

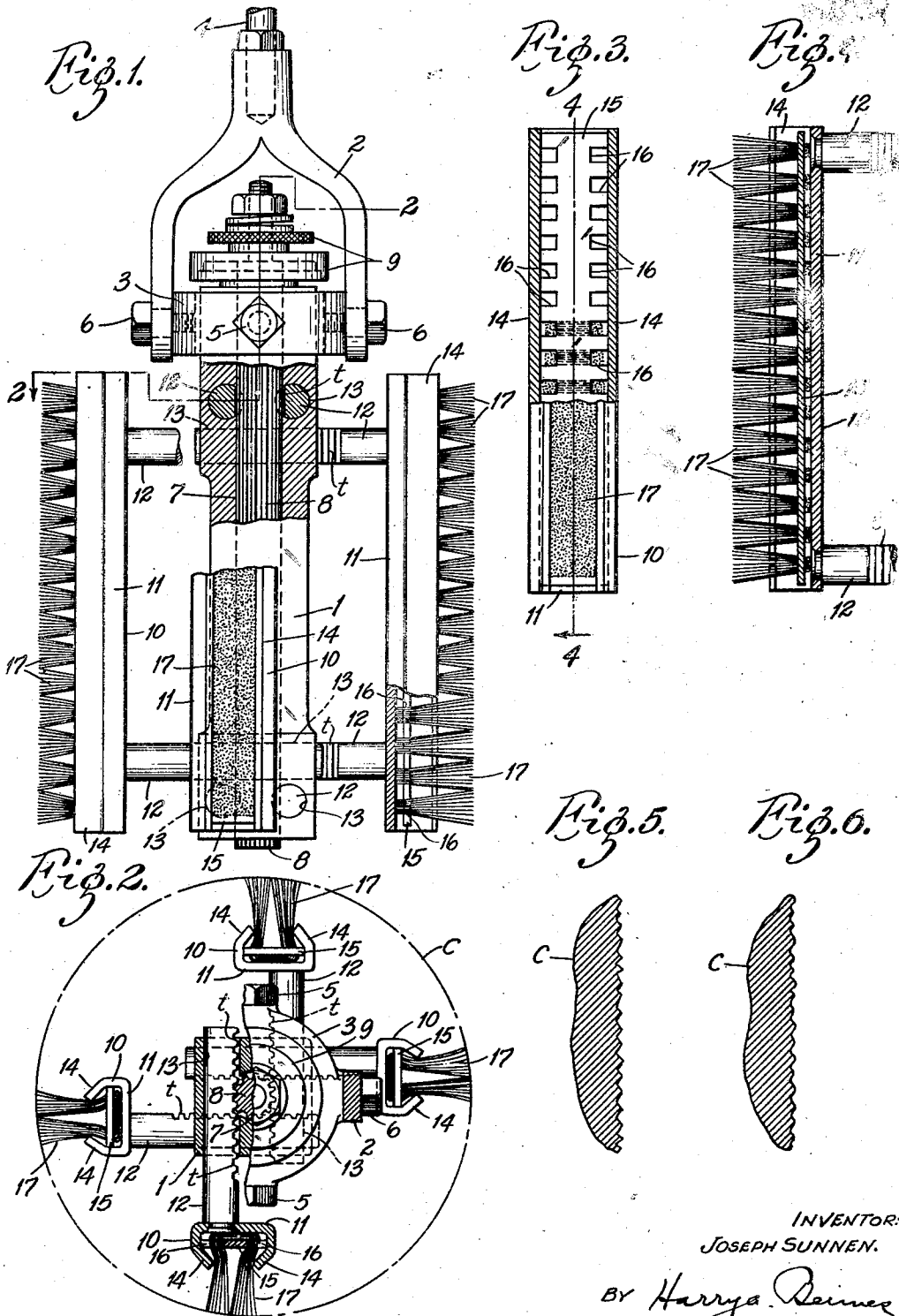
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ENGINE CYLINDER BURNISHING DEVICE

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ENGINE CYLINDER BURNISHING DEVICE

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1 Claim. (Cl. 15—195)

My invention has relation to improvements in burnishing devices for engine cylinders and it consists in the novel features of construction more fully set forth in the specification and pointed out in the claim.

The invention is particularly adapted for finishing operations on engine cylinders that are being restored to serviceable condition by grinding or honing; and it consists in providing a burnishing brush or set of brushes for arrangement on a rotatable holder which is inserted within the cylinder and actuated to cause the brushes to scrub and burnish the cylinder wall.

Grinding stones, or hones, operate, as is well known, by abrasion, and when a cylinder is reconditioned by grinding, sharp abrasion scores remain on the wall of the cylinder, even though a relatively fine stone is used for the final grinding operation. If the cylinder is true these scores are tolerated because they are uniformly distributed over the entire cylinder wall. However, the presence of the abrasion marks prevents a newly ground cylinder from functioning at its maximum efficiency until after it has been operated a certain length of time, or worn in. Of course, during this "wearing in", or smoothing operation, excessive wear comes on the piston rings so that they are seriously damaged by the time the cylinder wall has been worn smooth.

My invention obviates to a large extent the necessity of "wearing in" the cylinder by use, as it provides means for wearing off the sharp edges of the abrasion marks, and thus burnishing the cylinder wall as a final, or finishing step, in the reconditioning of worn and out of round cylinders. After reground cylinders have been burnished with my improved device they are smooth, and require very little "wearing in". Obviously, the piston rings are thus subjected to no more than normal wear when first operated in a reground cylinder and will function efficiently for a longer time than otherwise.

It is a further object of the invention to provide a burnishing brush that may be substituted for the abrasive element in a "Sunnen" cylinder grinder of the type shown in my co-pending application Serial No. 233,788, filed November 17, 1927, so that a single holder will suffice for performing both the grinding and burnishing operations. Further and other advantages will be better apparent from a detailed description of the invention in connection with the accompanying drawing, in which:

Figure 1 is a side elevation of my improved burnishing device with parts of the brush holder

and parts of one of the brushes broken away; Fig. 2 is a horizontal cross-section of the device taken on the zig-zag line 2—2 of Fig. 1; Fig. 3 is a front elevation of one of the brushes with parts broken away to show the bristle retaining strip within the brush body; Fig. 4 is a longitudinal section through the brush taken on the line 4—4 of Fig. 3; Fig. 5 is a greatly enlarged cross-section through a fragment of cylinder wall showing the abrasion marks on the inner surface thereof before the cylinder wall has been burnished by my improved device; and Fig. 6 is an enlarged cross-section through the same cylinder wall portion after the said cylinder wall has been burnished.

Referring to the drawing, 1 represents the tool holder of a Sunnen cylinder grinder of the type described in the above referred to patent application, said holder being suspended by yoke 2 and collar 3 from a shaft 4. The collar 3 is pivotally connected to the holder 1 by means of studs 5, 5, and the yoke 2 is pivotally connected to the collar by means of studs 6, 6, so that a universal joint connection is formed between the shaft 4 and the holder 1. The holder 1 is provided with a longitudinally disposed axial bore 7 within which is housed a pinion shaft 8 rotatable by means of the adjusting head 9 for the purpose of extending and retracting the brushes 10, 10. The construction and the operation of the tool holder, comprising the parts just described, is substantially the same as that of the holder of my honing device described in detail in the aforesaid patent application and will not be further described herein except insofar as necessary to explain the operation of the burnishing elements, or brushes 10, 10.

Each of the brushes 10 comprises a body portion 11 from the back of which toothed pins or rack bars 12, 12 project, said rack bars supporting the brush in the holder 1 by virtue of spaced openings 13, 13 (there being a pair of such openings for each brush) in which the rack bars are mounted. It will be observed that openings 13 intersect the bore 7 and the teeth of pinion 8 project into each of said openings 13 so that they will mesh with the teeth of each rack bar 12, whereby the rack bars are simultaneously moved inwardly or outwardly with the rotation of the pinion 8 so as to effect uniform adjustment of the brushes to fit the cylinder C within which they are being operated. The mounting of the brushes and the method of adjusting the same is the same as that employed when abrasive elements are used, as described in the application

referred to, and in practice the brushes are constructed so that they will be interchangeable with the abrasive elements. Thus a mechanic need have but a single holder with his set of grinding tools, or abrasive elements, and burnishing elements. After he has performed the rough grinding operation upon a cylinder, followed up by the smooth grinding operation he replaces the grinding elements with the burnishing elements, or brushes 10, whereupon the burnishing operation is performed in exactly the same manner that the grinding operations were performed.

The specific manner of constructing the brush is immaterial, although I illustrate in Figures 3 and 4 a construction that is durable and otherwise very satisfactory. The brush body 11 is provided with side walls 14, 14 bent inwardly so as to crimp between them a kerfed plate or bristle strip 15 having notches 16 formed from one end to the other in uniformly spaced relation on both edges. Bristle tufts 17 are disposed in the notches 16, said tufts being arranged in pairs so that the bristles comprising opposite tufts are composed of wires common to both tufts, said wires passing under the strip 15. The wires are firmly pinched and held between the strip 15 and the back of brush body 11 by the side walls 14, 14 of the brush body, as shown in the drawing (Fig. 2). The longitudinal spacing of the tufts 17 is sufficiently close so that the bristles of one tuft will run into those of the next adjacent tuft, thus forming a continuous line of bristles from one end of the brush to the other. The tufts are also sufficiently close to each other laterally so that when looking at the face of the brush one will see a substantially solid mass of bristle points.

From the foregoing description it is apparent

that when four brushes are mounted in a holder (as shown in Fig. 2) and are rapidly rotated over the inner surface of cylinder C they will not only scrub the wall of said cylinder to clean it of all loose adhering particles of grindings, but the stiff bristles will also remove all burrs that remain from the grinding operation and round off the sharp abrasive marks, such as shown in Fig. 5, so that such abrasive marks will more or less assume the contour shown in Figure 6. That these sharp abrasive marks are actually worn off is apparent by a microscopic inspection of the cylinder surface. The smoothness of the cylinder wall after burnishing the same with my improved burnishing device is also apparent to the touch when said cylinder wall is carefully felt both before the finishing operation and after the finishing operation.

In order to provide the necessary stiffness to effect the burnishing operation above described the bristles making up the tufts 17 are preferably of hard steel (that is, harder than the wall of the cylinder) and short enough so as not to bend over when applied to the cylinder wall. In other words, the ends of the bristles must bear against the wall with considerable pressure as the brush is rotated in contact therewith.

Having described my invention, I claim:

A burnishing brush comprising a channel-shaped body portion, a bristle retaining strip in the channel of the body portion and having marginal notches, bristle tufts looped around said strip and projecting from opposite notches, the outer parts of the sides of the body portion being crimped inwardly to hold the strip and bristle tufts securely to the body portion.

JOSEPH SUNNEN.