April 17, 1951 J. R. ARTHUR 2,549,043

GLAZE BREAKER

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Fig. 1.

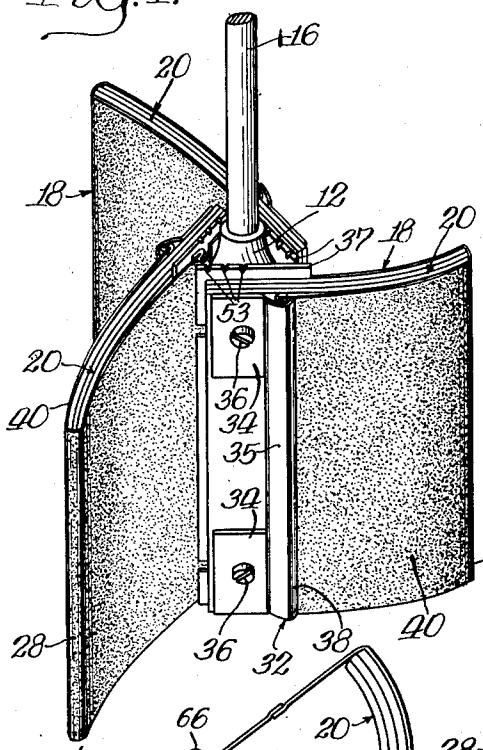


Fig. 2.

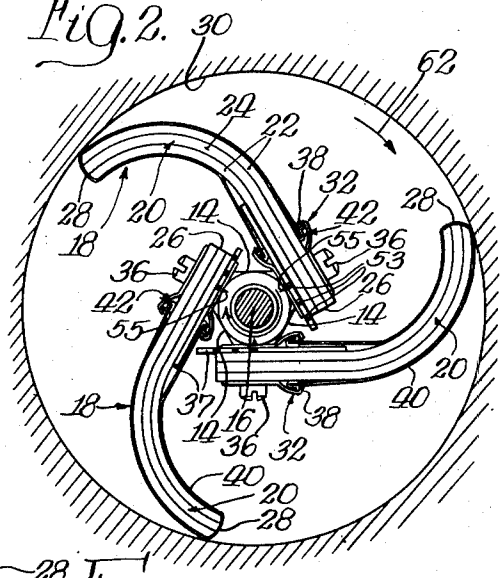


Fig. 8.

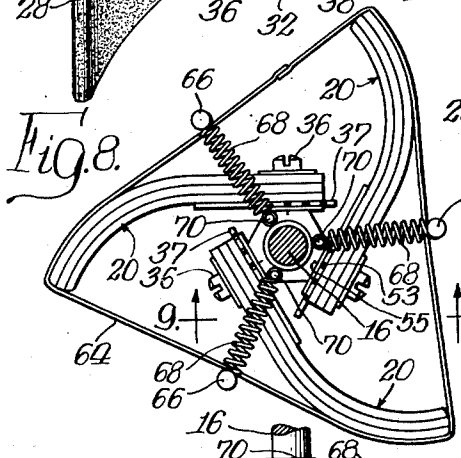


Fig. 3.

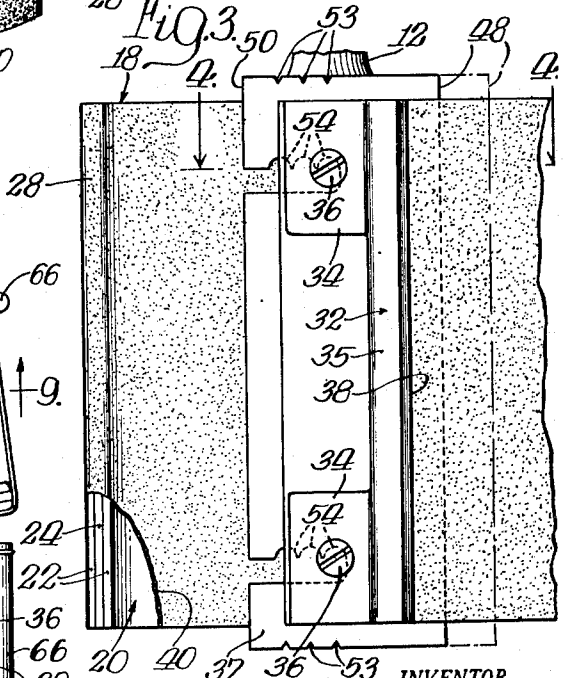
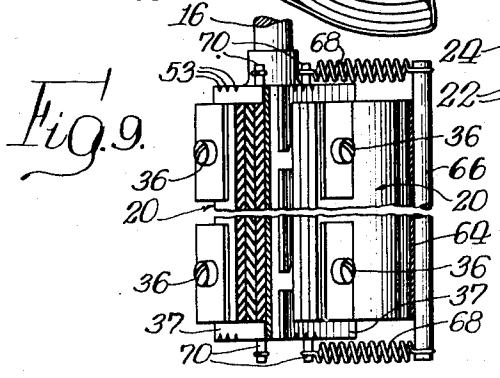


Fig. 9.



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Fig. 4.

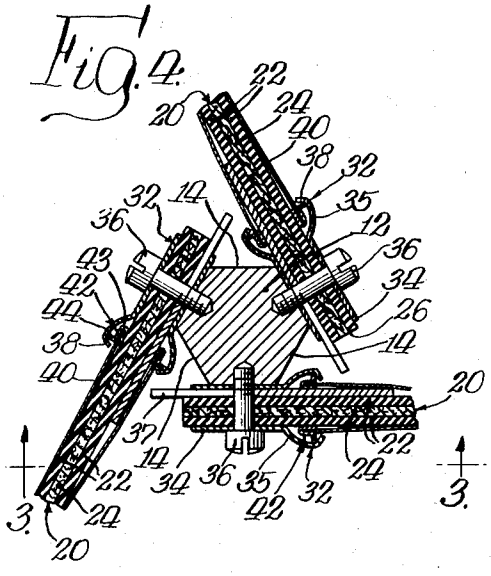


Fig. 6.

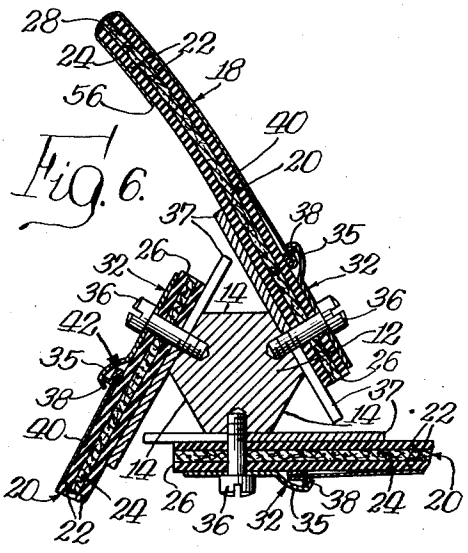


Fig. 5.

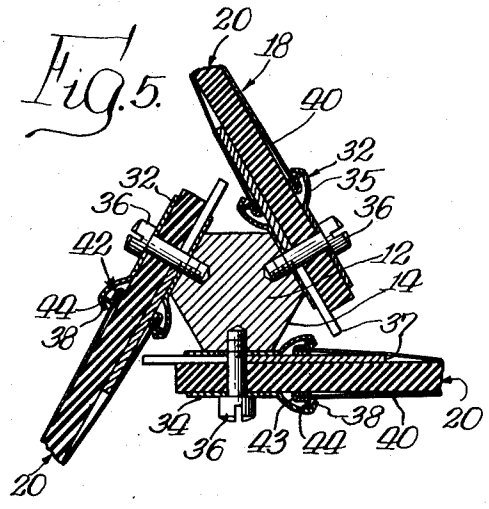
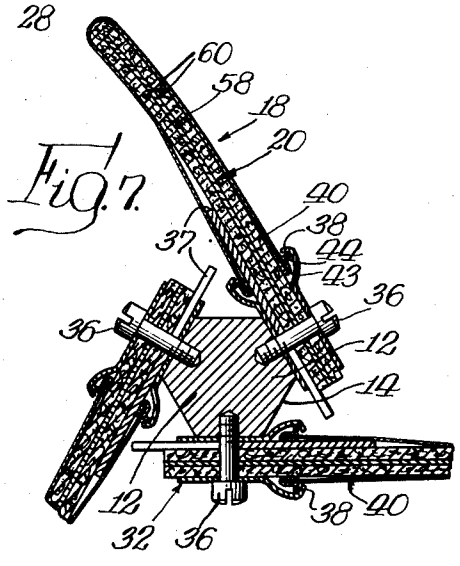


Fig. 7.



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GLAZE BREAKER

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Application May 18, 1948, Serial No. 27,634

1 Claim. (Cl. 51—194)

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This invention relates to glaze breakers.

A glaze breaker is used for removing the glazed surface from cylinder walls caused by the continued rubbing of piston rings thereover. When old rings are removed and new ones installed, the presence of a glazed surface prevents the new rings from wearing in and seating perfectly, and therefore the glazed surface must be removed. The surface is thus roughened, only slightly, and then the new rings form a seal with the roughened surface.

Such a device is also used for smoothing out, to a degree, surfaces of cylinder walls after they are rebored, the reboring operation leaving surfaces too rough for proper seating by piston rings.

An object of the present invention is the provision of a glaze breaker which is simple in construction and operation.

Another object is the provision of a glaze breaker effective for operation in cylinders of a substantial range of sizes with substantially equal pressure being exerted on the walls thereof regardless of the size of the cylinder within said range.

Still another object of the invention is the provision of a glaze breaker having flexible abrasive arms or members adapted to be effective on cylinder walls having slight irregularities.

A further object of the invention is the provision of a glaze breaker having flexible abrasive members, and means in the form of tension plates for biasing the abrasive members in directions toward the wall of the cylinder in which the device operates.

A still further object is the provision of a glaze breaker as just previously referred to in which the tension plates are adjustable outwardly toward and inwardly from the cylinder wall to accommodate different sizes of cylinder walls.

Another object is the provision of a glaze breaker of the type just previously referred to in which the tension plates are provided with indicia means and so constructed and arranged that all are readily adapted to be similarly adjusted with respect to each other for applying equal biasing pressure on all of the abrasive members.

A further object of the invention is the provision of a glaze breaker having flexible abrasive members which can be easily flexed and collapsed by one hand by the user for insertion into the cylinder being operated upon.

A further object is the provision of a glaze breaker having abrasive members including abrasive elements, in which the abrasive elements can be quickly and easily placed thereon and removed therefrom.

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Another object is the provision of a glaze breaker having abrasive members each made up of a flexible abrasive element and a flexible body element formed of oil absorbent material.

A further object is the provision of a lightweight and sturdy glaze breaker which can be operated by a low power driving tool.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained as hereinafter more fully set forth, pointed out in my claim and illustrated in the accompanying drawing, wherein:

Figure 1 is a perspective view of the glaze breaker of the present invention;

Figure 2 is a top view of the device positioned in a cylinder of an engine and in operating position;

Figure 3 is an enlarged side view of the device, portions thereof being broken away, taken on line 3—3 of Figure 4;

Figure 4 is a sectional view taken on line 4—4 of Figure 3;

Figure 5 is a sectional view similar to Figure 4, showing a modified form;

Figure 6 is a sectional view similar to Figure 4, showing a second modification;

Figure 7 is a sectional view similar to Figure 4 showing an additional modification;

Figure 8 is a top view on a reduced scale of a modified form of device; and

Figure 9 is a view taken on line 9—9 of Figure 8.

Referring in detail to the drawings and particularly to Figures 1 to 4 inclusive, the glaze breaker includes a central, elongated body member 12 which in the present instance is hexagonal in cross section. The hexagonal configuration is merely one example, and other shapes may be employed as well, as long as it is provided with a plurality of flat faces, such as are indicated at 14. Secured to and extending from one end of the central body member 12, coaxially thereof, is a rod 16 by which the device is connected to a driving tool for rotation of the device about the axis of the rod 16 and also about the longitudinal axis of the body member 12.

A plurality of leaf-like arms or wings 18 are secured one each to certain of the flat faces 14 of the body member 12. The wings 18 may also be referred to as abrasive members. Each abrasive member 18 includes a central flexible element 20 which in the preferred form of the device is formed of laminated rubber and fabric.

Other materials of a resilient nature may be employed. Layers of rubber are indicated at 22 which are disposed on the outside of a central layer of fabric 24, the three layers being bonded together to form a unitary leaf or wing. The central layer of fabric 24 is adapted to absorb oil or other lubricant so that the whole element 20 is in effect an oil absorbent element. The outer layers of rubber 22 are preferably synthetic rubber, or other desired oil resistant type. The inner end 26 or terminal edge of each element 20 is secured to one of the flat faces 14 of the body 12 in a manner to be later described, and the outer end 28 of each element 20 is adapted to be flexed generally tangentially to the central axis of the tool. This flexing condition is most readily observed in Figures 1 and 2, Figure 2 showing the outer ends 28 in contact with the wall of an engine cylinder 30. Although the wings or abrasive members 18 are actually slightly tangential to the axis of the tool, they are in effect also radial, and may be referred to as such.

The inner end 26 of each element 20 is provided with a clip or retaining plate 32 on each of the flat sides of the element 20. It will be noted that each element 20 has a length longitudinally of the device substantially equal to the length of the body member 12. Each clip or retaining plate 32 may be of uniform width throughout its length, or it may, as herein illustrated, be provided with longitudinally spaced ears 34 interconnected by a member 35, each of the ears being provided with a hole for the reception of a screw 36. The screws 36 are inserted through the holes in the ears 34 and through holes formed in the inner ends of the elements 20 and finally into threaded holes in the body member 12. A tension plate 37 to be referred to later in detail is also secured in connection with each element 20 by means of the screws 36. The screws 36 are spaced longitudinally along the body member 12 and retain the element 20 and clips 32 rigidly in solid position on the respective flat face 14 of the body member 12.

Each clip or retaining plate 32 is provided with an inturned hook 38 extending substantially the full length of the clip. The terminal edge or free edge of the hook 36 extends toward and approaches the respective side of the element 20.

An abrasive element 40 is folded over the free or flexing edge 28 of each element 20. This abrasive element 40 is preferably fabric or other thin and strong flexible material having abrasive material covering its outer surface. The abrasive elements 40, of course, extend longitudinally the length of the elements 20.

The free edges of each abrasive element 40 are provided with a detent member 42 comprising a bead 43 extending longitudinally along the respective edge of the abrasive element and crimped thereon. The detent members 42 are preferably of metal. Each bead 43 is provided with an outturned extremity or hook member 44 adapted to be engaged by the hook members 38 on the clips 32. The terminal edges of the hooks 38 approach sufficiently close to the sides of the central element 20 so that the detent members, and thereby the free edges of the abrasive elements 40, are retained by the hooks 38 against movement outwardly from the central elements 20. However, the abrasive elements 40 can be removed from the central elements 20 in directions longitudinally of the device by reason of the fact that the detent members 42 can slide in the hooks 38.

An adjustable tension plate 37 is associated with each of the arms or abrasive members 18. The plate 37 is substantially the same length longitudinally as the arm 18, and as here illustrated is slightly longer.

Each tension plate 37 is disposed between the surface of the element 20 and the respective flat face 14 of the body member, and also between the element 20 and the inner clip 32. Each plate 37 has an edge 48 which may be termed the outer edge, and an inner edge 50. The dimension of the plate between the edges 48 and 50, or the dimension transverse to the length of the plate, is greater than the corresponding dimension of the respective flat face 14 of the body member 12. Each tension plate 37 is provided with a pair of slots 52 opening out of the inner edge 50 and extending substantially perpendicular thereto toward the outer edge 48. Each slot 52 is provided with a plurality of smaller notches 54 formed along one side edge of the slot. The slots 52 are arranged and spaced longitudinally for the reception of the securing screws 36. The element 20, the clips 32, and the plate 37 are thereby all secured together in a rigid assembly to the respective flat face 14 by means of the screws 36. The slots 52 are of a width slightly greater than the diameter of the screws 36 so that the plate 37 has limited longitudinal movement and so that the screws 36 can be fitted in the smaller notches 54. Each plate 37 can be adjusted in directions between the edges 48 and 50 by reason of the feature that the slots 52 can slide over the screws 36.

Indicia notches 53 are formed on each end of each of the tension plates 37, in line with respective notches 54 in the slots 52. Cooperating indicia notches 55 are formed in each end of the body member 12. By means of the notches 53 and 55, the user can determine when all of the tension plates 37 are adjusted similarly.

Figure 5 is similar to the embodiment of Figures 1 to 4, except that the elements 20 of the arms or abrasive members 18 are of solid rubber, or other resilient material, instead of having a central layer of fabric as in the previous embodiment.

Figure 6 illustrates an embodiment differing from Figures 1 to 4, in that each abrasive element 40 is provided with only one clip 32 and one cooperating detent member 42. The opposite side of the abrasive element 40 terminates as indicated at 56 on the trailing side of the element 20 and does not reach down to be secured by a clip on the inner surface of the wing. The trailing side of the element 20 will be referred to later.

Figure 7 illustrates a device differing from the embodiment of Figures 1 to 4, in that each element 20 of the abrasive members 18 is made up of a central spring steel leaf 58 on which is bonded resilient material 60, one layer on either side of the spring steel leaf. The layers 60 may be felt, as shown, or rubber, or other resilient material, or they may be laminated rubber and felt. The material forming the layers 60 is folded over the outer edge of the leaf spring 58 so that the outer edge of the bare leaf spring is not exposed to rubbing action on the cylinder wall.

If desired, the device of Figure 7 may include a leaf spring 58 on which a layer 60 of rubber or rubber-fabric is bonded to only one side of the leaf spring.

In the form of device illustrated in Figures 8 and 9, a single, continuous flexible abrasive element **64** surrounds all of the flexible elements **20**. A bar or rod **66** is disposed between each two adjacent elements **20**, on the outer side of the abrasive element **64** and extends axially of the device. A tension spring **68** is connected to each end of each bar **66**, the springs **68** being connected to lugs or hook means **70** on the body member **12**.

The circumferential extent of the abrasive element **64** is such that regardless of the flexed positions of the elements **20**, the springs **68** draw inwardly on the abrasive element and retain it substantially taut on the elements **20**, and in engagement with the outer ends thereof.

Use and operation

The normal condition of the arms or abrasive members **18**, when the device is not in use, is as shown in Figure 1 wherein they are flexed or curved slightly. This curvature is in the same direction as that illustrated in Figure 2, although to a lesser degree. In using the device, the operator collapses the arms **18** by manually flexing them and increasing the normal curvature, and inserting the device into the cylinder **30** of an engine as illustrated in Figure 2. After releasing the arms **18**, they tend to straighten out and the outer ends **28** of the arms **18**, with the abrasive element **40** thereover, engage the wall of the cylinder **30**. As noted above, the arms **18** may be referred to as extending generally radially of the body member **12**, although they do not assume a true radial position. The inner edges **26** of each member **20** are disposed tangentially to the body member **12**, and the outer edges **28** are flexed and curved rearwardly with respect to the direction of rotation of the device in the cylinder which is indicated by the arrow **62**. The inner edges **26** of the members **20** are held rigidly against the respective flat faces **14** of the body member by the securing screws **36**, aided by the clips **32** and tension plates **37**, and the outer edges **28** are adapted to flex and be curved inwardly toward the body member **12** to accommodate various sizes of cylinders.

The glaze breaker of the present invention adapts itself to various sizes of engine cylinders, and the degree of pressure exerted against the walls of the cylinders can be controlled so that the pressure exerted is substantially equal for all sizes of cylinders. For a small cylinder, the tension plates **37** are adjusted inwardly with respect to the free ends of the abrasive members **18**, that is, the slots **52** are slid on the screws **36** until the screws **36** are disposed at or approach the inner closed ends of the slots **52**. In this position of the plates **37**, substantially the whole length of the abrasive members **18** beyond the flat faces **14** can be flexed.

For larger cylinders, the tension plates **37** are adjusted in the opposite direction, or in the direction outwardly toward the free edges of the abrasive members **18**. When adjusted to the latter position, the plates **37** provide rigid support to an extent farther outwardly toward the free edges of the abrasive members **18**, and those portions of the abrasive members beyond the tension plates **37** are shorter than in the previous position of adjustment and, accordingly, the biasing pressure of the abrasive members **18** is exerted farther out toward the free edges thereof. In this manner, the pressures exerted on the walls of different sizes of cylinders are substantially equal.

It will be noted that centrifugal force need not be relied upon for bringing the abrasive member into abrasive engagement with the cylinder wall.

The cooperating indicia notches **53** and **55** assure that both ends of each plate **37**, as well as all of the tension plates with respect to each other, are adjusted to similar positions so that the biasing pressure supplied to the abrasive members is equal in all cases.

The oil absorbent quality of the central layers of fabric **24** of the elements **20** enables lubricant to be retained therein for providing lubricant for the walls of the cylinder, increasing the fineness to which the surface of the walls are abraded. This oil absorbent characteristic also reduces the possibility that fine particles of metal removed from the cylinder walls fly free and collect on bearings and other critical parts of the engine. The whole device may be dipped in oil for impregnating the layers **24** of the elements **20**.

It occurs at times that cylinder walls are not entirely true, but have irregularities or depressions. In the case of rigid honing or abrading elements, these depressions are not affected, but in the present case, due to the flexibility and yieldability of the abrasive members **18** carrying the abrasive elements, all such depressions are abraded.

The yieldability of the elements **20** may be considerable to accommodate inaccuracies in the surface of the cylinder wall, and yet the elements **20** are strong enough to retain their shape in the absence of pressure and to exert considerable pressure outwardly in engaging the cylinder walls.

The abrasive elements **40** in the case of any tool similar to the present, wear out on occasion and it is necessary to replace them. In the present instance, such elements can be replaced readily. The securing screws **36** may be loosened slightly and the abrasive elements **40** slid off of the elements **20** longitudinally of the device, and others replaced quickly.

When it is desired to replace the abrasive strip **64** (Figures 8 and 9), the springs **68** are unhooked from the lugs **70**, the abrasive strip is slid off axially, and a new one put on.

While I have herein shown and described certain embodiment of my invention, manifestly they are susceptible of modification and rearrangement of the parts without departing from the spirit and scope thereof. I do not, therefore, wish to be understood as limiting my invention to the precise forms herein disclosed, except as I may be so limited by the appended claim.

I claim:

In a device of the class described, the combination comprising, a body member, a plurality of arms extending generally radially outwardly from said body member, a strip of flexible abrasive material substantially covering each of said arms and having edges terminating adjacent said body member on opposite sides of the respective arms, and retaining means on opposite sides of each arm for securing said abrasive strips on said arms, said retaining means comprising, outturned hook means on the adjacent edges of the respective abrasive strips and plate-like clip means having inturned hook means secured to said body member, said inturned hook means being engageable with said outturned hook means.

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