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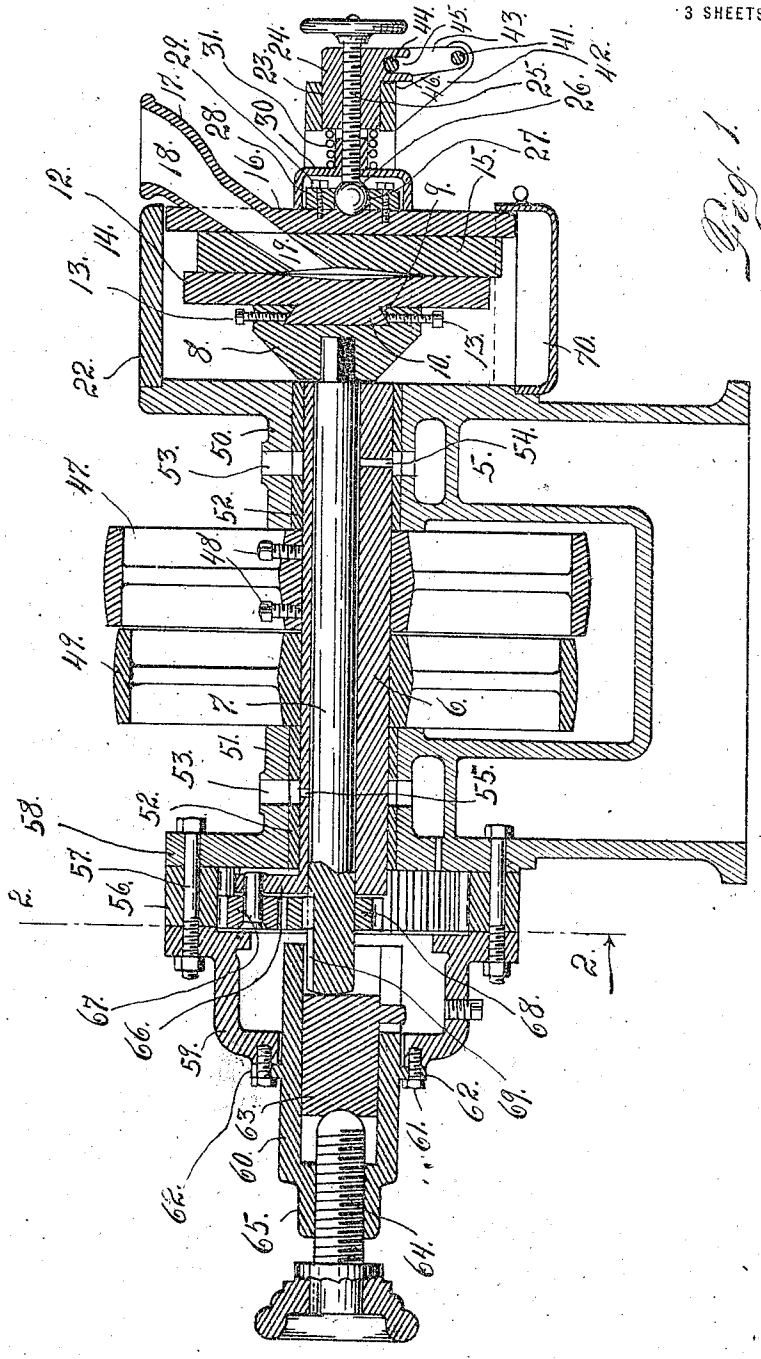
ORE GRINDER.

APPLICATION FILED SEPT. 13, 1911. RENEWED NOV. 16, 1914.

1,144,305.

Patented June 22, 1915.

3 SHEETS—SHEET 1.



Witnesses

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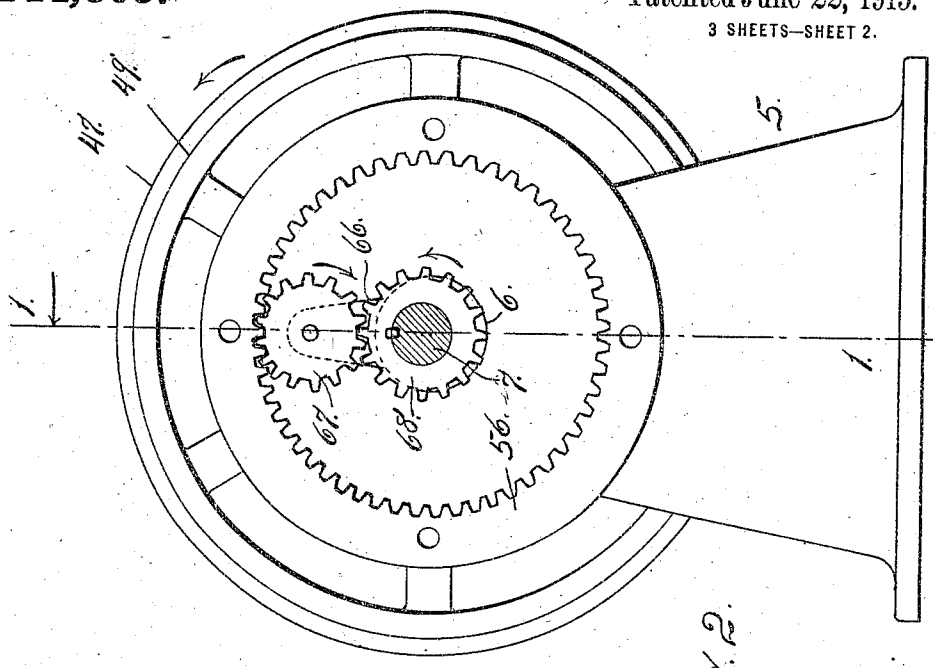


Fig. 2.

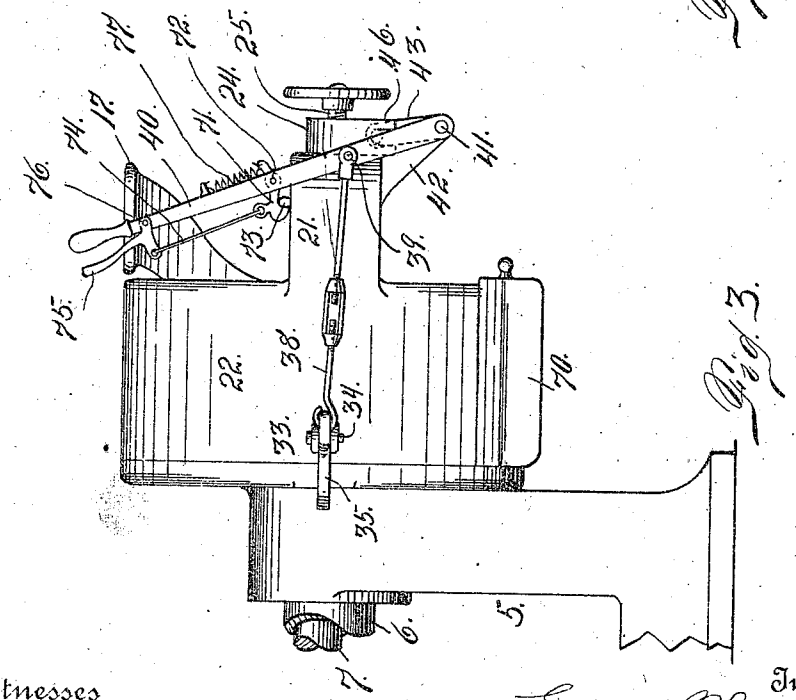


Fig. 3.

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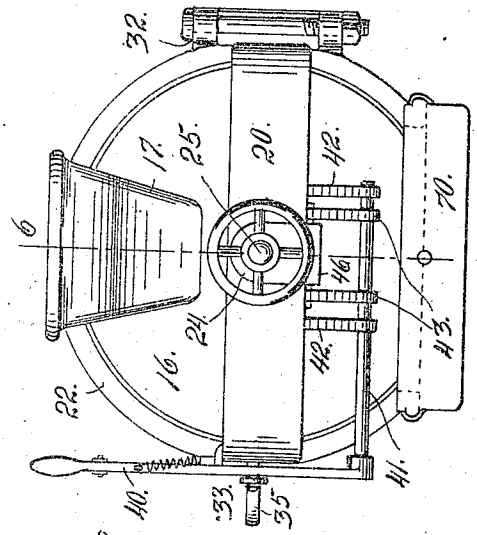


Fig. 5.

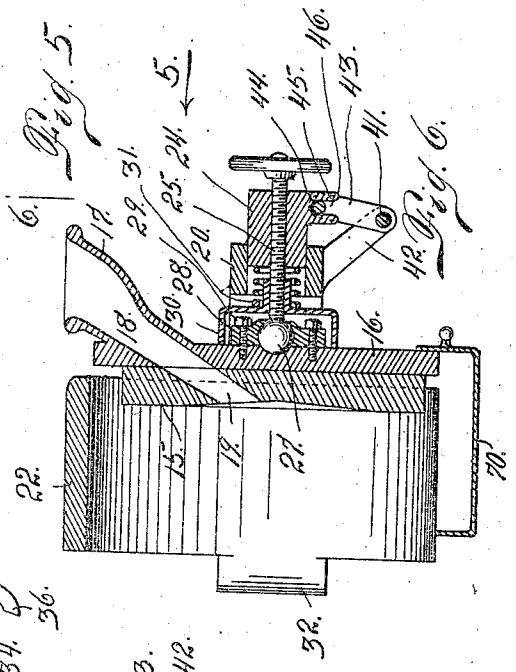


Fig. 6.

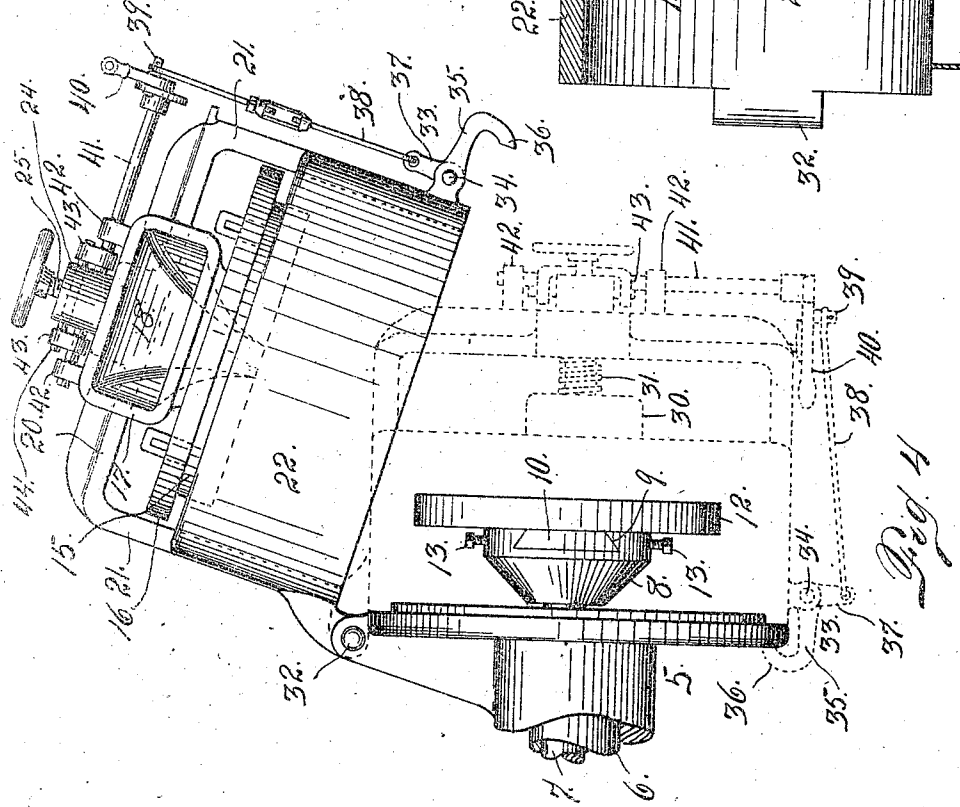


Fig. 4.

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UNITED STATES PATENT OFFICE.

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ORE-GRINDER.

1,144,305. Specification of Letters Patent. Patented June 22, 1915.

Application filed September 13, 1911, Serial No. 649,209. Renewed November 16, 1914. Serial No. 872,501.

To all whom it may concern:

Be it known that I, EDWARD F. McCOOL, a citizen of the United States, residing at Victor, county of Teller and State of Colorado, have invented certain new and useful Improvements in Ore-Grinders; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in ore grinders being more especially adapted for use in grinding ore for samples, special provision being made whereby it becomes practicable to thoroughly clean the grinding disks or members, whereby the quality of the ore ground at one operation will not, in any way, affect the quality of the next charge, and to this end special attention has been given to the construction, whereby the grinding or pulverizing members may be thoroughly cleaned after each operation.

In my improved construction, the grinding function is performed by two disks, to which the ore to be ground is fed through a hopper, carried by one of the disks, the last-named disk being comparatively stationary, but being mounted to permit, to a limited extent, a rocking action to compensate for any unevenness that may exist between the two disks for any reason.

In my improved construction, I mount an operating shaft eccentrically within another shaft, which will hereinafter be referred to as a hollow shaft or sleeve. To one extremity of the operating shaft is secured a head grooved to receive the tongue of a rotary disk, which cooperates with the first-named disk, or relatively stationary member, to perform the grinding function. Power is transmitted initially to the hollow shaft upon which a fast pulley is mounted for the purpose. This hollow shaft carries a crank arm upon the outer extremity of which is mounted a pinion or relatively small gear, which meshes with a larger gear fast on the operating shaft, whereby rotary motion is transmitted to the operating shaft upon its own axis, and at a faster speed than the rotation of the hollow shaft, the operating shaft being carried around in an orbit, so to speak, with the hollow shaft, during the rotary action of the latter. Hence, the operating shaft has two movements, one on its own axis, and the other, a body or orbital travel with the hollow shaft, in which it is eccentrically mounted. Provision is made for adjusting the rotary grinding member with reference to its cooperating relatively stationary member, by means of a feed screw threaded in one end of the casing, and acting upon a movable block, the latter in turn bearing on the adjacent extremity of the operating shaft. Provision is further made for swinging the grinding head, upon which the relatively stationary grinding member is mounted away from the rotary grinding member, thus giving ample opportunity for thoroughly cleaning the grinding faces of both members, after the treatment of each charge of ore.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing, in which is illustrated an embodiment thereof.

In this drawing: Figure 1 is a vertical longitudinal section, taken through my improved ore grinder. This may be termed a section taken on the line 1—1 of Fig. 2. Fig. 2 is a vertical cross section, taken on the line 2—2 of Fig. 1, looking toward the right. Fig. 3 is a side elevation of the grinding head of the machine, the balance of the structure being broken away. Fig. 4 is a view of the same construction as Fig. 3, the grinding head, however, being shown in two positions, the dotted line position being that which it normally occupies during the operation of the machine, and the full line position that which it occupies when swung away from the rotary grinding member. Fig. 5 is an end elevation of the grinding head of the machine, being a view looking in the direction of arrow 5, Fig. 6. Fig. 6 is a vertical section, taken on the line 6—6, Fig. 5.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a suitable framework in which is journaled a hollow shaft 6, within which is eccentrically mounted an operating shaft 7, whose forward extremity is fixedly connected with a block 8 to cause the said block to rotate with the shaft, the block having a dovetail groove 9 adapted to receive a tongue 10 of counter-

part shape, formed on the rotary grinding member 12, the grinding member being locked on the said block by means of set bolts 13. The grinding member 12 protrudes into a hollow grinding head 14, including a grinding member 15, mounted on a plate 16, carrying a hopper 17, whose opening 18 registers with an opening 19 extending through the grinding member 15. The grinding head is equipped with a forwardly located yoke 20, which extends horizontally in front of the head plate 16, and is provided with arms 21 extending parallel with each other, their rear extremities being formed integral with a housing 22, forming a part of the grinding head. This yoke is centrally recessed, as shown at 23, and in this opening is slidably mounted a nut 24, through which is threaded an adjusting screw 25, whose inner extremity is ball-shaped, as shown at 26, and engages a socket 27 of similar shape, formed in the head plate 16 and a reinforcing member 28, centrally connected with the head plate by bolts 29. This reinforcing member is covered by a housing 30, through which the shank of the screw 25 passes. By virtue of this construction, the head plate 16, together with the grinding members 15 mounted thereon, is longitudinally movable with the nut 24 and the latter is caused to travel back and forth in the direction lengthwise of the machine by turning the screw 25 in the nut 24. A spiral spring 31 is interposed between the housing 30 and the inner extremity of the nut 24. This grinding head is hinged to the main framework of the machine, as shown at 32, but is normally locked in the position to operate, as shown by dotted lines in Fig. 4, by a bell-crank lever 33, pivoted at 34 on the housing member 22, one arm 35 of the bell-crank lever being formed into a hook 36 to engage the stationary framework of the machine. The opposite extremity 37 of the bell-crank lever is connected by means of a rod 38 with a wrist-pin 39, formed on the hand lever 40, a short distance above the fulcrum or the lower extremity of the latter. The lower end of this lever 40 is made fast to a rock shaft 41, journaled in relatively stationary arms 42, secured to the yoke 20 and extending downwardly and slightly rearwardly therefrom. Fast on this rock shaft are two crank arms 43, whose upper extremities are equipped with a pin 44, engaging a recess 45 formed in a depending part 46 of the nut 24. By moving the hand lever 40 forwardly, the hooked arm of the bell-crank lever 33 is disengaged from the forward portion of the stationary frame simultaneously with the forward movement of the nut 24 in the yoke, this forward movement of the nut serving, through the instrumentality of the screw 25, to impart a corresponding movement to the head plate 16, together with the hopper 18 and the grinding member 15. As soon as the bell-crank lever has been thrown to the disengaged position, illustrated in full lines in Fig. 4, a further pull upon the hand lever 40 can only result in swinging the grinding head upon its hinge 32 whereby the said head is caused to occupy the position shown by full lines in Fig. 4, thus leaving the face of the rotary grinding member 12 exposed for cleaning purposes. Attention is called to the fact that, as the head plate and grinding member 15 are thrown forwardly by initial action of the hand lever 40, they are caused to occupy the position shown in Fig. 6, whereby the head plate is moved out of the housing 22, thus giving ample opportunity to clean the edge of the head plate to the end that the entire grinding head may be thoroughly cleaned, after each grinding operation.

The hollow shaft 6 is equipped with a fast pulley 47 secured thereto by bolts 48. It also carries a loose pulley 49. The opposite extremities of the hollow shaft are journaled in bearings 50 and 51, formed in the framework of the machine, the said bearings having the usual Babbitt lining 52. These bearings are equipped with openings 53 for the introduction of lubricating material. The hollow shaft is also provided with perforations 54 and 55, through which the oil or other lubricant passes through the shell of the hollow shaft to the eccentrically-mounted operating shaft 7. An interiorly-cogged ring 56 is mounted on the framework, being secured in place by bolts 57, which pass through a flange 58 of the framework, the ring 56, and a housing 59, the housing being further connected with a sleeve 60 by means of bolts 61 passed through lugs 62 formed on the sleeve and threaded into the housing 59. Within the sleeve 60 is movably located a plug or block 63, whose forward extremity bears against the adjacent extremity of the operating shaft 7. The rear extremity of this block is engaged by a feed screw 64, which is threaded in the outer extremity 65 of the sleeve. As the feed screw is rotated in the proper direction, it acts upon the block 63 to move the operating shaft longitudinally and cause the rotary grinding member 12 to approach the relatively stationary grinding member 15. The rear extremity of the hollow shaft 6 is equipped with a crank arm 66, carrying at its outer extremity a relatively small gear or pinion 67, which meshes with the interior cogs of the ring 56. This pinion also meshes with a larger gear 68, splined on the rear extremity of the operating shaft 7, as shown at 69. By virtue of this construction, it will be understood that power is transmitted to the hollow shaft from a line shaft or motor, which is connected with

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the fast pulley 47, and rotary motion will be transmitted to the operating shaft 7, eccentrically mounted within the hollow shaft, as heretofore explained, the rotary speed of the two shafts varying. The rotary motion of the operating shaft on its own axis is also transmitted to the grinding member 12, as well as the movement resulting from the orbital travel of the operating shaft with the hollow shaft, due to the fact that the axis of the operating shaft does not coincide with the axis of the hollow shaft. Hence, the grinding member 12 not only has a rotary movement, due to the rotation of the operating shaft, but also a circular travel with the operating shaft due to the eccentric mounting of the latter within the hollow shaft.

During the operation of the machine, ore is fed into the hopper 18 and reaches the adjacent grinding or pulverizing faces of the coöperating grinding members 9 and 15, the said members being slightly centrally recessed forming a sort of pocket to permit the entrance of the ore to be ground. This ground ore passes downwardly and is caught in a sort of drawer or sliding receptacle 70, which is large enough to contain the charge of ore, or the sample which has been ground by the machine. Having removed the sliding receptacle from the grinding head, the latter is then swung outwardly to the full line position in Fig. 4 for purposes of thoroughly cleaning the grinding members and other adjacent parts of the head and the machine preparatory to the use of the latter in preparing another sample. When the grinding head is locked to the framework of the machine by the hook-shaped bell-crank lever 33, the parts are locked in the said position by means of a dog 71, pivoted on the lever 40, as shown at 72, the operating extremity of the dog engaging a lug 73 fast on the yoke 20. This dog is connected by means of a rod 74 with a handle 75 pivoted on the lever, as shown at 76. When the grinding head is returned to the locking position, the dog will engage the lug 73, and, by virtue of its spring 77, the dog will normally remain in the locking position. This locking mechanism is necessary in order to permit the adjustment of the grinding member 15 through the agency of the screw 25, since, otherwise, when turning the screw, in order to cause the grinding member 15 to approach the grinding member 12, the nut 24 might travel outwardly on the screw. This it cannot do, when the locking dog 71 is employed, since this dog locks the hand lever against movement, and the nut cannot move independently of the movement of the lever.

Having thus described my invention, what I claim is:

1. An ore grinder, comprising a suitable frame, an operating shaft, a grinding disk mounted to rotate with said shaft, a coöperating non-rotary grinding member, a housing surrounding the grinding member, a yoke carried by said housing and extending forward of the same, a nut slidable in said yoke, a screw threaded into the nut, the inner extremity of the screw having a ball-and-socket connection with the non-rotary grinding member, whereby the said member is longitudinally movable toward and away from its coöperating member, and means for moving the nut within the yoke to impart longitudinal movement to the non-rotary grinding member, substantially as described.

2. In an ore grinder, the combination with a suitable frame, of a housing hinged to the frame, a yoke connected with the housing, a nut slidable in the yoke, a non-rotary grinding member inclosed by the said housing, a suitable connection between the non-rotary member and the nut, a rock shaft, a connection between the rock shaft and the nut for sliding the latter as the shaft is actuated, a hand lever connected with the rock shaft, a bell-crank lever, mounted on the housing remote from the hinge and having one of its arms hook-shaped to engage the adjacent member of the frame when the housing is in the normal position, and an operative connection between the bell-crank lever and the hand lever, whereby as the latter is actuated, the bell-crank lever is disengaged from the frame, and the non-rotary grinding member moved longitudinally by virtue of its connection with the slidable nut, the hand lever also serving to swing the housing and its connections on the housing hinge.

3. In an ore grinder, a sleeve, a shaft eccentrically mounted within said sleeve, means for rotating said sleeve and shaft at different speeds, a grinding disk supported upon said shaft and a non-rotatable grinding disk mounted to permit of a slight rocking movement and arranged to bear against the grinding face of said first disk.

4. In an ore grinder, a sleeve, a shaft eccentrically mounted therein, means for rotating said sleeve and shaft, a grinding disk supported on said shaft and a non-rotatable grinding disk mounted to permit of a slight rocking movement and arranged to bear against the grinding face of said first disk.

5. In an ore grinder, a sleeve, a shaft eccentrically mounted therein, means for rotating said sleeve, a grinding disk supported upon said shaft and a non-rotatable grinding disk mounted to permit of a slight rocking movement and arranged to bear against the grinding face of said first disk.

6. In an ore grinder, a suitable frame, a sleeve, a shaft eccentrically mounted therein, means for rotating said sleeve and shaft,

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a grinding disk supported upon one end of said shaft, and means for adjusting said shaft longitudinally, independent of said sleeve, substantially as described.

7. In an ore grinder, a frame, a hollow grinding head hinged upon said frame, a fastening opposite the hinge, a non-rotary grinding member within said grinding head, a nut slidable in said grinding head and supporting said non-rotary grinding member, and means for actuating said nut and fastening simultaneously.

8. In an ore grinder, a frame, a hollow grinding head hinged upon said frame, a fastening opposite the hinge, a yoke exterior of the said grinding head, a non-rotary grinding member within the said grinding head, a nut slidable in said yoke and supporting said non-rotary grinding member, and means for actuating said nut and fastening simultaneously.

9. In an ore grinder, a frame, a hollow grinding head hinged upon said frame, a fastening opposite the hinge, a non-rotary grinding member within the said grinding head, a nut slidable in said grinding head and supporting said non-rotary grinding member, and a lever for actuating said nut and fastening simultaneously.

10. In an ore grinder, a frame, a sleeve, a shaft eccentrically mounted therein, means for rotating said sleeve and shaft, a grinding disk supported upon one end of said shaft, an adjustable abutment at the opposite end of said shaft, a grinding disk arranged to bear against the grinding face of said first disk and means for adjusting said last named grinding disk toward and away from the first named disk.

11. In an ore grinder, a frame, a sleeve, a shaft eccentrically mounted therein, means for rotating said sleeve and shaft, a grinding disk supported upon one end of said shaft, and an adjustable abutment at the opposite end of said shaft acting upon the latter independently of the sleeve, a grinding disk arranged to bear against the grinding face of said first disk, and means for adjusting said last named grinding disk toward and away from the first named disk.

12. In an ore grinder, a frame, a sleeve, a shaft eccentrically mounted therein, means for rotating said sleeve, an operative connection between said sleeve and shaft to transmit rotation to said shaft, a grinding disk supported upon one end of said shaft, an adjustable abutment at the opposite end of said shaft, a grinding disk arranged to bear against the grinding face of said first disk and means for adjusting the said last named grinding disk toward and away from the first named disk

In testimony whereof I affix my signature, in presence of two witnesses.

EDWARD F. McCOOL.

Witnesses:

CLARA E. BRADEN,

F. E. BOWEN.