

W. P. HARRIS & J. R. JENKINS.

GRINDING MILL.

APPLICATION FILED MAY 21, 1910.

992,658.

Patented May 16, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

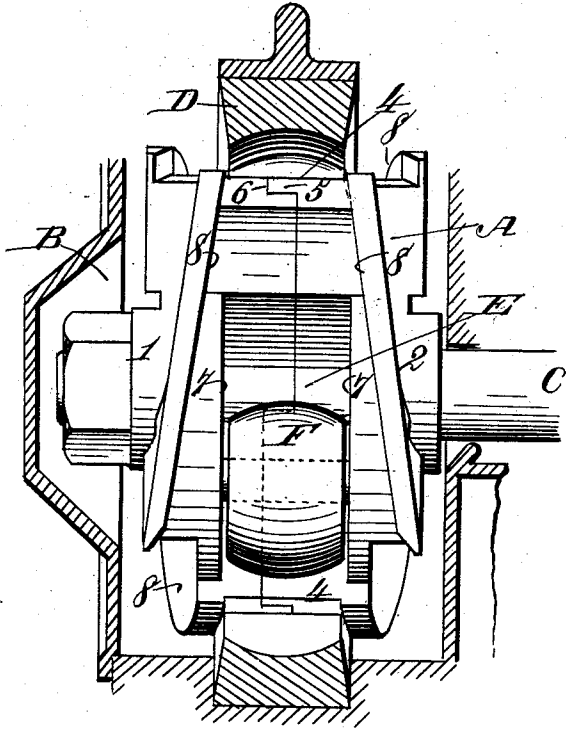
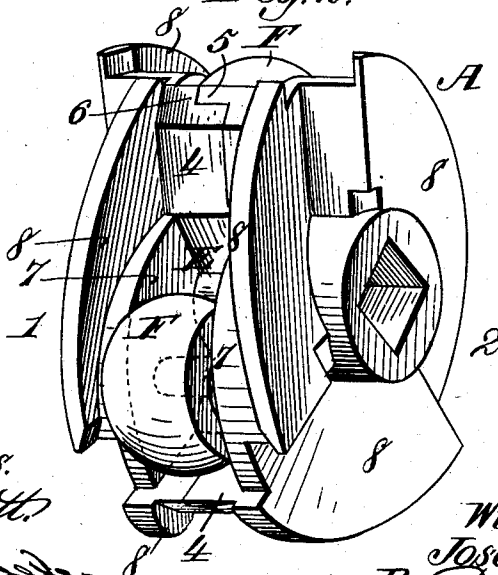


Fig. 2.



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William P. Harris.
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Att'y.

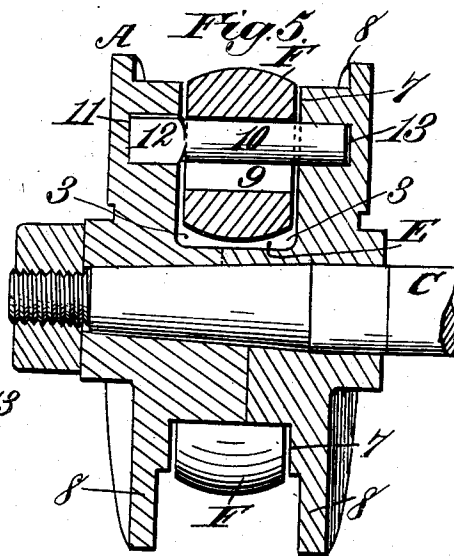
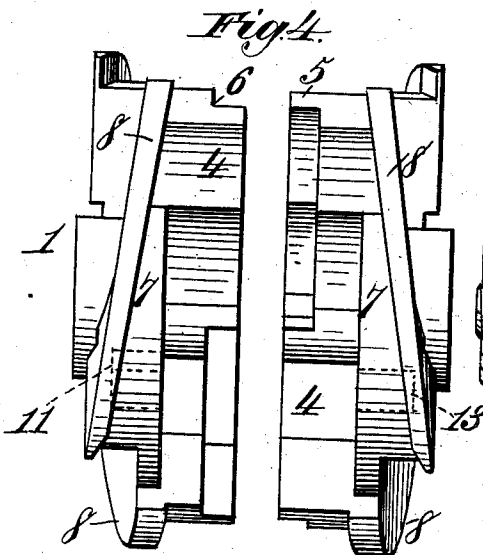
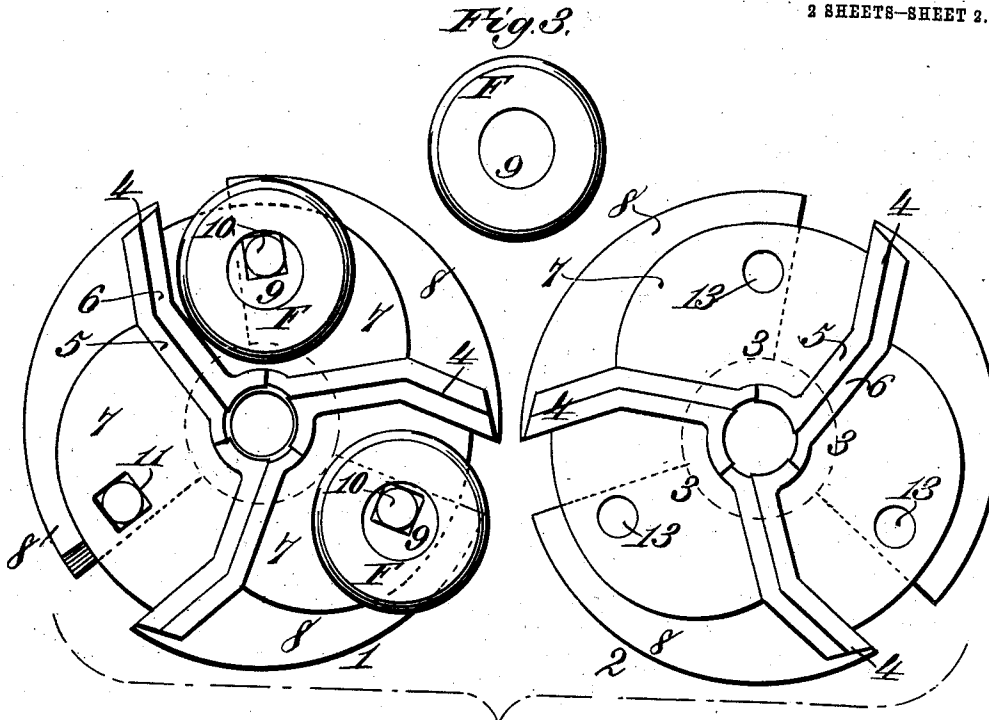
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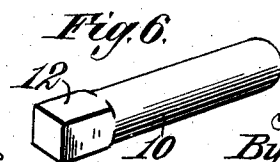
Patented May 16, 1911.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

WILLIAM P. HARRIS AND JOSEPH R. JENKINS, OF ALPENA, MICHIGAN.

GRINDING-MILL.

992,658.

Specification of Letters Patent.

Patented May 16, 1911.

Application filed May 21, 1910. Serial No. 562,669.

To all whom it may concern:

Be it known that we, WILLIAM P. HARRIS and JOSEPH R. JENKINS, citizens of the United States, residing at Alpena, in the county of Alpena and State of Michigan, have invented new and useful Improvements in Grinding-Mills, of which the following is a specification.

The present invention has reference to improvements in grinding mills, and more especially in that type of mill wherein the grinding elements are constituted by a series of rolls seated in pockets formed in a rotatable driver or carrier.

In the known constructions in most general use, the carrier is of integral formation, and the walls of its pockets are provided with elongated bearing slots or the like in which the gudgeons or shafts of the rolls are loosely seated, so as to provide for a bodily outward movement of said rolls by the centrifugal force of rotation, and to admit of their ready removal in the event of injury. Such constructions, however, have proven unsatisfactory in two important respects; the integral formation of the carrier prevents complete chilling of the pockets and, as a result, the strain of the roll shafts or gudgeons in the bearing slots rapidly superinduces wear, which is increased by the friction developed incidental to the movements of said shafts or gudgeons, thus shortening the "life" of the carrier, since it has been found that as soon as the side walls of the slots become cut in by wear, the action of centrifugal force upon the rolls is impeded, and the latter are, in consequence, held away from the grinding track.

To overcome the afore-mentioned defects, this invention comprehends the production of a grinding mechanism wherein the carrier is composed of two separable parts or sections, as opposed to the objectionable integral construction above referred to, whereby perfect chilling is rendered possible, and the roll shafts are mounted in fixed, stationary position in said carrier, with the rolls loose thereon, so that the strain, and, consequently, the wear, is transferred from the carrier to said shafts, with a resultant prolongation of the period of effective use of the mechanism.

The invention also contemplates the construction of the carrier sections in such a

manner as to permit their connection without the aid of bolts or similar fastening devices which are easily injured, and are apt to work loose under vibration.

A structural embodiment of the invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a front elevation of the carrier in place within the grinding chamber, the latter appearing in section. Fig. 2 is a perspective view of said carrier. Fig. 3 is a collective face view of the component parts of the carrier. Fig. 4 is a side elevation of the carrier, with the sections thereof separated and the rolls removed. Fig. 5 is a sectional view of the carrier. Fig. 6 is a perspective view of one of the roll shafts.

The carrier A, as shown in said drawings, is located within the grinding chamber B of the mill, (which chamber is in the main of conventional construction), and is mounted upon the drive shaft C for coaction with the usual curvilinear grinding track, or shoe D, likewise arranged within said chamber. Said carrier is provided, as is customary, with a series of peripheral pockets E, wherein the grinding rolls F are mounted.

In accordance with the chief object of the invention, the carrier is constructed of two separate counterpart sections 1 and 2, formed with alining axial openings through which the drive shaft extends. The terminal of said shaft is preferably threaded, as shown in Fig. 5, and carries a nut adapted to be tightened against the adjacent face of section 1. The axial openings of both sections are tapered, and the drive shaft is correspondingly tapered, so that when said nut is tightened, as above described, both sections will be held rigidly in place upon the shaft. The inner faces of these sections are provided with cavities 3 which mate and constitute the pockets E, the front and rear walls of said cavities being comprised by radial flanges 4 integral with said sections and having a slight angular formation. Each flange, in turn, has its side face formed with a projection or shoulder 5 and a groove or seat 6 arranged side by side and coextensive in length therewith. Consequently, since the two sections are counterparts, the flanges will mate, and the shoulder portion of each flange of one section will fit in the seat in the opposite flange of the other, and vice versa, thus producing an interlocking

effect which serves to positively preclude any independent or relative movement of said sections with respect to each other.

The side walls of the pockets are composed in part by bosses 7 formed upon the sections 1 and 2, and in part by pairs of plows or scoops 8, which latter are likewise integral with said sections, and converge from their front to their rear ends. This construction and arrangement prevents compacting of the material in the lower portion of the grinding chamber by forcing such material inwardly toward the track D from opposite sides, the material being distributed evenly over the entire inner surface of said track directly in the path of the rolls F.

In order to provide for a removable mounting of the rolls, and to facilitate their insertion in and withdrawal from the pockets, each roll is formed with an axial bore 9, the diameter of which considerably exceeds that of the shaft 10, whereby it is carried, so that said rolls are enabled to rotate freely on their shafts and are, in addition, capable of a slight bodily movement thereon by centrifugal force during the rotation of the carrier. The shafts themselves are designed for attachment in a stationary manner in the pockets, to which end the bosses 8 of one section are formed with polygonal seats 11, which receive the correspondingly shaped ends 12 of said shafts, the other ends of the shafts fitting in seats 13 in the bosses of the opposite section, the latter seats being preferably, though not necessarily, cylindrical. It will be apparent, therefore, from the foregoing, that the sectional construction of the carrier enables it to be set up, and subsequently taken apart if injured, and also insures complete chilling of the pockets. Provision is also made in the same way for the ready positioning and removal of the roll shafts, and since said shafts are mounted in fixed position and are held against turning, the wear incidental to the operation of the mechanism and the centrifugal movements of the rolls is transferred to said shafts from the carrier, and the period of effective use of the latter is proportionately prolonged. Moreover, since the rolls are loose upon their shafts, it will be understood that injury to a roll will not, of necessity, affect its shaft and render the latter useless, and vice versa, as either part, when damaged, may be replaced by a new part at a comparatively slight cost. Finally, it will be observed that by reason of the production of the interlocking flanges, no bolts or similar fastening devices which tend to work loose under vibration need be employed.

We claim as our invention:

1. In a roller grinding mill, the combination, with a drive shaft, of a roll carrier secured on said shaft for revolution with the same and comprising a pair of separably-

connected sections having their inner faces formed with radially-arranged flanges, the flanges of each section being adapted to directly interlock with those of the other section.

2. In a roller grinding mill, the combination, with a drive shaft, of a roll carrier secured on said shaft for revolution with the same and comprising a pair of separably-connected sections having their inner faces formed with radially-arranged flanges projecting laterally therefrom, the flanges of each section being adapted to directly interlock with those of the other section.

3. A carrier for the rolls of a grinding mill comprising a pair of separably-connected sections having their inner faces formed with a plurality of lateral flanges provided with projections and depressions, the projections and depressions of the flanges of each section being adapted to directly interlock with those of the flanges on the other section.

4. A carrier for the rolls of a grinding mill comprising a pair of separably-connected counterpart sections having their inner faces formed with a plurality of radially-arranged flanges projecting laterally therefrom, the side face of each flange of each section being provided with longitudinal projecting and recessed portions arranged side by side and adapted to interlock with those of the corresponding flange on the opposite section.

5. A carrier comprising a pair of separably connected counterpart sections having their inner faces formed with radially-arranged lateral flanges, the flanges of each section being adapted to directly engage those of the other section, said sections being formed between said flanges with pairs of alining seats, a series of shafts extending between said sections and having their ends removably fitted in the seats therein, and a roll mounted on each shaft.

6. A carrier comprising a pair of separably connected counterpart sections having their inner faces formed with radially-arranged lateral flanges, the flanges of each section being adapted to directly engage those of the other section, said sections being formed between said flanges with pairs of alining seats, a series of shafts extending between said sections and having their ends removably fitted in the seats therein, and a roll removably mounted on each shaft.

7. A rotating carrier comprising a pair of separably-connected counterpart sections formed with mating cavities constituting pockets, a stationary shaft extending across each pocket, and a roll mounted on each shaft and provided with an axial bore the diameter of which greatly exceeds that of said shaft, whereby said rolls are supported substantially eccentrically on said shafts and

will be caused to move upon the same outwardly of said pockets by centrifugal force during the rotation of the carrier.

5 8. A carrier comprising a pair of separably-connected counterpart sections formed with mating cavities constituting pockets, the side walls of which are provided with alining seats, a stationary shaft extending across each pocket and having its ends re-
10 movably fitted in the seats therein, and a roll removably mounted on each shaft.

9. A carrier comprising a pair of separably-connected counterpart sections formed

with mating cavities constituting pockets, and with mating interlocking radial flanges 15 constituting the front and rear walls of said pockets, a shaft removably mounted in each pocket, and a roll mounted on each shaft.

In testimony whereof we have hereunto set our hands in presence of two subscribing 20 witnesses.

WILLIAM P. HARRIS.
JOSEPH R. JENKINS.

Witnesses:

C. E. CANFIELD,
E. W. BLAKE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
