

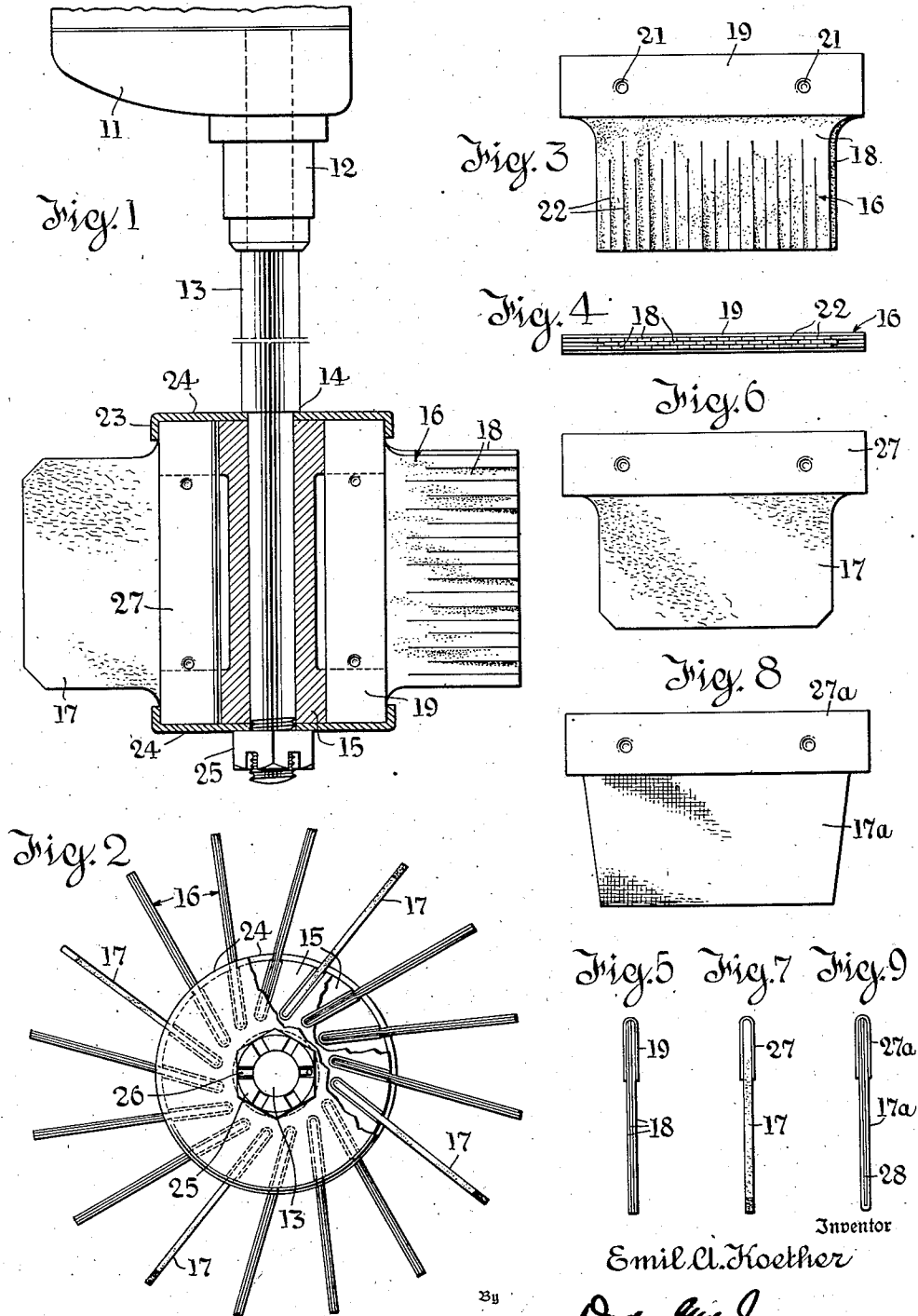
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APPARATUS FOR RECONDITIONING ENGINE CYLINDERS

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## APPARATUS FOR RECONDITIONING ENGINE CYLINDERS

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4 Claims. (Cl. 51—190)

This invention relates to a method of and means for reconditioning cylinder walls of internal combustion engines.

In the past, when an internal combustion engine, particularly gasoline engines such as used in automobiles, showed evidence of oil pumping and loss of compression, the practice was to rebore or regrind the cylinders and insert new pistons and new rings. The procedure was expensive, and required the installation of expensive machinery.

The next step in the development of the reconditioning art involved a honing operation designed to remove less metal from the cylinders than boring or grinding, in order to correct any taper and out-of-roundness which might exist. This method was also expensive and not entirely satisfactory, as in most instances a substantial amount of metal had to be removed from the cylinders and besides the additional expense new pistons were invariably then required.

Both the prior art methods have been largely supplanted since the development of flexible rings and expanders. The practice has been to use these rings as replacement rings in old pistons and to assemble the pistons with the new rings in the old cylinders without any treatment of the cylinders. Obviously, if the old pistons are to be used, the cylinders can not be enlarged by any machining or grinding operation.

The present invention is based on determination that in almost all cases the condition of the old cylinder walls is such that the new rings will not function properly without some form of treatment to the cylinder walls before the new rings are installed. Most frequently, when new rings are put into old cylinders that are not reconditioned in some way, serious blowby takes place and this results in subsequent wear, and also scoring of the rings and cylinders invariably occurs. Slight scratches in the old cylinder walls, and adherent layers of carbon and so-called "cylinder varnish," which is a deposition the cylinder walls believed to result from partly burned oil, all exert a harmful action on the new rings and prevent their burnishing and seating properly in any reasonable operating period. Another frequent cause of trouble are the glazed surfaces which are common in used cylinders, and these glazed spots usually protrude slightly above the adjacent surfaces. When the rings pass over these spots they receive quite a shock and are forced away from the cylinder which causes blowby and excessive oil consumption.

They also prevent the rings from seating-in properly in any reasonable operating period.

The present invention provides a simple scheme for cleaning and buffing the cylinder walls by the use of a flexible expandable tool which may be driven by an ordinary electric drill stock and which requires no special guiding structure or fixtures.

The invention provides a buffing head which, when properly operated, will recondition the cylinder in about sixty (60) seconds and has a useful life of about fifty (50) to sixty (60) reconditioning operations, which, when considering the average automobile of six cylinders, is normally over three hundred (300) cylinders.

Broadly considered, the invention contemplates a buffer which is freely expandable and hence may be used with a considerable range of cylinder sizes. It buffs or polishes the cylinder walls by rotary motion about an axis approximately concentric with the axis of the cylinder and by eliminating minor scratches and all deposits of carbon and cylinder varnish, produces a surface on the cylinder walls such that the new piston rings will seat-in in a relatively short period.

The operation does not contemplate the removal of any material amount of metal from the cylinder walls, but is rather a hand-guided buffing operation effective to remove foreign substances adhering to the walls of the cylinder. Not only are the high spots and glazed surfaces in the cylinder surfaces buffed smooth to a velvet-like finish, but also the low spots and so-called "bellies" in the cylinder are thoroughly reconditioned. The surface produced on the cylinder walls is new metal and, therefore, clean and uniform throughout, and its velvet-like surface is ideal for the seating-in of new rings.

The invention will now be described with reference to the accompanying drawing, in which: Figure 1 is a view partly sectional of the buffer head mounted in a chuck of an electric drill, a portion of the shank or stem being broken away to reduce the length of the view.

Fig. 2 is an end elevation of the buffing tool shown in Fig. 1.

Fig. 3 is a face view of one of the abrasive units.

Fig. 4 is an edge view of the unit shown in Fig. 3.

Fig. 5 is an end view of the unit shown in Fig. 3.

Fig. 6 is a face view of a wiper unit, preferably composed of felt-like material.

Fig. 7 is an end view thereof.

Fig. 8 is a face view of an alternative form of wiper unit composed of canvas or like fabric with an internal metallic stiffener.

Fig. 9 is an end view of the unit shown in Fig. 8.

In Figure 1, 11 represents the housing of an electric motor drill, and 12 represents the chuck thereof. In the chuck 12 is mounted a stem or shank 13 which is shouldered at 14 to receive a sleeve-like hub 15. The hub 15 is longitudinally slotted to receive a number of abrasive units generally indicated by the numeral 16, in Figs. 1 and 2, and shown in detail in Figs. 3, 4 and 5, and also a smaller number of wiper units generally indicated at 17 in Figs. 1 and 2. These wiper units are preferably of the form shown in Figs. 6 and 7, but in lieu thereof, I may use a modified form, shown in Figs. 8 and 9.

It will be observed that the slots are not radial but secant, so that the units project from the hub at an angle of perhaps twenty degrees (20°) from a radial line.

The units 16 can now be described with reference to Figs. 3, 4 and 5.

Each unit is made up of one or more plies of flexible abrasive cloth, i. e., cloth or material coated or impregnated with an abrasive 18, the plies being clamped together by a sheet metal clip 19 which is folded over the inner edges of the plies and clamped by any suitable means, such as the crimps 21. Carborundum cloth or aloxite cloth are suitable abrasive cloths.

The lengths of the clips 19 are the same and are approximately equal to the length of the hub 15. Each ply of abrasive cloth is slitted as indicated at 22, alternate slits being long and short, as clearly indicated in Fig. 3, so that each abrasive unit comprises a sort of brush in which the fingers corresponding to the bristles are staggered as to successive plies (see Fig. 4).

The abrasive material is cut back adjacent the ends of the clip 19, to give clearance for the flanges 23 of the retaining caps 24 which are assembled against the ends of the hub 14 after the clips 19 have been inserted in the slots. The parts are held in assembled relation by a castellated nut threaded on the end of the shank 13 and locked by means of a cotter-pin 26.

The units 17 (see Figs. 6 and 7) are mounted in clips 27, identical with the clips 19, but the wiper blade 17 is composed of a sheet of felt impregnated with rubber or other suitable materials. Consequently, it is flexible, but, as compared to the abrasive fingers, rather stiff.

Other forms of wipers such as shown in Figs. 8 and 9 may be substituted for those shown in Figs. 6 and 7. In such case, the clip 27a is identical with those already described, but the wiper blade comprises a sheet of canvas or similar fabric 17a folded around a flexible metallic stiffener 28 which is completely housed within the canvas and serves as a resilient element to hold the canvas wiper to its work.

To recondition the cylinder, the buffing head is inserted into the cylinder after removal of the cylinder head and is rotated by operating the electric drill 11. While it rotates, it is shifted

axially back and forth through the cylinder and in the course of about one minute will clean and impart a high polish to the cylinder wall, removing all coatings of carbon and cylinder varnish, but removing a negligible amount of metal. This leaves the cylinder walls in a condition which ensures rapid seating of the replacement rings.

The wipers 17, being stiffer than the abrading elements 16, serve to center the buffing head. They also collect particles of abrasive and perform a secondary polishing action. Four such elements are satisfactory, but the number is subject to variation. They are arranged at approximately uniform intervals.

The slitting of the plies of the abrasive cloth and staggered arrangement of the slits give flexibility with support of one ply by the next. The alternate long and short slits prevent undue localization of flexure and thus serve to increase the life of the unit.

A single unit can be used to recondition cylinders of various sizes (within reasonable limits) because the abrasive units and wipers are each flexible and are urged outward by centrifugal force when rotated.

While one embodiment has been described in considerable detail, this is intended to be illustrative and not limiting.

What is claimed is:

1. A rotary buffing tool for reconditioning engine cylinders, comprising a shank for mounting in suitable rotating means; a head mounted on said shank; a plurality of brush-like elements projecting outward from said head and comprising abrasive coated fabric slitted to form flexible fingers; and flexible centering means comprising a plurality of relatively stiff flexible wipers interspersed among the brush-like elements at approximately uniform intervals around said head.

2. A rotary buffing tool for reconditioning engine cylinders, comprising a shank for mounting in suitable rotating means; a head mounted on said shank; and a plurality of brush-like elements projecting outward from said head and each comprising a plurality of superposed plies of abrasive coated fabric slitted to form flexible fingers, the fingers in one ply being staggered relatively to those in adjacent plies.

3. A rotary buffing tool for reconditioning engine cylinders, comprising a shank for mounting in suitable rotating means; a head mounted on said shank; a plurality of brush-like elements projecting outward from said head and each comprising a plurality of superposed plies of abrasive coated fabric slitted to form flexible fingers, the fingers in one ply being staggered relatively to those in adjacent plies; and flexible centering means comprising a plurality of relatively stiff flexible wipers interspersed among the brush-like elements at approximately uniform intervals around said head.

4. The combination defined in claim 1 in which the brush-like elements and wipers include clips which clamp the abrasive cloth or the wiper elements as the case may be, and said clips are received in slots in the head and are there retained by flanged caps which confine the clips.

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