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RECOVERY OF ANTIMONY

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This invention relates to the recovery of antimony and more particularly to the recovery of antimony from drosses, such, for example, as the aluminum-antimony and other drosses referred to in the Osborn Patent No. 2,278,134 or in the Osborn Patent No. 2,304,197, dated December 8, 1942. The present invention is especially concerned with an improvement in the procedure described in the former patent in which the grinding in oil or other inert vehicle may be omitted.

It is an object of the present invention to provide an improved procedure for the recovery of antimony. Another object is to provide an improved method for the disintegration of drosses or similar materials. It is also an object of the invention to provide a procedure for disintegrating drosses containing antimony and/or arsenic by which the particles of disintegrated material are put in such a condition that they can be stored with greater safety. It is a further object to provide a method for accurately controlling the roasting of the disintegrated dross. Other objects will become apparent.

As pointed out in the aforesaid Patent No. 2,278,134, there is considerable danger in the recovery of antimony and arsenic from drosses containing them, due to the possibility of the formation of the very poisonous gases stibine (antimony hydride, SbH_3) or arsine (arsenous hydride, AsH_3). In fact, aluminum-antimony drosses are among the most hazardous industrial materials to handle. The present invention is directed to an improved procedure for disintegrating such drosses at temperatures above those at which these gases will form. The dross is disintegrated by rotation in a tumbling screen at temperatures at which the poisonous gases, if formed, would dissociate, and preferably under conditions such as to partially oxidize the disintegrated particles. Such partially oxidized disintegrated particles may be stored with less danger than the original briquettes. For, if the original briquettes are stored, they generate lethal concentrations of arsine within the container in which they are stored; whereas the disintegrated powder from the present invention, although it still has to be treated with respect and care, is nevertheless much more inert and can be handled with much more safety. The invention also includes the further oxidation of the disintegrated particles in a roaster to volatilize the antimony as the trioxide.

In describing the invention, reference will be made to the drawings, in which Figure 1 is a vertical cross section on the center line of the disintegrator, certain portions being illustrated in elevation. Figure 2 is a fractional section on the line 2—2 of Figure 1. Figure 3 is a vertical section on the center line of the roaster and Figure 4 is a fractional sectional view on the line 4—4 of Figure 3.

The antimony dross, which may result from the refining of tin by the addition of aluminum or other drossing metals, as described in the aforesaid patents, may be separated from the mass of molten metal and charged, while still at temperatures above the decomposition temperatures of stibine and arsine, i. e., above 446° F., into the charging hopper 1 of the disintegrator shown in the drawings. It is preferred to remove at least some of the entrained molten metal from the dross before charging it to the disintegrator. This may be done, for example, by pressing the dross in a kettle press under pressures of about 125 to 225 pounds per square inch while maintaining it at a temperature above the melting point of the molten metal. If desired, the briquettes from the kettle press may be further pressed, before charging them to the hopper, at higher pressures than those ordinarily used in a kettle press, in order to separate a greater quantity of the entrained molten metal. One of the advantages of the present procedure, however, is that such higher pressure pressing is made unnecessary.

The material charged to the hopper 1 passes from the charge hopper directly into the rotating screen 2. This screen is made up of an outer metal cylinder 3 with rectangular or other shaped holes 4 cut in its peripheral surface to provide steel ribs running the length of the surface of the cylinder and with sufficient cross connecting circumferential ribs to give it the required strength. The cylinder in the apparatus illustrated may be made, for example, of a 16 inch iron pipe 36 inches long with the sections 4 cut out by burning to provide an open grid work, as illustrated in the drawings. If desired, the openings may be closer together than illustrated in order to provide a greater proportion of openings. Inside of this cylinder there is placed a cylinder of 4 mesh steel wire screen, as illustrated at 5, and inside of this screen there are placed two layers of 16 mesh steel wire screen, as illustrated at 6, and an inner layer of 4 mesh screen, as shown at 5a. The purpose of the 4 mesh screen is to give support and strength to the finer mesh screens and to protect it against the pounding effect of the briquettes.