

[54] **PLIERS FOR INTERNAL COMBUSTION
ENGINE PISTON PACKING-RING**

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81/302

[56] **References Cited**

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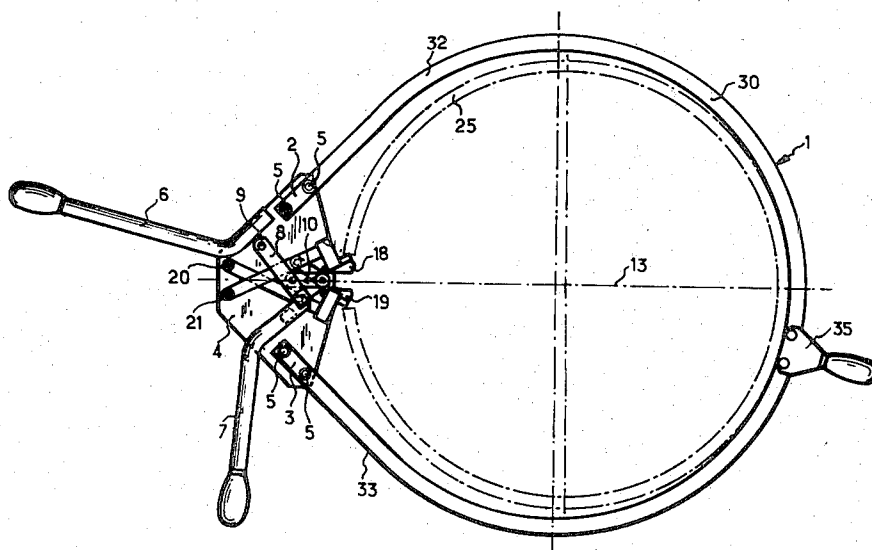
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[57] ABSTRACT

Pliers for installation of packing-rings into the grooves of pistons of large diameter, comprising a circular arcuate portion for accommodating the packing-ring therein, a pair of jaws for spreading apart the packing-ring ends and a toggle system connected to at least one of the hand-grips of the pliers and to said jaws, wherein the improvement consists in the provision of means for continuously backing approximately the half-circumference of the packing-ring on the side opposite to the ring ends in the spreadapart condition thereof.

5 Claims, 2 Drawing Figures



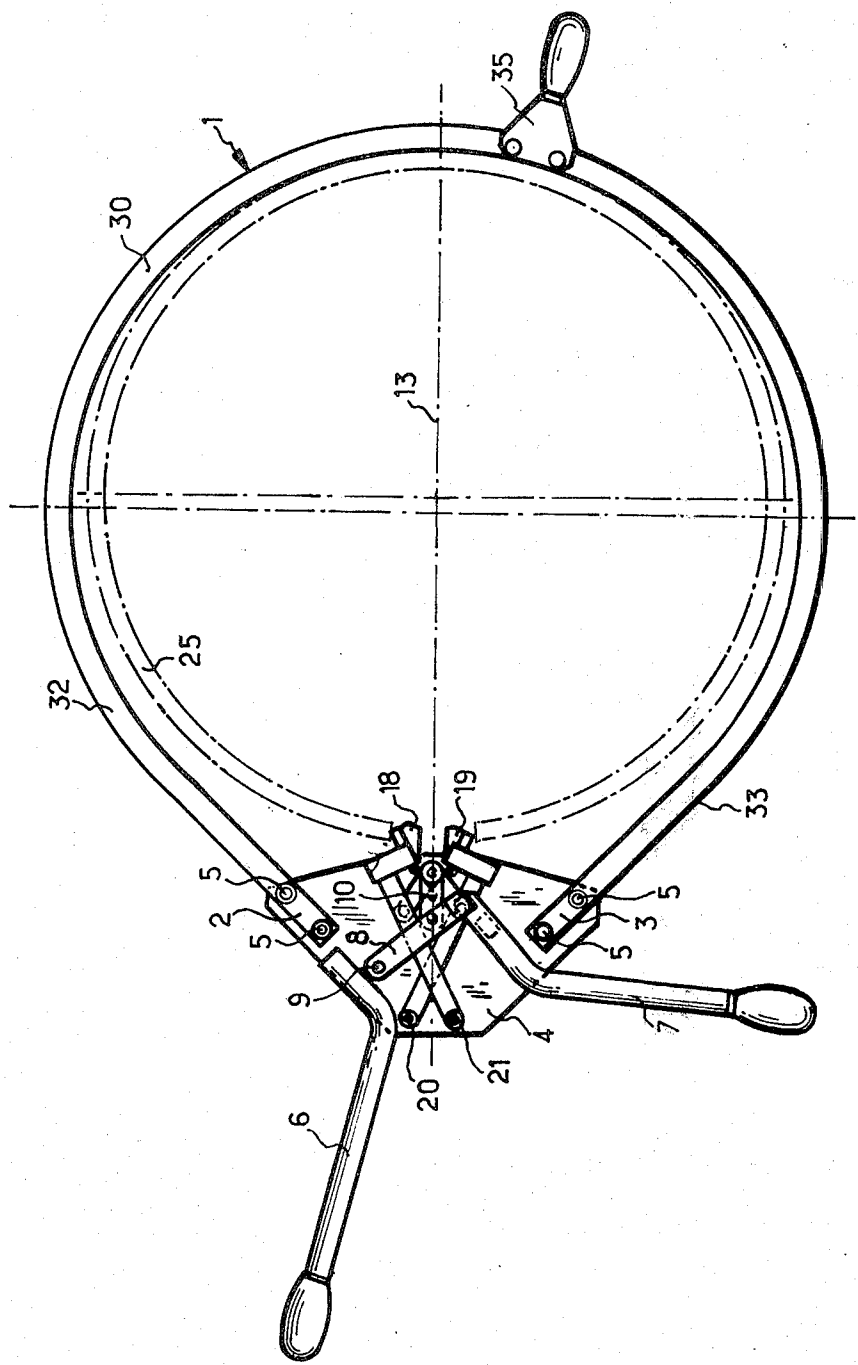


Fig. 1.

PLIERS FOR INTERNAL COMBUSTION ENGINE PISTON PACKING-RING

The invention relates essentially to pliers for piston packing-rings of a heat engine generally such as an internal combustion engine, enabling the installation of the packing-rings into the corresponding grooves of pistons having a relatively large diameter.

Such pliers already known in the prior art, comprise a substantially circular arcuate portion or arch-like section inside of which the packing-ring to be mounted is placed, a pair of jaws for spreading apart the ring ends and a toggle system, linked arms or pivotally interconnected or knuckle-jointed levers arrangement for operating the spreading apart jaws, which is connected on the one hand to at least one of the handles or hand-grips of the pliers and on the other hand to said spreading jaws. In these pliers according to the prior art the packing-ring was positioned inside of an arcuate portion or arch-like section and caused to bear with its portion substantially opposite to its free ends against a resilient abutment or like stop means integral with the arcuate portion. The spreading jaws actuated by means of said handles were in engagement with both free ends of the packing-ring and spread them apart from each other so as to increase the inside diameter of this ring. The toggle system was adapted to lock both jaws in their positions of maximum spacing or spreading apart of the ring ends. It was then merely necessary to slip the pliers and the ring over and about the piston head and to move the assembly into registering relationship with the corresponding piston groove so as to be able to fit the ring easily into the groove by causing both jaws to move towards each other by means of said hand-grips.

These prior art pliers sometimes exhibit a serious inconvenience. As a matter of fact their spreading jaws were guided so as to move in substantially parallel relation to both end portions of the ring, i.e. when both ring ends engaged by the jaws were spread apart or moved away from each other they would move along paths of travel substantially tangent to the circular apparent contour or outline of the ring. In view of this the ring would move as a whole or bodily towards that part of the arcuate portions which is opposite to the spreading jaws and a retractable backing means or like supporting abutment onto which the ring would bear was provided on this part of the arcuate portion between the arcuate portion and the corresponding part of the ring.

Thus, spreading the ring ends apart from each other would cause in that part of the ring which is diametrically opposite to the ends the occurrence of excessive bending stresses in that part which would result in initiations of immediate or delayed failure or breaking when the packing-ring was mounted on the piston.

On the other hand the handling of these prior art pliers was not very convenient because the packing-ring in the spread-apart condition was kept in bearing engagement with a very narrow portion of said retractable abutment so that this bearing engagement was particularly unstable.

Moreover, the ends of the ring bearing on the spreading jaws would tend to slip or slide on these jaws during opening or spreading thereof.

In order to avoid these drawbacks of the prior art the present invention provides piston packing-ring pliers adapted in particular to fit the packing-rings into the grooves of a piston of large diameter, said pliers being of the kind comprising a substantially circular arcuate

portion or arch-like section inside of which the packing-ring is accommodated, a pair of jaws for spreading the ring ends apart from each other and a toggle system or like linked arms or pivotally interconnected levers arrangement connected to at least one of the hand-grips of the pliers and to said spreading jaws, said pliers being characterized by means for continuously backing approximately the half-circumference of the ring on the side substantially opposite to the ends of said ring in the spread or expanded condition thereof.

According to the invention the whole half-circumference forming the back side of the ring opposite to the open ends of this ring is therefore gradually caused to bear against or engage in substantially continuous relationship said backing or abutment means when the ring ends are spread apart or moved away from each other.

According to another characterizing feature of the invention said spreading jaws are guided during their displacement along paths of travel which are substantially radial with respect to the substantially circular apparent contour or outline of the ring.

According to a further characterizing feature of the invention, these backing or abutment means are constituted by said arcuate portion which comprises a semi-circular ring segment the inner side of which has substantially the same diameter as the radially outer peripheral surface of said packing-ring, this section of the arcuate portion being substantially opposite to said spreading jaws.

Thus, the back side of the packing-ring which is opposite to the open ends of the packing-ring is accordingly gradually caused to be backed along a half-circumference of the arcuate portion proper forming the pliers. Upon the spreading apart of the open ring ends, excessive bending stresses may therefore not occur at any given point of the packing-ring thereby removing the possibility of initiations of failure or breaking experienced in the prior art. The installation of the packing-rings within the piston grooves according to the invention therefore results in a longer life of the packing-rings and in particular avoids accidental failures or ruptures of these packing-rings a short time after their having been mounted.

The invention will be better understood and further objects, characterizing features, details and advantages thereof will appear more clearly as the following explanatory description proceeds with reference to the accompanying diagrammatic drawings given by way of non-limiting example only illustrating a presently preferred embodiment of the invention and wherein:

FIG. 1 is a top view of pliers according to the invention showing the packing-ring fitted inside of the pliers in the nonexpanded condition; and

FIG. 2 is a view similar to FIG. 1 but showing the packing-ring expanded by the jaws of the pliers.

The pliers used for installing the packing-rings of pistons of relatively large diameters which is shown in the drawings consist essentially of an arcuate metal portion 1 both ends 2 and 3 of which are mounted in spread-apart condition onto at least one holder or like supporting plate 4. The ends 2 and 3 of the arch-like portion 1 are secured to the plate 4 each one by means of a pair of suitable fastening members 5 so that the supporting plate 4 and the arcuate portion 1 form together a rigid non-deformable assembly. Usually a second supporting plate not shown is provided to cover the first support-

ing plate and the ends 2 and 3 of the arcuate portion which are accordingly positioned between both supporting plates.

A stationary handle or like grip 6 is also secured to the supporting plate 4 for instance on the side opposite to the end 2 of the arcuate portion whereas a second handle 7 forming a movable actuating hand-grip is fixedly mounted onto the end of a lever 8 the other end of which is pivotally connected at a point 9 to the supporting plate 4 near the attachment of the first handle 6.

A flat bar or link 10 is pivotally connected with one of its ends to an intermediate point of the lever 8 and is rigidly connected at its other end to a pin, bolt or other suitable element 11 which is slidably guided lengthwise within a slot 12 formed in at least one of said supporting plates, this slot 12 extending along the longitudinal centre line 13 of the pliers. To the sliding element 11 are also pivotally connected a pair of flat bars or links 14 and 15 which are pivotally connected with their opposite ends to a pair of arms or rods 16 and 17, respectively, carrying the spreading jaws 18 and 19. These arms 16 and 17 are pivotally connected with their ends to points 20 and 21, respectively, of the supporting plate 4.

A piston packing-ring 25 with a substantially circular contour and split or divided to define a pair of free ends is positioned inside of the arcuate portion 1 so that these free ends are positioned on either side of the spreading jaws 18 and 19, respectively.

When the movable handle 7 is moved towards the stationary handle 6, the lever 8 rotates clockwise about its pivot pin 9 thereby drawing the link 10 in the direction opposite or away from the packing-ring 25 and the arcuate portion 1. The sliding member 11 rigidly connected to the links 14 and 15 connected to the arms 16 and 17 of the spreading jaws moves accordingly towards the end of the slot 12 located towards the handles 6 and 7 and the links 14 and 15 are thus effective to cause the arms 16 and 17 to be spread apart or moved away from each other in opposite directions so that the spreading jaws against which the ends of the packing-ring 25 are bearing are spread apart from each other and moved into the position shown in FIG. 2.

The packing-ring 25 the ends of which have thus been spread apart or moved away from each other may then be fitted into the corresponding groove of a piston.

The arcuate portion 1 according to the invention advantageously comprises a substantially semi-circular part 30 forming a backing or bearing abutment for the corresponding outer portion of the packing-ring 25 when the ends of the latter are spread apart or moved away from each other by the jaws 18 and 19. This semi-circular part 30 forms that part of the arcuate portion 1 which is substantially opposite to the spreading jaws 18 and 19 and which is extended by two side members 32 and 33 secured to the supporting plate 4. Both of these side members 32 and 33 define an inner contour which is larger than the corresponding apparent outer contour of the packing-ring 25 so that when the ends of this packing-ring are spread apart by the jaws 18 and 19 the space defined between the side members 32 and 33 on the one hand and the corresponding end portions of the packing ring 25 on the other hand is sufficient to allow the deformation of the packing-ring to take place upon the spreading apart of its ends by said jaws.

It should be pointed out that the spreading apart of the ring ends by the jaws 18 and 19 when the half-circumference of the packing-ring is backed by or engages in bearing or abutting relationship the semi-circular part 30 of the arcuate portion is possible owing to the fact that the spreading jaws will move along paths of travel which extend substantially radially with respect to the apparent circular contour of the packing-ring accommodated within the arcuate portion. It is thus possible to spread the ring ends apart from each other without displacing the diametrically opposite portion of the packing-ring which is bearing against the corresponding part of the arcuate portion.

On the other hand as seen in FIG. 2, the links 14 and 15 move during the spreading motion of the jaws 18 and 19 beyond an unstable equilibrium position in which they are substantially aligned in registering relationship. Accordingly the angle defined by the links 14 and 15 is inverted or reversed in the final positions of the links with respect to the angle they define in the starting position shown in FIG. 1. The spreading jaws 18 and 19 are thus locked in the spread apart position and may not return by themselves to their closely spaced positions.

In order to provide for a more convenient or easier handling of the pliers forming piston-ring tongs, spreader, squeezer, expander or like inserter means when the packing-ring is spread apart or expanded by the jaws 18 and 19 the arcuate portion 1 may be provided with an additional stationary handle 35 which is generally substantially opposite to the stationary hand-grip 6 so as to facilitate the grasping of the pliers.

It should be understood that the invention is not at all limited to the form of embodiment described and shown which has been given by way of example only. In particular it comprises all the means constituting technical equivalents of the means described as well as their combinations if same are carried out according to its gist and used within the scope of the appended claims.

What is claimed is:

1. Piston packing-ring pliers having handles for installing packing-rings into the grooves of pistons of large diameters, of the kind comprising a substantially circular arcuate portion inside of which said packing-ring is placed, a pair of jaws for spreading apart packing-ring ends and a toggle system connected to at least one of the handles of said pliers and to said spreading jaws, respectively, wherein the improvement consists in the provision of bearing abutment means for continuously backing approximately the half-circumference of said packing-ring on the side substantially opposite to the ends of said packing-ring in the spread apart positions thereof, and means for guiding said spreading jaws during their displacements along paths of travel extending substantially radially with respect to the substantially circular apparent contour of said packing-ring.

2. Pliers according to claim 1, wherein said backing means are constituted by said arcuate portion which comprises a semicircular ring segment the inner side of which has substantially the same diameter as the radially outer peripheral surface of said packing ring, that segment of said arcuate portion being substantially opposite to said spreading jaws.

3. Pliers according to claim 2, wherein said arcuate portion is constituted by said semi-circular segment

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and by a pair or side members secured with their ends to at least one stationary plate carrying said toggle system, said handles of said pliers and said spreading jaws, both of said side members defining an apparent inner contour larger than the apparent outer contour of the corresponding part of said packing-ring in the spread apart condition thereof.

4. Pliers according to claim 1, comprising means for locking said spreading jaws in their spread apart posi-

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tions, said means consisting of a pair of pivotally connected levers of said toggle system which extend beyond an unstable equilibrium position at the end of the spreading motions of said jaws.

5. Pliers according to claim 1, wherein said arcuate portion is provided with a transport handle which is substantially opposite to said operating handles.

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