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PISTON AND PISTON RING INSTALLING TOOL

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This device relates to a tool for installing pistons and piston rings into a cylinder and particularly to a type thereof by which a piston and the piston rings seated in said piston are simultaneously held and, while so held, may be introduced into a cylinder bore.

The problem of assembling pistons and piston rings together and then introducing the assembled articles into a cylinder bore has been the subject of a great deal of attention. The inherent awkwardness of the parts to be handled, and the necessity of compressing the piston ring against the piston with a substantial degree of pressure while simultaneously introducing same into the cylinder bore, present problems of handling which have defeated many attempts to provide a convenient handling tool. Accordingly, a principal object of the invention is to provide a tool by which a piston ring can be held in the ring groove of a piston and to hold said parts in such a manner as to permit their insertion into the bore of a cylinder.

A further object of the invention is to provide a tool, as aforesaid, in which a plurality of piston rings may be so held in corresponding and spaced ring grooves of a piston while said piston and rings are introduced into the bore of the cylinder.

A further object of the invention is to provide a tool, as aforesaid, which will hold said rings positively and without likelihood of escape, and yet permit same to be introduced into said cylinder bore without material inconvenience.

A further object of the invention is to provide a tool, as aforesaid, which may be operated by hand and without the use of other tools.

A further object of the invention is to provide a tool, as aforesaid, which may be conveniently and easily handled by a single operator.

A further object of the invention is to provide a tool, as aforesaid, which may be, by a simple adjustment, readily altered for use with pistons or piston rings of slightly varying diameter.

Other objects and purposes of this invention will be apparent to persons acquainted with the problems above outlined upon reading of the following specification and upon inspection of the accompanying drawings.

In the drawings:

Figure 1 represents a plan view of the tool in its closed, or piston holding, position, the plane of said view including the cutting plane 1—1 in Figure 2.

Figure 2 is a side, partially in central section, elevation view of the tool in its closed, or piston holding, position, the sectioned portion thereof being taken on the line 2—2 of Figure 1.

Figure 3 is a section taken on the line 1—1 of Figure 2 showing the piston gripping sleeve in its open, or piston releasing, position.

Figure 4 is a section taken on the line 4—4 of Figure 1.

General description

In general, the device consists of an expansible split sleeve 1 whose free and opposed edges are held by the jaws 2 and 3 of the pressure element 4. This latter is actuated manually by the handles 5 and 6. A hook 7 is pivotally affixed to the jaw 3 and engages selectively one of the pins 8 or the disk 9, which disk is pivoted to the other jaw 2. By selecting the desired one of said pins 8, which pins are each placed at different distances from the axis or point of pivotal fastening of said disk to said jaw, the distance between said jaws, and consequently the distance between the free and opposed edges of said split sleeve, may be accurately controlled to meet different conditions of use. A bracket or cantilever 10 is mounted on the sleeve 1 and supports an impact element 11. Thus, the piston and piston rings may be held in alignment with the cylinder bore by one hand gripping the handles 5 and 6 while the other hand strikes the impact element 11 as needed to drive said piston and the rings associated therewith downward out of sleeve 1 and into said bore.

Detailed description

Referring now to the drawings in more detail, the expansible split sleeve 1, which is made of any suitable resilient material, as steel, is made of sufficient circumference to embrace substantially the full circumference of the piston with which it is to be used, and is made of sufficient length to span the ring grooves in said piston. Said sleeve 1 has a lug 15 at one of its opposed free edges and a lug 16 at its other opposed free edge, said lugs being intermediate the ends of said sleeves and at substantially the midpoint thereof. Pivotally affixed to each of said lugs are pin bases 17 and 18 to which are affixed the pins 19 and 20 for purposes appearing hereinafter.

The pressure element 4 comprises a pair of crossed members including the handles 5 and 6 and the jaws 2 and 3 which members are pivotally connected by any convenient means, as a bolt 21 provided with a nut 21a. Suitable openings are provided in the jaws 2 and 3 for the reception of the pins 20 and 19, respectively, and said pins are fixed therein against undesired withdrawal therefrom by the pins 22 and 23 extending therethrough and being partly received in the grooves 24 and 25, respectively, of said pins 20 and 19.

The hook 7 is pivotally affixed to the jaw 3 by any convenient means, as the nut and bolt combination 21. The handle 26 is rigidly or pivotally attached to said hook in order that same may be moved on the pivot easily by the thumb of the hand that is gripping the handles 5 and 6.

The disk 9 is pivotally affixed to the jaw 2 by the spindle 27 at such a point thereon that it may be partly overlaid by the hook 7. Said spindle may be threaded at its end and fastened in any convenient manner, as by a safety washer and nut. A plurality of pins 8, here three, are arranged around the pivot 27 of said disk at unequal distances therefrom with respect to each other. Said pins are all arranged with respect to the hook 7 so that upon different positioning of said jaws 2 and 3 with respect to each other, said hook will engage the one of said pins which in a selected adjustment thereof is positioned closest to the desired distance from the pivot point 25 of said hook, which is preferably yieldably held in a selected position by any conventional means, such as the spring and ball of the detent mechanism 49 appearing in Figure 4. Thus, by rotation of said disk, the hook can be caused to engage a selected one of said pins and thereby position said jaws at different distances from each other when said hook and a selected one of said pins are interengaged.

The bracket or cantilever 10 is supported upon and by a lug 30 which extends sidewardly from said sleeve...
at one end thereof. Said lug is of relatively heavy construction and is adapted to withstand substantial impact. Said bracket 10 has an opening 31 therethrough, which is substantially aligned with the axis of said sleeve when same is in a closed position. It will usually be desirable also to include a boss 32 in said bracket to provide a better bearing surface for the hereinafter described plunger.

The impact element 11 comprises a tubular plunger 35 having a head 36 at its upper end, affixed thereto by the depending boss 42, and an impact head 37 at its lower end. Said tubular plunger 35 is slidably received within said opening 31. A slot 38 is provided through one or both sides of said tubular plunger 35 and a pin 39 extends through the walls of said opening 31, through said slot and into said tubular plunger. A spring seat 40 is slidably positioned within said tubular plunger, rests against said pin 39, and supports the lower end of a spring 41. The upper end of said spring bears against the boss 42 of the head 36.

The openings in the jaws 2 and 3 for the pins 19 and 20 are of such construction that when said pins are received therewithin, the compression element 4 assumes an angular position with respect to the sleeve 1 as best shown in Figure 2. This will contribute to the convenience of handling the tool but it is not an essential element thereof.

Operation

The operation of the device will be evident from the foregoing description, but will be hereinafter reviewed for the purpose of completeness.

Beginning with the tool as shown in Figure 1, an operator will grip the handles 5 and 6 with his right hand and will move the lever 26 with his thumb to rotate the hook 7 in a counterclockwise direction for the purpose of disengaging same from the one of said pins 8 then engaged thereby. This permits the jaws 2 and 3 to be moved apart and the sleeve 1 to open. With the piston rings 45 and 46 positioned in their respective ring grooves of the piston, the sleeve is slippered over said rings and piston located so that a portion of said piston projects below said sleeve and the handles 5 and 6 then urged together sufficiently to permit said hook 7 to re-engage a selected one of said pins 8. Said hook and pins are so located that upon such engagement the split sleeve is drawn tightly around the piston and the rings are thus urged fully into the ring grooves thereof. The spring 44 will hold said hook against said pin with sufficient force to prevent accidental disengagement and the detent mechanism will hold said disk in a selected position with respect to said jaws 2.

The piston and its associated rings, said rings now being slid and fully into the ring grooves, is now brought to the bore in which said piston is to be inserted. The portion of the piston extending below the sleeve 1 is inserted into said bore and acts as a pilot. The operator may now strike the handle 36 a sharp, quick, blow with his hand and this will cause the head member 37 and 20 to be so urged into the bore of said piston. The spring 41 returns the striking element 11 to its upward position after each impact. Thus, by repeated impacts, the piston may be quickly and accurately driven into the bore and the rings will have no opportunity to escape from their respective ring grooves as they are transferred from retention hook to the split sleeve 1 to retention by the walls 50 of said bore.

While the piston may be driven all the way into said bore by the impact element 11 it will normally be more convenient to drive it thereinto only far enough to assure the engagement of the uppermost piston ring by the walls of said bore, then to release said piston by disengaging said hook 7 from the engaged one of said pins 8 and then spreading the free edges of the sleeve 1 sufficiently to release said piston. The tool is then ready to receive another piston and ring assembly for a repetition of the steps above described.

It will be recognized that there are many details of construction that have been herein specifically illustrated and described for illustrative purposes which may be varied freely without departing from the scope of this invention. It will be recognized that there are other variations and modifications which may also be made in the tool herein described.

We claim:

1. In a tool for holding piston rings in the ring grooves of a piston and effecting the introduction of said piston and rings into a cylinder bore, the combination comprising: a resilient split sleeve; a pair of crossed members pivoted at their point of crossing and having adjacent ends of each thereof affixed to each of the free, opposed, edges of said sleeve; a hook pivotally affixed to one of said adjacent ends and extending toward the other thereof; a disk pivotally mounted on the other of said adjacent ends and a plurality of pins extending from said disk and positioned from the center of said disk at unequal distances with respect to each other; each of said pins being positioned for engagement with said hook and each effecting when so engaged by said hook a different spacing between said adjacent ends; a cantilever member affixed to said sleeve near one axial end thereof and extending substantially diarametrically thereacross a rod extending through said bracket and on the axis of said sleeve.

2. In a tool for holding piston rings in the ring grooves of a piston and effecting the introduction of said piston and rings into a cylinder bore, the combination comprising: a resilient split sleeve; a pair of crossed members pivoted at their point of crossing and having a pair of adjacent ends, each thereof pivotally affixed to said sleeve on opposite sides of, and near to, the split therein; a hook pivotally affixed to one of said adjacent ends and extending toward the other thereof; a disk rotatably mounted upon the other of said adjacent ends; a plurality of pins extending from said disk at points spaced unequally from the axis of said disk, said pins each being engageable with said hook for holding said adjacent ends at different positions with respect to each other against the resilience of said sleeve; and the axes of said hook pivot, said disk and said pins, being parallel; a cantilever bracket affixed to said sleeve near one axial end thereof and extending substantially diametrically thereacross and a rod extending through said bracket and substantially along the extended axis of said sleeve.

3. The structure of claim 2 in which: the axes of said hook pivot, said disk and said pins are all parallel with the pivotal axis of said crossed members; resilient means secured to said one of said adjacent ends and urging said hook to pivot in pin engaging direction; and manually engageable means on said hook for pivoting said hook in pin disengaging direction.

4. The structure of claim 2 in which said cantilever bracket is secured to said sleeve adjacent to the split therein, resilient means is mounted on said rod for urging same away from said sleeve along the axis thereof and stop means is provided for limiting such urging.

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