Feb. 13, 1923. 1,445,154.

H. A. MILLER.

METAL FINISHING TOOL.

FILED DEC. 17, 1921.

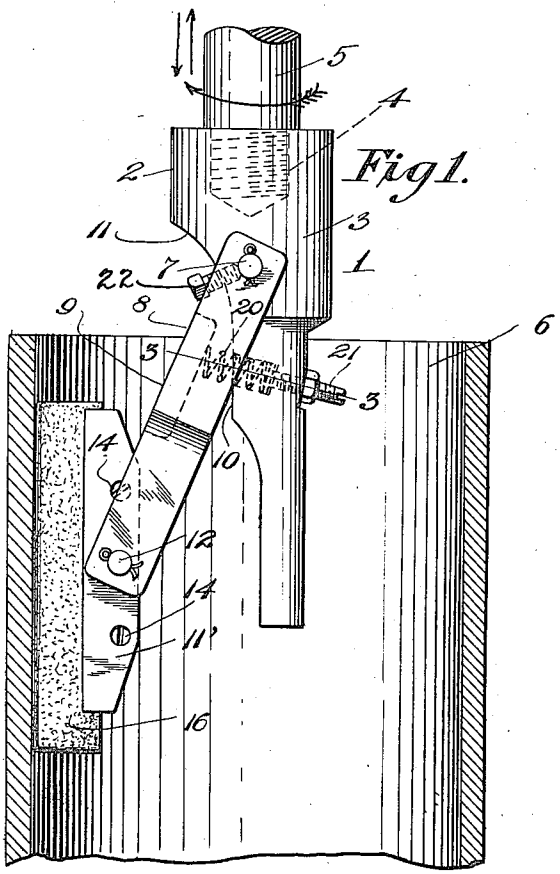


Fig 1.

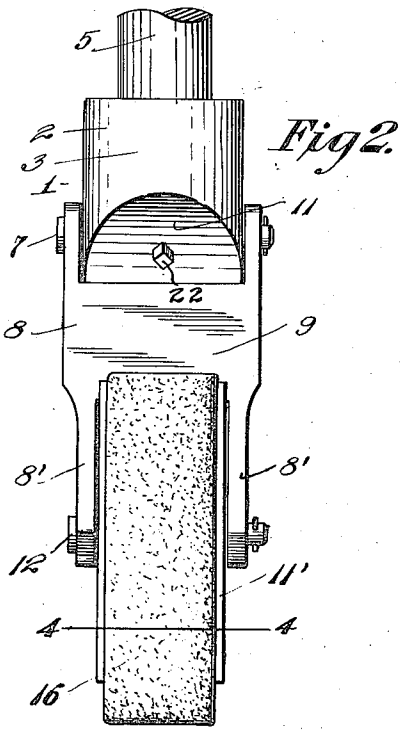


Fig 2.

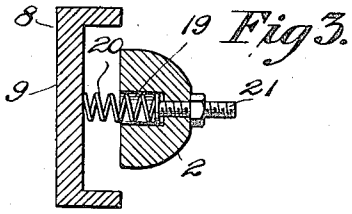


Fig 3.

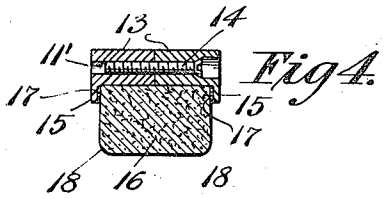


Fig 4.

Inventor

Harry A. Miller

By C. C. Shepherd

Attorney

Patented Feb. 13, 1923. 1,445,154

UNITED STATES PATENT OFFICE.

HARRY A. MILLER, OF WASHINGTON COURT HOUSE, OHIO, ASSIGNOR OF ONE-HALF TO R. R. MERRIWEATHER AND ONE-HALF TO R. S. WATERS, BOTH OF WASHINGTON COURT HOUSE, OHIO.

METAL-FINISHING TOOL.

Application filed December 17, 1921. Serial No. 523,064.

To all whom it may concern:

Be it known that HARRY A. MILLER, a citizen of the United States, residing at Washington Court House, in the county of Fayette and State of Ohio, has invented certain new and useful Improvements in Metal-Finishing Tools, of which the following is a specification.

This invention relates to an improved device for smoothing, polishing and finishing the inner surfaces of metallic tubular bodies, and an object of the invention resides in the provision of an attachment of this nature specifically designed for smoothing metallic surfaces initially cut by boring tools, or other rotary cutters.

Another object of the invention resides in the provision of a finishing tool primarily adapted for the smoothing of the internal walls of the cylinders of internal combustion engines following the boring or reboring of said cylinders, in order to overcome and eliminate the relative roughness and unevenness remaining on such walls following the operation of the boring or cutitng tools, the object being to finish said walls with such exactness that proper relationship will exist between said cylinder walls and the pistons movably mounted therein to avoid loss or leakage in engine compression.

The invention resides in a finishing tool of the above character wherein is included a rotatable standard or shaft extension arranged to be mounted in registration with the longitudinal axis of a tubular body and wherein said extension is provided with a pivotally connected frame pressed outwardly by a spring interposed between the frame and the extension, the latter having its outer end, in turn, pivotally connected to the intermediate portion of a holder arranged to carry a whetstone or the like having rounded edges disposed for engagement with the internal circular wall of said body, the arrangement being such that the whetstone will be caused to revolve in unison with said shaft extension, will be forced into engagement with the wall to be finished by the action of the spring, and will be flushly engaged with said wall by reason of the pivotal connection existing between the holder of the stone and the outer end of the swinging frame.

Still another object of the invention is to provide means for adjusting the tension exercised by the spring on the swinging frame, in the provision of means for limiting the outward swinging movement of the frame and in an effective holder construction for removably retaining the whetstone in its operative position within the tool.

For a further understanding of the invention reference is to be had to the following description and to the accompanying sheet of drawing, in which similar characters of reference denote like and corresponding parts throughout the several views thereof.

In said drawings:

Figure 1 is a side elevation of the improved cylinder finishing tool comprising the present invention, the tool being shown in an operative position within an engine cylinder,

Figure 2 is a front elevation of the tool,

Figure 3 is a sectional view on the horizontal plane indicated by the line 3—3 of Figure 1, and

Figure 4 is a similar view on the line 4—4 of Figure 2.

Referring more particularly to the details of the invention, the numeral 1 designates my improved cylinder finishing tool in its entirety. This tool consists of an axially rotatable standard or shaft extension 2 turned down from cylindrical stock to provide an enlarged upper portion 3, in which is formed a threaded socket or its equivalent 4, arranged for the reception of the similarly threaded lower end of a rotating spindle 5. It will be understood that this spindle may constitute a part of any suitable machine capable of rotating the spindle at desired speeds and to effect vertical movement on the part thereof such, for instance, as a drill press. Preferably, the spindle 5 constitutes a part of a boring machine in which the cutters have been removed and the finishing tool applied in lieu thereof. A specific use of the invention consists in adapting the same to the finishing of rebored engine cylinders. As is well known the cylinders of internal combustion engines after more or less usage become worn to an extent which, in order to preserve the efficiency of the engine, necessitates the reboring of said cylinders for the purpose of truing the same and to permit of proper engagement between the piston rings and the walls of said cylinders.

Ordinarily boring tools leave the engine cylinders cut thereby in a comparatively rough and unfinished condition, which must be dressed, polished or finished by other means to procure requisite smoothness in the cylinder walls. Devices heretofore proposed for this purpose have been difficult to operate, cumbersome in application and unless skillfully operated do not produce surfaces of required smoothness. Therefore, to overcome these objections I have designed the attachment or tool 1, which may be conveniently operated to secure surfaces of desired finish with but a minimum of expense and expenditure of labor and time.

In Figure 1 the numeral 6 designates a tubular or cylindrical body, which may constitute the cylinder of an internal combustion engine. It will be noted that the spindle 5 is positioned in the true axial center of the cylinder, and after the boring operation, while the cylinder is retained in true axial registration with the spindle 5, the latter is elevated, the cutting or boring tools removed therefrom and the finishing tool 1 comprising the present invention, applied to the spindle 5 in the manner shown in Figure 1. By this operation the axial coincidence between the tool 1, the spindle 5 and the body 6 is preserved so that the finishing tool may properly follow and complete the work initially started by the boring tools.

Pivoted as at 7 to the extension 2 is a frame 8, which is of general rectangular form and includes spaced parallel downwardly extending arms 8′ united in this instance by an integral transversely extending web 9 disposed in spaced relationship from a plane surface 10 provided upon the extension 2 by reducing the forward face of the latter, relative to the upper portion 3 thereof, as indicated at 11. The lower ends of the arms 8′ are pivotally connected to the intermediate portion of a stone holder 11′ as at 12, in such manner that the holder will be positioned between the lower ends of the arms 8′ and permitted to oscillate independently of the frame 8 generally. The holder 11′ comprises a split body consisting of separable sections 13 united by transverse screws 14, ribs 15 being provided upon the outer edges of the sections 13 for cooperation with the sides of a grinding or polishing stone 16. Liners 17 may be inserted between the side faces of the stone 16 and ribs 15 for the purpose of enabling the sections 13 to be tightly drawn into firm holding engagement with the stone 16, retaining the latter in connection with the holder against undue displacement. The stone includes outer rounded edges 18 arranged for engagement with the internal walls of the cylinder 6. To maintain this engagement the shaft extension is provided with a socket 19, in which is positioned a coil spring 20, having its outer end disposed for engagement with the inner face of the web 9, the inner end of said spring engaging with an adjustable screw 21 which upon being adjusted controls the tension exercised by the spring 20 upon the frame 8. A stud 22 is adjustably positioned in the surfaces 11 of the shaft extension for the purpose of limiting outward movement of the swinging frame. As shown the stud 22 is so adjusted as to permit the frame to swing upwardly, but when it is desired to limit the movement of this frame the stud 22 is manipulated so that it will be in the path of movement of the frame. This is necessary since the spring 20 constantly urges the frame upwardly and outwardly.

In view of the foregoing it will be seen that in operation the shaft extension is positioned in registration with the longitudinal axis of an engine cylinder and the said shaft extension is rotated and vertically raised and lowered with respect to said cylinder by the spindle 5, which may be actuated by any suitable means. When thus positioned the stone 16 of the tool will be disposed in engagement with the internal circular wall of the cylinder so that said surfaces will be polished, ground to a limited extent and smoothly finished by the rotation of the stone therein. It will be observed that by the employment of the pivoted frame 8 and the spring 20 the stone will be forced outwardly with sufficient pressure to properly engage with the cylinder wall and with a sufficient degree of friction to assure proper finishing of the cylinder wall. Again, by pivoting the lower ends of the parallel base of said frame to the intermediate portion of the stone holder the latter will be permitted to oscillate independently of said frame, so that the rounded edges 18 of the stone will be automatically maintained in parallelism with the wall of a cylinder thus compensating for irregularities in the axial alignment of said cylinder with the extension 2.

What is claimed is:

In a tool of the class described, a rotatable shank, a frame including a web, means for pivotally connecting the web to the shank, said web having a pair of spaced arms depending from its lower edge, resilient means carried by the shank and engaged with the web for forcing the frame outwardly, a holder pivotally mounted intermediate its ends between the lower ends of said arms, and a finishing stone carried by the holder, as and for the purpose set forth.

In testimony whereof I affix my signature.

HARRY A. MILLER.