(No Model.)

E. GRÜTZNER & O. KOEHLER.

APPARATUS FOR TREATING ZINC ORES.

No. 453,806. Patented June 9, 1891.

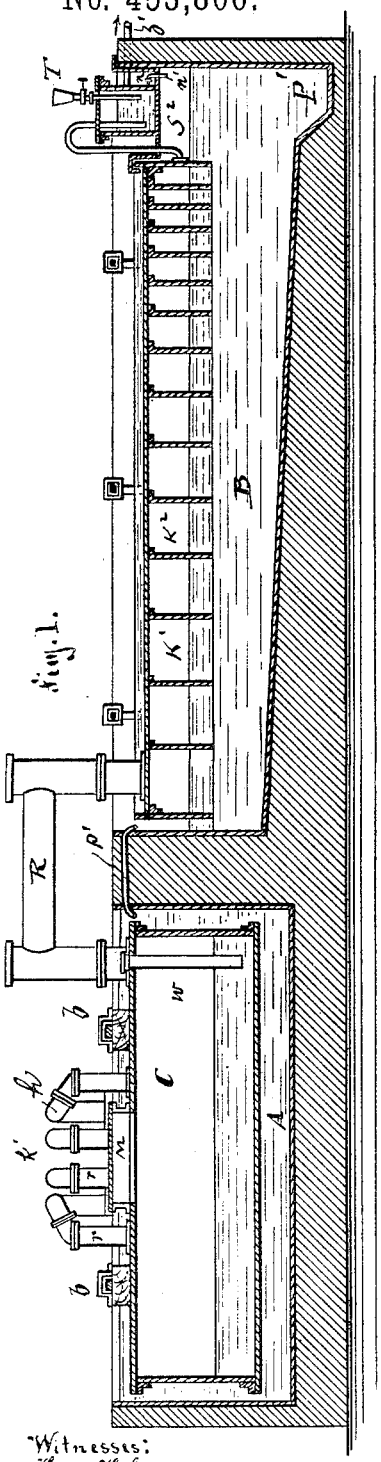

Fig. 1.

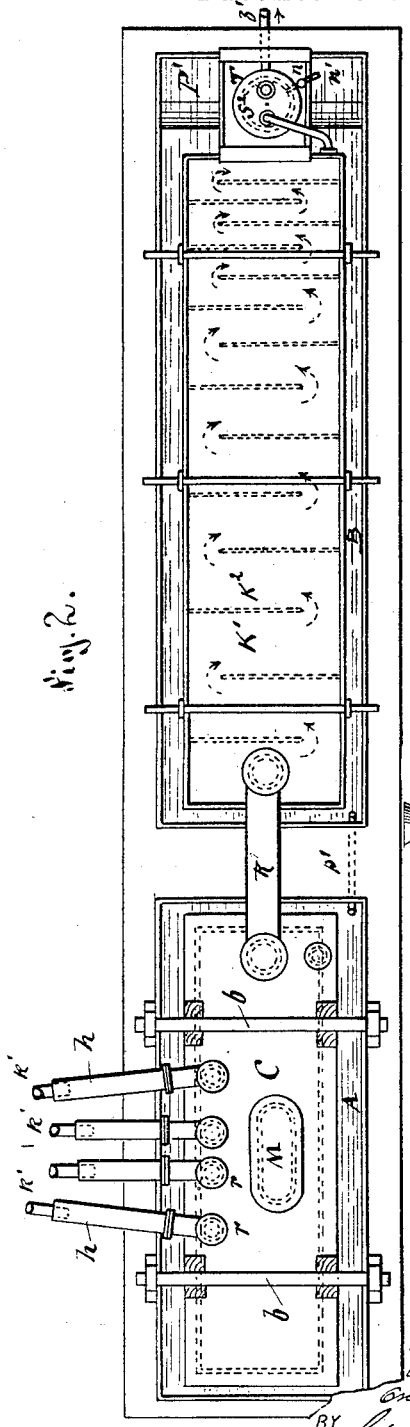

Fig. 2.

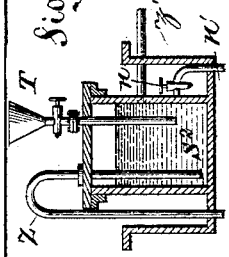

Fig. 1a.

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APPARATUS FOR TREATING ZINC ORES.

SPECIFICATION forming part of Letters Patent No. 453,806, dated June 9, 1891.

Application filed March 8, 1890. Serial No. 343,090. (No model.)

To all whom it may concern:

Be it known that we, EDUARD GRÜTZNER, of Romagna Grube, near Loslau, Germany, and OSCAR KOEHLER, of Czernitz, Upper Silesia, Germany, citizens of Germany, have invented certain new and useful Improvements in Apparatus for Treating Zinc Ores; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in apparatus for the condensation of zinc-vapors; and the object of our invention is to provide a new and improved apparatus for condensing zinc-vapors in an economical manner and so that the laborers are not injuriously affected by the gases.

The invention consists in the construction and combination of parts and details, as will be fully described and set forth hereinafter, and finally pointed out in the claims.

Figure 1 is a vertical longitudinal sectional view of our improved apparatus for condensing the products of zinc distillation. Fig. 1^a is an enlarged detail sectional view of the safety-box. Fig. 2 is a plan view of the same.

Similar letters of reference indicate corresponding parts.

Our apparatus for condensing the metallic vapors of zinc under the exclusion of air consists of two tanks or basins A B, placed endwise, as shown in Figs. 1 and 2, which basins or tanks are constructed of masonry and are lined with lead. The basin B has its bottom inclined from the basin or tank A toward the opposite end at an angle of about four in one hundred and is provided at its lower end with a collecting-trough P′. The tank or basin A holds the condenser C, made of sheet-iron and supported by transverse beams *b*, secured to the side walls of the tank or basin. The condenser C displaces a quantity of the water in the tank or basin A, causing the water to rise to the top of said condenser.

In the tank or basin B a cooling apparatus K′ is placed, which is open at the bottom and provided with a series of transverse partitions K^2, which alternately project from opposite sides of the condenser and are so arranged that the distance between them gradually decreases from that end of the condenser nearest the tank or basin A toward the opposite end. The lower ends of said partitions project into the water in the basin B. The upper surface of the condenser is also covered with water, which is retained on said condenser by the side walls projecting above the top of the condenser.

The condenser C and the cooling apparatus K′ are connected by the large tube R, and that end of the cooling apparatus opposite the one connected with the condenser is connected by pipe Z with a safety-box S^2, which serves for preventing the admission of air into the apparatus by being filled with water through the tunnel T.

The condenser C is provided at its top with a series of necks *r*, having elbow-tubes *h*, into which the tubes *k*′ can be inserted, which lead to a retort or furnace or to the muffles used heretofore. If desired, the necks can be connected with a series of forked or branched tubes leading to a number of retorts or muffles. In such case, however, the pipes must be so arranged that any one retort or muffle can be cut out without interfering with the rest.

For the purpose of avoiding explosion by the igniting of the zinc-vapors when mixed with air the connection between the necks *r* and the muffles or retorts must only be made when the safety-box S^2 and the condenser C are entirely filled with water, the condenser being filled with water by means of a tube *w*, which extends to near the bottom of the same. After the connection between the condenser and the retorts or muffles has been made and all the joints and seams closed by means of clay, and after the generation of vapors and gases in the retorts and muffles has begun, the water is removed from the condenser C by means of a pump and conducted into the tank B, so much water remaining in the condenser that the lower end of the pipe *w* projects about four inches into the water. Thereby a vacuum is created in the entire apparatus from the muffles or re-

torts to the safety-box S^2, so that the vapors and gases can expand and the metallic vapors are condensed and precipitated. The metallic oxides (zinc-dust) which are carried along mechanically by the gases while passing through the serpentine passage of the cooler collect upon the bottom of the basin or tank B. If now by opening the cock n the water is conducted out of the safety-box S^2 through the pipe n', and the cock is then closed immediately, the gases can be conducted from the cooling apparatus through the pipe Z into the safety-box S^2 and from the same through the pipe Z′ to a retort or furnace to be used as fuel, or to the smoke-stack, both of which create a draft, and the condensing apparatus is now in full operation. The current of the gases is so great that atmospheric air cannot enter at the end of the pipe Z′. Then after a certain time—about twenty-four hours—the charge in the muffles or retorts has been exhausted and the said muffles or retorts must be recharged. The safety-box S^2 is first filled with water to prevent the air passing into the apparatus. After the retorts or muffles have been charged the joints are closed and sealed, and when the formation of metallic vapors has begun the safety-box S^2 is again emptied and the condensation of the vapors begins, as previously stated. After a few days the metallic precipitations which have accumulated in the condenser C must be removed, which is done most advantageously while charging the retorts. Before doing this the safety-box S^2 and the condenser C are filled with water, the man-hole cover M of the condenser is removed, and the metallic precipitations are shoveled out of the condenser and are then refined. The man-hole is then closed and the water is again pumped out of the condenser in the manner previously described. The zinc-dust is drawn by means of suitable implements into the trough P′ and removed from the same without in any way interfering with the operation of the apparatus. If for some reason or other it is necessary and desired to cut out any one of the muffles or retorts, the same are not again charged. In such cases the safety-box S^2 and the condenser are filled with water, the corresponding tube h is disengaged from the corresponding neck r, and by means of a suitable cap said neck r is closed. Said retort or muffles can then easily be removed without interfering with the adjacent muffles or retorts. The small pipe p', connecting the tanks or basins A B, serves to conduct the cooling-water from the basin A into the basin B.

The above-described cooling apparatus can be arranged within the same building in which the furnaces are erected or outside of the same. It is economical and advisable to arrange two condensing apparatuses at the side of each other in two common basins or tanks and to use each cooling apparatus for a corresponding furnace arranged at the side of the same.

In the above-described apparatus the metallic vapors obtained by the distillation of zinc can be condensed under the exclusion of air and without any of the metallic oxides passing into the building containing the furnaces.

Our improved cooling device possesses the following advantages:

First. It prevents the escape of metallic vapors or oxides and of carbonic oxide into the apartments in which the workmen are employed, thus protecting the laborers from the injurious effects of these gases, to which they are now subjected while treating zinc ores.

Second. The cost of production is reduced, as the losses which heretofore amounted to from twenty to thirty per cent. are totally avoided.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. In an apparatus for the condensation of zinc-vapors, the combination, with two basins or tanks, of a closed condenser placed in one basin or tank, a cooling-vessel in the other basin or tank, a pipe connecting the condenser with the cooling-vessel, a box connected with the cooling-tank, pipes in said box adapted to be closed by a water seal formed in said box, and pipes for conducting fumes to the condenser, substantially as set forth.

2. In an apparatus for the condensation of zinc-vapors, the combination, with two tanks or basins, of which one has an inclined bottom, and a trough at the bottom of the inclination, of a closed condenser placed in one tank or basin, a cooling-vessel having an open bottom and a serpentine passage placed in the basin having the inclined bottom, a pipe connecting the condenser and cooling-vessel, a box connected with the cooling-vessel, pipes projecting into said box and adapted to be closed by a water seal in said box, and pipes for conducting the fumes to the condenser, substantially as set forth.

3. An apparatus for condensing zinc-vapors, comprising a closed condenser for receiving the zinc-fumes, pipes for conducting the fumes into said condenser, a tank or basin into which said condenser is placed, a cooling-vessel having an open bottom and serpentine passages in the same, a tank or basin in which said cooling-vessel is placed, and a pipe connecting the condenser with the cooling-vessel, substantially as set forth.

4. An apparatus for condensing zinc-vapors, comprising a closed vessel for receiving zinc-fumes, pipes for conducting the zinc-fumes to said condenser, a water tank or basin in which said condenser is placed, a cooling-vessel having an open bottom, a separate tank or vessel into which said cooling-

vessel is placed, which latter tank or vessel has an inclined bottom, and a trough at the bottom of said incline, a pipe connecting the condenser and the cooling-vessel, a box connected with the cooling-vessel, and pipes in said box, which pipes are adapted to be closed by a water seal formed into the box, substantially as set forth.

In testimony whereof we have affixed our signatures in presence of two witnesses.

EDUARD GRÜTZNER.
OSCAR KOEHLER.

Witnesses:
AUGUST SENDTER,
MARGOT HENNEK.