

(No Model.)

J. C. WISWELL.
ORE CRUSHER AND METAL SEPARATOR.

No. 400,988.

Patented Apr. 9, 1889.

FIG. 1.

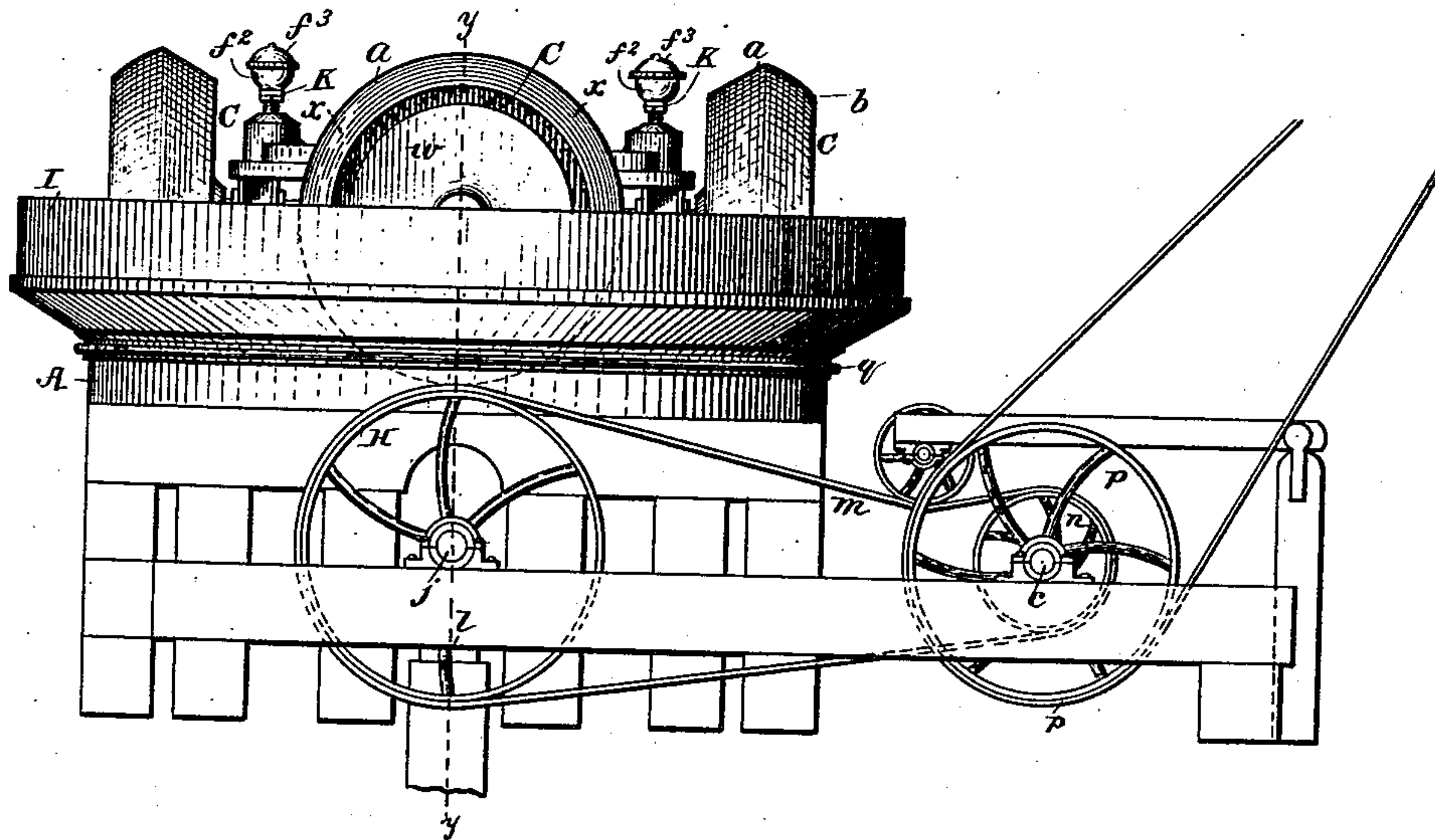


FIG. 2.

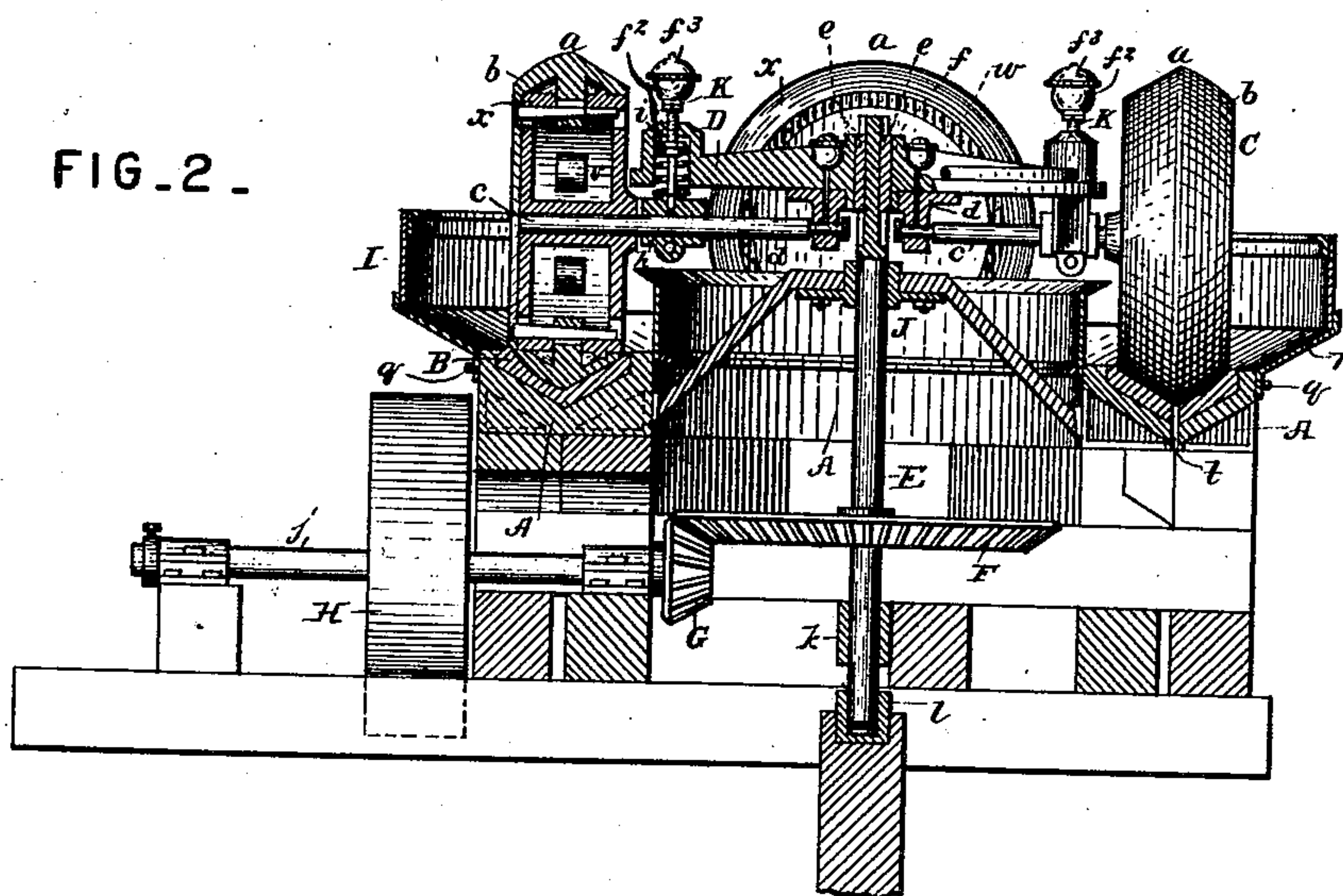
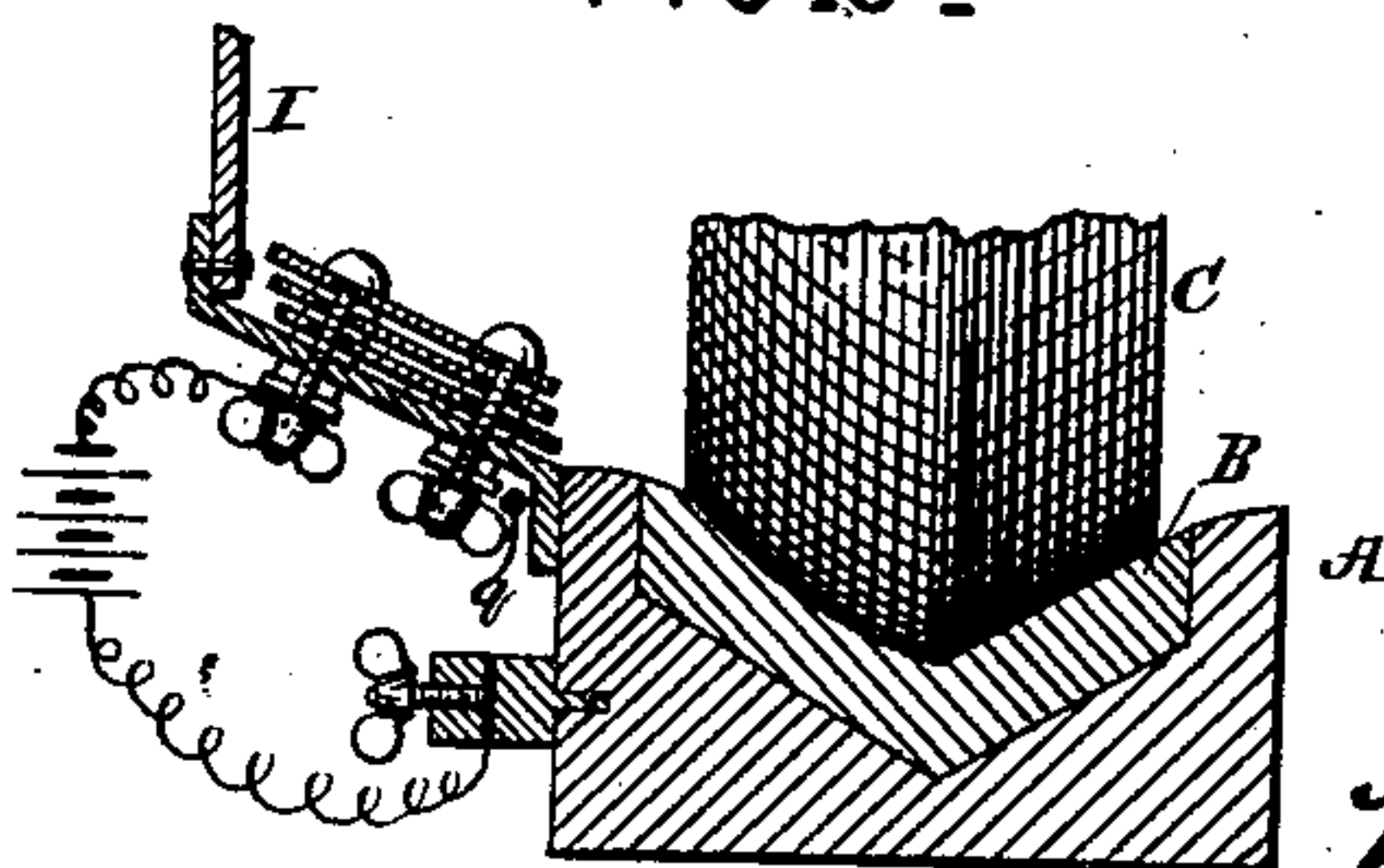


FIG. 3.



Attest:
Jas. K. McLathran
Am. S. Hodges,

Inventor:
J. C. Wiswell
By
Wm. Brown & Co.
S. A. attys.

UNITED STATES PATENT OFFICE.

JACOB CHARLES WISWELL, OF MEDFORD, MASSACHUSETTS, ASSIGNOR TO
THE WISWELL ELECTRIC MINING MACHINERY COMPANY, OF PORTLAND,
MAINE.

ORE-CRUSHER AND METAL-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 400,988, dated April 9, 1889.

Application filed September 30, 1887. Serial No. 251,086. (No model.)

To all whom it may concern:

Be it known that I, JACOB CHARLES WISWELL, of Medford, in the county of Middlesex and State of Massachusetts, have invented
5 certain new and useful Improvements in Ore-Crushers and Metal-Separators, of which the following is a specification.

My invention relates to improvements in machines, apparatus, and means for eliminat-
10 ing metals from their ores or other substances which may be associated with the metal or metals to be extracted; and it consists in improvements on Letters Patent of the United States granted to me April 1, 1884, No. 296,096;
15 November 4, 1884, No. 307,513, reissued November 3, 1885, under No. 10,659; February 9, 1886, No. 336,030, and March 9, 1886, No. 337,726, and which is hereinafter fully described, and particularly pointed out in the
20 claim.

Similar letters of reference indicate like parts throughout the several figures of drawings.

In the drawings which accompany this
5 specification and form a part thereof, Figure 1 is an elevation of my improved ore crusher and separator. Fig. 2 is a vertical transverse section of the same, taken on the line *y y*, Fig. 1. Fig. 3 shows the electric excitant and
30 connection therefrom to the plate or plates electrically insulated from any and all other parts of the mill.

Referring to the drawings, the bed A is an annular ring resting on a foundation of wood
35 or other suitable material. The upper surface of the bed A is recessed in the form of a circular V-groove, into which wearing-plates B of similar exterior contour may be detachably secured to be renewed when worn out.
40 The interior contour of the wearing-plates B is made to conform to the peripheral shape of the rolls C. The body *w* of the said rolls is made hollow, as shown in Fig. 2. This space may be filled through the holes *v* with
45 cement, lead, or other material of the requisite density to obtain the desired weight. Firmly secured to the body *w* of the rolls C are the sectional tires *x*, which may be made
50 of metal of such quality or hardness as to best

resist the abrasive action of the material being reduced. The outer grinding-surfaces of the said rolls C, from the apex *a* to the corner *b*, form the arc of a circle, with the exception of the said points *a* and *b* named, which are rounded off, as shown, to antici-
55 pate the form the said rolls will assume by wear in use, whereby new tires *x* or wearing-plates B may replace those worn out, while at the same time insuring an approximate fit between the grinding-surfaces of the tires *x*
60 and wearing-plates B.

The rolls C may be of any desired number, and are each firmly secured to an axle, *c*, the inner ends of which are journaled to the pendent portions *d* of the carriage D, as
65 clearly shown in Fig. 2.

The carriage D is fitted to the vertical shaft E in such a manner as to permit of vertical movement on said shaft E, while by means of feather-keys *e*, either in the shaft E or in the
70 hub *f* of the carriage D, and fitting into corresponding grooves or recesses, a rotary motion will be imparted to the said carriage D when the vertical shaft E is made to revolve. Depending from the under side of the pe-
75 ripheral rim of the carriage D are "hounds" or bifurcated projections *g*, which inclose the sides of the axle *c*, or the boxes *h*, inclosing the same, whereby rotary motion can be im-
80 parted from the shaft E and carriage D to the axles *c* and rolls C.

In order to add to the weight of any roll C which might by lack of its own gravity be unable to crush any portion of the material being operated on, I have found it advisable
85 to interpose between the axle-boxes *h* and carriage D springs *i*, which permit of one roll C rising and assuming an increase of weight from the said carriage, resulting from its rise on the shaft E, and consequent relief of
90 weight from all the other axles *c*. Should it be desired to still further add to the weight of the rolls C, the carriage D may be weighted, in which case the springs *i* would be com-
95 pressed to an undesirable extent, leaving insufficient space for increased compression by the accidental rising of one or more rolls C, at the same time inclining the upper part or parts of the said roll or rolls inward to such
100 an extent as to seriously interfere with rapid

reduction of ore, while also tending to destroy the proper contour of the grinding-surfaces of the said rolls C and wearing-plates B, to obviate which I have provided followers 5 f' , that rest on the springs i . These followers are vertically adjustable with respect to the carriage D by means of screws K, and there retained in place by the check-nuts f^4 .

Lubrication may be performed by orifice 10 through the screw K, which in this instance constitutes both adjusting-screw and oiler, the upper, f^2 , being made in the form and for the purpose of holding oil and waste in the usual manner, and screwed by a cap, f^3 . The orifice 15 o' in the screw K leads down to the follower f' , which has a continuing orifice, o^2 , extending down to the boss b' , which is counterbored to receive the tube containing the said orifice o^2 , thus insuring continuous and regular lubrication to the axles c without unnecessary waste of oil.

Motion is imparted to the shaft E by means of a bevel gear-wheel, F, keyed or otherwise secured to the said shaft E, the teeth of which 25 intermesh with a pinion, G, secured to and mounted on the shaft j , as shown in Fig. 2. Continued reference to the same figure shows the lower bearing, k , and step l , the first preventing lateral movement of the shaft E, the latter supporting the same at proper height. 30 The shaft j also carries a pulley, H, secured thereto, which, as will be seen by referring to Fig. 1, receives motion through the barrel m from pulley n , secured to and mounted on the shaft o . A second pulley, p , mounted on 35 the said shaft o and secured thereto, receives in any suitable manner from any suitable motor motion of sufficient power to operate the movable parts enumerated. The tires x 40 of the rolls c are preferably made in sections and secured to a core or hub by keys or wedges driven through apertured ears or lugs thereof. (See Fig. 2.)

Having fully described the machinery for 45 comminuting the ore, I will now proceed to explain how, by this construction and parts hereinafter to be described, I am enabled to separate the metal from the earthy matter.

Surrounding the bed A, Figs. 1 and 2, Sheet 50 1, is a curb, I, secured to the bed A by such means as will make the joint thereby formed water-tight, either by cement, calking, or packing, and retained in place in any suitable manner—in this instance by a circular 55 hoop, q , drawn tight by nuts or clamps in the usual manner.

Immediately above the hoop q the curb I is made to flare out at an angle from a vertical line to a short distance when the wall of the 60 said curb I is made vertical to a height approximating the center of the rolls C. The curb I is provided with one or more openings for the exit of the comminuted ore.

As is well known to those skilled in the art to which this invention pertains, metallic particles of extreme fineness ground in water or 65 other liquid are either held in suspension or will float on the liquid and flow away with the liquid. In order to prevent such loss I make electrical connection from an electric 70 generator to the bed A or rolls C, or both, by the positive pole. Electrical connection is similarly made from the negative pole to plates s , that are electrically insulated from any and every part of the ore-crusher, thereby 75 constituting the bed A and rolls C the anode and the plates s the cathode, whereby when electrical excitement is produced the metal-oids amenable to such treatment, whether 80 in solution, suspension, or floating, will tend to deposit on the said plates s in such form as can subsequently be recovered.

In some cases it has been found advisable to reverse the poles, in which case, mercury 85 being introduced in the groove of the wearing-plates B, the metals in solution or suspension will tend toward the mercury in common with the larger and heavier particles.

Mercury may be and generally is used whether connection be made with electric 90 generator, so as to make bed A and rolls C the anode, or vice versa. By insulating the inner curb, J, from the bed A and the outer curb, I, from the said bed, the said plates s may be dispensed with or the insulation of 95 them from the curb I made unnecessary. When the mercury has become sufficiently charged with metal, it may be drawn off through an orifice, t , Fig. 2, through one of the 100 wearing-plates B, said hole t coinciding with a similar hole in the bed A and closed at its lower extremity by a suitable gate or valve, which also supports a fluted pin, upon which, at its upper end, ore is crushed, while by 105 means of the flutes the mercury freely passes.

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

In an ore-crusher and metal-separator made substantially as described, the combination of the bed A, plates B, rolls C, with 110 the curb I, provided with one or more openings fitted with screws, with the insulated plate or plates s , electric excitant, and connections therewith, substantially as and for the purpose hereinbefore set forth. 115

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 22d day of September, 1887.

JACOB CHARLES WISWELL.

Witnesses:

C. F. BROWN,
A. D. HARRISON.