

March 23, 1937.

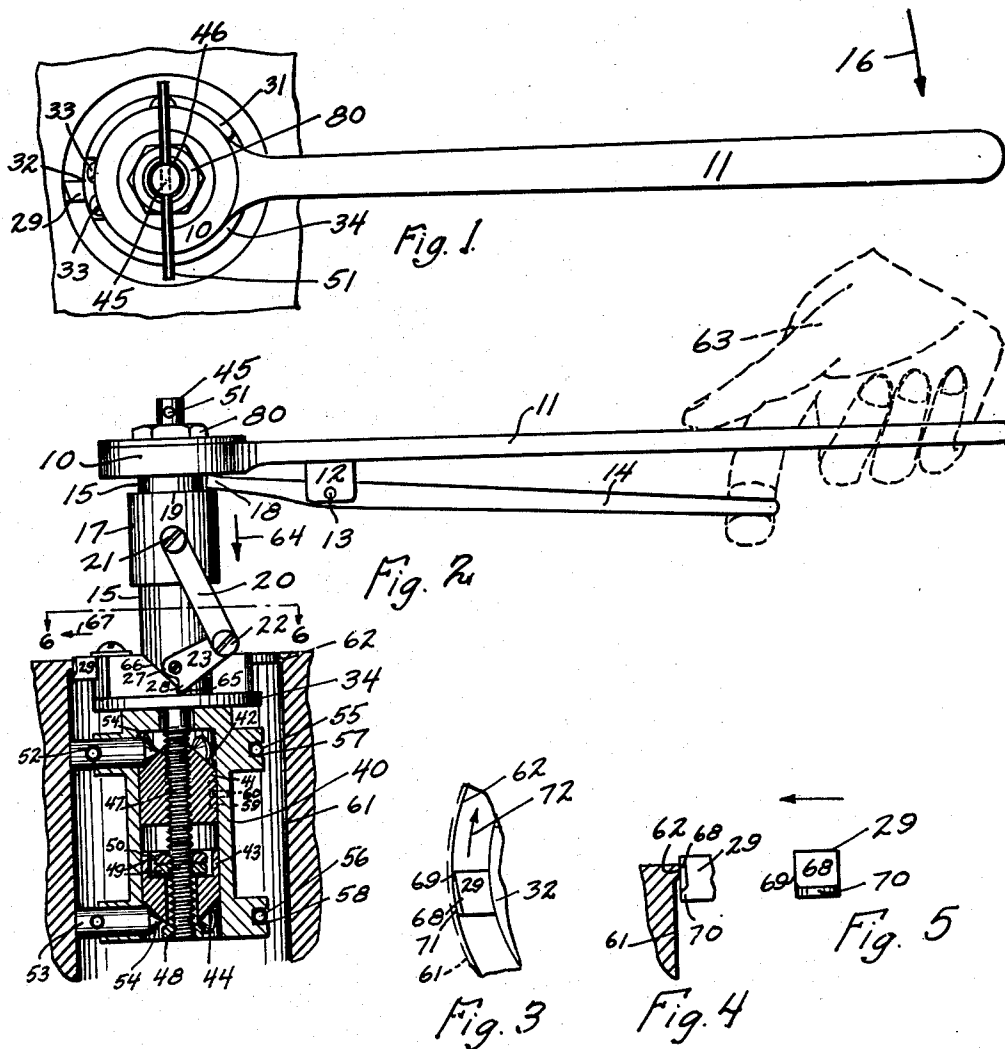
C. C. PETERSEN

2,074,424

PISTON RING RIDGE REMOVER

Filed Oct. 29, 1934

2 Sheets-Sheet 1



Inventor
Carl C. Petersen
Lynn H. Latta

By

Attorney

March 23, 1937.

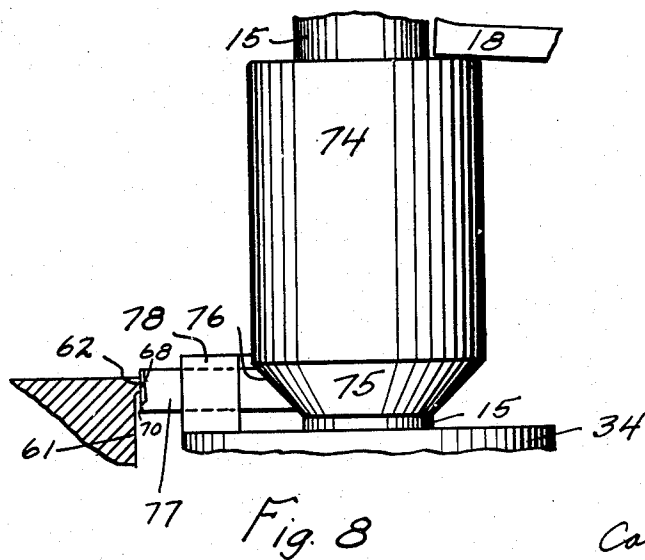
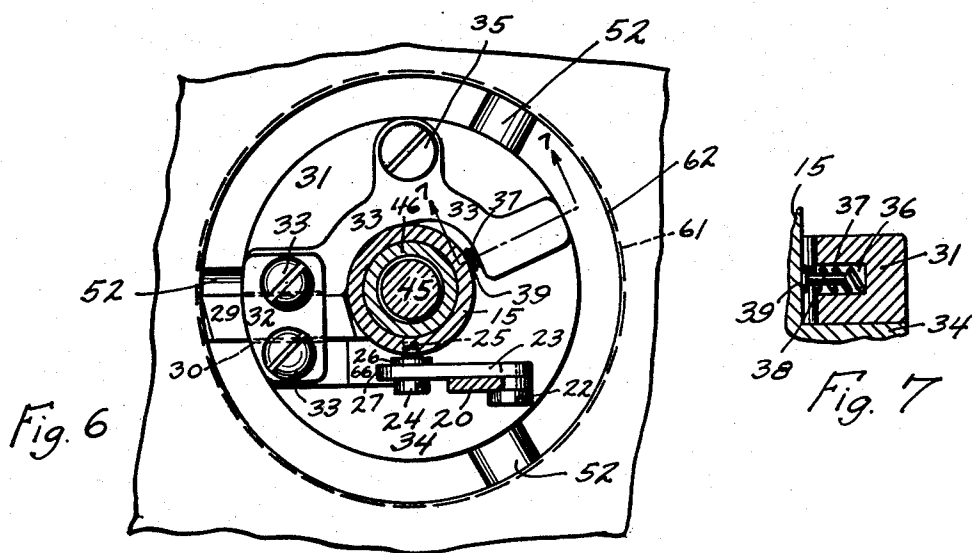
C. C. PETERSEN

2,074,424

PISTON RING RIDGE REMOVER

Filed Oct. 29, 1934

2 Sheets-Sheet 2



Inventor
Carl C. Petersen
Lynn H. Latta

By

Attorney

UNITED STATES PATENT OFFICE

2,074,424

PISTON RING RIDGE REMOVER

Carl C. Petersen, Wayne, Nebr.

Application October 29, 1934, Serial No. 750,403

1 Claim. (Cl. 77-2)

My invention relates to a device for cutting the unworn shoulder at the top of a cylinder.

The piston in reciprocating within the cylinder usually wears down cylinder walls with the exception of a slight shoulder at the top thereof. It is necessary to remove this shoulder to replace oversized piston rings, and to prevent unnecessary knocking of the new rings against the shoulder when the pistons are in motion. The ridges formed are generally not uniform in depth, and it is necessary to cut down the ridge flush with the worn portions of the cylinder walls.

An object of my invention is to provide such a cutting arrangement which will accurately center the boring tool to provide for any variations.

A further object of my invention is to provide a cutting tool which will permit a progressive depth to be cut as the shoulder is being turned down.

A further object of my invention is to provide means for advancing the cutting edge by means of the hand so that a very close adjustment can be obtained.

A further object of my invention is to provide a cutting tool which includes a fool proof feature in that it will not permit the cutting to take place deeper than the maximum diameter of the cylinder.

A further object of my invention is to provide the above mentioned objects in a construction of the greatest possible simplicity commensurate with a minimum cost of manufacture.

With these and other objects in view, my invention consists in the construction, arrangement, and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claim, and illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of the device,

Figure 2 is a side elevation taken partially in section,

Figure 3 is a plan view of the cutting tool,

Figure 4 is a side elevation of the same,

Figure 5 is an end view of the same,

Figure 6 is an enlarged detailed sectional view of Figure 2 taken along the line 6-6 thereof,

Figure 7 is a sectional detail of Figure 6 taken along the line 7-7 thereof, and

Figure 8 is a modified form of the device.

I have used the character 10 to designate the ratchet portion of my device. Formed integrally with the ratchet 10 is the extended handle 11, attached to the handle 11 is the member 12, to

which is pivoted at 13 the further lever 14. The hollow shaft 15 is attached to the inner portion of the ratchet member 10. This ratchet member need not be elaborated on herein since it employs the usual ratchet structure which is well known in the art. The ratchet is so arranged that when the tool is rotated in the direction of the arrow 16, the ratchet locks, and the hollow shaft 15 is likewise turned, and the ratchet turns freely about the shaft 15 when the handle is moved in the reverse direction.

Slidably engaged with the hollow shaft 15 is the collar 17. The lever 14 includes the extended portion 18 which normally rests against the upper shoulder 19 of the collar 17. The link 20 is pivoted at the screw 21, which screw is fastened to the collar 17. The other extremity of the link 20 is pivoted at the screw 22 to the further member 23, which is pivoted at the screw 24, which screw is fastened to the shaft 15 at 25 (see Figure 6). A small washer 26 acts as a spacer. The member 23 includes the arcuate portion 27 and the further bearing portion 28.

The cutting tool 29 is received within the opening 30 (see Figure 6), which opening is formed within the member 31. The tool is rigidly held in place by means of the keep plate 32, which is secured by means of the two machine screws 33. It will be seen from this construction that the cutting tool 29 can be moved inwardly or outwardly corresponding with the necessary diameter to be cut.

The member 31, which can be suitably ribbed as at 33, is pivoted to the circular base plate 34 by means of the machine screw 35. The member 31 further includes the cavity 36 (see Figure 7) which receives the compression spring 37, which in turn receives the small headed member 38 having the head 39. The head 39 is made small enough to pass within the cavity 36.

The centering device comprises the shell 40 which receives an upper member 41, which member includes the tapered upper shoulder 42. The shell also receives the further member 43 which includes the tapered shoulder 44.

The centering shaft 45 passes downwardly from the top of the device through the hollow shaft 46 (see Figure 1), which shaft is an integral extension of the shell 40. The lower end of the shaft 45 is threaded as shown, and is threadedly engaged at 47 with the upper member 41; and the member 43 however, is not threadedly engaged with the threaded ends of the shaft 45. This member is loosely engaged therewith and is held in place by means of the end nut 48 which is 55

rigidly attached to the shaft and by means of the locked nuts 49 which are received within the cavity 50.

It will now be seen that as the shaft 45 is turned by means of the lengthened pin 51 that the upper cone member 41 will be pulled upwardly, or conversely in the reverse direction.

The centering pins 52 and 53 include the tapered ends 54 which coincide with the tapered faces 10 of the larger cones as shown. There are three of the pins 52 and three of the pins 53 spaced 120 degrees apart. These pins pass horizontally through the shell and are held under tension by means of the coiled springs 55 and 56 which are received within the cavities 57 and 58. The function of these springs is to maintain the pins in close engagement with the cones at all times.

The upper cone member 41 can include the slot 59 which receives the pin 60 attached to the shell. This will prevent rotation of the upper cone so that the threads will perform the function of raising or lowering this cone.

In operating the device, the centering shell 40 is lowered into the cylinder 61 with the cutting member 29 arranged to be either flush with the top of the cylinder or slightly thereabove. The shaft 45, which passes completely through the device, is then turned by means of the lengthened pin 51. This brings the upper cone 41 upwardly and forces the three upper pins 52 outwardly against the cylindrical wall of the cylinder by virtue of the tapered engagement therewith.

Since the upper cone will be carried upwardly, the lower cone 43, which is not threadedly engaged with the rod 45, but which rotates freely thereabout, will be forced downwardly forcing the lower centering pins 53 outwardly against the cylinder walls in the same manner. By virtue of this arrangement, the centering is accomplished from the top of the device and is certain to be accurate. It should be noted that the lower cone is not locked against rotation and rotates freely about the lower stud portion of the shaft 45 and the function of the various nuts is to prevent any vertical movement of this cone with respect to the shaft 45 itself.

The springs 55 and 56 will automatically keep the centering pins in place at all times. The centering pins can be varied when desired to provide adjustment for different diameter cylinders. After the centering has been accomplished, the machine is ready for the cutting operation.

The principal function of the machine as heretofore explained is to cut down the upper ridge 62 for the purposes mentioned. This is accomplished by rotating the hand member 11 in the direction of the arrow 16, and by means of the ratchet arrangement, the cuts can be made progressively as desired. The depth of cut is automatically increased by virtue of the lever 14. It will be seen from Figure 2 that the hand 63 grasps the rigid lever 11 and one finger is all that is necessary to manipulate the lever 14. When the lever 14 is brought upwardly towards the lever 11 by virtue of the pivoted arrangement, the collar 17 will be forced downwardly in the direction of the arrow 64. This forces the link 20 downwardly also, and forces the portion 28 of the member 23 against the shoulder 65 of the member 31. The upper tapered shoulder, against which the portion 27 rests, is designated by the character 66. This member rests in this position normally when the cutting operation is not taking place. The pressure of the portion 28 against the shoulder 65 carries the cutting member 29

outwardly in the direction of the arrow 67 so that the cutting can be made in progressive depths.

It will be noted that the entire upper structure revolves freely about the inner hollow shaft 46, which is received directly within the other hollow shaft 15. The nut 80 is threadedly engaged with the upper end of shaft 46, and a slight clearance between it and the ratchet 10 permits free movement of the ratchet.

The member 38, which is spring urged against the shaft 15, normally forces the cutting member 29 and the entire arrangement out of the cutting position by virtue of the pivoting of the member 31 about the screw 35 so that the cutting member will spring back to a non-cutting position as soon as the finger or fingers of the hand is released.

Since it is desired to cut the ridge 62 exactly down to the periphery of the rest of the cylinders, I have devised the cutting member 29 with a special arrangement to prevent unnecessary undercutting. To this end I provide the tapered face 68 which terminates in the forward point 69, which point actually does the cutting. At the bottom of the tool, I provide the blunt portion 70 which extends out to the maximum cutting depth of the tool. This portion also is approximately arcuate in shape and follows generally the contour of the cylinder as at 71. Since this portion includes no cutting edges and is rather blunt, as soon as it strikes any portion of the cylinder wall beneath the ridge 62, it will prevent the upper cutting edge from cutting any deeper.

The thickness of the ridge 62 in a cylinder is always less than the thickness of the cutting member so that as the tool progresses into the work, the portion 70 will always underlie the rim and will contact the wall as stated, so there can be no unnecessary and undesirable undercutting.

The direction of movement of the tool is indicated generally by the character 72 in Figure 3 and by the character 73 in Figure 5 so that the underlying principle will be seen. By virtue of this entire arrangement, the centering is made automatically and a true circular cut is certain to be made since the centering arrangement in combination with the specific tool assures this result.

A modified form of the device is shown in Figure 8 in which the collar 17 is replaced by the collar 74 which is slidably engaged with the hollow shaft 15. In this structure, however, the collar 74 includes the lower tapered portion 75 which bears against the tapered portion 76 of the cutting member 77. The cutting member is slidably received at 78 with the tool holder 79. The outer edge of the cutting tool 77 includes the same characteristics heretofore mentioned.

It will now be seen from the structure of this form that as the collar 74 is forced downwardly by means of the end 18 of the lever 14 that the tapered surfaces will force the tool 77 outwardly in a corresponding manner to cut down the ridge 62 of the cylinder 61.

It will now be seen that I have provided a cutting tool which will accurately allow centering in a cylinder.

It will be seen further that I have provided a cutting tool which can be mounted conveniently on a centering means, which tool can be progressively fed into the work by means of the hand, that I have provided features to prevent undue undercutting of the tool, and that I have provided a cutting arrangement of this type which is accurate in operation.

It will be seen further that I have provided means for centering the device at the top thereof, and which permits the work to be done directly in combination with the centering means in a structure which can be manufactured at a reasonable cost.

Some changes may be made in the construction and arrangement of the parts of my invention without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claim any modified forms of structure or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

- 15 A tool for cutting the upper projecting rim of a cylinder comprising centering means, a rotatable tool mounted thereon including an extending rigid

hand member, a retractable lever pivoted to the said hand member, a hollow shaft attached to the hand member and rotated thereby, a slidable collar receiving said shaft, a link pivoted to the collar, a forcing member pivoted to the link, a cutting member adapted to be fed horizontally toward the said rim by the said forcing member when the retractable lever is compressed, means for resiliently holding the said cutting member including an arcuate member receiving the said hollow shaft and having a cavity including a compression spring, a plunger within the spring adapted to be pressed against the shaft, said extending rigid hand member providing means for rotating said hollow shaft and said cutting member circumferentially within the cylinder.

CARL C. PETERSEN.