(No Model.) 2 Sheets—Sheet 1.

E. KRATZER.

APPARATUS FOR REDUCING ANTIMONY ORES.

No. 563,234. Patented June 30, 1896.

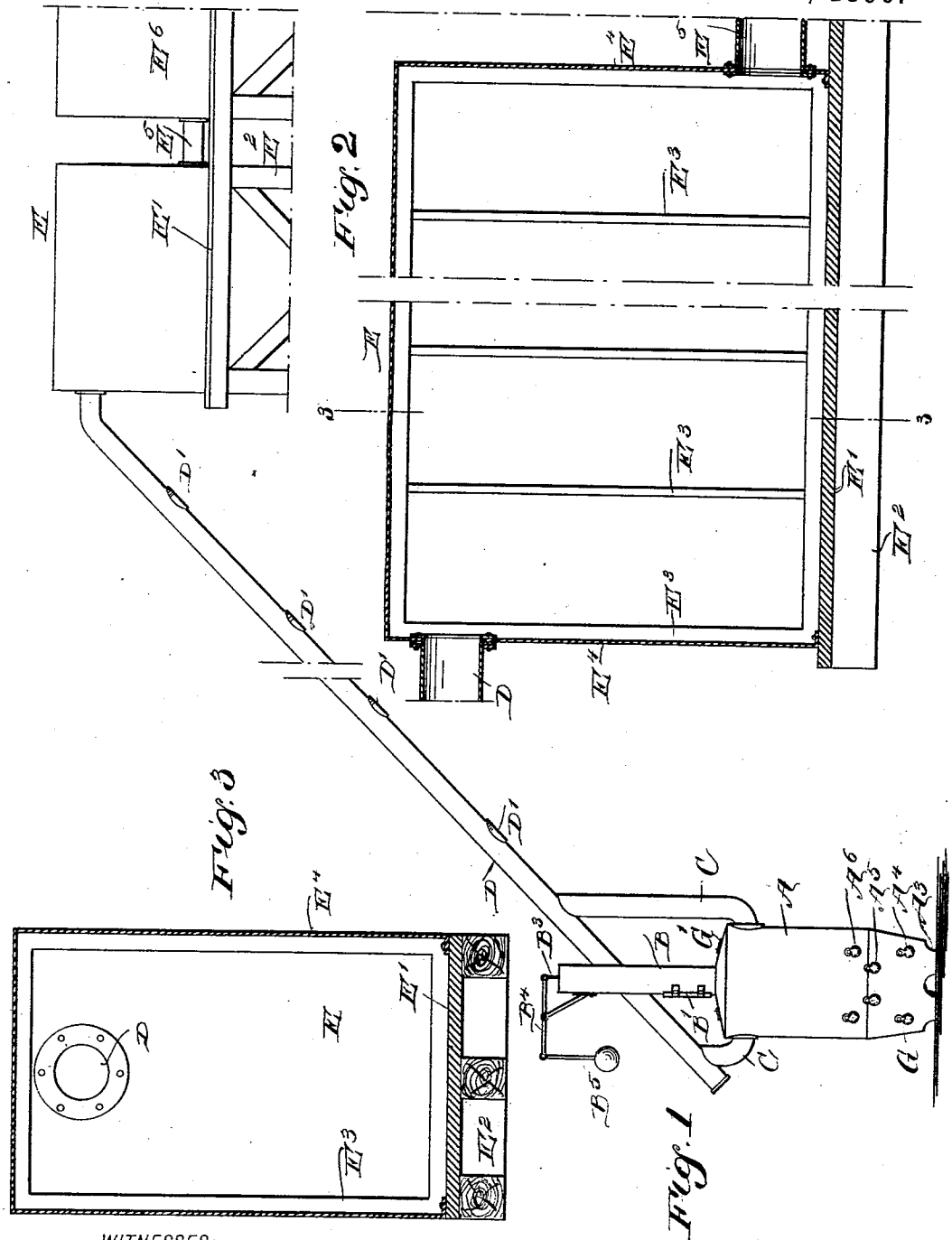

Fig. 2

Fig. 3

Fig. 1

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INVENTOR

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(No Model.) 2 Sheets—Sheet 2.

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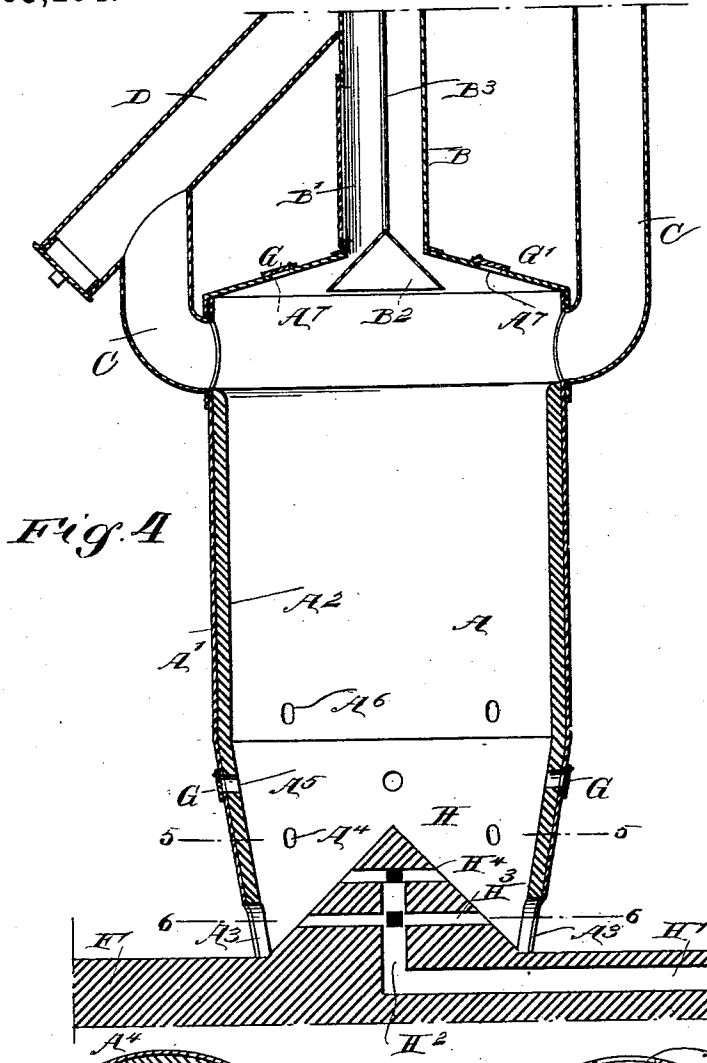

Fig. 4

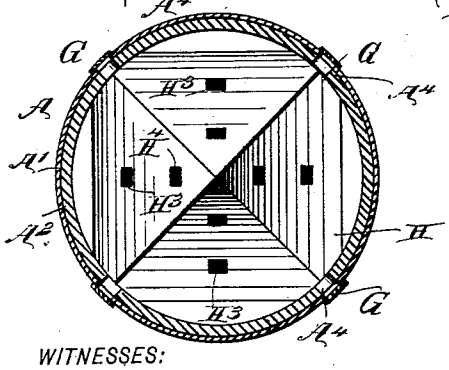

Fig. 5

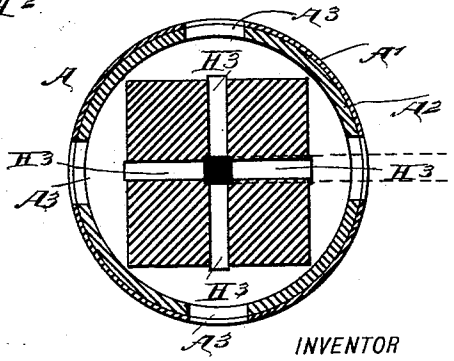

Fig. 6

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UNITED STATES PATENT OFFICE.

EDWIN KRATZER, OF THOMPSON FALLS, MONTANA.

APPARATUS FOR REDUCING ANTIMONY ORES.

SPECIFICATION forming part of Letters Patent No. 563,234, dated June 30, 1896.

Application filed June 19, 1894. Serial No. 515,046. (No model.)

To all whom it may concern:

Be it known that I, EDWIN KRATZER, of Thompson Falls, in the county of Missoula and State of Montana, have invented a new and Improved Apparatus for Reducing Antimony Ores, of which the following is a full, clear, and exact description.

The object of my invention is to provide a new and improved apparatus to extract antimony from its ores, separate it from the gangue in a simple and economical manner by sintering the ore, fuming, oxidizing, and condensing the antimony and collecting it as an oxid of antimony in form of a powder in a common condenser.

The apparatus consists principally of a center or draft furnace having side-draft holes and a cone or equivalent body in its bottom, the cone being formed with a center-draft inlet and a series of channels leading from the inlet to the sides of the cone.

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

Figure 1 is a side elevation of the improved apparatus. Fig. 2 is an enlarged sectional side elevation of one of the condensers. Fig. 3 is a transverse section of the same on the line 3 3 of Fig. 2. Fig. 4 is an enlarged sectional side elevation of the center-draft furnace. Fig. 5 is a sectional plan view of the same on the line 5 5 of Fig. 4, and Fig. 6 is a similar view of the same on the line 6 6 of Fig. 4.

The improved apparatus is provided with a center-draft furnace A, (shown in detail in Figs. 4, 5, and 6,) and formed with an outer shell A′, made of sheet metal and lined on the inside with fire-brick A^2. The lower portion of the furnace is somewhat contracted, and in the top is arranged a charging-pipe B, formed in one side with a door B′ for introducing the antimony ore to be treated. The pipe B can be closed at its inner end by a bell B^2, held on a rod B^3, extending upward through the pipe B, to connect at its upper outer end with a lever B^4, carrying a weight B^5, to hold the bell normally in a closed position.

From the upper end of the furnace A lead the branch pipes C, connecting with a cooling-pipe D, extending, preferably, at an angle of about forty-five degrees in an upward direction and for a considerable distance, to finally connect at its upper end with a condenser E. (Shown in detail in Figs. 2 and 3.) In the bottom of the pipe D are arranged suitable doors D′, placed sufficient distances apart and adapted to be opened from time to time for removing any oxid of antimony which may precipitate in the said pipe.

The condenser E is provided with a floor E′, made of matched boards and set on a suitable framework E^2, and on the top of this floor E′ are set a series of transversely-extending frames E^3, over which is stretched canvas E^4, of a fine mesh, to permit sulfuric acid to escape, but to prevent the escape of antimony fumes, so as to precipitate the antimony in the shape of the oxid of antimony in a white powder form on the floor E′. The end of the condenser E, opposite the inlet of the pipe D, is connected by a branch pipe E^5 with a second condenser E^6, similar in construction to the condenser E, and any number of such condensers may be connected with each other to completely precipitate all the oxid of antimony contained in the fumes.

The lower end of the furnace A is set on a suitable base F, and is formed near the same with large draft-openings A^3, opening upon the base of a cone or a pyramid H, arranged in the bottom of the furnace A, and built on the base F, as plainly shown in Figs. 4, 5, and 6. Through the base F extends a draft-channel H′, leading to a vertical channel H^2, arranged centrally in the cone or pyramid H, and from this draft-channel H^2 lead two sets of horizontally-extending channels H^3 and H^4 to the sides of the cone or pyramid, so that air from the outside can pass to the sides of the cone to create a center draft in the charge contained in the furnace A. Additional sets of draft-holes A^4 A^5 A^6 are formed in the sides of the furnace A, and located one above the other, the outer ends of the said draft-holes being closed by suitable covers G.

In using the apparatus the furnace A is charged with the antimony ore and charcoal or other suitable fuel, and as the antimony ore contains a large quantity of sulfur, the mixture will readily burn within the furnace, to cause the antimony contained in the ore

to change into fumes without melting. The fumes arising in the furnace A pass through the branch pipes C into the inclined pipe D, in which the fumes cool without concentrating, to finally pass into the condenser E, in which the oxid of antimony is precipitated in the form of a fine white powder on the floor E′, while the sulfur and other gases can escape through the meshes of the canvas sides, walls, and top of the condenser E.

It will be seen that by the arrangement described a sufficient amount of air is supplied to the center and the sides of the charge, so as to cause a uniform sintering of the ore without creating too intense a heat, allowing the antimony to be converted into fumes, without melting and matting the gangue, causing a cheap and economical separation of the ore from the gangue without the aid of fluxes or forced draft.

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

1. An ore-furnace provided in its upper end with outlet-pipes for the fumes and products of combustion, an inclined cooling-pipe with which the upper ends of said pipes connect, a series of doors in the lower side of the cooling-pipe and a condenser into which the upper end of the cooling-pipe discharges, substantially as described.

2. An apparatus for reducing antimony, comprising a furnace formed in its sides with draft-holes, a cone extending into the bottom of the said furnace and formed with draft-channels leading to the sides of the cone, branch pipes leading from the upper end of the said furnace, an inclined pipe into which discharge the said branch pipes, and a condenser into which discharges the upper end of the said inclined pipe, the condenser being formed with a solid floor and canvas sides, ends and top, substantially as shown and described.

3. In an antimony-ore furnace, a condenser formed of a series of parallel frames, a wooden bottom therefor, a fabric covering stretched over said frames and forming the top, sides and ends of the condenser, and pipe connections in the opposite ends of said condenser for the inlet and outlet pipes, substantially as described.

EDWIN KRATZER.

Witnesses:
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E. A. GOODCHILD.