

No. 745,560.

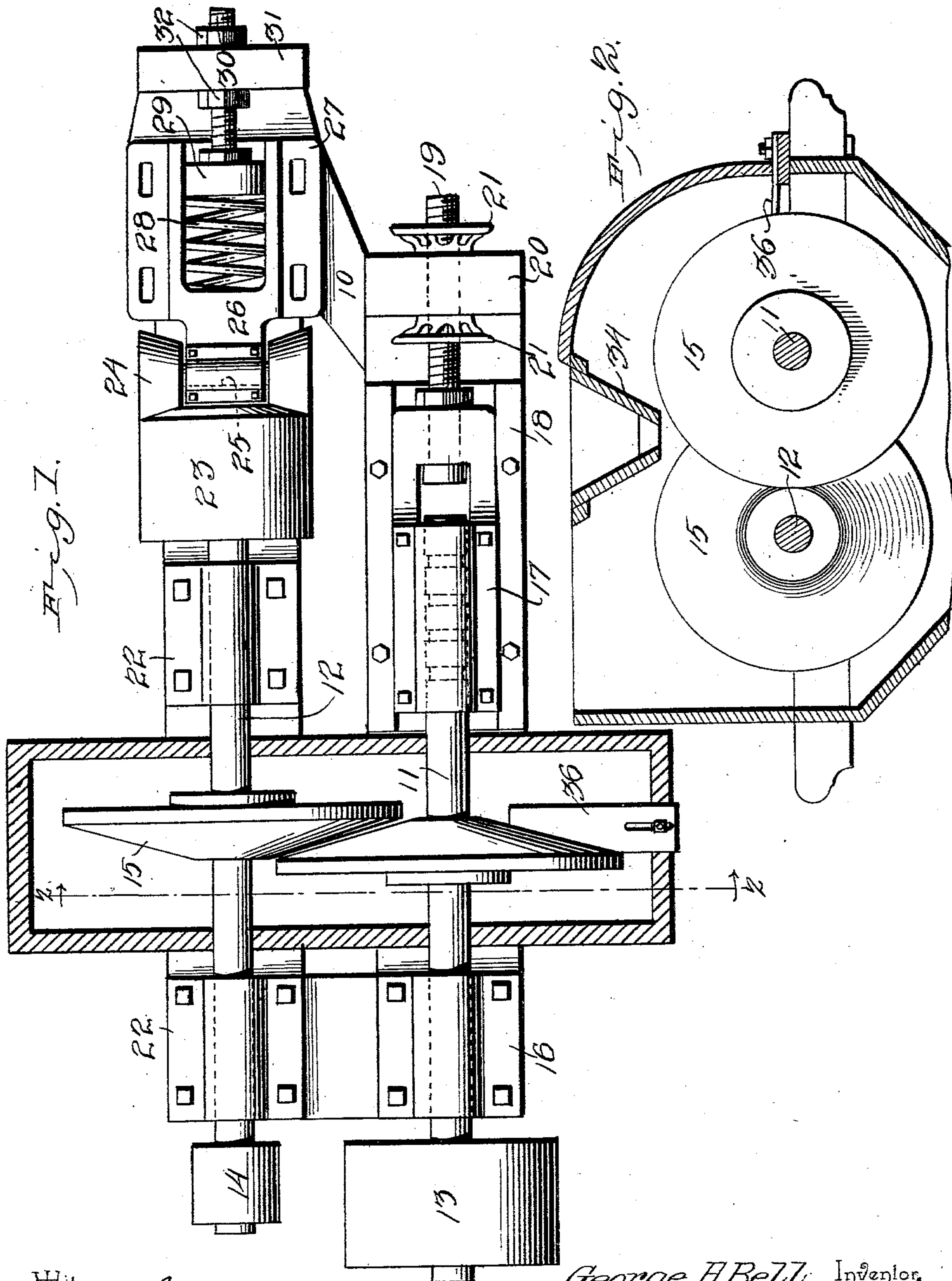
PATENTED DEC. 1, 1903.

G. A. BELL.  
GRINDING MILL.

APPLICATION FILED JULY 25, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses  
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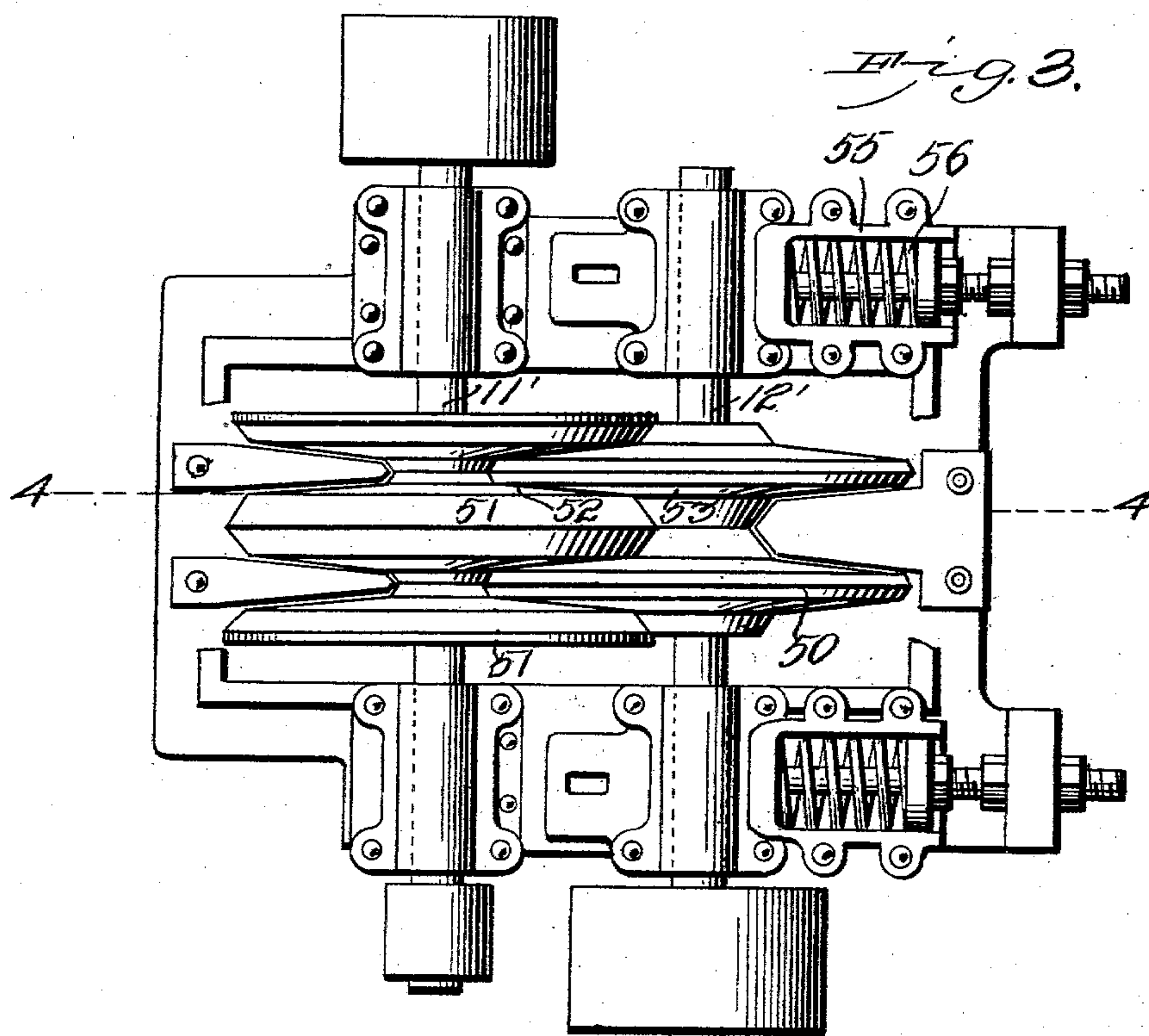
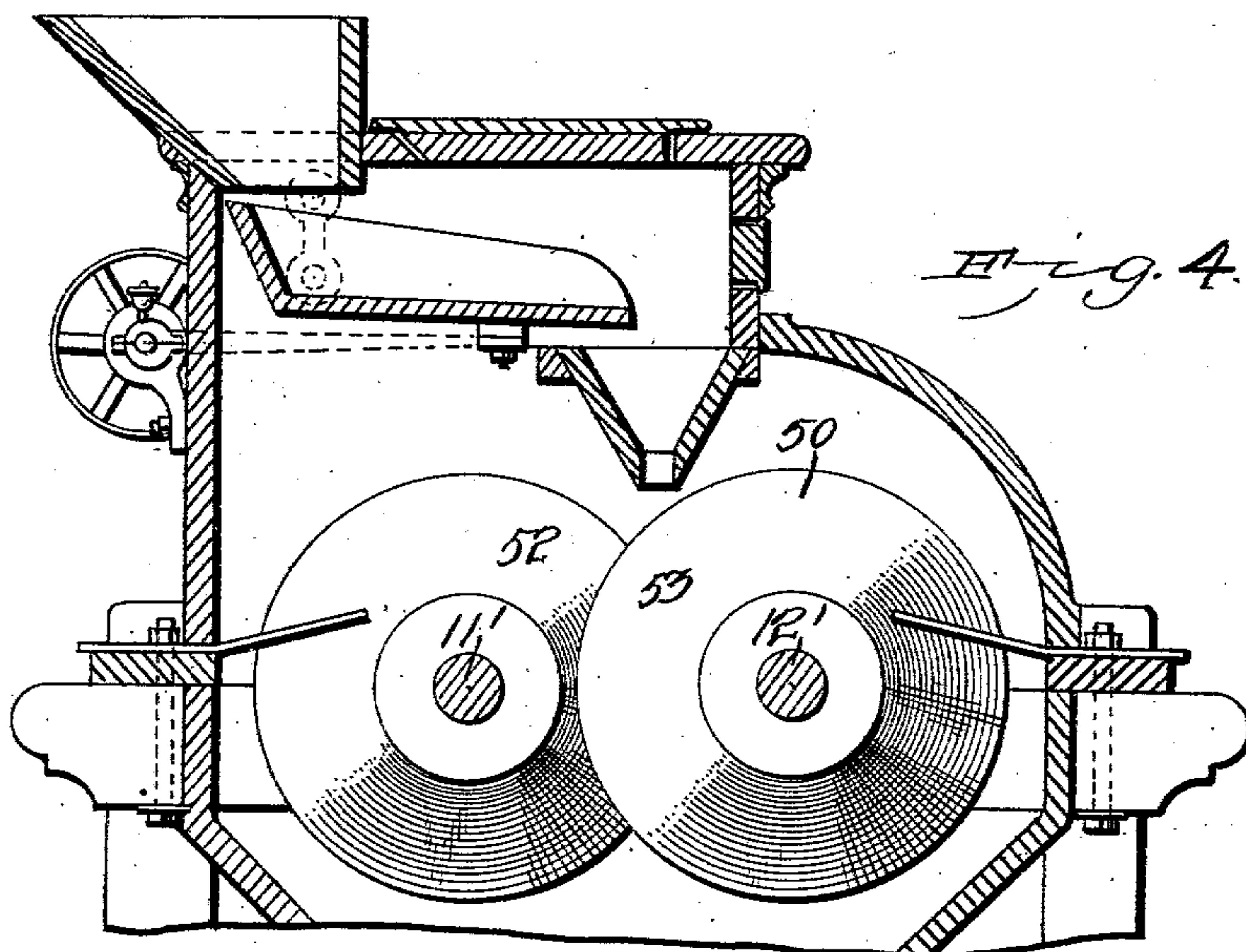
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Witnesses  
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# UNITED STATES PATENT OFFICE.

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## GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 745,560, dated December 1, 1903.

Application filed July 25, 1902. Serial No. 116,979. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE A. BELL, a citizen of the United States, residing at Port Huron, in the county of St. Clair and State of Michigan, have invented a new and useful Grinding-Mill, of which the following is a specification.

The invention relates to certain improvements in grinding or crushing mills for the reduction of rocks, bone, and the like to smaller fragments or particles or the reduction of grain and similar materials to flour.

The principal object of the invention is to provide an improved form of roller-mill in which the material acted upon is crushed or ground between the inclined faces of beveled disks driven at differential speeds in opposite directions and in which provision is made for the separation of the grinding-surfaces to permit the passage of bars of metal or like substances which would tend to injure or break the disks.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the drawings, Figure 1 is a sectional plan view of a disk grinding and crushing mill constructed in accordance with my invention. Fig. 2 is a transverse sectional elevation of a portion of the same on the line 2 2 of Fig. 1. Fig. 3 is a sectional plan view illustrating a further modification of the invention, the disks in this figure being beveled on each side to provide a plurality of surfaces for contact with the material to be acted upon. Fig. 4 is a transverse sectional elevation on the line 4 4 of Fig. 3 and illustrating a casing and a feed device which may be employed in connection with any of the grinding or crushing disks.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

In the drawings, 10 indicates a suitable supporting-frame provided with bearings for the reception of a pair of shafts 11 and 12, provided with driving-pulleys 13 and 14, which are connected by belts to a power-shaft, the

pulleys being of different diameter in order that the two shafts may be driven at different speed.

On each of the shafts is a crushing-disk 15, having a beveled or frusto-conical surface, the two beveled faces of the disks being inclined at the same angle and adapted to fit closely together in order to reduce the material to be ground to small particles or to flour.

The shaft 11 has two bearings, one of which, 16, is fixed to the frame, while the bearing 17 is adapted to guideways 18, carried by the frame, and is provided with internal ribs adapted to peripheral grooves in the shaft, the connection between the shaft and bearing being similar to the thrust-bearing of a propeller-shaft. In one end of the bearing-block 17 is swiveled a screw 19, extending through an opening in a block 20 and provided with a pair of hand-nuts 21, which may be turned on the screw until they impinge on opposite sides of the block 20 and confine the screw and shaft in any position to which they may be adjusted. This construction permits of the longitudinal adjustment of the shaft 11 and its beveled disk to any desired extent in order to compensate for wear or to bring the grinding-surfaces into more intimate contact.

The shaft 12 is held in a pair of bearing-blocks 22, which permit free longitudinal movement of the shaft, and at one end of said shaft is a circular head 23, having a beveled rear end for contact with a pair of frusto-conical antifriction-rollers 24, carried by a shaft 25, which is held in the bearing in a longitudinally-movable block 26.

The block 26 is held in guides 27 on a fixed frame, and the rear end of the block is recessed for the reception of a compression-spring 28, extending between the rear face of the block and a disk 29, carried by a screw 30. The screw 30 extends through a guide-opening in a block 31, forming a part of the fixed frame, and is provided with nuts 32, which may be adjusted on the screw to regulate the stress of the spring 28. In this manner the disks may be forced toward each other with any desired degree of pressure, the pressure being adjusted in accordance with the character of the material being acted



upon; but in the event of the entrance of a metallic article between the disks or the feeding of any other material which the disks cannot reduce the spring will yield and permit such material to pass freely between the disks without danger of breaking or otherwise injuring the grinding-surfaces.

In this form of mill the disks are rotated in opposite directions, but at different speeds, and the beveled faces of said disks are preferably smooth, or in some instances they may be corrugated or otherwise dressed to accommodate work of any desired character.

The material is fed from a suitable hopper 34 to a point between the two disks, and the disks proper are inclosed within a suitable casing, if desired.

When grinding material which is liable to cling to the grinding-surfaces, I employ a scraper-blade 36 of the character shown in Fig. 1 for contact with one or with both of the grinding-disks.

In Figs. 3 and 4 I have illustrated a form of grinding-mill in which the beveled grinding or crushing surfaces are increased in number and the angular faces disposed in different angular planes for the purpose of increasing the area of the disks in frictional contact with each other. In this case the disks 50 may be formed of separate members secured upon a carrying-shaft or may be formed of a single-piece roller turned down in the corrugated form shown. The principal grinding-surfaces 51 are arranged in an angular plane similar to that in which the similar surfaces of the disks shown in Figs. 1 and 3 are located, and at each end of these grinding-surfaces the disks are turned to form additional grinding-surfaces 52 and 53, both of which are at the same angle in order that the disks may fit closely to each other when assembled in the manner shown in Fig. 4.

In the construction shown in Fig. 4 one of the shafts, 11', is held in fixed bearings, while the second shaft, 12', is mounted in the bearings on movable blocks 55, which are acted upon by compression-springs 56 to keep the disks in intimate contact, while permitting the separation of the disks to an extent sufficient to allow the free passage of any hard material likely to injure the grinding-surfaces.

By arranging the grinding or crushing faces at an angle to the axis of rotation of the disks an extensive grinding-surface is secured in a mill of small width, and should there be any irregularity in the surfaces from wear said surfaces may be readily trued and reshaped and adjusted without the necessity of employing an entirely new roller or disk.

The mill is adapted for the crushing or grinding of any material, and while the construction herein described, and illustrated in the accompanying drawings, is the preferred

form of the device it is obvious that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described my invention, what I claim is—

1. In a grinding or crushing mill, a pair of revoluble disks having coöperating beveled faces, shafts carrying said disks, bearings for the support of the opposite end portions of said shafts, driving-pulleys of different diameters mounted on the respective shafts to transmit revoluble movement to said disks in opposite directions and at different speeds, and a spring acting on one of said shafts to maintain the disks in operable relation and permit separation of said disks on the entrance of unyielding material between said disks.

2. In a grinding or crushing mill, a pair of disks having beveled contact-surfaces, shafts carrying said disks, bearings for supporting the opposite ends of said shafts, an adjusting device for moving one of the shafts, a compression-spring for exerting pressure on the second shaft in a longitudinal direction, a box for the reception of the spring, a pair of tapering rollers carried by the box, a tapered cylindrical head carried by and engaging with said rollers, and means for adjusting the stress of the spring.

3. In a grinding and crushing mill, the combination with a pair of disks having beveled contact-faces, shafts carrying the disks, bearings for the support of the opposite end portions of said shafts, guiding-pulleys of different diameters carried by the shafts for imparting rotative movement thereto in opposite directions and at different speeds, a supporting device on which one of the bearings of one shaft is adjustable, a screw carried by said bearing, a perforated block receiving the threaded end of the screw, a pair of adjusting and jam nuts carried by the threaded portion of the screw at points on opposite sides of said block, a cylindrical head carried by the second shaft, a slidable spring-box, a bearing carried by the spring-box, a shaft supported by the bearing, a pair of tapered antifriction-rollers carried by the shaft and engaging against the cylindrical head, an adjustable block, means for moving and for locking said block in its adjusted position, and a compression-spring disposed between said block and one end of the spring-box, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

GEORGE A. BELL.

Witnesses:

CLEMENT R. STICKNEY,  
S. L. BRENNAN.