Sept. 29, 1953 O. VICCI 2,653,770

CONICAL GRINDING MILL

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Fig. 1

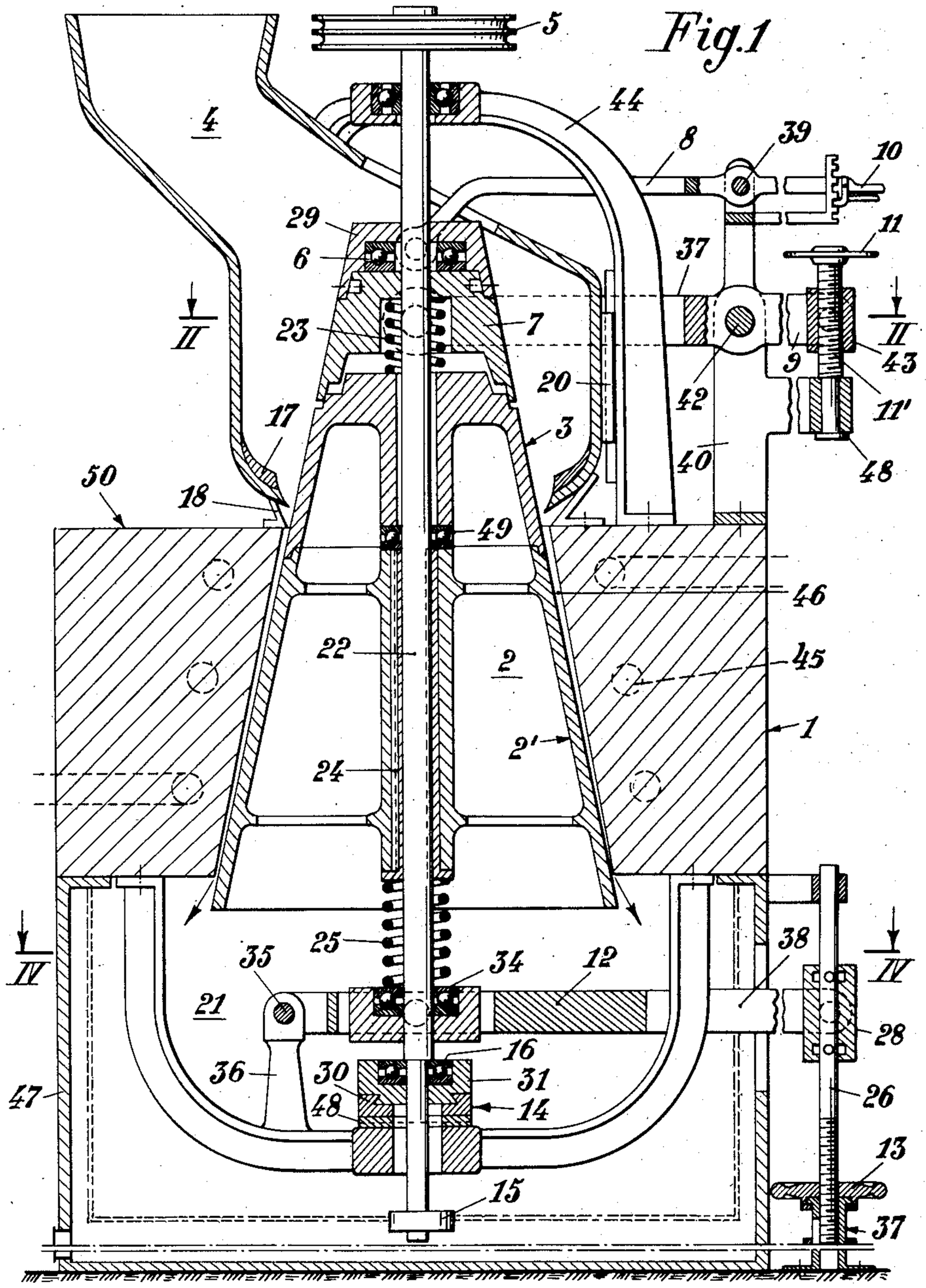

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Fig. 2

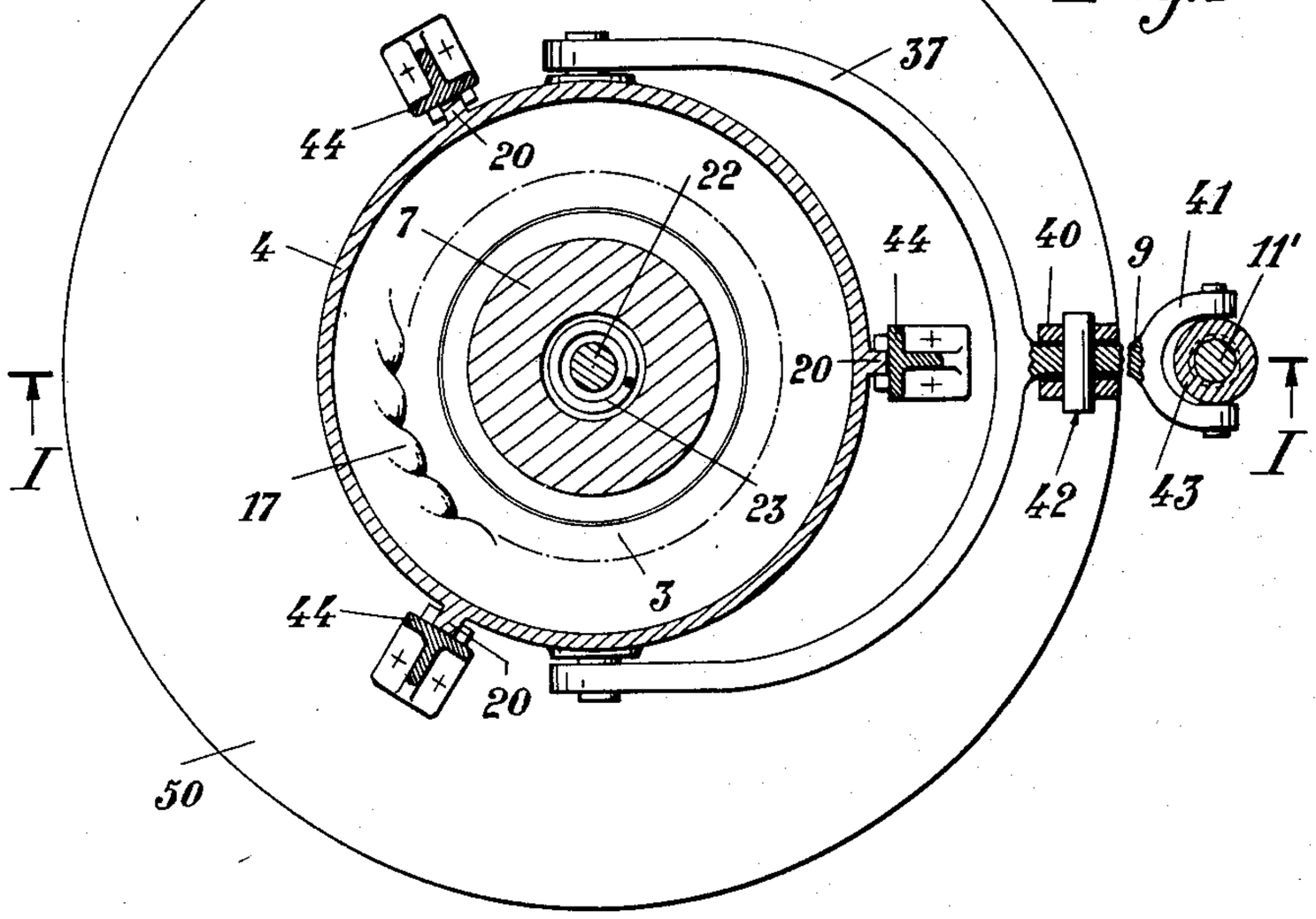

Fig. 3

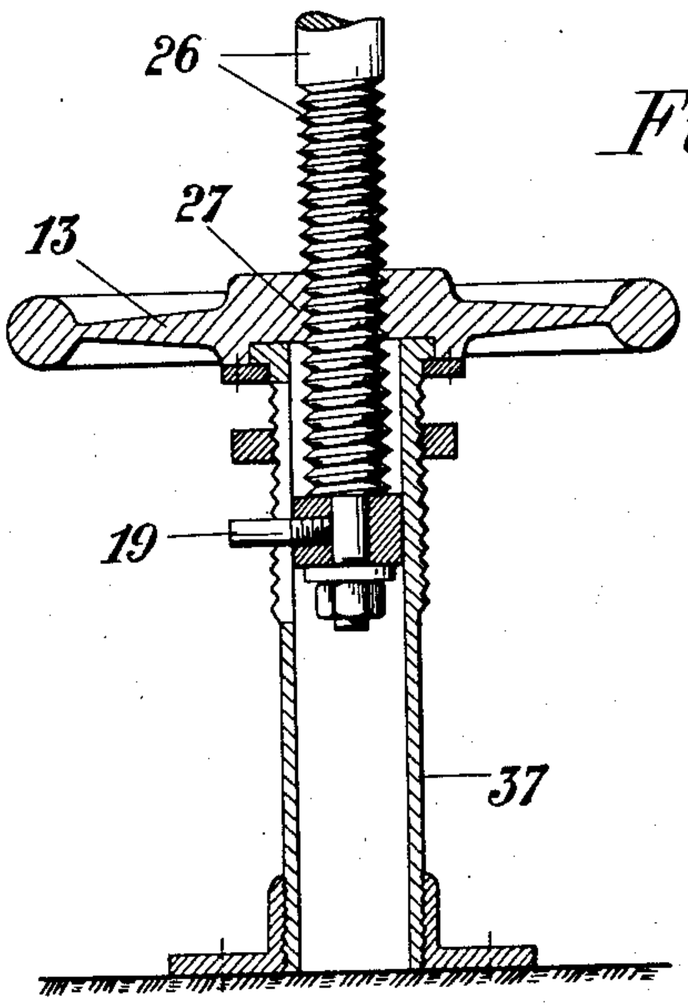

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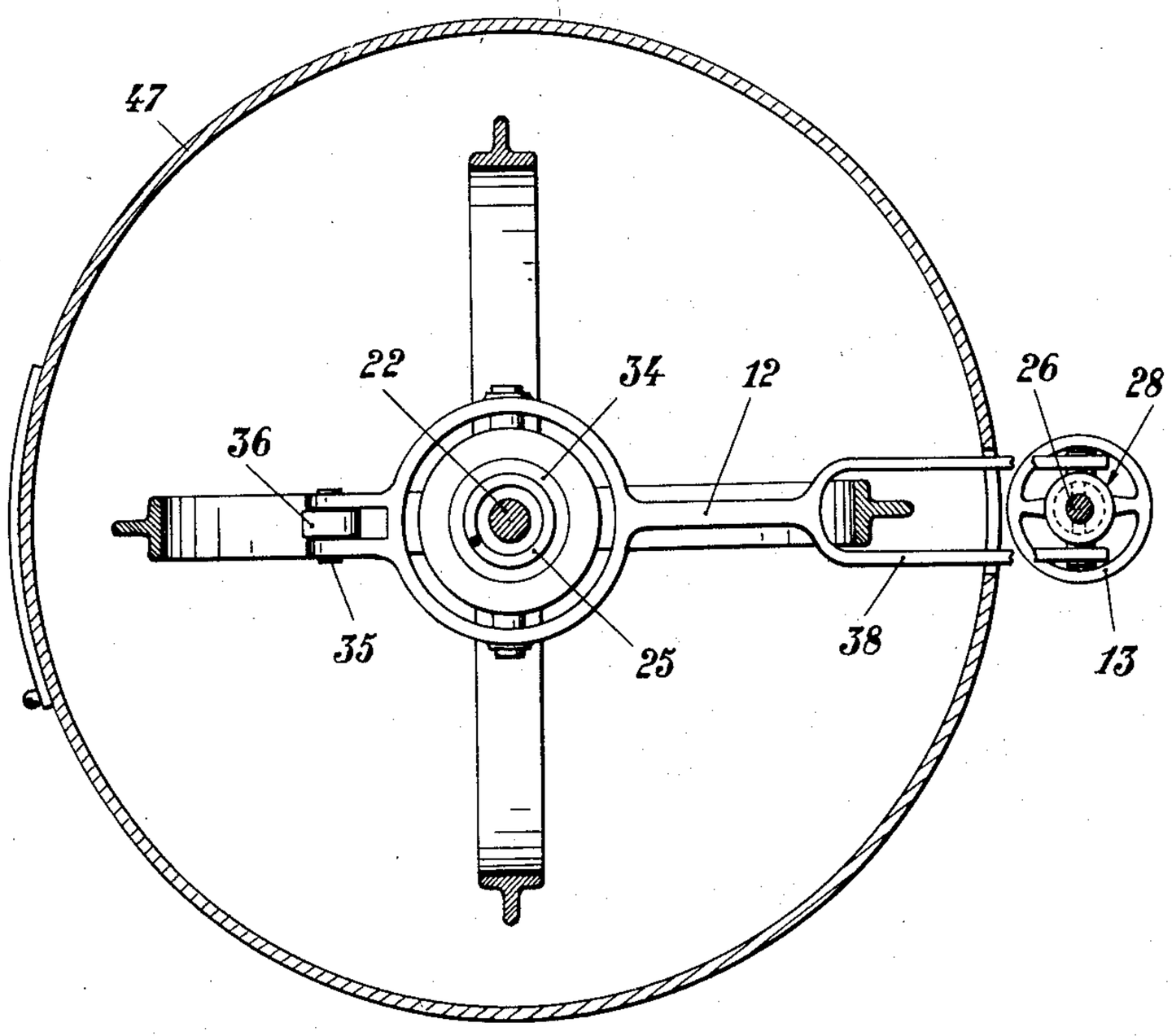
Fig. 4



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CONICAL GRINDING MILL

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In Italy February 26, 1949

5 Claims. (Cl. 241—162)

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The present invention relates to feed and grain grinders and the object of the invention is to provide improvements in the construction of the grinder for grinding all kind of grain feed through a gradual reduction of the material to be ground.

Another object of the invention is to obtain the grinding of the material by means of two different members and to have the material gradually feed from the first grinding member to the second one.

These and other objects are attained by means of the construction illustrated in the accompanying drawings, in which:

Figure 1 is a vertical section of the grinder along line I—I of Figure 2;

Figure 2 is a section along line II—II of Figure 1;

Figure 3 illustrates a detail, in vertical cross section, of the device for the vertical displacement of the movable grinding cone, and

Figure 4 is a section along IV—IV of Figure 1.

A stationary grinding cone 1 is supported by a frame 47. A movable grinding cone 2, formed of two portions whereof the upper one 3 is supported by the lower one 2' through a bearing 49 is rotatably mounted in the cone 1. The portion 3 may rotate together with the lower portion 2' or may remain stationary during rotation of the latter. The upper portion 3 of the movable grinding cone is surrounded by a hopper 4 movable in vertical direction, the lower edge of which is provided with a circular jaw 17, which, in cooperation with the periphery of the portion 3, is intended to effect the first breakage of the material to be ground. The hopper 4 rests on supports 18 mounted on the flange 50 of the stationary cone 1.

The movable grinding cone 2 is axially bored for the passage of the shaft 22, whereon the lower portion 2' of the movable grinding cone is keyed through the sleeve 24, while the upper portion 3 is mounted idle on the shaft 22. On the latter, above the portion 3, the friction clutch 7 is keyed, said clutch is provided with a head 29 which follows the clutch in the vertical motion thereof, but remains stationary when the clutch 7 rotates. Between the clutch 7 and the head 29 a thrust bearing 6 is interposed. Between the clutch 7 and the upper portion 3 a spring 23 is interposed which facilitates the disengagement of these two pieces when the clutch 7 is lifted.

The upper end of the shaft 22 is provided with pulleys 5 which are driven by a motor, not shown.

In the lower part, the shaft is supported by a device which allows the exact centering of the

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shaft. This device comprises a slipper 14 provided on the upper face with a dove-tailed groove 30, wherein is slidably mounted the piece 31. The slipper 14 fits, at its lower part, in a dove-tailed groove in the piece 48. In piece 31 the thrust bearing 16 is arranged and wherein the shaft 22 is journaled.

The lower end of the shaft is provided with a cam 15 for controlling the motion of sieves for the bolting of the ground product which falls in the chamber 21 as shown in dotted lines in Fig. 1.

The movable grinding cone 2' may be lifted through lever 12, so as to vary the dimensions of the space 46 between the stationary cone 1 and the movable cone 2'. Between the cone 2' and the lever 12 the spring 25 is interposed, which bears at one side on the sleeve 24 and at the other side on the thrust bearing 34.

Lever 12 is hinged at 35 to the support 36 and, at the free end has a fork 38 (Figure 4) whereon is hinged a sleeve 28 mounted on shaft 26; the latter in its lower portion is threaded and enters the hand-wheel 13 which is provided with an internal thread 27. By rotating the hand-wheel 13, the shaft 26 is lifted or lowered, carrying therewith the sleeve 28, whereby the lever 12 is moved. An abutment 19 prevents the outer surface of the movable cone 2' from touching the inner surface of the stationary cone 1.

The clutch 7 is controlled by means of a hand-operated lever hinged at 39 on the support 40, and which may be locked by a pawl 10.

When the clutch 7 is lifted and the shaft 22 is caused to rotate, then also the clutch and the lower portion 2' of the movable cone rotate, while the head 29 of the clutch and the upper portion 3 of the movable grinding cone remain still. By lowering the clutch 7, so as to engage the portion 3, then the latter is also caused to rotate.

The vertical displacement of the hopper 4 is effected by means of a lever 9, which ends at one side in a fork 37, which encircles the hopper and at the other side with a fork 41 (Figure 2) whereon the sleeve 43 is hinged and in which the stem 11' of hand-wheel 11 screws. Lever 9 is hinged at 42 on the support 40. By rotating the hand-wheel 11, the stem 11' of which is fixed in its lower part to the bracket 48, the lever 9 is caused to move around the pivot 42 whereby the hopper is lifted.

The hopper is provided with projections 20 (Figure 2) which fit in grooves in the upper frame 44, and prevent the hopper from rotating and serve as a guide therefor during its vertical displacement.

The operation of the grinding mill is carried out in the following way. The hopper 4 is lowered on the supports 18 so that the jaws 17 face the periphery of the upper portion 3 of the movable cone and into the hopper the material to be ground is introduced. After engaging the friction clutch 7 with the portion 3, the shaft 22 is rotated. Thus, a first coarse breakage of the material contained in the hopper 4 is obtained. Then the clutch 7 is disengaged and the hopper 4 lifted, so as to allow a portion of the material contained therein to fall into the space 46 between the stationary cone 1 and the movable cone 2', where the succeeding grinding takes place which may be carried out to a desired degree through the vertical displacement of the movable grinding cone 2' with respect to the stationary cone 1'.

The stationary cone 1 may be cooled by circulating water or other cooling liquid for cooling the space wherein the grinding takes place as shown in dotted lines at 45 in Fig. 1.

The inner surface of the stationary cone and the periphery of the movable cone 2' may be made smooth or grooved according to the particular use for which the grinding mill is intended.

I claim:

1. A conical mill for grinding grains and feed comprising in combination a frame, a stationary grinding cone supported on said frame, a shaft rotatably journaled in said frame and centered with respect to said stationary cone, a grinding cone movable in a vertical direction and formed of two portions, the lower of said portions being keyed on said shaft and rotatably mounted in said stationary grinding cone, the upper portion of said grinding cone projecting out of said stationary grinding cone and being mounted idle on said shaft, said upper portion being adapted to rotate together with said lower portion or to remain stationary during the rotation thereof, a hopper movable in vertical direction surrounding said upper portion of said movable grinding cone, jaws on the lower edge of said hopper to effect, in cooperation with said upper portion, a first breakage of the material to be ground, a friction clutch keyed on said shaft, a head on said friction clutch which follows the vertical motion of the clutch and remains stationary during rotation thereof, said clutch being adapted to rotate said upper portion together with the lower portion of the movable cone when engaged with the former, means for lifting the movable grinding cone in respect to the stationary grinding cone to vary the dimensions of the space between said movable and said stationary

grinding cone and means for lifting said hopper in respect to the upper portion of the movable cone for permitting material contained in the hopper to fall into the said space between the said lower part of the movable grinding cone and the said stationary grinding cone.

2. A conical mill as claimed in claim 1, and wherein said shaft is journaled in a thrust bearing supported by a device adapted to center the shaft within said stationary cone.

3. A conical mill as claimed in claim 1, and wherein the lifting means for the movable grinding cone comprises a lever hinged at one end and being fork-shaped at the other end and supporting at the fork-shaped end a sleeve, a vertical shaft, said sleeve being connected to said vertical shaft, the lower part of said shaft being threaded, a hand operated wheel in which the said threaded part of the shaft is inserted and adapted to lift or lower the said shaft when said hand operated wheel is rotated, whereby said lever is moved for lifting or lowering the movable cone.

4. A conical mill as claimed in claim 1, and wherein the friction clutch is provided with a lever adapted to displace in vertical direction the said clutch and a spring interposed between said clutch and upper part of the movable cone to facilitate disengagement of the said clutch when it is lifted.

5. A conical mill as claimed in claim 1, and wherein the means for lifting the hopper comprise a lever fork-shaped at the two ends, one end encircling said hopper, a rotatable threaded shaft, a centrally bored spring mounted on said shaft and hingedly connected to the other end of said fork-shaped lever, said sleeve being displaced in vertical direction when said threaded shaft is rotated.

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