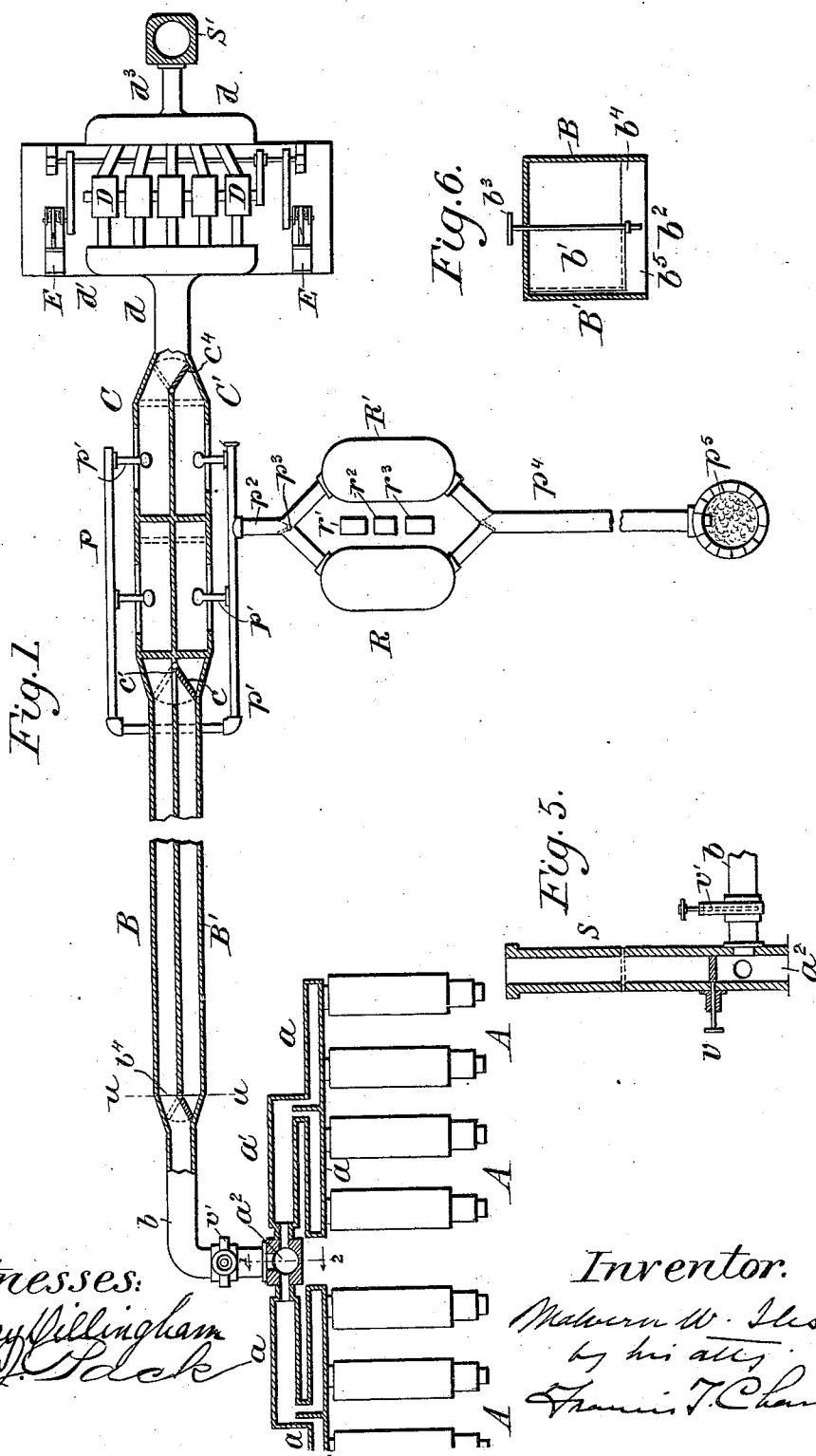


M. W. ILES.

APPARATUS FOR CONDENSING METALLIFEROUS FUMES.

No. 553,989.

Patented Feb. 4, 1896.



Witnesses:
Conway, Billingham
Ol. J. Lick

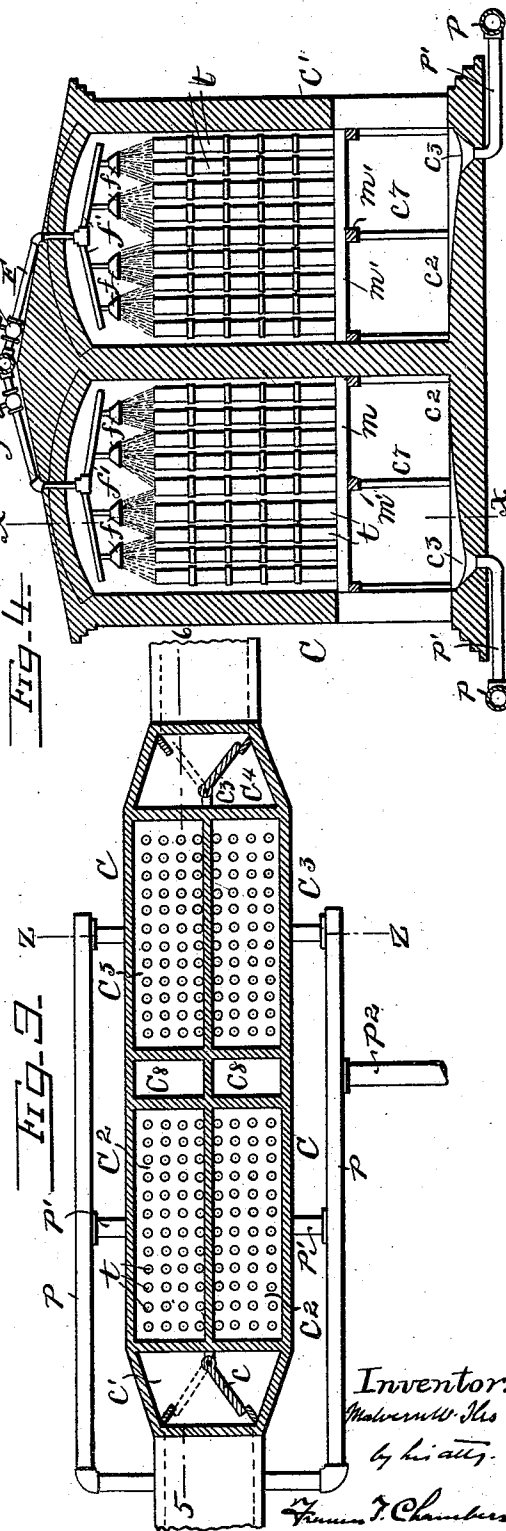
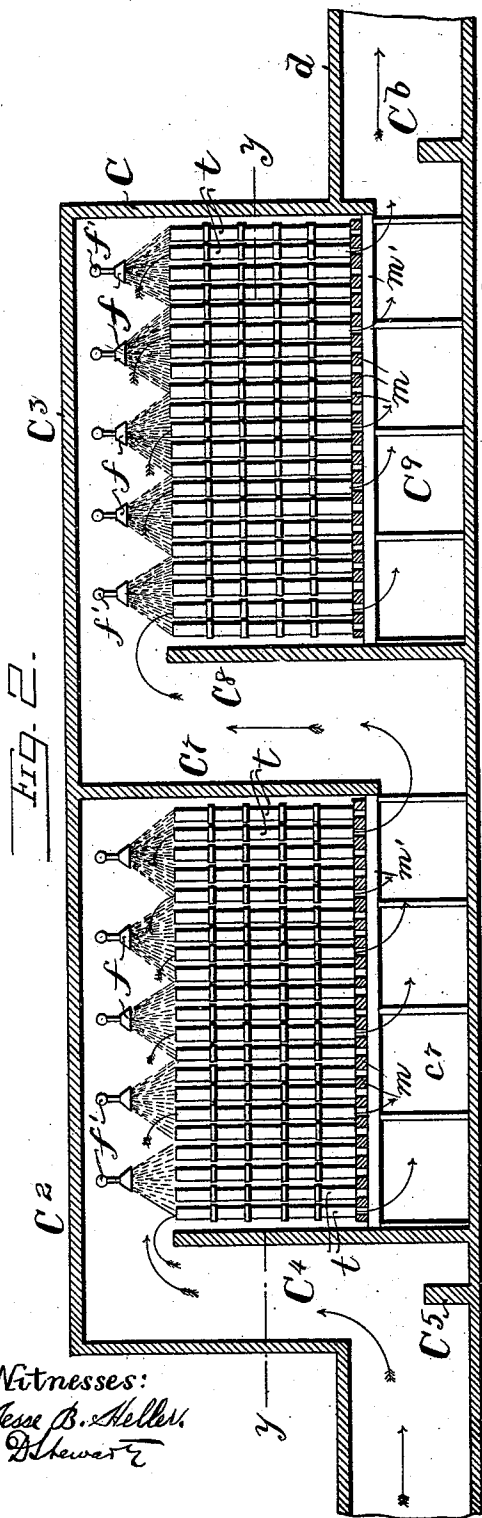
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UNITED STATES PATENT OFFICE.

MALVERN W. ILES, OF DENVER, COLORADO.

APPARATUS FOR CONDENSING METALLIFEROUS FUMES.

SPECIFICATION forming part of Letters Patent No. 553,989, dated February 4, 1896.

Application filed September 27, 1893, Serial No. 486,592. (No model.)

To all whom it may concern:

Be it known that I, MALVERN W. ILES, of Denver, county of Arapahoe, State of Colorado, have invented a certain new and useful Apparatus for Condensing Metalliferous Fumes, of which the following is an exact and true description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an apparatus for condensing smoke and metalliferous fume from metallurgic furnaces.

The main object of my invention is to provide an apparatus for condensing the disagreeable and dangerous fumes which arise from metallurgic furnaces, particularly those in which ores are roasted, and for collecting the condensed fume; and my invention consists, first, in providing a cooling-chamber for the fume and smoke as they come from the furnaces, preferably provided with two or more branches, so that one can be cooled while another is in use, and a condensing-chamber into which the cooling-chamber opens, provided with spraying-nozzles so arranged that a spray of water will be thrown always in the direction of the fume-current, and means for collecting the fume and separating it from the water carrying it, and in certain arrangements of apparatus, as will be more definitely pointed out in the claims affixed to and forming part of this specification.

My invention can best be explained by reference to the accompanying drawings, which illustrate an apparatus designed to carry out my method of condensing smoke and fumes, and in which—

Figure 1 is a plan view, partly in section, of a cooling and condensing apparatus for the smoke of the furnaces shown to the left. Fig. 2 is a vertical section, on the line xx of Fig. 4, of my preferred form of condensing-chamber. Fig. 3 is a sectional plan view on the line yy of Fig. 2; Fig. 4, a sectional end view on the line zz of Fig. 3; Fig. 5, a sectional view of the stack leading from the furnaces at the left of Fig. 1; and Fig. 6 is a section on the line ww of Fig. 1.

The smoke and metalliferous fumes which escape from roasting or other metallurgic furnaces I first cool, preferably by means of pass-

ing these gases through a long dust-chamber. From thence such of the fume as is not condensed is passed to a condensing-chamber, where the valuable metalliferous particles are condensed and carried away by means of a spray of water. This water, carrying with it the condensed metalliferous fume, is collected and the fumes separated therefrom by means of filtration.

The drawings illustrate a very convenient apparatus to carry out this method, and in Fig. 1 $A A$ represent a series of metallurgic furnaces, which are connected by means of passages $a a'$ to a chamber a^2 at the base of a stack S . Valves $v v'$ are arranged, as shown in Fig. 5, so that the smoke and metalliferous fume coming from the furnaces can either be turned up the stack S or out through the conduit to the cooling and condensing system. This system, which is best adapted for treating smoke and fumes from furnaces for roasting ore, consists, first, of a cooling or dust chamber B , in which the smoke and metalliferous fume is cooled, and in order to facilitate cleaning out the dust-chamber I prefer to arrange another similar chamber, B' , at the side of the chamber B and provide a gate b' , whereby the current of smoke and fume can be turned into either one or the other of these chambers. From the cooling-chamber B the fume is conducted to a condensing-chamber C , which I also preferably make in two parts, $C C'$, and provide gates c , pivoted at c' and c^4 , pivoted at c^5 , as shown in Fig. 3, so that the current can be turned into either side of the condensing-chamber, as preferred. This condensing-chamber is preferably provided, as shown in Fig. 2, with a wall C^4 , against which the fumes strike on entering the chamber, and by which they are thrown upward, as indicated by the arrows, an auxiliary wall C^5 being arranged slightly behind it, if desired. Between these walls the fume condensing on the walls C^4 is collected.

In the part C^2 of the chamber C are arranged a series of longitudinal supports m' and cross-bars m , (which may conveniently be of wood,) and on these I arrange a series of pipes t , and inasmuch as the fume and smoke is often of a very corrosive nature, carrying large quantities of sulphuric and sul-

phurous acid, it is necessary that these pipes should be made of some substance which will not be destroyed by the action of such acids, and I prefer to use drain-tiles as the cheapest and most easily arranged, though obviously any other tubes which would as successfully withstand the action of the corrosive acids could be used. These tiles are placed closely together, as shown in Fig. 3, and through and between them water is sprayed by means of pipes f' connected to a main water-pipe F and having spraying roses or nozzles f . Valves f^2 are arranged to govern the water-supply. It will be noted that the water is sprayed in the same direction as the current of smoke and gases, thereby not only not impeding the current, but rather aiding it.

Such of the gases and smoke as are not condensed in the portion C^2 of the condensing-chamber pass, as indicated by the arrows, to the chambers c^7 below the pipes T , then up through the passage c^8 , formed by walls C^7 and C^8 , to a portion C^3 , having vertical tubes and sprayers similar to those shown in portions C^2 of the condensing-chamber. Fume passes down through the pipes t in this portion C^3 of the condensing-chamber to the space c^9 beneath them and out through the conduit d , a wall C^6 being preferably arranged as shown to prevent any light condensed fume from being carried with the current of gases. This conduit d leads to a chamber d' , from which a series of fans D , operated by an engine E , as best shown in Fig. 1, exhaust the gases and force them into a chamber d^2 , whence they escape by means of a conduit d^3 into a stack S' .

The floors c^2 of the chambers C C' , as best shown in Fig. 4, are inclined to a basin-like depression c^3 , from which lead pipes p' , which connect with pipes p , from which a main p^2 leads to reservoirs R R' , as indicated in Fig. 1, a gate being provided at p^3 , whereby the water carrying the condensed fume may be turned into either of the reservoirs R R' at will.

r' r^2 r^3 are filter-presses which serve to separate the solid particles from the water by filtration, preferably after the solid particles have somewhat settled in the reservoirs R R' . From these reservoirs the water is conducted, by means of a pipe p^4 , to a well p^5 , which reaches down to gravel or to any other suitable place where it may be gotten rid of.

As indicated in Fig. 6, a wall b^4 is arranged at the entrance of the chambers B B' , extending a short distance up from the floor p^5 . The gate b' is pivoted at b^2 in such a manner that its lower extremity is stopped against the wall b^4 at some distance above the floor. The object of this is to raise the level of the gate b' , so that the fume which collects in the chambers will not prevent its being turned, as it would do if the lower edge of the gate were near the level of the floor b^5 .

It will be observed that in the condensing-chamber the water coming from the nozzles is always sprayed in the same direction as the current of gases, so that there is no hinderance to the flow of this current, and the gases, which come of course intensely heated from the furnaces, are first cooled in one or the other of the cooling-chambers B or B' , and a considerable portion of the fume condensed in these chambers. What is left is practically all condensed in the condensing-chambers C or C' and merely valueless gases go up the stack S' .

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus for condensing fume, the combination with a metallurgic furnace or furnaces, of a cooling-chamber B for conducting the smoke and metalliferous fume from said furnace or furnaces, a condensing-chamber C into which the chamber B opens having two or more sets of tubes or pipes therein, passages so arranged that the smoke and fume will be conducted through one set of the tubes after the other and nozzles for throwing a spray of water through said tubes always in the direction of the smoke-current so as not to impede but rather to aid the flow of the current, and means for collecting the water and separating it from the condensed fume carried thereby.

2. In an apparatus for condensing fume, the combination with a metallurgic furnace or furnaces, of two cooling-chambers B B' for conducting the smoke and metalliferous fume from the furnace or furnaces, a gate b' adapted to turn the current of smoke and fume into either of the cooling-chambers, a condensing-chamber C into which the chambers B B' lead, upright tubes t , in said chamber, and sprayers f adapted to throw a spray of water in the direction of the smoke-current, and a collecting-pipe for the water and condensed fume.

3. In a fume or dust collecting apparatus the combination, of two chambers as B B' , a wall b^4 at the entrance of said chambers, and a gate b' adapted to close either one or the other of said chambers and adapted to be stopped by the wall at a distance above the floor b^5 of the chambers, whereby the movement of the valve will not be impeded by the collected fume.

4. The combination with metallurgic furnaces A of cooling-chambers B B' leading therefrom, a gate b' governing the entrance to said chambers, condensing-chambers C C' into which the cooling-chambers lead, reservoirs R , pipes p' leading from the chambers C C' to the reservoirs R , and filters r' , &c., all substantially as and for the purpose specified.

5. A condensing-chamber C having a portion C^2 provided with vertical pipes t , an opening for introducing smoke and metallurgic fume above the pipes, and nozzles for spray-

ing water down through the pipes, a passage
c³ leading from below the pipes in the cham-
ber C² to the upper part of a corresponding
chamber C³ provided with tubes and sprayers
5 corresponding to those in the chamber C², the
floors c² of the chambers C² C³ being inclined
to basin-like depressions c³, and pipes for the

conveying away of the water and condensed
fume carried thereby leading from the ba-
sins c³.

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Witnesses:

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GEO. F. BURTCH.