(No Model.)

3 Sheets—Sheet 1.

J. W. VAUGHAN.

GRINDING MILL.

No. 515,181. Patented Feb. 20, 1894.

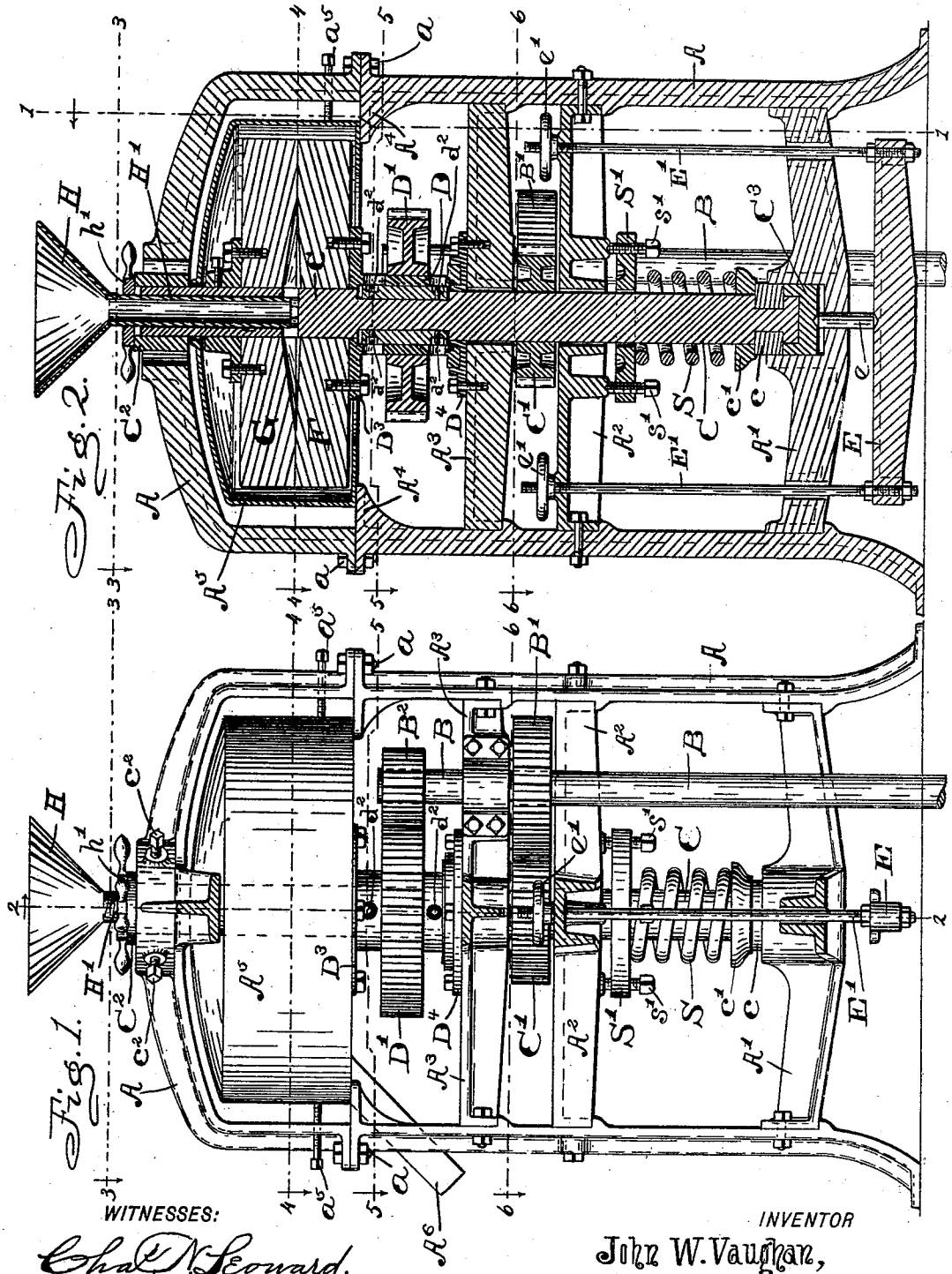

Fig. 2.

Fig. 1.

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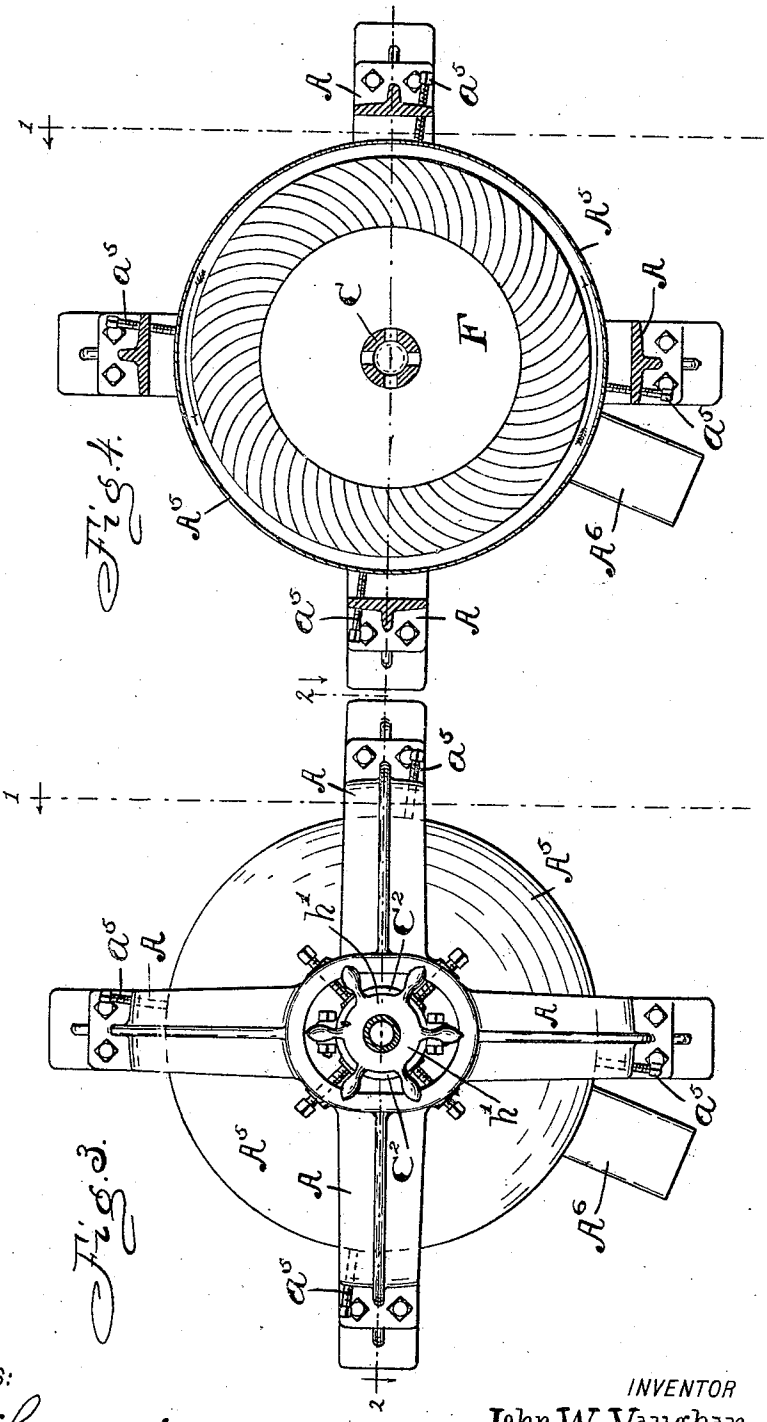

Fig. 4.

Fig. 3.

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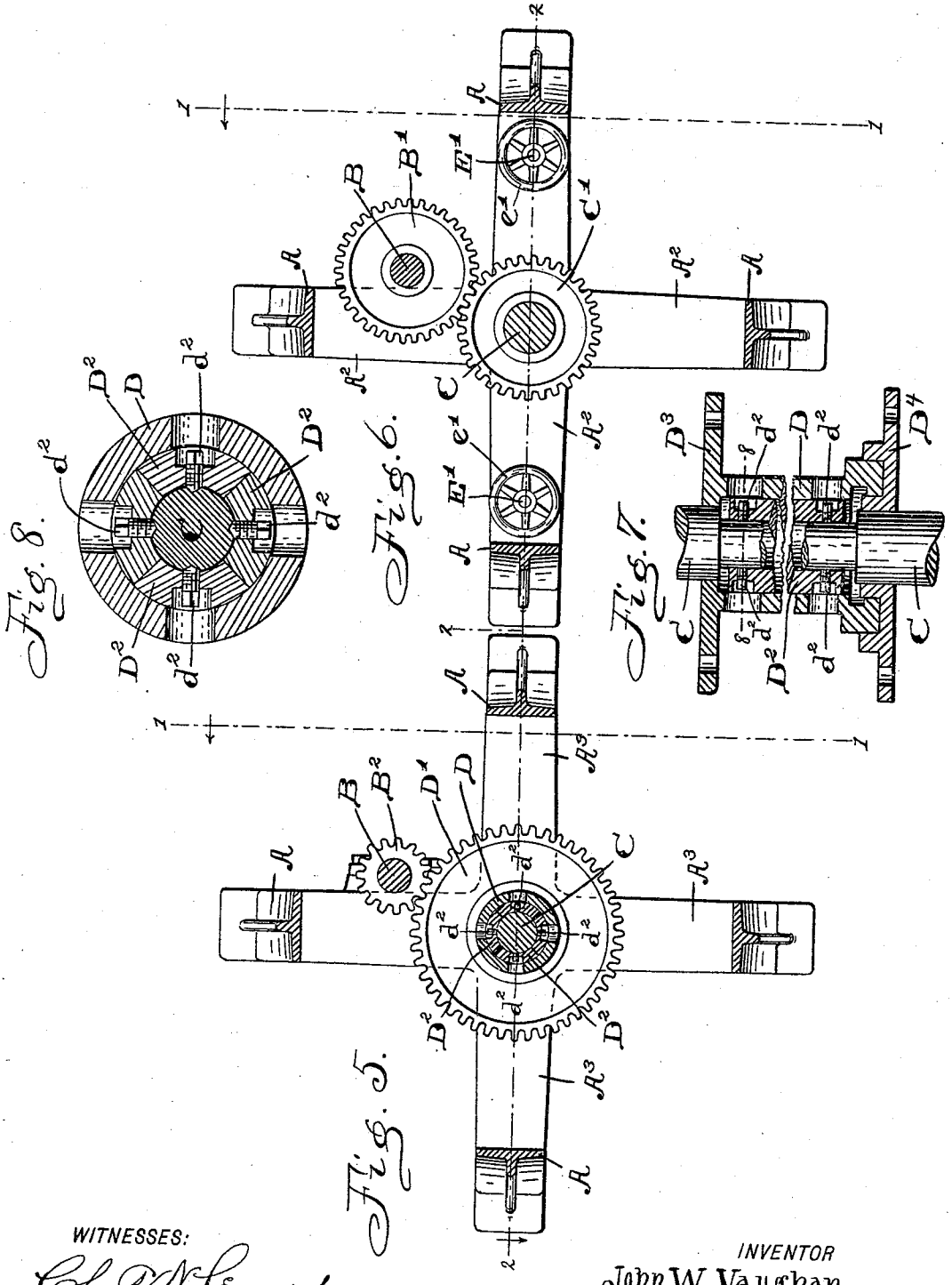

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

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UNITED STATES PATENT OFFICE.

JOHN W. VAUGHAN, OF TAYLORSVILLE, INDIANA.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 515,181, dated February 20, 1894.

Application filed May 23, 1893. Serial No. 475,254. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. VAUGHAN, a citizen of the United States, residing at Taylorsville, in the county of Bartholomew and State of Indiana, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification.

The object of my said invention is to produce a grinding mill in which disks shall to a large extent take the place of rolls, or in other words, to secure many of the advantages of a roller mill in a mill of substantially the general form of the old fashioned burr mill.

A grinding mill embodying said invention will first be fully described, and the novel features thereof then pointed out in the claims.

Referring to the accompanying drawings, which are made a part hereof, and on which similar letters of reference indicate similar parts, Figure 1 is a side elevation, with a portion of the frame-work cut away, of a mill embodying my said invention, as seen from the dotted line 1 1; Fig. 2 a central vertical sectional view on the dotted line 2 2; Fig. 3 a top or plan view, except the hopper, as seen from the dotted line 3 3; Figs. 4, 5 and 6 horizontal sectional views on the dotted lines 4 4, 5 5 and 6 6, respectively, and Figs. 7 and 8 detail views, on an enlarged scale, similar to portions of Figs. 2 and 5.

In said drawings the portions marked A represent the frame-work of the mill; B the driving shaft; C the central disk shaft by which the upper disk is driven; D a sleeve thereon by which the lower disk is driven; E an adjustable yoke carrying the shaft C; F and G the grinding disks, and H the hopper.

The frame-work A is preferably of a skeleton form, and is constructed as shown, with the cross bars or bridge trees A′ A^2 and A^3 for supporting the mechanism, and wings or brackets A^4 for supporting the case which contains the grinding disks. The said case, A^5, is mounted on said brackets A^4, and its position concentrically to the grinding disks is adjusted and determined by means of set screws a^5. As shown in the drawings, most plainly in Fig. 4, a discharging spout A^6 leads out from one side of said case, through which the treated material may escape. The upper portion of the frame A is preferably separable from the lower, in order to permit the case A^5 and grinding disks to be conveniently inserted, and is secured to the lower portion by bolts *a*. The general construction of this frame is best shown in Fig. 2.

The driving shaft B extends up from any convenient motor, (not shown,) and is adapted to drive the grinding disks. These should be driven in the same direction, but at different speeds, and therefore the spur gears B′ and B^2 on said shaft and the corresponding gears C′ and D′ on the shaft C and sleeve D are of different sizes, as shown in Figs. 1, 5 and 6. The shaft C is mounted at the lower end in a bearing in the bridge tree A′, and at the upper end in an adjustable bearing C^2 secured in the upper end of the frame A. Set screws c^2 form a desirable means of adjustment. The downward thrust of this shaft is received through a step C^3 and stud *e*, as will be presently described. Just above its extreme lower end a groove is formed therein, into which a collar *c* is inserted, and upon this collar, either with or without the interposition of a washer *c*′, bears a spring S which holds said shaft down onto its step, except when forcibly raised during the process of grinding, as when anything too hard to be ground comes between the grinding disks, thus forcing the disk G upwardly, which, being fixedly secured to said shaft C, pulls said shaft with it, compressing said spring. A plate S′ surrounding the shaft forms the upper bearing for the spring S, and the set screws *s*′ engaging with the cross-bar A^2 serve to adjust said plate and regulate the tension of the spring.

The sleeve D is firmly secured to the disk F, and drives the same, it being driven by the gear wheel D′, which is firmly secured thereto. This sleeve surrounds the shaft C, which is recessed or cut down at this point to receive it, and also an interior boxing D^2, which, as shown in Fig. 8, is made in sections, and inclosed within the sleeve, between it and the shaft. These sections may be adjusted by means of set screws d^2, which bear against and rest in notches in the sides of the shaft C. By this means the bearing may be a closed one at all times, and wear may be compensated for. It is also a means whereby the relative position of the sleeve D and shaft C

may be determined within the limits of a small but sufficient adjustment. The sleeve D terminates at the upper end in a flange plate D^3, which is bolted fast to the under side of the lower grinding disk F, and is thus rendered practically integral therewith. A flange plate D^4 is secured to the bridge tree A^3, and contains an annular groove in its upper surface into which the lower end of the sleeve D will enter, and thus said sleeve is given a firm support. The lower end of the sleeve may be thickened somewhat where it enters this groove, giving greater bearing surface, as shown most plainly in Fig. 7.

The yoke E is carried by rods E′ upon the upper ends of which are hand wheels e', and thus said yoke may be adjusted up and down, and the vertical position of the shaft C determined. Two of these rods and hand wheels are shown, and an adjustment is thus provided for at both ends of the yoke; but manifestly an adjustment at one end only would be sufficient. By means of this adjustable yoke the distance between the grinding disks is determined, and the coarseness or fineness of the product of the mill thus also determined.

The grinding disks F and G are in form much like the stone burrs of old-fashioned grinding mills. They both revolve, however, instead of one only, as in such old fashioned mills, and thus greater uniformity of relation can be secured, as each is subjected to substantially equal wear, while there is a greater centrifugal force upon the material to be ground, which is of considerable advantage.

The hopper H has a long spout or feed tube H′ which extends down into a central perforation in the upper end of the central shaft C to a point substantially opposite the grinding space between the two grinding disks. At the bottom of the perforation in the shaft C are radial orifices in said shaft leading out into said space through which the material to be ground may escape. The feeding tube H′ passes down within this perforation to partially across these radial orifices, and by adjusting the same vertically, the openings through which the material may escape to between the grinding disks is varied. I have shown this feeding tube as screw threaded upon the outside with an annular interiorly screw threaded ring h' surrounding it and resting upon the bearing C^2. Manifestly, by revolving said ring, the hopper and its feed tube may be elevated or depressed as may be desired, and a screw thread adjustment like this is capable of very fine manipulation, so that the feed may be very accurately determined.

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

1. The combination, in a grinding mill, of the two grinding disks, a central shaft carrying the upper grinding disk and passing through the lower grinding disk, a sleeve surrounding said shaft and attached to said lower grinding disk, a space between said sleeve and said shaft, and an adjustable boxing placed within said space, whereby the relation of the sleeve and shaft to each other can be regulated, and wear compensated for, substantially as set forth.

2. The combination, in a grinding mill, of the grinding disks, a central shaft carrying the upper grinding disk, a sleeve surrounding said shaft and carrying the lower grinding disk, a space between said sleeve and said shaft, and a boxing composed of sections D^2 interposed in said space and provided with set screws d^2 whereby they may be adjusted, substantially as shown and described.

3. The combination, in a grinding mill, of the two grinding disks, a central shaft mounted upon a step and passing through the lower grinding disk and secured to and supporting the upper grinding disk, the plate D^4 secured to the frame-work, a sleeve surrounding said central shaft and secured to and supporting the lower grinding disk and resting upon and carried by said plate, said plate being provided with an annular ring which surrounds and retains in position said sleeve substantially as shown and described.

4. The combination in a grinding mill, of the grinding disks, the driving mechanism, the frame-work, a casing surrounding the grinding disks and supported by the frame-work and adjustable thereon by means of set screws a^5, substantially as shown and described.

5. The combination of two grinding disks, the central shaft passing through the lower and supporting the upper disk, an adjustable step carrying said shaft, a sleeve surrounding said shaft and secured to the lower disk, gearing connecting said sleeve and said shaft whereby one is driven from the other, a collar c' secured to said shaft, an adjustable plate S′ surrounding said shaft and bearing against a portion of the frame, a spring S interposed between said collar and said plate, said shaft being also provided with a longitudinal perforation at its upper end with radial orifices leading out between the grinding disks, a hopper having a tube leading down into said perforation, and an appropriate casing surrounding said grinding disks, the whole forming a grinding mill, and arranged and operating substantially as set forth.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 20th day of May, A. D., 1893.

JOHN W. VAUGHAN. [L. S.]

Witnesses:

CHESTER BRADFORD,

JAMES A. WALSH.