(No Model.)

J. W. BAILEY.

ORE CONCENTRATING MILL.

No. 329,694. Patented Nov. 3, 1885.

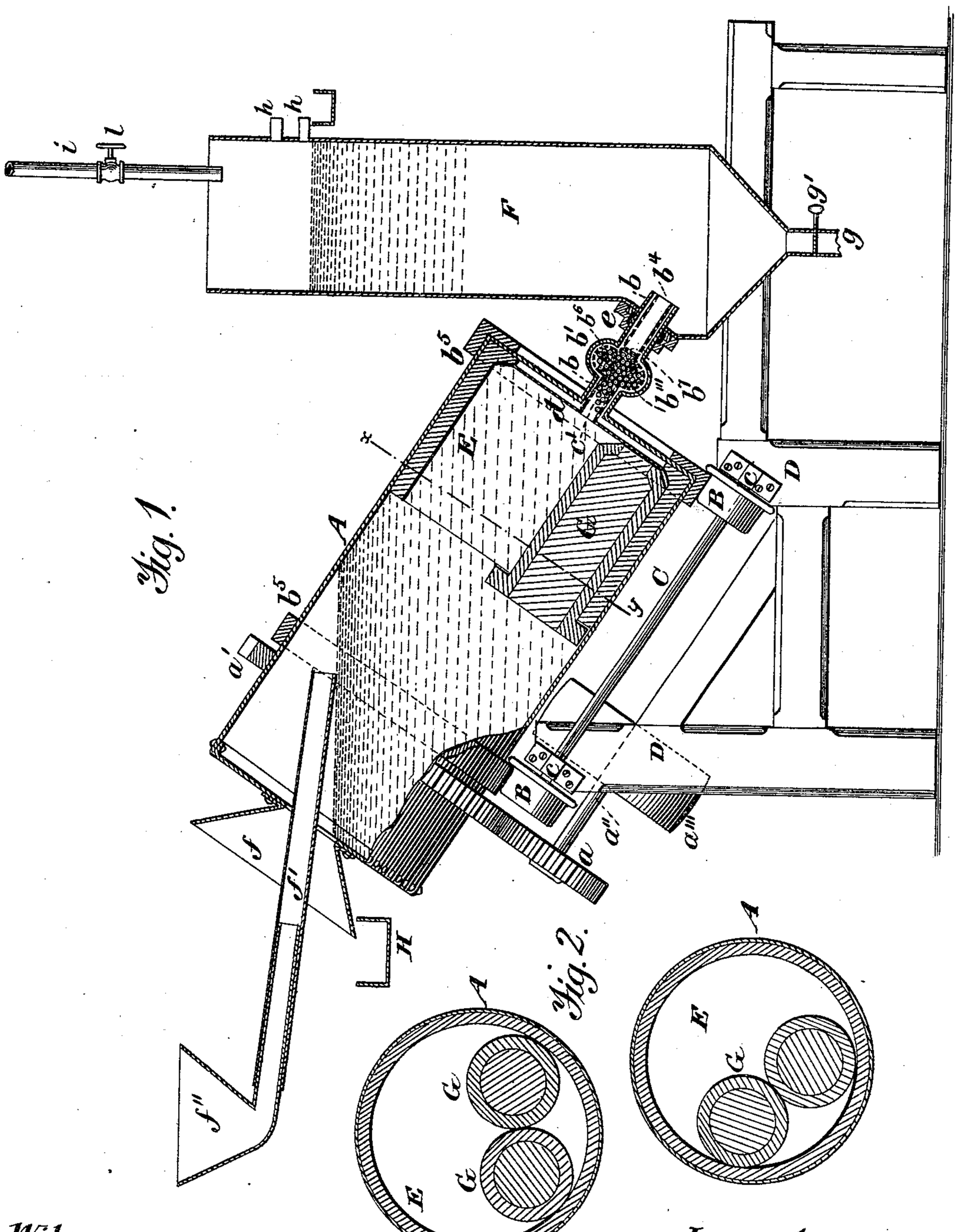

Fig. 1.

Fig. 2.

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JOHN W. BAILEY, OF DENVER, COLORADO.

ORE-CONCENTRATING MILL.

SPECIFICATION forming part of Letters Patent No. 329,694, dated November 3, 1885.

Application filed February 6, 1885. Serial No. 155,124. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. BAILEY, of Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Ore-Concentrating Mills, of which the following is a specification, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The objects of this invention are chiefly to produce a complete separation by giving motion to each grain of ore, to prevent the packing of the sand or stock, to effect a more perfect distribution of the current of water up through the stock, and to allow the pressure of water to be regulated as may be desired.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of my invention. Fig. 2 shows two sections on the line *x y* of Fig. 1, representing different positions assumed by the cylindrical weights G G (hereinafter referred to) in the rotation of the cylinder.

Similar letters of reference indicate similar parts in each figure.

A is a cylinder mounted axially in an inclined position, and adapted to revolve through the medium of a pinion, *a*, engaging a toothed wheel, *a'*, which surrounds and is securely attached to the cylinder A. The pinion *a* is mounted upon the shaft *a''*, which carries the driving-pulley *a'''*. The cylinder A is provided with bands b^5, which rest upon flanged wheels B, mounted upon inclined shafts C, which rotate in bearings *c*, attached to the stationary frame D. The shafts C are placed sufficiently far apart to allow the wheels B to give, in connection with the bearing afforded by the tank F, as hereinafter described, the necessary support to the cylinder A.

The lower end of the cylinder A is provided with an interiorly-removable band, E, said band being made of heavy cast-iron or other material. The said lower end of the cylinder is provided with a tubular neck, *b*, the outer end of which passes through the stuffing-box *e*, secured to the base of the water-tank F, so that the said neck serves, in a measure, as a shaft upon which the cylinder A revolves. The neck *b* is provided with a bulb or enlargement, *b'*, the inner end of the neck opening into the cylinder and the outer end into the water-tank F.

Near the lower end of the cylinder A is placed a perforated diaphragm, *d*, a space being left between the diaphragm and the lower end of the cylinder. The material of which the diaphragm is made is centrally of the cylinder, formed into a tube, b^4, of a diameter somewhat smaller than that of the neck *b*, and also into a bulb, *b'''*, also of lesser diameter than the bulb *b'*, the tubular portion b^4 extending beyond the bulb, the whole resting within the tubular neck and bulb *b b'*, so that an annular space, b^6, is left between the neck and its bulb and the perforated material. The bulb *b'''* contains shot *c'* or other material, the shot being confined by means of a gauze partition, b^7. The fine concentrates work through the changing spaces of the shot.

A heavy cylindrical weight, G, or a series of such weights, is placed within the lower end of the cylinder, and adapted to roll upon the band E. At the upper end of the inclined cylinder A is a funnel-shaped outlet, *f*, within which enters the feed-pipe *f'*, made in telescopic sections, as shown. The object of making the feed-pipe telescopic or adjustable is to carry the receiving-hopper *f''* any required or suitable distance away from the cylinder for convenience in feeding. I do not confine myself to any number of telescopic sections. The funnel-shaped outlet *f* is adapted to discharge the tailings during the rotation of the cylinder into a sluice-box, H.

The water-tank F is open at the top, and extends any suitable distance above the level at which the water is to be maintained within the cylinder A. The lower end of the tank is hopper-shaped, as shown, and has a discharge-pipe, *g*, and a valve, *g'*. The upper end of the tank F is furnished with an overflow-pipe, *h*, or with a series of such overflow-pipes. The water is supplied to the tank through the pipe *i*, which is provided with a valve, *l*.

In operation the pulverized ore is placed in the hopper *f''*, and passes through the pipe *f'* into the cylinder A. The drawing Fig. 1 indicates that about six inches head of water is provided in the tank F. The water under pressure enters the neck *b* through the annu-

lar space b^6 and passes through the wire-gauze partition *d*. Water also enters the pipe b^4, and, passing through the shot, enters the cylinder. By this means a free current from the tank F through the space b^6 and an obstructed current through the shot *c'* are produced. The weight of the shot and the force of the current operating against it to lift or displace it are so regulated that only such material as is intended to pass the shot can escape into the tank F. This feature of my invention I term a "double current," one current passing into the cylinder through the space b^6 and the other through the shot. The water being maintained in the cylinder A to the level shown, a constant overflow is allowed to the sluice-box H, this being produced by the head of water in the tank F. The larger particles of ore fall to the lower end of the cylinder, and in the revolution of the cylinder the ore is crushed and pulverized by the action of the rolling cylindrical weight or weights G. Lighter particles are floated or lifted to the surface of the ascending water, the heavier ones sinking to the bottom. The effect of the shot or filtering material is such that no sand can pass through into the tank F unless it has sufficient gravity to overcome the current of water passing in the contrary direction. The center of the cylinder being practically in a condition of rest, the finer particles filter to that point through the coarser particles.

The pressure of water forced up into the cylinder A must be regulated by the head in the tank F to suit the character of the ore, and the amount of pressure is intended to be only sufficient to assist the lighter particles to reach the surface.

The separation by the means described is rapid and complete, as every grain is in constant motion, and no packing of the sands is possible. No packing of heavy sand in one place and of lighter sand in another can occur. The coarser particles are crowded by the incline given to the cylinder to the periphery of the cylinder, where they are further crushed by the action of the weights or cylindrical rolls G.

One of the most important features of this invention is that of the production of two currents, one through the diaphragm *d* and the other through the changing spaces between the shot or other material contained within the bulb b'''. Another important feature is in the inclined arrangement of the cylinder with the feed-pipe at one end, and the opening for the discharge of the concentrates at the other end, together with the crushing devices provided in connection with said inclined cylinder.

Having described my invention, I claim—

1. In an ore-concentrating mill, an inclined rotating cylinder having an upper overflow, combined with a perforated diaphragm at its lower end, a water-tank, and a tubular connection between said water-tank and the cylinder, substantially as set forth.

2. In an ore-concentrating mill, a revolving inclined cylinder, combined with a lower discharge-pipe having a bulb and shot, substantially as set forth.

3. In an ore-concentrating mill, a water-pressure tank combined with a cylinder having a discharge-pipe containing shot, and an outer or surrounding passage, whereby provision is made for the passage of two currents of water under pressure from the tank into the cylinder, one through the filtering material and the other through the surrounding passage, substantially as set forth.

4. In an ore-concentrating mill, a revolving inclined cylinder having a lower discharge-outlet, combined with a water-tank from which water under pressure is forced through the discharge-outlet into the cylinder, substantially as set forth.

5. In an ore-concentrating mill, a water-pressure tank having an out-flow and a feed pipe, combined with an inclined rotating cylinder discharging into said tank and receiving water therefrom under pressure, the water being maintained at a level within and discharged from the upper end of the cylinder, substantially as set forth.

6. In an ore-concentrating mill, an inclined rotating cylinder having an upper funnel-shaped discharge-outlet for the water and tailings, combined with a sluice-box adapted to receive the discharge from the funnel-shaped outlet, and a feed-pipe extending into said outlet, substantially as set forth.

7. In an ore-concentrating mill, an inclined cylinder having a perforated diaphragm near its lower end, and a tubular neck and bulb, combined with shot contained within said bulb, and a screen at the lower end thereof, whereby a discharge-outlet from and a passage for the water upward to the cylinder are formed, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JOHN W. BAILEY.

Witnesses:
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