(No Model.) 2 Sheets—Sheet 1.

J. W. BAILEY.

ORE PULVERIZING AND AMALGAMATING MILL.

No. 321,937. Patented July 14, 1885.

Fig. 1.

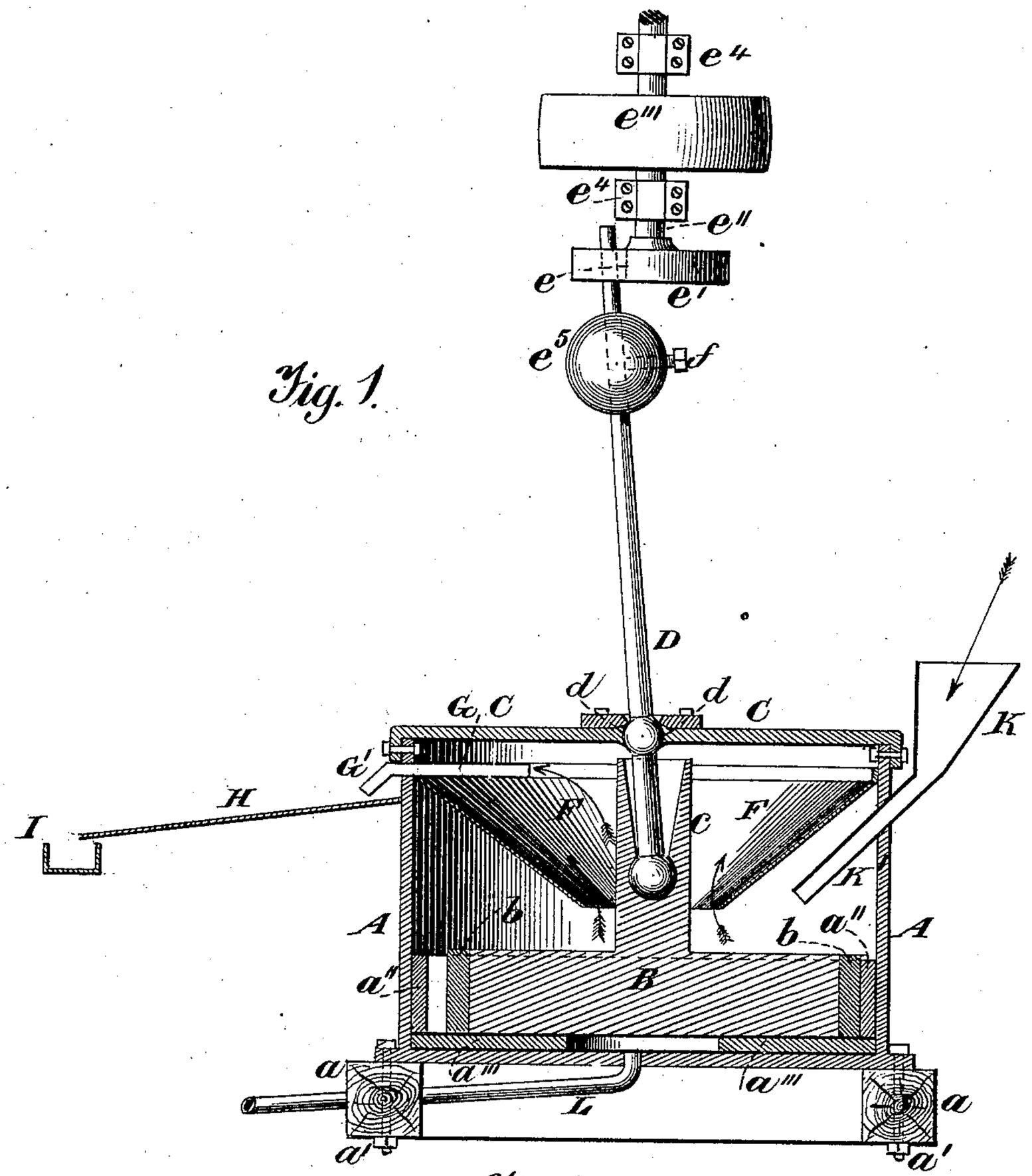
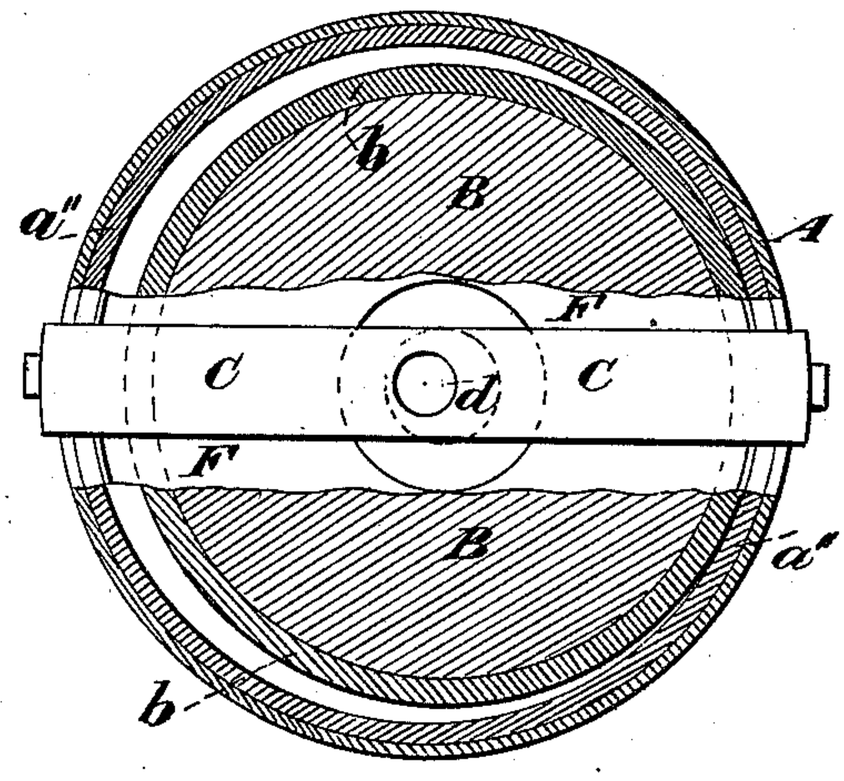


Fig. 3.



Witnesses:
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E. Kruse

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(No Model.) 2 Sheets—Sheet 2.

J. W. BAILEY.

ORE PULVERIZING AND AMALGAMATING MILL.

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Fig. 2.

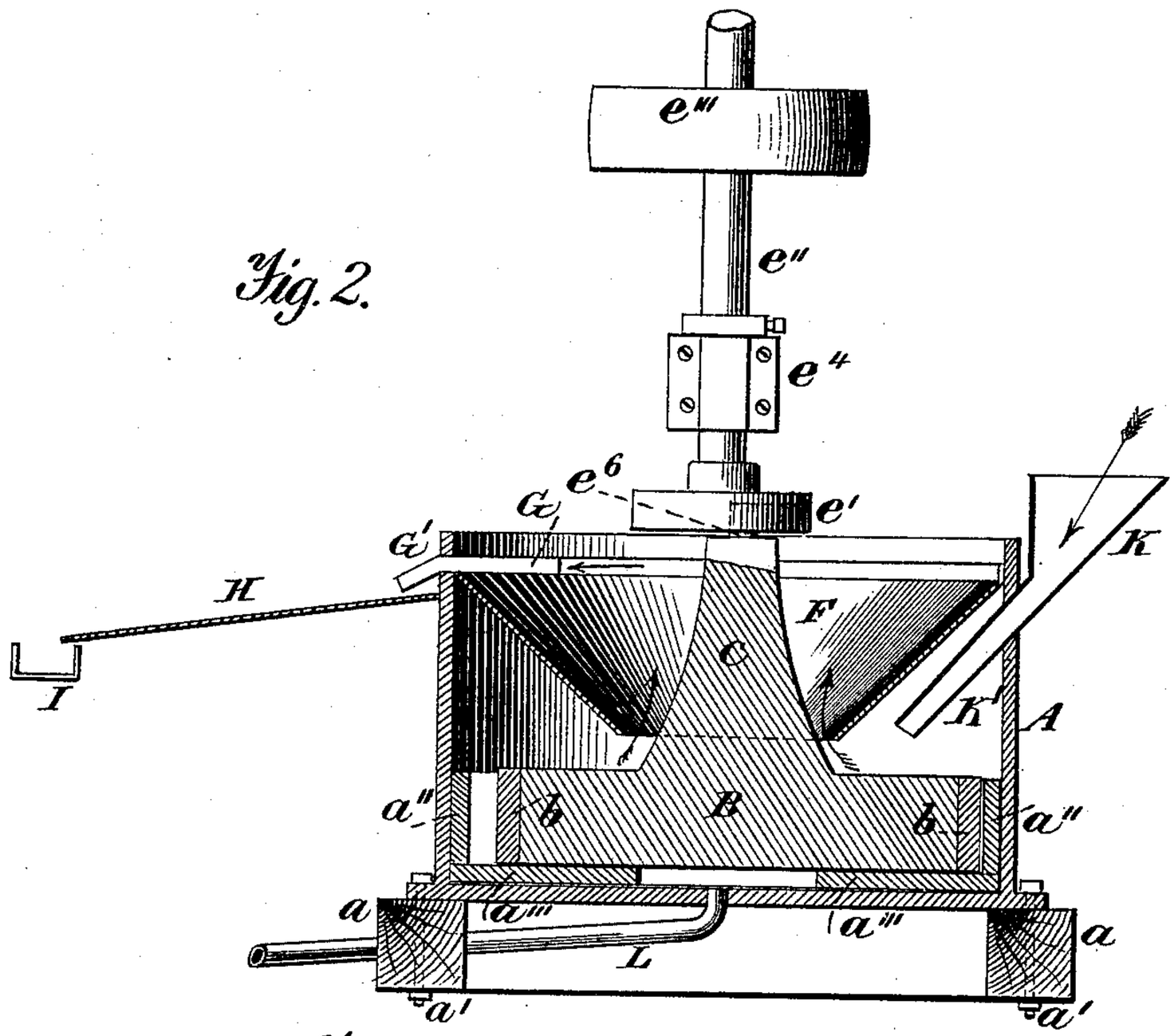


Fig. 4.

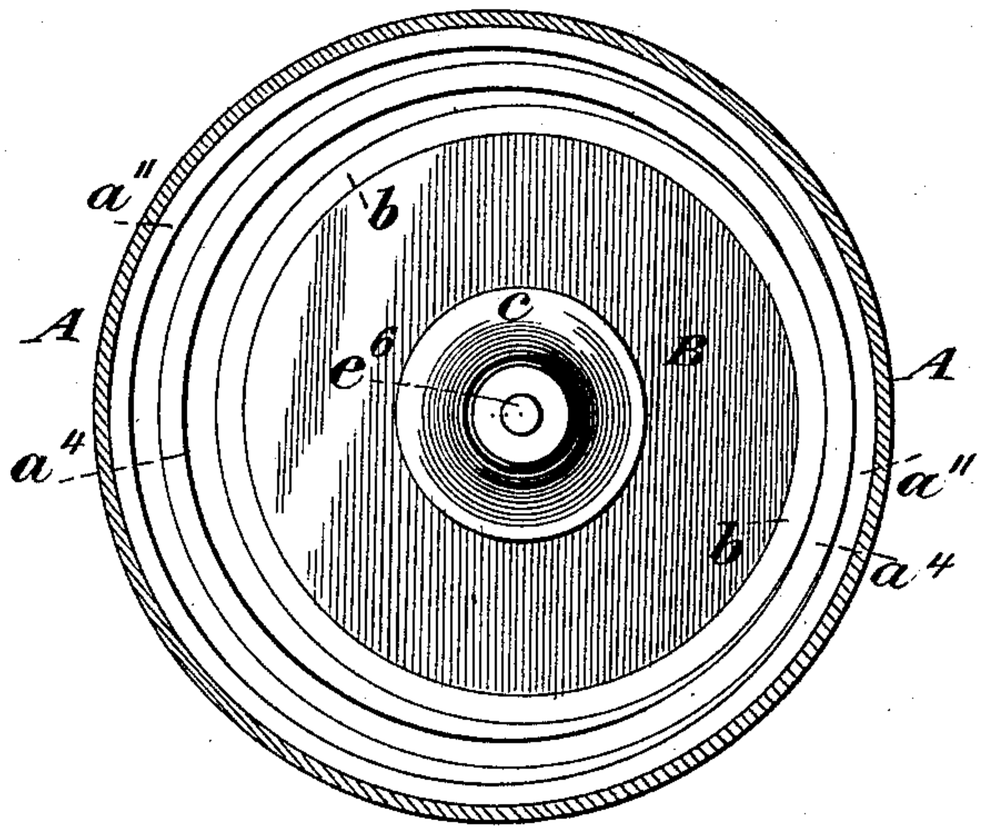
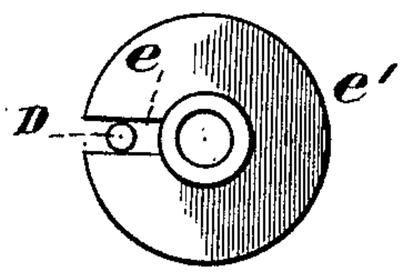


Fig. 5.



Witnesses.
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UNITED STATES PATENT OFFICE.

JOHN W. BAILEY, OF DENVER, COLORADO.

ORE PULVERIZING AND AMALGAMATING MILL.

SPECIFICATION forming part of Letters Patent No. 321,937, dated July 14, 1885.

Application filed September 15, 1884. (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 Pulverizing and Amalgamating Mills, of which the following is a specification, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object of this invention is to effect the pulverization, washing, and discharge of the stock, and the process of amalgamation in a rapid and effective manner by a simple combination of devices which shall not be liable to derangement, and shall be capable of ready repair.

In the accompanying drawings, Figure 1 is a vertical section of my improved mill, the machine being shown in connection with a portion of the driving mechanism. Fig. 2 is a similar section showing a modified construction. Fig. 3 is a sectional plan. Fig. 4 is a sectional plan showing a modification. Fig. 5 shows a detail of the driving mechanism.

Similar letters of reference indicate similar parts in the respective figures.

A is a pan, heavily constructed of metal, and secured to timbers *a* by bolts *a'*. Within the lower part of the pan are the vertical and horizontal rings *a''* *a'''*, which are of chilled or hardened metal, and so constructed or composed as to withstand violent shocks and wear.

B is the muller, heavily constructed of cast-iron, and provided with an exterior annular band, *b*, of chilled or hardened metal. The muller proper is of cylindrical formation, and provided with a central cylindrical extension, *c*.

Across the top of the pan is a bar, C, securely bolted to the pan, as shown. The central portion of the bar is provided with a spherical socket, *d*, which forms the fulcrum of a lever, D. The end of the short arm has a ball end which rests within a spherical socket formed within the extension *c* of the muller. The long arm of the lever D passes through a slot, *e*, of a wheel, *e'*, adapted to revolve with a vertical shaft, *e''*, by means of a pulley, *e'''*, the shaft *e''* being suitably supported by bearings e^4. A weight, e^5, is secured to the upper portion of the long arm of the lever D, said weight being adjustable thereon by means of a set-screw, *f*.

F is a circular dish-shaped amalgamated copper plate, the upper portion or edge of which is attached near the upper edge of the pan, the lower or smaller portion of the plate surrounding the vertical extension *c* of the muller.

About on a level with the top edge of the circular plate F is a pipe, G, terminating in a spout, G', leading to an outer copper amalgamated plate, H, which in turn leads to the sluice-box I.

A hopper or funnel, K, is placed at the exterior of the pan A, and is provided with an inclined pipe, K', passing through the pan and adapted to discharge under the circular plate F and upon the upper surface of the muller.

A discharge-pipe, L, leads from the lower portion of the pan.

In Fig. 2 the motion is imparted directly to the muller by a connection of the muller by a pin, e^6, with the slot *e* in the wheel *e'*, the lever D being dispensed with.

In Fig. 4 a double crushing-surface is shown, a loose ring, a^4, being placed so as to surround the muller. A series of loose rings may be employed, if desired, the crushing-surface being thus capable of increase in area.

The action of the weight e^5 (shown in Fig. 1) is to increase the force exerted by the muller, the weight being thrown out by centrifugal action, and, in consequence, violently forcing the muller against the vertical ring *a''*.

The spout L is used for drawing off the gold or precious metals which settle at the bottom of the pan, and for discharging the contents when cleaning up.

The operation is as follows: The ore and water are fed from the hopper or funnel K through the incline pipe K' beneath the circular amalgamated copper plate F. Motion having been imparted to the driving-pulley *e'''*, the periphery of the muller is caused to move rapidly against the vertical ring *a''*, the muller resting and sliding upon the horizontal ring *a'''*. The function of the slot *e* in the wheel *e'* is to allow freedom to the long arm of the lever D, and to permit shocks to be given by the muller against the vertical ring *a''* without injury to the lever and connected parts.

If the muller has a diameter of three feet, five hundred revolutions per minute given to the driving-shaft will cause the band *b* of the muller to move upon the ring *a''* at the rate of four thousand five hundred feet per minute. The speed can be increased by the use of a muller of greater diameter. The movement given to the muller is not only a rotary, but a rolling movement, and its crushing capacity upon the stock which finds its way between the band *b* and vertical ring *a''*, and under the muller, and between it and the horizontal ring *a'''*, is very great. The wearing-surfaces can be readily removed and other parts substituted for those worn. The amalgamation takes place in the usual manner, the metals settling beneath the muller B and adhering to the circular amalgamated copper plate F, and the outside amalgamated copper plate, H, over which the discharged pulp runs to the sluice box I. The pulverization continues in the bottom of the pan until the dross is fine enough to float in the current of water passing in at the pipe K', and out, as indicated by the arrows, through the circular plate F and discharge pipe G. The quartz, earthy matter, and the sulphurets, all of which are brittle—such as iron, lead, &c.—are crushed to a fine powder, while the gold or other precious metal, being ductile, is not pulverized, and by its superior gravity will not float, being thereby saved by the action of gravitation and by amalgamation. Native silver is saved in the same way. Chlorides, oxides, &c., of silver may also be saved by the use of hot water and chemicals, in order to change them to the metallic state while under processes of pulverization.

The machine is simple and effective, and all the parts subject to wear can be readily replaced. Pulverization to a fine degree is produced, which is necessary to a close extraction of the precious metals.

Having described my invention, I claim—

1. The combination, in an ore-pulverizing mill, of a cylindrical pan, a cylindrical muller, and means for rotating it about an eccentrically-shifting vertical axis and rolling it in a horizontal plane around and against the inner sides of the cylindrical pan, whereby the plane of the muller is at all times horizontal with relation to the axial line of the pan, and the axis of the muller during its rotation is ever changing its relation to the axial center of the pan, substantially as set forth.

2. In an ore-pulverizing mill, a cylindrical pan having vertical and horizontal bearing-plates at or near its lower portion, and a cylindrical muller having a hardened peripheral band adapted to impinge in a horizontal direction against the said vertical plate of the pan, combined with means for rotating the muller about an eccentrically-shifting vertical axis and rolling it in a horizontal plane around and against the inner sides of the pan, substantially as set forth.

3. In an ore-pulverizing mill, a cylindrical pan, a bar across the top of said pan having a spherical socket, a cylindrical muller within the said pan, a lever having its fulcrum in the cylindrical socket of the bar, and its short arm connected by a ball-and-socket joint with the muller, combined with a revoluble driving-shaft carrying a wheel united by a slotted connection with the long arm of the lever, substantially as set forth.

4. In an ore-pulverizing mill, a cylindrical pan having vertical and horizontal bearing-plates at or near its lower portion, a bar or support across the top of said pan having a spherical socket, a cylindrical muller within said pan, a lever having its fulcrum in the spherical socket of the bar, and its short arm connected by a ball-and-socket joint with the muller, combined with a revoluble driving-shaft carrying a wheel united by a slotted connection with the long arm of the lever, substantially as set forth.

5. In an ore pulverizing and amalgamating mill, a cylindrical pan, a cylindrical muller, mechanism for revolving and rolling said muller within the pan, and a dish-shaped amalgamated copper plate within the pan, open at its lower end, combined with an inlet-pipe discharging below said plate, and an outlet-pipe discharging above it, substantially as set forth.

6. In an ore-pulverizing mill, a cylindrical pan, a cylindrical muller adapted to be rotated within and rolled around said pan, combined with a loose ring, or series of rings, surrounding said muller, and adapted to be removed from the pan, substantially as set forth.

7. The combination, in an ore-pulverizing mill, of a cylindrical pan, a cylindrical muller, a lever having a ball-and-socket fulcrum in a support attached to the pan, the short arm of said lever being united by a ball-and-socket joint with the muller, and the long arm with a revoluble driving-wheel, substantially as set forth.

8. The combination of a cylindrical pan, a cylindrical muller, a lever connected with said muller and having its fulcrum in a support attached to the pan, the short arm of the lever being connected to the muller, and the long arm of said lever being weighted and connected to a revoluble driving shaft, substantially as set forth.

9. In an ore pulverizing and amalgamating mill, the combination of a pan having a lower discharge-pipe, a dish-shaped amalgamated copper plate, an inlet below said plate, vertical and horizontal bearing-plates, a discharge-pipe above said amalgamated copper plate, a cylindrical muller, and means for revolving said muller about a shifting vertical axis and rolling its periphery against the vertical bearing-surface of the pan, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JOHN W. BAILEY.

Witnesses:
S. V. FARNUM,
A. MIALL.