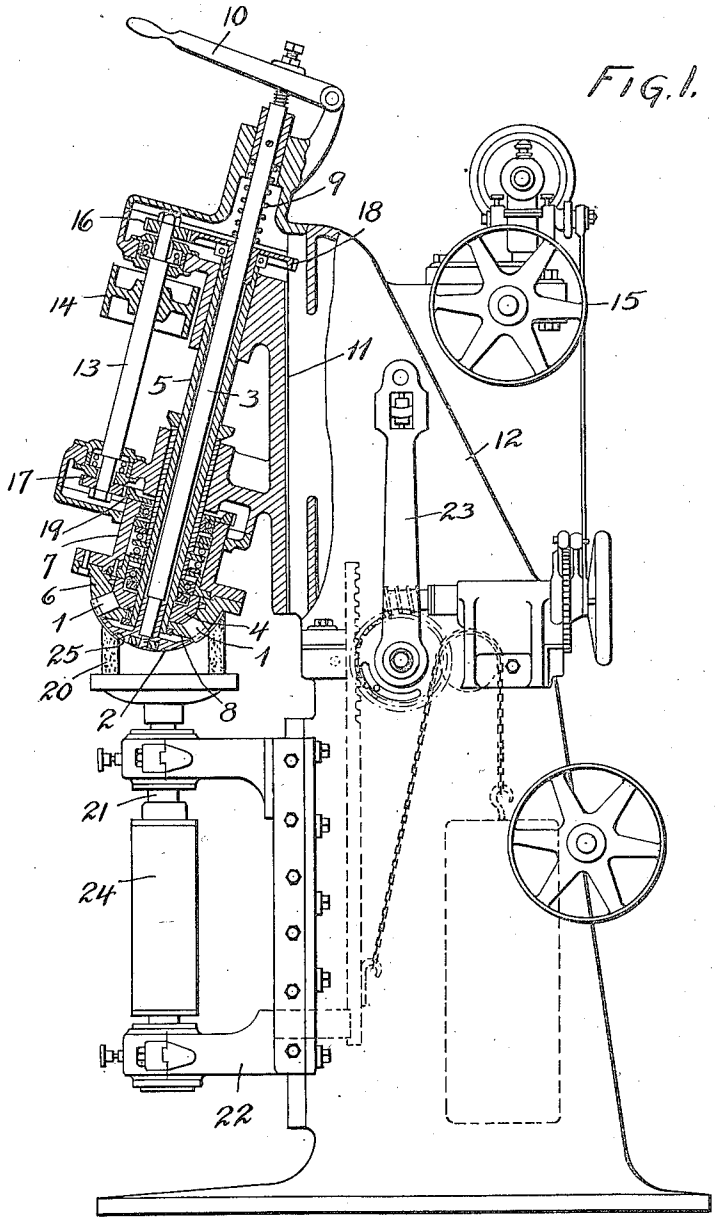
Feb. 12 , 1924. 1,483,754

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MÁCHINE FOR GRINDING ROLLERS HAVING AN ARC SHAPED GENERATRIX

Filed Aug. 24, 1920 2 Sheets-Sheet 1

FIG. 1.



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Fig. 2.

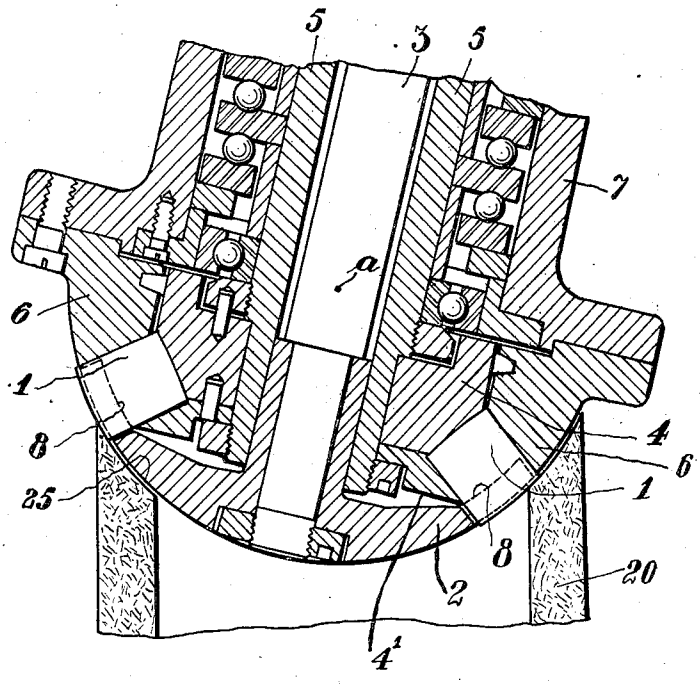
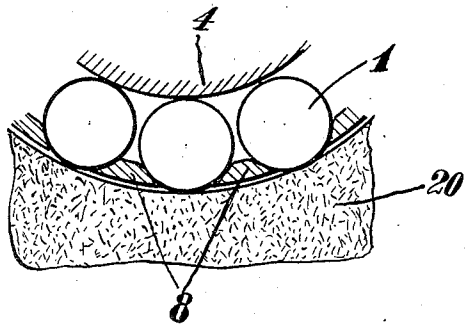


Fig. 3.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR GRINDING ROLLERS HAVING AN ARC-SHAPED GENERATRIX.

Application filed August 24, 1920. Serial No. 405,636.

To all whom it may concern:

Be it known that I, VICTOR ABRAHAM SVENSSON, a subject of the King of Sweden, residing in the city of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Machines for Grinding Rollers Having an Arc-Shaped Generatrix, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in machines for grinding rollers having an arc-shaped generatrix.

Machines of this kind are known in which the grinding operation is performed by means of a rotating grinding disc the working surface of which is curved in essential conformity to the arc-shaped profile of the rollers, the rollers being mounted, during the grinding operation, in a roller cage provided with pockets for retaining the rollers. In such machines the axis of the roller cage coincides with the axis of rotation of the grinding disc, the result being that the rollers are acted upon, during the grinding operation, by one and the same part of the working surface of the grinding disc. As the latter is generally worn unevenly, it is very difficult to grind rollers in machines of said kind with such exactness as is required for instance for roller bearings.

According to my present invention, the said drawback is avoided by an improved construction of the grinding machine.

The invention consists chiefly in the combination with a grinding machine of the kind above referred to, of a rotating grinding disk the working surface of which is formed in essential conformity with the arc-shaped profile of the rollers, a roller race the axis of which forms an angle with the axis of rotation of the grinding disc, and a roller cage rotatable in relation to the roller race and adapted to guide the rollers when rotating on said race during the grinding operation.

By this construction of the grinding machine, the grinding disc will be worn absolutely evenly and accordingly always maintain its exact profile in conformity with the arc-shaped generatrix of the rollers to be ground.

In the accompanying drawings I have shown an embodiment of my invention. Fig. 1 shows an elevation of my improved grinding machine partially in vertical section. Fig. 2 shows, on a larger scale, a sectional view of the roller race and cage. Fig. 3 shows a detail of the roller cage.

Referring to the drawings, 1 designates the rollers to be ground which are mounted in pockets of a roller cage and adapted to roll, during the grinding operation, on a substantially conical roller race. The roller cage consists of two parts, viz. a retaining and driving ring 2 which is connected to a central rotating spindle 3, and an outer guiding ring 6 connected to a sleeve 7 which is rotatably journalled on a stationary sleeve 5 by means of ball bearings. The roller race is provided on a ring made in two parts 4, 4′ and secured to the sleeve 5. The retaining and driving ring 2 is provided with fingers 8, see Figs. 2 and 3, which project between the rollers and bring the latter to partake in the rotation of the spindle 3. The parts 4, 4′ and 6, of which the parts 4, 4′ may be integral, have such a form that the transverse middle planes of the rollers all intersect each other in a common point *a* on the axis of the roller cage. The spindle 3 is not only rotatable but also movable in its longitudinal direction, and it is acted upon by a spring 9 which normally holds the spindle raised in the position shown in Figs. 1 and 2. By depressing a lever 10 acting upon the upper end of the spindle 3, the latter may be moved downwards, thus lowering the retainer 2 with its fingers 8 in relation to the parts 4 and 6. The rollers may then be easily put into the roller cage or taken out therefrom.

The roller cage and the race ring as a whole is vertically movable on guides 11 in the frame 12. Journaled in the roller cage is a shaft 13 which is parallel with the spindle 3, and keyed to the said shaft 13 is a pulley 14 driven by a belt (not shown in the drawings) from a pulley 15. Secured to the shaft 13 are also two gears 16 and 17 of equal size, the upper one meshing with a toothed wheel 18 on the spindle 3 and the lower one with a toothed wheel 19 on the sleeve 7. By said gearings, the driving ring 2 and the guiding ring 6 are rotated in the same direction and with equal velocity, the intermediate ring 4 being stationary.

The rollers 1 are in this manner caused to rotate about their own axes and at the same time rotate about the axis of the roller cage, or the spindle 3.

The grinding disc 20 is secured to a vertical shaft 21 journaled on a slide 22 which is movable up and down. Said slide may be manually lowered and raised in usual manner by means of a lever 23 and, moreover, it may be raised by means of an automatic feeding device. The grinding disc is caused to rotate by means of a belt roller 24. In the embodiment shown, the working surface 25 of the grinding disc is spherical, having its centre in the point a in which the axis of rotation of the grinding disc and the axis of the roller cage intersect each other under an obtuse angle. The outer surfaces of the rings 2 and 6 are also spherical, and the rollers 1 only slightly project outside the said surface and, therefore, have a good guiding in the roller cage.

When the rollers to be ground are to be introduced into the apparatus, the grinding disc is first lowered by means of the lever 23 to its lowermost position, then the driving ring 2 with its fingers 8 is lowered by lever 10 sufficiently for enabling the introduction of the rollers in the pockets of the roller cage, whereupon the lever 10 is released and the spring 9 raises the driving ring 2. The grinding disc 20 is then raised by means of the lever 23 against the rollers, whereupon the automatic feeding device is brought in operation and the machine is started. When the grinding disc 20, the driving ring 2 and the guiding ring 6 rotate, the rollers 1 are caused to rotate on the race of the stationary race ring 4. As the axis of the roller cage forms an angle with the axis of the grinding disc, the rollers perform in effect an oscillating movement (about the point a) in relation to the working surface 25 of the grinding disc, whereby the rollers obtain the desired exact form.

The machine above described may be modified in several ways without departing from the scope of the invention. If rollers having a concave peripheral surface are to be ground instead of barrel-shaped rollers, the grinding disc is disposed in such position in relation to the work that its working surface lies between the rollers and their centre of oscillation a, the roller cage being, obviously, modified in a corresponding manner.

What I claim is:—

1. Machine for grinding rollers having an arc shaped generatrix, comprising in combination, a rotary grinding disc having a curved working surface to act on the rollers and form said arc shaped generatrix, a race ring for holding the rollers with their peripheral surface presented to the curved working surface of the grinding disc, the axis of said race ring intersecting the axis of the grinding disc, and a roller cage adapted to cause the rollers to rotate relatively to the race ring during the grinding operation.

2. Machine for grinding rollers having an arc shaped generatrix, comprising in combination, a rotary grinding disc having a curved working surface to act on the rollers and form said arc shaped generatrix, and means for causing the rollers to roll during the grinding operation in contact with said curved working surface of the grinding disc, and in a path whose axis intersects the axis of the grinding disc.

3. Machine for grinding rollers having an arc shaped generatrix, comprising in combination, a grinding disc having a curved working surface to act on the rollers and form said arc shaped generatrix, a stationary race ring for holding the rollers with their peripheral surface presented to the curved working surface of the grinding disc, the axis of said race ring intersecting the axis of the grinding disc, and a rotary roller cage adapted to cause the rollers to roll on said race ring during the grinding operation.

4. Machine for grinding rollers having an arc-shaped generatrix, comprising a grinding disc, a race ring the axis of which forms an angle with the axis of the grinding disc, a roller cage for retaining the rollers against the said race ring and consisting of a retaining ring and a guiding ring, and means for driving the two latter rings with equal angular velocity in relation to the race ring.

5. Machine for grinding rollers having an arc-shaped generatrix, comprising a grinding disc the working surface of which is formed in essential conformity with the arc-shaped profile of the rollers, a stationary race ring for the rollers, the axis of which forms an angle with the axis of the grinding disc, a roller cage consisting of a retaining and driving ring and a guiding ring and means for axially displacing said retaining and driving ring in relation to the race ring and the guiding ring.

6. Machine for grinding rollers having an arc-shaped generatrix, comprising a grinding disc having a spherical working surface a race ring for the rollers the axis of which forms an angle with the axis of the grinding disc, and a roller cage adapted to retain the rollers against said race ring, during the grinding operation, and having a substantially spherical outer surface.

7. Machine for grinding rollers having an arc-shaped generatrix, comprising in combination, a rotary grinding disc having a curved working surface to act on the rollers and form said arc shaped generatrix, a holder for the rollers rotatable about an axis which intersects the axis of the grinding disc, said holder adapted to retain a plurality of rollers therein with their transverse

middle planes intersecting each other at a point coincident with the point of intersection of the axis of the holder with the axis of the grinding disc, said holder presenting the peripheral surface of said rollers to the curved working surface of the grinding disc and means acting on the rollers in the holder to cause them to rotate about their individual axes in the rotation of the holder about its axis.

In testimony whereof I have signed my name.

VICTOR A. SVENSSON.