

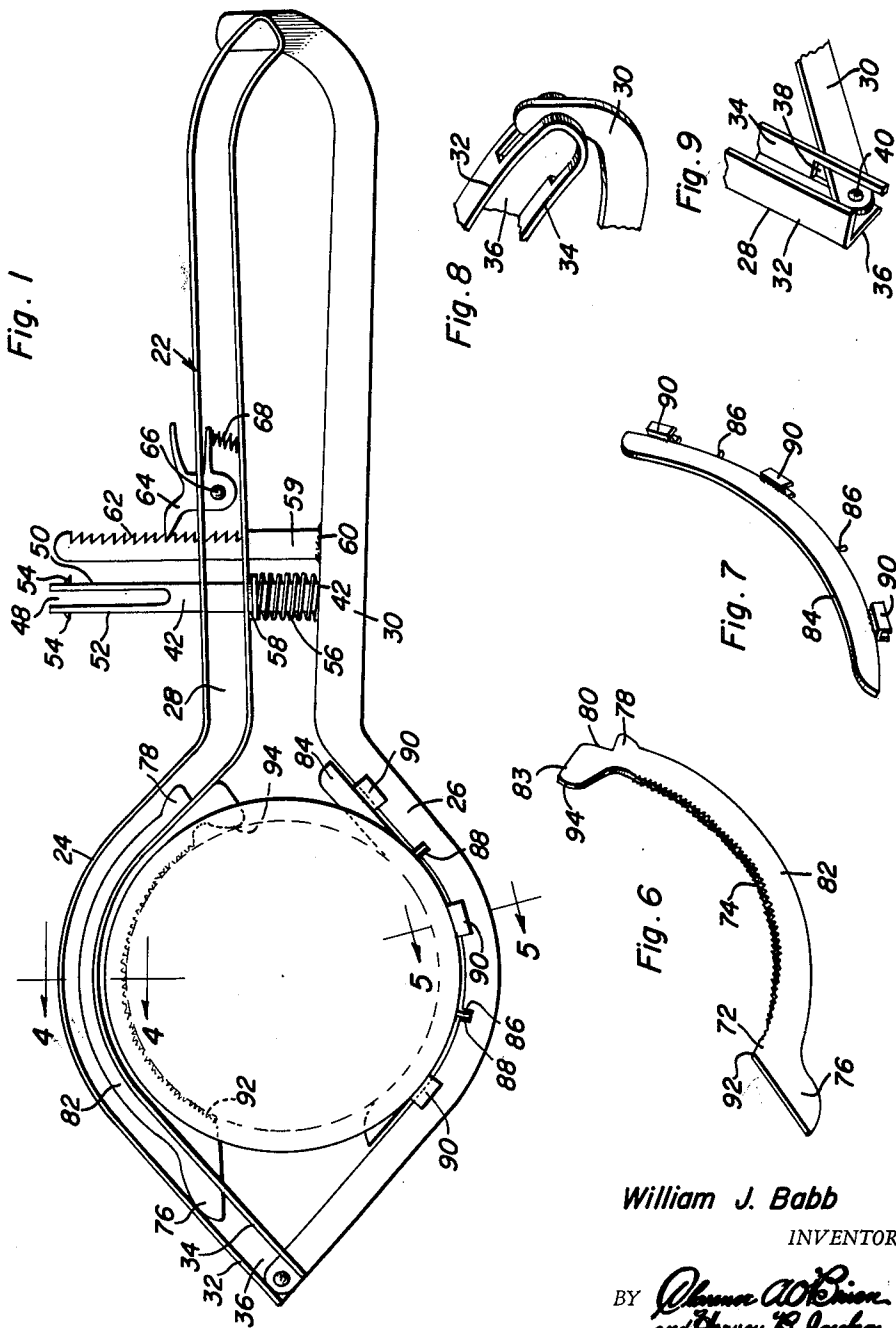
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W. J. BABB
PISTON GROOVE CLEANER

3,188,670

Filed Jan. 18, 1963

2 Sheets-Sheet 1



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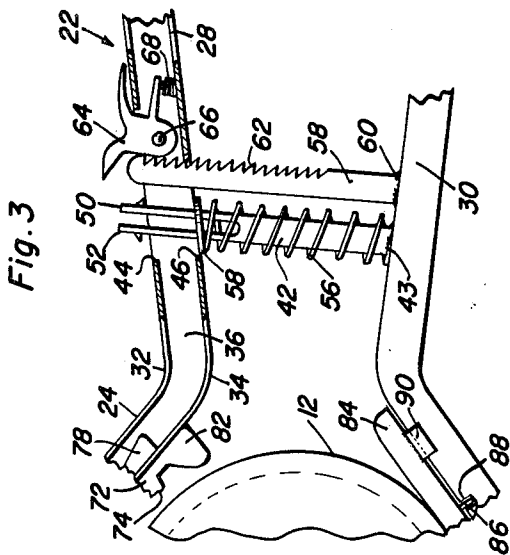
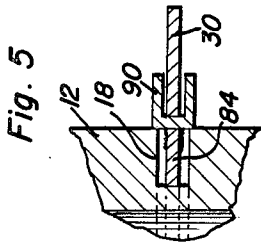
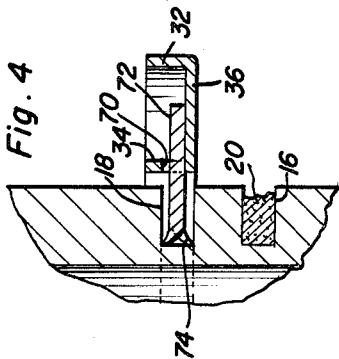
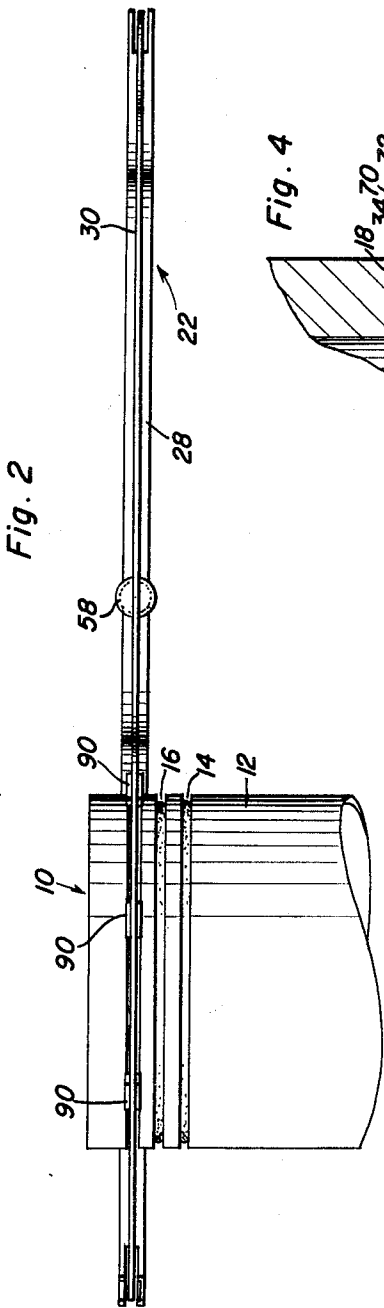
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2 Sheets-Sheet 2



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3,188,670

PISTON GROOVE CLEANER

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7 Claims. (Cl. 15—104.01)

This invention relates to a novel and useful piston groove cleaner and more specifically to a tool which is designed to clean the grooves of a piston of an internal combustion engine in an improved manner in order that the functioning of a new ring seated in that groove will not be interfered with by carbon deposits and the like.

While most piston groove cleaners are constructed in a manner whereby they may be utilized to remove carbon deposits from piston grooves, they are for the most part provided with one or possibly two cutting elements which are mounted and shaped so as to be received in a piston groove at points spaced a considerable distance apart. While the cleaning elements of these piston groove cleaners are capable of removing carbon deposits, since they are so widely spaced apart each one acts as an individual cutting element and may therefore dig into the carbon deposits excessively and cause the cleaning tool to jam. In addition, these widely spaced cleaning elements also have a tendency to cut into the wall of the piston groove and to remove material therefrom as the cleaning operation of each groove is being completed. This, of course, will increase the depth of the groove and therefore lessen the effectiveness of an expander spring disposed behind a piston ring seated in that groove.

The piston groove cleaner of the instant invention includes a pair of jaw members with one of the jaw members including means defining an arcuate plate-like member whose concave edge portion opens toward the other jaw member and includes scraping elements adapted to be snugly received in a groove of a piston disposed between the two jaw members. The scraping elements on the plate-like member of the one jaw member comprise closely spaced saw-like teeth. In this manner, the closely spaced saw-like teeth define carbon cutting means not unlike that of a file and therefore no one or two of the saw-like teeth or cutting elements is able to dig into the carbon deposits excessively or to gauge the inner wall of the piston groove as the cleaning operation being performed on that groove is being completed. Therefore, the piston groove cleaner of the instant invention is constructed in a manner whereby it may operate more smoothly and efficiently with less effort on the part of the person using the tool.

The main object of this invention is to provide a piston groove cleaner including an arcuate plate-like member having closely spaced scraping elements formed on its concave edge portion which are saw-teeth-like in nature and which are of a size and shape adapted to be snugly received in a piston groove.

A further object of this invention, in accordance with the immediately preceding object, is to provide a piston groove cleaner whose plate-like member includes opposite end portions which are free of the closely spaced saw-like teeth, whereby the opposite end portions of the concave edge portion of the plate-like member may be utilized as abutments for limiting penetration of the saw-like teeth into a piston groove being cleaned.

Still another object of this invention, in accordance with the preceding objects, is to provide a piston groove cleaner whose jaw members are formed on and adjacent one pair of corresponding ends of a pair of arm members with the one pair of ends of the arm members being pivotally secured together. In this manner, the other pair of corresponding ends of the arm members may be gripped by one hand in order to urge the jaw members

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together while the piston being cleaned is held in the other hand.

A further object of this invention, in accordance with the immediately preceding object, is to provide arcuate plate-like members for each of the jaw members and arcuate plate-like members which may be readily removed and replaced by plate-like members whose arcuate concave edges are formed by different radii. In this manner, the piston groove cleaner of the instant invention may be readily adapted to handle pistons of various sizes.

A final object of this invention to be specifically enumerated herein is to provide a piston groove cleaner in accordance with the preceding objects which will conform to conventional forms of manufacture, be of simple construction and easy to use so as to provide a device that will be economically feasible, long lasting and relatively trouble free in operation.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a top plan view of the piston groove cleaner of the instant invention showing the manner in which it may be secured in engagement with a piston whose piston grooves are to be cleaned;

FIGURE 2 is a side elevational view of the embodiment illustrated in FIGURE 1;

FIGURE 3 is a fragmentary enlarged view of the center portion of FIGURE 1 and showing the arm members of the tool in different positions relative to each other;

FIGURE 4 is an enlarged fragmentary vertical sectional view taken substantially upon the plane indicated by the section line 4—4 of FIGURE 1;

FIGURE 5 is an enlarged fragmentary vertical sectional view taken substantially upon the plane indicated by the section line 5—5 of FIGURE 1;

FIGURE 6 is a perspective view of one of the plate-like adapters carried by one jaw member;

FIGURE 7 is a perspective view of the other of the plate-like members which is supported from the other jaw member;

FIGURE 8 is a fragmentary perspective view showing the manner in which the free ends of the arm members may be moved into overlapping engagement with each other; and

FIGURE 9 is an enlarged fragmentary perspective view of the pivotal connection between the two arm members of the tool.

Referring now more specifically to the drawings the numeral 10 generally designates a piston including cylindrical side walls 12 in which piston grooves 14, 16 and 18 are formed. As can best be seen from FIGURES 2 and 4 of the drawings, the piston grooves 14 and 16 have carbon deposits 20 disposed therein. It is these carbon deposits which should be removed prior to the installation of new rings on the piston 10.

The piston groove cleaner of the instant invention is generally designated by the reference numeral 22 and includes a pair of jaw members 24 and 26 which are formed on corresponding end portions of a pair of arm members 28 and 30. The arm member 30 is substantially planar while the arm member 28 is generally U-shaped in cross-section including a pair of generally parallel legs 32 and 34 interconnected by means of a bight portion 36. From FIGURE 9 of the drawings it may be seen that the arm member 30 passes through slots 38 formed in the leg 34 of the arm member 28 and is pivotally secured to the bight portion 36 by means of a pivot

fastener 40. In this manner, the jaw members 24 and 26 are mounted for movement toward and away from each other in the same plane.

A guide strap 42 is secured at one end to the arm member 30 in any convenient manner such as by welding 43 and extends through a pair of slots 44 and 46 formed through the legs 32 and 34. The portion of the guide strap 42 which projects through the arm member 28 has a longitudinal slot 48 formed therein defining a pair of furcations 50 and 52. The furcations 50 and 52 include abutment members 54 and may be urged together at their free ends to enable the abutment members 54 to pass through the slots 44 and 46.

A compression spring 56 is disposed about the guide strap 42 and is disposed between the inner face of the arm member 30 and a thrust washer 58 disposed on the guide strap 42 and abutted against the confronting surface of the leg 34.

An elongated rack bar 59 is also secured to the inner surface of the arm member 30 in any convenient manner such as by welding 60 and received through the slots 44 and 46. The rack bar 59 includes a plurality of teeth 62 spaced longitudinally thereof and a pawl member 64 is pivotally secured to the bight portion 36 by means of a pivot fastener 66 and is spring urged by means of compression spring 68 into engagement with the teeth 62. When in the operative position illustrated in FIGURE 1, the pawl 64 prevents movement of the free ends of the arm members 28 and 30 away from each other.

The leg 34 has a longitudinally extending slot 70 formed therein adjacent the bight portion 36 and an arcuate plate-like member 72 having a concave arcuate edge portion with saw teeth 74 formed thereon has its toe portion 76 passed through the slot 70 at one end thereof and its heel portion 78 positioned in the remote end of the slot 70. The toe portion 76 is received from between the legs 32 and 34 and closely overlies the bight portion 36 while the heel portion 78 is seated in the opposite end of the slot 70. It will be noticed that the heel portion end of the plate-like member or adapter plate 72 includes an abutment surface 80 limiting penetration of the outer peripheral edge portion 82 into the slot 70. While the toe portion 76 engages the leg 32 and prevents the toe and of the adapter plate 72 from penetrating too deeply through the groove 70, the abutment surface 80 engages the leg 34 and limits penetration of the heel end of the abutment plate 72 inwardly of the slot 70. The heel end of the adapter plate 72 includes a tab portion 83 which may be gripped between two fingers in order to withdraw the adapter plate from the slot 70.

A second adapter plate 84 also arcuate in configuration includes a plurality of projections 86 spaced longitudinally therealong which are received in notches 88 formed in the concave edge portion of the jaw member 26. In addition, the adapter plate 84 includes three channel members 90 at points spaced longitudinally therealong which embracingly engage the arcuate edge portion of the jaw member 26 at points spaced longitudinally therealong.

It is to be noted that the opposite ends of the arcuate edge of the adapter plate 72 are free of the teeth 74. In this manner, these opposite end portions 92 and 94 define abutments for limiting penetration of the teeth 74 in the groove 18.

The adapter plates 72 and 84 are removable in order that they may be removed and replaced by adapter plates having concave arcuate edge portions defined by different length radii. In this manner, the tool 22 may be adapted to be used in connection with pistons of various diameters. The saw-like teeth 74 are spaced close enough together so that the entire concave edge portion of the adapter plate 72 functions more or less as a file as opposed to one or two cutting elements spaced at considerable distance from each other which, of course, would have a tendency to gauge the carbon deposits 20 being removed and also the inner wall of the groove 18.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A piston groove cleaner comprising a pair of jaw members mounted for movement toward and away from each other in the same plane, one of said jaw members including readily removable and replaceable insert means defining an arcuate plate-like member disposed in said plane and whose concave edge portion opens toward the other jaw member and includes teeth-like scraping elements closely spaced longitudinally therealong and adapted to be snugly received in a piston ring groove, said jaw members being adapted to receive a piston therebetween.

2. The combination of claim 1 wherein said other jaw member also includes readily removable and replaceable insert means defining a second arcuate plate-like member whose concave edge portion opens toward said one jaw member and is adapted to be snugly received in said piston groove.

3. A piston groove cleaner comprising a pair of jaw members mounted for movement toward and away from each other in the same plane, one of said jaw members including means defining an arcuate plate-like member disposed in said plane and whose concave edge portion opens toward the other jaw member and includes teeth-like scraping elements closely spaced longitudinally therealong and adapted to be snugly received in a piston ring groove, said jaw members being adapted to receive a piston therebetween, said arcuate plate-like member comprising an adapter plate removably secured to said one jaw member and whose concave edge is of an arc adapted to closely conform to the arc defined by the innermost wall of said ring groove.

4. The combination of claim 1 wherein said jaw members comprise one pair of corresponding ends of a pair of arm members, said one pair of corresponding ends being pivotally secured together.

5. The combination of claim 4 including coacting means carried by the other pair of corresponding ends of said arm members for adjustably limiting movement of said other pair of ends of said arm members away from each other.

6. A piston groove cleaner comprising a pair of jaw members mounted for movement toward and away from each other in the same plane, one of said jaw members including means defining an arcuate plate-like member disposed in said plane and whose concave edge portion opens toward the other jaw member and includes teeth-like scraping elements closely spaced longitudinally therealong and adapted to be snugly received in a piston ring groove, said jaw members being adapted to receive a piston therebetween, the opposite ends of said concave edge portion being free from scraping elements and comprising relatively smooth abutments adapted to limit the amount the scraping elements may bite into the innermost wall of said ring groove, said jaw members comprising one pair of corresponding ends of a pair of arm members, said one pair of corresponding ends being pivotally secured together, coacting means carried by the other pair of corresponding ends of said arm members for adjustably limiting movement of the other pair of ends of said arm members away from each other, and means connected between said other pair of corresponding ends of said arm members yieldingly urging said other pair of corresponding ends of said arm members away from each other.

7. A piston groove cleaner comprising a pair of jaw members mounted for movement toward and away from each other in the same plane, one of said jaw members including means defining an arcuate plate-like member dis-

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posed in said plane and whose concave edge portion opens toward the other jaw member and includes scraping elements adapted to be snugly received in a piston ring groove, said jaw members being adapted to receive a piston therebetween, said other jaw member also including means defining a second arcuate plate-like member whose concave edge portion opens toward said one jaw member and is adapted to be snugly received in said piston groove, said last-mentioned plate-like member comprising an adapter plate removably secured to said other jaw member and whose concave edge portion is of an arc adapted to closely conform to the arc defined by the innermost wall of said ring groove, said other jaw member including a plurality of notches spaced longitudinally thereof, the last-mentioned concave edge portion including a plurality of projections and means defining channel members projecting outwardly from its convex edge portion receivable in

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said notches and embracingly engaging the concave marginal edge portion of said other jaw member, respectively, at points spaced longitudinally therealong.

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