June 4, 1940. S. F. OLIVER 2,203,175

PISTON EXPANDING TOOL

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FIG. 1.

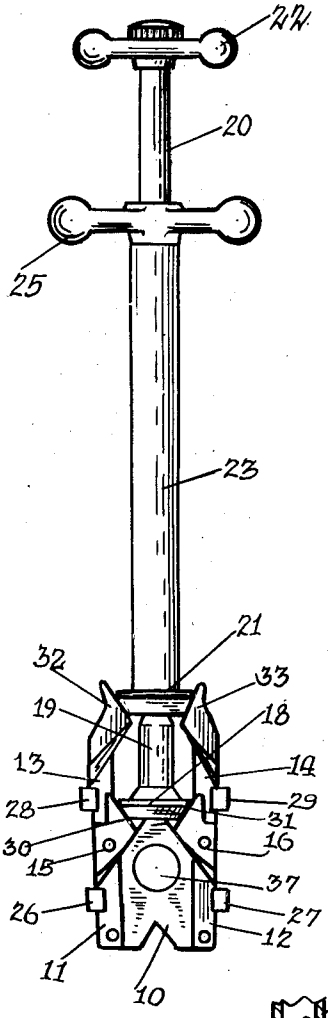


FIG. 3.

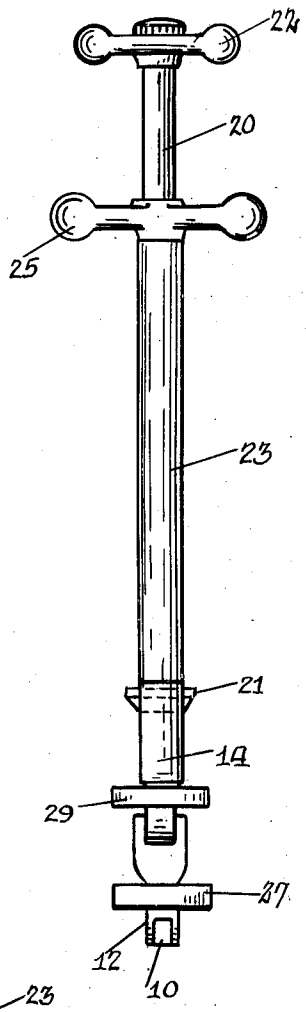
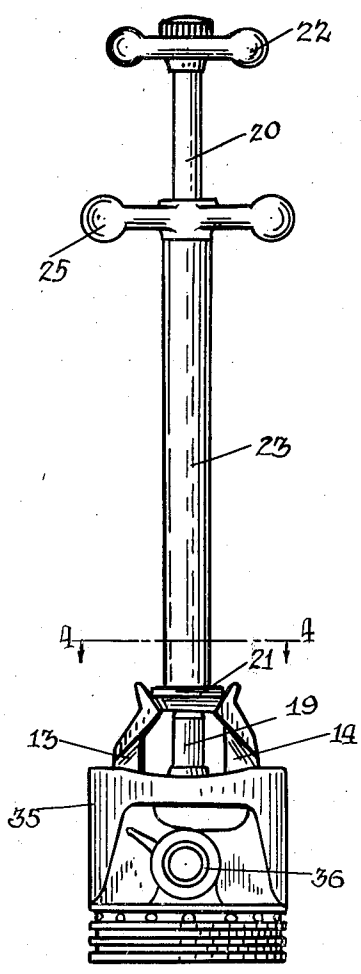


FIG. 2.



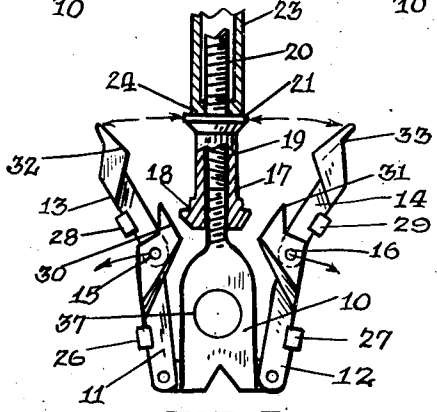
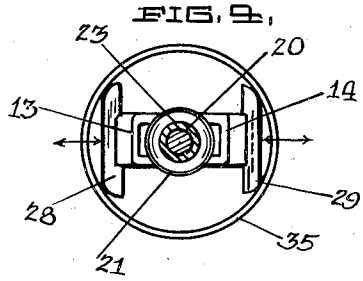


FIG. 5.

FIG. 4.



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FIG. 6.

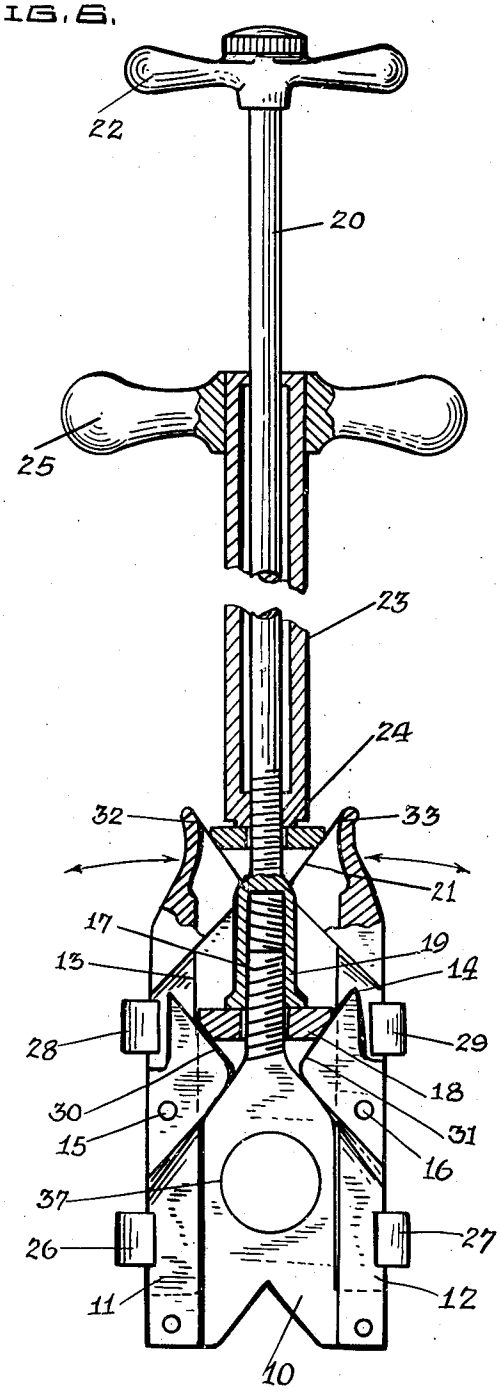


FIG. 7.

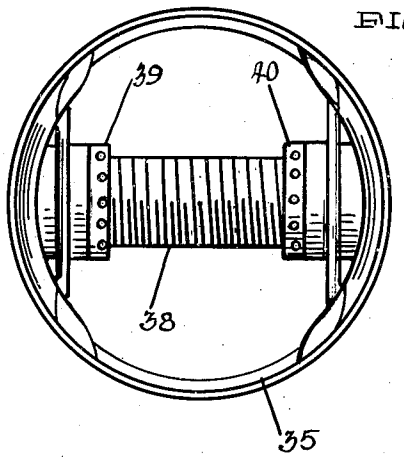
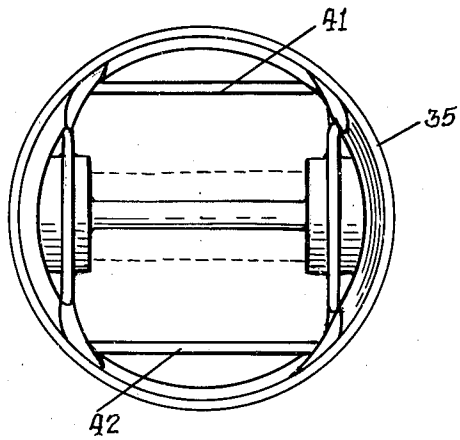


FIG. 8.



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PISTON EXPANDING TOOL

Sheffield F. Oliver, Modesto, Calif.

Application April 25, 1939, Serial No. 270,035

3 Claims. (Cl. 153—80)

This invention relates to improvements in expanding tools and has particular reference to a piston expanding tool for expanding and treating worn motor vehicle pistons.

The principal object of the present invention is to provide a piston expanding or reconditioning tool and a unique process or method of applying the tool, whereby a successful and positive expanding treatment may be applied to worn motor vehicle pistons.

Another object of the invention is to provide a tool of the character set forth which is especially adapted to the treatment or reconditioning of alloy pistons and one which when inserted in a piston and properly expanded will hold the piston skirt in its adjusted or expanded position while being heated.

A further object of the invention is to provide an expanding tool of this character which when inserted in position and expanded will not cause distortion of the wrist pin bosses as it straddles the wrist pin, which pin is left in the piston during the entire expanding operation.

A still further object of the invention is to provide a tool which is positive in its action, may be easily inserted into a piston to be treated, and is comparatively simple in design and, therefore, may be economically constructed.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same:

Fig. 1 is a side elevation of the improved expanding tool, showing the operating parts thereof in normal position;

Fig. 2 is a side elevation of the tool shown in operative position in a piston to be expanded;

Fig. 3 is an end view of the tool;

Fig. 4 is a plan section of the tool taken on the line 4—4 of Fig. 2 and further illustrating the operating elements of the device;

Fig. 5 is a side elevation partly in section, showing the expanding elements of the tool swung outwardly to better illustrate the operation thereof;

Fig. 6 is a full scale elevation of the tool partly in section, showing all operating elements in normal or non-expanded positions;

Fig. 7 is a plan view of a piston, showing a modified form applied to the wrist pin bosses of the piston;

Fig. 8 is a plan view of a piston having plates inserted therein to engage the expanding tool in the event the piston is of a too large internal diameter to fit the tool.

It is a well-known fact in the art of repairing motor vehicle engines that used pistons are much better than new ones for various reasons, one reason of importance being that pistons which have operated in an engine for a considerable period become tempered and seasoned, and another important fact being that these worn pistons may be much more cheaply repaired and refitted in the engine cylinders than new pistons which have to be turned and precisely fitted in the engine, which requires more time and expense than that required in reconditioning the worn pistons.

Figs. 1 to 6 inclusive illustrate the preferred form of the invention and include an expander plate 10 having pivotally mounted at opposite lower edges links 11 and 12, which links are in turn pivoted to links 13 and 14 at the points 15 and 16 respectively.

One end of the plate 10 is provided with a threaded stud 17, upon which is loosely mounted a bevelled disc 18. Bearing against the disc 18 and threadedly connected to the stud 17 is a sleeve 19, which sleeve is also an integral part of the threaded stem 20 of the tool, said stem being also provided with a loosely mounted bevelled disc 21 arranged upon the shouldered end of the sleeve 19, and the stem 20 is provided at its outer end with an operating handle 22.

A tube 23 surrounds the threaded stem 20 and has a threaded end 24 adapted to engage the threads of said stem, the threaded end of said tube normally bearing against the face of the bevelled disc 21, and said tube being provided at its upper end with an operating handle 25.

The links 11 and 12 are provided with integrally formed expanding bars 26 and 27 respectively, and the links 13 and 14 are provided with similar transversely arranged expanding bars 28 and 29 respectively, said links 11 and 12 also being provided with cam elements 30 and 31 fixed thereto and having obliquely arranged cam faces capable of engaging opposite bevelled faces of the disc 18, and the links 13 and 14 are each provided with similar obliquely arranged cam faces 32 and 33 respectively capable of engaging opposite bevelled faces of the disc 21.

It will now be observed that when the tool is to be inserted into the skirt section of a piston 35 to be expanded, the wrist pin 36 must be first removed from the piston bosses. The tool is next placed within the skirt in a normal collapsed position, and the wrist pin is again replaced in

the piston bosses and extends through the aligned opening 37 formed in the plate 10 to receive the tool. The links 11, 12, 13, and 14, of course, straddle the wrist pin 36 of the piston.

In Fig. 7 I have shown a modified form in which a threaded member 38 may be inserted in the piston bosses and is provided with threaded nuts 39 and 40 which may be rotated upon the threaded member 38 by means of any suitable tool.

Fig. 8 is a plan view of a piston which may be too large in diameter to effectively receive the tool. Therefore, I provide insert plates 41 and 42 to reduce the inner diameter of the piston skirt between which the operating elements of the tool may be operated to properly expand the piston skirt.

It will now be observed that when the tool is inserted into a piston to be reconditioned, the links are all necessarily in retracted positions and when properly set by the reinsertion of the wrist pin are expanded in the following manner:

The handle 22 is rotated, which causes the rotation of the stem 20, said stem, carrying the threaded sleeve 19, causes the sleeve to bear downwardly and force the beveled disc downwardly and against the cam members 30 and 31, thus forcing the links 11 and 12 outwardly and causing the expanding bars 26 and 27 to likewise move outwardly and firmly grip and expand the inner walls of the piston.

When the operating handle 25 is operated, the tube 23, carrying the nut 24, moves downwardly upon the threaded stem 20 and forces the beveled disc 21 downwardly, which disc rides against the oblique cam sections 32 and 33 of the links 13 and 14, which action causes these links to be expanded and force the expanding bars 28 and 29 outwardly against the interior wall of the cylinder skirt, this expanding action, of course, being determined by the conditions required.

The tool is now locked in position in the piston, and the piston and tool are next placed in a heating oven and heated to the desired degree, and the tool and piston are then placed in a solution and chilled; and if the proper degree of expansion is not acquired after tests, this operation is repeated until the piston is expanded to a precise fit in the engine cylinder.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that various changes relative to the material, size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A tool of the class described embodying expansible cooperating pairs of links carrying piston expanding bars arranged in pairs, one above the other, means associated with said tool for expanding said links, said means including cam elements formed on said links, and threaded adjusting elements cooperating with said links and carrying bevelled members capable of contacting said cam elements, said threaded elements being arranged to selectively operate said bevelled members, whereby the piston expanding links and bars may be selectively expanded to engage the interior wall of the piston skirt at different points relative to the end thereof.

2. In a tool of the class described including a plate having a threaded stud formed on one end thereof, expansible cooperating links pivoted to one end of said plate, said links having cam elements formed thereon, a bevelled operating disc freely mounted on said stud and capable of engaging the cam elements of certain of said links, a threaded stem having an integrally threaded sleeve normally engaging said stud to cause the actuation of said operating disc, a second set of links pivoted to the first mentioned links and having cam faces, a second bevelled operating disc loosely mounted on said threaded stem and capable of engaging the cam faces of the second set of links, and a tubular member surrounding said stem and having a threaded end section engaging the threaded stem and normally contacting said second-mentioned operating disc, whereby when said threaded stem and said tubular member are rotated, the link members are independently expanded.

3. In a tool of the class described including a plate having a threaded stud formed on one end thereof, expansible cooperating links pivoted to one end of said plate, said links having cam elements formed thereon, a bevelled operating disc freely mounted on said stud and capable of engaging the cam elements of certain of said links, a threaded stem having an integrally threaded sleeve normally engaging said stud to cause the actuation of said operating disc a second set of links pivoted to the first mentioned links and having cam faces, a second bevelled operating disc loosely mounted on said threaded stem and capable of engaging the cam faces of the second set of links, a tubular member surrounding said stem and having a threaded end section engaging the threaded stem and normally contacting said second-mentioned operating disc, whereby when said threaded stem and said tubular member are rotated, the link members are independently expanded, and actuating handles carried by said threaded stem and said tubular member respectively for the selective actuation of said stem and said tubular member.

SHEFFIELD F. OLIVER.