May 20, 1952 F. P. HEGEMAN 2,597,795

GRINDING OF LONGITUDINALLY CURVED ROLLERS

Filed Sept. 22, 1948

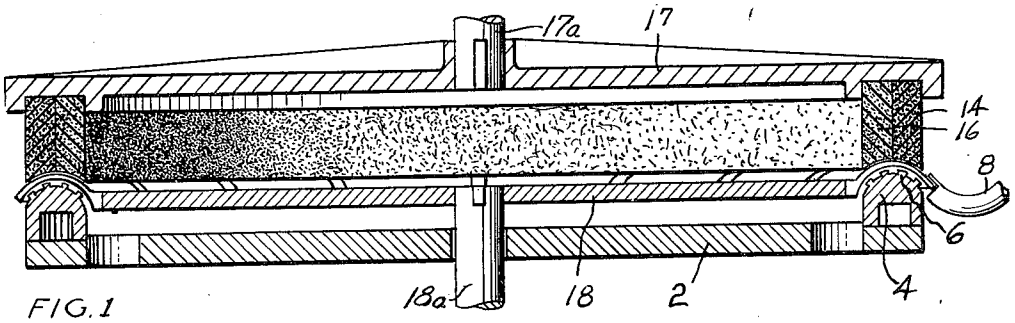



FIG. 1

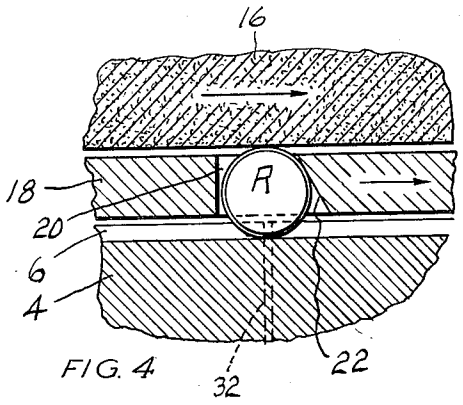



FIG. 4

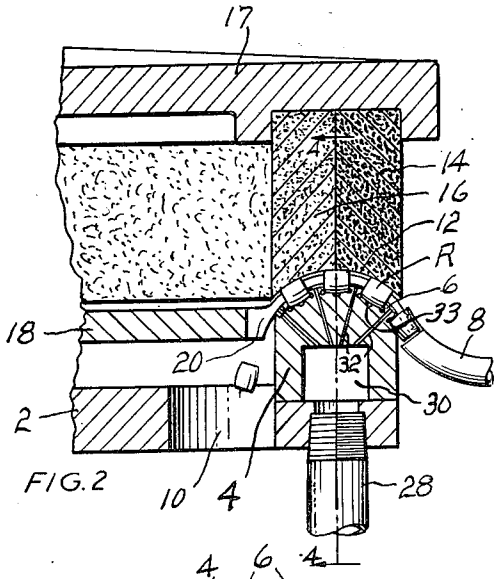



FIG. 2

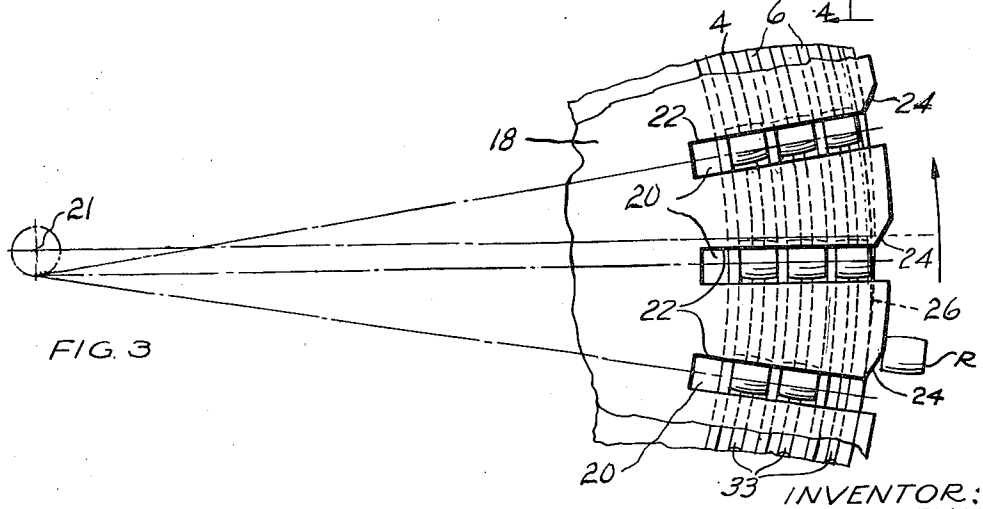



FIG. 3

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Patented May 20, 1952 2,597,795

# UNITED STATES PATENT OFFICE

2,597,795

## GRINDING OF LONGITUDINALLY CURVED ROLLERS

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Application September 22, 1948, Serial No. 50,505

8 Claims. (Cl. 51—130)

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This invention relates to the grinding of longitudinally curved rollers and is herein shown as embodied in a machine for grinding the peripheries of barrel-shaped rollers. An object of the invention is to provide an improved machine for grinding antifriction bearing rollers which are longitudinally curved. Another object is to provide a simple and efficient grinding machine for this purpose. To these ends and also to improve generally upon machines of this character, the invention consists in the various matters hereinafter described and claimed.

In the drawings,

Fig. 1 is a vertical sectional view of the general structure, some details being omitted.

Fig. 2 is a vertical section of a portion of Fig. 1 enlarged.

Fig. 3 is a diagrammatic view in plan of a portion of the apparatus.

Fig. 4 is an enlarged vertical section on the plane of line 4—4 of Fig. 2.

The numeral 2 indicates a stationary plate or disc on whose rim a work supporting ring 4 is fixed. The upper surface of the ring is shown as generally convexly curved from its outer periphery to its inner periphery, this surface being provided with a spiral thread or rib 6 having spaced convolutions which provides a roller guiding channel of spiral form. The bottom of the channel is transversely rounded to fit the rollers R which are urged forcibly endwise into the channel entrance through a curved supply pipe 8, the end of the pipe projecting upwardly to guide the rollers into the first convolution. After entry the rollers travel sidewise along the channel as they slowly move endwise across the stationary ring in a curved path and drop out through an opening 10 in the plate 2.

In the course of travel the longitudinally curved surfaces of the rollers engage an annular abrasive ring having a surface 12 which is curved concavely from its outer periphery to its inner periphery. Preferably the abrasive ring is formed in two concentric ring sections, an outer ring section 14 being of coarser abrasive grade than an inner section 16. The sections are secured to a rotary disc 17 driven by a shaft 17a for rotation coaxially of the work supporting ring 4 and at usual grinding speed in the direction indicated by the arrow in Fig. 4.

The speed of travel of the rollers around the stationary spiral track as they progress across and between the two curved rings is controlled by a cage plate or carrier 18 located coaxially of these rings by a driven shaft 18a, this carrier

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having its peripheral portion arched to clear the adjacent rings. The peripheral portion has a series of roller receiving slots 20 whose center lines do not intersect the axis of rotation 21 but are each slightly angled to a radius from the center line so as to lie perpendicular to the spiral rib. Thus the edges of each slot will engage the middle of each roller and tend to maintain the roller axis perpendicular to the spiral rib for better stability. One side wall of the spiral rib engages an end face of the roller and insures the gradual endwise advance of the rollers between the curved rings.

The leading edges 22 of the slots 20 are desirably bevelled as indicated in Fig. 4 so that, when the fast rotating grinding wheel tends to advance the roller sidewise ahead of the carrier, there will be a force urging the roller down. Slanting guide surfaces 24 at the ends of the slots facilitate entry of the rollers as each slot approaches the cusp 26 where the spiral thread fades out. It will be understood that the pressure of following rollers in the supply pipe 8 urges the last roller up against the outer edge of the carrier and causes the roller to enter a slot when a slot arrives in taking position. The end of the pipe is laterally open. The stationary ring, the grinding ring and the carrier have a common axis.

One or more pipes 28 lead to an annular fluid receiving chamber 30 in the stationary ring 4. At intervals around the ring, the chamber is connected by a series of ports 32 radiating outwardly through the spiral rib 6 to conduct cooling compound to the grinding zone. The curved bottom of the spiral channel is desirably relieved at the center as by a groove 33 for better guiding of the roller. The base of the spiral rib has little relief grooves to clear the corners of the rollers.

By way of example and without limitation, it may be stated that a carrier having 40 pockets and rotating at 8 revolutions per minute will deliver 320 rollers per minute. With three spiral turns under the curved grinding surface each roller will have 22½ seconds of grinding time. Assuming a mean diameter of 24 inches for the sectional grinding ring, the three turns of the spiral channel will have a total length of nearly 19 feet and antifriction rollers of usual diameter will rotate on their axes many times as they progress through the channel. For grinding longitudinally curved rollers of the waisted or hour glass type, the abrading surface would be made convex and the supporting ring generally concave.

I claim:

1. In a machine for grinding longitudinally curved rollers, a stationary ring, an annular surface thereon and generally curved in a radial direction from its outer periphery to its inner periphery, a spiral rib on said ring, a rotary abrading ring coaxial with the stationary ring, an annular abrasive surface on the abrasive ring and curved radially from its outer periphery to its inner periphery, a rotatably driven carrier having a curved peripheral portion radially extending between the rings, said peripheral portion having a series of roller receiving slots extending into it from its outer edge, and feeding mechanism for urging rollers into the open ends of the slots and between said rings as the carrier rotates.

2. In a machine for grinding longitudinally curved rollers, a stationary ring, an annular surface thereon and generally curved in a radial direction from its outer periphery to its inner periphery, a spiral rib having spaced convolutions on said ring, a rotary abrading ring coaxial with the stationary ring, an annular abrasive surface on the abrading ring and curved in a radial direction from its outer periphery to its inner periphery, said abrasive surface comprising a plurality of ring sections which are of different abrasive grades, and mechanism for relatively rotating the rings whereby a roller located between the rings will travel spirally around the stationary ring and across said ring sections.

3. In a machine for grinding the peripheries of rollers, a supporting ring, an annular surface thereon, a circumferentially extending spiral rib on said ring, a rotary abrading ring, an annular abrading surface on the abrading ring and formed in a plurality of ring sections coaxial of the supporting ring and which are of different abrasive grades, a driven carrier a peripheral carrier portion coaxial of and spaced between the rings and slotted inwardly from its outer edge, and feeding mechanism for urging rollers into the open ends of the slots as the carrier rotates.

4. In a machine for grinding the peripheries of rollers, a supporting ring, an annular surface thereon, a spiral rib having circumferentially extending convolutions on said ring, a rotary abrading ring, an annular abrasive surface on the abreading ring and coaxial with the supporting ring, a plate having a peripheral portion spaced between and coaxial with the rings, the peripheral portion having a plurality of slots each nonradially arranged with respect to the supporting ring to lie perpendicular to the spiral rib, mechanisms providing relative rotary movement between the plate and the supporting ring, and feeding mechanism for inserting rollers into the slots and against said rib.

5. In a machine for grinding the peripheries of rollers, a supporting ring, an annular surface thereon, a circumferentially extending spiral rib on said ring and projecting from said surface, a rotary abrading ring, an annular abrasive surface on the abrading ring and spaced from the supporting ring, a rotary carrier having a peripheral portion spaced between the rings, mechanism for relatively rotating the brading ring and the carrier, said peripheral portion having a series of open ended roller receiving slots, the leading edge of each slot terminating short of the periphery and being connected to the periphery of the carrier by a slanting surface, the trailing end of each slot extending to the periphery, and feeding mechanism for urging rollers endwise against the periphery of the carrier and against said slanting surfaces for endwise entry into the slots ahead of the trailing edges.



6. In a machine for grinding longitudinally curved rollers, a supporting ring, an annular surface thereon and generally curved in a radial direction between its outer and inner peripheries, a circumferentially extending spiral rib projecting from said annular surface, a rotatable abrading ring coaxial with the supporting ring, an annular abrasive surface on the abrading ring and spaced from said supporting ring surface and curved in a radial direction from its outer periphery to its inner periphery, mechanism for rotating the abrasive ring, and mechanism to feed rollers against the spiral rib and between said rings whereby the rollers will be peripherally ground while rotatably advancing in a spiral direction around the supporting ring.

7. In a machine for grinding longitudinally curved rollers, a supporting ring, an annular surface thereon and curved in a radial direction between its outer and inner peripheries, a spiral rib on the ring and extending circumferentially of said surface, a rotatable abrading ring mounted in coaxial relation to the supporting ring, an annular abrading surface on the abrading ring and spaced from said supporting ring surface and curved in a radial direction between its outer and inner peripheries, mechanism providing relative rotation between said rings, a rotatable cage having an annular portion curved radially thereof and extending between and spaced from said rings, said annular portion being provided with roller-receiving slots having open ends at the cage periphery, mechanism providing relative rotation between the cage and the supporting ring, and feeding mechanism for inserting rollers endwise into the open ends of said slots and between said rings.

8. In a machine for grinding longitudinally curved rollers, a stationary ring, an annular surface on said ring generally curved in a radial direction between its outer and inner peripheries, a circumferentially extending spiral rib on the ring, a rotatable abrading ring coaxial with the stationary ring, an annular abrasive surface on the abrading ring and curved in a radial direction between its inner and outer peripheries, mechanism providing relative rotation of said rings, and feeding mechanism presenting rollers between said rings and against the rib whereby the rollers will travel in a spiral direction around the stationary ring and across the curved surface of the abrading ring.

FRANKLYN P. HEGEMAN.


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