

May 13, 1958

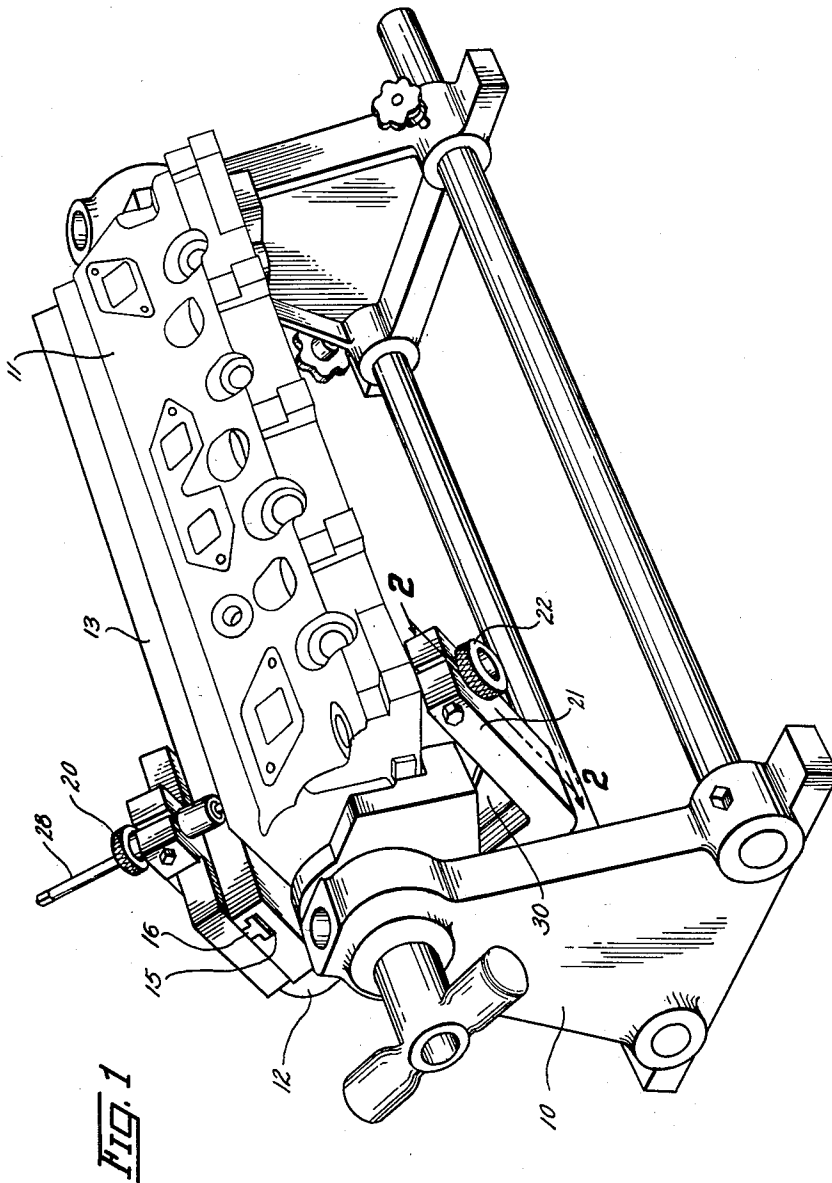
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2,834,233

ENGINE RECONDITIONING EQUIPMENT

Filed Feb. 17, 1955

3 Sheets-Sheet 1



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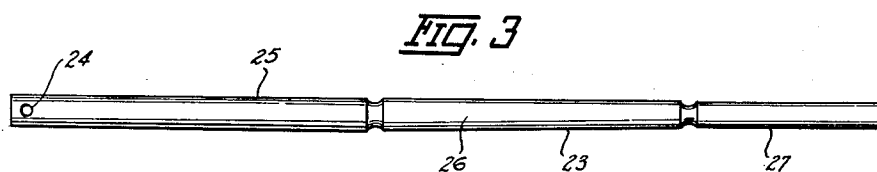
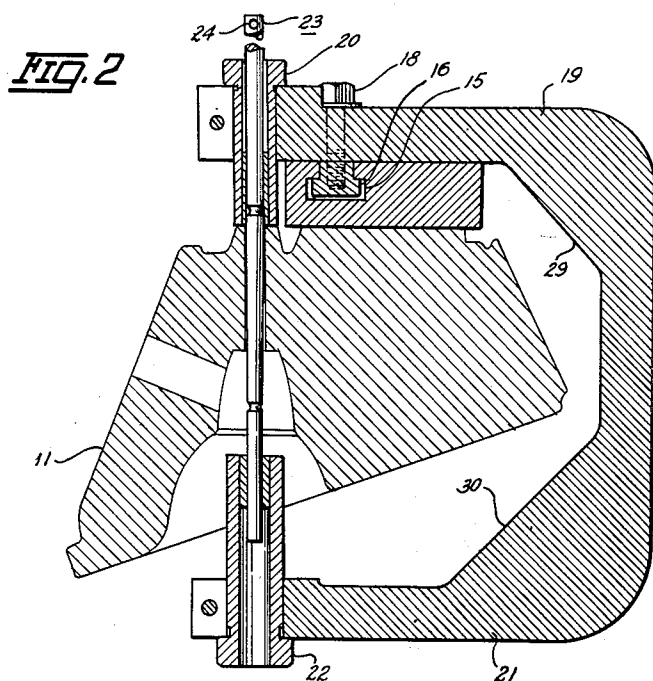
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Filed Feb. 17, 1955

3 Sheets-Sheet 2



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FIG. 5

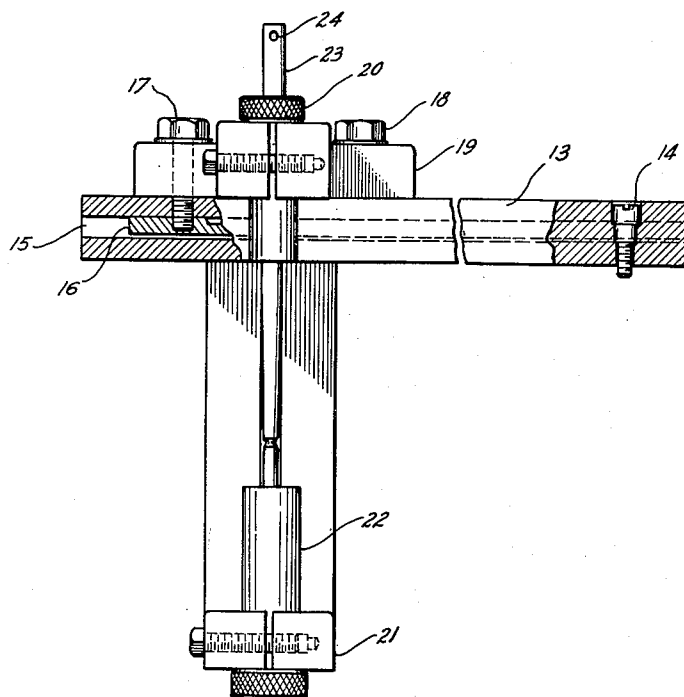


FIG. 6

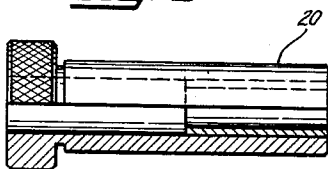


FIG. 8

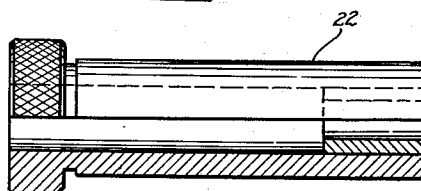
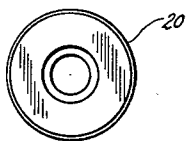


FIG. 7



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ENGINE RECONDITIONING EQUIPMENT

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Application February 17, 1955, Serial No. 488,824

3 Claims. (Cl. 77—2)

This invention relates to a reaming fixture and particularly one which is adapted to be used in conjunction with the head casting of an overhead valve internal combustion engine in which the valve guide is provided by boring the head casting to the proper size.

The guide portions of an overhead valve engine vary considerably from the type of guide mechanism which was used in the older L-head engines. In the L-head engine it has been the practice to provide a steel or bronze sleeve which is inserted in the block and serves to guide the valve stem. Of course this type of sleeve is replaceable. However, with the increasing use of overhead valve engines, manufacturers have seen fit to secure a valve guide by simply boring a hole through the head casting and permitting the cast iron surface to serve as a bearing surface.

In engines of this later type of course it is impossible to replace the guide assembly. It is apparent, however, that these guides could be rebored to receive oversized valve stems, and at the same time it is obviously a considerable problem for the average garage, with its limited equipment, to accurately rebore or ream this hole with the same accuracy that was achieved with the original boring by the heavy machinery found in all automotive engine factories.

It is therefore the primary object of my invention to provide a reamer and reaming fixture or guide which will duplicate the original bore so as to secure an absolutely vertical hole in relation to the valve seat.

It is a further object of my invention to provide a fixture which is of substantial weight and strength to prevent any accidental misalignment by virtue of the movement of the reamer, either hand operated or power driven.

It is still another object of my invention to provide an alignment means which will readily and easily position the reaming fixture.

It is yet another object of my invention to provide a clamping means which will loosely align the reaming fixture and yet may subsequently be tightened to hold the alignment thus secured.

It is a still further object of my invention to provide a fixture which will firmly hold both ends of the reamer while it is being operated.

Other and further features and objects of the invention will be more apparent to those skilled in the art upon a consideration of the accompanying drawings and following specifications, wherein is disclosed a single exemplary embodiment of the invention, with the understanding, however, that such changes may be made therein as fall within the scope of the appended claims without departing from the spirit of the invention.

In said drawings:

Figure 1 is a view in perspective of a cylinder head positioned in a stand and having the reaming fixture operatively mounted thereon.

Figure 2 is a view in cross section of the reaming fixture taken on a center line 2—2 of Figure 1, together with

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a cross sectional view of a cylinder head to show the internal position of the guide bar.

Figure 3 is a view of the guide bar used in Figure 2.

Figure 4 is a view of the reaming tool such as is shown in position in Figure 1.

Figure 5 is a view of the reaming fixture clamping means and the alignment block, a portion of the block being cut away.

Figure 6 is a cross sectional view of the upper bushing.

Figure 7 is a top view of the upper bushing, and

Figure 8 is a side view of the lower bushing, the internal bore thereof being shown by dotted lines.

Referring now to the drawings, and more particularly to Figure 1; a device constructed according to my invention comprises generally a reaming fixture 12 and means for aligning the fixture, such as the guide bar 13, which may be attached to an engine head 11 which in turn may be mounted in a stand 10. It will be seen that the stand 10 is adapted to mount the head and permit it to be turned through a 360 degree arc. This stand is described in more detail in my co-pending application entitled "Engine Reconditioning Equipment."

The head 11 is of conventional design such as is used in many overhead valve engines. The reaming fixture 12 is shaped in the form of a yoke and is of sufficient size that the head can be positioned between its opposed jaws.

The reaming fixture is held in position on the head by means of heavy rectangular guide bar 13, which in turn is fastened to the head by a series of socket head screws, such as shown at 14 in Figure 5. These may be inserted in the bolt holes always found in a cylinder head. The guide bar contains a T-shaped, slotted means 15 which runs the entire length of the bar. A key member 16 is adapted to slidably interlock within this T-slot and is fastened to the reaming fixture by bolts 17 and 18 which in turn are mounted in the head portion of the fixture. This head portion 19 is adapted to carry the upper bushing 20. A second bushing 22 is positioned directly opposite the upper bushing on the lower jaw 21 of the yoke.

I will now describe in detail the means whereby the upper and lower bushings are brought into accurate alignment with the bore of the valve guide. An arbor member 23 provides the guide by which this alignment is achieved. The structure of this guide is of considerable importance.

Referring to Figure 3, it will be seen that the guide member is composed of three substantially cylindrical portions. One end of the guide member has a small hole 24 drilled therein. These three sections are of different dimensions. The portion 25 with the hole in the outer end is the largest of the three. The center portion 26 is somewhat smaller, and in addition, carries a slight taper towards its lower end, and the third portion 27 is yet smaller in diameter than 26. The taper is provided to permit the guide member to be wedged in the guide which locks it in position.

Of course a number of these guides must be provided to accommodate the various size bores used by different manufacturers, but in general, the relationship between the three sections and the guide will be substantially the same. As an example, the lower end may have a diameter of .3120. The second section may have a diameter of .3600 with a taper of .0024, while the third and outer section may have a diameter of .3745. It will also be apparent immediately that the range of permissible variation is relatively small. It will also be apparent that the bushings 20 and 22 must have an internal diameter of approximately the same dimension as the ends of the guide bars.

Referring now to Figure 2 which is a cross sectional view of the yoke positioned on the engine head; the rela-

tive position of the various parts can be seen. To secure alignment, the procedure would be to first position the yoke on the guide bar 13 moving it into close proximity with a selected valve guide opening, leaving the bolts 17 and 18 loose in their sockets. Once the upper bushing is in reasonably close alignment with the hole, the arbor 23 is inserted through the upper bushing, down through the valve guide, and into the lower bushing. As this arbor is being moved downwardly through the three points, it will cause the yoke member to move slightly in whatever direction is necessary to secure the required perfect alignment. These close dimensions, which I have previously described, serve to bring about this accurate alignment.

Once the arbor is in position, the bolts 17 and 18 are tightened, drawing the key into position against the upper surfaces of the slots 15, which locks the fixture firmly in position. The arbor may then be withdrawn and the fixture is ready to receive the reamer which is shown in detail in Figure 4.

The reamer, indicated generally at 28, carries substantially the same measurements at its two ends as did its mating arbor. Of course the reaming portion is somewhat larger in order to secure the necessary cut. These diameters are such that the close fit will exist between the reamer ends and the bushings mounted in the fixture. It will be obvious that the actual diameters of the arbors and reamers will be fairly small, since most automobile engines use a small diameter valve stem. It is therefore necessary that both ends of the reamer be firmly supported in order to prevent deflection or whipping while the reamer is being turned.

From the foregoing description, it will be readily apparent that an extremely rigid reaming fixture has been provided. In order to strengthen the corners of the yoke, two web portions 29 and 30 are formed. Through the means of this fixture and the use of close tolerances in the bushings and arbor, a straight, true guide can be secured in an old, worn engine head. Yet it does not require the services of an expert machinist to achieve this result. Any reasonably competent mechanic who accurately follows the procedure set forth will always achieve quality workmanship.

Of course a reaming fixture of the type described would have numerous sizes of bushings, arbors, reamers to accommodate the various makes of automobiles. Further, it would be possible to repeatedly enlarge the valve guide on a single head should the engine require additional overhauls.

Although I have described a specific embodiment of my invention, it is apparent that modifications may be made by those skilled in the art. Such modifications may be made without departing from the spirit and scope of my invention as set forth in the appended claims.

I claim as my invention:

1. In an engine boring tool of the type described, a yoke member, the jaws thereof being sufficiently distant

from each other to be positioned on both sides of an engine head adjacent an opening therein, a pair of opposed bushings positioned in opposite jaws of said yoke member, one of said bushings having a slightly lesser internal diameter than the other, an arbor member slidably positioned in said bushing, said arbor being composed of three sections, one of said sections being of the same diameter as the smaller bushing, the opposed section being of the same diameter as the larger bushing, and the center section thereof being slightly tapered whereby said arbor member may be inserted through said bushings in said opposed jaws and through said opening in said engine head in accurate circumferential dimensional relationship therewith, and means for mounting said yoke on said engine head, said means including a locking portion adapted to rigidly position said yoke in relation to said mounting means after said arbor is aligned in the engine head.

2. In a valve guide boring tool holder of the type described, a U-shaped member having accurate dimensioned bushings in the outer ends thereof in vertical alignment, said outer ends being of sufficient distance from each other to permit an engine head to be loosely positioned therebetween, a guide rod removably, slidably positioned in said bushings, the outer ends of said guide rod being of the same dimensions as the bushings, the center portion of said rod being tapered, whereby said rod may be moved laterally through the upper bushing, the valve guide and into the lower bushing to secure accurate circumferential vertical alignment of said bushings and said valve guide, means adapted to rigidly secure said U-shaped member against movement once said circumferential alignment is attained.

3. In valve guide reboring equipment of the type described, an engine head having valve guide openings therein, a yoke member, the arms thereof being loosely positioned on either side of said engine head, sized bushings in said yoke member, a sized alignment rod having an inwardly, downwardly tapered center portion adapted to center said rod and bushings radially in relation to said openings said rod being slidably positioned in and movable through said bushings and said engine head opening, a block having a longitudinal slot along the upper surface thereof, means for rigidly positioning said yoke member in relation to said block, means in said block to secure said block to said engine head whereby once said alignment rod has been positioned, said yoke and said engine head may be rigidly locked in relation to each other.

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