W. O. DAVIS.

APPARATUS FOR DESULPHURIZING ORES.

No. 181,776. Patented Sept. 5, 1876.

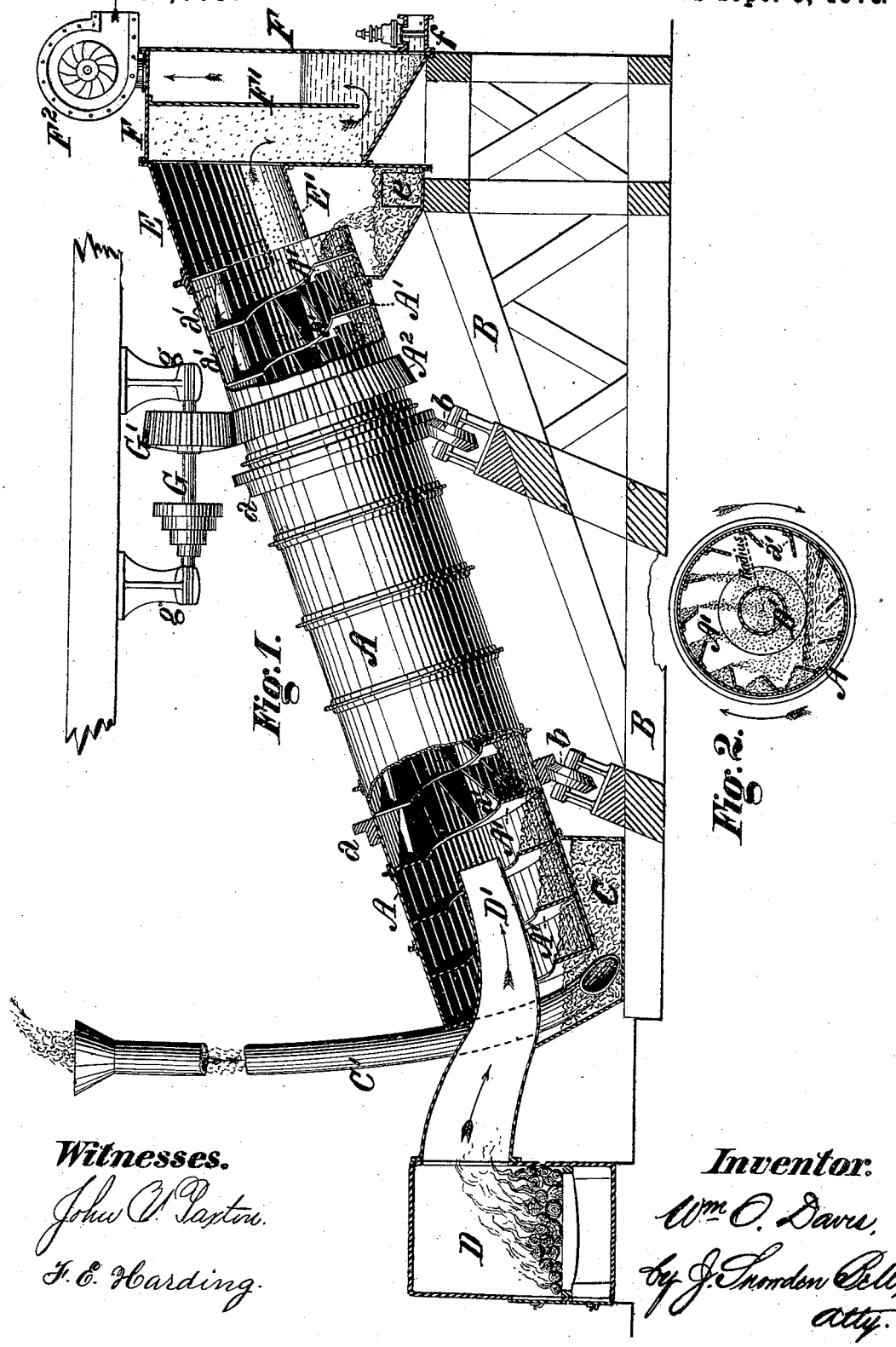

Fig. 1.

Fig. 2.

Witnesses.

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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN APPARATUS FOR DESULPHURIZING ORES.

Specification forming part of Letters Patent No. **181,776**, dated September 5, 1876; application filed July 28, 1876.

To all whom it may concern:

Be it known that I, WILLIAM OTIS DAVIS, of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Desulphurizing Ores, &c., of which the following is a specification:

The object of my invention is to provide an apparatus for desulphurizing pulverized ores by the application of heat, which shall be continuous and automatic in its operation, and shall further provide such facilities for a thorough exposure of the ores to the direct action of the heat as will, as far as practicable, reduce the duration of the operation, and insure its satisfactory result.

To this end my improvements consist in the combination of a revolving cylinder or chest having an internal screw-conveyer, a series of agitator-blades connected with the screw-conveyer, an inlet hot-air flue, and a draft-chamber and partition, arranged to prevent the escape of light particles of ore, all as hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a side view, mostly in section, of an apparatus embodying my improvements; and Fig. 2, a transverse section of the chest.

To carry out the object of my invention I provide a chest or casing, A, of cylindrical or polygonal form, which is preferably made of stout sheet metal, strengthened by exterior bands or braces, and is supported in a horizontal or inclined position on friction-rollers *b*, mounted in bearings in a frame, B, at suitable points in the length of the chest, collars *a*, secured to the periphery of the latter, bearing upon the rollers. A spiral blade of metal, tile, or fire-clay, constituting a screw-conveyer, A′, is secured to the inside of the chest A, extending from one end to the other thereof. The depth of this plate may be, say, one-fourth of the internal diameter of the chest A, so that an unobstructed central space will be left in the same from end to end for the passage of heated gases. A series of agitator-blades, *a′*, are secured to the inner surface of the chest, between the threads of the screw-conveyer, each of the blades extending from one thread to another, and being, say, one-half the depth of the plate forming the conveyer, or thereabout. Each agitator-blade is inclined, with relation to a radius of the chest, from the side which is secured to the chest to the inner side, in the direction of movement of the chest, as indicated in Fig. 2, for a purpose hereinafter to be explained.

The lower or receiving end of the chest rests in a box or case, C, to which the pulverized ore is supplied through a spout, C′, and a flue, D′, leads from a furnace, D, into the receiving end of the chest, being extended for a short distance therein along the central space. The upper or delivery end of the chest extends into an opening in a discharge chamber or box, E, divided into two compartments by a partition, E′, the lower being provided with a tight-fitting door, *e*, and the upper opening into a draft-chamber, F, in which is placed a tight partition, F^1, extending entirely across the chamber from its top downward for the major portion of its depth, leaving a free opening at bottom, thus constituting a hydraulic trap. The bottom of the chamber is, by preference, inclined, and is provided at its lowest point with a valve or sluice, *f*. An exhaust-fan or other suitable exhausting device, F^2, communicates with the top of the chamber F, on that side of the partition F^1 which is farthest from the chest A. A counter-shaft, G, is mounted in bearings *g*, in convenient relation to the chest A, and carries a spur or bevel pinion, G′, which meshes with a corresponding gear, A^2, on the periphery of the chest A, for the rotation of the latter by the application of power to the counter-shaft.

In the operation of the apparatus the draft-chamber F is filled with water to a point between the partition E′ and the bottom of the partition F^1, and the valve *f* is closed. The chest A is rotated in the direction of the arrow, and an upward draft is maintained in the chamber F by the exhaust-fan F^2, the action of the exhaust-fan tending to raise the level of the water on the side of the partition F^1 nearest to it, and depress that upon the opposite side to a point at or below the bottom of the partition, so as to enable the escaping gases to pass through the water without carrying off particles of ore.

Fire is maintained in the furnace D of sufficient intensity to impart to the products of combustion, which enter the chest A through the flue D′, a temperature of 400° Fahrenheit or upward, as may be required by the particular ore operated upon. The pulverized ore, which is supplied to the chest through the spout C′, is carried through the chest and delivered into the lower compartment of the box E by the screw-conveyer A′; and in its traverse through the chest is elevated in small portions at a time from the lower to the upper side of the chest by the agitator-blades *a′*; thence falling by its own gravity through the heated currents, to be again elevated and dropped, and so on until its discharge into the box E, thus being thoroughly and continuously exposed to the action of the heat.

The desulphurized ore is withdrawn from time to time through the door *e*. Such of the lighter portions of the ore as may be carried up by the draft into the upper compartment of the box E will be deposited in the water resting in the draft-chamber F, being prevented from escaping with the exhaust by the partition F¹, and may be withdrawn, as required, by the valve *f*.

It is obvious that the apparatus is continuous and automatic in its operation, the ore being supplied continuously and not in separate charges, and requiring no manipulation in its traverse of the apparatus.

The drawings show the chest in an inclined position, for the purpose of enabling it to fulfill the additional function of an elevator, discharging the desulphurized ore at a higher level than that at which it is supplied; but if such elevation should not be desirable, the chest may be placed in a horizontal position without interfering with the normal operation.

The apparatus is, further, well adapted for use as a chlorinator without any change of its parts, and may, with certain modifications, be rendered adaptable for use as an amalgamator, the conveyer and agitator-blade serving to effect an intimate mixture of the ore with the mercury.

I claim as my invention and desire to secure by Letters Patent—

1. The combination, in an apparatus for desulphurizing ores, &c., of a cylinder or chest, an internal screw-conveyer blade, and a series of agitator-blades placed between the threads of the screw-conveyer, and extending from one thread to the other, so as to raise the pulverized ore as they revolve with the cylinder, substantially as set forth.

2. The combination, in an apparatus for desulphurizing ores, &c., of a cylinder or chest, a hot-air flue communicating with the receiving end thereof, a draft-chamber communicating with the delivery end, and an exhaust-fan and hydraulic trap, substantially as set forth.

3. The combination, in an apparatus for desulphurizing ores, &c., of a cylinder or chest, a discharge-chamber divided horizontally into two compartments, and a draft-chamber communicating with the upper compartment of the discharge-chamber, substantially as set forth.

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Witnesses:
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