BINGHAM & COWARD.

Ore Mill.

No. 79,630.

Patented July 7, 1868.

Fig. 1.

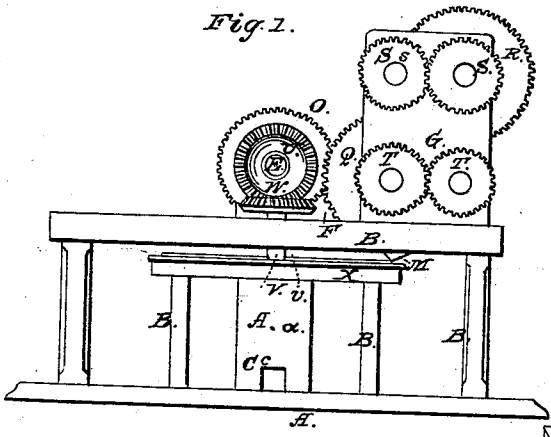


Fig. 3.

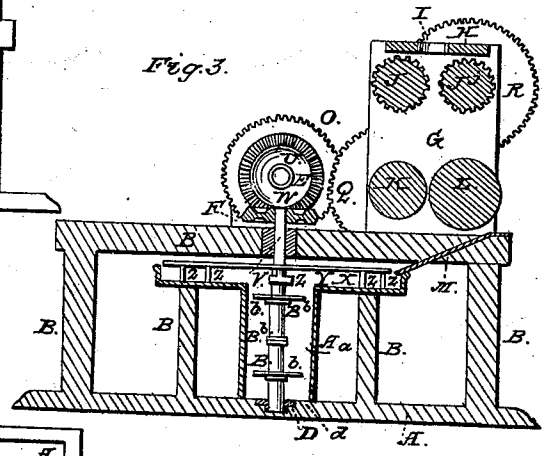


Fig. 2.

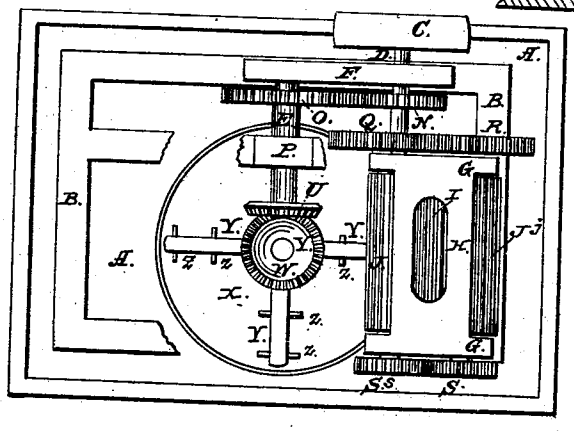


Fig. 4.

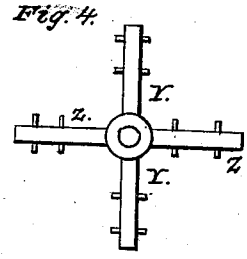
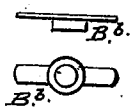


Fig. 5.



Witnesses

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JAMES BINGHAM AND ROBERT COWARD, OF PITTSBURG, PENNSYLVANIA.

Letters Patent No. 79,630, *dated July* 7, 1868.

IMPROVED ROCK-CRUSHER AND TEMPERING-MACHINE.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that we, JAMES BINGHAM and ROBERT COWARD, both of the city of Pittsburg, and county of Allegheny, and State of Pennsylvania, have invented a new and useful "Combined Rock-Crusher and Tempering-Machine," for crushing and tempering clay-rock for the manufacture of brick, earthenware pipe, or to any of the uses clay is put to; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of our invention consists in providing a substantial frame, on the top of which two "housings," through which, in suitable bearings, two corrugated or fluted rollers revolve, below which are two smooth-faced rollers, of two different diameters, which also pass through and rotate through the heretofore-mentioned housings, by also providing, below these smooth-faced rollers, a chute or spout, the extremity of which rests on the frame before mentioned, and the other end is above a large deep dish or basin, which we term a sludge-pan, and the said sludge-pan is supported by a hollow annular cylinder, with an aperture at the base. This cylinder rests upon a bed-plate, which is the foundation of the frame heretofore mentioned. By furnishing, also, six geared wheels, which act as the movers of the rolls heretofore mentioned, viz, one gear-wheel attached to a main horizontal driving-shaft, on the end of which is affixed a driving-pulley or drum, which gear-wheel drives a counter horizontal shaft by reason of another gear-wheel upon it, on the end of which horizontal counter-shaft is attached a bevel-gear wheel, which is rotated by the counter-shaft in suitable bearings, and by also furnishing another bevel-gear wheel of the same pitch as the bevel-gear wheel before mentioned, which is affixed to a vertical shaft, which passes through the before-described sludge-pan and annular hollow cylinder, and revolves in a suitable bearing or step beneath the annular cylinder.

To this vertical shaft are attached three or more sets of knives or beaters, placed at right angles to each other, and bent in such a form that their outside edge or line will be of an Archimedian-screw form; and these knives or beaters, being attached to the vertical shaft, revolve with it within the annular cylinder.

By also providing a spider, consisting of four or more arms, with two or more sets of knives or beaters attached to each arm, which spider is furthermore attached to the aforesaid vertical shaft, in such a manner and in such a position, that as the vertical shaft revolves, the knives will nearly touch the bottom of the sludge-pan. These knives are of such a form, and set at such an angle, that they would have the tendency in their circular travel to force anything within the sludge-pan to the centre thereof. By also providing a gear-wheel on the main horizontal shaft, and attached to one of the smooth-faced rollers before described, in such a manner that this gear-wheel will mesh or interlace its teeth with another gear-wheel of the same pitch, which is affixed to one of the corrugated or fluted rollers before described. By also providing, on the opposite side of the corrugated roller, a geared pinion. By also providing, on the same side of the other corrugated roller, another geared pinion of the same pitch as the pinion just described, both so arranged that the teeth of the respective pinions will mesh or interlace. By also providing a geared pinion upon one of the lower smooth rollers, and on the opposite side than that which has the driving-gear wheel before mentioned; and by also providing, on the same side, a geared pinion to the other smooth roller, both pinions being so arranged that their respective teeth or cogs will mesh or interlace. By also providing a cross-frame, stretching between and at the top of the before-mentioned housings. This cross-frame has an aperture of an oval form.

To enable others skilled in the art of constructing machinery to make and use our invention, we will proceed to describe its construction and operation.

In the accompanying drawings—

Figure 1, sheet 1, is an elevation of our combined rock-crusher and tempering-machine.

Figure 2, a plan of our combined rock-crusher and tempering-machine.

Figure 3, sheet 2, a longitudinal section.

Figure 4, a plan of the spider, showing the knives or beaters.

Figure 5 is a view of the knives or beaters attached to the vertical shaft.

A represents the bed-plate; B, the frame; C, the driving-pulley; D, the main horizontal shaft; E, the horizontal counter-shaft; F, the plummer-block or bearing of the counter-shaft E and main shaft D; G, the housings; H, the cross-frame; I, the aperture in it; J, the corrugated roll; J^J, the second corrugated roll; K, the smooth-faced roll; L, the smooth-faced roll of larger diameter; M, the chute or spout; N, the gear-wheel, which drives the horizontal counter-shaft E; O, the gear-wheel upon the horizontal counter-shaft E; P, the bearing or pillow-block, in which the horizontal counter-shaft rotates; Q, the gear-wheel upon main horizontal shaft D; R, the gear-wheel upon the corrugated roll J^J; S, the geared pinion on the corrugated roll J^J; S^S, the geared pinion on the corrugated roll J; T, the geared pinion on the smooth rolls; U, the bevel-geared wheel on the horizontal counter-shaft; V, the vertical shaft; W, the geared bevel-wheel on the vertical shaft V; X, the sludge-pan; Y, the spider; Z, the knives or beaters affixed to the spider Y; A^A, the annular cylinder; B^B, the knives or beaters, attached to vertical shaft V; C^C, the aperture in annular cylinder; D^D, the step, in which the vertical shaft V rotates.

We propose making the roller L of larger diameter than the roller K, since the pinions T T, on the ends of the respective smooth rolls, being of the same diameter and pitch, would revolve the rollers equally as regards speed. By giving a larger diameter to the roller L, it has a tendency to attenuate or draw out whatever material passes through.

The operation of working our combined rock-crusher and tempering-machine is as follows, viz:

Motion is communicated to all the movable parts by applying steam or horse-power to the main driving-wheel, the whole being so combined, arranged, and put together, that when the clay, rock, or any other such like material, may be thrown through the aperture I of the cross-frame H of the housings G, the rock falls on the top of the corrugated rolls J and J^J, and by their revolving the rock is crushed, and passes through to the top of the smooth rolls K and L, by whose action the material is thoroughly pulverized or granulated, and falls through on the chute M, by which it is conveyed into the sludge-pan X, and is subjected to the rotary motion of the spider Y and its knives Z. A stream of water is kept playing in the sludge-pan, and the knives Z make the material by the aid of the water, into a paste-like consistency, and at the same time the knives are forcing the paste down into the annular cylinder, and it is furthermore subjected to the action of the knives B^B, which force the paste through the aperture C^C of the cylinder A^A.

The advantage we claim in our combined rock-crusher and tempering-machine, is, that the machine is so simple, and so is not likely to be easily disarranged, and also that it will, with ease, break up the hardest rock, convert it into mud, of any required consistency for the manufacture of brick, or any other such like article, such as pipe gas-retorts.

We also contemplate using our machine for crushing copper or iron ore, or flint or quartz rock.

Having thus described the nature, construction, and operation of our combined rock-crusher and tempering-machine, what we claim, is—

The two pairs of rollers J and J^J and K L, the spout M, the sludge-pan X, the spider Y, having knives Z, the annular cylinder A^A, and their operative mechanisms, when constructed, combined, and arranged as described, and to operate in the manner substantially as set forth.

In testimony whereof, we have signed our names to this specification in the presence of the subscribing witnesses.

JAMES BINGHAM,
ROBT. COWARD.

Witnesses:
PERCEVAL BECKETT,
JACOB GRUNNAGLE.