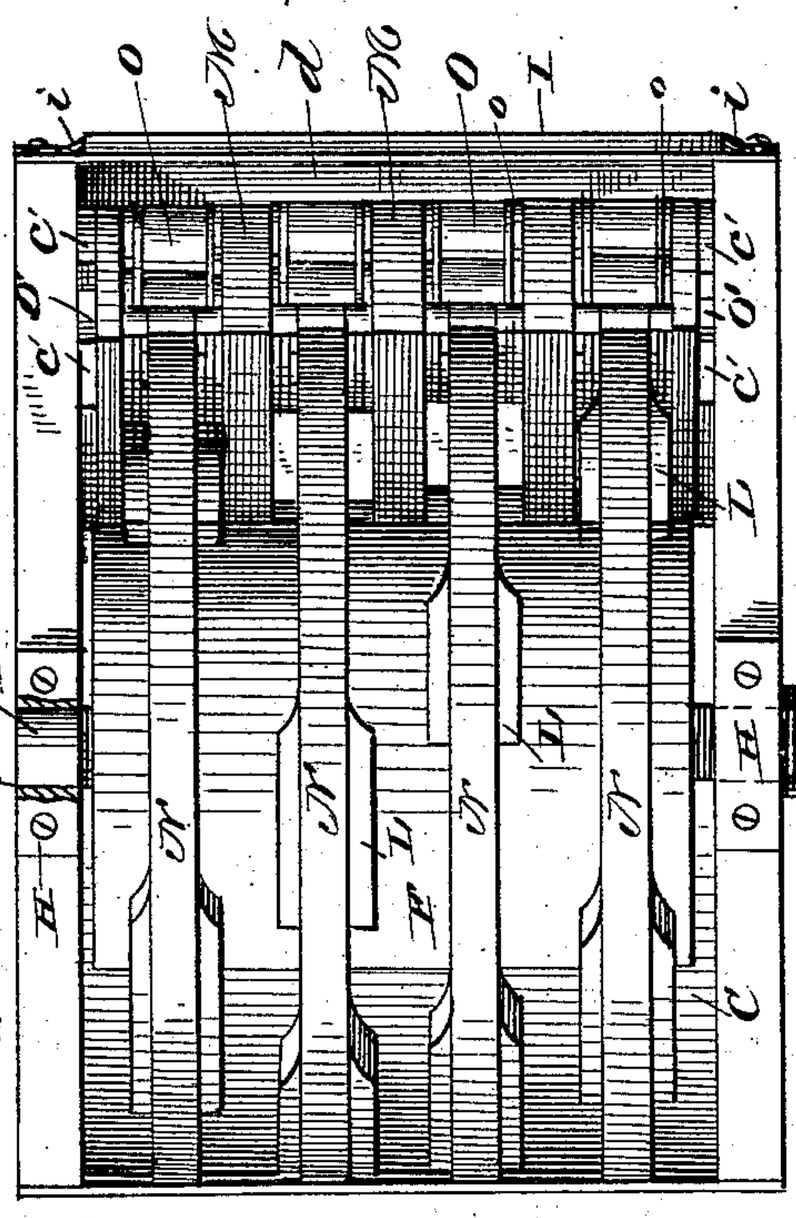
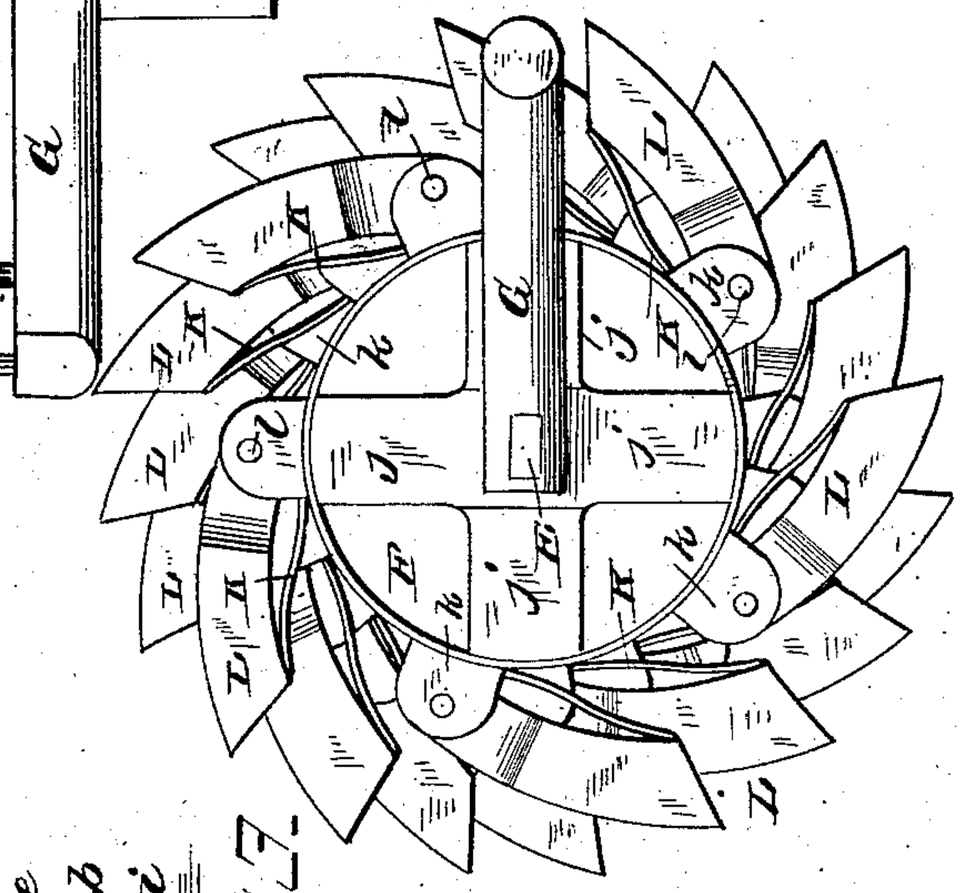
(No Model.)

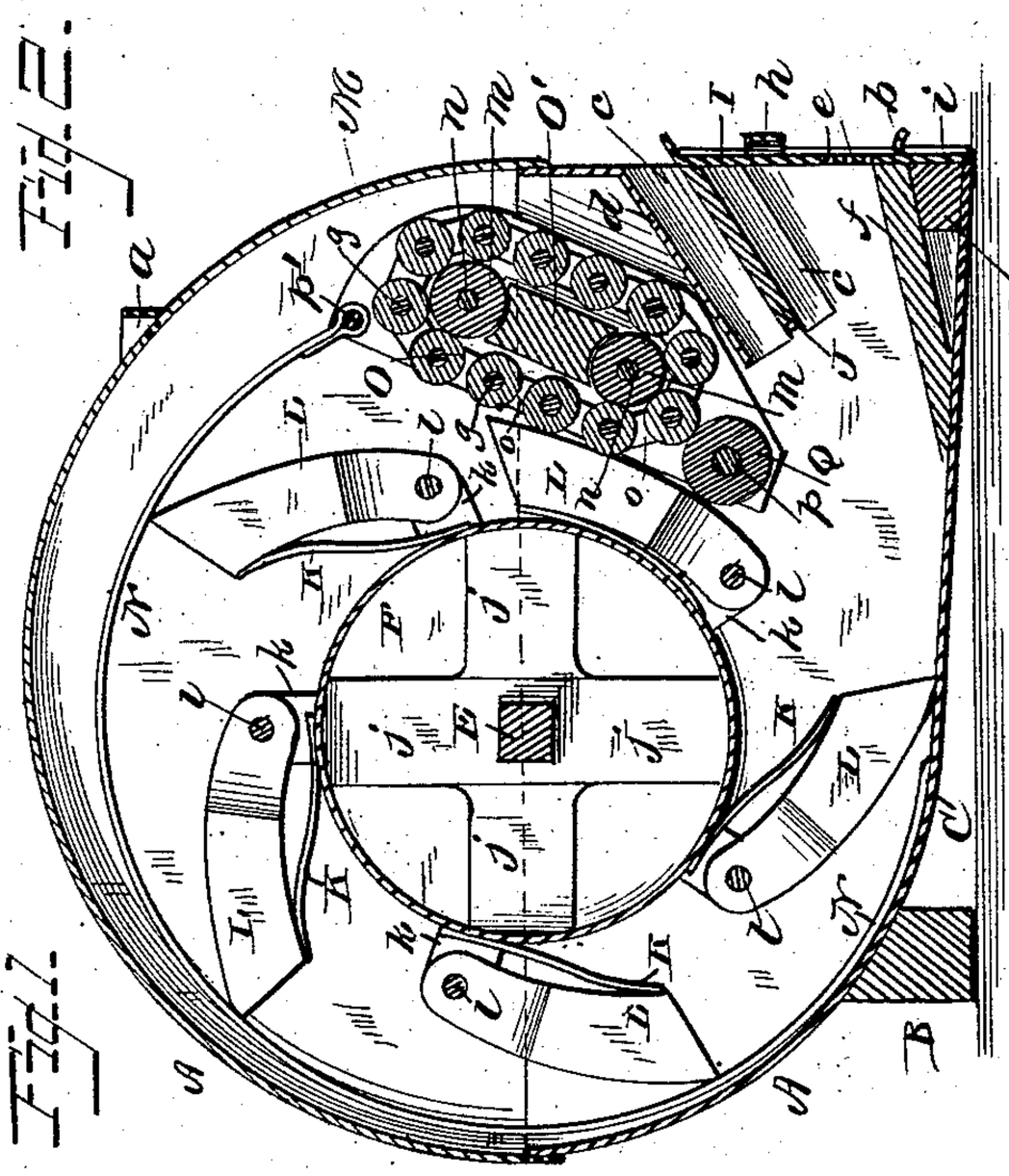
# C. DANDURAND & L. M. LAFRANCE.

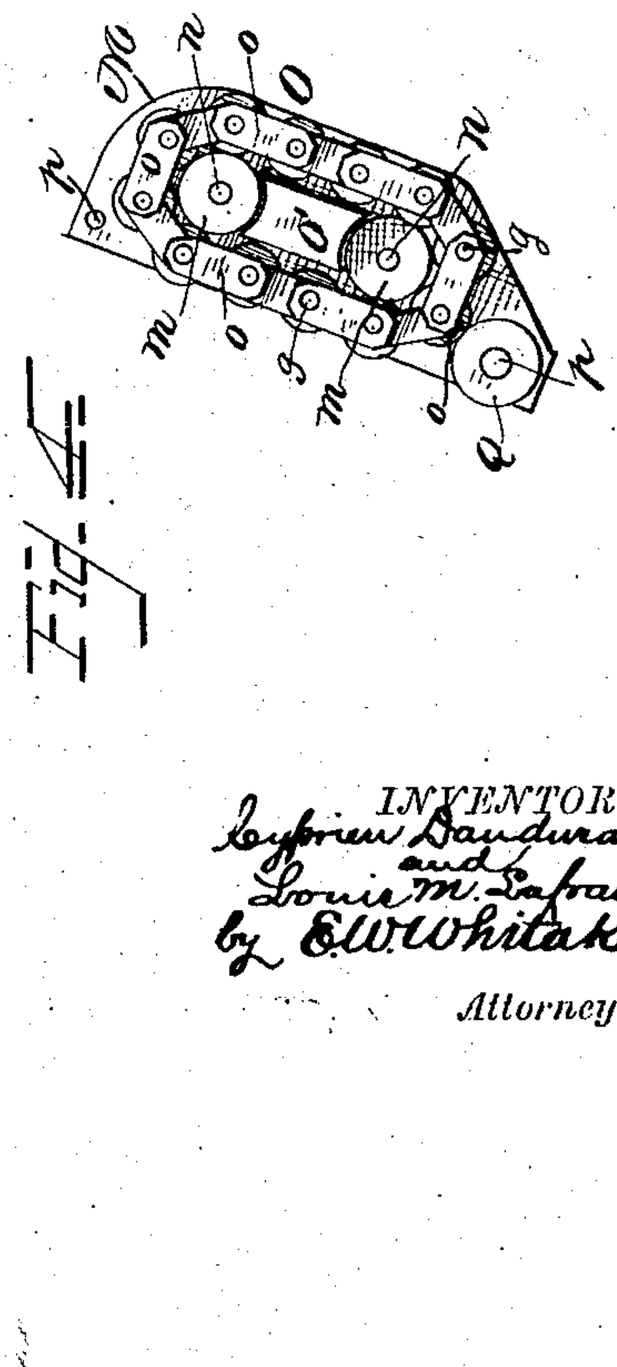
## QUARTZ CRUSHING MACHINE.

No. 292,543. Patented Jan. 29, 1884.









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# UNITED STATES PATENT OFFICE.

CYPRIEN DANDURAND AND LOUIS M. LAFRANCE, OF VIRGINIA CITY, NEVADA; SAID LAFRANCE ASSIGNOR OF ONE-THIRD TO SAID DANDURAND.

## QUARTZ-CRUSHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 292,543, dated January 29, 1884.

Application filed September 29, 1883. (No model.)

*To all whom it may concern:*

Be it known that we, CYPRIEN DANDURAND and LOUIS M. LAFRANCE, each and both citizens of the United States, and residing in Virginia City, county of Storey, and State of Nevada, have invented a new and useful Quartz-Crushing Machine, of which the following is a specification.

Our invention relates to improvements in quartz-crushing machinery, in which rotary arms attached to a revolving cylinder operate in conjunction with springs and gangs of rollers and fall at regular intervals upon the material to be reduced; and the objects of our improvements are, first, to substitute arms attached to a revolving cylinder for the stamps now in use; second, by the use of springs attached to the revolving cylinder and acting directly upon the arms, to add the force of the springs to the weight of the arms; third, by the use of the rollers, with which the arms in passing come in contact, to lessen the friction in the working of the machine. We attain these objects by the mechanism illustrated in the drawings, in which—

Figure 1 is a vertical section of the machine, with the side of the frame of the machine and the side of the frame of the rollers removed. Fig. 2 is a top view of the machine, with the upper half of the drum or cover removed. Fig. 3 is a view of the inner drum or cylinder, with the arms and springs attached. Fig. 4 is a view of the gang of rollers and the manner in which the rollers are relatively placed in one frame.

The same letters refer to the same or similar parts throughout the several views.

The drum A A and its leg or standard B, secured to plate C, constitute the frame-work and cover of the machine. The plate C is of curvilinear form, and is for receiving the ore upon which the arms L L L fall, and furnishes the bottom and a portion of an end of drum A A.

In the bearings D D, Fig. 2, rests and revolves the axle E, which runs through the cylinder F, and is connected on the outside of the drum A A with the crank G, and the tops of the bearings are secured to the lower part of the drum A A by the screws H H. In the upper half of the drum A A is a series of holes under the lip *a*, for the conveyance of water necessary to assist in reducing ores to pulp by the "wet process," so called, and said holes are so situated as to also wash down the débris clinging to the arms L L L. The opening in the drum A A (marked *c*) is a chute, through which the ore is fed to the arms L L L, and it extends the whole width of the machine. A slide, I, movable vertically in cleats attached to the drum A A, covers the chute *c* when not in use in receiving ore. In the lower end of the slide I are holes at *e*, to permit the discharge of the slime, as in the battery-screen in common use. The slide I is conveniently moved by a handle, *h*.

The purposes of the outer drum, A A, are to provide a frame and cover for the machinery, and to provide a receptacle for water and for the ore, as well as to confine the water and pulp thrown about by the action of the arms L L L. For convenience, the outer drum, A A, is divided into two sections, upper and lower, the upper section being removable at will. The cylinder F is fastened to the axle E by spokes *j j j* on the inside of the cylinder, it being otherwise hollow. Upon the outer surface of the cylinder F is fastened the series of arms L L L, the number and size of the same being regulated by the size of the cylinder F and the corresponding size of the machine. The arms L L L are made of metal and fastened to the cylinder F by means of lugs *k k k*, through which run bolts *l l l*, to allow of removal and replacement. The arms L L L, in being pressed toward the cylinder F, and in falling upon the ore to be reduced, turn easily upon the bolts *l l l*. Under the arms L L L are springs K K K, which are fastened to the cylinder F under the lugs *k k k*. These springs (not attached to the movable arms) are forced back toward the cylinder F when the arms L L L touch the endless chains of rollers O O, and act suddenly with full force upon the arms when the ends of the arms leave the last or lowest rollers, Q Q, and force the arms to act with great force upon the material to be reduced. By means of the pressure induced by the springs K K K the arms

L L L, when in contact with the endless chains of rollers O O, cause such rollers to revolve separately and in combination with the revolution of the rollers *m m*, and when in contact with rollers Q Q also cause them to revolve. The springs K K give force to and regulate the fall of the arms L L L, first upon the endless chains of rollers O O and the rollers Q Q, and then upon the material to be reduced. No two of the arms L L L fall simultaneously. The revolution of the cylinder F and the frequency of the fall of the arms L L L are regulated by the operator or by the force of the motive power. The arms L L L are longitudinally of concave form on their inner and of convex form on their outer surfaces. The sides are parallel surfaces, except that they taper at one extremity to fit on the lugs *k k k*. The base of each arm L farthest from the lug *k* is a square plain surface, forming an angle of about eighty degrees with the outer surface of the arm. The bands N N are of metal, and attached to the plate C back of the place of fall of the arms L L L, then pass around under the drum A A and over the arms L L L, and are connected with the frame-work of the rollers *m* by a rod running through the frame-work of the rollers *m*. (Marked *p'*.) The bands N N, Fig. 2, are intended to keep the arms L L L in place and guide them to the rollers; also to prevent the arms L L L from striking the top of the frame A A. They serve also to strengthen the connection of the frame of the machine with the frame of the rollers.

The beam O', Fig. 4, passes through the frame-work M of the rollers and into the sides of the frame of the machine, and is the main connection of the frame-work of the rollers. There are four separate sets of rollers, each set including an endless chain of rollers, O, rollers *m m*, and the rollers Q. Between each set of rollers is a partition of iron or wood, which, with the outer covering on each side, forms the frame-work M of the rollers. Through this frame-work M pass the beam O', the rod *p'*, the axles *n n* of the rollers *m m*, and the axle *p* of the rollers Q Q. The rollers Q Q act independently of the endless chains of rollers O O, and the use of the rollers Q Q is to receive the arms L L L after they leave the endless chains of rollers O O, and from the rollers Q Q the arms L L L fall upon the material to be reduced. The frame M of the sets of rollers is also firmly attached to the sides of the lower part of the frame-work of the machine, by cleats and screws, at *c' c'*. The smallest rollers are connected in endless chains by strips *o o o*, each strip connecting one roller with the next roller on either side, the axle *g* of each small roller in the endless chains passing through one end of each strip and acting as a bolt upon which the strips move readily when in revolution. The use of the rollers *m m* is to add another rotation, in combination with the rotation of the endless chains of rollers O O, and to reduce friction. The rollers *m m* are not connected with each other, except as being in the same frame M. The rollers Q Q are larger, and have a larger axle than the rollers in the endless chains O O, and, being stronger and firmer, form a better resistance to the arms L L and the springs K K before such arms L L L are suddenly released and fall upon the material to be reduced. The endless chains of rollers being constructed with smaller rollers than the rollers Q Q, offer a more uniform surface for the pressure of the arms L L than larger rollers would offer; but the endless chains of rollers O O and the rollers *m m* may be dispensed with by using a sequence of separate rollers, as Q Q, each acting upon its own axle, in place of each endless chain of rollers and the two rollers *m m* in combination, four such sequences of larger rollers being set in the same frame M. All the rollers are made of iron or other metal. The outer drum, A A, should be substantially constructed to resist the vibration of the operating parts of the machine.

We claim as our invention—

The outer drum, A A, with its plate C, the cylinder F, the rotary arms L L L, and the springs K K, in combination with the endless chains of rollers O O, the rollers *m m*, the rollers Q Q, and the frame M, as hereinbefore described, and for the purposes set forth.

his
CYPRIEN × DANDURAND.
mark.
LOUIS M. LAFRANCE.

Witnesses:
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