

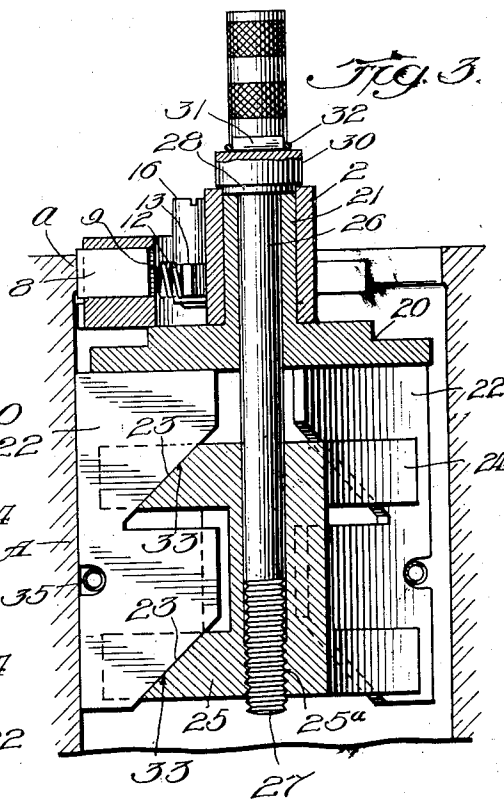
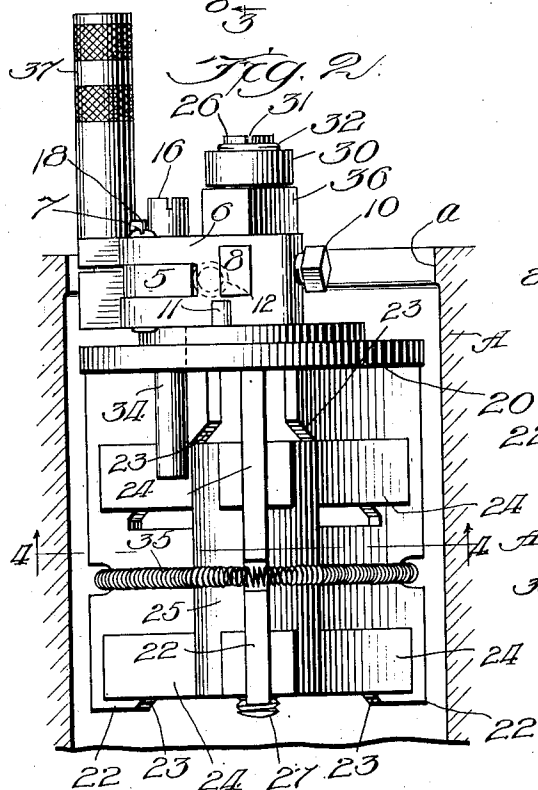
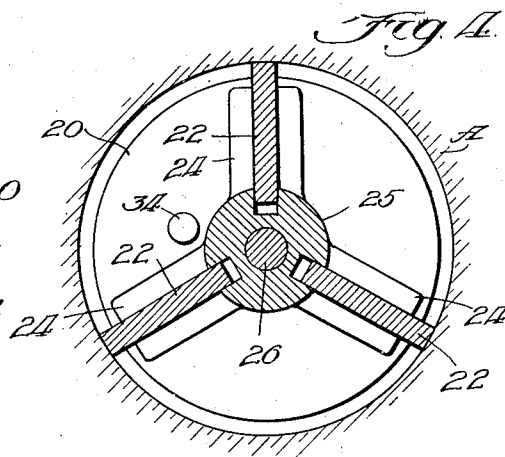
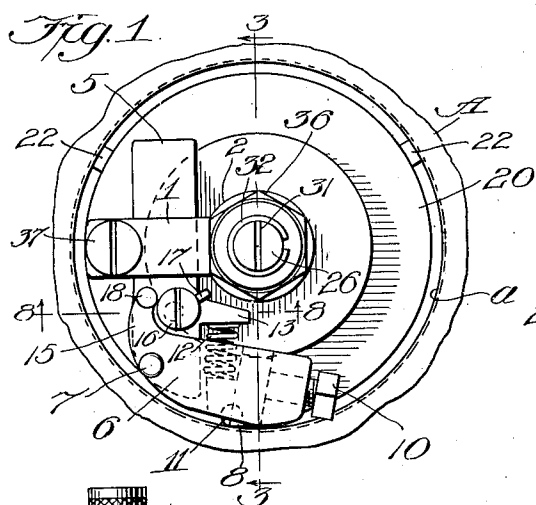
Nov. 8, 1938.

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CYLINDER RIDGE REAMER

2,136,350

Filed Feb. 15, 1937

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 5.

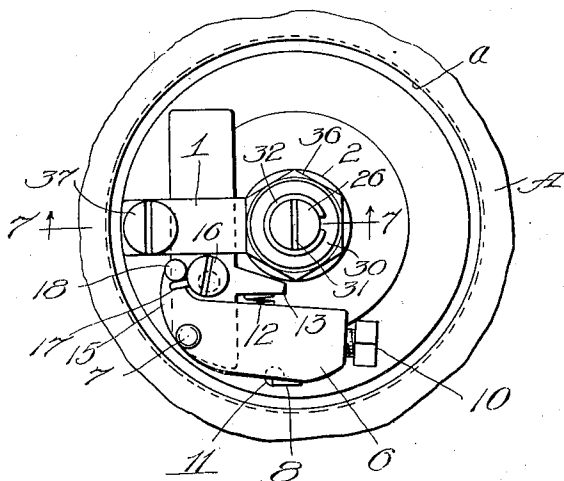


Fig. 6.

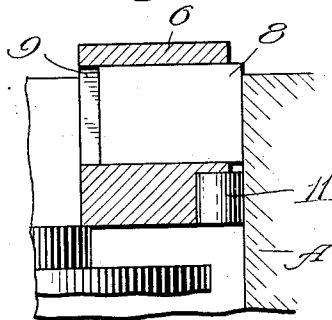


Fig. 7.

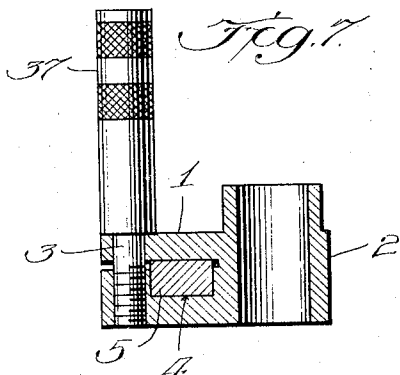
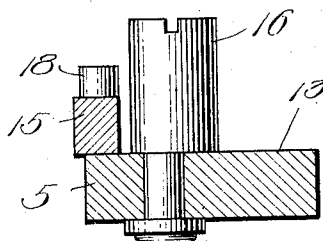


Fig. 8.



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UNITED STATES PATENT OFFICE

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CYLINDER RIDGE REAMER

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9 Claims. (Cl. 77-2)

The present invention relates to so-called ridge reaming tools for engine cylinders and has for its object to simplify and improve the construction and operation of the same.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is a top plan view of a preferred form of my improved tool, showing it in working position in an engine cylinder; Fig. 2 is a side elevation of the tool, the cylinder being shown in section; Fig. 3 is a section taken on line 3-3 of Fig. 1; Fig. 4 is a section taken on line 4-4 of Fig. 2; Fig. 5 is a view similar to Fig. 1, showing the holder for the cutter retracted; Fig. 6 is a section, on a larger scale, on the same plane as Fig. 3, showing a small fragment of the cylinder and tool in their relative positions at the end of a reaming operation; Fig. 7 is a section through the rotating arm and its cutter bar, taken approximately on line 7-7 of Fig. 5; and Fig. 8 is a section, on an enlarged scale, taken approximately on line 8-8 of Fig. 1.

Tools of the kind under consideration must be clamped to the cylinder so as to provide an immovable base or support for a revolving cutter element. There are various ways for thus clamping or firmly securing the tools, and my improved tool may be clamped or secured in any usual or suitable way. In the drawings, I have illustrated a preferred construction in which the tool is locked to the cylinder by an expansion device that is inserted in the cylinder and, for the sake of brevity, the detailed description will be confined to this particular embodiment.

What may be termed the tool proper is a short rugged arm 1 having at one end a tubular part or hub 2; the arm extending radially from this hub. The arm 1 is bifurcated at its free end in a plane at right angles to the axis of the hub, and the two sections thus created may be drawn together by a screw 3 extending freely through one section and screw-threaded into the other. One or both of the sections are cut away inwardly from the screw to provide a rectangular passage 4 of considerable width and depth and adapted to receive a rectangular cutter bar 5. By tightening the screw after the cutter bar has been inserted, the two sections of the arm are

drawn together and clamp the bar firmly in place.

On one end of the cutter bar is mounted a swinging holder 6 for the cutter element. In the arrangement shown, this holder is made considerably thicker than the cutter bar and a deep slot is cut into one end of the same, the cutter bar being engaged in said slot. A suitable hinge pin 7 extends through the slotted portion of the holder and through the cutter bar to form a hinge connection between the same. This hinge connection is near one end of the holder proper, while at the other end provision is made for mounting a cutter 8. In the arrangement shown, the cutter is in the form of a short rectangular bar whose width is somewhat greater than the width of the zone or band to be reamed, set into a rectangular opening 9 extending transversely through the holder at right angles to the axis of the hub 2. The cutter may be caused to project any desired distance beyond what may be termed the outer edge of the holder and be locked in the desired position by a set screw 10. Below the cutter, that is on the side which extends farthest into a cylinder which is being operated upon, is a small block 11 of hardened, polished steel set into the outer edge of the holder but projecting somewhat beyond the latter. The cutting edge of the cutter, as best shown in Fig. 6, must lie in a plane tangent to the block 11 at the outermost vertical line in the surface of the latter.

A compression spring 12 is arranged between an ear or lug 13 on the cutter bar and the rear edge of the holder, the spring engaging the holder at a point between the hinge axis of the latter and the cutter.

It will be seen that if the arm 1 is rotatably mounted on a suitable support so that the axis of its hub is coincident with the axis of a cylinder to be reamed, cylinders of various sizes may be reamed by properly adjusting the cutter bar so that the cutting edge will be pressed against the cylinder wall by the action of the spring on the holder. The manner of mounting the tool proper must be such that the cutting edge of the cutter 8 engages with the ridge *a* in the end of a cylinder A and projects beyond the inner and outer margins of the ridge, as illustrated in Fig. 3. The stop block 11 is now positioned within the cylinder inwardly from the ridge and out of contact with the worn portions of the cylinder wall. Upon revolving the swinging arm 1 about the axis of the cylinder, the cutter cuts away the ridge and, as the ridge disappears, the stop block comes into contact with the worn portion of the

cylinder wall, as illustrated in Fig. 6, preventing any further cutting by the tool.

To facilitate the setting of the cutter so as to exert the proper pressure against the cylinder, I provide means for swinging the holder 6 inwardly against the resistance of the spring, and locking it there until the actual reaming operation is to begin. This I accomplish by providing the holder 6 with a tail 15 projecting from its hinge end and placing on the cutter bar behind this tail a rotatable post 16 which is cam shaped or a cylindrical post eccentrically mounted. This post serves as a stop to limit the outward swinging movement of the holder. By turning the post between two different angular positions, the holder may be swung outwardly under the pressure of the spring or be pushed back and locked in an idle position. The post may be provided with a kerf in the top for receiving a screw driver by which it may be turned, and it may have thereon a pin 17 adapted to engage with an upwardly projecting pin 18 on the tail piece 15 to prevent the post from being turned completely around.

In applying the tool to a cylinder, the cutter bar is moved back and clamped and the post 16 is turned in the clockwise direction from the position illustrated in Fig. 1 to that illustrated in Fig. 5, thereby retracting the holder and compressing the spring. When the tool proper is inserted in the cylinder, the cutter stands clear of the cylinder wall, as indicated in Fig. 5. The cutter bar is then shifted, if the size of the cylinder makes this necessary, so as to bring the cutter close to the cylinder wall. Then the post 16 is turned to release the cutter holder and permit the spring to rock the holder outwardly and force the cutter against the cylinder wall as illustrated in Fig. 1. It will be seen that by using the adjustment of the cutter bar simply for the purpose of bringing the cutter close to the surface of the cylinder, this adjustment need not be made against the resistance of the spring, nor does the act of making the adjustment interfere with the proper functioning of this spring after the holder has been freed. It will also be seen that the tool can be taken out of the cylinder without unclamping the cutter bar, by simply retracting the cutter holder and locking it in its retracted position. This permits the tool to be inserted in each of the cylinders of a multi-cylinder engine, without change of adjustment.

As heretofore stated, the tool unit just described may be supported in various ways. In the arrangement shown, the immediate support for this unit is a disk-like table 20 small enough in diameter to enter the smallest cylinder to be operated upon and having a central tubular post 21 rising therefrom. The hub 2 fits upon this post which therefore serves as a journal bearing about which the arm 1 may rotate while resting on the table. The table in turn rests on the upper edges of a plurality of long, thin, flat shoes 22 each cut away at one long edge to provide two parallel inclined faces 23, 23, one above the other. These shoes are a sliding fit in arms 24 of a device 25 which may be termed a spider. This spider has a central bore extending through the same and provided with an internal screw thread, as indicated at 25a. A screw which may have a long smooth stem portion 26 terminating in a screw-threaded portion 27 at the lower end extends down through the post 21 and table, and is engaged with the screw threads 25a in the spider. The stem 21 has an enlargement 28 on the same just above the upper end of the post and resting on top of the

latter. Therefore, when the stem is turned, the spider and the table are drawn toward each other or spread apart, depending upon the direction of rotation. The stem 26 has a further enlargement or head 30 thereon just above the part 28, the marginal portions of the part 30 overlying the hub 2 of the tool unit and preventing the hub from being lifted off the post. The member 26 may be rotated by means of a screw driver engaged in a kerf 31 in the extreme upper end thereof. In order to prevent the screw driver from slipping out through the ends of the kerf, I have surrounded the upper end of the stem 26, above the head 30, with a wire band or hoop 32 that forms at least a partial closure for the ends of the kerf. When a screw driver is applied, any lateral movement thereof will be arrested by the band or hoop.

It will be understood of course that the slots in the arms of the spider 25 are shaped with diagonal bottoms 33 complementary to the inclined faces 23 of the shoes. Thus, when the member 26 is turned to draw the spider and the table toward each other, the shoes are pushed outwardly until they press against the cylinder wall when a device is positioned in a cylinder. In order to prevent the table 20 from turning completely around, I provide it with a long depending pin or finger 34 that projects down into the space between two of the upper arms of the spider, thereby limiting the relative turning movements of the table and spider to a fraction of a revolution. The expansion device as a whole may be surrounded by an elastic band or hoop 35, in a manner usual in this type of construction.

Where the tool unit is to be employed with a mounting such as described, the hub 2 is preferably made elongated so as to project a considerable distance above the top of the arm 6. This upward projection of the hub is made non-circular in cross section, preferably hexagonal, as indicated at 36, to receive a wrench for turning the hub and rotating the arm 1. The head 30 on the screw stem 26 is made smaller in transverse dimensions than the wrench receiving part of the hub 2, so that it will not interfere with the placing of a wrench upon the upper end of the hub.

For the sake of having a little handle by which the tool as a whole may be held while being placed in or removed from a cylinder, I have provided the clamping screw 3 with a head that is in the form of a long upright cylindrical body 37 of convenient diameter; this member projecting well above the highest part or remainder of the tool, so that the upper end may be easily gripped by a workman.

While I have illustrated and described with particularity only a single preferred form of my invention, I do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the definitions of my invention constituting the appended claims.

I claim:

1. In a cylinder ridge reamer, a device having an upwardly projecting cylindrical post and including means adapted to enter a cylinder and lock the device therein with the axes of the post and the cylinder coinciding with each other, a rugged arm journaled on and rotatable around said post, a bar extending transversely of and adjustably secured to the arm toward the free end of the latter, a holder mounted at one end thereof on said bar for rocking movements in a

plane at right angles to the axis of the post, and a cutter carried at the free end of said holder.

2. In a cylinder ridge reamer, a device having an upwardly projecting cylindrical post and including means adapted to enter a cylinder and lock the device therein with the axes of the post and the cylinder coinciding with each other, a rugged arm journaled on and rotatable around said post, a bar extending transversely of and adjustably secured to the arm toward the free end of the latter, a holder mounted at one end thereof on said bar for rocking movements in a plane at right angles to the axis of the post, a cutter carried at the free end of said holder, and a spring interposed between said bar and said holder and tending to swing the holder outwardly.

3. In a cylinder ridge reamer, a device having an upwardly projecting cylindrical post and including means adapted to enter a cylinder and lock the device therein with the axes of the post and the cylinder coinciding with each other, a rugged arm journaled on and rotatable around said post, a bar extending transversely of and adjustably secured to the arm toward the free end of the latter, a holder mounted at one end thereof on said bar for rocking movements in a plane at right angles to the axis of the post, a cutter carried at the free end of said holder, a spring between the holder and the bar tending to swing the holder outwardly, and means to swing the holder inwardly against the resistance of the spring and hold it against outward movement.

4. In a cylinder ridge reamer, a device having an upwardly projecting cylindrical post and including means adapted to enter a cylinder and lock the device therein with the axes of the post and the cylinder coinciding with each other, a rugged arm journaled on and rotatable around said post, a bar extending transversely of and adjustably secured to the arm toward the free end of the latter, a holder mounted at one end thereof on said bar for rocking movements in a plane at right angles to the axis of the post, a cutter carried at the free end of said holder, and a hardened stop on said holder below the cutter in position to engage with the interior of the cylinder wall below the zone of the ridge when the cutter has removed the ridge.

5. In a cylinder ridge reamer, a device having an upwardly projecting cylindrical post and including means adapted to enter a cylinder and lock the device therein with the axes of the post and the cylinder coinciding with each other, a rugged arm journaled on and rotatable around said post, a bar extending transversely of and adjustably secured to the arm toward the free end of the latter, a holder mounted at one end

thereof on said bar for rocking movements in a plane at right angles to the axis of the post, a cutter carried at the free end of said holder, an adjustable member on said bar in position to engage with the holder and rock it in a direction to carry the cutting edge toward the axis of the post, said bar having thereon a shoulder behind said holder, and a spring between said shoulder and the holder and tending constantly to swing the holder outwardly.

6. In a cylinder ridge reamer, a device having an upwardly projecting cylindrical post and including means adapted to enter a cylinder and lock the device therein with the axes of the post and the cylinder coinciding with each other, a rugged arm journaled on and rotatable around said post, a bar extending transversely through and adjustable in said arm, a clamping screw associated with said arm to clamp the bar thereto, said clamping screw having a part extending upwardly a considerable distance and serving as a handle by which the reamer may be lowered thereto and removed from a cylinder, and a tool holder on one end of said bar.

7. In a cylinder reamer, a rigid spider, vertical cylinder-engaging shoes mounted on the spider so as to move inwardly and outwardly when the spider and the shoes are moved relatively in the vertical direction, a loose table resting on the upper edges of said shoes and having a central tubular post rising therefrom a cutter unit journaled on and rotatable about said post, a screw extending loosely down through said post and said table and into said spider, said screw having a shoulder engaged with the top of the post, and a second shoulder overlying a part of said cutter unit to prevent the unit from being lifted from the post while leaving it free to revolve about the same.

8. In a cylinder ridge reamer, a rotatable arm, a bar extending transversely through and adjustable in said arm, and a holder for a cutter mounted on one end of said bar for rocking movements from and toward the axis of rotation of the arm.

9. In a cylinder ridge reamer, a rotatable arm, a bar extending transversely through and adjustable in said arm, a holder for a cutter mounted on one end of said bar for rocking movements from and toward the axis of rotation of the arm, a spring interposed between said arm and said holder and tending constantly to swing the holder outwardly, and cooperating, relatively movable parts on the arm and the holder to rock the holder against the resistance of the spring and hold it against being moved outwardly by the spring.

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