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R. BAGGALEY.

APPARATUS FOR REMOVING IMPURITIES FROM FURNACE GASES.

APPLICATION FILED SEPT. 24, 1903.

NO MODEL.

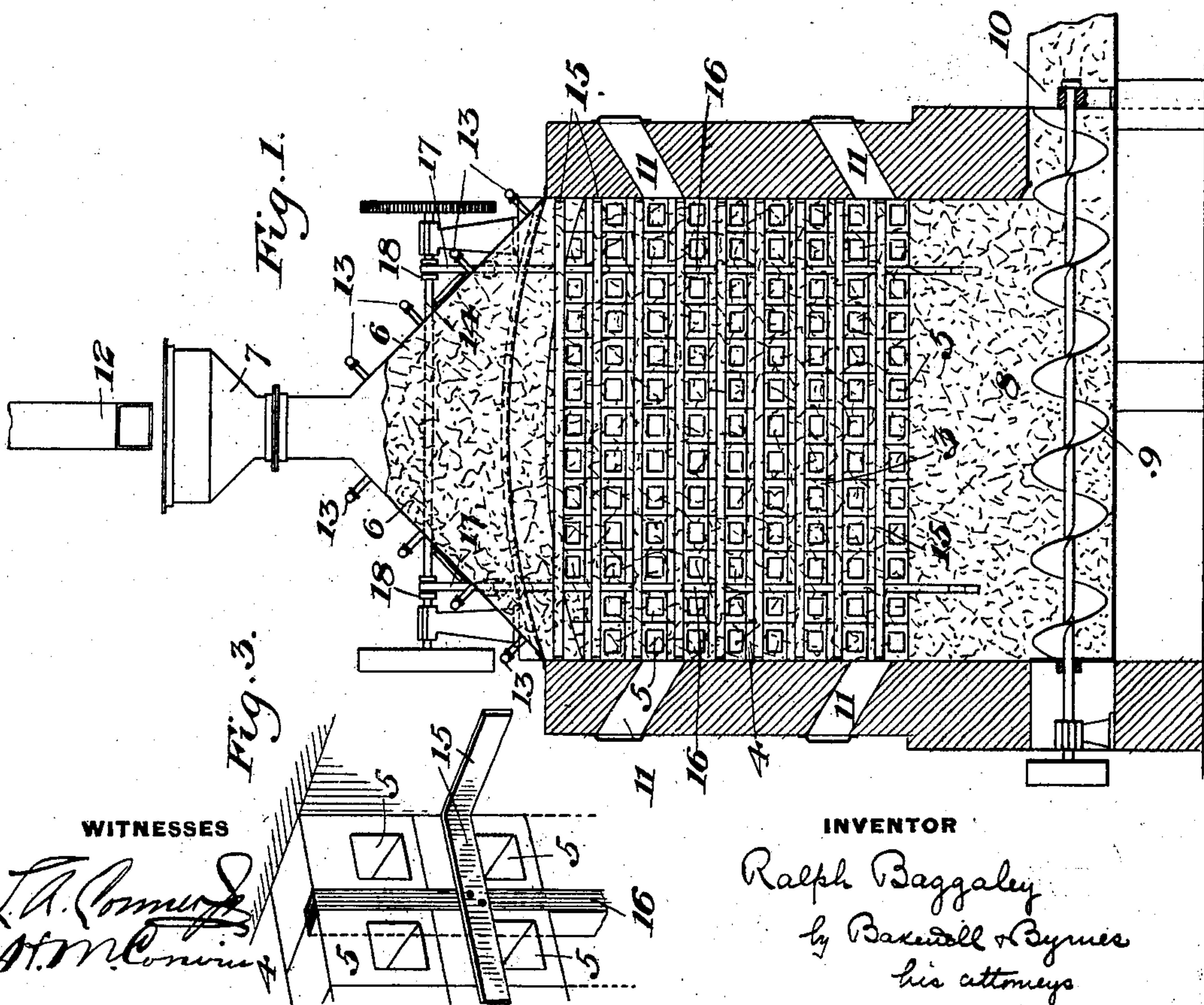
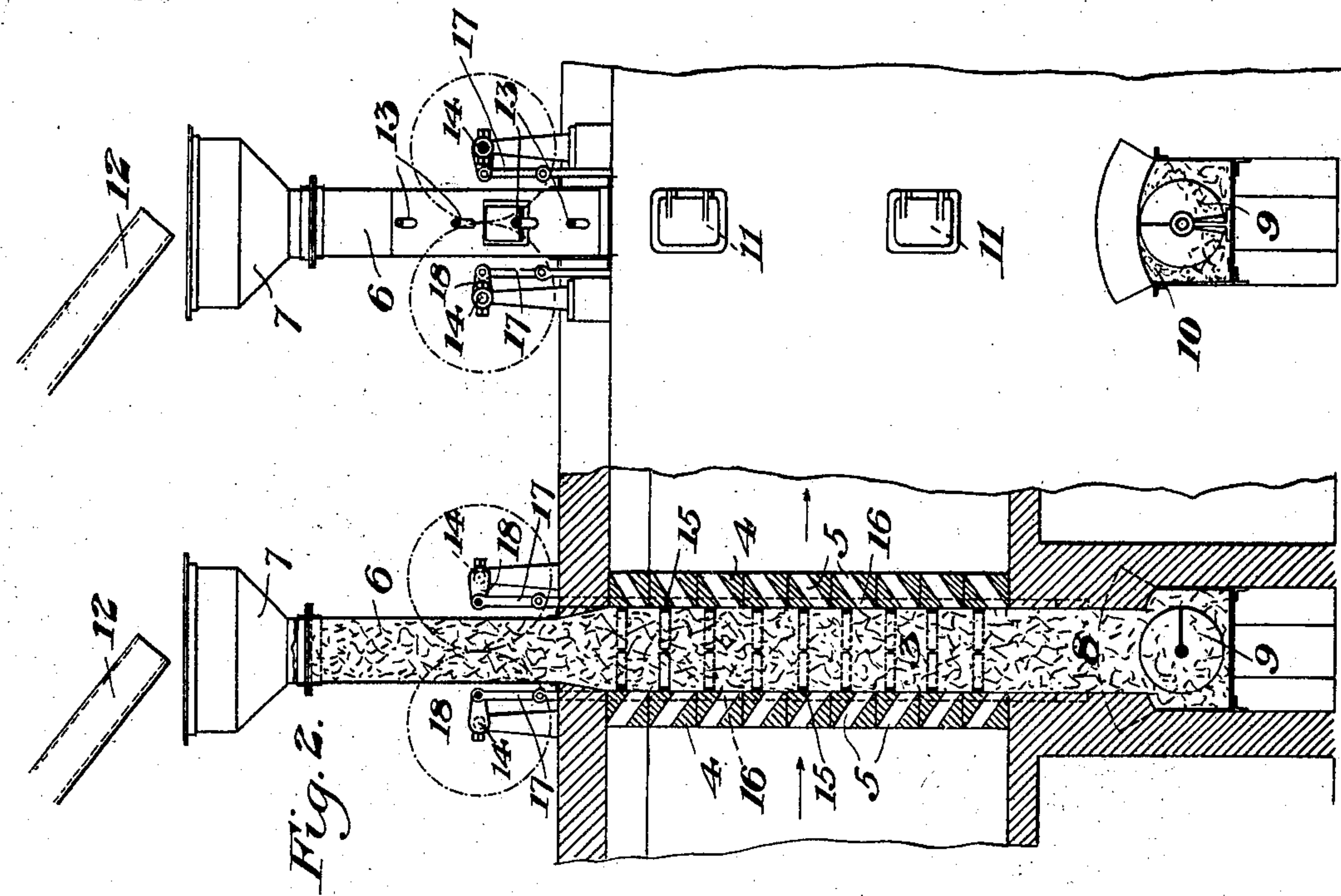


Fig. 3.

WITNESSES

*L. A. Conner*  
*A. M. Conner*

INVENTOR

*Ralph Baggageley*  
*by Baxendell & Byrnes*  
*his attorneys*



# UNITED STATES PATENT OFFICE.

RALPH BAGGALEY, OF PITTSBURG, PENNSYLVANIA.

APPARATUS FOR REMOVING IMPURITIES FROM FURNACE-GASES.

SPECIFICATION forming part of Letters Patent No. 746,261, dated December 8, 1903.

Application filed September 24, 1903. Serial No. 174,432. (No model.)

*To all whom it may concern:*

Be it known that I, RALPH BAGGALEY, of Pittsburgh, Allegheny county, Pennsylvania, have invented a new and useful Apparatus  
5 for Removing Impurities from Furnace-Gases, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

10 Figure 1 is a vertical cross-section of apparatus embodying my invention, the section plane extending through one of the charcoal-containing chambers. Fig. 2 is a side elevation, partly in vertical longitudinal section.

15 Fig. 3 is a perspective view, on a larger scale, showing the cutter-bar mechanism for removing from the walls incrustations deposited from the furnace-gases.

My invention is designed to prevent the devastating effects to vegetation and to the streams arising from the smelting or copper  
20 ores containing sulfur, arsenic, &c. It is well known that the country surrounding smelting plants, sometimes for many miles distant, is devastated through the destruction of vegetation by the fumes inseparable from the fusion of sulfid ores.

In a furnace smelting three hundred and sixty tons of ore that contains, say, twenty  
30 per cent. of sulfur from sixty to seventy-five tons of sulfur are volatilized daily and of course deposited in the surrounding country. On damp or rainy days the sulfur will fall within a short distance of the smelter-stack.  
35 On clear days it will often be carried for a distance of fifteen or twenty miles. The result is the same wherever it falls. Vegetation is destroyed, and the sulfur is carried by the surface drainage into the streams and  
40 ponds, and the water is polluted and rendered unfit for use. A still more injurious effect is produced when the ores contain arsenic, which is also volatilized and when carried into the streams renders the water poisonous. So serious  
45 has this become that it is impossible to operate smelting plants and to conduct agriculture successfully in the same district.

My invention is intended to prevent in an economical manner these objectional features  
50 of the smelting industry as at present practiced.

I have found that by interposing screens

or filters of broken material, preferably charcoal set within enlarged chambers located between the smelting-furnace and the stack  
55 or located between the smelting-furnace and a suitable fan or other mechanical device for producing an induced draft, these obnoxious sulfur fumes will be absorbed effectually up to the point where the charcoal has been  
60 increased approximately twenty per cent. of its weight.

In order to secure the most effective results in the operation of apparatus such as described above, it is necessary to provide means  
65 for removing the incrustated impurities from the walls. A portion of the deposited impurities will precipitate as a hard mass in the flues on the interior of the flue-walls, and especially around the interior edges of each flue, and as  
70 the tonnage precipitated is very great such accumulations of incrustations, &c., are necessarily quite rapid, and in time projections of precipitated material on the interior of the  
75 flue-walls will interfere with and obstruct the draft and in time may clog and obstruct the travel of the screens. It is important that these obstructions be quickly and cheaply removed from the interior walls so often as may  
80 be desired and in such a manner that the apparatus will not be thrown out of service or its successful working be delayed or interfered with. It is also of importance that this work  
85 should be accomplished without manual labor. I effect the removal of these hard incrustations by the use of cutter-bars actuated by suitable mechanism, which maintains them  
90 in motion along the surface of the flue-walls, so that they will forcibly dislodge the incrustations, and thus keep the flues freely open for the passage of the gases.

In the drawings, in which I show the preferable construction of my apparatus, 3 is a chamber connected at one end with the down-  
95 comer-pipe of a smelting-furnace and at the other end communicating with a stack or other means for drawing the smelter-gases rapidly through it. The chamber is provided at intervals with the screens above mentioned. Each screen is formed by vertical  
100 double walls 4 4, having perforations 5 5, which are inclined upwardly in order to prevent loss of the charcoal contents and offer free passage to the smelter-gases. Each



screen-chamber has at its upper end a feeding-space 6, preferably formed with upwardly-converging walls and communicating with a feed-hopper 7, and at its lower end it terminates in a space 8, provided with a screw conveyer 9 or like discharging mechanism adapted to discharge the screen material at an opening 10. At the ends of the screen spaces or chambers are openings 11, fitted with suitable doors and adapted to permit the admission of a poking-tool when it is desired to facilitate the discharge of the contents.

At the upper end of each screen-chamber are pipes 13, by which water or alkaline solution may be introduced in quantities, as desired. The fresh charges of charcoal are fed into the hopper by spouts or chutes 12, which lead from suitable sources of supply, so that the feeding and discharge of the charcoal may be effected without manual labor.

In use of the apparatus the screen-chambers between the perforated walls are filled with charcoal introduced through the hoppers, and the charcoal of the third screen is kept drenched from the pipes 13 by a simple alkaline solution or a solution of sulfid of calcium for the sole purpose of precipitating any remaining arsenic.

In order to present fresh charcoal surfaces to the gases from time to time, a part of the charcoal is withdrawn at the bottom of the screen-chambers, its place being taken by charcoal fed through the hoppers, the rapidity of the withdrawal of the charcoal being governed by the percentage of impurities contained in the ores under treatment.

The cutters by which the hard incrustations deposited on the walls are dislodged are preferably constructed as follows: 15 15 are bars which extend horizontally across the screen-chamber and are connected by vertical rods 16, set in grooves in the masonry walls and adapted to be reciprocated by links 17 from cranks 18 on shafts 14. The bars 15 may be made of hard wood, faced with brass or other material not corrodible by the furnace-gases, or they may be made entirely of brass. The bars on opposite sides of the screen-chambers are moved by the cranks in opposite directions, and thus constantly free the interior of the chamber from incrustations, allowing the filtering material to drop readily without obstruction. The upright bars or rods which carry the cutter-bars are sunk in vertical grooves in the walls of the flues, in which manner they are protected from the action of the gases and are also partially protected from the action of the water

and the alkaline solutions on the filtering material. Each cutter-bar when at rest is shielded and protected from the action of the gases by reason of its position between the flue-mouths. Each upright bar is provided with guides both above and below, that hold it rigidly in the exact position necessary to enable the cutter-bars to do the most effective work in their mission of removing such incrustations and precipitated materials. The cutter-bars themselves may work continuously and slowly or intermittently and rapidly, as may be found in practice to best suit the work and to produce the most economical results, in each plant where my invention may be utilized, and at the corners of the screen-chambers the cutter-bars may be given an angular form, as shown in Fig. 3, in order to operate upon the end walls of the chambers, as well as upon the side walls.

Within the scope of my invention as defined in the claims the cutter-bar mechanism may be used in apparatus employing material other than charcoal as the filtering agent.

I do not claim herein broadly the use of cutters for removing incrustations from the flue-walls of gas-filtering apparatus, since I have made such claim in an application filed by me on June 27, 1903, Serial No. 163,322.

I claim herein as my invention—

1. Apparatus for removing impurities from gases, comprising in combination with a chamber through which the gases pass, cutter-bars, and reciprocating bars set in grooves in the chamber-wall and carrying the cutter-bars; substantially as described.

2. Apparatus for removing impurities from gases, comprising in combination with a chamber through which the gases pass, cutter-bars, and moving mechanism set in grooves in the chamber-wall and carrying the cutter-bars; substantially as described.

3. Apparatus for removing impurities from gases, comprising a charcoal screen interposed in the path of the gases, moving mechanism adapted to remove the impregnated charcoal from the base of the screen, means for feeding fresh material to the screen to replace the portions removed, and cutter mechanism arranged to dislodge deposited impurities from the walls of the apparatus; substantially as described.

In testimony whereof I have hereunto set my hand.

RALPH BAGGALEY.

Witnesses:

GEO. B. BLEMING,  
JOHN MILLER.