No. 648,960. Patented May 8, 1900.

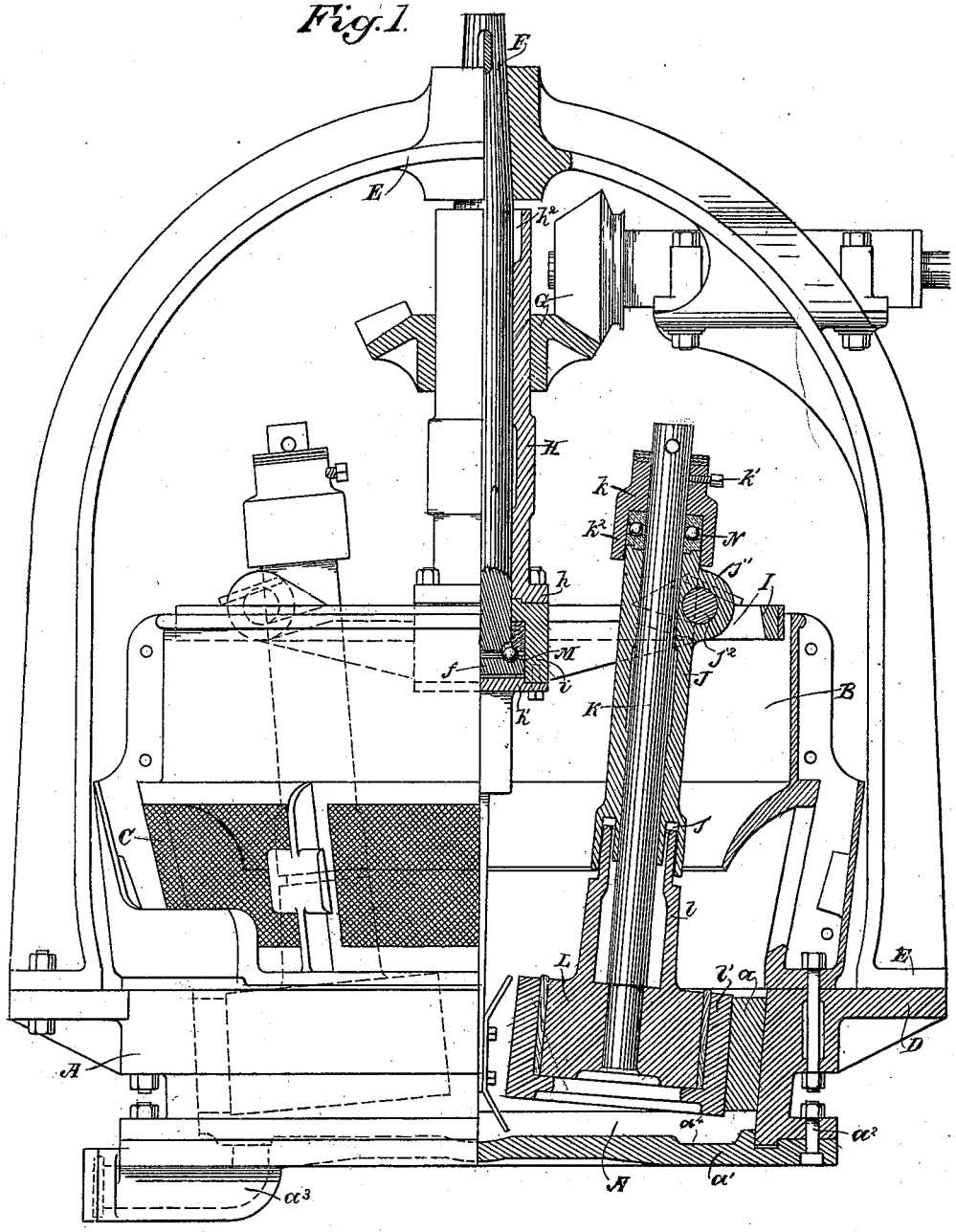
F. A. HUNTINGTON.

ROLLER CRUSHING MILL.

(Application filed May 17, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



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his Atty.

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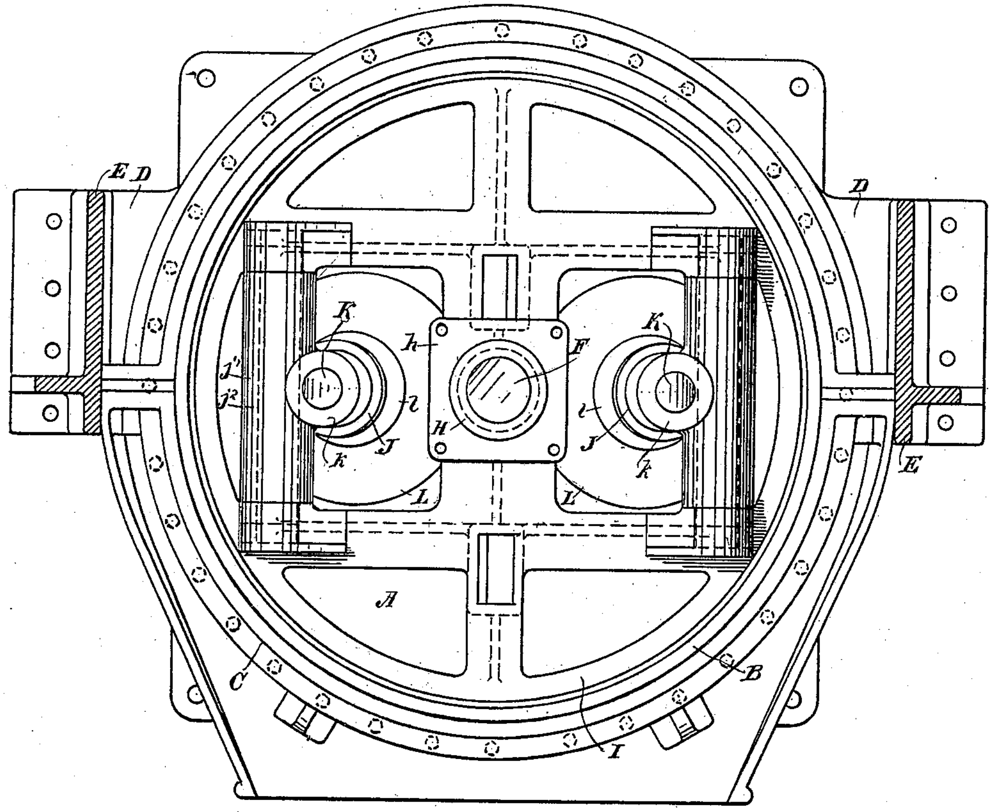
Fig. 2.



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UNITED STATES PATENT OFFICE.

FRANK A. HUNTINGTON, OF OAKLAND, CALIFORNIA.

ROLLER CRUSHING-MILL.

SPECIFICATION forming part of Letters Patent No. 648,960, dated May 8, 1900.

Application filed March 17, 1898. Serial No. 674,179. (No model.)

To all whom it may concern:

Be it known that I, FRANK A. HUNTINGTON, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Roller Crushing-Mills; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of crushing-mills for ore and other substances and materials in which a roller or rollers are pivotally hung from a rotating driver and revolve within a pan against the peripheral die in which they swing outwardly by centrifugal force.

My invention consists in certain improvements in the mill, the general objects of which are to increase the efficiency of the device both in operation and manipulation and to reduce the cost of manufacture by reason of its compactness, though still retaining its desirable capacity. These improvements, together with the special object and advantage of each, will hereinafter fully appear.

Referring to the accompanying drawings, Figure 1 is a part vertical section and part elevation of my mill. Fig. 2 is a plan of same, the bracket E being in section.

A is the pan, to the top of which is secured the hopper or receiving portion B, in the lower part of which are the usual screens C. Rising from a rim-flange D of the pan is a bracket E, in the top of which is keyed or otherwise rigidly secured a depending spindle F, located centrally over the pan. Upon this spindle F is fitted and adapted to be rotated by any suitable means, such as a pulley and belt or by the bevel-gears G here shown, a sleeve H, to the lower extremity of which is firmly secured the driver I, in the arms of which are pivotally suspended the hangers J, which carry the shafts K of the rollers L, operating in the pan. It will be observed that I dispense with the usual central cone of the pans of this class of mills. My pan is therefore clear, and I am enabled to make said pan of smaller diameter, while still retaining large rollers, because said rollers can lie closer to the center nearer to one another. The mill is thus smaller, while still having the same or even greater capacity of crushing effect because of the large rollers; but another advantage of my improved construction rests in the opportunity it affords to operate from overhead a suspended driver, the bearings or journals of which are of a character to reduce friction to a minimum. This is the result both of the character of the journal and the formation of an oil-chamber capable of receiving and retaining the oil and not permitting it to waste or drop down into the pan under any circumstances.

The construction is as follows: On the lower extremity of the fixed central depending spindle F is a fixed flange or collar f, around which is fitted the hub i of driver I, and between these parts, with suitable wearing-surfaces, are the balls M. The hub i is embraced at the top and bottom by and is secured between the foot-flange h of sleeve H and a bottom plate h'. Thus the sleeve H and the driver I are supported by the collar f through the intervention of the ball-bearing. Oil poured into the cup-recess h^2 in the top of the sleeve H will flow down around spindle F and lubricate the ball-bearing below, and it will be retained in said bearing, which is completely inclosed by the driver-hub and the foot-flange and bottom plate as described. Thus not only is a practical antifriction-bearing provided, but also a closed oil-chamber, from which the oil cannot drop down into the pan. This construction, by reason of these results, is more advantageous than those in which a driver is suspended directly from a depending rotating shaft driven from overhead, for the shaft in such cases must have its journal lubricated, and it cannot be closed in, so that the oil can only be prevented from dropping into the pan by the doubtful expedient of absorbent waste; but by having a fixed spindle and a driver-carrying sleeve rotating on the spindle an effective journal and a confined oil-chamber may be provided, as I have shown.

The rollers L are made fast on the lower ends of their shafts K, and the shafts are journaled to rotate within the hangers J as follows: On the top of the shaft is set, as by the screws k', the collar k, having a flange k^2 overlapping the top of the hanger J. In the chamber formed by this overlap is a ball-bearing N. The roller has extending from its upper surface an annular hub-flange l, which freely

embraces the shaft K, forming an oil-chamber, as shown. The upper end of this flange enters loosely an annular groove j in the base of the hanger J, whereby a joint is formed, which by the height and depth of the flanges composing it will prevent the oil from splashing out from and the dirt from entering into the oil-chamber. The ball-bearing N above presents an antifriction-bearing and a support for the roller and its shaft.

Heretofore the roller-hangers have been pivotally suspended from the driver by short gudgeons from its sides. I have found it advantageous in practice to lengthen this pivotal support, and this I accomplish by means of a socket cross-arm j' on its outer side, made of sufficient length to stretch across the necessarily-wide opening in the driver-arm. This offset arm j' is journaled on a fixed pin j^2, which is supported by the driver-arm. Thus a long bearing for the roller-hanger is provided; but a further advantage sought and attained lies in the position of the offset socket-arm j', which, being as far out as possible toward the vertical plane of the ring-die a in the pan, against which the shoe l' of the roller bears in operating, causes said shoe to approach the die and its work in swinging outwardly more squarely or with greater parallelism than if the point of pivotal support were farther in. By having this offset arm j' the pivotal pin j^2 will not interfere with the roller-shaft journaled in the hanger.

The wear upon the interior of the pans in mills of this class is excessive. To compensate for this, it is usual to protect the surfaces liable to wear by means of dies and false bottoms. Consequently heretofore it has been the practice to place in the bottom of the pan a false removable bottom. This, while serving the purpose of receiving the wear, is very disadvantageous in that amalgam and gold will work their way under the false bottom and cannot be reached until the bottom is taken out or the pan broken up. Users seriously object to this delay in the realization of their profits, for it frequently amounts to hundreds of dollars. To obviate this difficulty, I make my pan A with its own proper bottom a' removable or separable and adapted to be secured to the pan by bolts a^2 or other fastenings. I dispense with any interior wearing part on the bottom, using only the separable bottom a' itself. This receives the wear, and when worn out it can be easily replaced. This leaves the interior of the pan clear and clean, with no pockets or hiding-places for the precious materials. Under one portion of this separable bottom I form or cast a quicksilver-receptacle a^3, with which communicates a circumferential channel a^4, which I form on the upper surface of the separable bottom. Into this channel the amalgam finds its way and is worked around by the rollers into the quicksilver-receptacle a^3.

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

1. In a roller crushing-mill, the combination of a pan, a support above the pan, a fixed spindle depending from said support, a sleeve journaled on said spindle, means for positively driving the sleeve, means for preventing the escape of oil from the sleeve-bearing into the pan, a driver carried by said sleeve, and a roller carried by said driver and working within the pan, substantially as described.

2. In a roller crushing-mill, the combination of a pan, a bracket rising from said pan, a spindle fixed in said bracket and depending over said pan, a sleeve having an extended bearing upon and supported and mounted rotatably upon said spindle, extending below the end of the spindle, and a bottom plate on the lower end of the sleeve, a driver carried by the sleeve and a roller carried by the driver and operating within the pan.

3. In a roller crushing-mill, the combination of a pan, a bracket above the pan, a spindle fixed in said bracket and depending therefrom, a fixed collar or flange at the lower end of said spindle, a sleeve on said spindle having an extended bearing thereon and supported by said collar, means for positively driving the sleeve, extending below the end of the spindle, and a bottom plate on the lower end of the sleeve, a driver carried by the sleeve, and a roller carried by the driver and operating within the pan, substantalliy as described.

4. In a roller crushing-mill, the combination of a pan, a bracket above the pan, a fixed spindle depending from said bracket over said pan, and having on its lower end a fixed collar, a sleeve having an extended bearing on and mounted rotatably upon said spindle, extending below the end of the spindle and a bottom plate on the lower end of the sleeve, a driver carried by the sleeve, a ball-bearing through which the sleeve and driver are supported by the fixed collar of the spindle, and a roller carried by the driver and operating within the pan.

5. In a roller crushing-mill, the combination of a pan, a bracket above the pan, a fixed spindle depending from said bracket over said pan, and having on its lower end a fixed collar, a sleeve mounted rotatably upon said spindle, a driver the hub of which is secured to the lower end of the sleeve and is supported by the collar of a spindle, a bottom plate under said hub and collar and secured to said sleeve, whereby a confined chamber for the oil is provided, and a roller carried by the driver and operating within the pan.

6. In a roller crushing-mill, the combination of a pan, a bracket above the pan, a fixed spindle depending from said bracket over said pan, and having on its lower end a fixed collar, a sleeve mounted rotatably upon said spindle, a driver the hub of which is secured to the lower end of the sleeve, a ball-bearing

by which the hub is supported by the collar of the spindle, a bottom plate under said hub and collar secured to said sleeve, whereby a confined chamber for the oil is provided, and a roller carried by the driver and operating within the pan.

7. In a roller crushing-mill, the combination with a pan, and a crushing-die thereon, of crushing-rolls, means for supporting the same located above the bottom of the pan, driving means for the rolls and a removable bottom for the pan, for the purposes specified.

8. In a roller crushing-mill, the combination of a pan, a support above the pan, a fixed spindle depending from said support and terminating at a point above the pan, a sleeve supported by and rotatably journaled on said spindle, means for positively driving the sleeve, a driver carried by said sleeve, and a roller operated by said driver and working within the pan, substantially as described.

9. In a chasing crushing-mill, the pan provided with a removable bottom having formed upon the upper surface thereof a circumferential channel, and on its lower side a receptacle for quicksilver and with which the channel communicates.

10. In a crushing-mill, a pan, having a removable bottom, adapted to be removed without disturbing the relation of the other parts of the mill.

In witness whereof I have hereunto set my hand.

FRANK A. HUNTINGTON.

Witnesses:
D. B. RICHARDS,
WALTER F. VANE.