

No. 626,326.

Patented June 6, 1899.

J. F. KEYTON.
ORE CRUSHER.

(Application filed Apr. 29, 1897.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

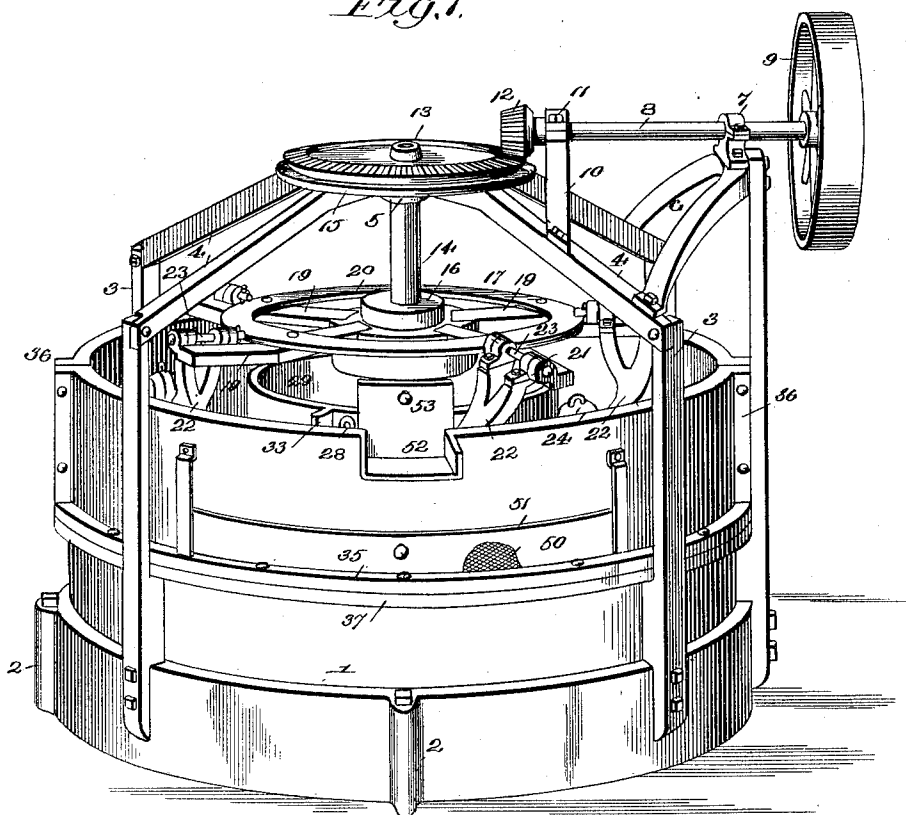
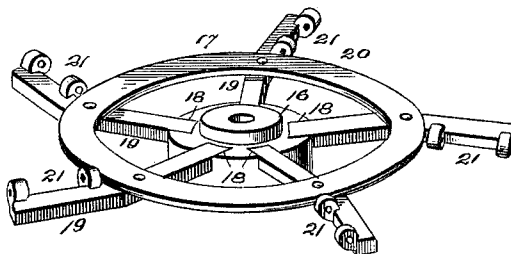
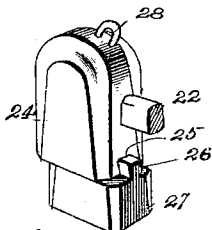


Fig. 3.



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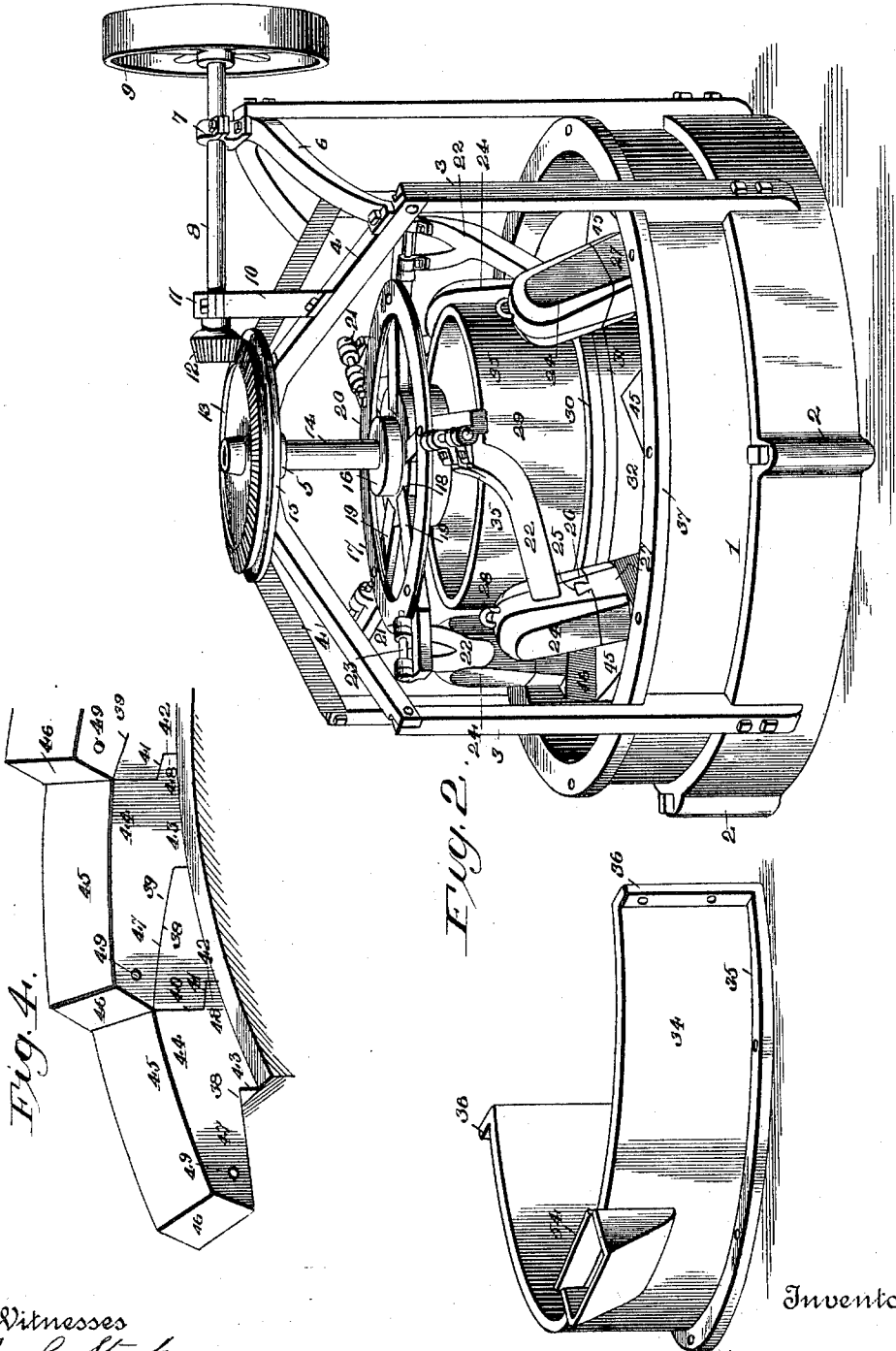
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

JOHN F. KEYTON, OF BAKER CITY, OREGON.

ORE-CRUSHER.

SPECIFICATION forming part of Letters Patent No. 626,326, dated June 6, 1899.

Application filed April 29, 1897. Serial No. 634,312. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. KEYTON, of Baker City, in the county of Baker and State of Oregon, have invented certain new and useful Improvements in Ore-Crushers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to quartz or ore crushers of that class employing a series of impacting devices movable around a common center and coacting with a series of dies resting in a mortar.

The invention consists, essentially, of a battery composed of a series of stamp-arms jointed to and rapidly rotated by a wheel, the arms carrying stamps or mullers over stepped dies located beneath them.

The invention further consists of the details of construction and arrangement of the several parts, which will be more fully hereinafter described and claimed.

In batteries as heretofore constructed the rotation and operation of the impacting devices have been comparatively slow and the grinding process partially ineffectual in liberating the gold. This difficulty has been due to a lack of continued or extended contact of the impacting devices with the under dies. Another difficulty encountered in such machines, preventing them from giving better results, is the frail structure of the several parts, that necessarily require slow movement to obviate fracture or injury.

One object of the present invention is to arrange the arms and stamps or mullers relatively over dies having long drag-surfaces between each fall and to confine the ore closely over and crush and grind it between the said surfaces.

A further object is to so attach the arms that they will not be disabled by rapid rotation around a common center and be capable also of supporting and operating heavy stamps or mullers.

A further object is to retard the movement of the pulp being operated upon in such manner as to prevent it from being carried around the race as an unobstructed stream.

Another object is to release the water and ore-pulp from the battery by grades through

the application of proper sieves, and thereby avoid loss.

In the accompanying drawings, Figure 1 is a perspective view of an ore-crusher embodying the invention. Fig. 2 is a similar view of the improved ore-crusher, showing the sides removed and one part thereof positioned at one side. Fig. 3 is a detail perspective view of the drag-wheel, showing one of the drag-arms disconnected therefrom and at one side thereof. Fig. 4 is a detail perspective view, on an enlarged scale, of a portion of the bottom of the mortar, showing the die-seats therein and the dies positioned in connection therewith.

Referring to the drawings, wherein similar numerals are employed to indicate corresponding parts in the several views, the numeral 1 designates a mortar of circular form and of suitable weight and material to resist fracture, having at regular intervals on the lower portion thereof enlargements or lugs 2, with openings therethrough for the purpose of receiving anchors of suitable form and securing the mortar to a stone or timber rest. Rising at regular intervals from the said mortar are uprights 3, which are securely bolted thereto and have attached to the upper ends thereof inwardly-extending obliquely-arranged braces 4, running to a common center 5, which forms a bearing and has an opening extending therethrough for a purpose which will be presently set forth. To a portion of the upper ends of the uprights 3 is a cross-brace 6, supporting a journal-bearing 7, in which is rotatably mounted a horizontal shaft 8, having a pulley 9 on the outer end, to which power is to be applied for driving the shaft 8 and the entire machine. On the inner part of the adjacent braces 4 another brace 10 is secured and supports a second journal-box 11, through which the said shaft 8 also passes, and on the inner end of the latter is a pinion 12, meshing with a bevel gear-wheel 13, keyed to the upper end of a shaft 14, which extends perpendicularly through the center of the machine and has a pivot-bearing at its lower end of suitable construction. Beneath the bevel-wheel 13 is a flanged plate 15 to prevent grease or oil from dropping into the battery. The shaft 8 and pulley 9, together with the pinion 12, gear-wheel 13, and plate 15,

may be dispensed with, if so desired, and a driving-pulley secured directly on the upper end of the shaft 14, the latter having bearing in the opening formed at the point where the
 5 braces 4 meet at the center. On the shaft 14, below the braces 4, is keyed the hub 16 of a wheel 17, the latter being formed with a series of openings 18, in which are fitted and secured arms 19, and over the said arms is
 10 mounted a circle brace 20, which is bolted in position and reinforces and holds the said arms against movement and loosening at the points where they are attached. The outer ends of the arms 19 are slightly deflected to
 15 bring the parts carried thereby in proper position within the mortar and have on one side hinge-sections 21 to removably receive corresponding formations on the upper ends of drag-arms 22 and attached by removable pin-
 20 tles or bolts 23. On the free end of each drag-arm 22 is secured a stamp or muller 24, having a dovetail groove 25 in the lower end thereof to removably receive a dovetail tenon 26 on the upper side of a shoe 27 to thereby
 25 hold the shoe in firm connection with the stamp and prevent it from having movement or loosening during the operation or impact of the shoe, as will be hereinafter set forth. To the upper end of each stamp is also se-
 30 cured a staple or eye 28, to which a chain or other device may be attached in lifting and removing the stamp carrying the shoe, together with the arm attached thereto, from the crusher or battery.
 35 In the center of the crusher or battery is mounted an inside drum 29, having lower flanges 30 applied to similar flanges 31 on a lower support 32, and the said inside drum is also provided at suitable points with vertical
 40 flanges 33 to break up a rapid swirl or current of the pulpy material in the crusher or battery to thereby cause a more effective operation of the stamps or mullers on the ore placed in the device. Surrounding the up-
 45 per part of the crusher are outside rims or bands 34, which have lower flanges 35 and end flanges 36, the said flanges 35 being bolted to a top flange 37 on the mortar 1, and the end flanges 36 bolted to similar flanges on
 50 corresponding sections, and between the inner sides of the said outside rims or bands and the inside drum a narrow circular race is formed to confine the pulp in such position as to be directly operated upon by the stamps
 55 or mullers, and the flanges located at this point prevent the water from whirling around with the stamps 24. As clearly shown by Fig. 4, the bottom of the mortar 1 has projected upwardly therefrom and arranged in
 60 circular form a series of die-seats 38, a sufficient thickness of material being left between the lower terminations of said die-seats, both in a vertical and lateral direction, in the bottom of the mortar as to resist the pound or
 65 weight delivered thereon. These die-seats are arranged at regular intervals and consist of upwardly-projecting enlargements in-

clined, as at 39, on their upper edges and from the highest point formed with a vertically-de-
 70 pending wall 40, extending partially down through the thickness of the height of the enlargement at this point and meeting a slightly downward beveled wall 41, which is again con-
 75 tinued at its front termination by a short vertical wall 42. The said walls 41 and 42 form a groove, and at the opposite reduced portion of the enlargement the end thereof ex-
 80 tends downwardly at a very slight incline, as at 43. The space formed between the downward incline 43 and the groove opposite and in advance thereof, together with the highest
 85 point of the vertical wall 40 of each enlargement, provides a seat for removably receiving a die 44, having an upper inclined edge 45 of considerable extent and terminating above
 90 the highest point of the enlargement in a slightly-beveled wall 46. The beveled edge 45 of the die forms a long surface, over which the shoes carried by the stamps and drag-arms scour as well as crush the ore and
 95 facilitate the liberating of gold from the material carrying the same, especially when sulfids are present and the metal is rusty, to thereby cause the quicksilver or amalgam to more readily pick up the brightened parti-
 100 cles of gold, as will be understood. By having the said wall 46 inclined, as shown, the stamps passing thereover drop downward and are thereby caused to travel or operate over the entire surface 45 of each die. The under
 105 side of each die is constructed with a recess 47, corresponding relatively to the contour of the upper surface of the enlargement, having the upper inclined edge and the front in-
 110 clined wall, and the front of each die is also provided with a tenon 48, fitting in the groove formed by the walls 40 and 41. By this arrangement the die is prevented from jumping or tilting, and at the same time can be readily removed or placed in position, and
 115 at one end each die has an opening 49 for the engagement with a suitable lifting device operated by power or otherwise manipulated.

In one of the rims or bands is a screen-dis-
 120 charge 50, covered by a movable plate 51, and when the said screen-discharge is closed the water and pulp are compelled to rise to an ad-
 125 jacent-situated discharge 52 in the upper edge of the outside rim or band and is controlled by a slide 53, and by this means a fine-
 130 grinding and thorough scouring action is attained and the pulp is permitted to run out of the crusher or battery, and the gold is being operated upon and the particles thereof have been fully exposed or brightened, so as
 135 to readily adhere to the quicksilver that is held in the battery. By operating the slide 53 to control the size of the opening the grade of fineness to which the ore is ground is regulated and different results can be obtained.
 140 When the slide is lowered, it forms a wide flat tube, and as a result the ore must be ground and scoured into a finer pulp than if the slide was left to provide a free exit-open-

ing. When the crusher or battery is being employed in treating gold-bearing ore, this operation facilitates the amalgam process in the battery. If it is desired to crush the ore more rapidly, the movable plate is opened and a suitable form of screen is placed over the opening, which will be arranged in accordance with the character of the ore being operated upon and the degree of fineness to which it is required to be crushed. On the opposite side of the crusher or battery, in one of the outside rims or bands 34, a feed opening or hopper 54 is located, by means of which the ore is placed in the crusher or battery, and water may be supplied by means of a rubber hose or pipe in any preferred manner.

The material advantages in this device, not only as to its increased capacity, but also in the economy of liberating and saving the precious metals, make it a valuable accessory to mining operations. The rapidity of movement of the operating mechanism is also beneficial in this class of devices by reason of the effectiveness and greater capacity and output within a certain time. As an example of the power of the machine, as heretofore set forth, there are five stamps or mullers employed and seven dies with seven drops to each stamp, and the weight of the stamps carried by the arms is about four hundred pounds, more or less. If the machine is run at twenty-five revolutions per minute, which is a perfectly safe speed, it would produce one hundred and seventy-five drops to each of the stamps or mullers, which is greatly in excess of the number of drops of other mills now commonly employed. This increases the crushing and scouring action, and consequently permits a greater quantity of ore to be operated upon within a given time.

It is obviously apparent that many minor changes in the details of construction and ar-

rangement might be made and substituted for those shown and described without in the least departing from the nature or spirit of the invention.

My object in having the wheel-arms deflected, as described, is to avoid torsion through centrifugal action by causing an equal draft on the fork or hinged legs of said arms through a simple hinged connection between the wheel-arms 19 and the drag-arms 22. The drag-wheel as a whole is built up as described, so that it may be easily repaired in case any part of the same is broken or injured that it may be taken to pieces for packing or shipping.

Having thus described the invention, what is claimed as new is—

1. In an ore-crusher, the combination of a drag-wheel involving a hub provided with slots, arms fitted into said slots, an annular band or brace attached to said arms, the arms being bent or deflected outside the brace, drag-arms jointed to the deflected projections, and stamps or mullers, substantially as described.

2. In an ore-crusher, the combination of a mortar having enlargements with recesses between them to form seats, and a groove at the lower portion of one end of each recess, and dies removably fitted over the said enlargement and having an under contour corresponding thereto and the recesses between the same, and also provided with tenons to engage the said grooves, substantially as and for the purposes specified.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN F. KEYTON.

Witnesses:

HERMAN FUCHS,
JAMES T. CHOUL.