

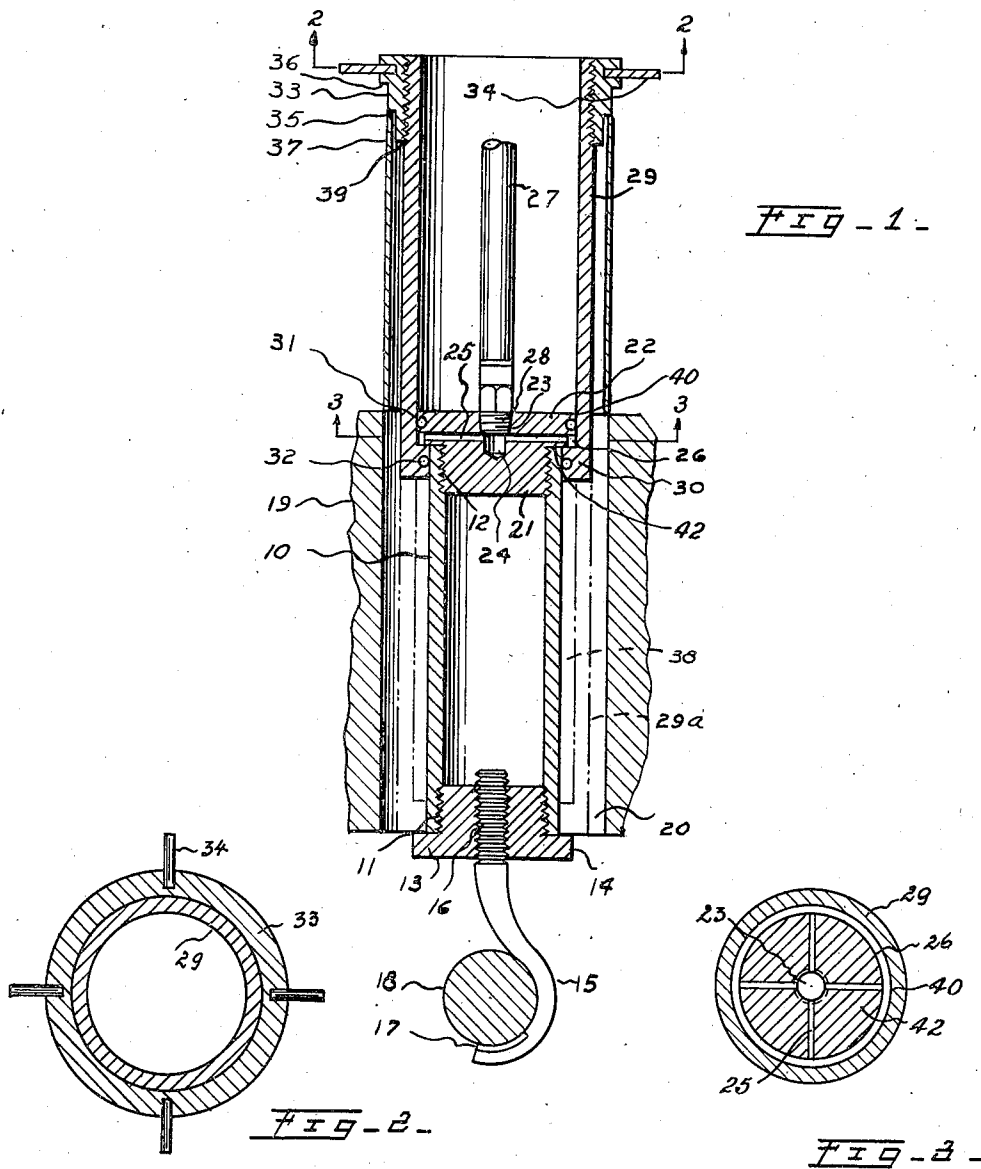
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TOOL FOR INSERTING CYLINDER LINERS

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TOOL FOR INSERTING CYLINDER LINERS

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The tool improved by me pertains to devices employed for the purpose of forcing thin sheet metal liners into cylinders of internal combustion engines.

The purpose of my invention is to provide a portable tool of simple construction by means of which the process of forcing the liners into the respective cylinders may be accomplished quickly, with little effort and in a manner assuring a uniform alignment of the lining within its cylinder throughout the length of the lining. It is further the object of the invention to provide the tool by means of which the liners may be inserted in place without distortion and without the need of readjustment or refinishing, once the liners are in place. I shall now describe my tool with reference to the accompanying drawings in which

Figure 1 is a longitudinal sectional view of my tool with a fragmentary sectional view of a cylinder block of an internal combustion engine, disclosing a cylinder therein into which a lining is to be forced.

Figure 2 is a sectional view of the tool on line 2—2 of Figure 1.

Figure 3 is a sectional view of the tool of line 3—3 of Figure 1.

Similar numerals refer to similar parts throughout the several views.

Basically the tool is built to employ hydraulic pressure for the purpose of forcing the liner longitudinally with respect to the axis of the respective cylinder into which the liner is to be inserted. More specifically the tool diverges from the ordinary practice of construction which employs a cylinder and a piston moving therein, and reverses the action of its component elements by holding the axially central member stationary while the cylinder, or a sleeve, being the outside member is made to proceed longitudinally in a telescopic movement over the central stationary member carrying the liner into the position which said liner is to occupy. The inner stationary member 10 has the form of a cylinder threaded internally at both ends as indicated by numerals 11 and 12 respectively. I shall designate the end marked 11, as the outer end, and the end marked 12 as the inner end of member 10, with reference to said moveable cylinder. A threaded plug 13 including a shoulder 14 closes said outer end of member 10 and serves as a support for an axially disposed hook 15, which includes a threaded shank 16, said hook being applied from outside to said plug.

It is by means of this hook 15 that the tool

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may be attached to crankshaft 18 of the engine in which the engine block is indicated by numeral 19, and the cylinder to be lined by numeral 20. This is accomplished by slipping the hook over the crankshaft sidewise, and the turning of the tool 90° to engage said crankshaft. In order to prevent the marring of the crankshaft and application of the hook, a bushing 17 is interposed between said crankshaft and said hook as shown.

The inner end of member 10 is closed by closure 21 threaded into said member. Integrally connected therewith is a disk shaped top 22 of expanded diameter, its rim forming a shoulder 40. Said top includes on its under side a portion 42 of reduced diameter somewhat in excess of that of the threaded part of closure 21. The top is provided with an axially disposed threaded socket 23 leading to a central well 24 in the body of closure 21, the well opening into a plurality of radially disposed conduits 25, leading to an annular chamber 26. A tube 27 capable of withstanding a relatively high pressure and provided with a nozzle 28, is threaded into socket 23 as a means of conveying liquid, such as oil under pressure towards said well 24.

The moveable element of my chamber is a cylindrical sleeve 29 being in an axial alignment with the stationary member 10. The inner diameter of the sleeve is large enough to fit over shoulder 40, said sleeve being provided with an inwardly turned flange 30 which forms a slip joint abutting the outer surface of said member 10. To assure a liquid-tight contact between the respective parts, an annular seal 32, consisting of a suitable packing is used in flange 30 between the outer surface of the stationary member 10, and the inner rim of flange 30 of the sleeve. A similar seal 31 is used in the rim surface of shoulder 40. The outer, or the remote end of the sleeve with respect to member 10 is equipped with a collar 33 threaded internally to fit the threading of the outer surface of the casing. The collar is longitudinally adjustable with respect to said casing by means of said threads. To facilitate manual adjustment of said collar it carries radial spokes 34. The spokes also serve as convenient handles for holding the tool during its operation.

As will be noted by reference to the drawings, collar 33 includes three shoulders, 36, 35 and 39, in a stepped down relation to accommodate liners of corresponding diameters. This provision is satisfactory for liners of sizes most commonly used in trade. Should it be necessary to

employ liners of different sizes, the collar may be easily replaced by another having the shoulders of the desired diametrical dimensions. This interchangeability of the collar is one of the important features of my invention.

After having described the component parts of my said tool, I shall now describe its operation:

It will be assumed that the tool is of the right size for the operation to be herein set out. From the description already given it will be clear that the outer sleeve of my tool being in a sliding engagement with the stationary member thereof may be moved longitudinally over said member into what may be called a telescopical collapsed relation, as differing from the extended relation shown in the drawings. In said extended relation of parts the stationary member is drawn out of the sleeve to the limit allowed by the construction of the tool. The initial steps of the operation of the tool take place when the tool is so extended. The liner 37 is then set in place by being slid over the hook end of the tool against shoulder 35 on collar 33, whereupon the tool is inserted into the respective cylinder of an engine block and secured in place within the cylinder by means of hook 15 by which it is anchored to crankshaft 18. Bushing 17 is interposed between the crankshaft and the hook to eliminate possible scratches of the crankshaft as already described above. The liner extending over the body of the sleeve abuts one of the shoulders of collar 33 and is disposed in an axial alignment with the cylinder at the receiving end thereof. Held by hook 15 at one end in the interior of the engine, the tool is supported manually at the other end by means of spokes 34. At this stage of the operation liquid under pressure is delivered through tube 27 towards well 24 and through radial apertures 25 into chamber 26. Here the pressure exerted against the inner well of the moveable flange 30 will force the flange inwardly into the cylinder 20 effecting a longitudinal movement of the sleeve with the liner thereon towards the hook end of the tool.

The movement is continued till the sleeve has reached shoulder 14 of plug 13 at the hook end of the stationary member 10. Position of the sleeve at this stage of the operation is shown by dotted lines 29a. At this stage, the liner carried in by the sleeve, will be in abutment with the inner surface of cylinder 20. It ought to be pointed out that at the above said position of the sleeve the initially restricted annular chamber 26, has been expanded till it includes space 38 surrounding the larger part of member 10.

As the seating of the liner on the collar of the sleeve is loose, the liner is adapted to adjust itself automatically to the contours of the wall of the cylinder. When the liner has been fully driven into its place in the cylinder, the application of hydraulic pressure supplied to the tool is discontinued, and the tool may be withdrawn from the cylinder on disengagement of the hook from the crankshaft.

The whole operation is speedy and efficient and results in a saving of as much as fifty per cent in time may be effected by the use of the tool, as has been proved by actual experience in the use of the tool under ordinary working conditions.

It will be understood that some changes may be made in the design, construction and the combination of the essential elements of my tool without departing from the inventive principle dis-

closed herein. What I therefore wish to claim is as follows:

1. An apparatus of the kind described, comprising a stationary cylindrical member adapted to be disposed axially within the cylinder of the engine to be equipped with a liner, means at one end of said member to anchor the apparatus to the crankshaft of the engine during the operation of said apparatus, a closure at the other end of said member having an annular shoulder extending outwardly, a cylindrical sleeve, open at one end and being slidably disposed over said shoulder, an annular collar on said sleeve at the open-end thereof to bear against the outer end of the liner, and an inwardly turned, annular flange on the opposite end of the sleeve to abut the outer surface of the stationary member, means to introduce liquid under pressure between the shoulder of the closure and the flange to drive said sleeve by means of said flange inwardly into the cylinder of the engine, with the liner on said sleeve to force the liner into its place in said cylinder.

2. An apparatus of the kind described, comprising a stationary cylindrical member adapted to be disposed axially within the cylinder of the engine to be equipped with a liner, means at one end of said member to anchor the apparatus to the crankshaft of the engine during the operation of said apparatus, a closure at the other end of said member having a shoulder extending outwardly, a cylindrical sleeve, open at one end and being in an internally sliding abutment with said shoulder, an interchangeable collar, longitudinally adjustable on the sleeve at its open end and provided with annular means for abutment with the end of the liner, an inwardly turned flange on the opposite end of the sleeve to abut the outer surface of the stationary member, means to introduce liquid under pressure into space between the shoulder of the closure and the flange to drive said sleeve by means of said flange, with the liner on said sleeve to force the liner into its place in the cylinder of the engine.

3. A tool of the kind described comprising a stationary cylindrical member adapted to be disposed within the cylinder of the engine to be equipped with a liner, means at one end of said member to anchor the same to a part of the engine, during the operation of the tool, a closure at the other end of the stationary member having a shoulder extending outwardly, a cylindrical sleeve open at one end and being in a sliding internal abutment with said shoulder, said sleeve including at its open end a longitudinally adjustable collar having an outwardly turned shoulder for abutment with the end of a liner and an inwardly turned flange at the other end to abut the outer surface of the stationary member, the above said closure being provided with a socket for reception of a tube adapted to convey liquid under pressure, and with a plurality of radial passages to convey said liquid outwardly to a space between said flange and the shoulder on the stationary member, to cause said sleeve, by the pressure of the liquid to slide longitudinally over the stationary member and to force the liner into its place in the cylinder of the engine.

4. An apparatus of the kind described comprising a stationary cylindrical member to be disposed axially within the cylinder of an engine which includes a crankshaft, means at the inner end of the stationary member to be anchored to said crankshaft, a closure at the other end of the stationary member, said closure having an

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outwardly extending annular shoulder, a cylindrical sleeve open at one end, axially aligned with said stationary member and being in an internally sliding abutment with said shoulder, an inwardly turned flange at the other end of the sleeve 5 to slidably abut the outer surface of the stationary member, said flange and said shoulder forming opposite walls of an expansible annular chamber, and external adjustable collar at the open end of the sleeve for frictional engagement 10 at the outer end of a liner to be forced into the cylinder of the engine, the above said closure being provided with a socket for reception of a tube to convey liquid under pressure and with a plurality of channels radially extending from said 15 socket to convey said liquid to said annular cham-

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ber to cause said sleeve, to slide longitudinally over the stationary member and to force said liner into its place in the cylinder of the engine.
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