No. 739,492. PATENTED SEPT. 22, 1903.

H. C. GROVES.

GRINDING MILL.

APPLICATION FILED JULY 31, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

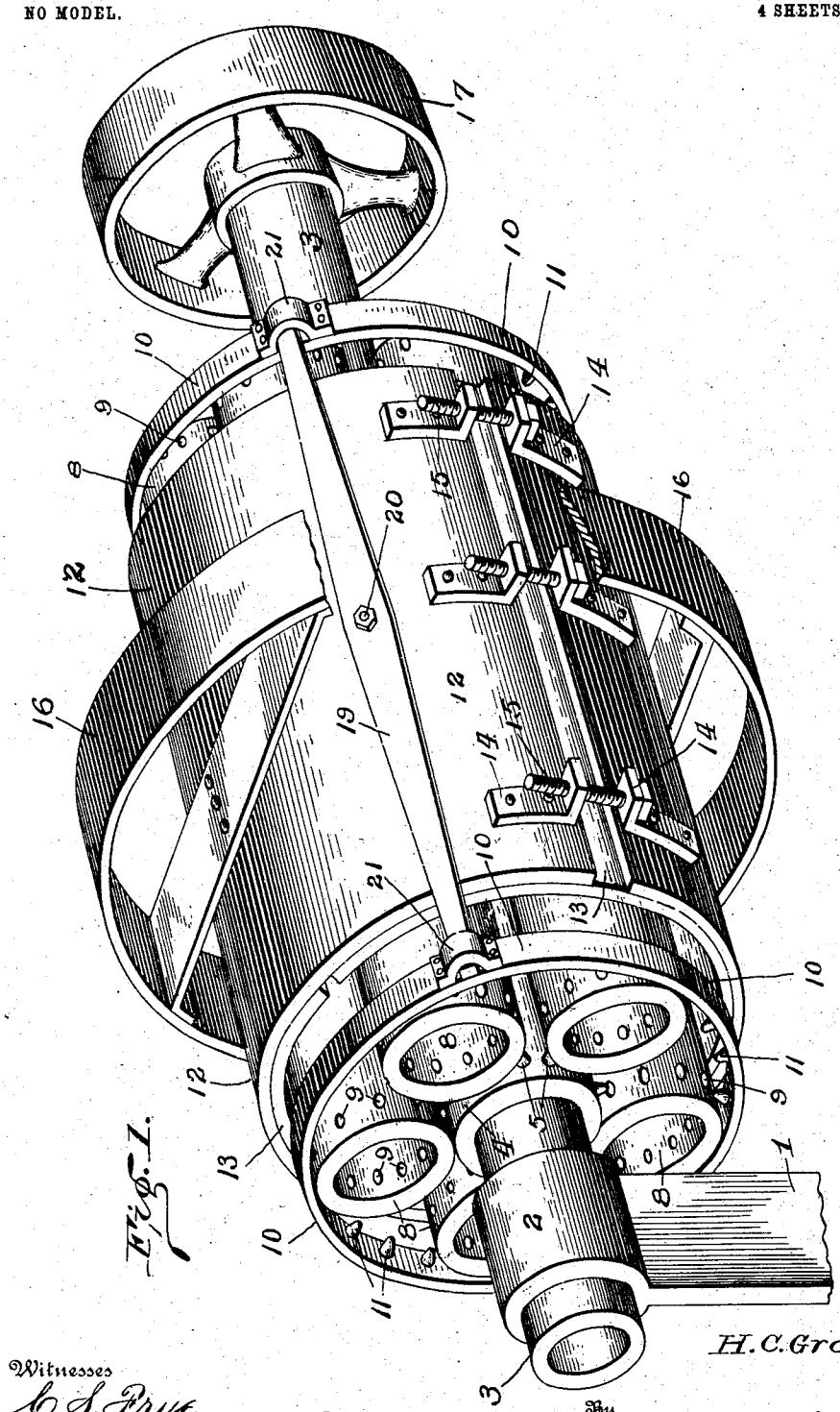


Fig. 1.

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NO MODEL. 4 SHEETS—SHEET 2.

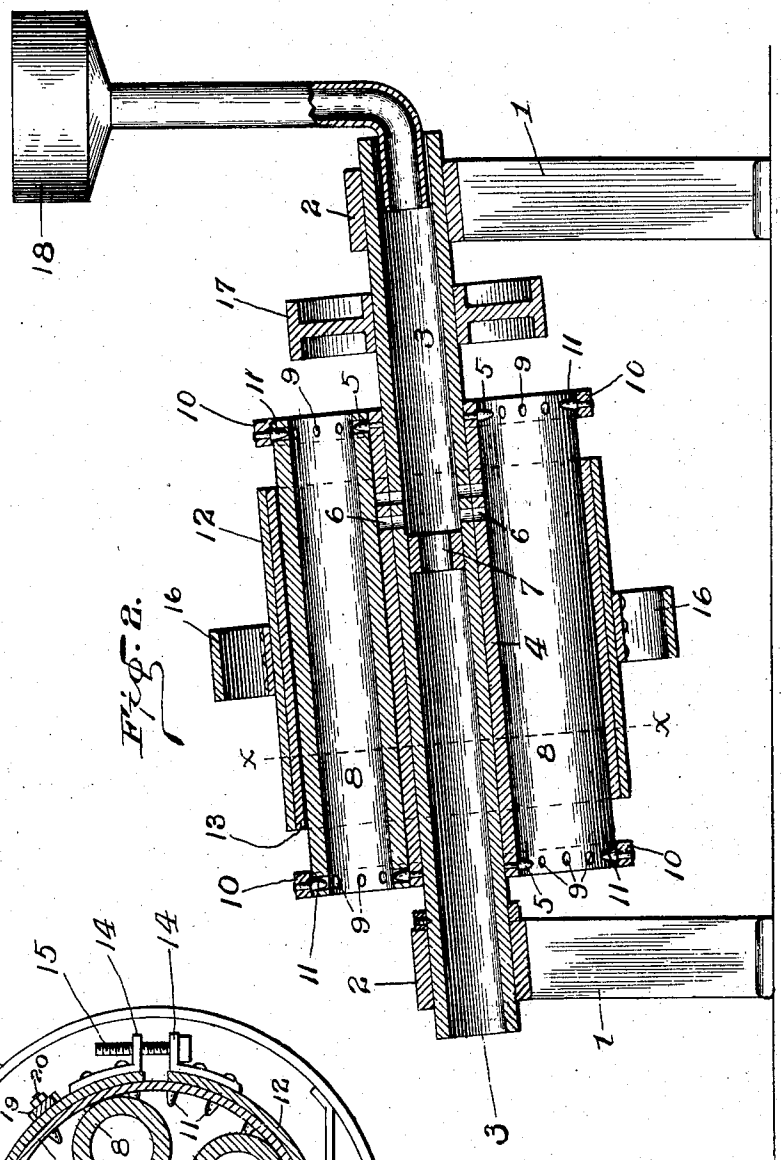


Fig. 2.

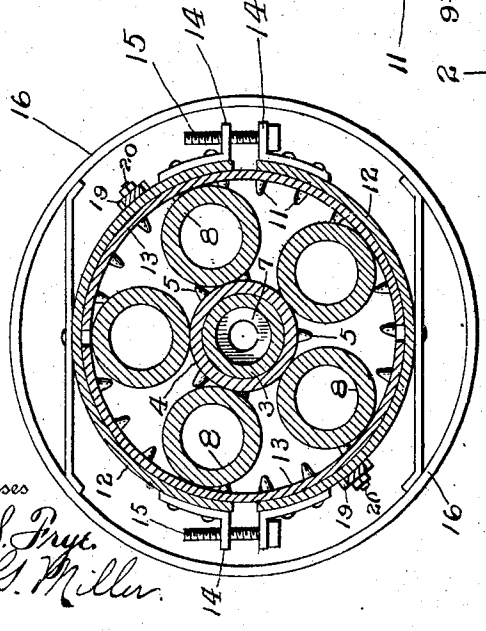


Fig. 3.

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NO MODEL. 4 SHEETS—SHEET 3.

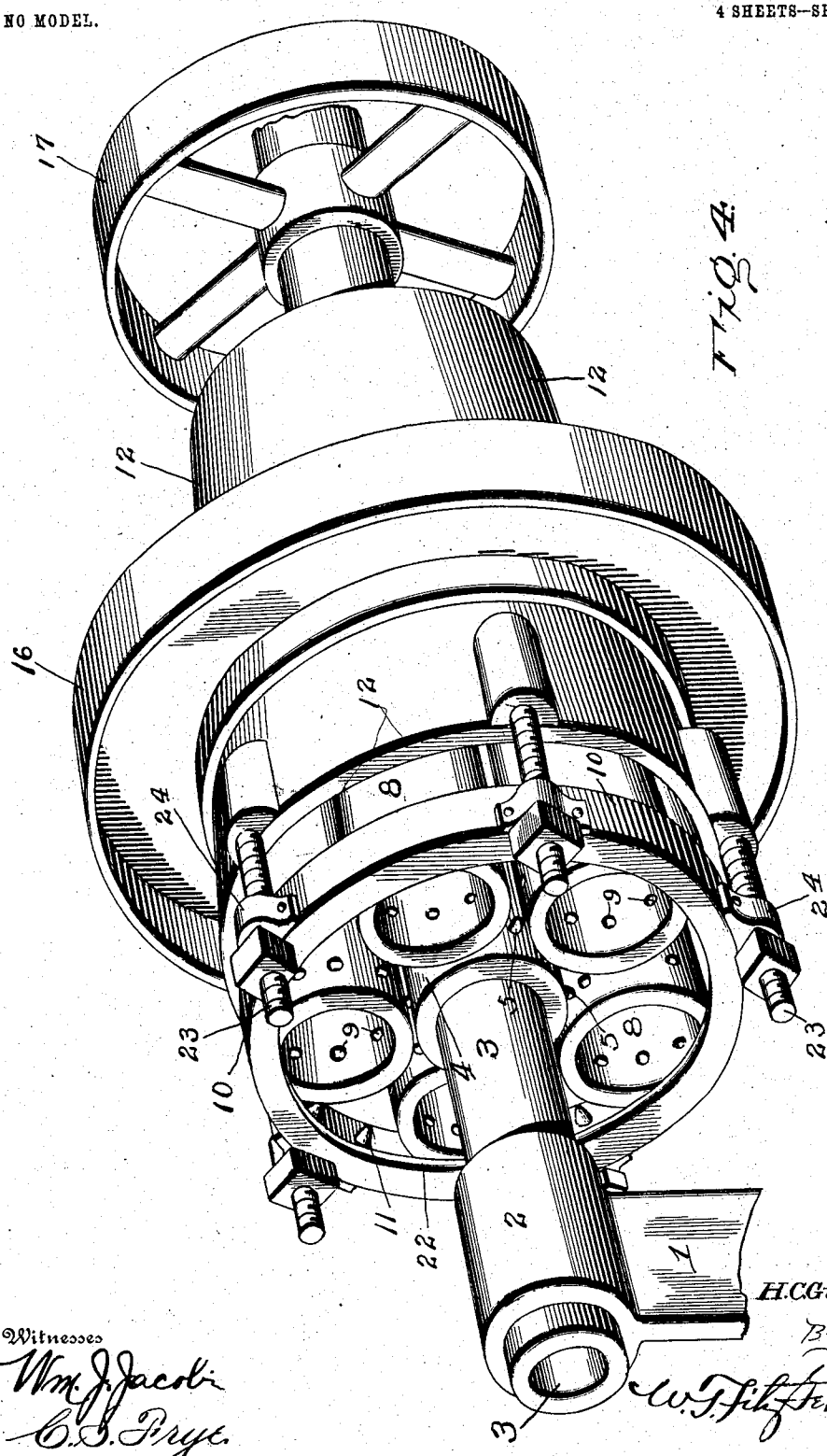


Fig. 4.

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NO MODEL. 4 SHEETS—SHEET 4.

FIG. 5.

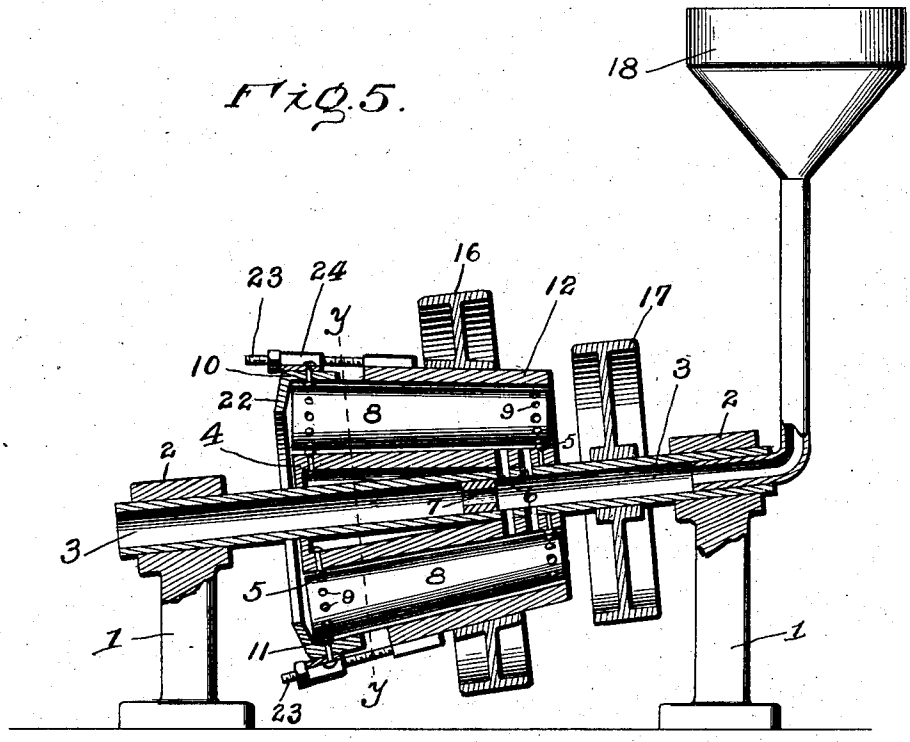


FIG. 6.

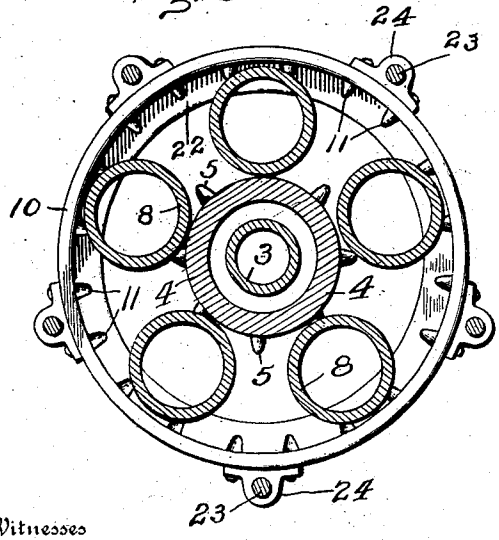
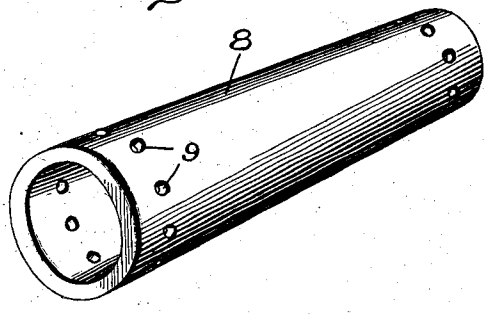


FIG. 7.



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No. 739,492. Patented September 22, 1903.

UNITED STATES PATENT OFFICE.

HIRAM C. GROVES, OF WOODWARD, OKLAHOMA TERRITORY.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 739,492, dated September 22, 1903.

Application filed July 31, 1902. Serial No. 117,889. (No model.)

To all whom it may concern:

Be it known that I, HIRAM C. GROVES, a citizen of the United States, residing at Woodward, in the county of Woodward and Territory of Oklahoma, have invented certain new and useful Improvements in Grinding-Mills; 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.

My invention has relation to roller-mills; and it consists of certain novel features of combination and construction of parts, of which the following is a clear description of the preferred form or materialization which may be adopted in carrying out my ideas.

The object of my invention is to provide a mill comprising but a very few coöperating parts which may be very readily and cheaply manufactured and quickly assembled each in its respective operative position.

A further object of my invention is to provide simple and efficient means for adjusting the relationship of the several coöoperating parts.

Other objects and advantages will be hereinafter made clearly apparent, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of my device in its operative position. Fig. 2 is a central vertical sectional view thereof. Fig. 3 is a sectional view as seen from the dotted line $x\,x$ in Fig. 2. Fig. 4 is a perspective view of a modified form of construction. Fig. 5 is a central vertical sectional view thereof. Fig. 6 is a sectional view as seen from the dotted line $y\,y$ in Fig. 5, and Fig. 7 is a perspective view of one of the crushing-rollers.

In order to fully set forth the details of my invention and the parts deemed necessary to coöperate therewith, numerals will be employed, the same numeral referring to a similar part throughout the several views, and of which—

1 represents suitable standards or supports, the upper ends of which are provided with suitable bearings 2, in which a tubular shaft 3 finds bearings. Securely attached to the shaft 3 or formed integrally therewith is a central roller 4, said roller being provided at either end with suitable teeth 5, the object of which will be hereinafter more fully stated. Adjacent to one end of the roller 4 I have provided suitable orifices or grain-outlets 6, through which the grain passes from the tubular shaft 3 to the outer side of the central roller 4, from whence it drops loosely between rollers 8 onto the inner surface of casing 12, where it is crushed.

In order to prevent the grain from passing on through the tubular shaft 3, I provide a bushing 7, adapted to snugly fit the bore of said shaft 3 and to be located immediately adjacent to the openings 6, so that the flow of the grain is retarded at this point and caused to pass through the said openings 6. The bushing 7 is also provided with a longitudinal orifice, so that should any foreign substances, such as pieces of corncob or the like, be left in the grain being ground and too large to pass through the orifices 6 they will be permitted to pass through the larger orifice in the bushing 7 and thrown out at the lower end of the tubular shaft 3.

Spaced at suitable distances around the periphery of the roller 4 are crushing-rolls 8, said rolls having suitable bores or sockets 9 at either end thereof, adapted to receive and be caused to revolve by the teeth 5, carried by the roller 4.

In order to keep the crushing-rolls 8 spaced properly, I have provided rings 10, said rings carrying suitable studs or teeth 11, which are also adapted to take into the sockets 9 in the crushing-rolls 8. By this means the crushing-rolls are caused to travel around the periphery of the inner roller 4 and at the same time are caused to rotate.

Surrounding the crushing-rolls 8 between the annular rings 10 is a suitable housing 12, said housing being composed of two or more sections, so that the grain may be crushed to different degrees of fineness by adjusting the said housing and lining closer to or farther from the said crushing-rolls 8. To accomplish this result, I have provided suitable ears 14 at different points upon the sections of the housing 12, through which take the adjusting-screws 15, so that when it is desired to crush the grain finer the ends of the sections 12 are drawn closer together, and vice versa when it is desired to crush the grain coarse. The

wearing upon the several parts may also be compensated for in this way. In order to impart motion to the casing 12, I have attached thereto a suitable belt-wheel 16, said wheel being concentrically located around the said housing 12, while motion is imparted to the tubular shaft 3 through the medium of the belt-wheel 17. The grain is fed into the tubular shaft 3 through a suitable hopper 18. One of the standards 1 is longer than the other, so that the machine will rest in a slanting position, thereby causing the grain to travel toward the openings 6 in the tubular shaft 3 and inner roller 4. It also causes the crushed grain to travel from one end of the housing 12 to the opposite end. The rings 10 are caused to travel with the housing 12 by suitable bars 19, said bars being held to the housing by bolts 20 and the ends of said bars 19 entering suitable clips 21, securely attached to the rings 10, thus making said rings 10 practically rigid with respect to the housing 12.

By crossing one of the belts leading to the pulleys 16 and 17 the housing 12 and the tubular shaft 3, carrying the inner roller 4, are caused to travel in opposite directions, and by having the said belt-wheels 16 and 17 of different size the housing and tubular shaft are caused to travel at different speeds, the difference in speed being regulated by the difference in size of the pulleys. If it is so desired, the bars 19 may be entirely dispensed with, allowing the rings 10 to travel independently of the housing 12. It will also be seen that the tubular shaft 3, carrying the inner roller 4, may be securely locked by any suitable means within the bearings 2, and thus prevented from revolving, so that the capacity of the mill will be greatly reduced, as by having said shaft held rigid the casing 12 imparts all the motion to the crushing-rolls 8 and would necessarily cause them to travel much slower. If so desired, the casing 12 and the tubular shaft 3 may be revolved in the same direction, one necessarily traveling faster than the other. In Figs. 4 to 7, inclusive, I have shown a modified form of construction, wherein the inner roll 4 and the crushing-rolls 8 are cone-shaped, the housing 12 also being cone-shaped. This construction is provided with but one annular ring 10, the said ring being provided with a downwardly-extending flange 22, said flange being adapted to bear against one end of the crushing-rolls 8.

When it is desired to grade the grain being ground, the housing 12 is moved laterally upon the crushing-rolls 8 through the medium of the adjusting-bolts 23, attached to one edge of the housing 12, and suitable clips 24, attached to the periphery of the annular ring 10, the downwardly-extending flange 22 serving to hold the annular ring 10 in place, thus causing the housing 12 to move inwardly or outwardly, as desired. In other respects this construction is operated in the same manner as the construction previously described, and it is therefore not deemed necessary to describe the operation of this device more fully. In operation the grain is placed in the hopper or receptacle 18, from whence it passes into the tubular shaft 3, passing thence through the orifices 6, where it is crushed by the rolls 8 while passing from one end of the housing 12 to the opposite end.

It will therefore be obvious that my mill will be found to be very strong and durable in character and that since the various parts may be manufactured so as to be readily interchangeable in different mills various required supplies may be readily obtainable for the purpose of replacement and repair as from time to time such action may be found necessary. Inasmuch as the casing normally rotates in an opposite direction from the rotation of the centrally-disposed roller, great speed may be attained by the application of a minimum amount of power, the roller 4 being disposed in the exact central portion of the casing and the plurality of rollers 8 adapted to move in a concentric path within the casing and all traveling in an opposite direction from the rotation of the central roller. The grain introduced within my improved grinding-mill will be reliably and quickly acted upon and crushed and disintegrated to the desired degree of fineness, inasmuch as I am enabled to produce a very finely-ground product or a coarse feed in accordance with the adjustment which I have placed upon the several rollers by reason of the change of relationship between said parts and the casing.

It will be understood that the various parts of my invention may be modified in construction as desired, inasmuch as certain changes or modifications may be made without departing from the spirit or scope of my invention, and I therefore wish to comprehend all substitutes and equivalents of the construction I have herein described and illustrated.

Believing that the advantages and manner of using my improved milling apparatus have thus been made clearly apparent from the foregoing specification, considered in connection with the accompanying drawings, further description is deemed unnecessary.

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

1. In a grinding-mill, the combination with a suitable casing of a roller concentrically mounted therein and a plurality of coöperating rollers disposed in the annular space between the central roller and the casing and means to adjust the relative position of said parts whereby the grain may be ground to any degree of fineness and additional means to rotate said central roller and casing all combined substantially as specified and for the purpose set forth.

2. In a grinding-mill, the combination with a suitable casing, of a roller concentrically mounted therein; teeth carried by said roller;

a plurality of coöperating rollers disposed in the annular space between the central roller and the casing; sockets carried by said coöperating rollers adapted to receive said teeth, whereby the said coöperating rollers will be positively rotated as set forth.

3. In a grinding-mill, the combination with a suitable casing, of a hollow shaft; a roller fixed to said shaft; coöperating rollers disposed in the annular space between the central roller and the casing, and means to rotate said coöperating rollers substantially as set forth.

4. A grinding-mill of the class described, consisting of a suitable casing; a belt-wheel secured to said casing; a ring at each end of said casing; studs secured to the inner faces of said rings and bars secured to the said casing adapted to hold said annular rings in place, in combination with a centrally-disposed roller and a plurality of coöperating rollers disposed in the annular space between the central roller and the casing, substantially as and for the purpose set forth.

5. In a grinding-mill, a central roller; a plurality of coöperating rollers surrounding said central roller and intermeshing therewith at suitable points; rings having studs adapted to intermesh with the coöperating rollers whereby said rollers will be caused to travel around the central roller, in combination with a suitable casing, and means carried by said casing whereby the said rings will be actuated by said casing substantially as set forth.

6. In a grinding-mill, a central roller and a plurality of coöperating rollers surrounding the same, in combination with a tubular shaft carrying said central roller; registering grain-outlets in said shaft and central roller; means within the shaft for stopping the flow of the grain through said shaft and directing the same through said outlets, said grain-checking means being adapted to permit foreign substances in the grain to pass onward through said shaft, as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

HIRAM C. GROVES.

Witnesses:
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N. B. NEWCOMB.