

No. 692,414.

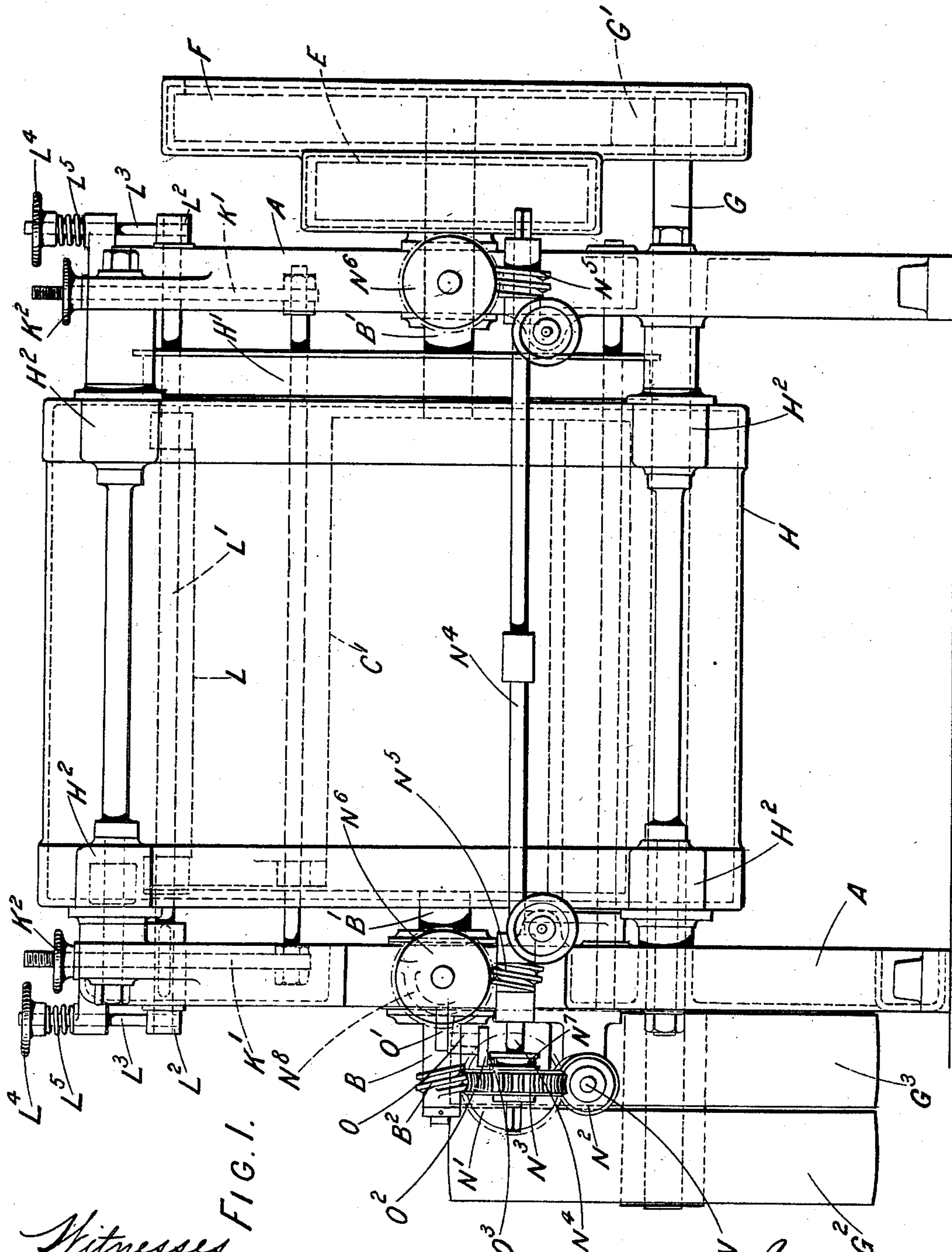
Patented Feb. 4, 1902.

G. S. BAKER.  
GRINDING APPARATUS.

(Application filed Oct. 13, 1900.)

(No Model.)

5 Sheets—Sheet 1.



Witnesses  
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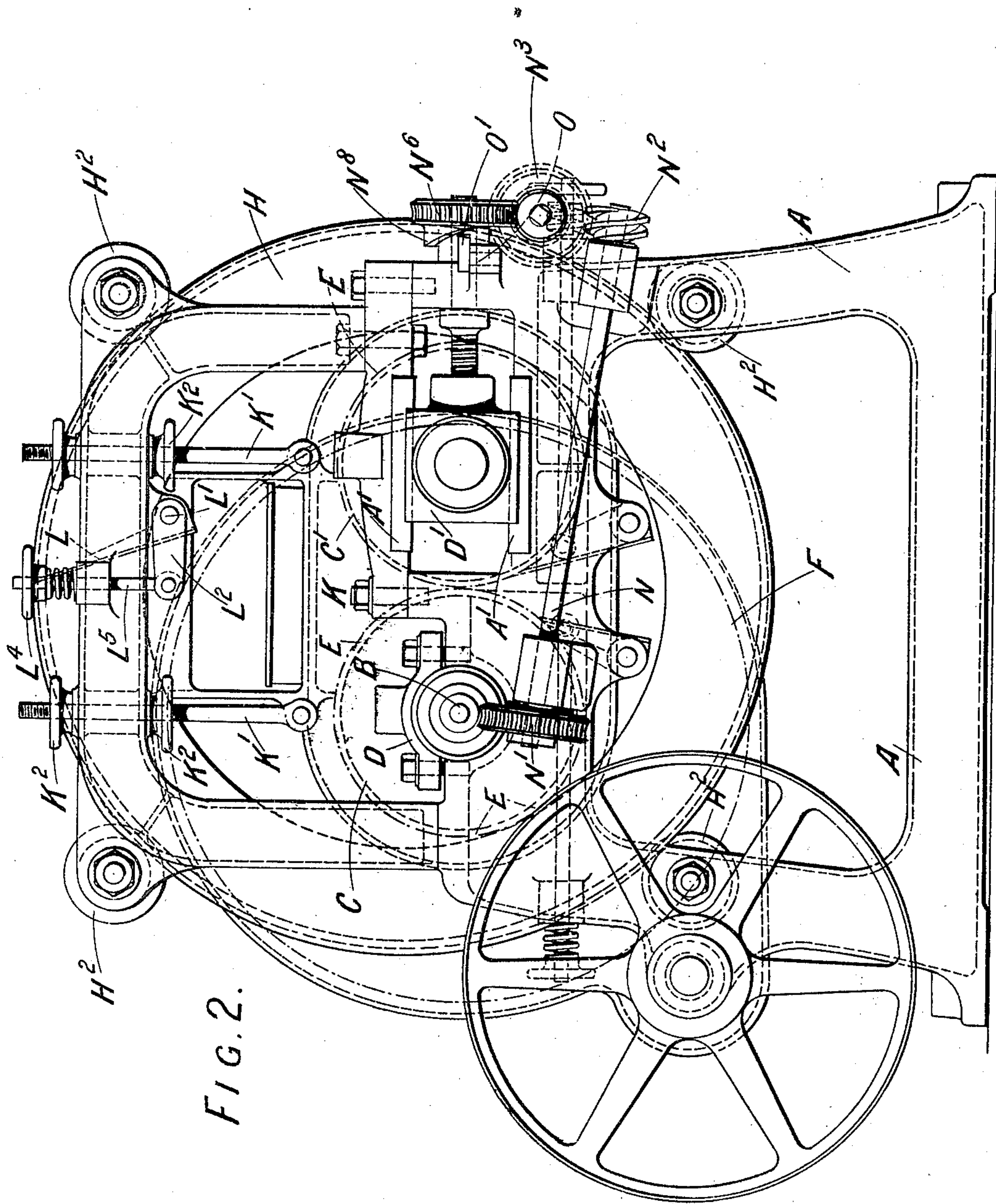


FIG. 2.

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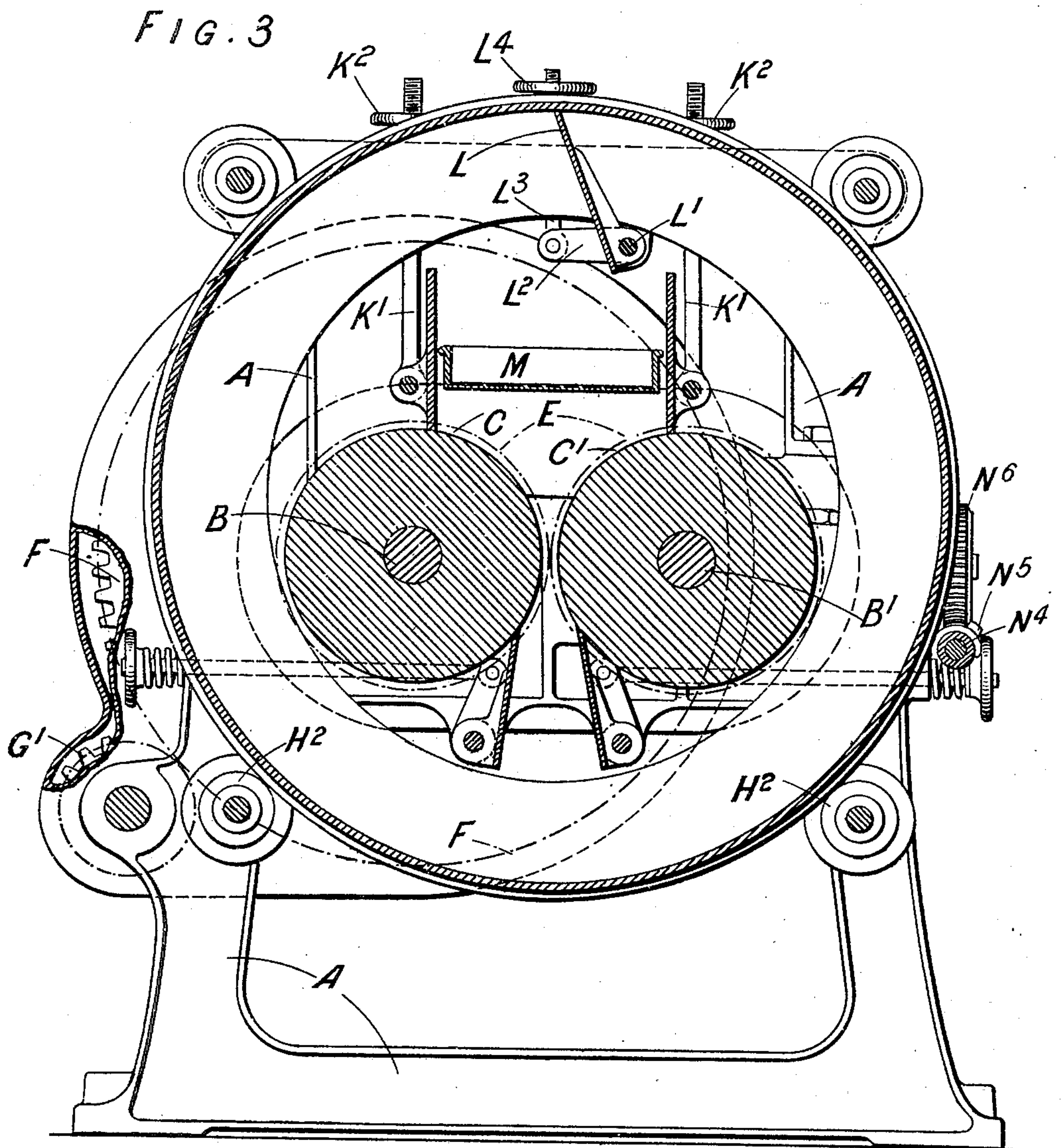
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5 Sheets—Sheet 3.



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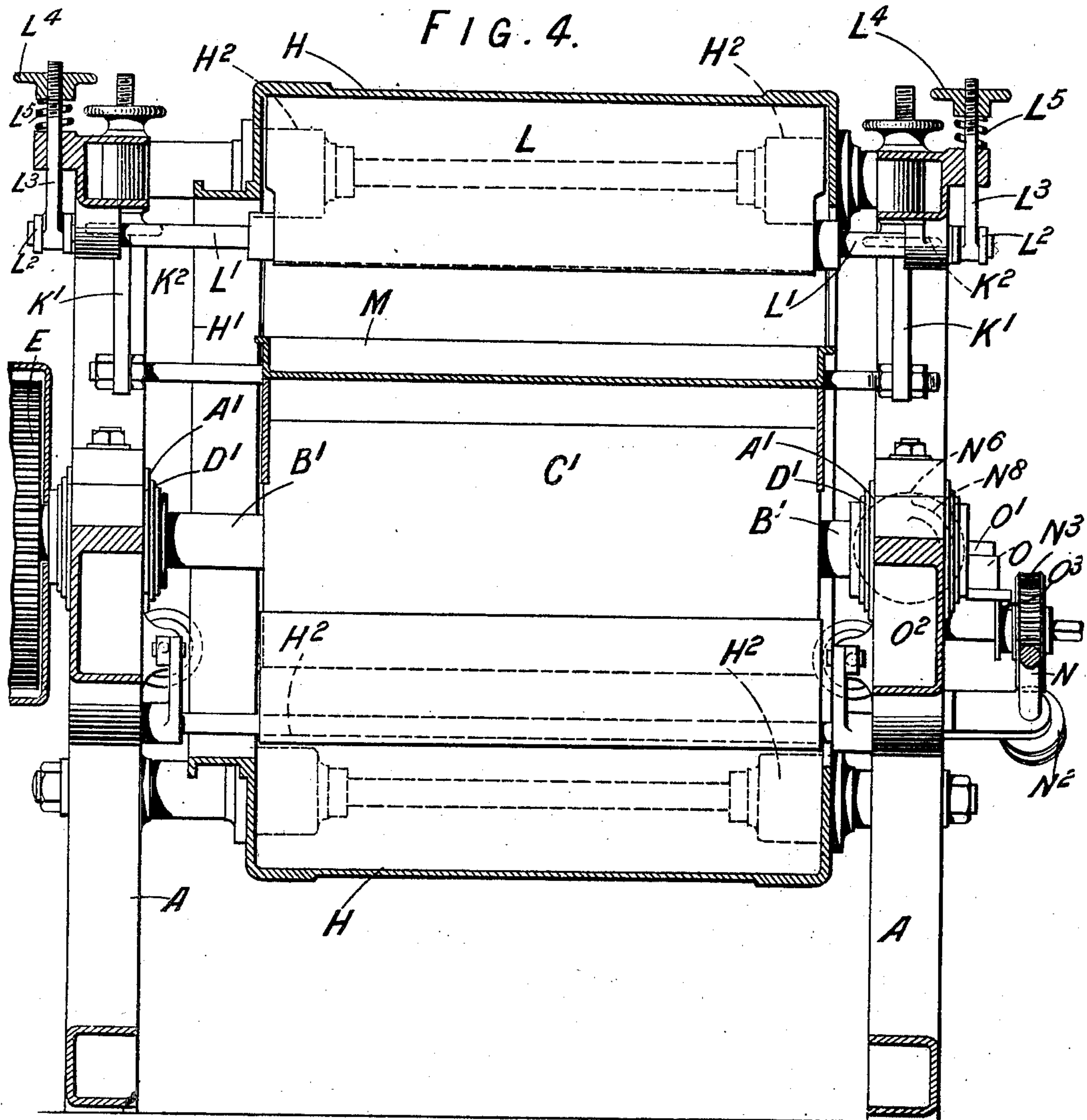
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(No Model.)

5 Sheets—Sheet 4.



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Patented Feb. 4, 1902.

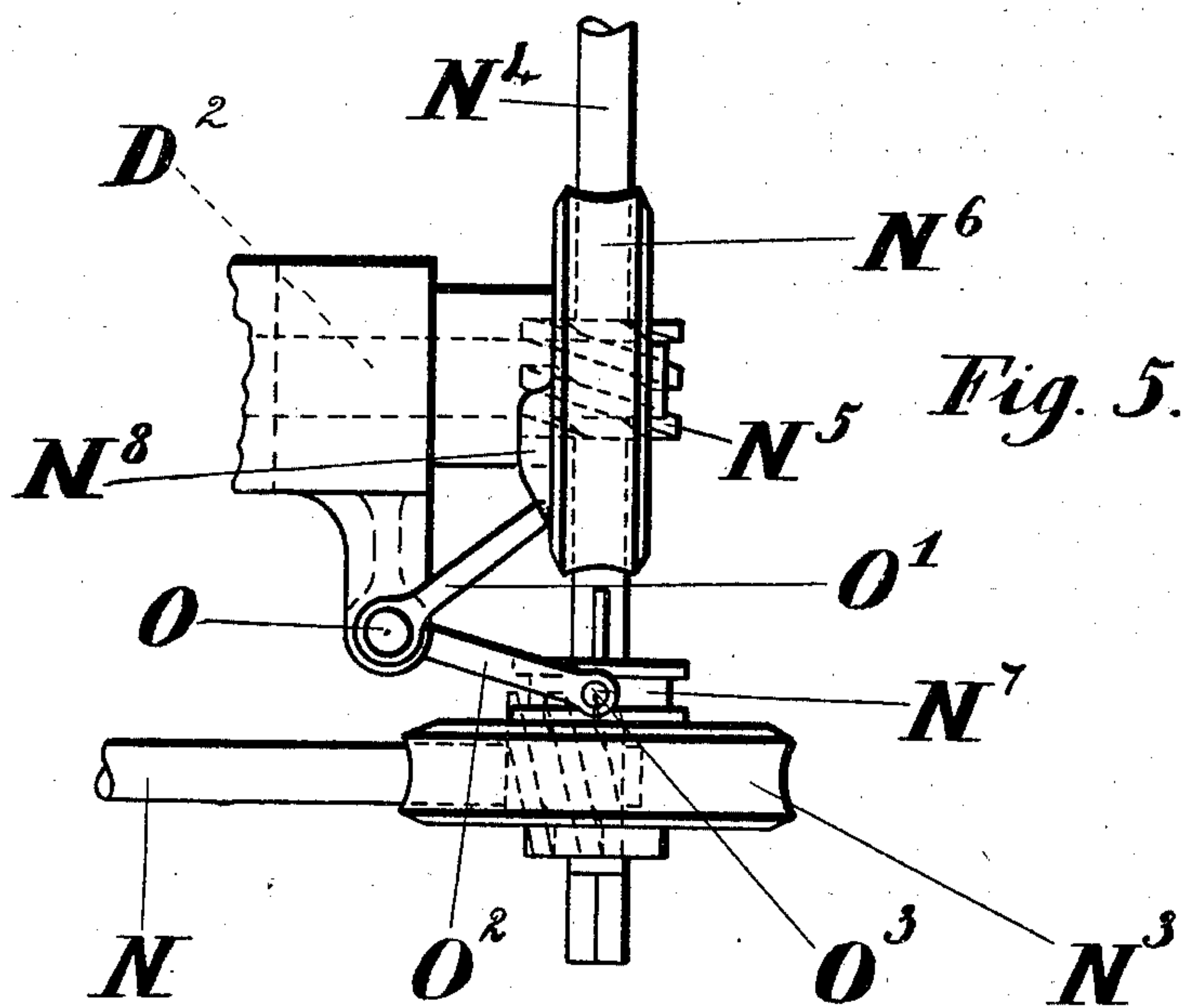
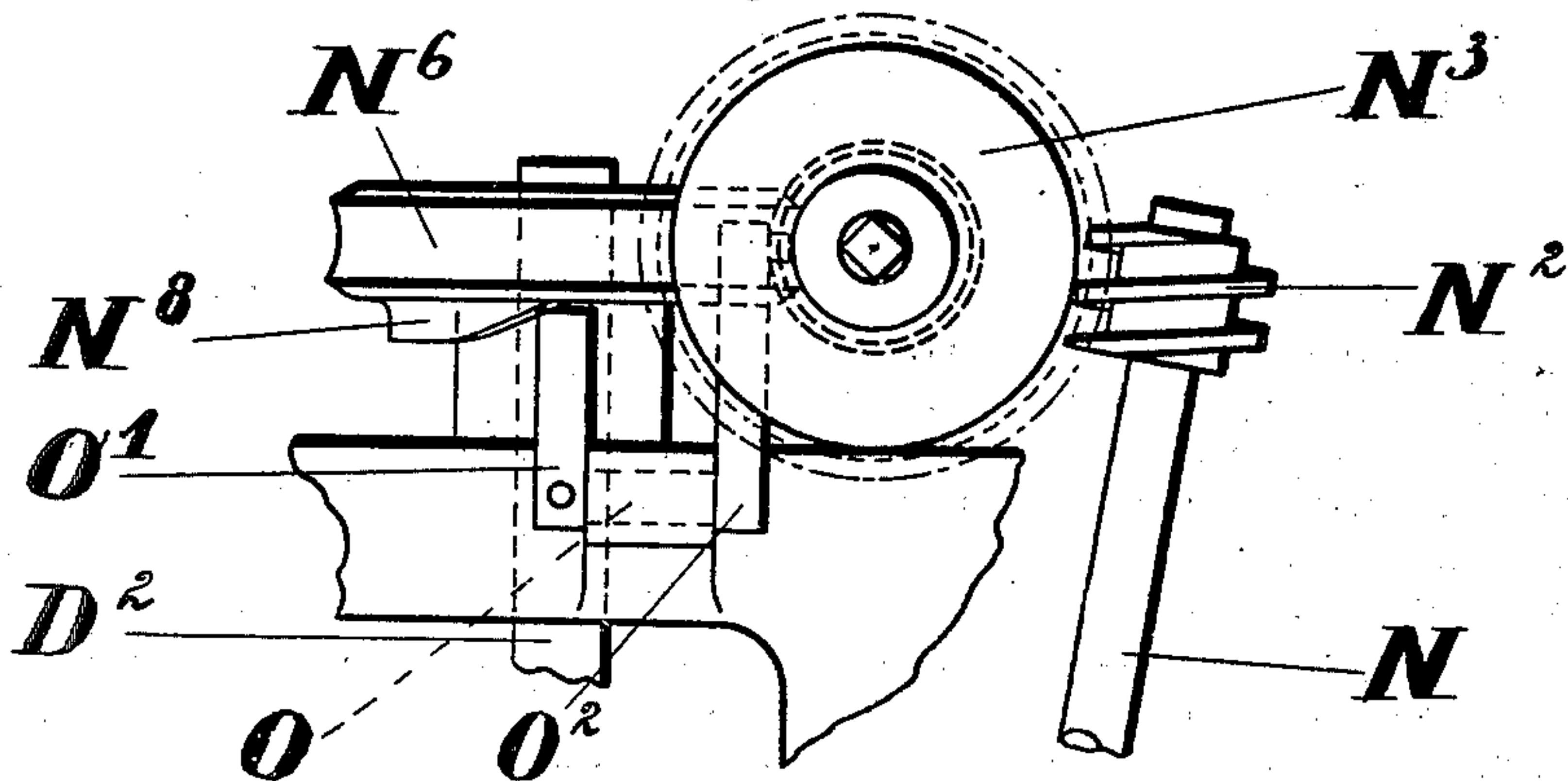
G. S. BAKER.  
GRINDING APPARATUS.

(Application filed Oct. 18, 1900.)

(No Model.)

5 Sheets—Sheet 5.

Fig. 6.



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Inventor:

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# UNITED STATES PATENT OFFICE.

GEORGE SAMUEL BAKER, OF LONDON, ENGLAND.

## GRINDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 692,414, dated February 4, 1902.

Application filed October 13, 1900. Serial No. 32,986. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE SAMUEL BAKER, a subject of the Queen of England, residing at London, England, have invented certain new and useful Improvements in or Relating to Grinding Apparatus, (for which applications have been made in Great Britain, No. 4,857, dated March 14, 1900; in Germany, Serial No. 26,646<sup>III</sup>/50, filed March 26, 1900; in France, No. 298,647, dated March 27, 1900, and in Switzerland, filed March 27, 1900,) of which the following is a specification.

This invention relates to grinding apparatus in which a material—such, for instance, as chocolate—can be subjected to continuous grinding between granite or other rolls whose opposed surfaces run either at the same circumferential speed or at different speeds and are automatically caused to approach each other gradually as the material operated upon becomes finer in the course of treatment.

In machines according to this invention provision is made for a continual circulation of the material treated through the rolls and for the automatic stoppage of the movement of the rolls toward each other as soon as the space between the rolls has been diminished to a predetermined minimum or as soon as the operation of grinding has continued for a predetermined period.

A further feature of this invention is the provision of means whereby the material treated can be inserted or withdrawn while the machine is in motion.

In one construction of machine according to this invention side frames support a pair of horizontal shafts parallel to each other. Each shaft has fixed upon it a granite roll. One of the shafts rotates in stationary bearings, while the other turns in sliding bearings, which latter, while they keep the roll level, permit of its being moved horizontally toward or away from its companion. The shafts of the two rolls are geared together by a pair of similar spur-wheels, and that one of the two shafts which is in stationary bearings is rotated by a large spur-wheel, which in turn is driven by a pinion actuated by belt-gearing, which latter comprises fast and loose pulleys. A circular casing encircles the pair of rolls and is caused to rotate at a suitable

speed by belt or other gearing. This casing can conveniently be supported and retained in position by rollers turning on bearings on the side frames or on stay-rods extending across between them. Within the circular casing is a hopper symmetrically disposed with regard to the space between the two rollers into which the material to be pulverized is to be delivered. This hopper is supported by the side frames, and the supports are preferably adjustable. They may consist of suspension-rods screw-threaded and provided with adjusting and locking nuts. In a space left above the hopper there is an adjustable scraper carried on a shaft supported in the side frames and bearing against the interior of the casing, there being an arm on the shaft controlled by a screwed link, on which are a nut or hand-wheel and spring, the latter bearing on the main frame, so that the spring can keep the scraper pressed against the interior of the casing.

In the accompanying drawings, Figure 1 is an elevation, and Fig. 2 an end view, of one construction of machine according to this invention. Fig. 3 is a transverse section, and Fig. 4 a longitudinal section, of the machine illustrated in elevation in Figs. 1 and 2. Fig. 5 is a plan view, upon an enlarged scale, of the clutch mechanism with the operating-cam  $N^8$  and arms  $O^1 O^2$ . Fig. 6 is an end view of the parts seen in Fig. 5.

Like letters indicate like parts throughout the drawings.

Side frames A support a grinding device, preferably formed by a pair of horizontal shafts  $B B'$ , parallel to each other and carrying granite rolls  $C C'$ . The shaft B rotates in stationary bearings D, while the shaft  $B'$  turns in sliding bearings  $D'$ , which latter, while they keep the roll  $C'$  level, permit of its being moved horizontally toward or away from its companion. The bearings  $D'$  are preferably arranged on slides  $A'$  on the side frames A. The shafts  $B B'$  are geared together by a pair of similar spur-wheels E, and the shaft B is rotated by a large spur-wheel F, which in turn is driven by a pinion  $G^1$  on the driving-shaft G, which is actuated by belt-gearing comprising a fast and a loose pulley  $G^2$  and  $G^3$ . A circular casing H encircles the pair of rolls  $C C'$  and is caused to



rotate at a suitable speed by a belt on the pulley H'. This casing is supported and retained in position by rollers H<sup>2</sup>, turning in bearings on the side frames A or on stay-rods 5 extending across between them.

Within the circular casing H is a hopper K, symmetrically disposed with regard to the space between the two rollers C C', into which the material to be pulverized is to be delivered. The hopper K is supported by the side frames A, and the supports are preferably adjustable. They may consist of suspension-rods K', screw-threaded and provided with adjustable locking-nuts K<sup>2</sup>. In the space left 10 above the hopper K there is an adjustable scraper or baffle L, carried on a shaft L', supported in the side frames A, the scraper bearing against the interior of the casing H. There is an arm L<sup>2</sup> on the shaft L', controlled 20 by a screwed link L<sup>3</sup>, on which are a nut or hand-wheel L<sup>4</sup> and spring L<sup>5</sup>, the latter bearing on the main frame, so that the spring can keep the scraper L pressed against the interior of the casing H. Similar scrapers are 25 applied to the surfaces of the rolls C C'. These scrapers may be spring-controlled or weighted. The hopper K is made so as to be able to support a portable tray or receiver M for the purpose hereinafter referred to.

Material fed into the hopper K passes down between the opposed grinding-surfaces of the two rolls C C' and falls downward onto the bottom of the interior of the rotating casing, which carries it around centrifugally until it 35 is diverted by the scraper or baffle L above the hopper K into the hopper again, whence it descends through the rollers and again circulates as before, this circulation proceeding continuously until the grinding operation is 40 finished, upon which the portable tray M, above referred to, is placed in the hopper, so that the former instead of the hopper receives the finished contents, which may then be removed. Fresh material may be tipped into 45 the space above and between the two rolls. The withdrawal of a completely-ground charge and the insertion of a fresh charge for grinding may both be inserted without stopping the machine, which therefore can run 50 continuously during working hours.

The roll C', carried in the sliding bearings B', is caused to approach its companion C gradually by means of screws D<sup>2</sup>, which engage those bearings and are rotated by a train 55 of worm-gear or other slow-speed gear operated from the shaft B or from some other convenient moving part of the apparatus.

The preferred gear comprises a worm B<sup>2</sup> on the shaft B, turning a worm-wheel N' at one 60 end of a shaft N, the other end having a worm N<sup>2</sup> upon it gearing with a worm-wheel N<sup>3</sup> on a shaft N<sup>4</sup>, which also carries a worm N<sup>5</sup> at each end of the machine gearing with worm-wheels N<sup>6</sup>, which are mounted upon the screws 65 D<sup>2</sup>. The wheel N<sup>3</sup> is mounted loosely upon the shaft N<sup>4</sup>, a clutch N<sup>7</sup> being provided for gearing the two together. In order to auto-

matically stop the approach of the roll C' toward the roll C, means are provided for rendering the gear B<sup>2</sup> N N' N<sup>2</sup> N<sup>3</sup> N<sup>4</sup> N<sup>5</sup> N<sup>6</sup> D<sup>2</sup> in- 70 operative by throwing the wheel N<sup>3</sup> out of gear with the shaft N<sup>4</sup> by moving the clutch N<sup>7</sup> along the shaft N<sup>4</sup>. Such automatic means comprise a cam N<sup>8</sup> upon the wheel N<sup>6</sup> adjacent to the wheel N<sup>3</sup>, operating the clutch N<sup>7</sup>, 75 preferably through two arms O' O<sup>2</sup> on a pin O, which is rotatively mounted on the frame A. The cam N<sup>8</sup> causes the pin O to rotate by coming in contact with the arm O', and thus the arm O<sup>2</sup>, which is provided with a 80 roller or pin O<sup>3</sup>, engaging with a groove in the clutch N<sup>7</sup>, moves the latter along the shaft N<sup>4</sup>, and so disconnects the wheel N<sup>3</sup> and the shaft N<sup>4</sup>. The clutch N<sup>7</sup> might, however, be operated otherwise than by a member of the 85 gear-train above referred to. For example, it might be caused to operate by clockwork mechanism of any known construction, which at the expiry of the time for which it was set should move the clutch N<sup>7</sup> along the shaft by 90 moving the two arms O' O<sup>2</sup>. The construction of the clock mechanism forms no part of the present invention.

Conveniently a hand-gear is connected to the screw-shaft D<sup>2</sup> or is included in the train 95 at some point near to the screw controlling the sliding bearings D', so that after the bearings have been automatically fed toward the companion roll slowly they can be returned rapidly to expedite the commencement of the 100 succeeding grinding operation.

The cam N<sup>8</sup> is preferably adjustable in relation to the screw-shaft D<sup>2</sup>, so as to regulate the distance within which the roll C' approaches its companion C. This may be ef- 105 fected either by adjusting the cam N<sup>8</sup> on the wheel N<sup>6</sup> or by adjusting the latter on the screw-shaft D<sup>2</sup>.

The bearings for the movable roll need not be operated by screw-gear, for any other convenient form of slow-speed feeding mechanism could be substituted therefor. 110

If desired, a spring may be interposed between the screws D<sup>2</sup> and the bearings D', so that as the roll C' approaches its companion 115 roll C a certain amount of play will be allowed between them.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a grinding-machine the combination 120 with a rotary casing open at one end of co-acting grinding-rollers within but not borne by the casing, a driving-shaft operatively connected with both the rollers, a scraper within the casing above the rollers, movable bear- 125 ings supporting one of the rollers, an adjusting-screw for moving those bearings, an operative connection between the screw and the driving-shaft, a disconnecting-clutch constituting a part of that operative connection, a 130 clutch-operating mechanism and a cam adapted to actuate that mechanism and operatively connected with the adjusting-screw, substantially as set forth.



2. In a grinding-machine the combination  
with a rotary casing open at one end of co-  
acting grinding-rollers within but not borne  
by the casing, a driving-shaft operatively con-  
5 nected with both the rollers, a scraper within  
the casing above the rollers, movable bear-  
ings supporting one of the rollers, an adjust-  
ing-screw for moving those bearings, an op-  
erative connection between the screw and the  
10 driving-shaft, a disconnecting-clutch consti-

tuting a part of that operative connection,  
and a clutch-operating mechanism substan-  
tially as set forth.

In testimony whereof I have signed my  
name to this specification in the presence of 15  
two subscribing witnesses.

GEORGE SAMUEL BAKER.

Witnesses:

W. M. HARRIS,

GEO. J. B. FRANKLIN.