(No Model.) 2 Sheets—Sheet 1.

# F. HIORTH.

## WOOD GRINDER.

No. 555,094. Patented Feb. 25, 1896.

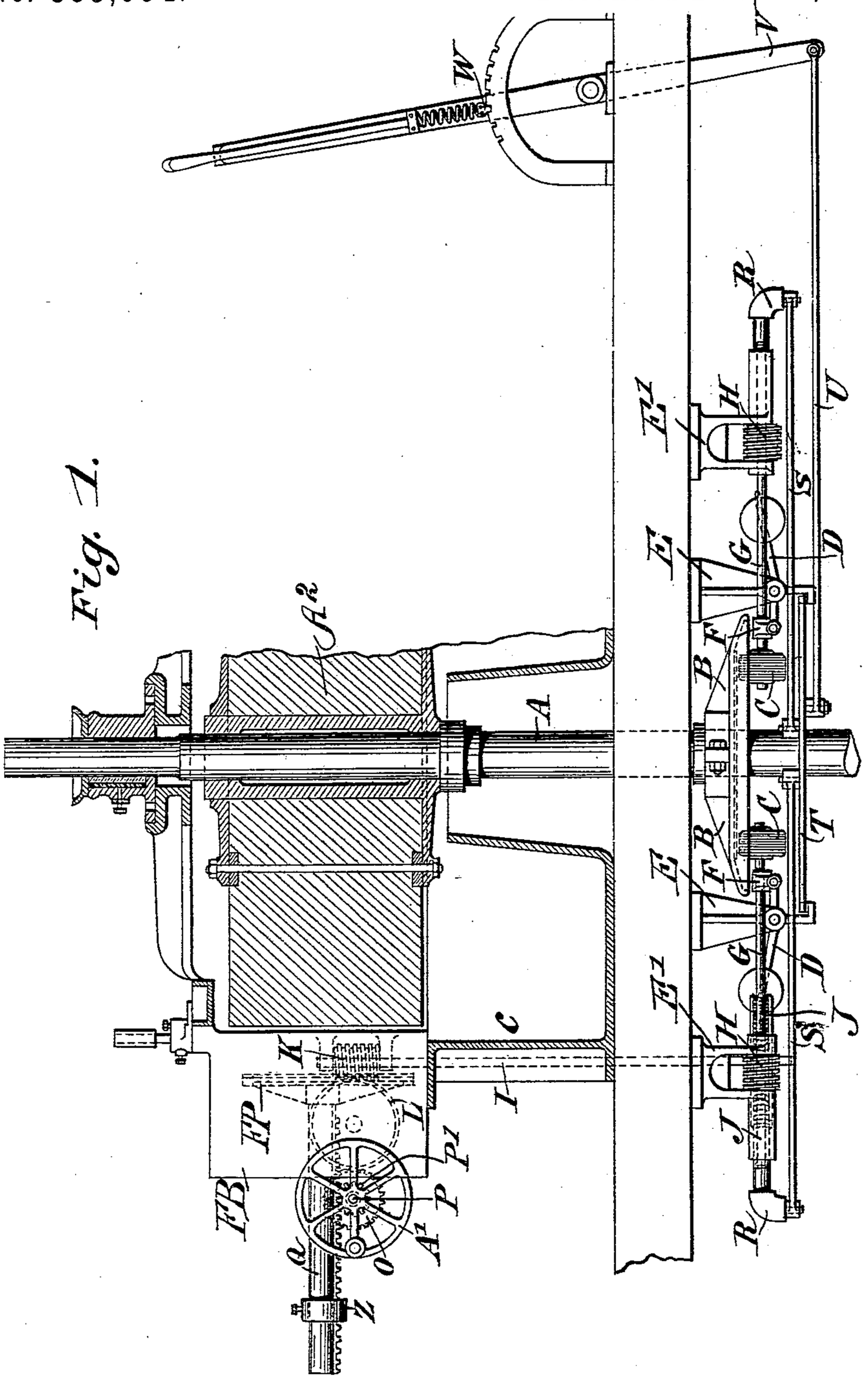


Fig. 1.

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Inventor
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(No Model.)

2 Sheets—Sheet 2.

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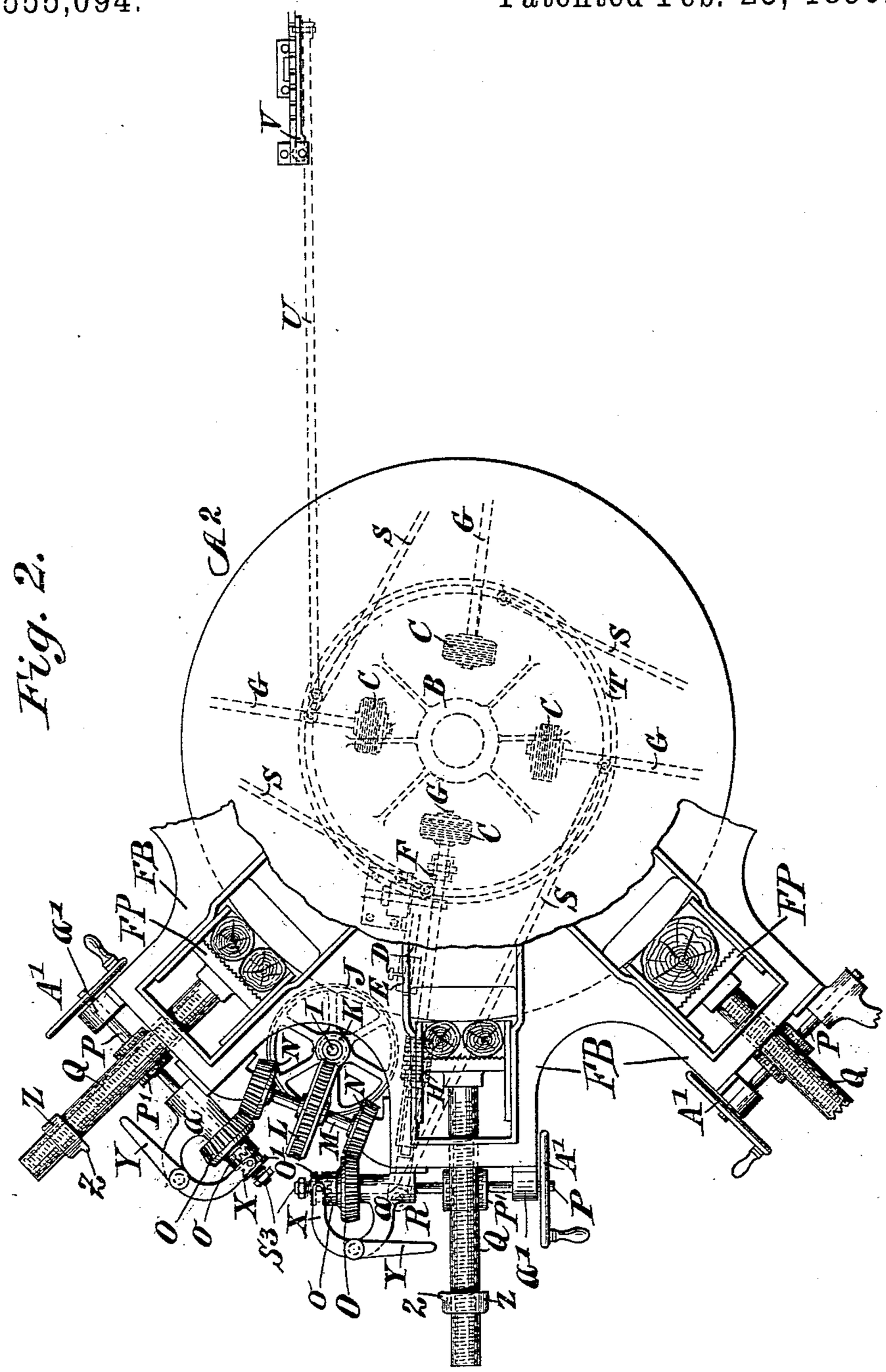
*Fig. 2.*

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# UNITED STATES PATENT OFFICE.

FREDRIK HIORTH, OF CHRISTIANIA, NORWAY.

## WOOD-GRINDER.

SPECIFICATION forming part of Letters Patent No. 555,094, dated February 25, 1896.

Application filed June 20, 1894. Serial No. 515,097. (No model.)

*To all whom it may concern:*

Be it known that I, FREDRIK HIORTH, a subject of the King of Sweden and Norway, and a resident of the city of Christiania, in the Kingdom of Norway, have invented a certain new and useful Improvement in Wood-Grinders; and I do hereby 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 letters of reference marked thereon, which form a part of this specification.

My invention relates to machines for reducing wood to a condition for converting the same into pulp; and it has for its object the provision of means whereby the feeding of the wood to the reducing device is effected automatically and continuously, and whereby the speed at which the wood is fed to the reducing device can be regulated whenever desired in accordance with the speed of the reducing device without thereby interrupting the operation of reduction or the operation of the feed mechanism, as will now be fully described, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional elevation, and Fig. 2 a plan view, of a portion of a wood-reducing machine sufficient to illustrate my invention.

A indicates the driving-shaft, on which is secured a grinding-disk $A^2$, said shaft being driven in any usual manner from a suitable prime motor, and *c* is the casing for the grinding-disk, on which casing are formed or secured the feed-boxes F B, the feeding device consisting of a piston F P, whose rod Q is guided in a suitable opening in the top of the feed-box.

The piston-rod Q is constructed in the form of a rack-bar, and carries a collar Z adjustable lengthwise thereof by means of a set-screw, said collar being provided with a tappet or finger *z*, adapted to engage the free end of a shifting-lever Y, fulcrumed to a bracket-arm *a* on the top of the feed-box F B. The forked end X of the lever Y engages a clutch-coupling O′, revolving with and having endwise motion against the stress of a spring $S^3$ on a shaft P, that has its bearings in the aforesaid bracket-arm *a* and in a standard *a′*, also on the top of the feed-box F B. The shaft P carries a pinion P′ in gear with the teeth on the piston-rod Q and a bevel-pinion O, provided with a clutch-face *o*, adapted to be engaged by the clutch O′, said pinion being loose on shaft P and in gear with a corresponding pinion N on a shaft M that has its bearings in suitable brackets formed in the adjacent feed-boxes, said shaft carrying a worm-wheel L and constituting the driving-shaft for the piston-rods Q of two contiguous feed-boxes, the shaft M carrying of course two pinions N fast thereon.

It is obvious that when the shaft M is revolved in the proper direction the pistons F P will be moved toward the grinding-disk $A^2$, and that when said pistons have moved a given distance in that direction, determined by the adjustment of the collar Z, the tappet or finger *z* thereon will engage the free end of the lever Y, thereby moving the forked end X thereof outwardly and with it the clutch O′ and uncoupling pinion O from shaft P, which may then be revolved in a reverse direction by means of the hand-wheel A′. When the piston is moved in a direction the reverse of its feed motion, as described, the tappet *z* will move out of contact with the shifting-lever, thereby enabling the spring $S^3$ to move the clutch O′ into engagement with the clutch-face of pinion O.

It will be observed that although two pistons are caused to move synchronously and at the same speed, yet the distance which said pistons move in the feed-boxes in one direction is determined independently of each other, and their motion in that direction stopped either synchronously or independently or at different periods. This is necessary in view of the fact that the thickness of the blocks of wood or the diameter of the logs introduced into the feed-boxes varies considerably, so that one piston will reach the limit of its motion toward the grinding-disk sooner than another, and unless the motion of the piston is stopped it would come itself into contact with said disk, which would result in damage to both.

I will now describe the speed-changing mechanisms through which a continuous motion is imparted to the shafts M and the speed of the grinding-disk is regulated, said mech-

anism being preferably arranged below the floor that supports the grinding apparatus, so as to be out of the way.

To the shaft A for the grinding-disk $A^2$ is secured a friction-disk B, and from hangers E E is supported a ring T concentric with shaft A, said ring being connected by rod U with one arm of an adjusting-lever V fulcrumed on the floor *f* and having a spring-tooth adapted to engage a toothed segment in a well-known manner and for well-known purposes, so that when the lever is shifted along the segment in one or the other direction the ring T will be correspondingly revolved on the foot of the hangers. To each of the hangers E is fulcrumed a weighted lever D, and to the free end thereof is pivoted a bearing-sleeve F for a horizontal shaft G, there being as many such shafts as there are pairs of feed-boxes F B about the grinding-disk $A^2$, the said shafts being further supported in bearings formed in the legs of forked hangers E′, between the fork of which said shafts carry a worm H. The worm H is connected with its shaft G by groove and feather so as to admit of endwise motion of said shaft, and said worm is in gear with a worm-wheel J, Fig. 2, at the foot of a vertical spindle I, that carries at its upper end a worm K in gear with the worm-wheel L on shaft M, hereinabove described.

At their inner end the shafts G carry a friction-wheel C, held in contact with disk B by weighted lever D, while the outer end of said shafts revolves in a coupling R that is connected with the adjusting-ring by means of a connecting-rod S.

It is obvious that when the ring T is revolved, as described, in one or the other direction the shafts or spindles G are moved inwardly or outwardly or toward or from the axis of rotation of the friction-disk B, and consequently of that of the grinding-disk $A^2$. Should the wood therefore not be fed with sufficient speed, by properly shifting the lever V the shafts G can be moved outwardly or from the axis of rotation of disk B, thereby increasing the speed of rotation of friction-wheels C in proportion to the distance to which they are so moved, such increased speed being communicated to the feed-pistons F P through the mechanism described. It will therefore be seen that by the manipulation of a single lever the speed of a number of feed-pistons can be varied as circumstances may require, and that the motion of said pistons is derived directly from the shaft of the grinding-disk.

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

1. In combination, the main shaft A, two feed-pistons F P having toothed rods, driving-shafts, a pinion thereon in gear with the piston-rods, a loose bevel-pinion on each of said shafts provided with a clutch-face, a clutch-coupling for each of said pinions revoluble with and endwise movable on their shafts, a shifting-lever, a tappet on the piston-rod adapted to act on the shifting-lever to move the coupling out of engagement with the clutch-face of the pinion, and driving mechanism controlled by the main shaft to impart continuous motion to the piston-driving shafts, for the purposes set forth.

2. In combination, the main shaft A, a plurality of feed-pistons, transmitting-gearing in gear with the piston-rods, intermediate gearing connecting the transmitting-gearing of two piston-rods, and driving mechanisms comprising a friction-disk on the aforesaid main shaft, friction-wheels in contact with the disk, a driving-gear on the shafts of said wheels meshing with the driven gear of the intermediate gearing, and adjusting devices for adjusting the friction-disks simultaneously toward and from the axis of rotation of the main shaft, for the purpose set forth.

3. In combination, the shaft A, feed-pistons F P, driving-gear connecting said pistons in pairs, a transmitting-spindle for the driving-gear of each pair of pistons, a worm-wheel on said spindles, and driving mechanism controlled by shaft A and adapted to impart motion to the transmitting-shafts, comprising a friction-disk on said shaft A, friction-wheels adjustable on said disk toward and from the axis of rotation thereof, and a worm on the shafts of said friction-wheels, in which worm said shafts have endwise motion, said worms in gear with the worm-wheels on the respective transmitting-spindle, substantially as and for the purpose set forth.

4. In combination, the shaft A, feed-pistons F P, driving-gear connecting said pistons in pairs, a transmitting-spindle for the driving-gear of each pair of pistons, a worm-wheel on said spindle, driving mechanism controlled by shaft A and adapted to impart motion to the transmitting-shafts, comprising a friction-disk on said shaft A, friction-wheels adjustable on said disk toward and from the axis of rotation thereof, and a worm on the shafts of said friction-wheels in which worm said shafts have endwise motion, said worms in gear with the worm-wheels on the respective transmitting-spindles, and a weighted lever for each of the shafts of the friction-wheels adapted to hold said wheels in contact with the friction-disk, substantially as and for the purpose set forth.

5. The combination with the main shaft A, the friction-disk B thereon, the vertical spindles I, and the worm-wheel J thereon, of the shafts G carrying friction-wheels C in contact with the aforesaid disk B, the worms H in which said shafts have endwise motion, the adjusting-ring T concentric with shaft A and connected with shafts G, and an operating-lever V connected with said ring, whereby endwise motion is imparted to all the shafts G when the ring is revolved in one or the other direction, substantially as and for the purpose set forth.

6. The combination with the shaft A, the friction-disk B thereon and the vertical spindles I each carrying a worm-wheel J, of the shafts G, weighted levers provided with a bearing for one end of the shafts G, in which bearing said shafts have endwise motion, a worm on each of said shafts G in gear with the worm-wheel on the vertical spindles, said shafts having endwise motion in their respective worms, an adjusting-ring concentric with shaft A and connected with said shafts G, and an operating-lever connected with and adapted to revolve said ring, substantially as and for the purpose set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

FREDRIK HIORTH.

Witnesses:

ALP. J. BRUYER,

JOLI VAALER.