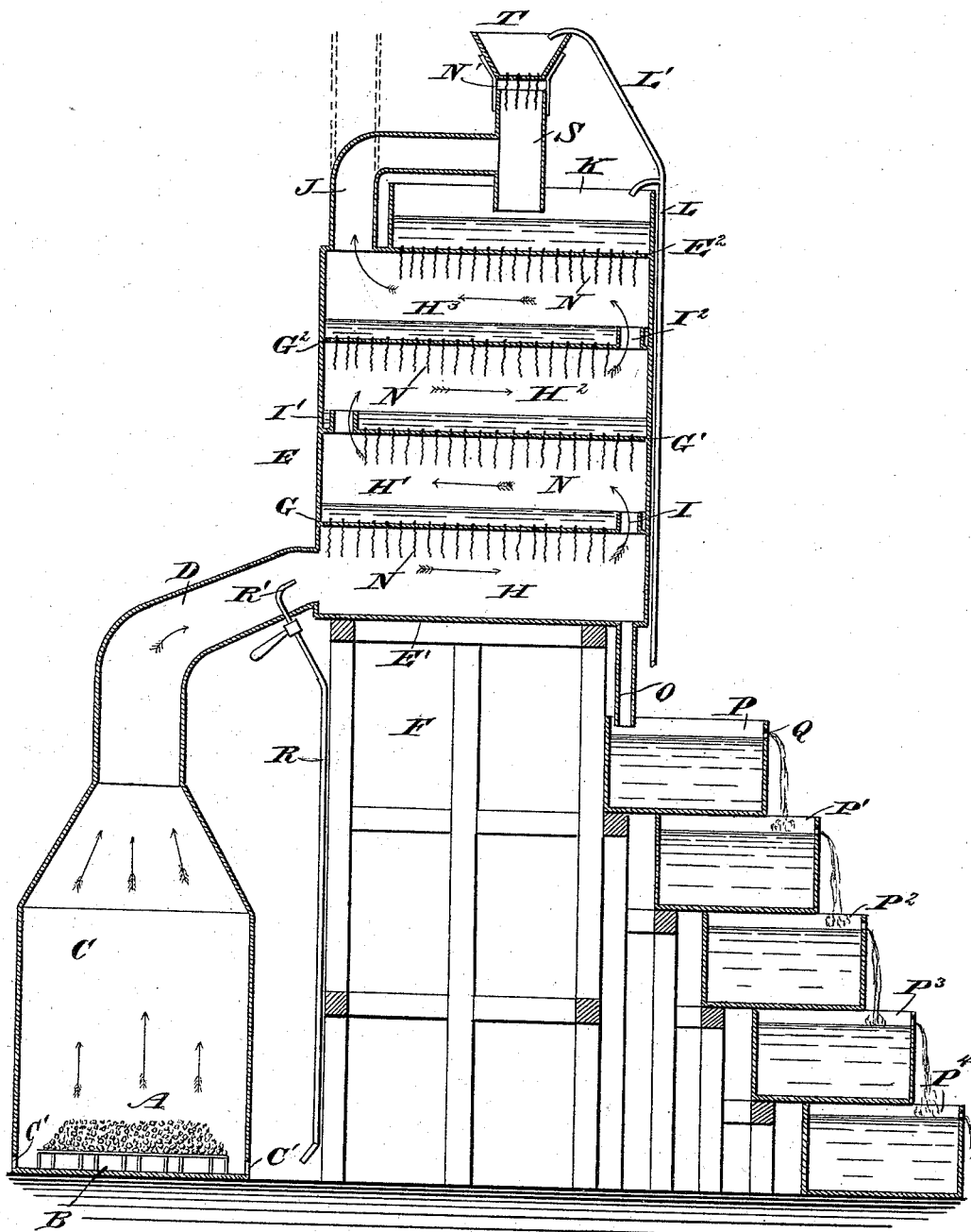


(No Model.)

F. MUELLER.
APPARATUS FOR CONDENSING FUMES.

No. 492,225.

Patented Feb. 21, 1893.



WITNESSES:

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FREDERICK MUELLER, OF BUTTE CITY, MONTANA.

APPARATUS FOR CONDENSING FUMES.

SPECIFICATION forming part of Letters Patent No. 492,225, dated February 21, 1893.

Application filed March 2, 1892. Serial No. 423,502. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK MUELLER, of Butte City, in the county of Silver Bow and State of Montana, have invented a new and Improved Apparatus for Condensing Fumes, of which the following is a full, clear, and exact description.

The invention relates to devices for roasting ore; and its object is to provide a new and improved apparatus for treating the metal carrying fumes arising and escaping from the ore under treatment, the apparatus serving to separate the fumes from the valuable metal, and saving the latter.

The invention consists principally of a series of compartments located one above the other and through which circulate the fumes, each compartment being formed with a water dripping device, and a top compartment charged with a liquid from a suitable reservoir.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawing forming a part of this specification, in which the figure represents a sectional side elevation of the improvement.

The ore A under treatment is piled on a suitable hearth B so that the ore is roasted in a pile in the usual manner. The ore, as well as the hearth B, is covered by a suitably constructed shed C formed, near its lower end, with openings C' which admit the necessary air for combustion. The shed C is formed with an outlet flue D connecting with a casing E directly above the bottom E' of the same, as is plainly shown in the drawing. This casing E is supported on a suitable framework F and is provided with a series of horizontal partitions G, G' and G², dividing the casing into a series of compartments H, H', H² and H³, located one above the other, the lower one H being connected with the flue D previously mentioned.

The several compartments H, H', H² and H³, are connected with each other at opposite ends by short pipes I, I' and I² extending upward from the respective partition, as is plainly shown in the drawing. The uppermost compartment H³ is connected with a chimney J

for finally carrying off the cleaned fumes and gases. On the top E² of the casing E is arranged a reservoir K charged with water containing suitable chemicals such as salt, &c., the liquid being supplied through a pipe L connected with a suitable source of supply.

In the top E² and in each of the partitions G², G' and G are formed apertures in which are inserted or plugged short ropes or cords N of any suitable fibrous material, the said ropes or cords extending a short distance into the compartment, as will be readily understood by reference to the drawing. It will be seen that by this arrangement the liquid in the reservoir K can percolate through the fibrous material of the cords or ropes N to drip into the compartment H³ from which the accumulating liquid can drip through the next set of ropes or cords N in the partition G² to the compartment H², and from the latter the liquid again drips in a similar manner into the next compartment H' and from the latter to finally pass into the lowermost compartment H precisely in the same manner. The smoke and gases entering the lowermost compartment H circulate freely through the same and the dripping liquid, so that part of the fumes are condensed, the rest passing through the short pipe I into the next compartment H' and through the same and the dripping liquid to the outlet I', through the same into the next compartment H², and so on, until the reduced and cleaned fumes finally pass into the chimney J.

In the bottom E' of the casing E, opposite the entrance of the flue D, is arranged an outlet pipe O to carry off the liquid and the metals carried by the said liquid and precipitated from the fumes in the manner above described. The liquid flows through the pipe O into a receptacle P containing scrap iron or chemicals which will precipitate the metals carried by the water coming down the pipe O.

In the front and near the upper edge of the receptacle P is formed an overflow Q, through which the liquid passes to be discharged into a second receptacle P' similar in construction to the receptacle P and also containing scrap iron or chemicals to precipitate the metals still contained in the liquid flowing from the receptacle P. Any desired number of receptacles P², P³, P⁴, &c., like the receptacles P

and P', may be employed, the one discharging into the other through an overflow, as described.

In order to prevent a too rapid flow of the fumes through the casing E, the fumes are saturated with steam at the time they enter the compartment H through the flue D. For this purpose, a steam pipe R is provided, connected with a suitable source of steam supply and extending through its upper end and into the flue D, near the entrance of the latter, into the compartment H. The inner end of the pipe R is formed with a nozzle R' bent in the direction of the casing E and through which the steam escapes to mingle with the forwardly and upwardly traveling fumes rising from the pile of ore. By saturating the fumes with steam they are rendered heavier and thereby their passage through the casing is retarded.

The chimney J may lead directly into the open air or it may connect, as shown in the drawing, with a vertically arranged tube S discharging at its lower end into the reservoir K. Above the upper end of the said tube S is arranged a hopper T connected by a pipe L' with the liquid supply pipe L. In the bottom of this hopper T are arranged ropes or cords N' of fibrous material similar to the ropes or cords N previously mentioned, and serving the same purpose; that is, permitting the liquid of the hopper T to percolate through the ropes or cords to drip into the tube S to condense the escaping fumes.

The several compartments may be provided with suitable doors in the sides to permit workmen to enter the compartments for cleaning or repairing, as the case may require.

The operation is as follows: The fumes arising from the ore pile A, pass into the flue D to be infused with the steam issuing from the nozzle R'. The fumes then enter the compartment H and pass through the dripping liquid so that the metallic particles contained in the fumes are collected or gathered, the liquid washing the metallic particles through the pipe O into the first receptacle P to be precipitated therein by the scrap iron or chemicals, as previously explained. The fumes, after passing through the compartment H, escape through the pipe I into the next compartment H' to be again subjected to the dripping liquid so that any remaining metallic particles are precipitated and pass through the openings in the partition G, and the cords or ropes into the compartment H, to finally pass into the pipe O to be further treated as above described. This operation is repeated in each of the compartments H² and H³, and the fumes finally escaping through the chimney J may again be treated to the dripping liquid coming down from the hopper T. Now, in lead smelting furnaces for instance, the sulphuric acid contained in the fumes, in connection with the dripping liquid, will increase the specific weight and cause condensation of the fumes, and the particles of metal will

drop with the liquid and pass by the pipe O into the receptacle P to be further treated, as above described.

It will be seen that the metals contained in the liquid and passing into the several receptacles P, P', P² and P³, will be precipitated in the said receptacles by the scrap iron or chemicals, so that the water finally discharged from the lowermost receptacle is comparatively pure. The receptacles P, P', P², P³, &c., are cleaned from time to time to collect the precipitated valuable metals.

It is understood that this device can be readily applied to any furnace, flue or chimney by connecting the same with the compartment H.

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

1. An apparatus for condensing fumes, comprising a casing having a series of compartments one above the other and communicating with each other, each compartment having its floor perforated and provided with cords or ropes passing through said perforations and depending into the compartment next below, the lower compartment being provided with an inlet and the upper one with an outlet, substantially as and for the purpose set forth.

2. An apparatus for condensing fumes, comprising a casing formed with a series of horizontally extending partitions forming compartments located one above the other, the lowermost compartment being connected with the fume inlet a series of cords or ropes held in each of the partitions and arranged to permit the liquid contained in one compartment to percolate through the said cords or ropes into the next compartment below, the liquid finally dripping from the cords or ropes, and short pipes held in each of the said partitions to connect the several compartments with each other, substantially as shown and described.

3. An apparatus for condensing fumes, comprising a casing formed with a series of horizontally extending partitions forming compartments located one above the other, the lowermost compartment being connected with the fume inlet, a series of cords or ropes held in each of the partitions and arranged to permit the liquid contained in one compartment to percolate through the said cords or ropes into the next compartment below, the liquid finally dripping from the cords or ropes, short pipes held in each of the said partitions to connect the several compartments with each other, and a reservoir located above the said casing and discharging through cords or ropes into the uppermost compartment, substantially as shown and described.

4. An apparatus for condensing fumes, comprising a casing formed with a series of horizontally extending partitions forming compartments located one above the other, the lowermost compartment being connected with

the fume inlet, a series of cords or ropes held in each of the partitions and arranged to permit the liquid contained in one compartment to percolate through the said cords or ropes into the next compartment below, the liquid finally dripping from the cords or ropes, short pipes held in each of the said partitions to connect the several compartments with each other, a reservoir located above the said casing and discharging through cords or ropes into the uppermost compartment, and a series of receptacles for containing precipitating substances in particles and one connected with the other by an overflow, the uppermost receptacle being connected with the lowermost compartment in the said casing, substantially as shown and described.

5. An apparatus for condensing fumes, comprising a casing formed with a series of horizontally extending partitions forming compartments located one above the other, the lowermost compartment being connected with

the fume inlet, a series of cords or ropes held in each of the partitions and arranged to permit the liquid contained in one compartment to percolate through the said cords or ropes into the next compartment below, the liquid finally dripping from the cords or ropes, short pipes held in each of the said partitions to connect the several compartments with each other, and a steam pipe discharging into the fume inlet flue at the point of the entrance of the latter into the lowermost compartment of the casing, substantially as shown and described.

6. An apparatus for condensing fumes, provided with a casing having partitions each formed with perforations, and ropes or cords held in the said perforations, substantially as shown and described.

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Witnesses:

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L. P. BOWMAN.