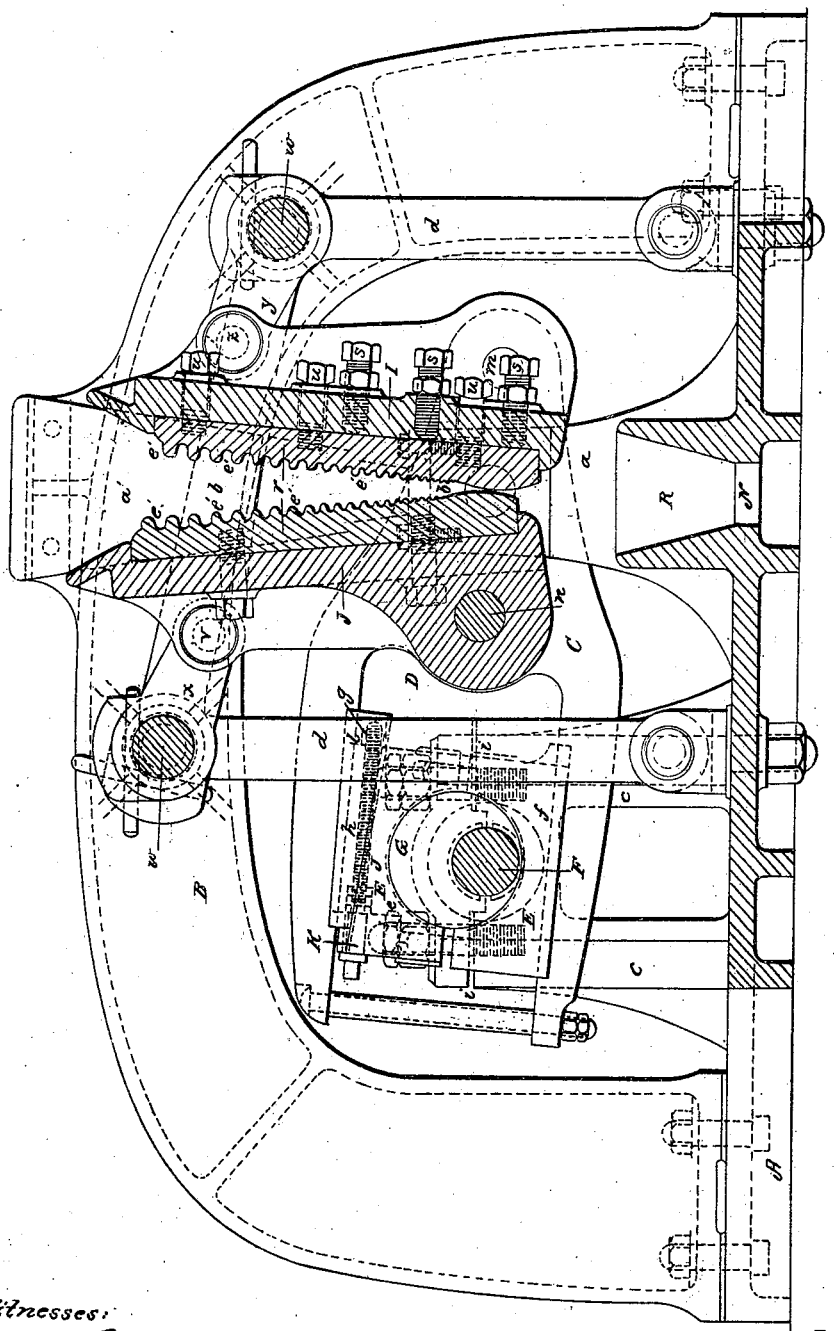
C. P. WAGNER.

Ore Crusher.

No. 55,181. Patented May 29, 1866.



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C. PH. WAGNER, OF NEW YORK, N. Y.

IMPROVEMENT IN QUARTZ-MILLS.

Specification forming part of Letters Patent No. **55,181**, dated May 29, 1866.

To all whom it may concern:

Be it known that I, C. PH. WAGNER, of the city, county, and State of New York, have invented certain new and useful Improvements in Machines for Crushing and Pulverizing Quartz and other Ores; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, making a part of this specification, which is a central vertical section taken longitudinally through a crusher and pulverizer constructed according to my invention.

This invention relates to that class of ore crushing and pulverizing machines which are known as "jaw-crushers" and "pulverizers;" and it consists in a novel mode of hanging and operating the jaws, whereby a powerful pinching action is exerted upon the ore to break and crush it simultaneously with a grinding or abrading action, which thoroughly pulverizes and reduces it to the required degree of fineness, and whereby the crushing and pulverizing of the ore and its discharge from the machine are rendered continuous instead of intermittent, as in the machines heretofore constructed, thus greatly increasing the working capacity thereof.

To enable those skilled in the art to understand the construction and operation of my invention, I will proceed to describe it with reference to the drawing.

A is a solid cast-iron bed-plate, to each side of which is firmly bolted an upright longitudinal frame, B, the said frames B being parallel with each other and having the grinding or breaking jaws with their appurtenances situated between them. Also formed at each side of the bed-plate A, near one end thereof, is a pillow-block, *a*. In each of these pillow-blocks *a* is rigidly fixed a short but thick and solid transverse horizontal pin, *b*, which projects inward and has pivoted upon it a lever, C. These two levers, C, are situated opposite each other upon the two sides of the machine, and the long arm of each is forked or provided with a large longitudinal slot, D, in which is situated the sliding box E. These levers C are of the same size and shape and operate conjointly and simultaneously in working the machine, their mechanical operation being the same as that of a single lever, as will be hereinafter fully set forth. Situated near that end of the bed-plate A opposite the pillow-blocks *a*, and, like them, upon opposite sides of the said bed-plate, are two other pillow-blocks, *c*, the upper sides or ends of which are furnished with suitable transverse boxes or bearings which receive the journals of a transverse driving-shaft, F, one end of which projects outward from one side of the machine and is furnished with a belt-wheel, by means of which it is rotated. Formed or fixed upon this driving-shaft F, near each end thereof, and just within the pillow-blocks *c*, is an eccentric, G. These eccentrics work in the boxes E, which have a longitudinal sliding movement in the slots D in such manner that the rotation of the shaft F communicates a simultaneous rocking movement to the levers C. In order to compensate for the wear of the sliding boxes E, they are divided longitudinally into two parts, *e* and *f*, with a narrow-space, *i*, between them, so that the said parts may be brought closer together when desired by means of a wedge, *h*, which is situated between the inclined upper surface of the upper part *e*, and the upper side of the slot, and is operated by turning the nut *g* of a longitudinal screw-bolt, *j*, the said bolt extending from a lug, *k*, on one end of the part *e* to another lug, *l*, on the opposite end of the wedge *h*.

Extending transversely from the end of the short arm of one lever C to that of the other is a strong shaft, *m*, on which the grinding or breaking jaw I is pivoted at its lower end. The long arms of the said levers C are also connected by another strong transverse shaft, *n*, which is situated at the same distance from the fulcrum *b* of the said levers as the shaft *m*. The other grinding or breaking jaw, J, is pivoted at its lower end upon this shaft *n* in the same manner that the jaw I is pivoted upon the shaft *m*, the said jaws being situated with their faces opposite each other and in a nearly-upright position, but with their faces inclined at an angle to each other, so that while they are some distance apart at the top they gradually approach each other with only a narrow opening at their lower ends, as represented in the drawing. Inasmuch as these jaws I J are pivoted upon opposite sides of the fulcrum *b* of the levers C the rocking movement of the said levers causes the jaws to alternately move up and down, one jaw moving upward as the other moves down-

ward, so as to thoroughly break and grind the ore between them, as will be presently fully set forth.

The jaws are made of cast-iron, very solid and heavy, while their face-plates *r*, which are made separately, are formed of franklinite, steel, or other metal of great hardness. In order that the angle at which the face-plates *r* stand with regard to each other may be adjusted when desired, they are secured to the jaws by means of set-screws *s* and *u*. The screws *s* are turned inward, so that their inner ends press against the backs of the face-plates *r* to bring them to the proper inclination, while the screws *u* are screwed into the said backs of the face-plates *r*, and thus bring them firmly against the inner ends of the screws *s* and hold them securely in position. The faces or inner surfaces of these face-plates *r* are furnished with teeth *e'*, which are cylindrical in form, with flat ends. These teeth may be arranged in rows across the said faces and regularly diminish in length from the top of the face, where they are the longest, to the bottom, where they are shortest, as represented in the drawing.

Situated behind the upper end of each grinding-jaw is a strong stationary shaft, *w*, which extends transversely from one frame B to the other, and has its ends securely fixed in the said frames. At each end of one of these shafts *w* is pivoted a swinging link, *x*, the said links *x* having their opposite ends pivoted upon a transverse bolt or shaft, *v*, passing through suitable lugs *f'*, formed in the back of the jaw J. This shaft *v* is situated at a lower point or level than the shaft *w*, which forms the fulcrum of the said links, so that as the jaw J is moved upward by the levers C the ends of the links *x*, as they swing upward, describe the arc of a circle and tilt or force the said jaws inward. Similar swinging links *y* are in like manner pivoted at one end to the other transverse shaft *w*, and have their inner ends pivoted to the back of the jaw I by means of similar lugs *g'* and a corresponding transverse bolt or shaft, *z;* but in that case the shaft *z*, which connects these links *y* with the jaw I, is situated at a higher point or level than the shaft *w* of the said links, whereby, as the said jaw I moves downward, as hereinbefore explained, the inner ends of the links *y*, describing the arc of a circle as they swing downward, tilt or force the jaw I inward in the same way that the jaw J is forced inward by the links *x* during its upward movement; whence it follows that the jaws approach each other simultaneously at each upward movement of the long arms of the levers C and recede from each other at each downward movement of the said arms, the movement of the jaws being greatest at their upper ends.

The shafts *w w* are connected by two strong longitudinal wrought-iron braces, *b'*, situated at or near the ends thereof, and each of the said shafts is also connected with the bed-plate A by means of two vertical wrought-iron braces, *d*, these braces holding the several parts rigidly together, thus preventing them from becoming loose, and also in a measure relieving the frames B from the strain brought upon them during the operation of the machine.

The quartz or ore to be crushed and pulverized is placed between the jaws I J, and is prevented from escaping laterally therefrom by vertical plates *a'*, of which there is one secured upon the inner side of each frame B in such manner as to close the ends of the space between the jaws.

Formed in the bed-plate A, immediately below the grinding-jaws, is a transverse opening, N, which is surrounded by a sort of hopper, R, into which the pulverized ore passes as it falls from the said jaws.

The quartz or other ore to be broken and pulverized being placed between the jaws I J, as just mentioned, and a rotary motion being given to the driving-shaft F, the cams G of the said shaft work the long arms of the levers C up and down, or, in other words, communicates a rocking motion to the said levers, which gives a reciprocating movement in opposite directions to the jaws I J at the same time that they are caused to approach and recepe from each other, all as hereinbefore fully set forth.

As the jaws move toward each other they exert a powerful pinching action upon the blocks or lumps of ore between their faces, and thus crush and crack them into smaller pieces, which fall downward as the jaws recede from each other, and are crushed still finer by the next pinching movement of the said jaws. Simultaneously with this crushing action of the jaws upon the ore the rubbing action of the teeth upon the said ore, as the jaws are moved up and down, triturate, grind, and abrade it, and thus gradually pulverize and reduce it to the required fineness, the pulverized ore passing out between the lower ends of the jaws into and through the hopper R and opening N to any suitable receptacle placed underneath the said opening to receive it.

Inasmuch as the jaws I J are in constant motion with reference to each other, their crushing and grinding action upon the ore is unintermittent, and consequently the discharge of the pulverized ore therefrom is continuous also.

It will be borne in mind that, inasmuch as the levers C are identical in shape, size, and operation, the same movement of the jaws would be obtained by the employment of only one of them; but it is preferred to use two, as herein set forth, in order that the jaws may be supported equally at both sides and prevented from being wrenched or twisted out of place by the strain upon them during the operation of the machine.

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

1. Communicating an alternate reciprocating movement bodily to the lower ends of the

crushing-jaws I J, and at the same time a vibrating movement to the upper ends of said jaws, so as to produce a rubbing or grinding action and a crushing action combined, employing for this purpose means substantially as described.

2. Pivoting the lower ends of the vibrating jaws I J, or their equivalents, to bearings which have a vertical vibration, and communicating a lateral vibration to the upper ends of said jaws by means substantially as shown and described.

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