No. 815,333. PATENTED MAR. 20, 1906.

A. C. CALKINS.

GRINDING MACHINE.

APPLICATION FILED SEPT. 26, 1904.

3 SHEETS—SHEET 1.

Fig. 1

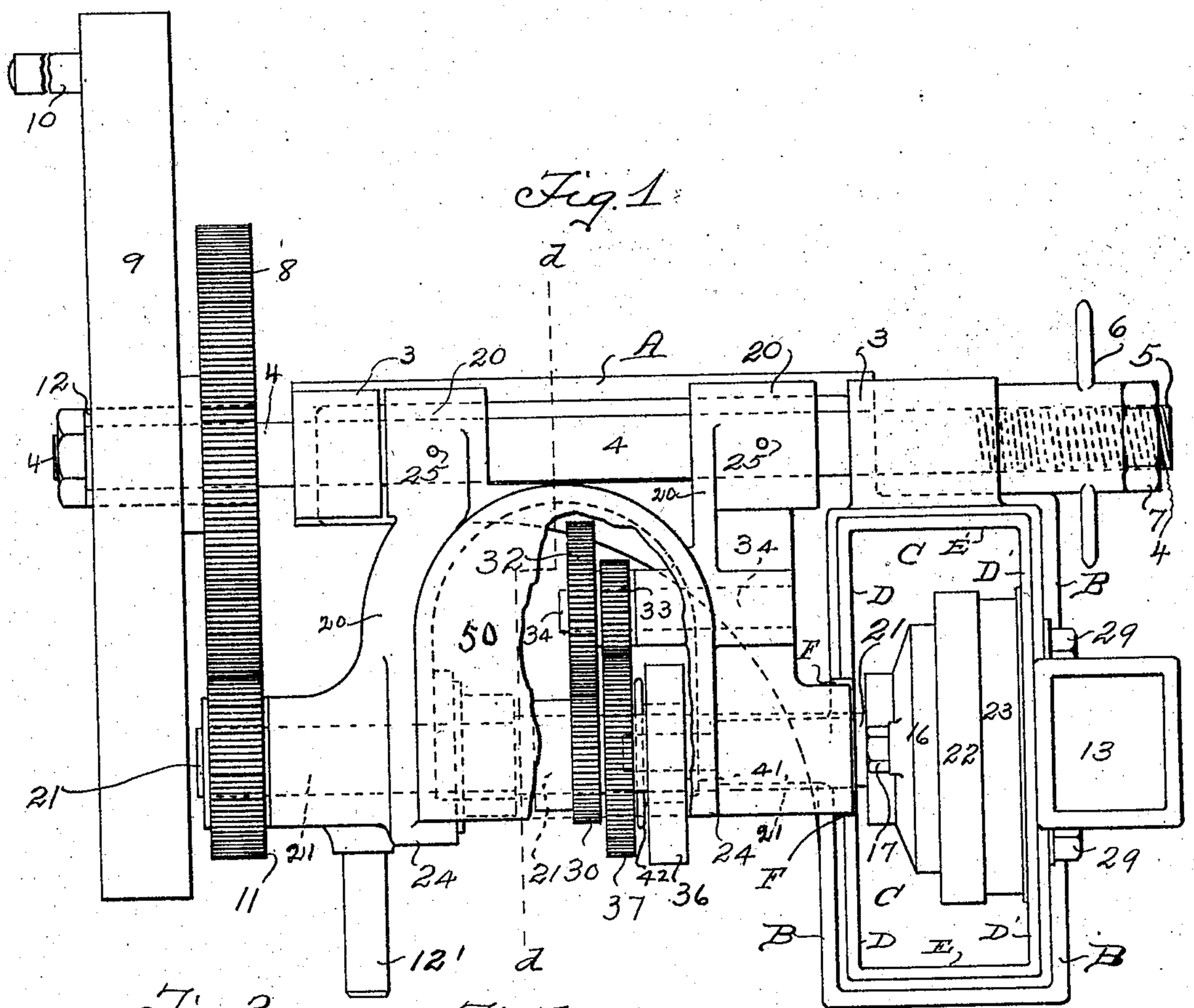


Fig. 2

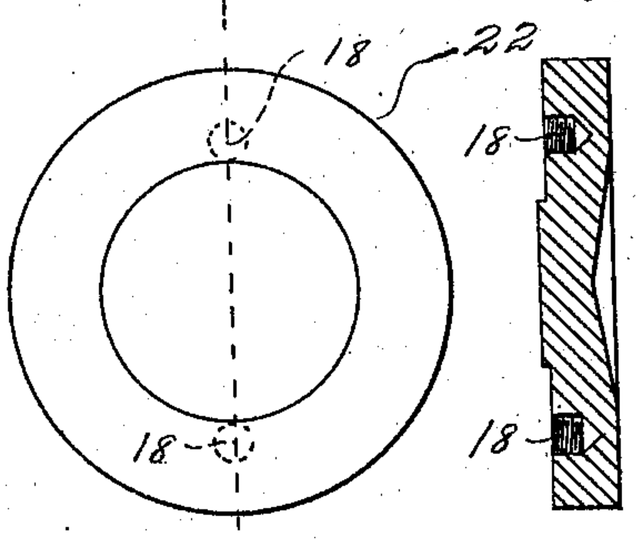


Fig. 3

Fig. 4

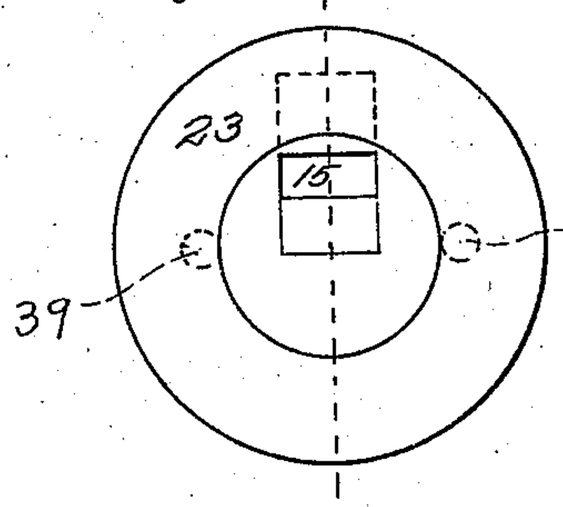
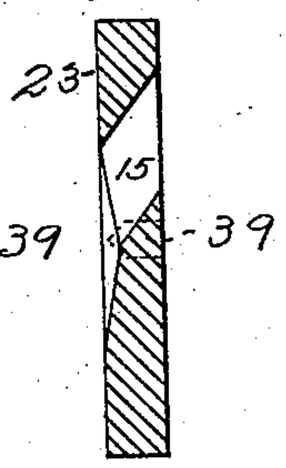


Fig. 5



a

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6

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3 SHEETS—SHEET 2.

Fig. 6

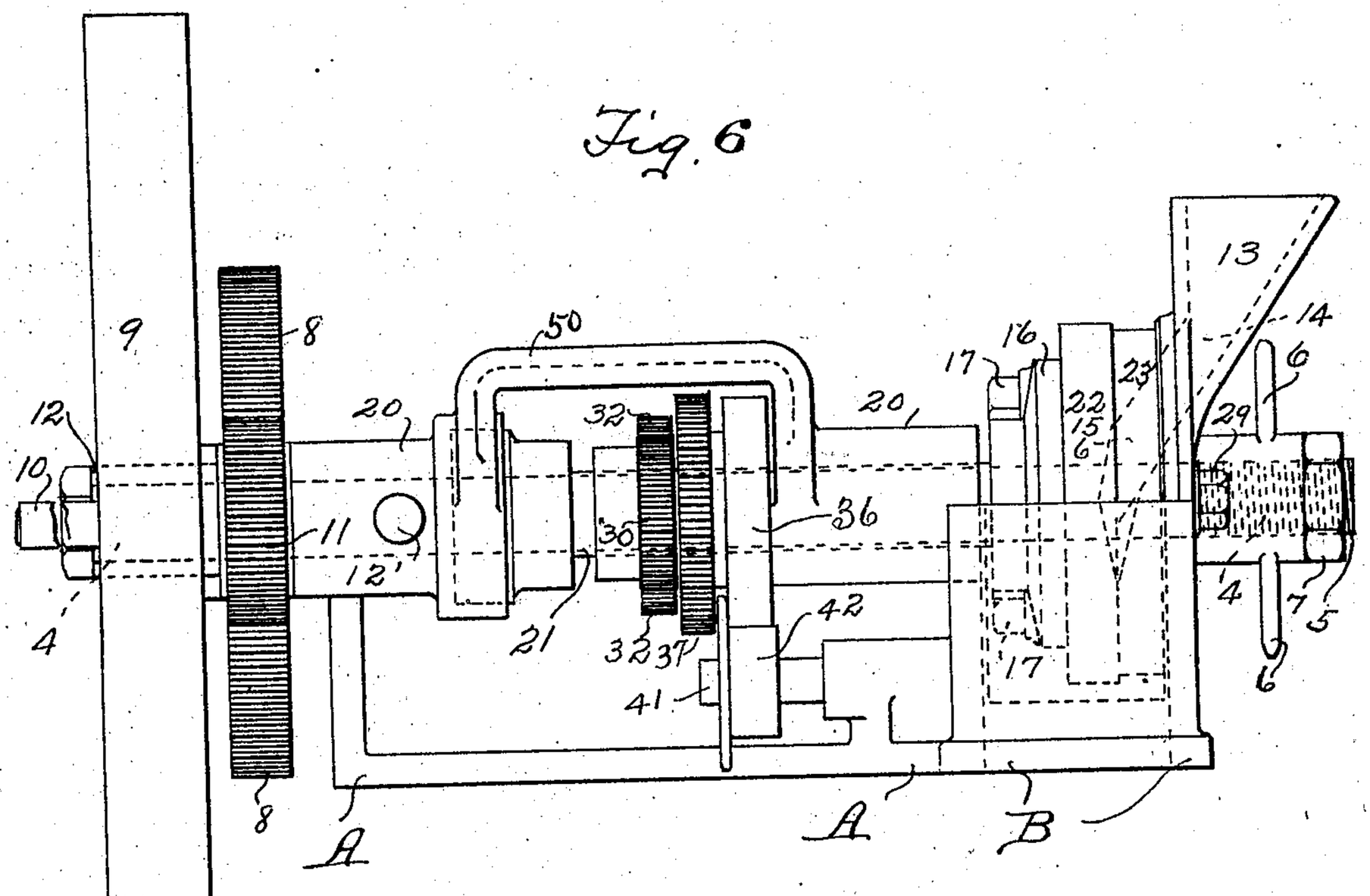


Fig. 7

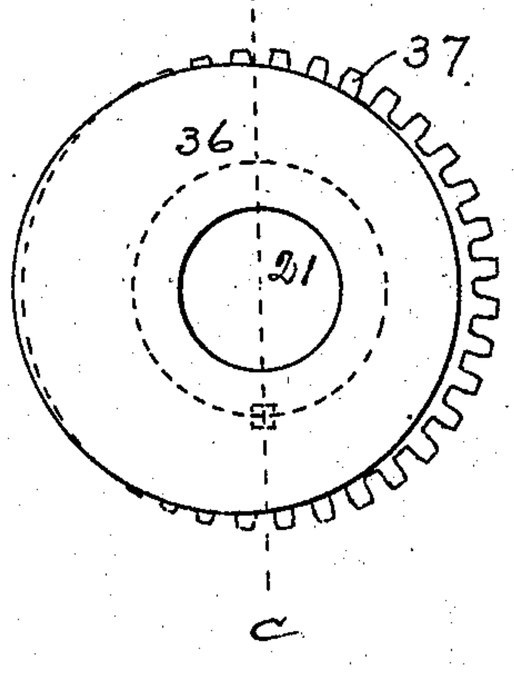


Fig. 8

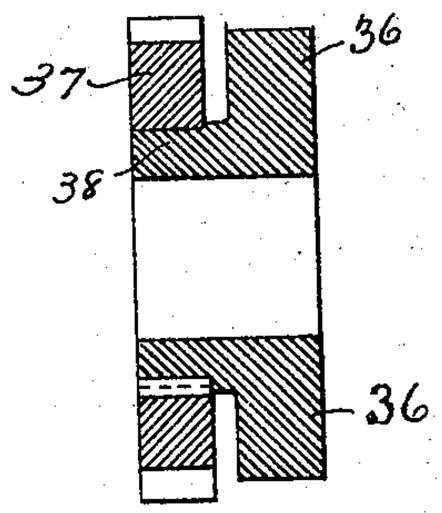
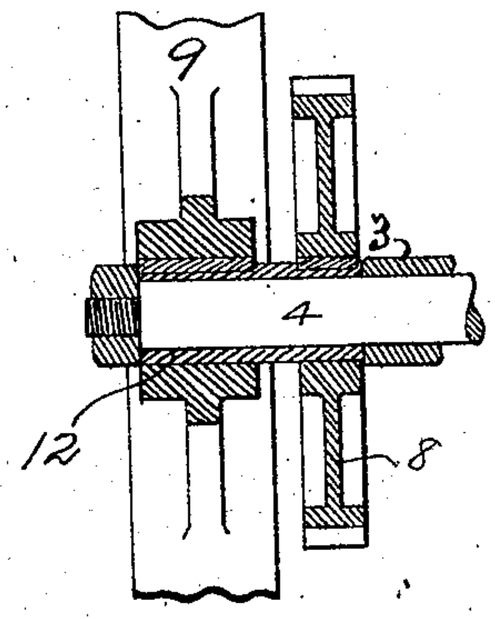


Fig. 11



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3 SHEETS—SHEET 3.

Fig. 10

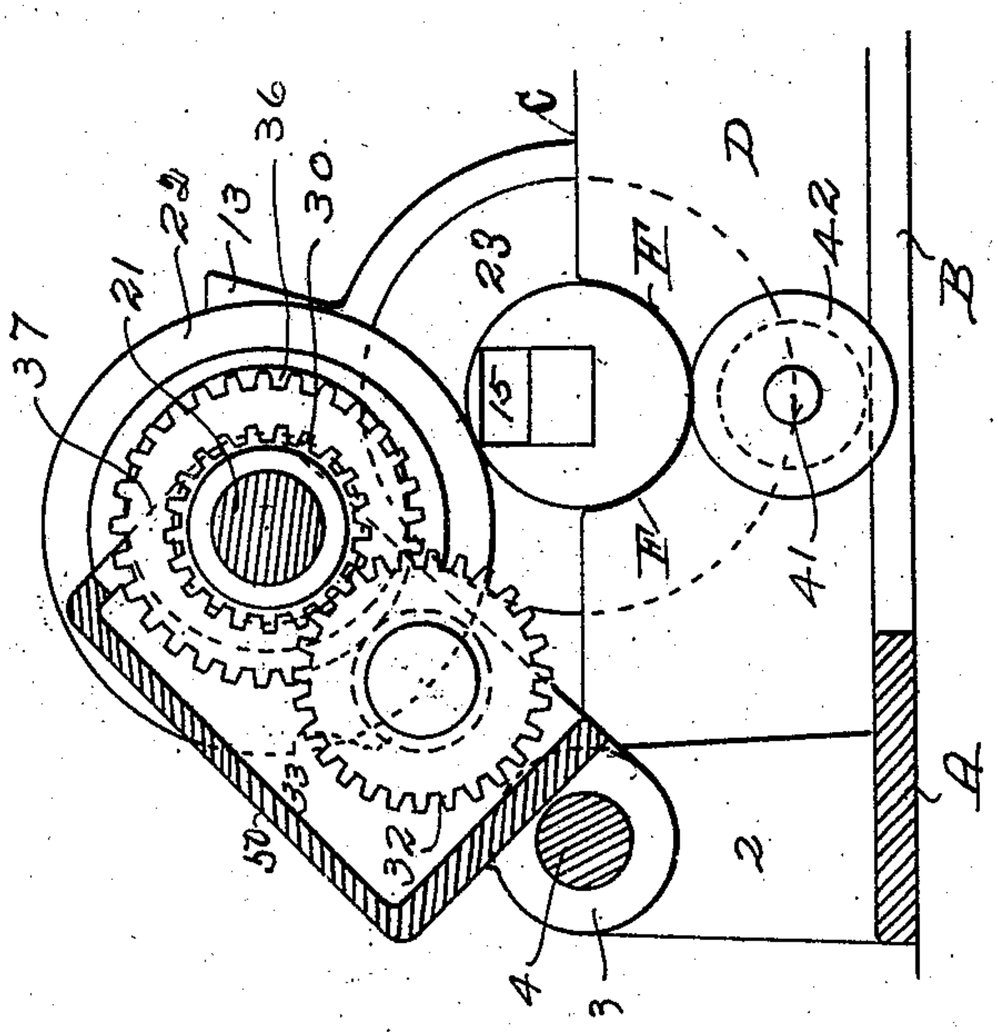
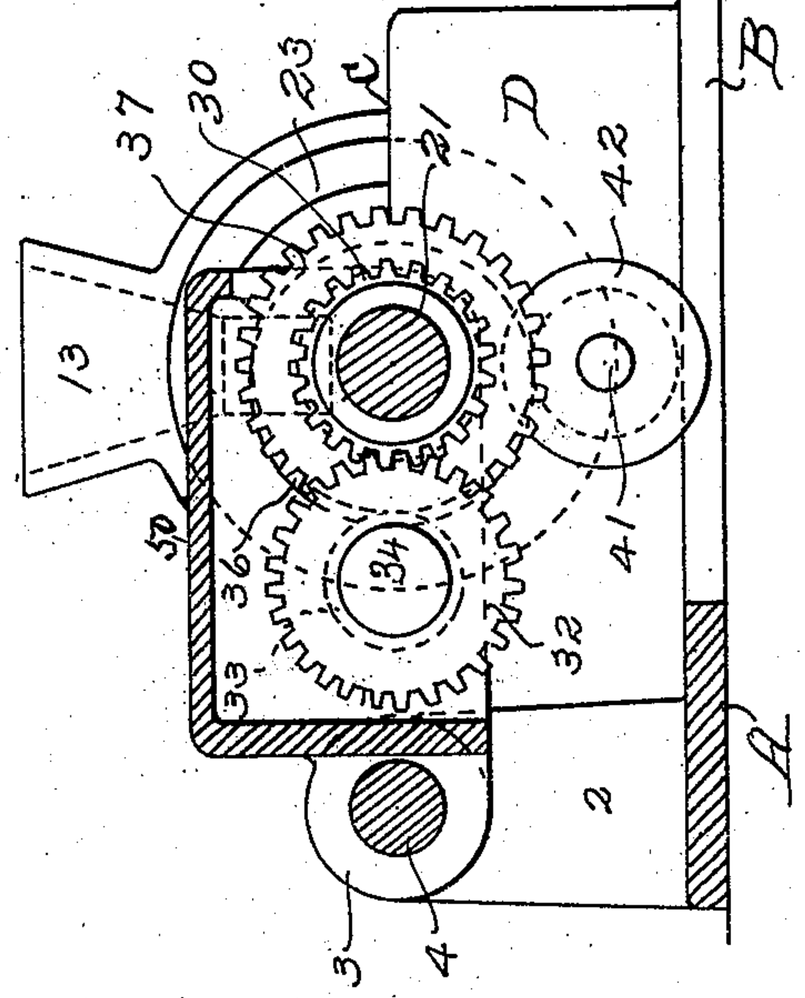


Fig. 9



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UNITED STATES PATENT OFFICE.

ALBERT C. CALKINS, OF LOS ANGELES, CALIFORNIA.

GRINDING-MACHINE.

No. 815,333. Specification of Letters Patent. Patented March 20, 1906.

Application filed September 26, 1904. Serial No. 226,030.

To all whom it may concern:

Be it known that I, ALBERT C. CALKINS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented and discovered a new and useful Improvement in Grinding-Machines; and I do hereby declare the following to be 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.

This invention relates to improvements in grinding-machines; and the objects of my improvement are, first, to construct disks or grinding-surfaces for grinding-machines used for pulverizing ores or other material that will avoid concentrically grooving the disks or grinding-surfaces; second, to manufacture machines for grinding samples of ores or other material in quick succession containing varied ingredients and different proportions of the same ingredients that obviate the mixing of the ingredients of one sample with the ingredients of another sample, and, third, to provide machines with grinding-disks that can be quickly separated and cleaned and again conveniently brought together for pulverizing ores to the required degree of fineness, reference being made to the accompanying drawings, to the figures, reference numerals, and letters marked thereon.

The invention consists, essentially, in the construction, combination, and arrangement of the several parts, as will be hereinafter fully described, and specifically pointed out in the claims.

I attain the objects above referred to by the construction, combination, and arrangement of parts illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the machine, a part of the gear-shield broken away. Fig. 2 is a plan view of the rotary grinding-disk removed from the driven shaft. Fig. 3 is a sectional view of the rotary disk, taken on the line *a a* of Fig. 2. Fig. 4 is a plan view of the stationary disk removed from the frame or support. Fig. 5 is a sectional view of the stationary disk, taken on the line *b b* of Fig. 4. Fig. 6 is a view in elevation of the machine, the parts thereof in operative positions. Fig. 7 is a plan view of the cam upon the driven shaft and a portion of the gear for operating said cam. Fig. 8 is a sectional view of the cam and driving-gear, taken upon the line *c c* of Fig. 7. Fig. 9 is a cross-sectional view of the machine, taken upon the line *d d* of Fig. 1. Fig. 10 is a cross-sectional view of the machine, the rocker-arm elevated and the disks in position to be cleaned; and Fig. 11 is a sectional view of parts in detail.

Similar reference numerals and letters refer to like parts throughout the several views.

The reference-letters A B denote the bed-plate or support for the machine. The letter A refers to the longitudinal portion of the said support, having horizontal and vertical parts, and the letter B indicates the end portion of said support. The rectangular, bottomless, and open-top box C, having side pieces D D′ and end pieces E E′, rests upon the portion B of the bed-plate or support A B, which is preferably constructed of cast-iron and made integral with the said side pieces D D′ and end pieces E E′ of the box. The side piece D is cut out or circularly recessed at F, as shown upon Figs. 1 and 10 of the drawings, the said recess F to allow unimpeded oscillation for a portion of the rocker-arm carrying the driven shaft when the machine is in operative position as illustrated upon Fig. 1 of the drawings. The reference-numerals 2 2 denote lugs projecting upwardly, one from either end of the said vertical part of the longitudinal portion A of the support or bed-plate A B of the machine, having elongated perforated heads 3 3 upon the ends of lugs, in which perforated heads the bar or rod 4 vibrates or rocks. The said bar or rod extends beyond the ends of the portion A of the support or bed-plate of the machine. On the rod 4 the rocker-arm 20 (hereinafter specifically mentioned) is secured and is adapted to be swung upward and rocked, respectively, as illustrated upon Figs. 10 and 1 of the drawings. The numeral 50 represents the gear-shield. The end of the said rod 4 adjacent to the open-top box C is screw-threaded at 5 to receive the hand-nut 6 and the angular wrench-nut 7 in order to longitudinally. adjust the said rocker-arm supporting the driven revolving shaft 21, carrying on one end thereof the movable revolving disk 22, adapted to be brought in contact with and grind against the face of the stationary disk 23, secured within the box C, to the side piece D′ thereof, by means of screw-bolts 29 29, which enter screw-threaded holes 39 39 in the outer face of the disk 23. Upon the opposite end of the bar or rod 4 farthest from the open-top box C the

driving-gear 8 and the pulley 9 are keyed to a flange-sleeve 12, which revolves upon the said rod or bar 4, the pulley 9 having a handle 10 secured thereon. The pulley 9, if required, may be driven by a belt passing over the driving-pulley of a motor. (Not necessary to be shown.) The driving-gear 8 meshes with the gear 11 upon the end of the driven shaft 21, journaled in the free ends 24 24 of the rocker-arm 20, which is secured to the said rod or bar 4 by means of pins 25 25, the said rod or bar turning within the perforated heads 3 3 as the said free ends 24 24 of the rocker-arm 20 are elevated or depressed by a cam 36. One end 24 of the rocker-arm 20 is provided with a handle 12′, by means of which the said rocker-arm is rocked or turned upward, as shown upon Fig. 10 of the drawings, in order to clean the grinding-disks 22 and 23. The reference-numeral 13 designates the hopper, which is preferably constructed of cast-iron and made integrally with the said side piece D′ of the box C. The opening 14 (shown in dotted lines upon Fig. 6 of the drawings) communicates with the perforation 15 in the stationary disk 23, through which opening 14 and perforation 15 the material to be ground or pulverized passes through the hopper to the grinding-surfaces of the disks 22 and 23. The material after being pulverized or ground falls into a suitable vessel or pan (not necessary to be shown) placed under disks 22 and 23 within the box C, and it can be quickly and conveniently removed or replaced under the said disks when desired. The movable revolving grinding-disk 22 is secured upon the end of the driven revolving shaft 21 by means of headed screw-threaded bolts 17 17, as illustrated upon Figs. 1 and 6 of the drawings, which pass through the plate 16, fastened upon the said shaft in any suitable manner, the said bolts being fastened into the screw-threaded holes 18 18 in the outer face of the grinding-disk 22, as shown upon Fig. 3 of the drawings.

Keyed or otherwise secured upon the driven revolving shaft 21 is the gear 30, adapted to mesh with the gear 32, which revolves upon the stud 34, projected from and secured to the rocker-arm 20. The gears 32 and 33 are secured together.

The cam 36 and the gear 37, the latter keyed upon the hub 38 of the former, both cam and gear mounted loosely, revolve upon the driven shaft 21, as illustrated upon Figs. 1, 7, and 8 of the drawings. The gear 37, splined upon the hub 38 of the cam, meshes with the gear 33 upon the projecting stud 34, and the cam contacts with and revolves upon the roller 42, which also revolves upon the projecting pin 41, secured to the rocker-arm 20. The cam 36 and the gear 37 being loosely mounted upon the shaft 21, the said gear 37 meshing with the smaller gear 33 on the stud 34 greatly decreases the number of revolutions of the cam 36 compared with the number of revolutions of the shaft 21, actuated by the driving-gear 8, of far greater dimensions than the gear 37. Besides, the said large driving-gear 8 meshes with the gear 11, of less dimension than the cam-gear 37. Thus it will readily appear that the speed of the cam and its gear 37, revolving independently of but upon the shaft 21, is greatly diminished in speed compared with the speed of the said shaft, on which the said cam and its gear 37 are loosely mounted. The different rates of speed which the shaft 21 and the cam 36 travel, the latter against the periphery of the roller 42, cause the movable revolving disk upon the shaft 21 to describe an ever-changing orbit eccentric to the circumference or imaginary orbit described by the stationary disk. The orbit of the former, the movable revolving grinding-disk, is an ever-changing orbit relative to or compared with the one fixed orbit described by the circumference of the stationary disk. The orbit described by the movable revolving disk compared with that of the stationary disk is one that changes or departs at every point thereof relative to the orbit of the circumference of the stationary disk. The former does not coincide with the latter—that is, a section of the orbit or any portion thereof is not coincident with any portion of the arc described by the circumference of the stationary disk.

It will readily appear from the foregoing description, when read in connection with the drawings hereto appended and made a part of the specification and claims, what is the operation of my machine, and further description of the manner of operating the machine is deemed unnecessary.

It is obvious that many variations and changes in the details of construction, combination, and arrangements of my invention would readily suggest themselves to persons skilled in the art and still be within the spirit and scope of my improvement.

I do not desire to confine this invention to the specific construction and arrangements of parts herein shown and described, and the right is reserved to make all changes in and modifications of the same that come within the spirit of this invention; but I do desire to secure as my invention all features of construction and equivalents thereof that come within the scope of my improvement as herein shown and described, and illustrated upon the drawings appended hereto.

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

1. A grinding-machine comprising a stationary disk and means for supporting the same, a longitudinally-adjustable oscillating rocker-arm and a support therefor, a driven shaft having a disk secured upon one end

thereof and means for revolving the said shaft upon the opposite end, a cam operated upon said driven shaft and a roller for contacting with said cam and for varying the revolution of said movable disk at every point relative to the stationary disk.

2. A machine provided with a shaft and driving-gear thereon, a rocker frame or arm on said shaft, a driving-shaft in said rocker-frame carrying a gear meshing with the first-mentioned gear, a disk carried by the driven shaft, a stationary disk, said parts being so constructed that the rotary disk can be swung into inoperative position without disengaging the parts.

3. A machine provided with a frame having a casing and bearings, a shaft journaled in said bearings, driving devices carried upon said shaft, a driven shaft mounted in said frame and having devices in engagement with the first-mentioned devices, a stationary disk mounted in said casing, a rotary disk carried by said driven shaft, a counter-shaft, gears connecting the counter and driven shafts, a sleeve, the driven shaft geared to the counter-shaft, an eccentric on said sleeve and a roller in engagement with said eccentric.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALBERT C. CALKINS.

Witnesses:
ANNA MORGAN,
G. H. WOODCOCK.