2 Sheets—Sheet 1.

E. S. BLAKE.

PULVERIZING-MACHINE.

No. 183,114. Patented Oct. 10, 1876.

Fig. 1.

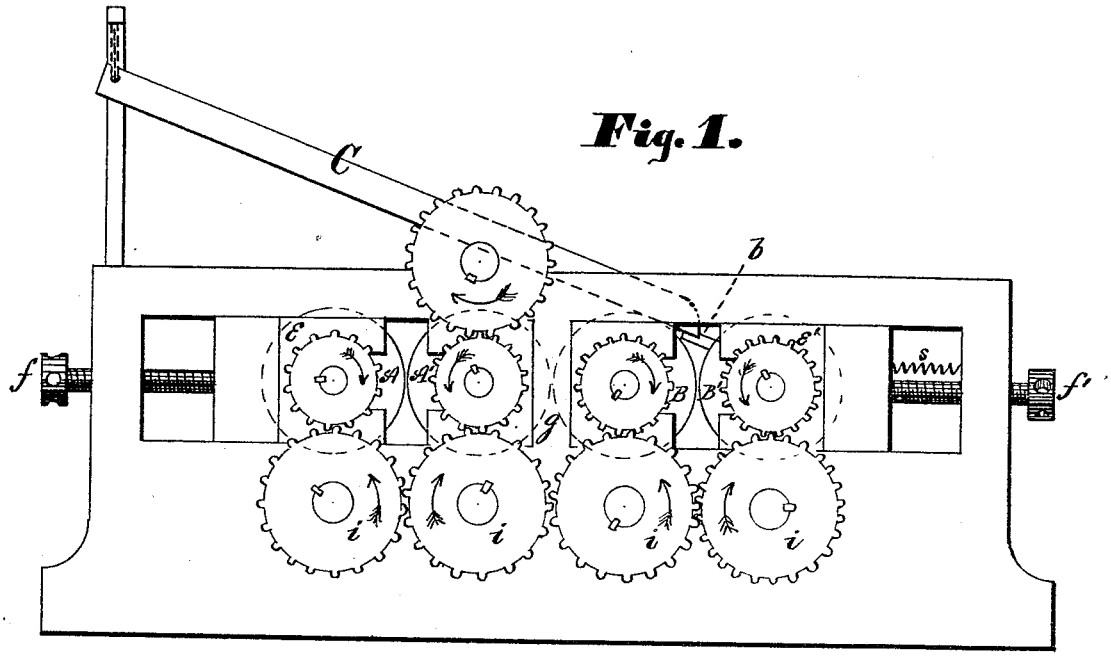
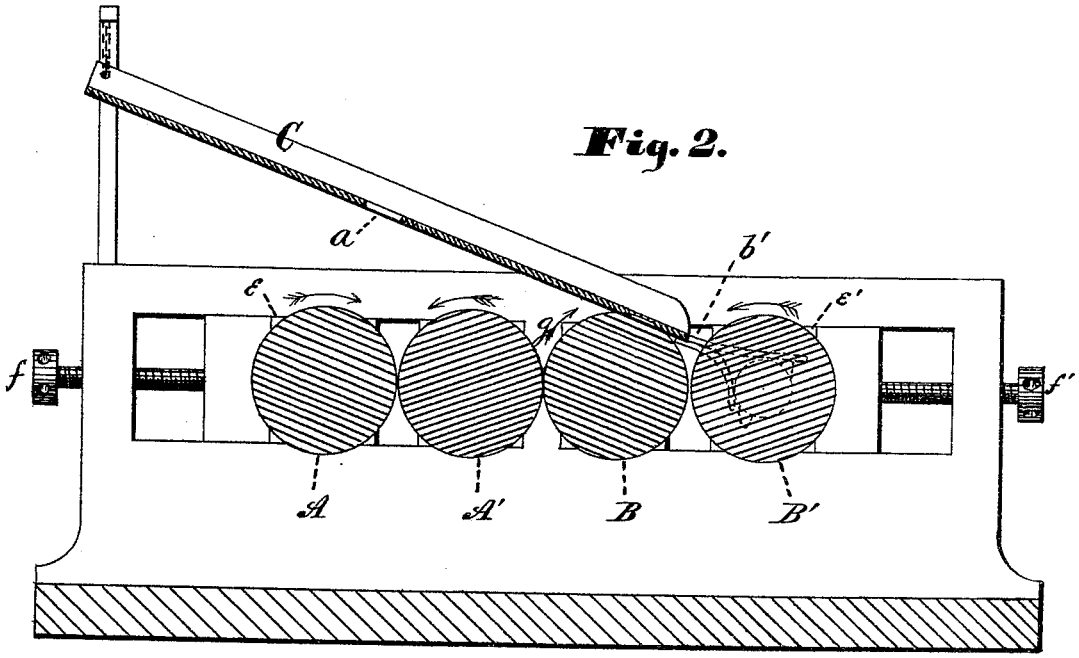


Fig. 2.



Witnesses

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2 Sheets—Sheet 2.

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Fig. 3.

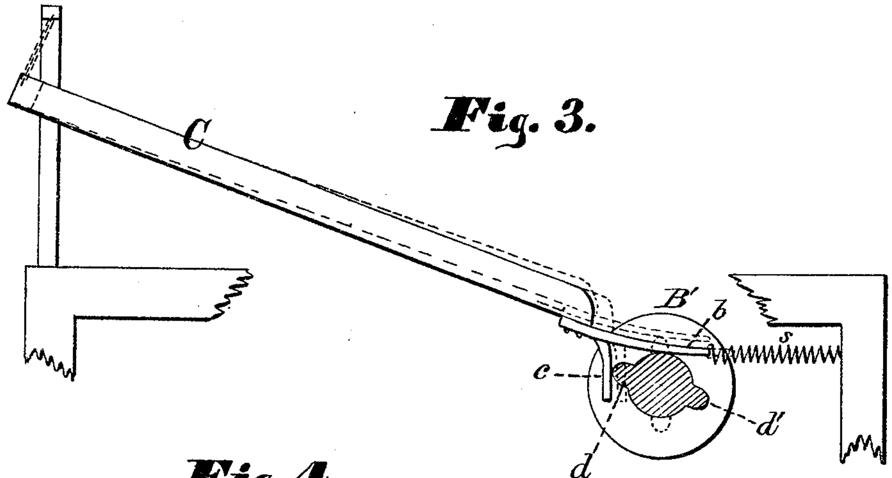
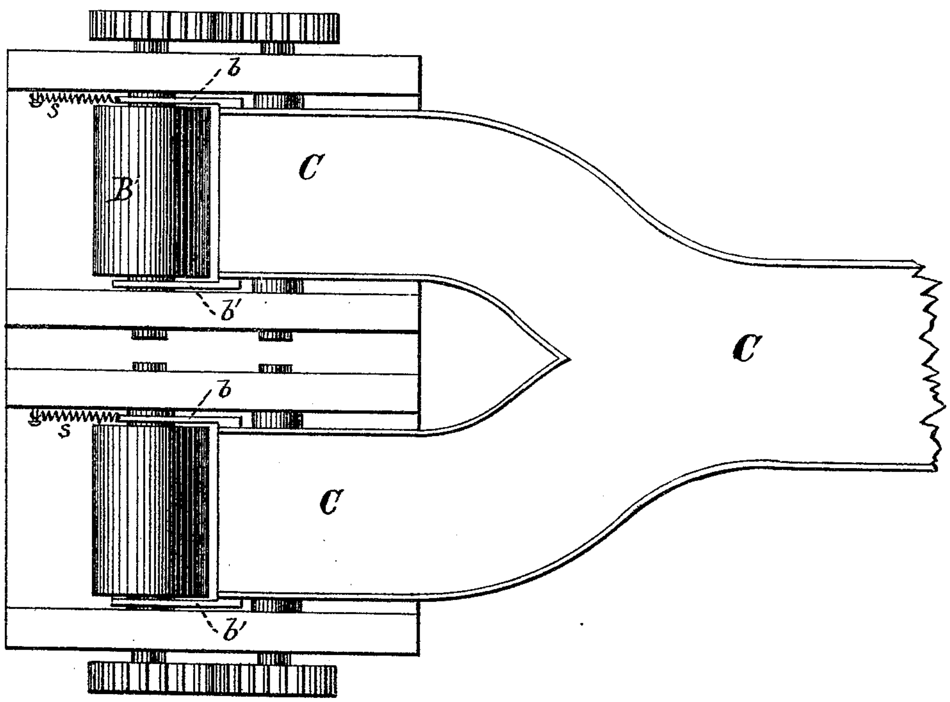


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

EDWARD S. BLAKE, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN PULVERIZING-MACHINES.

Specification forming part of Letters Patent No. **183,114**, dated October 10, 1876; application filed May 22, 1876.

To all whom it may concern:

Be it known that I, EDWARD S. BLAKE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Pulverizing-Machines; 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a side elevation. Fig. 2 is a longitudinal vertical section. Fig. 3 is a broken detail, showing operation of chute. Fig. 4 is a modification of arrangement.

This invention relates to improvements in pulverizing-machines of that class in which the stone or ore is pulverized by passing between a pair of rolls.

This invention consists in the novel construction, combination, and arrangement of parts, as hereinafter specifically described and claimed.

Referring to the drawings herewith, the various improvements are as follows: Rolls A A′ form one pair, having an introverting motion, and rolls B B′ form another pair, with like motion. As they can all be placed in the one set of housings, and run by the one power-wheel, economy is effected both in material and in machinery. The pairs of rolls need not be placed side by side, as they may also be placed end to end, or otherwise, as long as they are so arranged that they may all be fed from the same source, and act upon different portions of the same material at the same time. For instance, I can arrange them end to end, as in Fig. 4, and have a branching chute, feeding both from one source. So long as the same portions of material do not pass successively through all the pairs of rolls, but each receives different portions, my invention is carried out. When arranged in the one set of double housings, as first above described, they require a special form of chute, which is substantially as follows: Having its higher end loosely hung in chains or links to an appropriate bearing, an inclined chute, C, extends down across the rolls A A′ and roll B, delivering, by means of a slot or opening, *a*, into rolls A A′, and at its lower end into rolls B B′. The slot *a* is made of a size such that, from a given amount of material passing down the chute, enough will fall through to feed rolls A A′, and enough pass on to feed rolls B B′. The slot *a* may, if desired, be made adjustable in size. There may be an extension downward from slot *a*, so as to guide the material into rolls A A′. Too much inclination of the chute would give a tendency to the material to acquire such a velocity that it might skip over slot *a*, and then too little would be fed to rolls A A′ and too much to rolls B B′. It therefore becomes necessary to have only a moderate inclination, and effect the regular downward motion of the material by other means. For this purpose I attach the upper end of the chute loosely, as said, and at its lower end I construct two longitudinal arms, *b b′*, which rest on the shaft on each end of roll B′. Also, from one arm I construct a downward lever or spur, *c*, which passes down between the shaft of B and that of B′. On the shaft of roll B′ are two or more projections or cams, *d d′*, which give the motions to the chute. A recovery-spring, *s*, is fixed to the arm *b* and to the housings, so that after a motion toward the source has been given the chute, the spring *s* instantly draws it back preparatory to the next motion.

These motions are as follows: The roll B′ revolving in the direction of the arrow, the cam *d* first strikes arm *b* and lifts it, then releases it suddenly. This agitates the material in the chute, and, while it is in that state of mobility, the chute receives its other motion. The cam *d* passes on and strikes the spur *c*. This has to give way, and the consequence is a violent push, endwise, of the whole chute toward its upper end. The material being loose its own inertia causes it to remain in the same absolute position, while its relative position is changed by the chute moving suddenly along under it. The recovery by the spring then causes the chute to come back in a more or less nearly horizontal direction, thus pushing the material the length of the motion given the chute. These motions are repeated by cam *d′*. It is a series of sudden

longitudinal movements of the chute in the direction of its head, which do not overcome the inertia of the material upon it, and then, by the recovery, the material is steadily, though intermittently, thrown forward to the rolls. These particular means of bringing about such result may be greatly varied.

As the constant friction of the stone or ore very rapidly abrades and wears out the surface of the rolls, it is necessary to provide some means of taking taking up the wear or compensating it by approaching the rolls together as they become smaller. This I accomplish by making the outer pillow-block *e* *e'* of each pair of rolls adjustable in the housings by means of the adjusting-screws *f f'*, respectively, and having the inner blocks supported at the middle by the fixed bolster *g*, thus making the housings double horizontally. I arrange a series of idlers, *i*, below the line of the rolls gearing together, and each idler gearing also with the pinion of the roll above it. Thus arranged, when the rolls wear, the outer one of each pair may be moved inwardly by the adjusting-screws *f f'*, and still their pinions will not get out of mesh with their respective idlers. Power may be applied to any of the rolls or idlers. Arranged thus the direction of motion is indicated by arrows.

Hence, by my construction, double the amount of work can be performed that can at present be done by the ordinary rolls, while facilities are obtained for regular feed to the rolls, and adjustment to compensate for wear is made easy, the whole constituting a complete pulverizer that will do all the work that can be given it to do by the crusher, in connection with which it may be operating.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is as follows:

1. In a pulverizing-machine, an inclined delivery-chute, having positive horizontal and vertical reciprocating movements to cause a steady intermittent delivery of material, in combination with the pulverizing-rolls, from the shaft of one of which motion is communicated to said chute, substantially as described.

2. In a pulverizing-machine, the combination, with the roll B', having its shaft provided with the tappets *d'*, of the chute C, having the spurs *b* and *c*, the whole being constructed and arranged to give a vertical and horizontal reciprocating movement to the said chute, substantially as described.

3. The combination, with the shaft of a pulverizing-roll, B', having one or more projections, *d*, of a chute, C, provided with a projecting spur, *c*, engaging with projections *d*, and having the spring *s* arranged and operating substantially as described.

4. In a pulverizing-machine, the combination of the following elements, viz: an inclined vibrating or oscillating chute formed to deliver, as described, two pairs of crushing-rolls, a system of idlers, *i*, and double housings having a fixed central bolster and means of adjustment, all arranged and operating substantially in the manner and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 18th day of May, 1876.

EDWARD S. BLAKE.

Witnesses:
JAMES ANDERSON,
THOS. J. MCTIGHE.