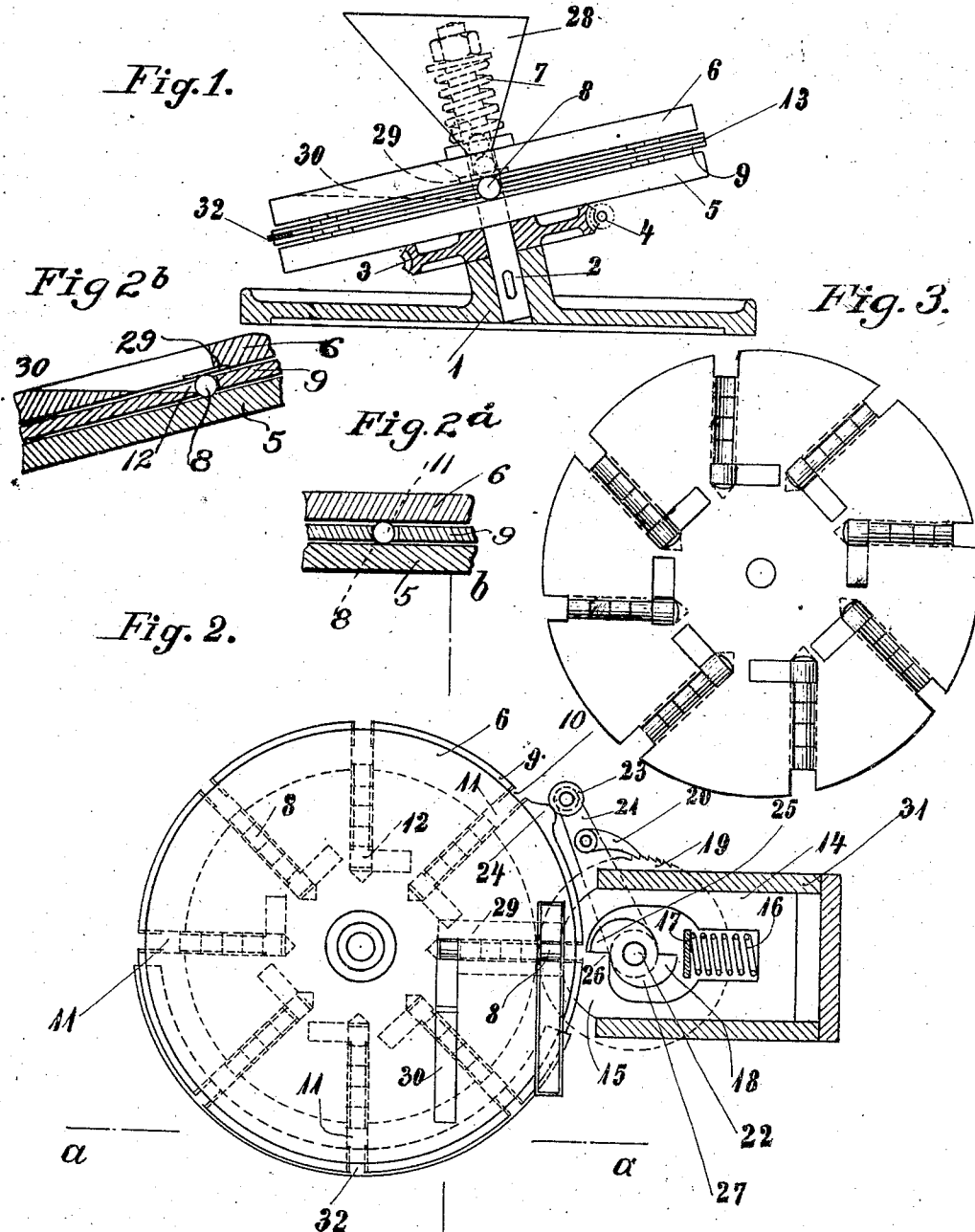


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MACHINE FOR GRINDING ROLLERS AND THE LIKE.
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1,033,021.

Patented July 16, 1912.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR GRINDING ROLLERS AND THE LIKE.

1,033,021.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOSEF KIRNER, a subject of the German Emperor, residing at Stuttgart, in the Empire of Germany, have invented certain new and useful Improvements in and Relating to Machines for Grinding Rollers and the Like, of which the following is a specification.

This invention has for its object a machine for grinding cylindrical rollers of as far as possible exactly the same diameter. The machine works by the rollers being revolved on their axes between two disks which are flat at the places where they come in contact with the rollers and one of which is formed as usual of metal and the other of an abrasive material, and at the same time altering their distance away from the center of the disks. The sliding friction necessary for grinding must arise in consequence of the difference in speed of the disks at the outer and inner ends of the cylindrical parts of the rollers.

An example of construction of the roller grinding machine is shown as an example in the accompanying drawings.

Figure 1 is a side view; and Fig. 2, a plan view of the grinding disks of the machine with an arrangement, drawn on an enlarged scale, for moving forward the rollers; Figs. 2^a and 2^b are sections on the lines *a-a* and *b-b* of Fig. 2; Fig. 3 is a plan view of a special form of construction of a cage guiding the rollers.

The machine frame 1 receives an inclined shaft 2 on which a grinding disk 5 of an abrasive material, operated by means of a worm wheel 3 and worm 4 loosely revolves, while a disk 6 made of metal does not rotate on the shaft 2 but may be displaced axially thereon under the action of a spring 7. The rollers 8 to be ground are guided in a cage 9 which is concentrically and also loosely mounted on the shaft 2 and provided with radial hollow walled slots 10, in which the rollers are held so as to be longitudinally displaceable after they have been introduced through an externally provided recess 11 in the edges of the slot holding the rollers. On the rotation of the disk 5 the rollers travel between the disks 5 and 6 which are pressed against them, the cage 9 being carried along in the same direction in which the disk 5 rotates, but at only half its speed of rotation. Now in order to prevent the rollers

forming grooves or flutings in the rotary grinding disk, they are gradually moved inward in the slots of the cage by means of a mechanism for pushing them forward. The cage is for this object provided on its outer ring with an annular slit or groove 13, in which can enter a slide 14 mounted in a casing 31, past the face 15 of which slide the outermost lying rollers, in slots in the cage. The longitudinal movement of the rollers between the two disks is facilitated by providing the stationary disk 6 with a shallow recess 29 at the place at which the pushing forward takes place. The slide 14 is on the one hand under the action of a spring 16 which bears against a plate 17 fixed in the casing 31 and, on the other hand, under the action of a cam disk 18, which is rotated by a ratchet wheel 19. The movement of the ratchet-wheel is produced by a pawl 20 on an arm 21 which is loosely mounted on the shaft 22 of the ratchet wheel and the cam disk 18, and carries at its outer end a roller 23 which at each revolution of the cage 9 is forced outward by its cam 24, after which it is again moved inward.

In the drawings it is assumed that in the perforation of the cage 9, which perforation faces the direction of movement, a new roller 8 has just been inserted. This is done in the following way:—The rollers of the pile of rollers coming in front of the slide or pusher 14 are gradually displaced inward by the pusher in its position shortly before the position shown, by means of the ratchet mechanism so that the outermost roller is completely moved from under the recess 11 of the edges of the slot. By the next oscillation of the arm 21 by the cam 24 the cam disk 18 is moved out of the position, which corresponds to the outermost position of the slide, so far that its tooth slips past the projecting shoulder 26 of the slide 14, whereupon the slide, under the action of the spring 16, snaps back into the position shown in Fig. 2 and bears with its shoulder against the rising upper face 27 of the next tooth of the cam disk. By this means an aperture, for the admission of the rollers, provided in the fixed upper disk 6 is uncovered and a roller passes out of the feed hopper 28, provided above the disk 6, through the recess 11 moved past beneath it, into the slot of the cage and on the fur-

ther rotation of the cage, a fresh roller then passes into each slot until all are filled afresh. When the rotation of the cage is completed the slide 14 is again pushed forward, a reciprocatory movement being made, at each fresh rotation of the cage, by the pawl arm 21 by means of the cam 24.

The rollers are removed from the cage 9 through an aperture 30 in the stationary disk 6, as soon as the rollers have been pushed by the slide 14 so far inward that the innermost rollers have come entirely within reach of the recesses 12 of the cage. On the rotation of the cage these recesses successively coincide with the aperture 30, so that the rollers after a given number of revolutions of the cage, drop out of themselves under the influence of gravitation, in consequence of the suitably inclined position of the disk 6. In order to prevent the rollers dropping out of the slots 10, a fixed ring 32 is provided in the lower part of the machine, which ring enters the recess 13 of the cage 9.

The inclined arrangement of the disks not only facilitates the construction of the arrangements for feeding and removing the rollers, but also facilitates the running off of the washing fluid carrying away the waste from the grinding. The action of the machine as a whole is not affected by arranging the disks somewhat differently, and it may therefore either be assumed, as in the present specification, that only one of the two disks rotates while the cage rotates at half the speed, or both disks may be rotated in opposite directions, in which case the cage remains stationary. The rollers are then pushed forward by a device which rotates with the rotating metal disk, and is thrown into action by encountering a catch 24. The axial movement of the rollers may also take place from the inside to the outside. Finally, the grinding action may also be increased by making the perforations of the cage not exactly radially but parallel with radii near the center, whereby the rollers are caused to slide longitudinally. Such a form of cage is shown in Fig. 3. As the friction of the rollers on the metal disk is less than on a disk formed of abrasive material, power for pushing forward the rollers is here also provided which is directed from the outside to the inside when the grinding disk has the direction of rotation indicated by an arrow in Fig. 3 and from the inside to the outside in the opposite direction of rotation. The pushing forward may therefore here be done automatically by the rotating disk and the feeding in and removal of the rollers is all that has to be provided for which operations may be done in similar manner to that employed in the form of construction of the roller grinding machine shown in Figs. 1 and 2. If both

disks, between which the rollers are rolled be made of metal, in which case the abrasive material must be supplied in pulverulent form, the automatic displacement of the rollers no longer takes place, because the rollers undergo equal friction on both sides from the disks. In this case in order to obtain automatic displacement, the friction of the two disks with the rollers must be different, for instance, by employing different metals for the disks.

I declare that what I claim is:—

1. In a roller grinding machine, the combination of two disks, means for rotating said disks relatively to each other, a cage between the disks adapted for holding and guiding rollers, or the like, and means separate from the disks for positively moving the rollers in the cage while the disks are operating thereon.

2. In a roller grinding machine, the combination of two disks, means for rotating said disks relatively to each other, a cage between the disks and having slots for holding and guiding rollers, or the like, and means separate from the disks for positively moving the rollers from the outer portions of the disk toward the central portions of the latter while the disks are operating thereon.

3. In a roller grinding machine, the combination of two disks, means for rotating said disks relatively to each other, a cage arranged between the disks having means for holding and guiding rollers, or the like, and a slide movable between the disks to positively move the rollers with respect to the cage while the disks are operating thereon.

4. In a roller grinding machine, the combination of two disks, means for rotating said disks relatively to each other, a cage arranged between the disks having means for holding and guiding rollers, or the like, a slide movable between the disks to positively move the rollers with respect to the cage while the disks are operating thereon, and mechanism operable by one of the disks for actuating said slide at predetermined intervals of time.

5. In a roller grinding machine, the combination of two disks, means for rotating said disks relatively to each other, and a cage concentrically mounted between said disks and having straight slots to receive and guide the rollers, or the like.

6. In a roller grinding machine, the combination of two disks, means for rotating said disks relatively to each other, a cage concentrically mounted between said disks and having straight slots to receive and guide the rollers, or the like, and means separate from the disks for positively moving the rollers in the slots of the cage while the disks are operating thereon.

7. In a roller grinding machine, the combination of two disks, means for rotating

said disks relatively to each other, means for introducing and removing the rollers into and out of the space between the disks, respectively, and means movable radially in the space between the disks for positively moving the rollers independently of the movement imparted thereto by the disks.

8. A roller grinding machine consisting of two disks, means for rotating these disks relatively to each other, a cage arranged between the said disks and having slots for holding and guiding the rollers, means for positively moving the rollers axially along the said slots, means for introducing and removing the rollers into and out of the cage.

9. A roller grinding machine consisting of two disks, means for rotating these disks relatively to each other, a cage arranged between the said disks and having slots for holding and guiding the rollers, there being a slit provided in the edge of said cage, a slide adapted to enter said slit and push rollers inward, means for introducing and removing the rollers into and out of the cage.

10. A roller grinding machine consisting of two disks, means for rotating these disks relatively to each other, a cage arranged between the said disks and having slots in the

cage for holding and guiding the rollers, there being a slit provided in the edge of said cage, a slide adapted to enter said slit and push rollers inward, a cam operated by pawl and ratchet gear for moving the said slide, means for introducing and removing the rollers into and out of the cage.

11. A roller grinding machine consisting of an upper stationary disk of metal, a lower rotating disk of abrasive material, means for rotating this disk, a cage arranged between the said disks, the cage having slots for holding and guiding the rollers and a slit in its edge, a slide adapted to enter said slit and push the rollers inward in the fixed metal plate being provided with a radial recess opposite the said slide to allow rollers to move freely, means for introducing and removing the rollers into and out of the cage.

In witness whereof, I have hereunto signed my name this 25 day of October 1910, in the presence of two subscribing witnesses.

JOSEF KIRNER.

Witnesses:

GUSTAV TAUSLY,
ADOLF BUOBY.