July 13, 1926. 1,591,967

W. F. EMERSON

CYLINDRICAL MILLING TOOL

Filed March 6, 1922 2 Sheets-Sheet 1

Fig. 1.

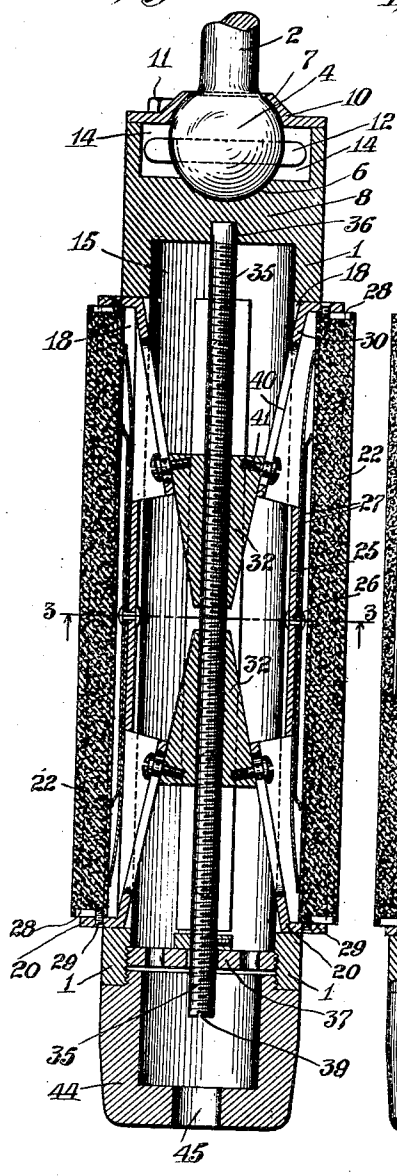


Fig. 2.

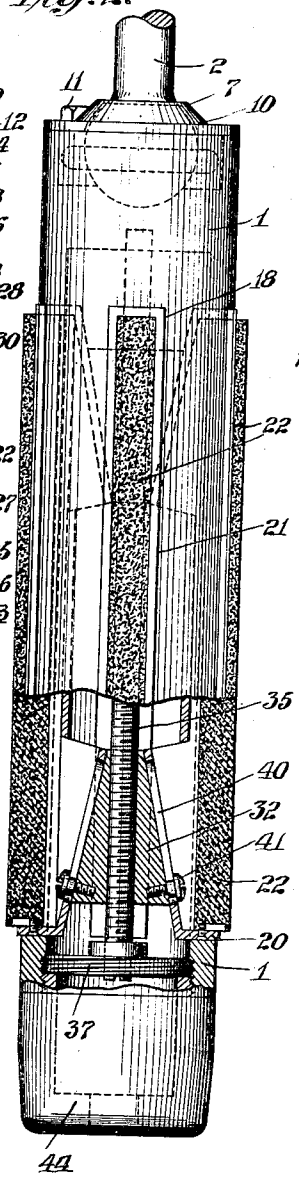


Fig. 3.

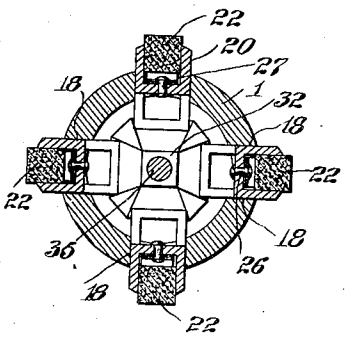


Fig. 4.

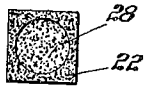
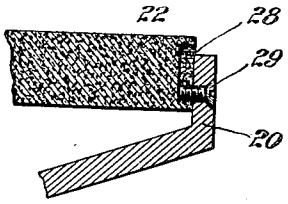


Fig. 5.



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2 Sheets-Sheet 2

Fig. 6.

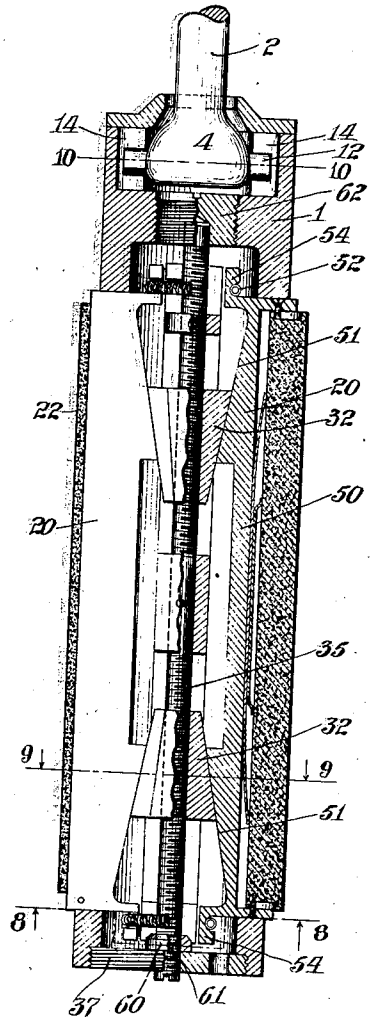


Fig. 7.

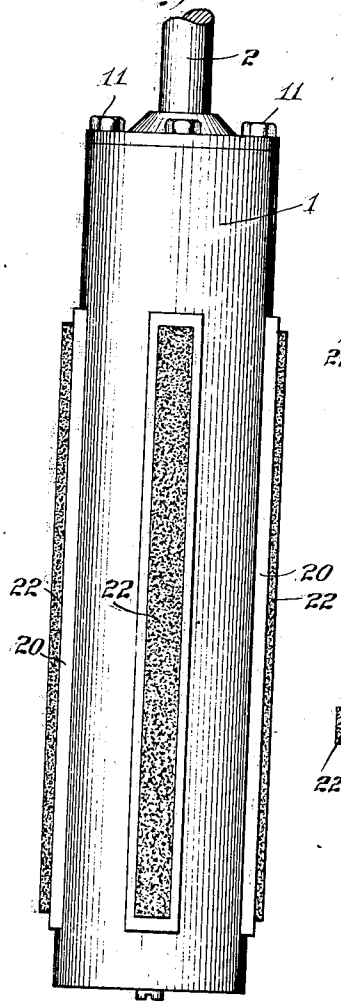


Fig. 8.

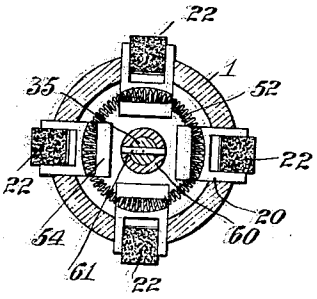


Fig. 9.

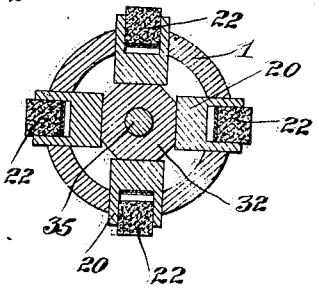


Fig. 10.

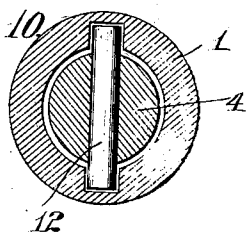
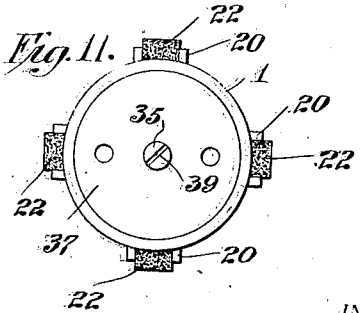


Fig. 11.



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UNITED STATES PATENT OFFICE.

WILLIAM F. EMERSON, OF WILLIAMSVILLE, NEW YORK.

CYLINDRICAL MILLING TOOL.

Application filed March 6, 1922. Serial No. 541,338.

This invention relates to the art of milling or grinding of inner cylindrical surfaces and consists of an improved portable milling tool particularly adapted for the regrinding of the cylinders of automobile and like internal combustion motors.

An important object of my invention is to provide a portable milling tool adapted for conveniently refinishing the inner peripheral surfaces or cylindrical bores of automobile engines of varying sizes and adapted to simplify the operation, in that the tool is specially designed to be rotated by a portable motor so as to be capable of manual manipulation in the regrinding of scored or worn cylinders. As a result my improved tool, in use in connection with the well known type of removable block motor, permits of regrinding of the cylinder bores without removal of the engine with resulting substantial economies.

Important features of my improved tool include the provision of radially disposed grinding or honing stones which are adjustably supported for the purpose of adapting the tool for the resurfacing of cylinders of varying sizes of internal diameter or bore; the provision of a removable guiding cap or nosing member adapted to function as a protective guard and to permit of its removal to give additional clearance for the milling of the closed head type of cylinders and an improved arrangement for securing the honing stones which provides for their adjustment and reversal of position for the renewal of the honing surfaces.

The described and other valuable features and advantages of my invention will be understood by reference to the accompanying drawings wherein like reference numerals are applied to the corresponding parts in the several views.

Referring to the drawings:

Fig. 1 is a central vertical sectional view of a desirable embodiment of my invention illustrating the parts in the position of outward adjustment.

Fig. 2 is a similar view partially in elevation with the parts adjusted for the milling of cylinder bores of reduced diameter.

Fig. 3 is a cross-sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is an end elevation of my improved honing stone for use therewith.

Fig. 5 is a partial longitudinal sectional view of the honing stone and associated parts.

Figs. 6 to 11 inclusive illustrate a suitable modified embodiment of the features of my invention of which:

Fig. 6 is a longitudinal section.

Fig. 7 is a view in side elevation.

Fig. 8 is a cross-sectional view taken on line 8—8 of Fig. 6.

Fig. 9 is a cross-sectional view on line 9—9 of Fig. 6.

Fig. 10 is a cross-sectional view on line 10—10 of Fig. 6 and

Fig. 11 is a bottom plan view.

In the approved embodiment of the features of my invention as exemplified and illustrated in the drawings, 1 indicates a cylindrical supporting member for the several parts of the tool which is of a size or diameter to fit bodily within the cylindrical bore to be acted upon. The supporting member 1 is arranged to be supported upon and rotated by an operating shaft, the connection therebetween being desirably of a flexible character. For this purpose, as shown, the operating shaft 2, which may be an extension of the armature shaft of a driving motor or connected thereto, is provided at its lower extremity with a ball enlargement 4 fitted within a complemental socket provided at the upper portion of the supporting member. The socket, as shown, is formed by opposed spherical surfaces 6 and 7 formed respectively in the upper wall 8 of the supporting member and in the centrally apertured cap 10 connected thereto by suitable screw studs 11. The supporting member or body 1 of the tool is rotatably secured to the operating shaft by means of a key 12 carried by the ball enlargement 4 of the shaft and registering with oppositely positioned radial notches 14 formed in the upper surface of the member 1.

The cylindrical supporting member 1, below the upper wall 8, is formed with an enlarged bore or opening 15 the wall of which is circular in form and concentric with the central longitudinal axis of the tool. The annular wall of the supporting member thus formed is provided with longitudinally extending, elongated and parallel guide slots 18, of which four are shown spaced equi-distantly around the circumference of the tool. The side walls of the oppositely positioned guide slots 18 are parallel to a

central vertical plane through the axis of the tool and form guideways to which are fitted carrier members or pans 20 adapted to be radially adjusted therein. The carriers 20 have their outer side walls 21 formed for guiding engagement with the guide slots and are adapted to receive and support the elongated honing stones 22 desirably rectangular in cross-section and formed of suitable carborundum or like composition.

The honing stones 22 are desirably supported within the pans or carriers 20 in a resilient and yielding manner so that in operation they will act under spring pressure against the surfaces being acted upon. For this purpose the central portion 25 of the rear wall of the pan or carrier is formed parallel to the longitudinal axis of the tool at suitable spacing and secured thereto by rivets 26 are longitudinally arranged flat springs 27 engaging the inner surface of the honing stone and exerting outward pressure thereagainst. The stones 22 are provided with annular recesses 28 at each end into which are entered the screw studs 29, threaded to the end walls of the carriers 20, thereby providing stops to determine the outer position of the stones within the carriers.

The latter arrangement is best illustrated in Figs 4 and 5 and is a valuable feature of my invention, for it will be noted that by the provision of the recess 28 of circular form, thereby providing an annular side wall or shoulder, the construction allows of the honing stone being turned or reversed within the carrier to several positions of adjustment thereby to renew the acting surfaces with resulting economy.

Further important features of my present invention consist in incorporating with the described features, means for adjusting the carrier members radially for the purpose of adapting the tool for the regrinding of cylinder bores of varying diameter. The arrangement provided for this purpose in the construction as illustrated in Figs. 1 to 3 consists in forming the carrier member 20 with the end portions 30 of its rear wall reversely and inwardly inclined. The inner or bearing surfaces of the inclined walls 30 are engaged by the parallel external inclined surfaces of wedges 32. These wedges are rectangular in cross-section with outer inclined walls and are centrally threaded for screw engagement with the axially extending, reversely threaded, adjusting screw 35. The adjusting screw is suitably journalled at its respective ends at 36 in the upper wall 8 of the supporting member and in the bearing plug 37 threaded to the lower end of the member 1. It is provided at its lower extremity with the manipulating slot 39 for adjustment by means of a screw-driver. The inclined walls 30 of the pan or carrier 20 are provided with longitudinal guide slots 40 to which are fitted guiding studs 41 threaded to apertures in the adjusting wedges 32, the studs being loosely fitted within the slot and the heads thereof acting to confine the carriers from outward movement with relation to the wedges. As will be obvious from the construction disclosed upon rotation of the screw 35 the wedges 32 will relatively advance or recede and thereby move the carriers radially outwardly or inwardly to varied positions of adjustment.

As indicated in Figs. 1 and 2 the lower end of the tubular supporting member 1 may desirably have threaded thereto a guide or guard member 44 of general cup form having its outer periphery suitably inclined to facilitate the entry of the tool within the cylinder bore and having a central aperture 45 in its bottom wall for the passage of the screw-driver in effecting the adjustment. The member 44 is particularly advantageous in acting as a guard against accidentally withdrawing the tool fully from the cylinder bore when rotating at high speed and in addition is separable to permit of its removal to provide additional clearance as ordinarily required in the boring out of cylinders of the closed head type.

In the construction of Figs. 6 to 11 inclusive the carrier members 20 are of modified form. In the latter construction the rear or bottom walls 50 of the carriers 20 are formed longitudinally continuous and at their inwardly directed end portions are provided with the inclined bearing surfaces 51 for engagement with the inclines of the wedges 32 as and for the purpose hereinbefore described. In this modification the slots 40 and coacting studs 41 are omitted and provision is made for inwardly moving the carrier members consisting of annular coil springs 52 fitted to recesses of shoulder extensions 54 formed upon the carriers at the ends thereof. The arrangement thus provides for the wedges 32 determining the outwardly adjustment of the carrier members while the springs 32 act to hold the carriers inwardly against the wedges.

I have thus produced an improved tool provided with a plurality of radially disposed honing stones adapted simultaneously to act upon the surface being refinished and which is specially designed to be rotated within the cylinder 4 by means of a portable motor. My improved construction further provides for radially adjusting the position of the stones to vary the effective diameter of the tool and, as described, further includes an improved manner of supporting the stones which allows of their being adjustable within the carriers. The latter fea-

ture permits of conveniently renewing the guiding surfaces or edges of the stones by reversing the position thereof which may be conveniently accomplished as will be noted from Fig. 1 by adjusting the carriers to extreme outward position so as to expose the screw studs 29. The operation of reversing the stones may thus be accomplished by merely removing the screw studs.

While I have described and shown a desirable modification of my invention it will be understood that the construction thereof is subject to various modifications without departing from the scope of the invention as defined in the appended claims.

Having described my invention I claim:

1. A device of the character described comprising a supporting member provided with radially disposed guideways, carrier members fitted to the guideways, said carrier members having inclined bearing surfaces, adjusting wedges provided with coacting inclined surfaces engaging the inclined surfaces of the carriers and means for moving the wedges to adjust the radial position of the carriers, and honing stones resiliently supported within the carrier members.

2. A device of the character described comprising a supporting member provided with radially disposed guideways, carrier members fitted to the guideways, means for adjustably supporting the carrier members in various positions of radial adjustment and honing stones resiliently supported within the carrier members.

3. A device of the character described comprising a cylindrical supporting member, a series of radially disposed carrier members carried upon the supporting member, honing stones detachably supported within the carriers and means operative to adjust the carriers radially in unison for varying the effective diameter of the device and said stones being supported to permit of reversal of position thereof.

4. A device of the character described comprising a cylindrical supporting member provided with a series of equi-distantly spaced, elongated, radially disposed guideways, carrier members fitted to the guideways, said carrier members at their inner sides having reversely arranged, inclined, bearing surfaces, wedge blocks positioned to engage said carrier bearing surfaces, means for shifting the wedges to adjust the radial position of the carriers consisting of an axially journalled adjusting screw threaded to the wedge blocks and honing stones resiliently supported within the carriers.

5. A device of the character described comprising a supporting member provided with radially disposed guideways, carrier members fitted to the guideways, said carrier members having oppositely inclined bearing surfaces, adjusting wedges provided with coacting, parallel, inclined surfaces engaging the inclined surfaces of the carriers and means for moving the wedges to adjust the radial position of the carriers consisting of a longitudinally extending adjusting screw suitably journalled and having reversely threaded engagement with the wedges and honing stones carried by the carrier members.

6. A device of the character described comprising a supporting member provided with radially disposed guideways, carrier members fitted to the guideways, means for adjustably supporting the carrier members in varying positions of radial adjustment, honing stones fitted within the carrier members and a guard extension detachably secured to the lower end of the supporting member.

7. A device of the character described comprising a supporting member, radially disposed honing stones carried by the supporting member and means adjustable to secure the honing stones comprising engaging means received within circular recesses formed in the ends of the honing stones.

8. A device of the character described comprising a supporting member provided with radially disposed guideways, carrier members fitted to the guideways, honing stones fitted within the carriers and formed with recesses in their end walls, set screws threaded to the end walls of the carriers to extend within the recesses, springs arranged to engage the inner sides of the stones and to exert an outward pressure thereagainst and said recesses being of a form to allow reversal of the stones within the carriers.

9. A device of the character described comprising a supporting member, carrier members supported by the supporting member, honing stones fitted within the carrier members, resilient means operative to impart yielding outward pressure upon the stones, said stones being of substantially rectangular cross-section and formed with enlarged recesses in their end walls, engaging means upon the carrier members received within the enlarged recesses for detachably securing said stones within the carriers while permitting of radial movement thereof, substantially as described.

In testimony whereof I have signed my name to this specification.

WILLIAM F. EMERSON.