March 4, 1930. G. R. MAUPIN 1,748,959

DEVICE FOR FINISHING CYLINDRICAL SURFACES

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Fig. 3.

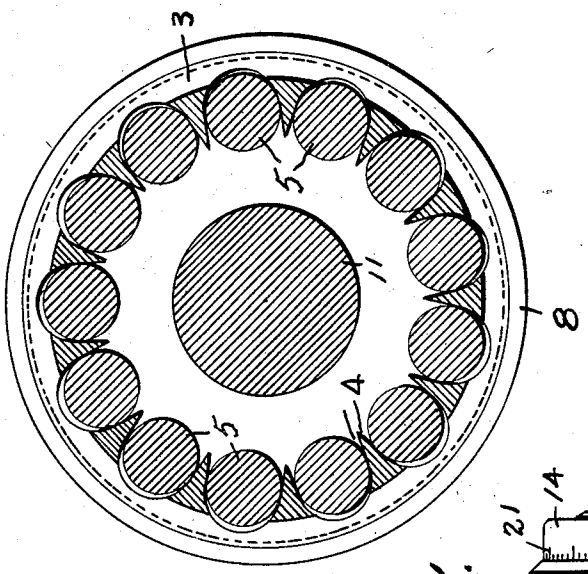


Fig. 1.

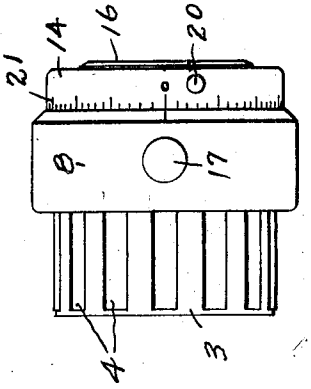
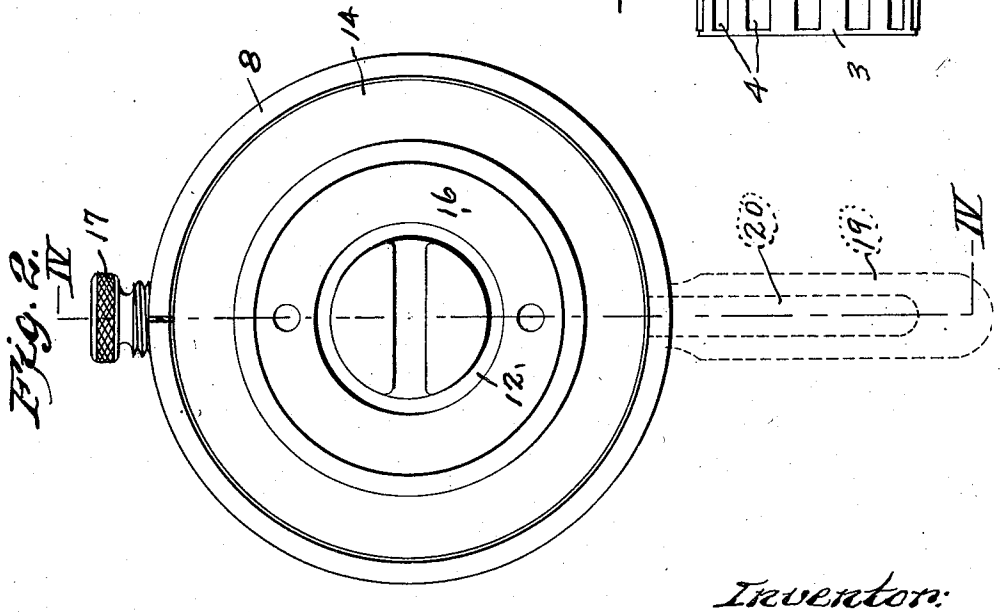


Fig. 2.



Inventor:
Graves R. Maupin.
By Edward E. Langan
Atty.

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Fig. 5.

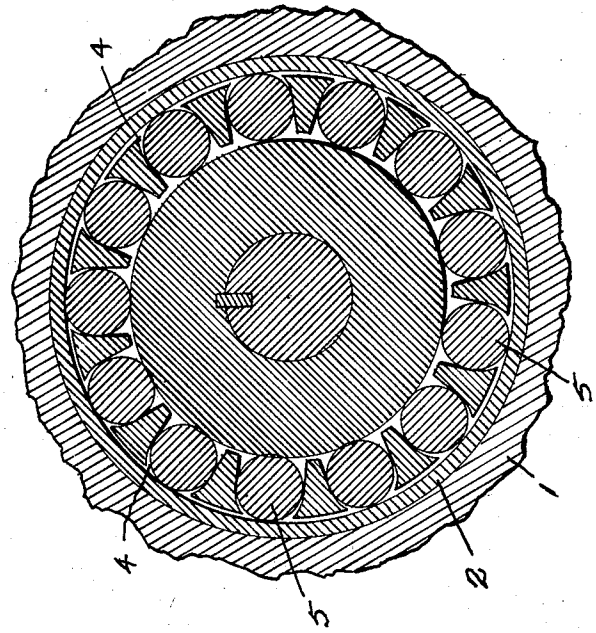
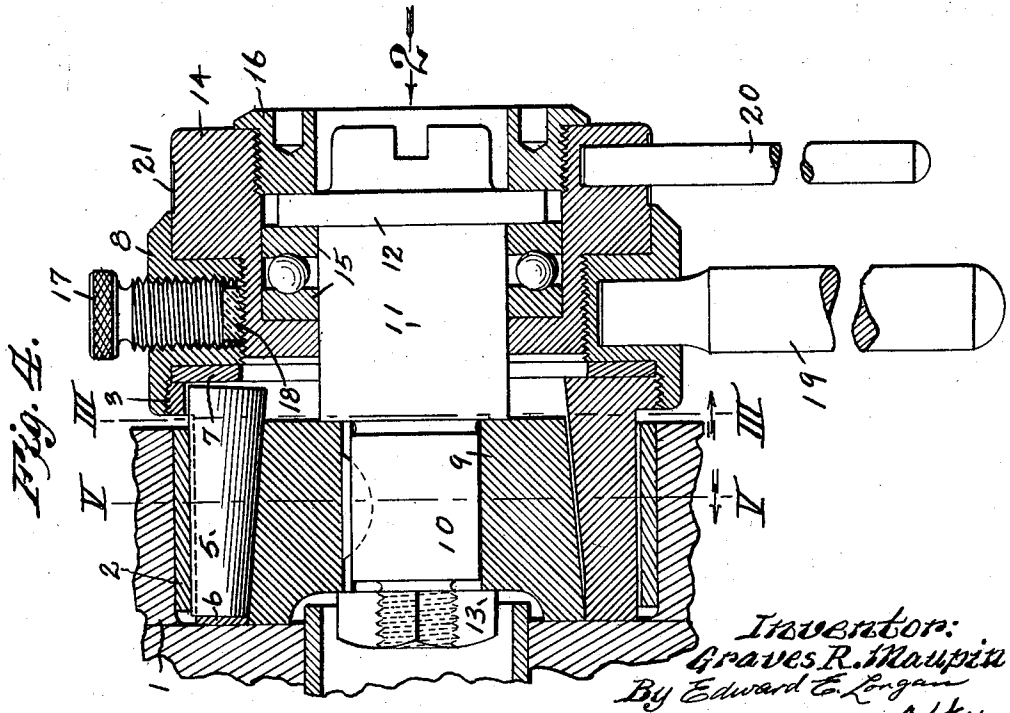


Fig. 4.



Inventor:
Graves R. Maupin
By Edward E. Logan
Atty.

Patented Mar. 4, 1930 1,748,959

UNITED STATES PATENT OFFICE

GRAVES R. MAUPIN, OF MOBERLY, MISSOURI

DEVICE FOR FINISHING CYLINDRICAL SURFACES

Application filed October 19, 1928. Serial No. 313,628.

My invention relates to improvements in a device for finishing cylindrical surfaces, and has among its objects the construction of such a device which shall be simple, convenient, compact, easy to use, accurate, and efficient and satisfactory for use wherever found applicable.

A further object of my invention is to provide a device of the kind described, which shall be operable to smooth or otherwise finish a cylindrical bearing surface, and more particularly triple valve piston bushings, without the necessity of the device being moved axially therealong, after the device has been arranged in place to engage said cylindrical bearing surface.

A further object of my invention is to construct a device of the character set forth, said device being provided with means for increasing the effective diameter of the bearing-engaging surfaces, and with means for accurately controlling the degree of such adjustment.

Other objects of my invention are to construct a device of the kind described, which can be used for not only smoothing out and finishing these cylindrical bearing surfaces, but which will toughen or harden them and improve them for the purpose for which they are to be used.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art to which this invention appertains, from the disclosures herein given.

To this end, my invention consists in the novel arrangement, construction and combination of parts herein shown and described and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts throughout the views.

Figure 1 is a plan view of my improved device;

Figure 2 is a side elevation of the same;

Figure 3 is a cross-sectional view, taken substantially along the line III—III of Fig. 4;

Figure 4 is a cross-sectional view taken substantially along the line IV—IV of Fig. 2; and

Figure 5 is a cross-sectional view taken substantially along the line V—V of Fig. 4.

In the drawings, wherein I have illustrated the preferred embodiment of my invention, there is shown a portion of any desired mechanism 1, such as a railway triple valve, pump, or in fact a mechanism of any nature, and having a cylindrical bearing surface which may be formed directly from the material out of which the mechanism is constructed, or as a separate element as shown at 2.

These cylindrical bearing surfaces must be very carefully maintained smooth and perfectly cylindrical so as to most efficiently perform their intended functions. If they become scored or lined, or in any other way become cut or defective, they must be re-surfaced to true dimensions.

My improved device is intended not only for originally truing up these cylindrical surfaces, but for renewing such surfaces after they have become worn or are otherwise defective.

As shown, a cage element 3 is provided, formed with a plurality of circumferentially spaced openings or slots 4 around its outer periphery and adapted to rotatably receive the roller elements 5 therein. A pair of end or thrust rings 6 and 7 may be provided to co-operate with the outer and inner ends of the rollers. A carrier member or element 8 is constructed to removably receive the cage element, preferably by having threaded engagement therewith, the inner thrust ring 7 fitting between the parts 3 and 8 as shown.

The roller elements are preferably long enough to bear upon and engage with the full axial length of the bearing surface to be finished or otherwise treated, so that after the tool has been placed in operative position, it need not be moved axially of such cylindrical bearing surface, and hence the work may be more easily and quickly performed, and without the danger of forming grooves or ridges or other uneven surfaces on such bearings.

A tapered mandrel or wedge member 9 is arranged to operate within the hollow cage

element, said mandrel preferably having a tapered outer surface, engageable with the roller elements. Obviously, if the rollers are held in contact with the cylindrical surface to be treated, and against axial movement, any longitudinal movement of the mandrel (to the right in Fig. 4) must necessarily actuath these rollers radially outwardly to increase their effective working radius and cause them to press more firmly against the cylindrical bearing surface 2.

The mandrel is provided with a keyed opening therethrough so as to fit upon one end of a shaft 10, said shaft having an enlarged section 11 adjacent the portion 10, and a radial enlargement or flange 12 beyond said portion 11. The mandrel is held in place against axial, as well as rotative, movement relatively of the shaft, between the shoulder provided at the end of the shaft section 11 and a nut 13. In this manner any movement of the mandrel will be transmitted directly to the shaft.

A collar element 14 is preferably threadedly engageable with the element 8 so as to have rotative movement relative thereto when desired, said collar being bored to slidably receive the portion 11 of the shaft. A thrust bearing 15 may be interposed between the flange 12 of the shaft and the collar element, and an end plug or closure member 16 is preferably threaded to engage with the collar and to abut the flange 12, to thereby clamp the collar against movement axially of the shaft, while permitting movement rotatively thereof.

The parts 8 and 14 may be detachably interlocked against any relative movement, by any suitable means, as by providing a set screw aperture in the element 8, into which opening the set screw 17 may be inserted to engage with the part 14. If desired, a piece of compressible material 18 may be interposed between the set screw and the part 14 so that the latter will not become injured at the point of securement between the two.

The operation of the device is as follows:

The tool is inserted into the opening at the cylindrical bearing surface, as shown in Fig. 4, so that the roller elements engage with the cylindrical bearing surface. At this point, it is again noted that the entire axial length of the bearing surface is engageable by the rollers, so that after the tool has once been inserted in place, it is not necessary to feed it along such cylindrical bearing surface.

The tool is then turned so that the rollers roll along the bearing surface 2, the member 8 being provided with a handle-receiving opening at some point thereon for a removable operating handle 19.

As soon as the rollers roll easily and smoothly along the bearing surface, the set screw 17 may be loosened and the collar moved in a direction away from the part 8, (to the right as shown in Fig. 4) while holding the part 8 fixed. This movement of the collar, relatively of the part 8, may be accomplished by any suitable tool, as by providing a removable bar 20 to engage with the collar, and such movement will actuate the shaft outwardly of the bearing being finished, such movement causing the mandrel carried thereby to move together therewith, and the roller elements will be actuated radially outwardly by the movement of the mandrel outwardly of the bearing surface, after which the set screw may be retightened and the member 8 rotated again.

When the effective rolling diameter of the rollers have been increased to the desired extent, the carrier member 8 may again be oscillated to smooth the bearing surface, this operation of backing out the mandrel and smoothing of the bearing surface being repeated as often as is necessary.

In order to accurately control the amount of expansion of the rollers, a micrometer scale 21 may be provided between the co-operating elements 8 and 14, somewhat as shown, and whereby any predetermined amount of adjustment between the elements may be had.

Having thus described my invention, it is obvious that various immaterial changes may be made in the same; hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described, or uses mentioned, except as limited by the claims.

An important feature of my present device is that it is the cage and not the mandrel which is rotated. However the mandrel does turn through the friction of the rollers but in the opposite direction to which the cage is turned, so that there will be no sliding of the expanding rollers on the mandrel. As before pointed out, my present device is intended primarily for refinishing the bushings of triple valves, such as are used in connection with brake cylinders on locomotives, railway and rolling stock, and is intended primarily, as aforesaid, to refinish the piston cylinder bushings which have become scored in any manner and without removing any metal whatsoever from these bushings. In other words, by the use of my device any score marks or grooves, which are formed during the operation of the valve, are ironed out so that no removal of metal is necessary.

Having fully described my invention, what I claim is:—

1. An apparatus of the kind described, comprising a cage member, a plurality of rollers rotatably mounted therein at spaced points thereabout, a tapered expander contacting with said rollers, a shaft carrying said expander and fixed thereto, a removable handle for rotatably operating said cage member, a size-adjusting means provided with a size in-

dicating gauge rotatably mounted in said cage member and adjustably movable relative to said cage, and a removable bar for adjusting said last-mentioned means to move the shaft and expander carried thereby longitudinally, whereby said expander will actuate said rollers radially.

2. A device of the class described comprising a rotary cage member, a detachable handle carried by said member, spaced apart tapered rollers slidably carried by said cage and adapted to be projected beyond the periphery thereof, a tapered member located within said cage and contacting with said rollers, a rotatable shaft for supporting said tapered members, a screw threaded element carried by said cage for supporting said shaft, and a removable bar carried by said threaded element for rotating the same independently of the cage for moving said element longitudinally of the cage whereby said tapered member is moved longitudinally and said tapered rollers bodily moved outward.

3. A device of the class described comprising a rotary cage member, a detachable handle carried by said member, spaced apart tapered rollers slidably carried by said cage and adapted to be projected beyond the periphery thereof, a tapered member located within said cage and contacting with said rollers, a rotatable shaft for supporting said tapered members, a screw threaded element having a micrometer gauge thereon carried by said cage for supporting said shaft, and a removable bar carried by said threaded element for rotating the same independently of the cage for moving said element longitudinally of the cage whereby said element and tapered members are simultaneously moved longitudinally and said tapered rollers bodily moved outward.

In testimony whereof I have affixed my signature.

GRAVES R. MAUPIN.