle *j*, the duct B B, with its reticulated surface *k*, the collecting or saving apparatus with the apartment C, to be managed and used as described in the specification.

I. M. MILBANK.

Witnesses:

R. W. MILBANK,

R. H. WARDLOW.