S. Wetherill,

Apparatus for Collection of White Oxide of Zinc,

No. 12,418, Patented Feb. 20, 1855.

Fig. 5

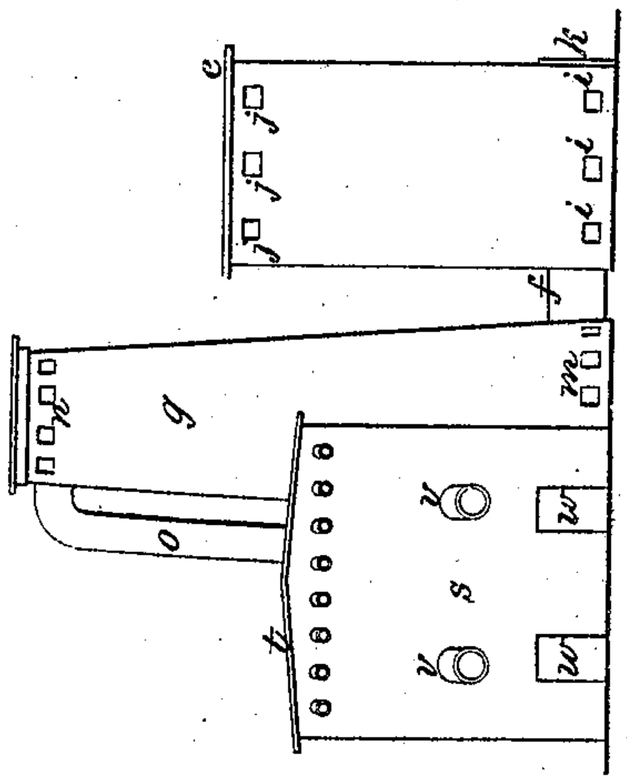


Fig. 3

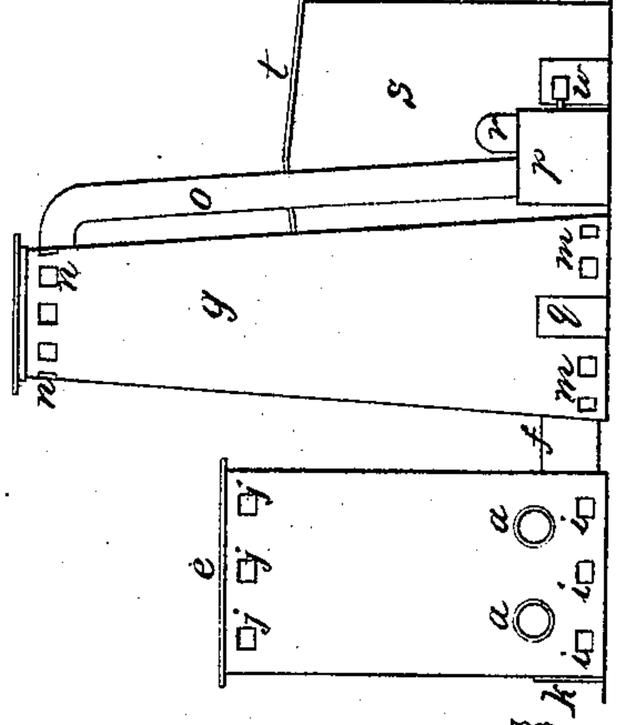


Fig. 4

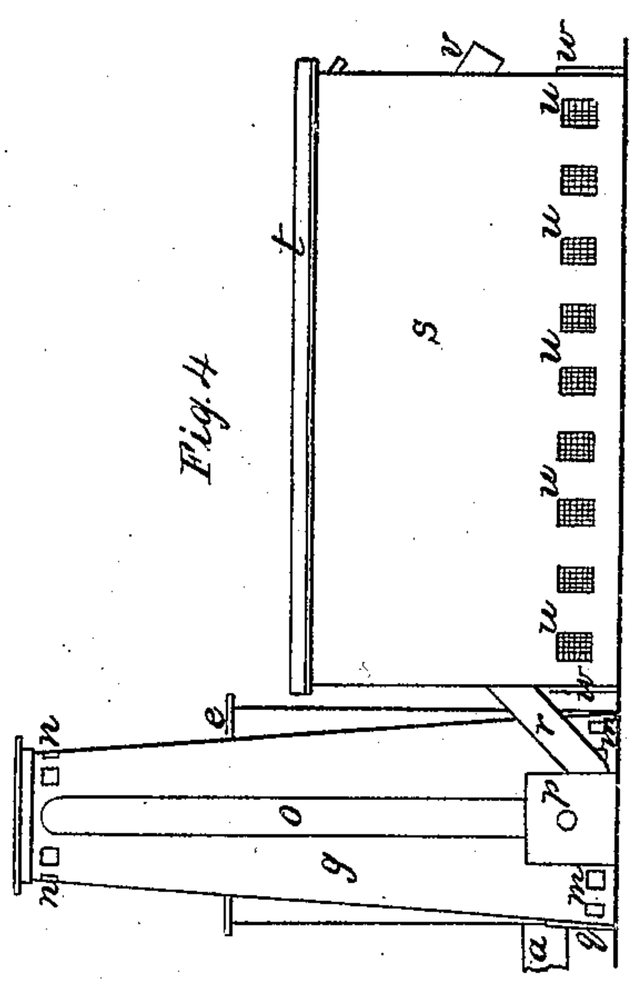


Fig. 2

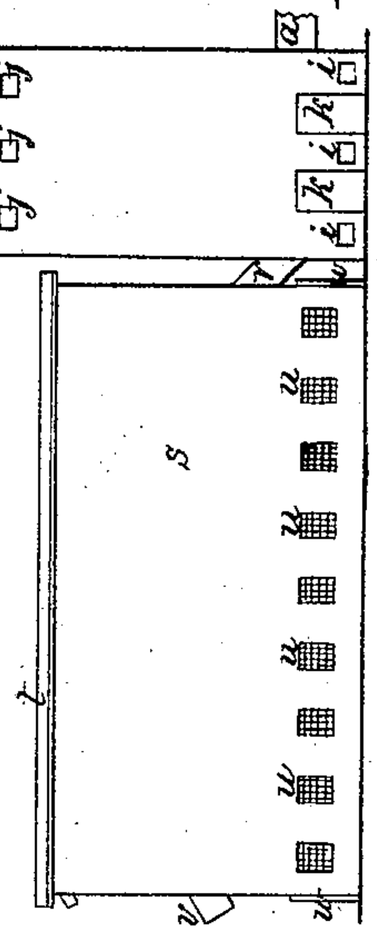


Fig. 7. B, b,

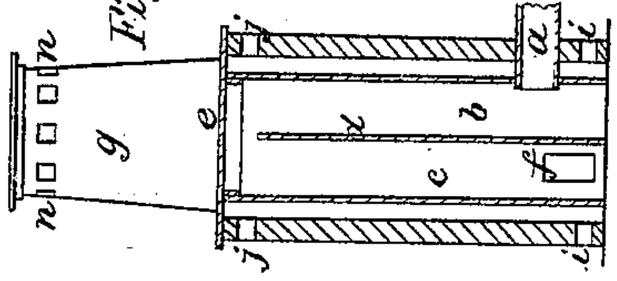


Fig. 6. A, a,

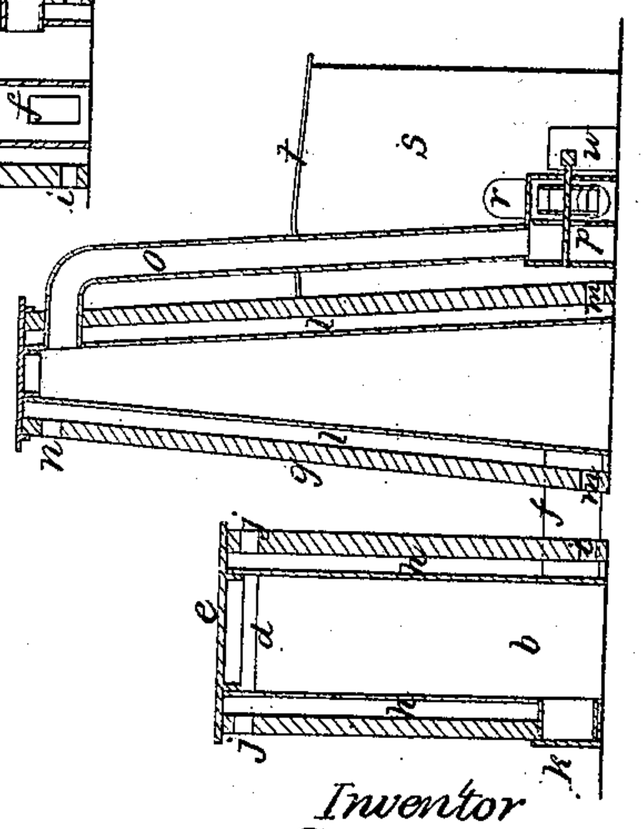
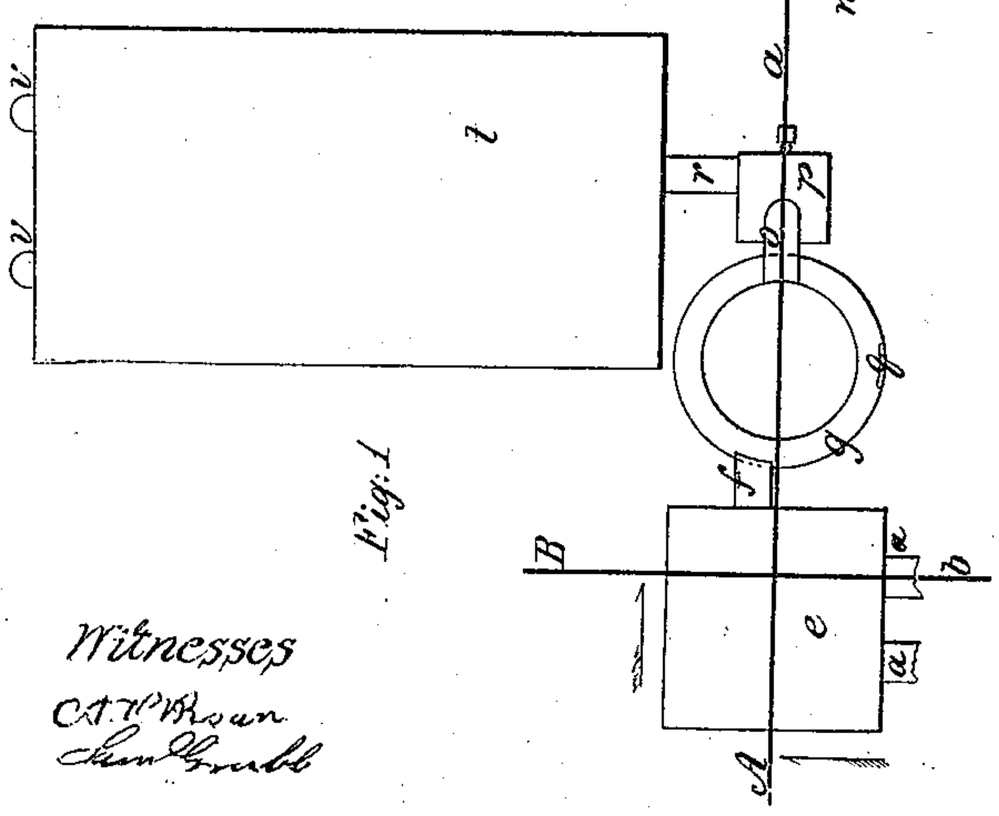


Fig. 1



Witnesses
C. A. W. Rowan
Saml Grubb

Inventor
Samuel Wetherill

UNITED STATES PATENT OFFICE.

SAMUEL WETHERILL, OF BETHLEHEM, PENNSYLVANIA.

IMPROVEMENT IN APPARATUS FOR SEPARATING ZINC-WHITE.

Specification forming part of Letters Patent No. 12,418, dated February 20, 1855.

To all whom it may concern:

Be it known that I, SAMUEL WETHERILL, of Bethlehem, in the State of Pennsylvania, have invented certain new and useful improvements in the apparatus for separating the white oxide of zinc from solid impurities, and for the cooling thereof, in the manufacture of the white oxide of zinc, which apparatus is also applicable to the separation of other gases from solid particles, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan; Figs. 2, 3, 4, 5, elevations of the four sides, and Figs. 6 and 7 vertical sections taken at the lines A *a* and B *b* of Fig. 1.

The same letters indicate like parts in all the figures.

In the process of manufacturing white oxide of zinc by the admixture of the ore with the fuel the force of the blast required for the reduction of the ore drives out of the furnace, with the vapor of zinc and other gases, solid particles of coal and ashes and other impurities which it is important to separate from the oxide of zinc; and it is also important to cool these gases before they are discharged into the collecting apparatus patented to S. T. Jones on or about the 24th day of February, 1852, which, consisting of a porous bag of muslin or other textile fabric, would otherwise be in danger of being inflamed.

The first part of my invention for effecting the separation of the white oxide of zinc from the solid impurities consists in causing the gases, as they escape with solid impurities from the furnace or other apparatus in which they are generated, to be carried by a blowing or exhausting apparatus upward through a high chamber or tower or series of chambers or towers or other equivalent therefor, the height of which is to be such relatively to the force of the current or currents that the oxide of zinc will be carried to the escape at the top, while the solid impurities, by reason of their greater specific gravity, will be left behind, and finally subside; and my invention also consists in partially cooling the white oxide and gases which are forced out of the furnace by the blast at a very high temperature during the process of separation by causing currents of air to pass through hollow spaces in the surrounding wall; and, finally, my invention consists in finally cooling the white oxide and gases by currents of air induced to enter through apertures in the lower part of the cooling-chamber by forcing the gases into the said chamber obliquely upward toward the roof of the cooling-chamber, which induces a partial vacuum in the lower portions of the chamber that atmospheric air may enter by atmospheric pressure.

In the accompanying drawings, *a a* represent two pipes, or "prolongs," as they are termed, for conducting the gaseous products from a furnace or furnaces or other apparatus for producing white-oxide of zinc from the ores thereof. These pipes discharge the gases into and near the bottom of a vertical chamber, *b*, separated from another like chamber, *c*, by a vertical partition, *d*, which extends from the bottom to within a short distance of the top or cover *e*, so that gases rising in the chamber *b* may pass over the partition in the chamber *c*, from whence they pass out near the bottom thereof through a pipe, *f*, into and near the bottom of a stack or tower, *g*. The walls surrounding the two chambers *b* and *c* are built of brick or other refractory material, and they are lined inside with metal or other suitable material, leaving a space, *h*, between the wall and the lining for the circulation of air, which enters at or near the bottom through holes *i* in the outer wall, and escapes near the top in corresponding holes, *j*, the upward current being induced by rarefaction. In this way the temperature of the inner lining of the walls is kept down, the walls are protected from the injurious effects of a high temperature, and the gases which enter the chamber *b* directly from the furnace or furnaces at a high temperature are gradually cooled. The two chambers are provided with doors *k k*, to give access for cleaning out the grosser impurities which may be deposited, particularly the chamber *b*, for the force of the upward current of gases from the furnace will not have sufficient power to carry the heavier particles of coal and other impurities that escape from the furnace with the metallic vapors and other gases. The stack or tower *g* is about twenty-two feet in diameter at the base, fifteen feet at top, and seventy-five feet in height. The wall is built of brick or other suitable material, and lined inside with sheet metal, leaving an open space,

l, between the two for the circulation of air, which enters through holes *m* near the bottom and escapes through corresponding holes, *n*, at top, in the same manner and for the same purpose as before described with reference to the chambers *b* and *c*. At or near the top of this tower there is a pipe, *o*, leading down to and connected with the exhausting part of a blower, *p*, by the action of which a current is produced from the furnaces, which will carry the gases through the chambers *b* and *c*, thence into and up the tower, and from the top thereof into the exhausting part of the blower, the force of which current, although sufficient to carry the metallic vapors and gases through this circuit will be insufficient to carry any of the solid particles of coal, ashes, and other impurities, which are of greater specific gravity, to the escape-pipe at the top of the tower. The heavier impurities will be deposited in the chamber *b*, but the lighter and more difficult to separate will deposit in the tower, from which they can be removed at pleasure through a door, *q*, near the bottom. From the blower there is a blast-pipe, *r*, which enters a cooling-chamber, *s*, at an angle of about forty-five degrees, to direct the blast of gases up toward the roof *t* of the said chamber, so that the direction of the blast shall induce a partial vacuum in the lower part of the chamber that currents of atmospheric air may enter through a range of apertures or windows, *u*, in the lower part of the walls, which apertures or windows are covered with fine wire-gauze. By this means an abundant supply of air is obtained to thoroughly cool the oxide of zinc and gases before they escape at the other end of the chamber through pipes *v v*, leading to the muslin or porous bag collecting apparatus patented by S. T. Jones on or about the 24th day of February, 1852. This cooling-chamber is provided with doors *w w*, to give access for withdrawing the white oxide, which is therein condensed and deposited.

I have thus described the mode of constructing and operating the apparatus which I have tried with success, and given the height of tower which effects the thorough separation of the oxide of zinc and gases from the solid impurities; but I do not wish to be understood as limiting myself to such special construction, arrangement, and proportions, as these may be varied without changing the principle or mode of operation which I have invented.

I claim—

1. The combination of the chambers *e*, *g*, and *s*, or their equivalents, arranged and operating as set forth.

2. The method of effecting the partial cooling of the white oxide zinc and gases before they reach the final cooling-chamber by currents of air passing through the hollow spaces in the surrounding walls, substantially as specified.

SAMUEL WETHERILL.

Witnesses:

A. P. BROWNE,

SAML. GRUBB.