(No Model.)

2 Sheets—Sheet 1.

A. FRASER.

ORE CRUSHING MACHINE.

No. 501,999. Patented July 25, 1893.

Fig. 2.

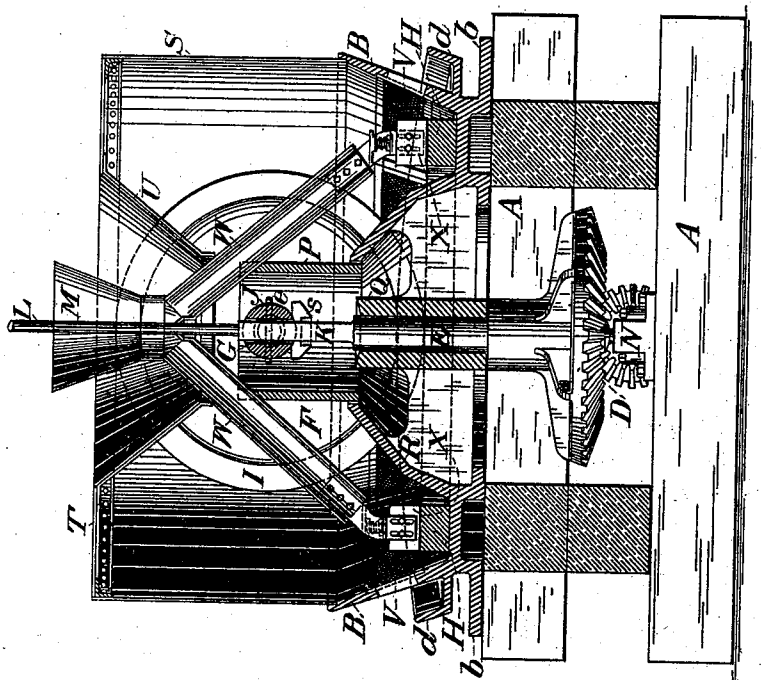
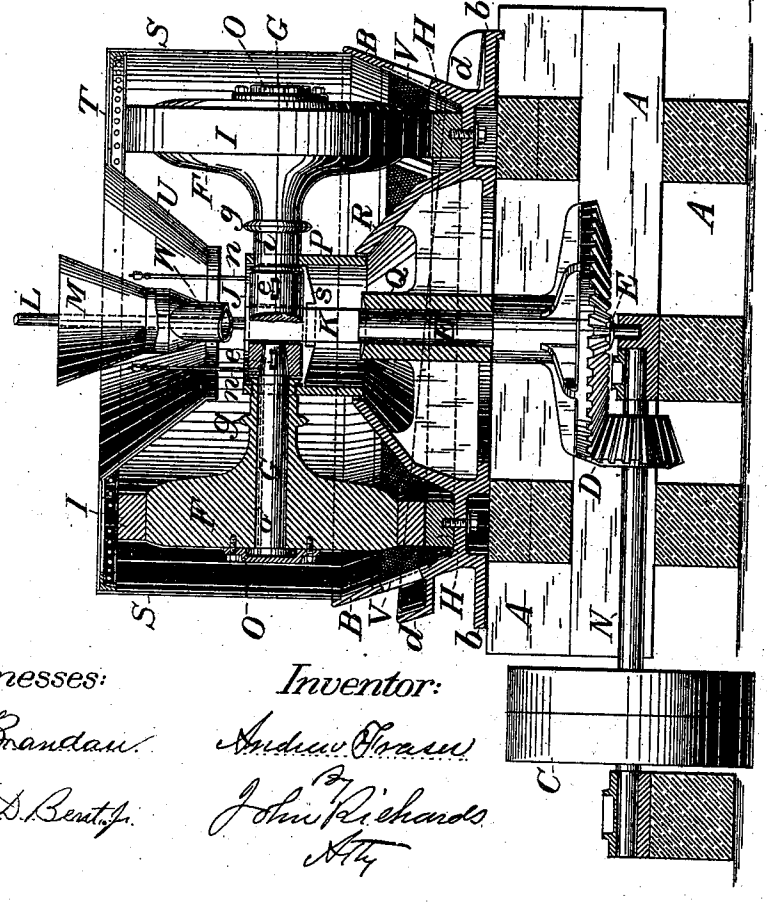


Fig. 1.



Witnesses:

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Wilson D. Bentley

Inventor:

Andrew Fraser

By John Richards

Atty

(No Model.) 2 Sheets—Sheet 2.

A. FRASER.

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Fig. 4.

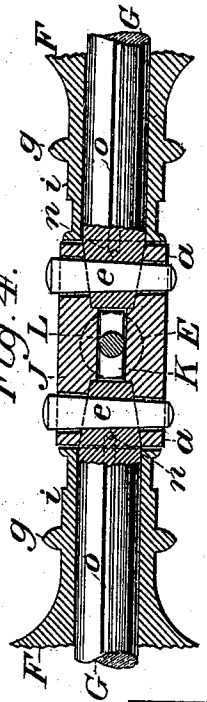


Fig. 6.

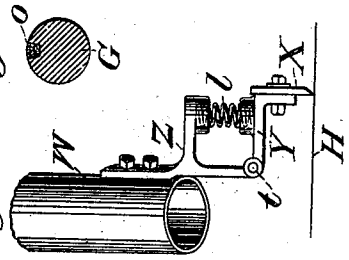


Fig. 5.

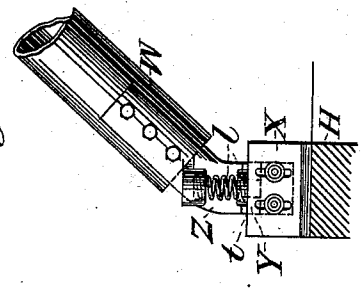


Fig. 8.

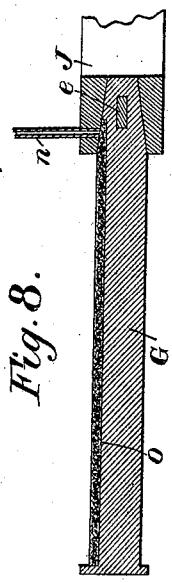
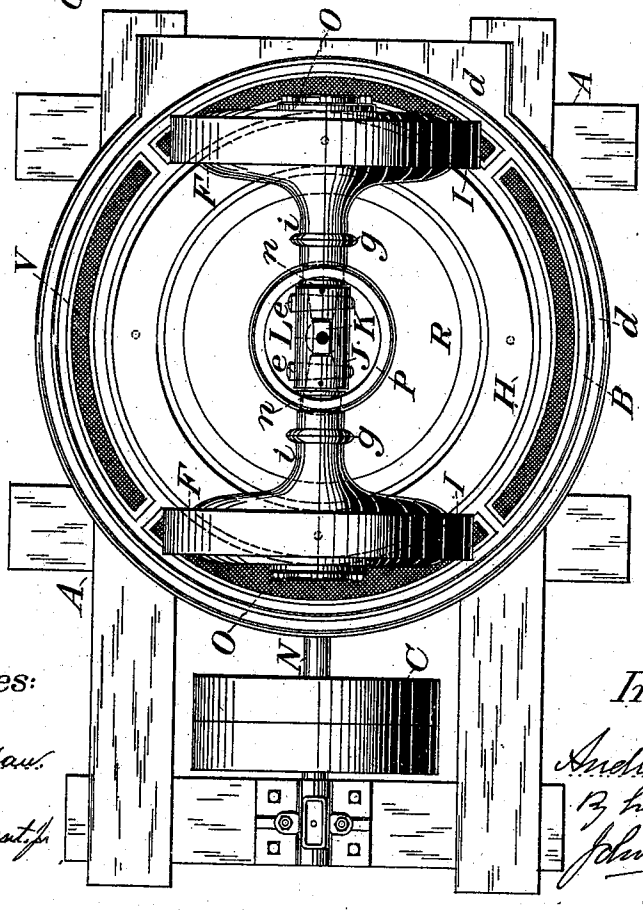


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

ANDREW FRASER, OF SAN FRANCISCO, CALIFORNIA.

ORE-CRUSHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 501,999, dated July 25, 1893.

Application filed April 14, 1892. Serial No. 429,159. (No model.)

To all whom it may concern:

Be it known that I, ANDREW FRASER, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Machines for Crushing Ore; and I hereby declare the following specification and the drawings therewith, forming a part of the same, to be a true, full, and exact description of my invention.

My invention relates to what are commonly called edge running ore mills, in which two or more wheels revolve on their own axis, and about another axis transverse thereto, commonly called Chili ore mills.

My invention consists in an improved method of mounting and driving the rollers or wheels of such mills; an improved method of feeding and distributing the ore to be crushed; means of lubrication and protection of the charge from oil, and other features of construction that will be more fully pointed out and explained in connection with the drawings, in which—

Figure 1 is a vertical section through an ore mill, through the main axis, parallel to the axis of the crushing rollers. Fig. 2 is a section in a plane at right angles to that of Fig. 1. Fig. 3 is a plan view taken on top of the same mill. Fig. 4 is a longitudinal horizontal section through the axis and a portion of the crushing rollers, and Figs. 5 and 6 are details of the feeding spouts and their attachments for distributing the ore. Fig. 7 is a transverse section through the stationary axis of the crushing rollers. Fig. 8 is a detail sectional view of the stub shaft taken longitudinally through the oil hole.

Similar letters of reference are employed to denote like parts in the different figures of the drawings.

Referring to Figs. 1, 2, and 3, the timbers A constitute a supporting frame or foundation structure, to which the main frame B of the mill is attached. The main frame consists of a base flange *b*, an annular spout *d* for catching the pulp or crushed material, an inner cylindrical shell R to support and protect the driving gearing, also forming an inner wall of the crushing trough, an outer main flange, on which rests the inclosing shell or housing S. On the top of the housing S is mounted a covering plate T, to which is attached a hopper U, giving access to the interior of the mill, and permitting ventilation.

A series of screens V is applied around the main frame, as shown in Figs. 1 and 2, so the pulverized material will, when fine enough, escape through these screens into the spout *d*, and be carried off for further treatment. Driving power is applied at C, and is transmitted by means of shaft N and bevel wheels D, to the main vertical driving axis E.

F F are the crushing rollers, revolving on the non-revoluble axis G, and rolling upon the die or sole ring H, on which the ore is crushed. The rollers F F are provided with tires I made of suitable material to withstand wear, and removable when worn so as to be replaced with new ones. The principal or rolling movement of the rollers F F, about the main axis E, is imparted by a cross-head J, shown enlarged in the detail, Fig. 4. This cross-head J has at each end cylindrical sockets *a a*, into which the ends of the spindles or axes G are inserted and held by the taper keys *e e*, and at its center a rectangular slot through which passes the rectangular extension K of the main axis or driving shaft E. This extension K fits loosely in the cross-head J, so as to permit deviation of the axes G in a vertical plane and thus permit the rollers F F to assume different levels respectively, if there is an unequal stratum of ore beneath them. This construction also permits a sliding action of the cross head J up and down the main axis E, as the amount of ore beneath the rollers F F may require, and also provides for the wear upon the die or ring, the cross-head J and axes G of the rollers F F descending accordingly. The rod L extends from the rectangular section K of the shaft E up through the ore hopper M, and may be employed to operate an ore feeding apparatus, a counter, or other mechanism connected with the mill. The rollers F F run loose on the studs or shafts G. These studs fit into taper sockets *a a* as shown in Fig. 4 and are held by keys *e e* so as to be easily removed with the rollers F F, without disturbing other main parts of the machine. In the top of these shafts G are formed grooves *o o* as shown in Fig. 7, to which oil is

supplied by pipes *n n* screwed into the ends of the cross-head J, and connecting with the grooves *o o* which are preferably filled with some kind of fibrous material to retain and distribute the oil. The outer ends of the studs or shafts G are formed with a collar to resist the centrifugal force of the rollers F F and keep them central on the die or sole ring H. This collar is inclosed by a close fitting cap O to exclude grit or sand, and also to prevent the escape of oil into the material below. The cylinder P is supported by, and revolves with the main vertical axis E of the machine, taking its bearing on the cross-head J, or on the extensions *i i* of the rollers F F, and projects downward so as to enter the conical extensions R of the main frame. In this manner it may be seen that the bearings on which the rollers F F revolve, are closed to the escape of oil except when the sleeves *i* abut against the cross-head J and that oil escaping there falls into a catch basin *s* and falls from there into the top of the main bearing Q of the shaft E and is again utilized, passing off without chance of escape into the main chamber so as to contaminate the charge of ore or amalgam in the machine.

The method of feeding the ore is continuous. The broken material is fed into the hopper M, and descends through the spouts W W, following on the die or sole ring H continually as the machine revolves. The hopper M is attached to the spouts W W which are secured upon the cylinder P, and revolve with the main shaft E, and cross-head J, so the ore is continually deposited between the rollers F F, and not fed in at one point, as has been the usual custom in such ore mills.

To the lower end of the feeding spouts W W I attach a hinged scraper X, shown in the detail, Figs. 5 and 6. This scraper X is adjustably attached to the member Y, which is pivoted at *t* to the other member Z, riveted or bolted to the spouts W as shown. The scraper X presses downward upon the die or sole ring H, by gravity and also by means of a spring *l*, so the surface is swept clear and the coarser or uncrushed material falls back again upon the die ring H, to receive the crushing action of the rollers F F, presenting continually new material in front of the rollers, and keeping the contents of the mill agitated. The scrapers X are made with slotted bolt ways, so as to be adjusted downward when they are worn, and to enable by such adjustment a more uniform tension in the spring *l*.

Around the sleeves *i i* of the rollers F, I form ledges or flanges *g g*, the purpose of which is to cause the water and sand, running off the rollers F F to drip back into the main pan, falling from these flanges down upon the beveled outer face of the inner wall R of the main frame, as shown in Fig. 1. It will be understood that the rollers F may be three or more in number as the size and capacity of a machine may admit; also that the feeding spouts W may be more or less in number to correspond to the rollers F.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an ore crushing machine, two or more rollers revolubly supported on studs or axes and having inward projecting sleeves or extensions reaching beyond the main chamber or pan of the machine, so as to give a long bearing for the rollers and convey escaping oil from the bearings, beyond the main pan or chamber, so it will not drip among the material being crushed, and may serve for lubricating the bearings of the central or main driving shaft, in the manner substantially as shown.

2. In an ore crushing machine provided with edge rollers as herein described, a central driving shaft around which the rollers revolve, and surrounding this axis a cylinder or shell that revolves with the main axis, excluding oil that drips from the bearings of the crushing rolls and serving as a support for the feeding hopper and distributing pipes that conduct ore to the machine, constructed in the manner substantially and for the purposes specified.

3. In an ore crushing machine having crushing rollers as herein described, two or more feeding pipes for ore moving with the crushing rollers about the main axis of the machine; hinged scrapers attached to the bottom of the feeding pipes and resting on the die or sole ring, in the manner and for the purposes substantially as described.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

ANDREW FRASER.

Witnesses:
ALFRED A. ENQUIST,
WILSON D. BENT, Jr.