H. BOLTHOFF.

Apparatus for Amalgamating Gold and Silver.

No. 46,632. Patented March 7, 1865.

Fig. 1.

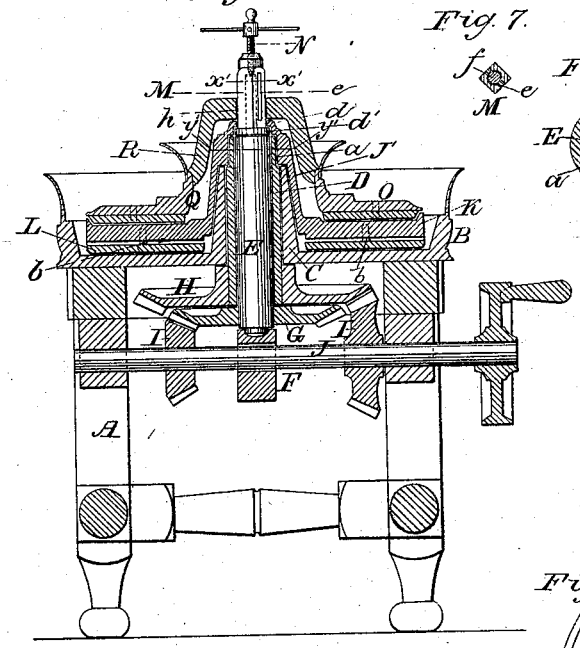
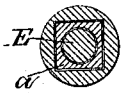


Fig. 7.

Fig. 8.



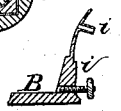


Fig. 9.

Fig. 3.

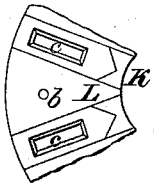


Fig. 4.

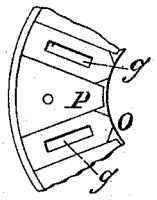


Fig. 2.

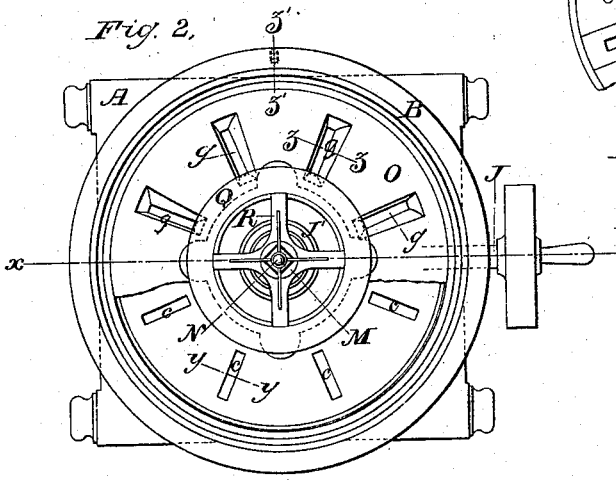


Fig. 5.

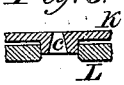
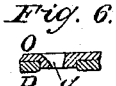


Fig. 6.



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UNITED STATES PATENT OFFICE.

H. BOLTHOFF, OF BURLINGTON, IOWA.

IMPROVED APPARATUS FOR AMALGAMATING GOLD AND SILVER.

Specification forming part of Letters Patent No. **46,632**, dated March 7, 1865.

To all whom it may concern:

Be it known that I, H. BOLTHOFF, of Burlington, in the county of Des Moines and State of Iowa, have invented a new and Improved Mill for Grinding Quartz and Amalgamating Precious Metals Contained Therein; and I do the hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical central section of my invention taken in the line *x x*, Fig. 2; Fig. 2, a plan or top view of the same, partly in section; Fig. 3, an inverted plan or face view of a portion of the lower muller; Fig. 4, an inverted plan or face view of a portion of the upper muller; Fig. 5, a section of a portion of the lower muller taken in the line *y y*, Fig. 2; Fig. 6, a section of a portion of the upper muller taken in the line *z z*, Fig. 2; Fig. 7, a horizontal section of Fig. 1 taken in the line *x' x'.*; Fig. 8, a horizontal section of Fig. 1 taken in the line *y' y'*; Fig. 9, a vertical section of a portion of the pan taken in the line *z' z'*, Fig. 2.

Similar letters of reference indicate like parts.

This invention relates to a new and improved mill for grinding quartz and amalgamating the precious metals contained therein; and it consists in using within a pan two rotary mullers arranged in such a manner that they will rotate in reverse directions, said mullers being provided with openings and placed one over the other, as hereinafter fully shown and described, whereby the pulp will be thoroughly ground and the mercury intermixed therewith, so that all the particles of precious metals contained in the former will be brought in contact with the mercury and amalgamated, the work being rapidly performed and in very efficient manner.

A represents a framing, which may be constructed in any proper manner, to support the pan B, which may be of the usual or any proper form and of any suitable or desired dimensions. This pan is cast or formed with a central hollow conical hub, C, through which a hollow shaft, D, passes, and within this hollow shaft D there is fitted a spindle, E, the lower end of which is stepped in a bridge-tree, F, in the framing A.

On the lower part of the spindle E, below the shaft D, there is keyed a bevel-wheel, G, and on the lower part of the shaft D there is keyed a similar wheel, H, and into these wheels G H bevel-pinions I I gear, the latter being on a horizontal shaft, J, to which the driving-power is applied. By this arrangement the hollow shaft D and spindle E are made to rotate in reverse directions, and the relative size of the gearing G H I I is such that the shaft and spindle will have an equal speed.

On the upper part of the hollow shaft D there is formed a square, *a*, which is above the conical hub C of the pan, and on or over this square there is fitted the square portion of a conical hub, J', which extends down over the hub C of the pan and is connected to or cast with the lower muller, K. (See Figs. 1 and 8.) This muller K is rather less in diameter than the pan B, and it is provided at its under or face side with shoes L, of V shape, (see Fig. 3,) and fitted in grooves in the under side of K, and secured to it by rivets or bolts *b*. These shoes L are designed to be fitted loosely to muller K, so that they will have a certain degree of vertical play and conform to the inequalities of the bottom of the pan should it not be perfectly level or in the same plane.

The muller K, between the shoes L, is provided with openings *c*, which are of V form in their transverse section, as shown in Fig. 5.

The spindle E, above the hollow shaft D, is reduced in diameter to receive a sleeve, M, which is fitted loosely upon it. This sleeve externally is of square form the greater portion of its length, there being a cylindrical projection or flange, *d*, at its lower end, over which a flange, *d'*, at the upper end of the hub J' of muller K, fits, as shown clearly in Fig. 1.

The sleeve M is provided with an oblique slot or opening, *e*, at two opposite sides of it, and a pin, *f*, passes horizontally through the reduced parts of the spindle E and the slots or openings *e*. This pin *f* and openings *e* cause the spindle E to rotate the sleeve M, while the oblong openings *e* admit of the sleeve M being raised and lowered on the spindle, said movement or adjustment of the sleeve being effected by means of a screw, N, which works

in an internal thread in the upper end of the sleeve M and rests or bears upon the upper end of the spindle E.

O represents a muller which is directly over the muller K, and is provided at its under or face side with shoes P, which are arranged and applied similar to the shoes L of the muller K. The muller O, between the shoes P, is provided with openings *g*, (see more particularly Figs 4 and 6,) and said muller has a central concentric hub, Q, which is hollow or of annular form and flaring at its upper end, and has bow-shaped arms R attached to it, at the center of which there is a square opening, *h*, to fit over or upon the sleeve M. The muller O is of the same diameter as the muller K. The pan B is provided with two outlets, *i i*, through which the contents of the pan are drawn off.

The operation is as follows: The shaft J is rotated by any convenient power, and the two mullers K O rotate in opposite or reverse directions. The pulp is fed into the hollow hub Q and passes between the two mullers O K, where it is ground, owing to the revolution of the mullers, the pulp passing through the openings *c* in the muller K and underneath the shoes L thereof, whence it is subjected to a further grinding between said shoes L and the bottom of the pan. The pan is supplied with a requisite quantity of mercury, which becomes thoroughly intermixed with the pulp during the grinding process. The foreign light portions of the pulp are forced up around the edges of the mullers O K, the amalgamated portions remaining below, and the light portion passes through the openings *g* of muller O, and is again subjected to a further grinding action between the two mullers. The reverse movements of the two mullers render the grinding process very efficient and cause the work to be rapidly performed.

The mullers may be raised at any time, so that the lower muller will be above or free from the bottom of the pan, by turning the screw N, the upper muller, of course, rising with the lower one.

I claim as new and desire to secure by Letters Patent—

1. The employment or use of the two mullers O K, placed one above the other in the pan B, and arranged in such a manner as to rotate in reverse or opposite directions, substantially as and for the purpose herein set forth.

2. The arrangement and combination of the central fixed conical hub, C, at the center of the pan B, spindle E, tubular shaft D, conical hub J′ of muller K, and the hollow hub Q of muller O, provided with arms R, fitted on the sleeve M, which is placed on the upper part of spindle E, with the screw N fitted in it, substantially as and for the purpose described.

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Witnesses:
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