Oct. 22, 1929. H. J. DUERNBERGER 1,732,967

CYLINDER LAPPING TOOL

Filed Jan. 19, 1926

Fig. 1.

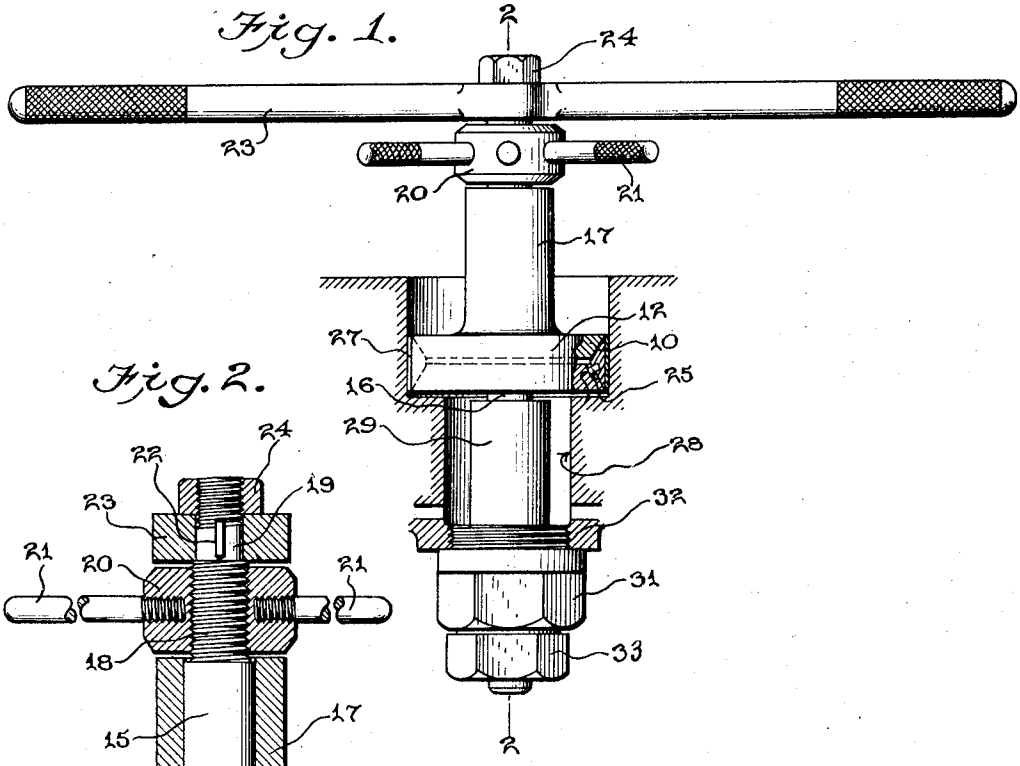


Fig. 2.

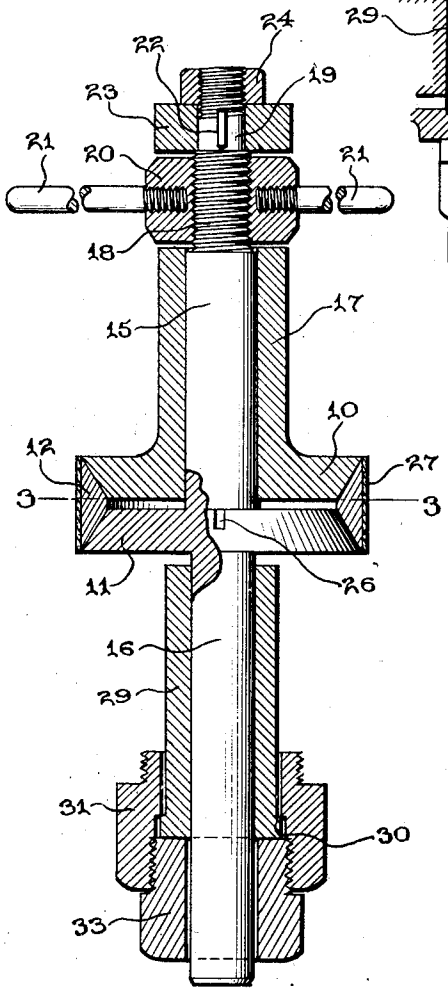
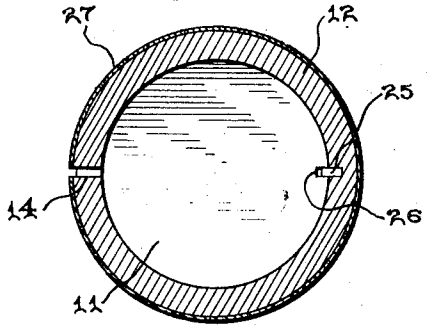


Fig. 3.



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UNITED STATES PATENT OFFICE

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CYLINDER-LAPPING TOOL

Application filed January 19, 1926. Serial No. 82,303.

The object of the invention is to provide a device particularly adapted for truing worn cylinders, such as those of internal combustion engines, distributing valves of air brake systems, and similar apparatus; to provide a construction in which the adjustment of the grinding or abrading member is instantaneous and susceptible of being made during the truing operation; to provide a guiding means for the tool or appliance so that the grinding or abrading member may be assured being held in axial alignment in the cylinder being operated upon; and to provide a construction in which the number of essential parts is reduced to a minimum, thereby reducing the cost of production of the tool and making it possible to market it at a low price.

With this object in view, the invention comprises a construction and arrangement of parts of which a preferred embodiment is illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevational view of the tool shown in operative position, the cylinder being operated upon being indicated in section.

Figure 2 is a central vertical sectional view on the plane indicated by the line 2—2 of Figure 1.

Figure 3 is a transverse sectional view on the plane indicated by the line 3—3 of Figure 2.

The grinding head of the tool consists of the complemental disks 10 and 11 and the interposed grinding ring 12. The disks are peripherally beveled toward their facing sides to provide seats for the grinding ring which is similarly beveled on its inner periphery and in opposite directions from the center. The ring 12 is split, as indicated at 14, and may, therefore, be diametrically expanded by the movement of the disks toward each other, the beveled edges of the disks sliding on the oppositely beveled interior faces of the ring.

While in the illustrated embodiment of the invention, the disk 11 is shown as an integral part of its stem 15, it is obvious that it may be a separate part from the stem and secured to the latter by a shrinking or forced fit or by an appropriate key. The essential thing is that it be fixed on the stem 15 which is extended below the disk to provide a guide pilot 16. The disk 10 is an integral part of the sleeve 17 which is disposed in surrounding relation to the stem 15 and is loosely mounted thereon, relative axial movement between the two being necessary to effect the expanding operation of the grinding ring 12. Relative angular movement of the sleeve and stem may or may not be prevented, as desired.

The stem 15 at the upper end is diametrically reduced and exteriorly threaded, as indicated at 18, and is further diametrically reduced, as indicated at 19. On the threaded portion 18 there is carried the adjusting nut 20 provided with a plurality of actuating radially disposed pins 21 constituting grips for the fingers by which the nut may be rotated. The nut having an abutting engagement with the upper end of the sleeve 17, will, when rotated in one direction, serve to advance the sleeve 17 along the stem 15 and therefore move the disk 10 toward the disk 11, thus serving to diametrically expand the grinding ring 12. Recession of the nut by a reverse turning movement of the grips 21 will permit the sleeve 17 to recede, the resiliency of the grinding ring 12 serving to diametrically contract it and therefore effect the relative separating movement of the disks 10 and 11.

The reduced portion 19 of the stem is provided with a key 22 engaging a keyway in the eye of a handle member 23 which is detachably secured to the stem by means of a nut 24 engaging the threaded extremity of the reduced portion 19 and abutting the top of the eye of the handle. When attached, the handle 23 is designed to impart angular or turning movement to the stem, and the key 22 serves as a positive lock to prevent relative angular movement between the handle and the stem. Therefore, when attached, the rotation of the handle will serve to rotate the stem and with it the disks 10 and 11 and the grinding ring 12, the latter being secured against relative turning movement with respect to the disk 11 which is fixed to the stem 15 by means of a depending pin 25 engaging

a slot or recess 26 in the upper face of the disk 11. Thus, the grinding ring being locked to the disk 11 and the latter fixed to the stem, the grinding ring must turn upon angular or turning movement of the handle 23, and the desired radial extent of the outer surface of the grinding ring is secured by the proper adjustment of the nut 20.

The peripheral surface of the grinding ring is covered with an abrading substance, preferably in the form of an emery or carborundum cloth 27, which is glued or otherwise appropriately secured to the peripheral face of the ring.

To insure axial alignment of the grinding ring with the bore of the cylinder 28 as the ring is being advanced, which is accomplished by the application of a pressure axially while the rotary movement is being imparted, a guide sleeve 29 is provided. This guide sleeve is flanged at its lower end, as indicated at 30, and the sleeve projects through a ring nut 31 threadingly engaged with the cylinder cap 32 and in the opening normally engaged by the cap nut which, in the grinding operation, is removed.

The eye of the ring nut 31 is counterbored for the reception of the flange 30 of the guide sleeve and the counterbore is interiorly threaded for the reception of a clamping nut 33 simulating the ring nut with its bore slightly in excess of the bore of the sleeve 29. The clamping nut 33 is brought down into abutting engagement with the flange 30 and forcing the latter against the shoulder in the ring nut 31, locks the sleeve in position in the ring nut and, therefore, locks the sleeve in position with reference to the cylinder as the ring nut is engaged with the can thereof.

The fit between the sleeve and the ring nut is not a snug one, the dimensions of the bore of the ring and the exterior dimensions of the sleeve and flange varying somewhat so as to permit slight lateral movement of the sleeve in the initial operation for correct alignment. The ring nut having been attached to the cylinder cap and the sleeve inserted, the clamping nut is attached but not brought into clamping engagement with the flange 30. The tool is then inserted in the cylinder with the pilot 16 engaged in the sleeve 29 and the grinding ring 12 then expanded by rotation of the nut 20. This presses the ring into firm engagement with the interior wall of the cylinder and practically aligns the stem and pilot axially of the cylinder. This operation, with the sleeve loosely mounted, will shift the sleeve laterally, if necessary, to properly position it in axial alignment with the cylinder, after which the nut 33 is tightened and the sleeve thus held in that position. The pressure of the grinding ring against the wall of the cylinder may then be relaxed and the tool raised until the ring is at the upper end of the cylinder, after which the adjustment of the nut will expand the grinding ring for the initial cutting operation. Then the ring may be rotated by the rotation of the handle 23 and the whole device advanced axially along the cylinder. Having reached the bottom, a further adjustment of the nut 20 will further expand the grinding ring when the device is moved axially in reverse direction, the direction of rotation preferably being the same so that the cuts formed by the initial movement will be crossed in the reverse movement. This cycle of operations is continued until the bore of the cylinder is cylindrically true.

The invention having been described, what is claimed as new and useful is:

1. A tool for the purpose indicated comprising a grinding head consisting of spaced complemental disks peripherally beveled toward their facing sides, an interposed ring provided with a peripheral abrading surface and interiorly beveled in correspondence with the bevels of said disks, a positive connection between said ring and one of the disks, the ring being split at one point, a stem carrying that disk to which the ring is positively connected, an actuating handle carried by the stem, and a nut threaded upon the stem below the handle, the other of said disks having a sleeve surrounding the stem and disposed in abutting relation with said nut.

2. A tool for the purpose indicated comprising a grinding head having an actuating stem extending from the upper face thereof and a pilot depending from the lower face, and a guide for maintaining axial alignment of the grinding head, said guide consisting of a sleeve in which said pilot engages, and a mounting for securing said sleeve to a cylinder cap, said mounting comprising a ring nut for threaded engagement with said cap and a clamping nut threadingly engaged with the ring nut, the sleeve projecting through said ring nut and having a peripheral flange bearing upon a shoulder in said ring nut and engaged by said clamping nut.

In testimony whereof he affixes his signature.

HERMAN J. DUERNBERGER.