April 29, 1930. R. D. STREBY 1,756,014

LAPPING TOOL

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Fig. 1.

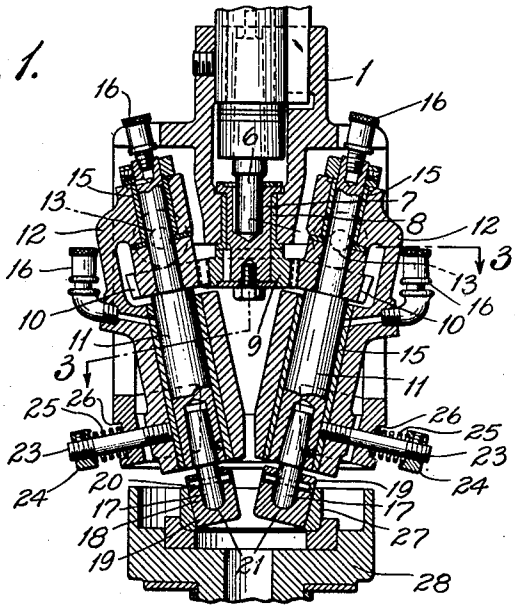


Fig. 2.

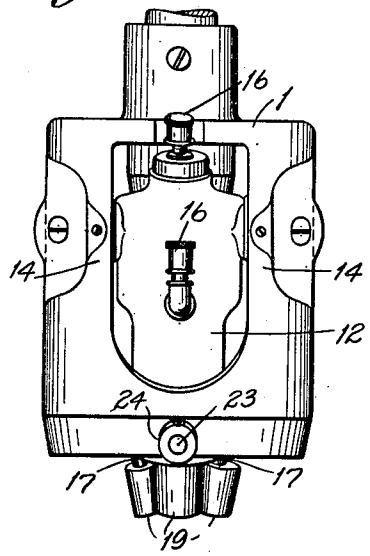


Fig. 4.

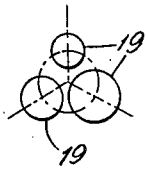


Fig. 3.

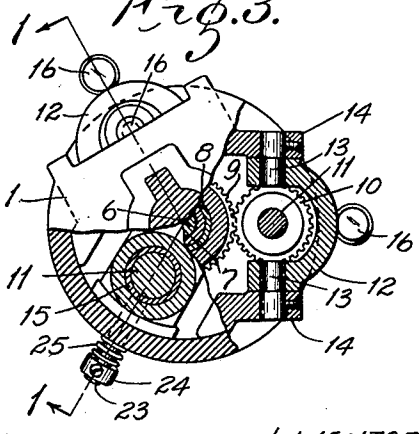
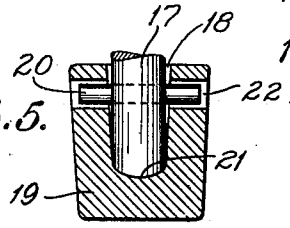


Fig. 5.



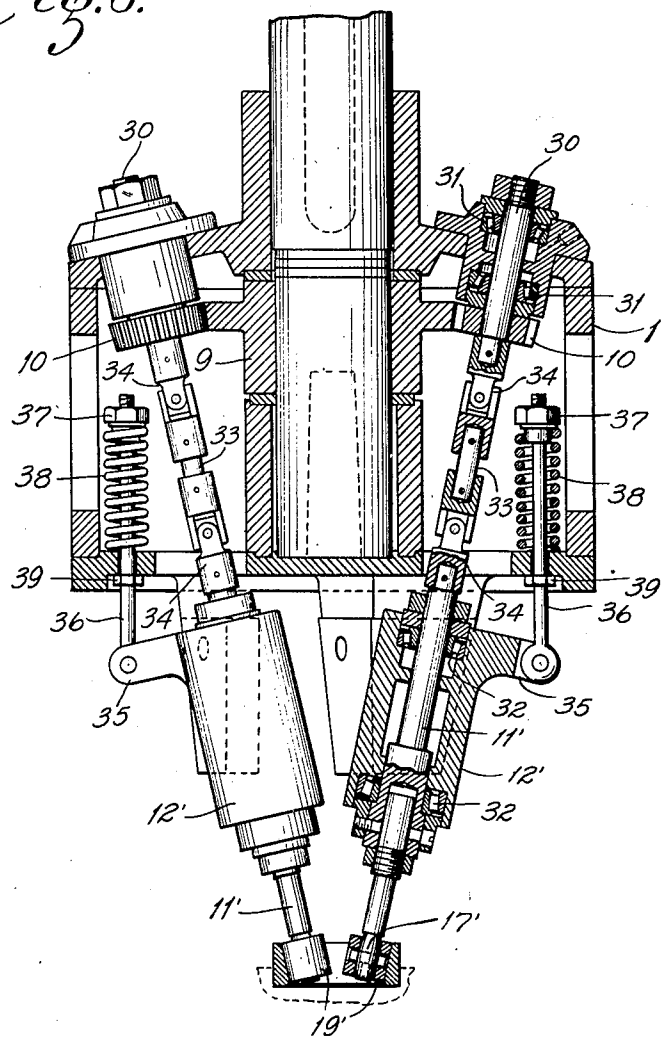
INVENTOR:
Ray D. Streby,
by Carr & Carr & Gravely,
HIS ATTORNEYS

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Fig. 6.



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Patented Apr. 29, 1930 1,756,014

UNITED STATES PATENT OFFICE

RAY D. STREBY, OF CANTON, OHIO, ASSIGNOR TO THE TIMKEN ROLLER BEARING COMPANY, OF CANTON, OHIO, A CORPORATION OF OHIO

LAPPING TOOL

Application filed March 11, 1929. Serial No. 345,941.

My invention relates to lapping tools or machine attachments for lapping the inner or outer surface of annular articles such as cups and cones for roller bearings. It has for its principal object to produce a slipping of the work with respect to the lapping member whereby the work is given an excellent finish. Further objects are the provision for self-alinement of the lapping tool (or tools) to accommodate itself to irregularities in the work, yieldable means for holding the lapping tool against the work and providing different peripheral speeds for each of a pluraltiy of lapping members. Further objects and advantages will appear hereinafter.

The invention consists principally in rotatably supporting each of a plurality of lapping members in a tubular head, pivotally mounting each of said heads in a supporting frame and arranging them in a circular series, providing spring devices for pressing the lapping tools against the work and giving each lapping member a peripheral speed different from the speeds of the other lapping members, either by using lapping rolls of different sizes or by providing each lapping member with a special drive means giving it a different speed of rotation from the speeds of the other lapping members. The invention further consists in the lapping tool and in the parts and combinations and arrangements of parts hereinafter described and claimed.

In the accompanying drawing,

Fig. 1 is a longitudinal sectional view of a lapping tool embodying my invention, showing the device arranged to lap the inner surface of a roller bearing cup taken on the line 1—1 of Fig. 3;

Fig. 2 is a side elevation;

Fig. 3 is a part top plan, part horizontal sectional view on the line 3—3 in Fig. 1;

Fig. 4 is a diagrammatic end view of lapping rolls of three different sizes;

Fig. 5 is an enlarged sectional view of one of the lapping rolls; and

Fig. 6 is a longitudinal sectional view of a slightly modified form of the invention.

A supporting frame 1 is non-rotatably secured to a suitable machine having a rotary drive spindle 6 whose end portion extends through the central bore of said supporting frame. A cap 7 mounted on the end of said rotary spindle extends through a suitable bushing 8 in said frame and its projecting end has a gear 9 secured thereto.

Said gear 9 meshes with all of a plurality of gears 10 (three being shown in the drawing). Each gear 10 is mounted on a spindle 11 that extends through a tubular supporting member or hanger 12 that is provided with projecting trunnions 13 that are mounted in projecting arms 14 of said frame. Suitable bushings 15 are provided for both ends of said spindles 11 and lubricant cups 16 are provided therefor.

Each spindle 11 is provided with a shank portion 17 at its outer end and each shank portion extends into the axial bore 18 of a lapping roll 19, the roll being secured to the shank 17 by means of a pin 20. Preferably, the end wall of each roll bore is formed into a concave seat 21 and the tip of each shank 17 is correspondingly convexly curved, the bore 18 of each roll 19 tapers and the roll holes 22 through which the securing pins 20 pass are larger than said pins; so that each lapping roll is permitted a rocking or self-aligning movement on its support.

Screwed into the side of each tubular hanger 12 near the lower end thereof is one end of a pin 23 threaded at each end. Each pin 23 extends through a hole provided therefor in the outer end of the supporting frame 1. A nut 24 is screwed onto the outer end of each pin 23 and a spring 25 is mounted on each pin between said nut and the supporting frame, a countersunk depression 26 being preferably provided in the frame to receive each spring 25. Thus said springs 25 tend to force the outer ends of the hangers 12 (and hence the lapping rolls 19) radially outward so as to force the lapping rolls against the work.

The work, such as a bearing cup 27 or other annular member having a conical bore, is mounted in a suitable support 28 that is free to rotate, but is not provided with a direct drive means.

In the lapping operation, the supporting frame 1 is moved endwise so as to bring

the lapping rolls 19 into engagement with the inner surface of the bearing cup 27 and the drive spindle 6 is rotated so as to rotate all the lapping roll supporting spindles 11. In the construction illustrated in Figs. 1 to 4, each lapping roll 19 is of a different size from the other lapping rolls so that each will have a different surface or peripheral speed from the others. As all of the rolls are in engagement with the surface of the work, the work is rotated as the result of the engagement of the rolls therewith, but slippage takes place as between the work and said rolls, the work being driven at any one time by only one roll and the other two rolls slipping. This slipping action produces the desired lapping of the work. Ordinarily some abrasive substance is used to assist in the lapping.

If desired, the supporting frame 1 may be reciprocated during the lapping operation; and the rolls 19 are free to accommodate themselves to any slight inaccuracies in the surface of the work.

In the modified construction shown in Fig. 6, the gear 9 on the end of the drive spindle meshes with three gears 10′, each having a different number of teeth; so that the lapping rolls 19′ (which in this case may all be of the same size) are positively driven at different speeds. Said Fig. 6 discloses other features of construction that are somewhat different from the construction above described. The gears 10′ are each secured to a short shaft 30 that is mounted in antifriction bearings 31 in the supporting frame 1′. Each lapping roll 19′ is mounted on a pin 17′ that is disposed in the end of a spindle 11′ that is mounted in antifriction bearings 32 in a hanger 12′. Said hanger is journaled at the bottom of said supporting frame 1′. Said shaft 30 and spindle 11′ are connected by an intermediate connecting member 33 that has swivel or universal joint connections 34 therewith, so as to accommodate the slight rocking movement of the lapping roll hangers 12′ without interfering with the drive of the lapping rolls. Each lapping roll hanger 12′ has a projecting portion 35 to which is pivotally secured a rod 36 that extends through a hole in the lower portion of the supporting frame 1′. On the threaded upper end of each rod 36 is a nut 37 and a coil spring 38 is mounted on the rod between said nut and the supporting frame. The upward pressure of said spring tilts the hanger so as to force the lapping roll at the lower end thereof outwardly against the work. The movement of the hanger is limited (and adjusted) by means of a nut 39 threaded on the rod and adapted to engage the underside of the supporting frame.

Obviously the device is capable of lapping devices with cylindrical or other shaped bores and it may also be arranged to lap the outer surface of annular articles. Numerous changes may be made without departing from the invention and I do not wish to be limited to the precise construction shown.

What I claim is:

1. A lapping tool comprising, in combination, a supporting frame, a plurality of hangers pivotally supported on said frame, a shaft rotatably mounted in each hanger, a lapping roll at the end of each shaft, said lapping rolls being conically disposed and arranged in a circular series whereby they are adapted to lap the inner surface of articles having a conical bore, spring devices engaging said hangers to force said lapping rolls against the work and means for rotating said shafts.

2. A lapping tool comprising, in combination, a supporting frame, a plurality of hangers pivotally supported on said frame, a shaft rotatably mounted in each hanger, a lapping roll at the end of each shaft, said rolls being so mounted on said shaft that they are free to rock to accommodate themselves to the work, said lapping rolls being conically disposed and arranged in a circular series whereby they are adapted to lap the inner surface of articles having a conical bore, spring devices engaging said hangers to force said lapping rolls against the work, and means for rotating said shafts.

3. A lapping tool comprising, in combination, a supporting frame, a plurality of hangers pivotally supported on said frame, a shaft rotatably mounted in each hanger, a lapping roll at the end of each shaft, said lapping rolls being conically disposed and arranged in a circular series whereby they are adapted to lap the inner surface of articles having a conical bore, spring devices engaging said hangers to force said lapping rolls against the work, and a gear meshing with all of said first mentioned gears to drive them, said roll driving shafts having swivel joint portions intermediate their ends to accommodate swinging movement of said hangers without interfering with the drive of the roll shafts.

Signed at Canton, Ohio, this 6th day of March, 1929.

RAY D. STREBY.