Sept. 7, 1926. 1,599,266

F. O. ALBERTSON

VALVE SEAT REFACER

Filed Nov. 24, 1924

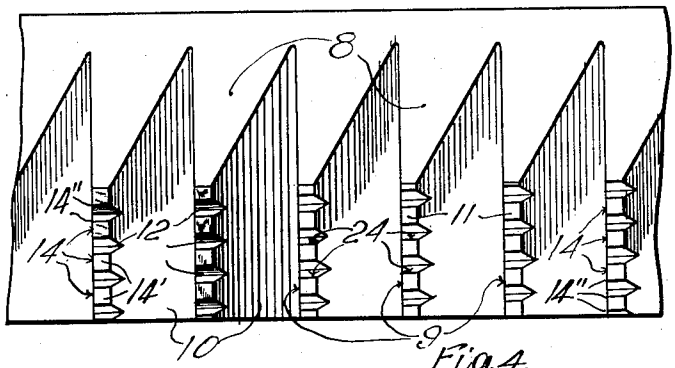


Fig. 4.

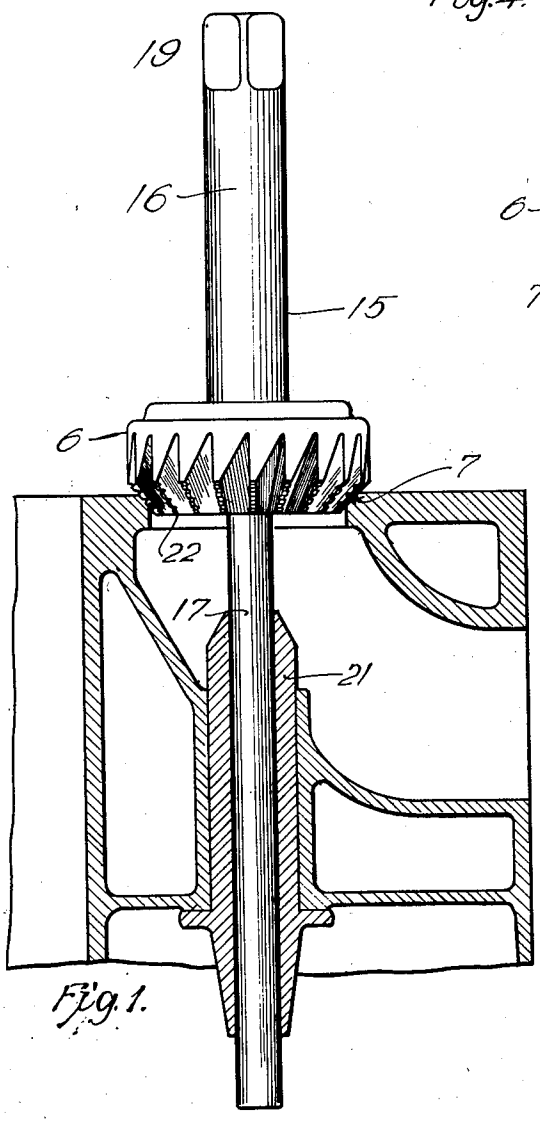


Fig. 1.

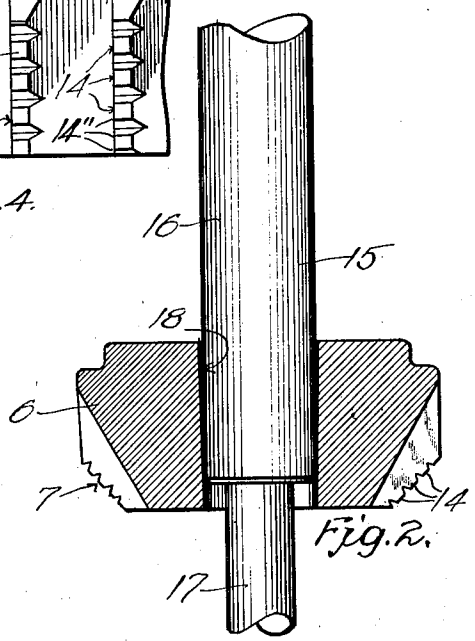


Fig. 2.

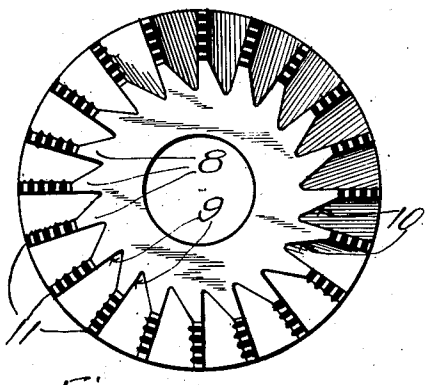


Fig. 3.

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UNITED STATES PATENT OFFICE.

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VALVE-SEAT REFACER.

Application filed November 24, 1924. Serial No. 751,785.

The present invention relates to valve seat refacers such as are used for refacing the poppet valve seats of internal combustion engines.

The object of the invention is to provide a cutting or refacing tool which will have a long period of usefulness and will easily and rapidly remove the hardened crystallized surface of a valve seat and reface the same.

In the accompanying drawings illustrating the preferred embodiment of this valve seat refacer:

Figure 1 is a vertical sectional view through the valve port of an internal combustion engine showing my improved refacing tool in position on the valve seat;

Figure 2 is a diametric section through the refacer, also showing a portion of the supporting shank or bit;

Figure 3 is an end elevational view of the refacing tool, and

Figure 4 is a developed view showing the cutting face of the tool developed into a single plane.

The original blank or body of the refacer consists of a short cylindrical block of metal having a lower conical cutting face 7. This cutting face has the same angle of obliquity as the valve seat to be refaced, which is generally 45° or 60°, these being the standard valve seat angles for the majority of automobile engines.

This blank is milled with a suitable hob to form a plurality of closely spaced cuts around the cutting face 7. The shape of the hob, or its cutting angle, is such as to form teeth 8 having leading faces or edges 9 which lie in vertical planes extending radially relative to the axis of the refacer. The reverse side of each tooth is formed by an inclined back slope 10 extending inwardly and backwardly to intersect the front face 9 of the next succeeding tooth. In the finished tool, these teeth have relatively narrow flat outer seat-engaging surfaces 11 which define the working face of the tool.

Machined around the working face 7 across the tops of the teeth 8 is a spiral groove 12 which winds by successive convolutions from the inner ends of the teeth outwardly to the outer ends thereof. As shown in Figs. 2 and 4, this groove forms a series of spaced notches across the entire face of each tooth 8, these notches 12 being of a width closely approaching the width of the metal intervening between the notches. The spiral groove may lead outwardly in a clockwise direction, as viewed in Fig. 3, so that the counter-clockwise rotation (Fig. 3) of the refacer will result in the spiral groove "feeding" outwardly, i. e. if a small chip or particle of metal should be caught in this groove and be retained therein through several revolutions of the refacer, it would be carried outwardly along the valve seat and discharged at the outer edge, thereof. While this tendency to feed the chips outwardly and thereby discharge them, exists in all of my refacers having the above described relation between the trend of the spiral groove and the direction of rotation of the tool, this feature is not an essential part of my invention and is only of practical value in tools having an angle of obliquity of 15 degrees or thereabouts.

It will be observed from Figs. 3 and 4 that the successive notches 12 formed in the upper edge of each tooth divide this edge into a series of separate cutting shoulders 14 spaced across the width of the tooth, each of these cutting shoulders having a substantially flat seat-engaging area 14′ associated therewith. As clearly shown in the drawings, the surface of each seat-engaging area meets the leading face of its tooth in such a manner as to provide a pair of sharp corners or penetrating points 14″. The action of these penetrating points is to pierce the hard, crystallized surface of the valve seat and to permit the cutting edges of the teeth to get under and readily remove this crystallized surface. An important feature is the V-shaped contour of the groove which gives a maximum base area to the cutting shoulders and their associated seat-engaging areas, thereby tending to eliminate any breakage which might otherwise result from the severe strain to which said bases are subjected. Particular attention is directed to the width of the seat-engaging areas, in a radial direction, relative to the width of the valve seat. In order to obtain the desired action of the refacer, it is essential that this width of the seat-engaging areas be substantially less than the width of the valve seat. This feature of this invention is clearly shown in Fig. 1.

In use, the refacer is usually mounted on a shank 15 of any suitable form, the one

illustrated comprising an enlarged upper end 16 and a reduced stem end 17. For holding the refacer 6 fast on this shank, the central socket 18 of the refacer may have a slight taper, or the shank may have a slight taper, whereby the two may be wedged together. The upper end of the shank has a square portion 19 for receiving the chuck of a power unit for driving the tool. After the valve has been removed, the stem end 17 of the shank is inserted down into the valve stem guide 21 and the refacer 6 brought down upon the valve seat 22. The guide stem 17 holds the refacer properly centered on the valve seat at all times.

In the rotation of the refacer the penetrating points pierce the crystallized surface of the valve seat, thereby permitting their associated cutting edges to get under the crystallized surface and act on the metal beneath said surface. The series of straight-edged cutting shoulders 14 on one tooth make spaced cuts on the valve seat, and immediately following these cutting shoulders are the slightly staggered shoulders 14 on the next succeeding tooth. Because of this slightly offset relation between the cutting shoulders 14 on adjacent teeth, these latter teeth will make cuts on the valve seat at points further out on the valve seat. Thus each tooth makes a series of spaced cuts which slightly overlap the spaced cuts made by the preceding tooth, and hence no one tooth cuts the entire width of the valve seat surface. On a pitted, crystallized surface, having perhaps one or more high spots, this distributes the cutting effort between the teeth, each tooth cutting a different section of the high spot.

I claim:

1. A tool for refacing a hardened and crystallized valve-seat comprising a cutting head, a shank adapted to be inserted in a valve-stem guide associated with a valve-seat to be refaced, said head provided with a cutting face disposed at an angle corresponding to the angle of the valve to be refaced, a plurality of teeth formed in said cutting face, each of said teeth having a substantially radial leading face and a seat-engaging face at an edge-forming angle to said leading face, said seat-engaging face being notched to divide it into a plurality of spaced seat-engaging areas, each of which in the radial direction, is of substantially less breadth than the seat to be refaced, the surface of each said spaced seat-engaging areas meeting its associated leading face to provide a sharp cutting edge and a pair of penetrating points, the notches of the several teeth being disposed in spiral formation so that no one of said piercing points is tracked by a corresponding piercing point of a following tooth.

2. A tool for refacing a hardened and crystallized valve-seat comprising a cutting head, a shank adapted to be inserted in a valve-stem guide associated with a valve-seat to be refaced, said head provided with a cutting face disposed at an angle corresponding to the angle of the valve to be refaced, a plurality of teeth formed in said cutting face, each of said teeth having a substantially radial leading face and a seat-engaging face at an edge-forming angle to said leading face, said seat-engaging face being notched to divide it into a plurality of spaced cutting shoulders, having associated seat-engaging areas, each of which, in the radial direction, is of substantially less breadth than the seat to be refaced, the surface of each said spaced seat-engaging areas meeting its associated leading face to provide a sharp cutting edge and a pair of penetrating points, the notches of the several teeth being so disposed that no one of said piercing points is tracked by a corresponding piercing point of an adjacent tooth.

3. A tool for refacing a hardened and crystallized valve seat comprising a cutting edge, a shank adapted to be inserted in a valve stem guide associated with the valve seat to be refaced, said head provided with a cutting face disposed at an angle corresponding to the angle of the valve to be refaced, a plurality of teeth formed in said cutting face, each of said teeth having a substantially radial leading face and a seat-engaging face at an edge-forming angle to said leading face, said seat-engaging face having notches therein to divide it into a plurality of spaced cutting shoulders, said notches being V-shaped whereby the bases of said cutting shoulders are of maximum area and strength, spaced seat-engaging areas associated with said cutting shoulders, each of which seat-engaging areas, in a radial direction, is of substantially less breadth than the seat to be refaced, the surface of each said spaced seat-engaging areas meeting its associated leading face to provide a sharp cutting edge and a pair of penetrating points, the notches of the several teeth being so disposed that no one of the said piercing points is tracked by a corresponding piercing point of an adjacent tooth.

In witness whereof, I hereunto subscribe my name this 17th day of November, 1924.

FRANS O. ALBERTSON