

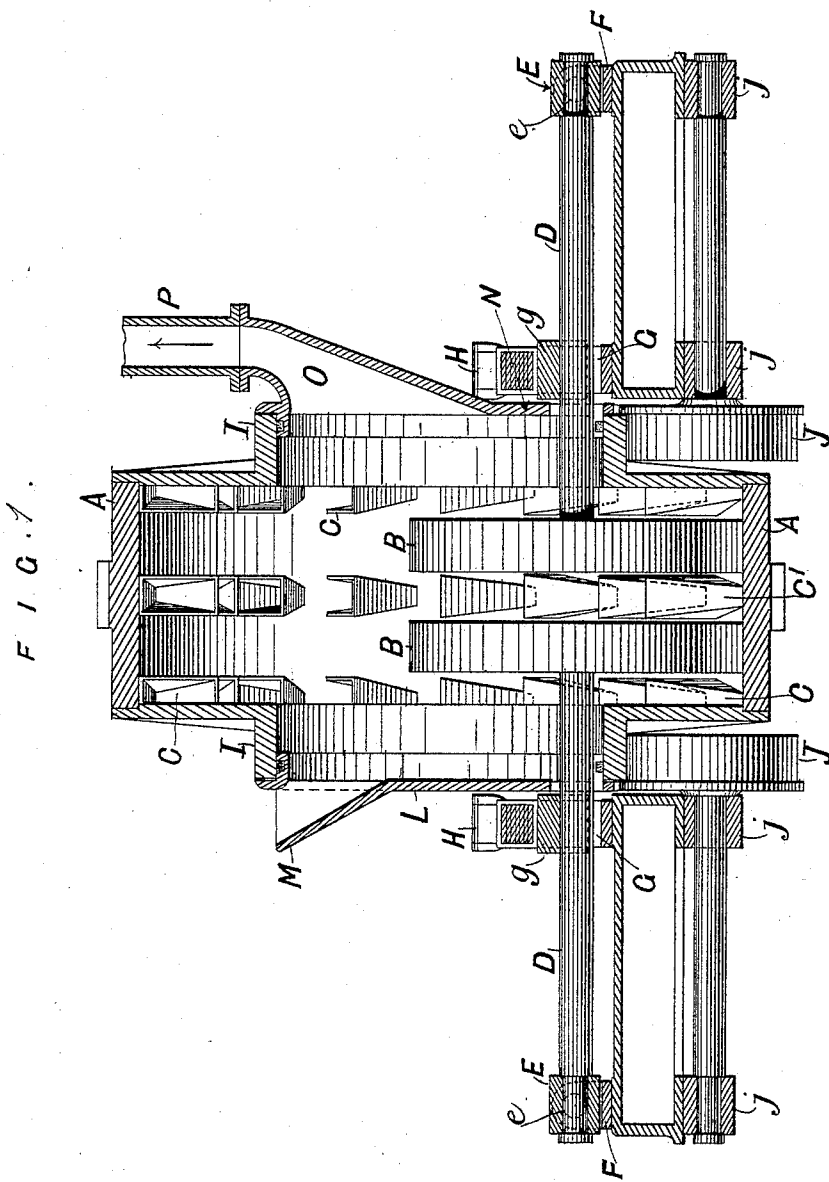
(No Model.)

2 Sheets—Sheet 1.

W. H. COWARD.
MILL FOR CRUSHING ORES.

No. 467,368.

Patented Jan. 19, 1892.



Witnesses:

Edgar Tate
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Inventor
W. H. Coward
by *Mum & Co.*
Attorneys

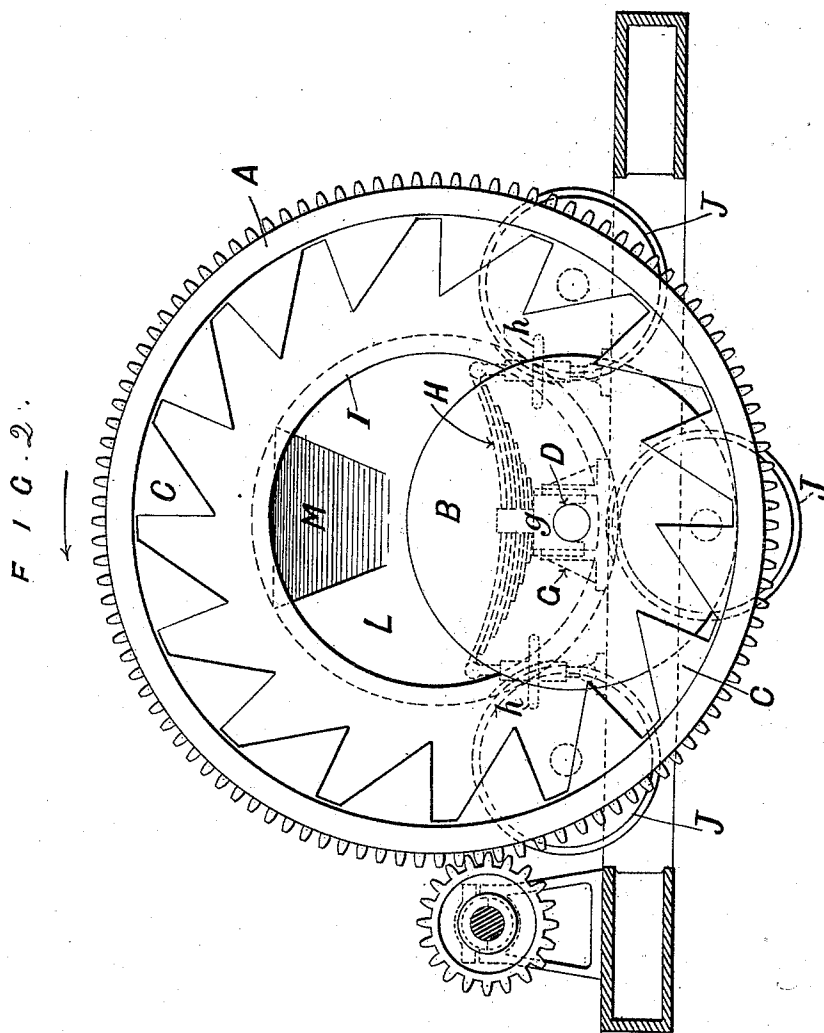
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MILL FOR CRUSHING ORES.

No. 467,368.

Patented Jan. 19, 1892.



Witnesses:
C. Sedgwick
Edgar Tate

Inventor
W. H. Coward
by *Munn & Co*
Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM HENRY COWARD, OF BATH, ENGLAND.

MILL FOR CRUSHING ORES.

SPECIFICATION forming part of Letters Patent No. 467,368, dated January 19, 1892.

Application filed March 9, 1891. Serial No. 384,288. (No model.) Patented in England March 27, 1889, No. 5,286.

To all whom it may concern:

Be it known that I, WILLIAM HENRY COWARD, engineer and machinery-broker, of Newark House, Railway Place, Bath, in the county of Somerset, England, have invented new and useful Improvements in Mills for Crushing or Pulverizing Ores and other Substances, (for which I have obtained Letters Patent in Great Britain, No. 5,286, dated March 27, 1889,) of which the following is a full, clear, and exact description.

This invention relates to improvements in mills for crushing or pulverizing, forming the subject of previous Letters Patent of the United States, dated October 22, 1889, No. 413,388, in which an edge runner rolls within a revolving drum furnished with cups, by which the material is repeatedly brought under the action of the edge runner.

The object of the present improvement is chiefly to increase the efficiency of the mill, to improve the mode of mounting the drum, and to more effectually expose the crushed material to the winnowing action of the air-current.

Reference is to be had to the accompanying drawings, forming part of this specification, wherein—

Figure 1 is an axial vertical section of the improved double form of mill, in which two sets of edge runners roll on different paths in the drum, the rolls of both sets being guided in their paths by spring-pressed shafts anchored in swivel-bearings. Fig. 2 is an elevation with the cover removed.

The same letters of reference denote like parts in both figures.

A is the drum, revolved on a horizontal axis by peripheral spur-gear.

B are two sets of edge runners rolling upon paths side by side within the drum, and guided, as hereinafter described, so that bodily motion of the roller is permitted only in a plane radial to the drum-axis.

C C' are sets of elevating-cups fixed near the periphery of the drum, their mouths being toward the direction of rotation of the drum, in order to catch the material after it has been crushed and carry it up and throw it down again in front of the edge runners,

and at the same time expose it to the winnowing action of the air-current.

Each edge runner B is fixed to the end of the shaft D, which passes out of the drum through a large circular opening in the side thereof, and is journaled at its outer end in a universal or swivel bearing E, which embraces the journal between shoulders and has lateral gudgeons *e*, pivoted in a rigid bracket F, the shaft D being thus firmly anchored to the base-plate, so that while the edge runner and shaft are free to revolve the edge runner is prevented from deviating from its path, but is free to rise and fall on passing over the roughly-broken material, the slight lateral motion of the edge runner due to angular motion about the axis *e* of the swivel-bearing E having the effect of supplementing the crushing action of the edge runner by an abrasive or rubbing action between the edge runner and the drum, which conduces to the more rapid reduction of the material. Each shaft D is guided by a bearing *g*, free to rise and fall in guides G, and pressed upon by an adjustably-weighted lever or by a spring H, regulated by screws *h*, in order to increase the crushing power of the edge runner.

The openings at the two sides of the drum giving passage to the shafts D are closed by stationary covers L, fitting within the surrounding flanges I, which are cradled upon sets of friction-rollers J, carried by shafts turning in bearings *j* on the bed-plate, the drum being thus wholly supported on the two sets of friction-rollers. The drum has three sets of elevating-cups—a set C, fixed to each side of the drum, as before, and a middle set C', fixed to the periphery of the drum and passing between the two sets of edge-runners, the cups C' being larger than the cups C.

The cover L at one side of the drum is provided with a feed-hopper M, while the other cover N has an aperture at the upper part leading through an upwardly-extending and gradually-contracted spout O into a vertical pipe P, which is carried up to a suitable height and then connected to an exhaust-fan. By this upward draft I am enabled to dispense with sieves over the exhaust-aperture, which are liable to become clogged by light parti-

cles in operating on micaceous ores, for example.

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

5 In a pulverizing-mill, the combination, with a drum mounted to revolve on a horizontal axis and having an aperture at each side and three internal peripheral sets of cups, of two
10 sets of edge runners rolling on different paths side by side within the drum and between different sets of cups, the edge runners of the two sets being respectively attached to shafts extending through apertures at opposite sides
15 of the drum, each shaft being anchored in a

swivel-bearing and spring-pressed and guided, so as to permit of rotary motion of the runners and of angular motion in a plane radial to the drum-axis, substantially as specified.

The foregoing specification of my improvement in mills for crushing or pulverizing ores and other substances signed by me this 20th day of November, 1890.

WILLIAM HENRY COWARD.

Witnesses

WM. CLARK,
53 Chancery Lane, London, Patent Agent.
JOSEPH LAKE,
17 Gracechurch Street, London.