F. W. LEHRACK.

GRINDING AND PULVERIZING MACHINE.

APPLICATION FILED JULY 21, 1919.

1,362,948. **Patented Dec. 21, 1920.**

3 SHEETS—SHEET 1.

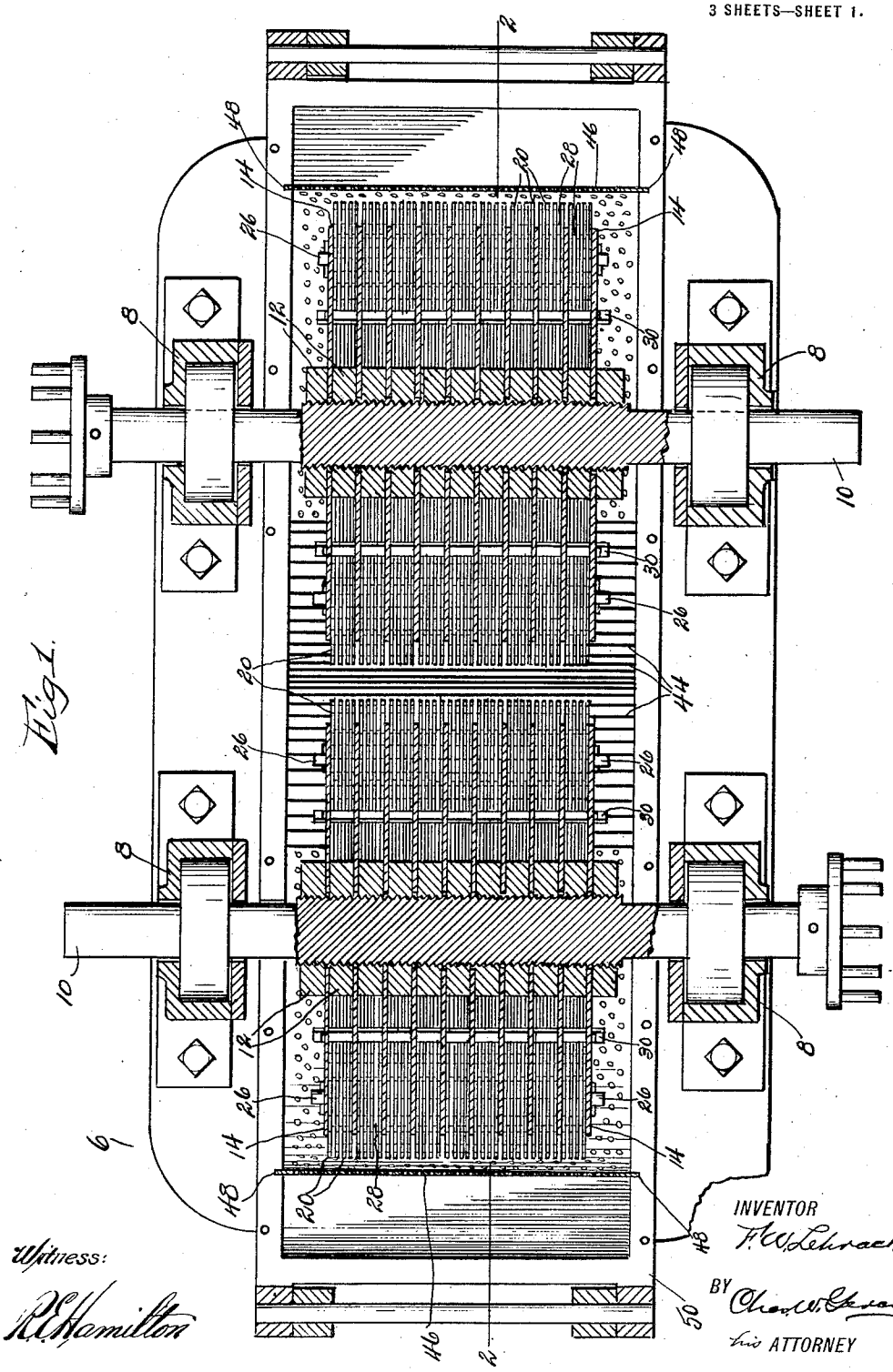


Fig. 1.

Witness:

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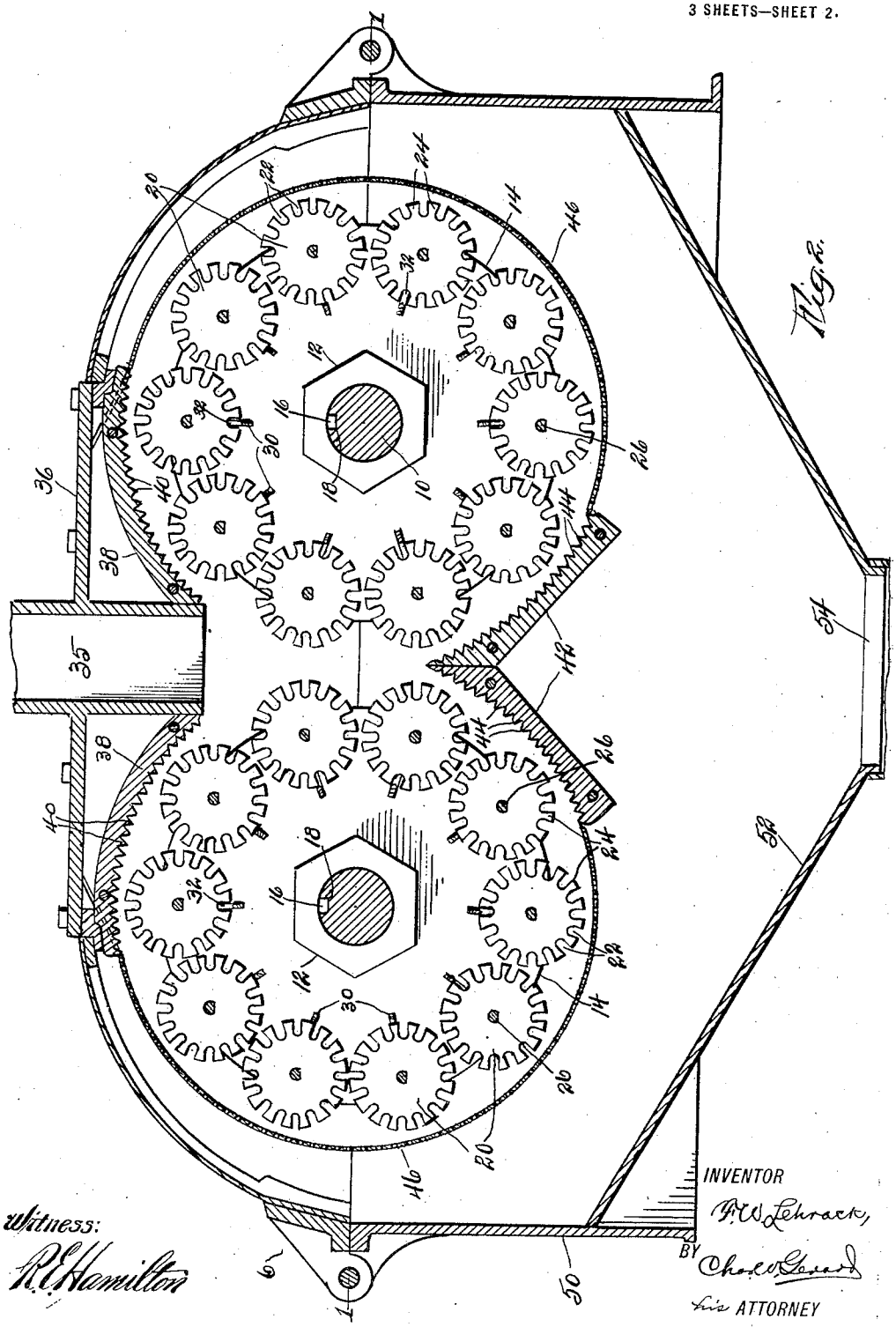
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3 SHEETS—SHEET 2.



Witness:

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3 SHEETS—SHEET 3.

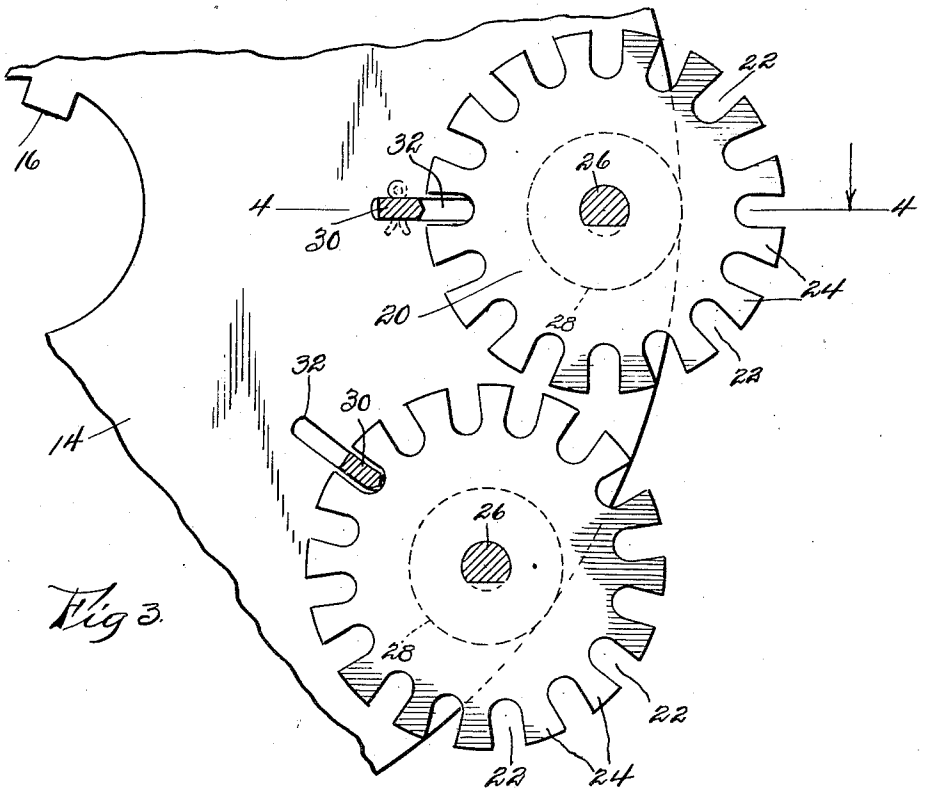
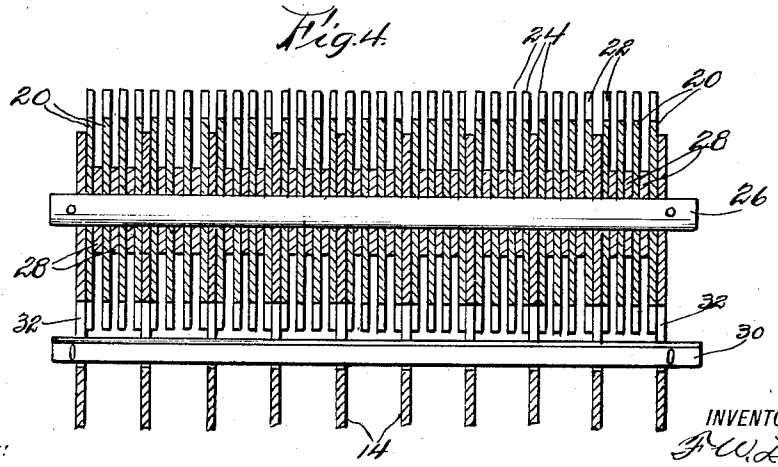


Fig 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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GRINDING AND PULVERIZING MACHINE.

1,362,948. Specification of Letters Patent. Patented Dec. 21, 1920.

Application filed July 21, 1919. Serial No. 312,336.

To all whom it may concern:

Be it known that I, FREDERICK W. LEHRACK, a citizen of the United States, and resident of Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Grinding and Pulverizing Machines, of which the following is a complete specification.

The present invention relates to grinding or pulverizing machinery and aims to provide an improved construction of machine for this purpose, of the rotary cylinder type.

Accordingly, one of the objects of the invention is to provide an improved rotary cylinder member having a plurality of cutting disks projecting from the periphery of the cylinder into position for cutting or grinding as the cylinder is rotated.

Another object of the invention is to devise a grinding cylinder of this character in which said cutting disks are adjustable for affording provision for varying the cutting position thereof, and thereby distributing the wear on the disks.

A further object of the invention is to provide a structure of this character in which the cutting elements of the cylinder are rotatably mounted and are also provided with automatic latching means acting after the cylinder has attained a certain speed of rotation to maintain said cutting elements latched against rotation independent of the cylinder.

Further features of the invention reside in the provision of a plurality of rotary cylinders of the character described, arranged in suitable coöperative relation for effecting the cutting or grinding operation.

With these general objects in view, as well as minor objects which will appear in the course of the detail specification, the invention will now be described with reference to the accompanying drawings illustrating one practical form of construction for embodying the improvements, after which the novel features thereof will be set forth and defined in the appended claims.

In the drawings—

Figure 1 is a sectional plan view of a grinding machine constructed in accordance with the present invention, said view being a section taken on the line 1—1 of Fig. 2;

Fig. 2 is a longitudinal sectional view of the machine, the section being taken on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged fragmentary detail view showing a portion of one of the cylinder sections with a pair of the disk cutting elements carried thereby; and

Fig. 4 is a section taken on the line 4—4 of Fig. 3, showing a portion of one of the cylinders with a complete gang of the disk cutting elements.

Referring now to the said drawings in detail, these illustrate the improved type of machine as comprising a framework 6 having suitable bearings (preferably of the roller bearing type) for mounting a pair of shafts 10 adapted to be driven in either direction from any suitable source of power (not shown). Each of the shafts 10 is externally threaded, as shown in Fig. 1, for applying thereto a plurality of threaded collars 12, whereby a plurality of disk members 14 may be mounted upon each shaft and retained thereon by being clamped in place between each pair of adjoining collars 12. The structure which thus results forms a pair of rotary members of general cylindrical shape, in view of which they will hereinafter be referred to as rotary cylinders, the several disk members 14 being each provided with a key portion 16 adapted to fit in a keyway 18 of the corresponding shaft 10.

Each of the rotary cylinders is provided with a plurality of gangs of cutting or grinding elements comprising a series of disks 20 having notches 22 shaped for forming teeth 24 which are gradually widened toward their outer edge as clearly illustrated in Fig. 3. Each gang of disks 20 is mounted on a rod or shaft 26 of substantially D-shaped cross-section, mounted in alined openings near the outer margins of the disks 14, and in such a position that the peripheries of the disks 20 intersect the periphery of the corresponding cylinder and project to the outside thereof in position for engagement with the material which is to be operated upon. Being rotatably mounted by means of the shafts 26, the disks 20 may be rotated into various positions for presenting new teeth into operative or grinding or cutting position, and thus distributing the wear thereon. The cutting disks 20 are spaced apart slightly by means of washers

28 mounted on the shaft 26 between each pair of adjoining disks 20.

Each gang of the cutting disks 20 is adapted to be automatically latched after a certain predetermined speed of rotation has been reached by the corresponding rotary cylinder, for which purpose a latch bar 30 is associated with each gang of said disks, said bar being slidingly mounted in registering slots 32 in the disks 14. Each set of slots 32 is alined with the radius intersecting the shaft 10 and the corresponding rod or shaft 26 and in such position that the bar 30 may be moved into and out of engagement with the notches 22 of the disks 20. The bars 30 will become disengaged from the disks 20 by gravity in passing through the upper path of its travel (if the cylinder is rotating sufficiently slowly), but will reëngage the same by gravity on passing beneath the shaft 10; and, finally, after said shaft and its cylinder have attained a certain higher speed of rotation the bars will remain engaged with the disks 20 under the influence of centrifugal force during the continued operation of the machine.

The material to be operated upon is fed into the machine through a feed passage 35 provided in the top section 36 of the machine frame, said passage being alined with the space between the rotary cylinders. On opposite sides of this feed passage is provided a pair of grinding plates 38 having the corrugations 40 arranged in position overlying each of the rotary cylinders for coöperation with the cutting disks 20 thereof for treating the material. Similar grinding plates 42 having the corrugations 44 are positioned on the opposite or lower sides of said cylinders and directly below the feed passage 35. For encircling the remaining portion of each of said rotary cylinders a metallic screen 46 is mounted in position between each pair of grinding plates 38 and 42, each screen being received in pair of grooves 48 at opposite sides of the machine frame. The lower section 50 of the machine frame is provided with a hopper bottom 52 adapted to direct the material toward an opening 54 with which a suitable fan connection (not shown) may be arranged for conducting away the product of the apparatus as it reaches said opening 54.

It will thus be apparent that I have provided a practical and efficient machine for carrying out the desired objects of the invention. The rotary cylinders may be driven either in the same direction or in opposite directions for effecting the grinding operation, in which the cutting disks 20 coöperate with each other opposite the feed passage, and also with the grinding plates and with the interior surfaces of the screens, as will be readily understood, producing a grinding and cutting action which effectively reduces the material to a finely divided state. The latch means for engagement with the cutting disks provides a means for positively latching said disks against any independent rotary movement throughout any given interval of continuous operation of the machine, and thus maintaining said disks in position for effective engagement and cutting action upon the material and preventing any choking up of the material in the passages around the cylinders. However, said latching means affords a structure in which the latching engagement may be intermittently released, as will be the case under slower speeds of rotation when the latch bars will drop by gravity from latching position, or said bars may be manually released, if desired, and the cutting disks manually adjusted to present new teeth into cutting position. This provides a wear-distributing feature which is of importance and a great advantage in a machine of this particular character, while the illustrated structure of the disks themselves is such as to provide cutting elements of great efficiency. The machine is adapted for operation on materials of a great variety, such as grains and cereals of various kinds, and also for the treatment of ores and barks, or any material of a nature adapted to be ground or pulverized by a mechanism of the character described, one of the special operations for which the same is adapted being the finishing of ground cereals. The capacity of the machine may be varied to any desired extent, as for example, by simply providing rotary cylinder members of the requisite length to take care of the amount of material to be treated in a given period of time.

While I have illustrated and described what I now regard as the preferred form of construction for embodying the proposed features of improvement, I desire to reserve the right to make such formal changes or modifications as may fairly fall within the scope of the appended claims.

Having described the invention, what I claim is:

1. A grinding machine comprising a rotating cylinder, a plurality of circular cutting elements rotatably carried by said cylinder with the peripheries of said cylinder and cutting elements intersecting each other, and means associated with said cylinder and operating automatically as said cylinder reaches a given speed of rotation to maintain said cutting elements latched against rotation independently of the cylinder.

2. A grinding machine comprising a concave grinding plate, a rotating cylinder partially closed by said plate, and a plurality of circular cutting elements rotatably carried by said cylinder with the peripheries of said cylinder and cutting elements intersecting

each other, said cutting elements being mounted for free rotative movement relatively to the cylinder, and each of said cutting elements being provided with a plurality of peripheral notches forming teeth adapted to be variously presented in cutting relation.

3. A grinding machine comprising a rotating cylinder, a plurality of circular cutting elements rotatably carried by said cylinder with the peripheries of said cylinder and cutting elements intersecting each other, each of said cutting elements being provided with a plurality of peripheral notches forming teeth adapted to be variously presented in cutting relation, and means connected with the cylinder and operating automatically as said cylinder reaches a given speed of rotation to latch said cutting elements by engagement with the notches thereof.

4. A grinding machine comprising a pair of rotating cylinders mounted in parallel relation and each provided with a plurality of circular cutting elements carried thereby with the peripheries of each cylinder and its cutting elements intersecting each other, said cutting elements mounted for free rotative movement relatively to the cylinder, and means for separately rotating said cylinders, and members providing toothed surfaces cooperating with said cutting elements to effect the grinding operation.

In witness whereof I hereto affix my signature.

FREDERICK W. LEHRACK.