(No Model.) 2 Sheets—Sheet 1.

A. SCHULENBURG.

ORE CRUSHING MORTAR.

No. 492,634. Patented Feb. 28, 1893.

Fig. 1

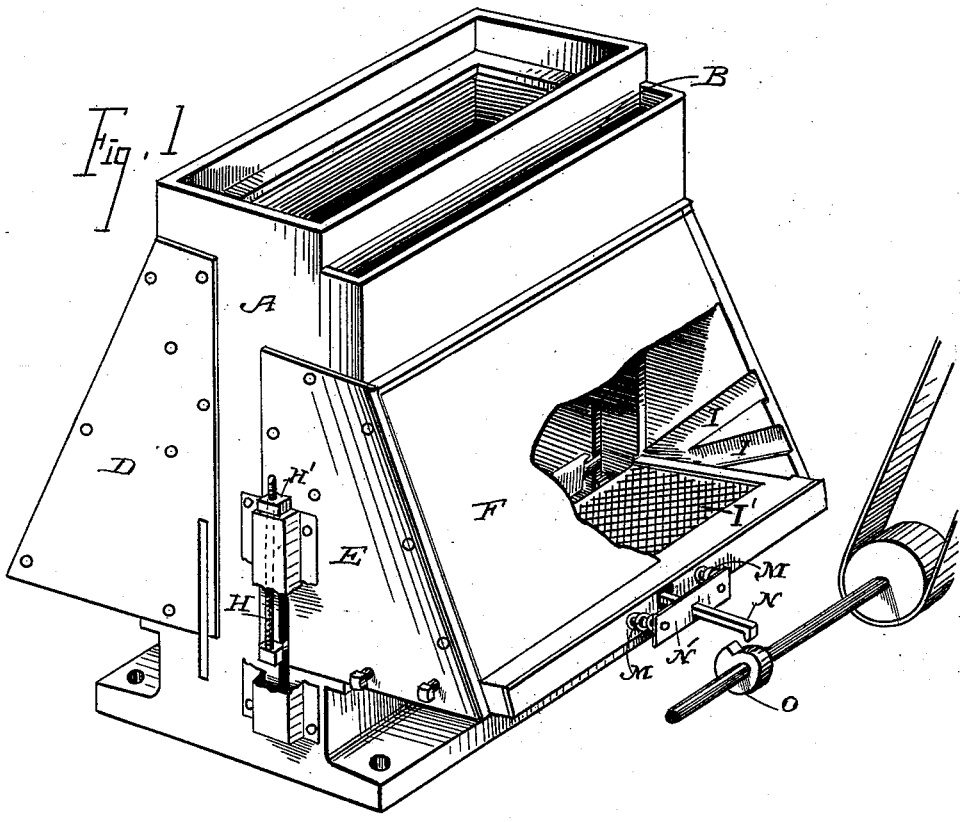
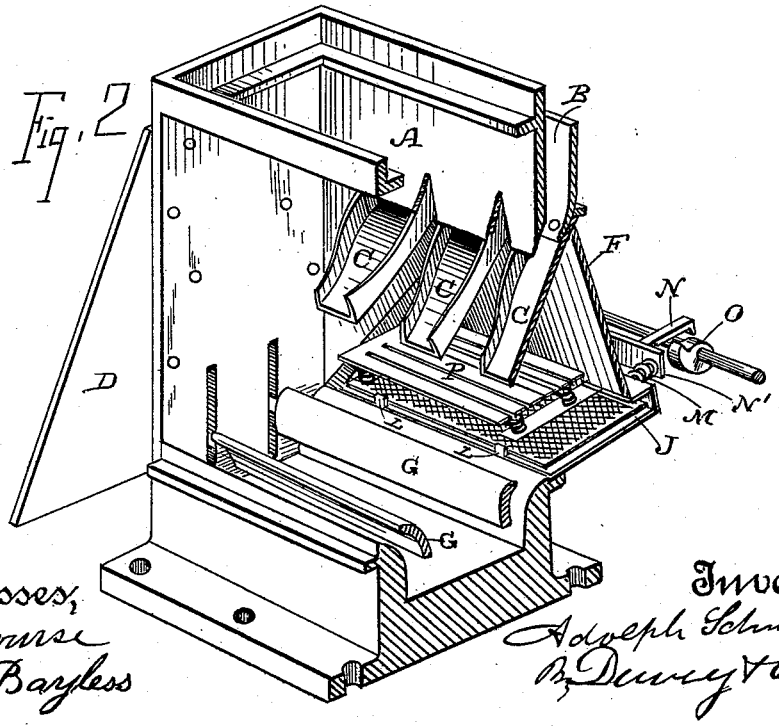


Fig. 2



Witnesses,
F. B. Morse
J. A. Bayless

Inventor,
Adolph Schulenburg.
By Dewey & Co.
Attys

(No Model.) 2 Sheets—Sheet 2.

A. SCHULENBURG.

ORE CRUSHING MORTAR.

No. 492,634. Patented Feb. 28, 1893.

Fig. 3.

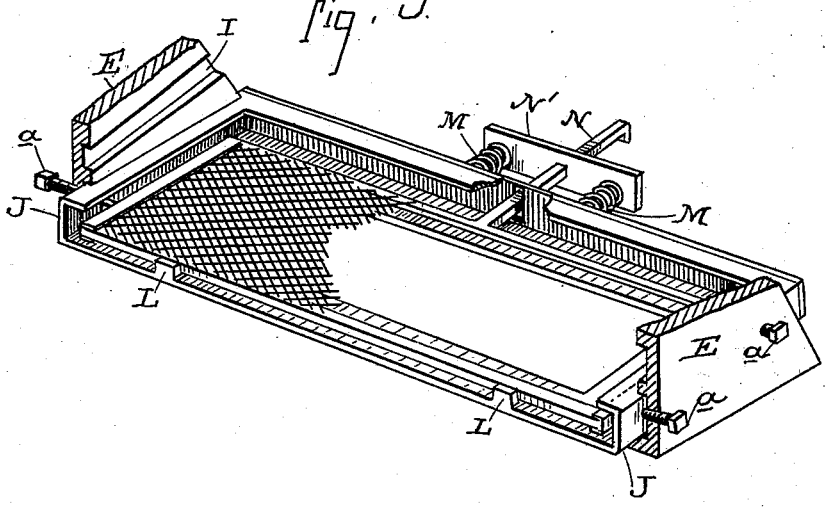


Fig. 4.

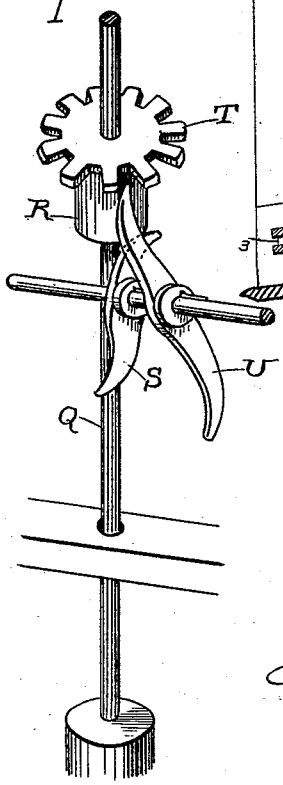
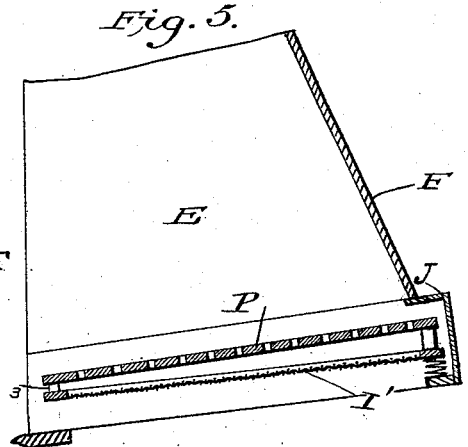


Fig. 5.



Witnesses,
J. A. Bayless

Inventor,
Adolph Schulenburg.
By Dewey & Co.
Attys

UNITED STATES PATENT OFFICE.

ADOLPH SCHULENBURG, OF SAN FRANCISCO, CALIFORNIA.

ORE-CRUSHING MORTAR.

SPECIFICATION forming part of Letters Patent No. 492,634, dated February 28, 1893.

Application filed April 29, 1892. Serial No. 431,218. (No model.)

To all whom it may concern:

Be it known that I, ADOLPH SCHULENBURG, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Ore-Crushing Mortars; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to certain improvements in mortars which are employed for the crushing of valuable ores, gravel, cement, &c.

It consists in certain details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a perspective view of a mortar showing my construction, with a portion broken away showing the screen. Fig. 2 is a section of the same in perspective. Fig. 3 is an enlarged detail showing the construction. Fig. 4 is a view of a stamp stem with ratcheted head and double cams for lifting and turning at one operation. Fig. 5 is a sectional view showing the supplemental frame, and the screen frame having its upper end resting upon a spring support.

The body A of my mortar is essentially of the ordinary shape of mortars made for this purpose, having openings at the front and the rear. At the upper rear side is formed a channel B extending from end to end of the mortar and adapted to receive the ore which is to be crushed, and which is delivered into this channel by a chute or other means. From the lower part of this channel are formed distinct and separate detachable spouts C which deliver the ore directly to the five stamps which are usually placed in each mortar. The stamps are caused to rise and fall by cams upon a cam shaft in the usual manner. The spaces between the spouts allow the crushed ore to splash outward to the screens when they are used in the rear, or to inclined amalgamating plates which are used when the rear of the mortar is closed, and the rear of the spouts themselves may be amalgamated to receive and save any valuable metal which may splash against them.

Upon the ends of the mortar are bolted supplemental, detachable plates D and E. The plates extending rearwardly may have screens supported between them, if it is desired to employ what is known as a double discharge from the mortar, or if it is to discharge only toward the front, the rear of the mortar will be closed by a plate which is bolted or otherwise secured over the rear opening, and inclined amalgamating plates fixed behind the feed spouts. The spaces between these spouts allow the material to freely reach these plates. In the present case I have only shown a single discharge.

F is a plate or cover bolted or otherwise secured upon the angular projecting plates E which extend from the front of the mortar. The inner surface of this plate may be amalgamated, if desired, so that any particles of ore or valuable metal splashed upon it by the action of the stamps, will be arrested and amalgamated at this point.

Through the ends of the mortar, and near the front and rear lower edge, are made vertical slots or channels through which the projecting ends from the splash-board G extend. This splash-board is intended to receive the first force of the particles of ore which are violently thrown about by the falling stamps and to prevent their being thrown too forcibly against the screens. This board is vertically adjustable by means of screws H connecting with the projecting ends from the splash-board so that it may be set at any desired position by means of nuts H′ upon the ends of the screws. This splash-board is provided with a suitable amalgamating surface so that any metal striking it will be amalgamated at once.

In Fig. 1 I have shown three grooves or channels I in the end plates, adapted to receive and hold the screens, in either position, as may be desired.

In the first or highest position the screen I′ is fixed in its frame and secured immovably between the upper channels I of the end plates E of the mortar, so that the ore which is splashed outwardly from the stamps falling upon this screen will be separated, that which is fine enough passing immediately through the screen, and that which is not fine enough falling back into the battery. The angle of this screen is sufficient to allow any ore which does not pass through it to slide back by gravitation.

The second form of screen I′ which I have

shown has its frame or rim fitted into a supplemental frame J. This supplemental frame is secured in one set of the channels between the plates E, and the side flanges of this frame are sufficiently deep to allow the screen frame to fit loosely between them, resting on springs at the upper end, so that the jar of the mortar, or any other means for producing a jar upon the screen frame, will agitate the screen within the supplemental frame, thus assisting the ore in passing through this screen, while that portion which does not pass through will be thrown back into the mortar by the jar. The angle of this screen may be a little less than that employed for the stationary screen, as the jar will assist in carrying the material back. If desired the supplemental frame may also be amalgamated to assist in obtaining valuable particles.

In the third position of the screen, which I have shown, it is likewise fitted into a supplemental frame J having grooved or channeled sides. In this case, the screen may be set at a less angle than either of the others, and fits into the grooves or channels upon the sides of the supplemental frame, as plainly shown.

L L are stops projecting upwardly from the inner edge of the supplemental frame, against which the inner edge of the screen frame strikes when it is forced inwardly.

M M are springs acting against the outer edge of the screen frame, through a bar or extension N projecting through the front, and having a plate N′ fixed to it. The springs are connected with this plate and with the front so that they are extended when the bar is drawn out, and when the bar is released, they act to draw it and the screen suddenly back.

The bar N connecting with the screen frame and extending out through the front edge of the supplemental frame, has an attachment which is adapted to be engaged by a cam O driven from any suitable moving part of the machinery, such as the cam shaft or some counter-shaft. This cam engaging with the projection from the bar N draws it outwardly within the supplemental frame, thus extending the springs M. As soon as the cam releases it, the springs act to throw the screen frame forcibly inward, and its inner edge strikes against the lugs L, thus giving it a percussive movement, which serves to sift and separate the ore lying upon it, allowing the finer particles to pass through the screen, while the remainder is gradually returned to the battery. This plan is better than to throw the ore directly against the screen, allowing that which strikes the holes to pass through, while the remainder falls back into the battery as it will be seen that the screen surface actually contains not over one third of perforations, and thus a large proportion of the material which is really fine enough to pass through these perforations, not striking in line with them will be thrown back to be pulverized still finer. The bar N, with plate N′, with springs, are detachable, also the front piece of supplemental frame in order to put in and take out the screen.

Above the screen which operates as thus described, is placed a second or third amalgamating plate P. These plates are set at an angle a little greater than that of the screens, the inner edge being raised a short distance from the screen surface by supporting lugs 3, and the outer edge being raised still higher. These amalgamated plates are perforated or formed with slots or openings of any suitable or desired description, and they receive the ore which is splashed outwardly from the stamps and being amalgamated, will arrest all metallic particles falling upon them. The finer portions of the ore which do not amalgamate will pass through the slots and eventually through the screens. These plates being mounted upon the screens see Fig. 5, will partake of the shaking or percussive motion, as the case may be, and will thus keep the ore from piling up or remaining upon their surfaces. They may also be supported upon springs, if preferred, as shown in Fig. 2. It will be manifest that any or all of these plates, frames, screens and other movable parts may be taken out and replaced whenever desired, and they may be held in place with relation to each other by any suitable contrivance which will readily suggest itself to the mechanic. If it is desired to fix the screens immovably in the exterior frames, it may be done by set screws *a* or in other suitable manner.

Q is the stamp stem, R the tappet which is engaged by the cam S to raise the stem and stamp in the usual manner.

T is a disk with radial arms, secured to the stamp stem adjacent to the tappet, and U is a second cam fixed to the cam shaft near the cam S. The office of this second cam is to engage the arms of the disk T, before the cam S strikes the tappet R, and it thus rotates the stem and stamp before the latter is raised and causes it to grind the ore in the mortar while the full weight of the stamp remains upon it. The cam S then engages the tappet R, and raises the stamp, and allows it to fall when released, to crush in the usual manner.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an ore crushing mortar, the main body with the receiving channel and feed spouts, the removable end plate extension D, E, bolted to the body, plates F by which the discharge fronts are closed, outwardly inclined screens supported between the end plate extensions, in combination with the vertically adjustable amalgamated splash board G extending between the ends of the mortar ex-

terior to the stamps, and interior to and independent of the inner ends of the inclined screens, substantially as herein described.

2. In an ore crushing mortar, the main body having openings at front and rear through which the ore is thrown outwardly to the screens, in combination with an amalgamated board G having projections extending through vertical slots in the ends of the mortar, and near the front lower edge of the discharge opening, and adjusting screws H connecting with said projections whereby the plate may be raised or depressed, substantially as herein described.

3. The supplemental frames J fixed between the projecting plates D, E, upon the ends of the mortar, screens fitted in said supplemental frames and movable by jar or oscillation, substantially as herein described.

4. In a mortar, the main body having the projecting end plates D, E, supplemental screen frames J fixed between said plates and having the projecting lugs L along the inner edge, a screen fitted to slide within the supplemental frame and strike against said lugs with a percussive movement, springs pressing against the outer edge of the screen to force it inwardly, a rod or extension connected with the outer edge of the screen frame, and a cam O whereby it is drawn outwardly against the pressure of the springs and suddenly released so that the springs act to force it against the lugs or stops L with a percussive movement, substantially as herein described.

5. An ore crushing mortar having the plates D, E, extending from the ends, supplemental frames J fixed between said projecting plates, a screen movable in said supplemental frame so as to have a percussive action, and a perforated or slotted amalgamating plate P supported above the screen adapted to receive the ore from the battery and afterward deliver it through the openings upon the screen, substantially as herein described.

6. An ore crushing mortar having the extension plates D, E, with screens, amalgamating plates and splash boards as shown, stamp stems with tappets R, and cams S upon a cam shaft by the rotation of which the stamps are alternately raised and released, in combination with a supplemental cam U fixed to the shaft, and a disk T with arms which are engaged by the cam U to rotate the stamp before it is raised, substantially as herein described.

In witness whereof I have hereunto set my hand.

ADOLPH SCHULENBURG.

Witnesses:
S. H. NOURSE,
J. A. BAYLESS.