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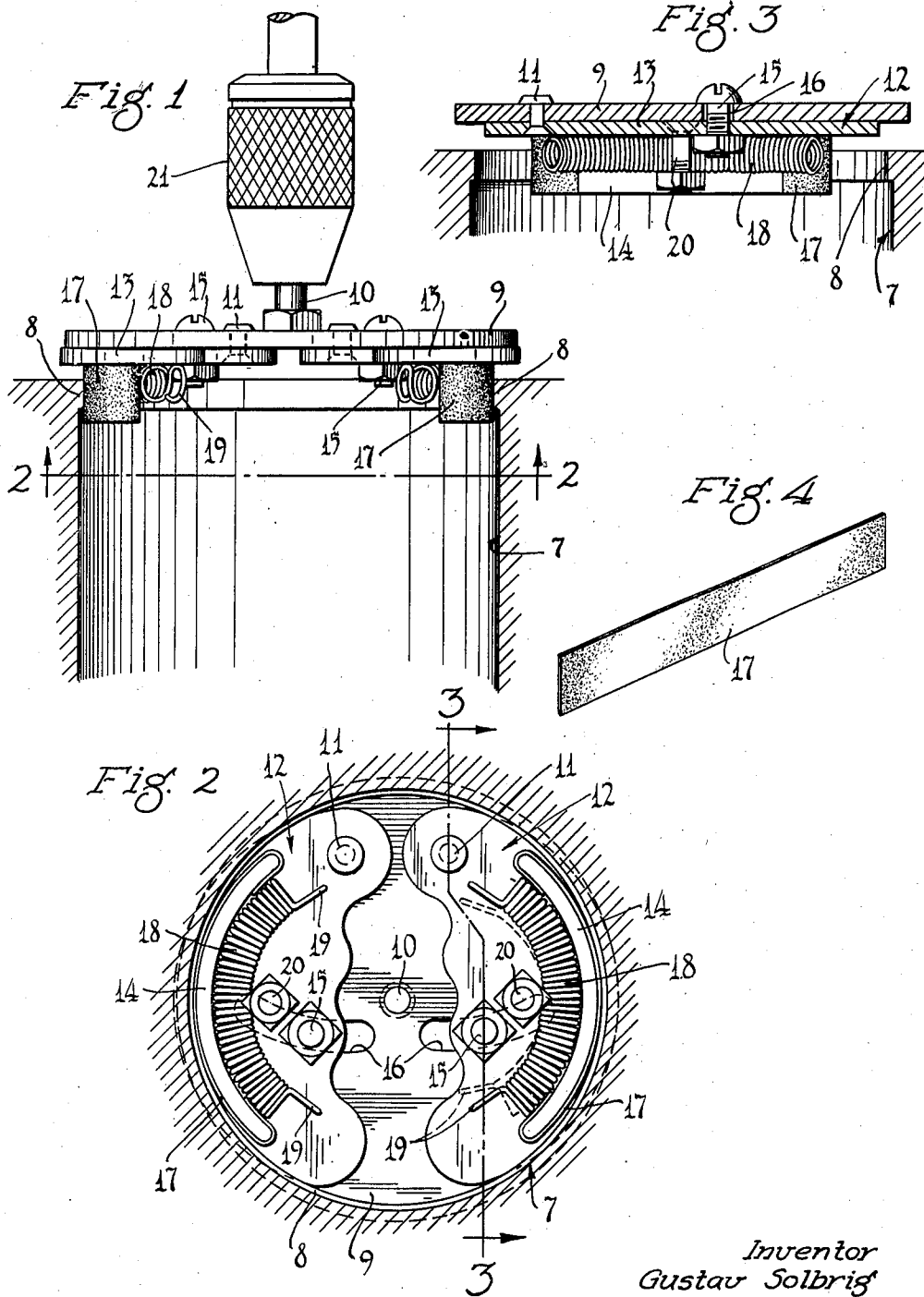
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CYLINDER RIDGE GRINDER

Filed Feb. 12, 1940

2 Sheets-Sheet 1



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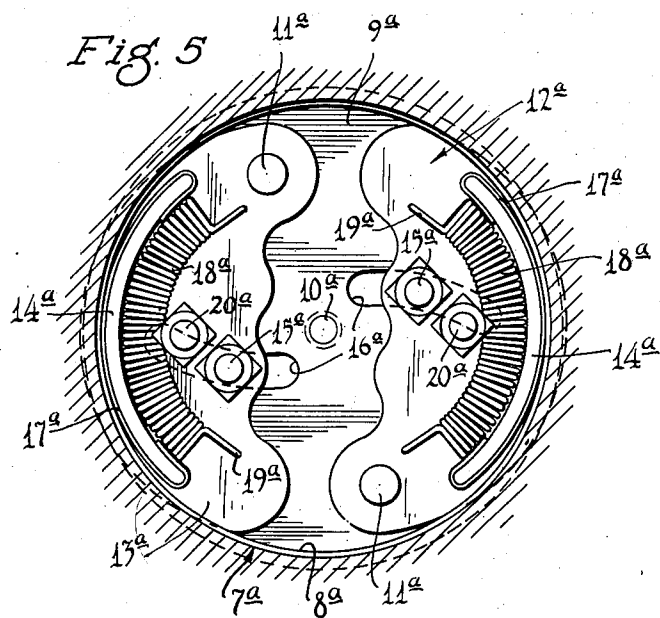
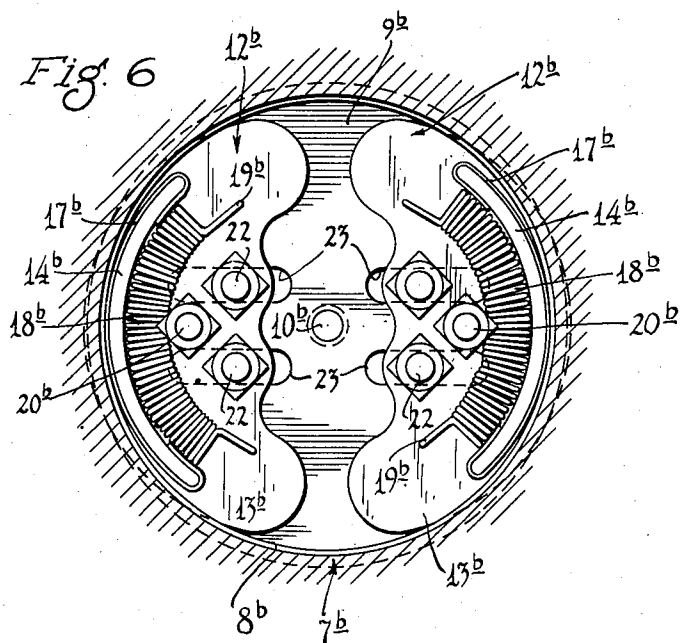
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UNITED STATES PATENT OFFICE

2,229,314

CYLINDER RIDGE GRINDER

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forty-eight per cent to William H. Dutton,
Minneapolis, Minn.

Application February 12, 1940, Serial No. 318,500

6 Claims. (Cl. 51-184.1)

My present invention relates to an improved tool for grinding or cutting down the annular ridges at the tops of engine cylinders, and may be hereinafter referred to as a cylinder ridge grinder.

In various types of engines and pumps employing piston equipped cylinders, the greatest wear on cylinders is produced by the piston rings, which latter are under resilient tension to expand against the cylinder. Since the piston rings are located below the top of the piston and the piston ring travel on the cylinder terminates somewhat short of the top of the cylinder, the cylinder becomes enlarged by piston ring wear throughout the portion traversed by the rings and this leaves an annular ridge above the piston ring travelled portion of the cylinder. When the pistons are removed from the cylinders for the purpose of replacing the piston rings, it becomes desirable, and in fact in many cases necessary, to cut down this annular ridge near the top of the cylinder to a diameter equalling that of the ring worn portion of the cylinder therebelow.

An important object of the present invention is the provision of a very simple and inexpensive, but highly efficient tool by which the ridges left in the top of cylinders as a result of ring wear therebelow can be quickly and accurately cut down to the diameter of the ring worn portion of the cylinder.

Another important object of the invention is the provision of a tool of the kind described which is adapted to be power operated from a portable hand operated unit such as a conventional motor driven drill driving unit.

Another object of the invention is the provision of a tool of the class described that is adaptable without adjustment to operate with equal efficiency on cylinders of different diameter.

Another important objective of the invention is the provision in a tool of the class described employing a plurality of abrasive carrying shoes that exert pressure on the cylindrical surface being ground as a result of centrifugal action, and wherein the shoes are provided with shoulders that overlap the top of the cylinders and definitely limit downward movement of the abrasive surfaces of the shoes to a position wherein their outer ends are above the tops of the cylinders.

Another important objective of the invention is the provision in a tool of the class described in-

corporating centrifugally movable segmental grinding shoes that are faced with removable strips of flexible abrasive such as emery cloth, of an improved simple and extremely efficient anchoring medium for such abrasive strips.

The above, and other and highly important advantages of the invention will be made apparent from the following specification and claims together with the appended drawings. In the accompanying drawings, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a view in side elevation of one form of the tool illustrating the same in an operative position in a cylinder that is shown in section;

Fig. 2 is a view taken on the line 2-2 of Fig. 1, and showing the tool of Fig. 1 in bottom plan;

Fig. 3 is a detail sectional view taken on the line 3-3 of Fig. 2;

Fig. 4 is a perspective view of one of the abrasive strips for the shoes of the forms of the tool herein illustrated;

Fig. 5 is a view corresponding to Fig. 2 but illustrating a slight modification of the tool; and

Fig. 6 is a view corresponding to Figs. 2 and 5, but illustrating still another form of the tool.

With reference first to Figs. 1 to 4 inclusive, an engine cylinder is indicated as an entirety by 7. This cylinder 7 has at its upper end a smaller diameter portion forming an inwardly projecting ridge 8, which ridge is left in the cylinder as a result of piston ring wear therebelow.

The tool of Figs. 1 to 3 includes a disc-like head 9 having an axially outwardly extended shank or spindle 10. Pivotaly mounted to the underside or face of the head 9 at 11 are a pair of shoes each indicated as an entirety by 12. The shoes 12 each comprise a flat flange 13 having a segmental outer edge, and a depending segmental abrasive carrying flange 14, which latter is also segmental, and is spaced radially inwardly from the outer edge of its respective flat upper flange 13. The flat upper flanges 13 of the shoes are pivotaly anchored to the disc-like head 9 at 11 preferably by rivets which hold the same snugly against the under face of the head, but permit free pivotal movements under centrifugal action. The radius of the arc of each segmental flange 14 of the shoes 12 preferably should be made no greater than that of the smallest cylinder to be operated on.

Of course, the pivoted shoes 12 will tend to move outwardly under the action of centrifugal force when the device is rotated in a cylinder,

but this pivotal action of the shoes will be held within predetermined limits by engagement of shoe carried bolts or the like 15 with the ends of arcuate slots 16 in the rotary head 9.

5 These bolts 15 will further aid in holding the shoe flanges 13 snugly against the under side of the head 9. The flanges 13 and 14 of the shoes 12 may be assumed to be integrally formed of cast iron or steel, but may, of course, otherwise
10 be made or formed of other materials.

The outer face of each of the segmental shoe flanges 14 is faced with a strip of flexible abrasive material such as emery cloth or sand paper; emery cloth being preferred. These facing strips of
15 emery cloth or the like, and which are indicated by 17, are preferably the same depth as the flanges 14, but are longer than said flanges and have their ends doubled around the ends of the segmental flanges 14, and detachably clamped in
20 place by spring clamping devices forming an important phase of the instant invention.

These clamping devices each comprise a normally straight and tightly coiled spring 18 terminating at its opposite ends in an out-turned loop
25 19 serving as a finger grip. The normally straight tightly coiled springs 18 are yieldingly bent in two to conform substantially to the arcuate curvature of the inner faces of the shoe flanges 14, and are maintained in this shape normally by engagement
30 with headed anchoring studs 20, which latter are shown as being in the nature of nut equipped bolts. The head acting nuts of the studs 20 overlap the spring anchors 18 cross sectionally, and thereby retain the same against accidental displacement. Of course, the spring anchors 18, due
35 to their resilient nature, and the fact that they are tightly coiled when straight, tend to straighten out and thereby exert a relatively very high degree of yielding pressure against the opposite end portions of the flanges 14. To clamp the doubled
40 back ends of the abrasive strips 17 in place, the ends of the spring anchors 18 are bent back as shown by dotted lines in Fig. 2, while the free ends of the abrasive strips are doubled into engagement with the backs of the flanges 14 after
45 which the ends of the spring anchors are released and come into tight clamping engagement with the ends of the strips. Retraction of the ends of the spring anchors away from the shoe flanges
50 is most readily accomplished by compressing opposite loop ends 19 thereof between the thumb and forefinger of one hand.

Operation of device of Figs. 1 to 3 inclusive

55 Preparatory to the grinding operation, the abrasive equipped shoe flanges 14 are dropped into a ridged cylinder to the maximum extent permitted by engagement of the radial projecting
60 edge portions of flanges 13 with the top of the cylinder. For the purpose of rotating the tool, the axially disposed stem or shank 10 of the head 9 will usually be clamped in the chuck 21 of a portable power drill unit or the like, not shown.
65 At any rate, it is contemplated that the power driven rotating unit will be of the portable type, which will be held in the operator's hands. When the motor of the power unit is turned on, the tool
70 will be rotated at relatively high speed and the shoes will be thrown outwardly into grinding engagement with the ridged portion of the cylinder by centrifugal force. Usually during the grinding operation, the operator will raise the tool slightly so that the projecting edge of flanges
75 13 will be out of frictional engagement with the

top of the cylinder, substantially as shown in Fig. 1.

Due to the low cost of the abrasive strips and the easy replacement, a stock of such strips with different degrees of abrasive quality may be kept
5 on hand at all times, and new strips of the proper abrasive qualities for any particular job can be applied for that particular job.

The device of Fig. 5 is like that of Figs. 1 and 2, in all respects except that, whereas the two shoes
10 12 of Figs. 1 and 2 are pivoted at opposite ends, the two shoes of Fig. 5 are pivoted at like ends. In this respect, it may be said that the arrangement of Fig. 5 has some advantage over the device of Figs. 1 and 2 in that a better balance will be
15 maintained on a rotation and the extent of centrifugal action on both shoes will be the same. The several elements of Fig. 5 are indicated by the same characters as are assigned to corresponding elements in Figs. 1 to 3 inclusive, plus
20 the exponent "a".

The device of Fig. 6 differs from those of Figs. 1 to 4 inclusive only in the manner of mounting the shoes on the rotary head, and all parts in Fig. 6,
25 which correspond to parts in Figs. 1 to 3 inclusive will be indicated by like parts plus the exponent "b". The shoes in Fig. 6, in place of being pivotally anchored to the disc-like head of the tool, are anchored to the disc-like head 9b for limited radial
30 movements through the medium of nut and head equipped bolts 22 that work in laterally spaced slots 23 in the head 9, and are anchored fast in the flanges 13b of the shoes 12b.

What I claim is:

1. In a cylinder ridge grinding tool, a rotary
35 head having a substantially circular flat face, an opposed pair of shoes working against the flat face of the head and anchored thereto for limited movements toward and from the axis thereof,
40 each of said shoes comprising a radially extended flat anchoring flange lying against the said face of the head and an axially extended segmental flange projecting from the radially extended flat flange, a primarily flat strip of flexible abrasive
45 material covering the segmental outer surface of each axially extended shoe flange and having its free ends turned over the ends of said segmental flanges and doubled back over the end portions
50 of the inner segmental faces thereof, and means for detachably anchoring the folded back ends of the abrasive strips to their respective flanges, the anchoring means for each shoe comprising a normally straight spring anchored to the shoe at its
55 longitudinally intermediate portion in such close relation to the concave inner surface of the segmental flange thereof that it will be made to conform normally to the concave contour of said segmental flange and the free ends thereof will be
60 yieldingly pressed toward the segmental flange, said spring being of such length that the free end portions thereof will overlap the folded back ends of the abrasive strip and detachably anchor the same in position.

2. The structure defined in claim 1 in which the
65 said anchoring springs are tightly coiled wire springs.

3. The structure defined in claim 1 in which the said anchoring springs are tightly coiled wire
70 springs and in which the ends of said anchoring springs are provided with outwardly turned finger engaging loops.

4. In a grinding tool of the kind described, a
75 rotary head, a grinding shoe mounted on said head for movements toward and from the axis thereof, said shoe having a depending abrasive

outer surface and a stop flange overlying said abrasive surface and projecting radially beyond the same, and serving as the means for limiting the movement of said tool axially into a cylinder or the like.

5 5. The structure defined in claim 4 in further combination with yielding means connecting said

shoe to said head and exerting force to press the same outward.

6. The structure defined in claim 4 in which there is a plurality of said shoes circumferentially spaced and independently connected to said head. 5

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