

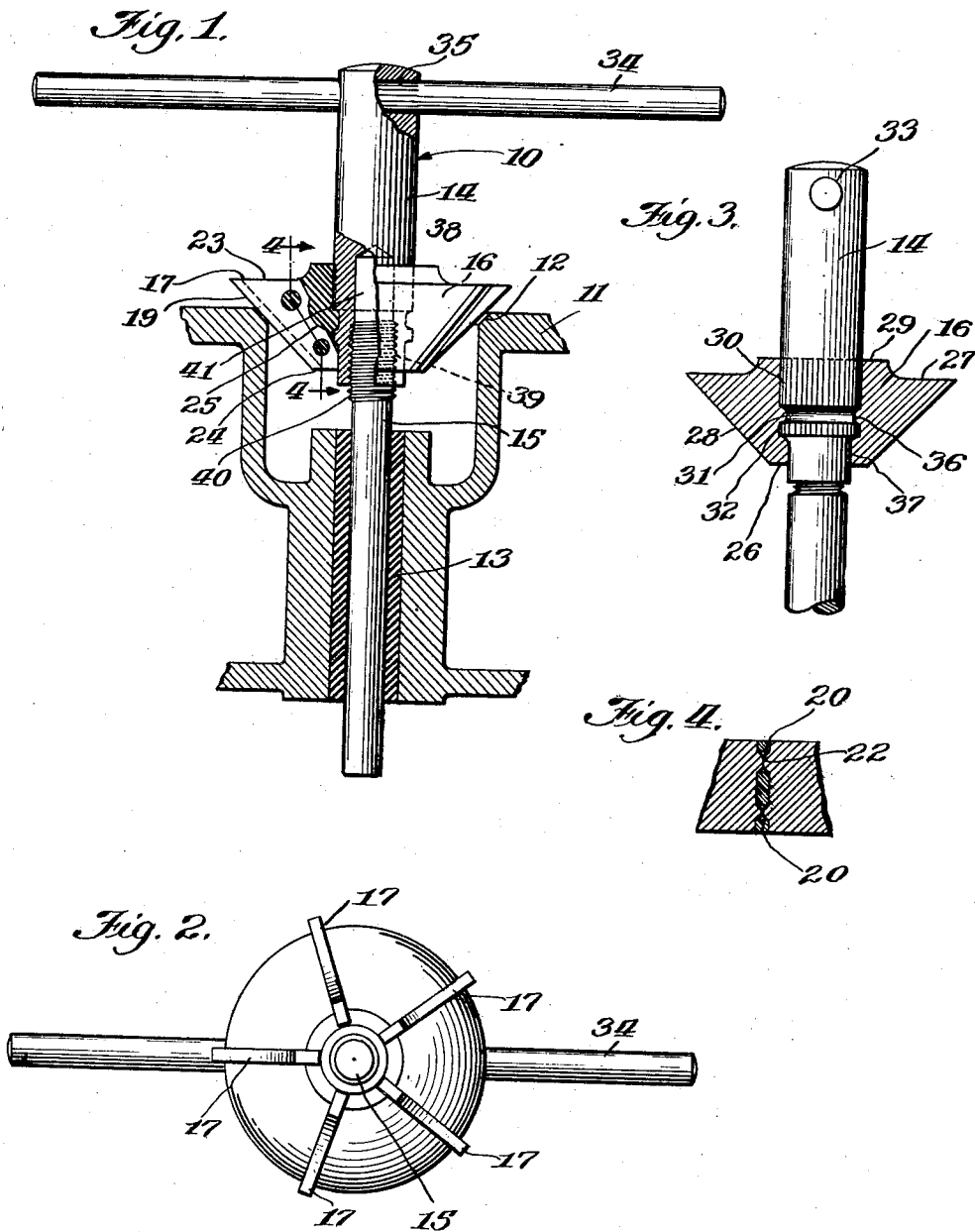
Sept. 29, 1931.

N. F. McNAUGHT

1,825,007

VALVE SEAT RECONSTRUCTION TOOL

Filed Oct. 11, 1928



Inventor
Norris F. McNaught.

By Williams, Broadbent, McCall & Knicker

Attys.

UNITED STATES PATENT OFFICE

NORRIS F. McNAUGHT, OF CHICAGO, ILLINOIS, ASSIGNOR TO DURO METAL PRODUCTS COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

VALVE SEAT RECONSTRUCTION TOOL

Application filed October 11, 1928. Serial No. 311,724.

The present invention relates to valve seat refacing tools, and is particularly concerned with tools for refacing the valves of internal combustion engines.

5 One of the objects of the invention is the provision of a novel method of manufacture for valve seat reamers and the like, which is capable of producing a serviceable tool of the class described, at a minimum cost.

10 Another object is the provision of an improved valve seat tool construction which is cheaper and more efficient than the tools of the prior art, by the use of inexpensive metal for its construction.

15 Another object is the provision of a valve seat reamer which is more quickly and economically manufactured so that the tools may be produced in quantity at a low price within the means of the occasional user of such tools.

20 Another object is the provision of an improved reamer structure which is capable of refacing valve seats with a high degree of accuracy.

25 Another object is the provision of a novel method of securing cutter blades in cast metal without drawing the temper of the cutter blades.

30 Other objects and advantages of the invention will be apparent from the following description and from the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

35 Referring to the drawings, of which there is one sheet;

Fig. 1 is a view in perspective of a valve seat reamer constructed according to the present invention with parts broken away to show the internal structure;

40 Fig. 2 is a plan view of the same;

Fig. 3 is a medial sectional view showing the structure of the arbor and body;

45 Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1, showing the engagement of anchoring formations on the blade with the cast metal body.

Referring to Fig. 1, 10 indicates my valve seat tool in its entirety, and the tool is shown 50 in conjunction with a conventional internal

combustion part 11 having a valve seat 12 and a valve stem guide 13 located axially of the valve seat 12. Although my invention is illustrated in conjunction with a valve seat reamer, I desire to be understood that the invention may be employed for the formation of other valve seat tools such as tools for cutting annular rings in replacing valve seats or tools for reboring or other operations, and the present embodiment is to be regarded as illustrative of one form of the invention.

The valve seat tool 10 preferably includes an arbor 14 provided with a pilot stem 15, a body member 16 and one or more cutter blades 17. In the preferred embodiment, the valve reamer includes a plurality of similar cutter blades 17 consisting of tempered steel members which may be formed of sheet metal and having a plurality of anchoring formations.

70 The anchoring formations may consist of interlocking irregularities formed at the rear portion of the blade away from the exposed cutting edge 19 or the anchoring formations may take the form of one or more apertures or sockets 20 within which portions 22 of the body member 16 are adapted to engage when the device is manufactured.

80 The blades 17 for a reamer are preferably formed with a relatively straight cutting edge 19 which may be slightly beveled after the blade has been sharpened as described hereinafter, and the upper edge 23 of the blade preferably extends backward at an acute angle in order to save material and make the edge of the blade flush with the top of the body 16. The bottom 24 of a blade 17 may extend inward at an obtuse angle to conform to the base of the body member 16, while the rear or inner edge 25 may be formed with anchoring portions or in any convenient manner which economy of material may necessitate.

85 The body member 16 comprises a cast metal member formed of die cast metal which is substantially frusto-conical in form, having bases 26 and 27 and sloping sides 28. In order to enhance the appearance of the body member and give it an increased length for engagement with the arbor 14, the present 100

body member is formed with an axially extending boss 29. Axially located in the body member 16 and secured therein by forming the body member about the interlocking formations 30, 31 and 32, is the arbor 14.

The arbor 14 comprises a relatively short shaft which may be provided with a non-circular upper end, or for reasons of economy may merely be provided with a transverse bore 33 of sufficient size to receive a rod 34. The rod 34 may be secured in the bore 33 by providing the rod with a milled surface 35 at a point midway between its ends and the rod 34 may be driven into the bore 33 so that the milled surface 35 engages the walls of the bore and secures the handle permanently in the arbor.

The arbor 14 is preferably provided with anchoring formations 30 to 32, both for the purpose of securing the body on the arbor against rotative motion and against axial motion. These anchoring formations may be varied considerably to accomplish the same result, the essential feature being the formation of shoulders on the arbor 14 which engage formations within the body member 16 so that the body member is securely cast about the arbor, but a convenient method of making such formations on the arbor consists in providing milled surfaces 30 and 32 and the annular groove 31 within which an integral ring 36 of the body member 16 may engage. The lower end 37 of the arbor may be reduced in size also, thereby increasing the holding engagement of the milled ridge 32.

The arbor 14 is preferably provided with a pilot stem 15 and in order to accommodate my valve tool to various types of engines, I prefer to make the pilot stem 15 removable so that any of a plurality of different sizes of pilot stems may be employed. As all of the various pilot stems are of substantially the same construction, but merely of a different diameter, only one pilot stem is illustrated, it being understood that a pilot stem should be used which corresponds most closely to the size of the valve stem guide 13.

The arbor 14 may be provided with an axially located bore 38 which may be threaded at its outer end as at 39. A pilot stem 15 comprises a substantially cylindrical metal member having complementary threads 40 adjacent its upper end, and the extreme end 41 of the pilot stem is preferably adapted to fit in the end of the bore 38 to more accurately align the pilot stem and arbor 14.

The operation of my valve seat tool will be obvious to those skilled in the art, but the method of manufacture of my tool is as follows.

The die cast metal which is employed for the body member 16 flows at a relatively low temperature of from 600 to 700 degrees Fahrenheit, which is insufficient to draw the temper of the tool steel of which the blades

17 are constructed, and consequently I am able to secure the blades 17 in a body of relatively cheap material, thereby constructing a reamer with a minimum of labor and material.

The tools may be formed by ordinary casting operations with sand molds, in which case a jig is provided for holding a plurality of blades 17, and the arbor 14, in a predetermined position as illustrated in Fig. 1. If the operation is to be performed by a die casting machine, the die itself will be constructed to hold the blades and arbor in predetermined position. As the construction of appropriate dies or jigs for this purpose will be known to those skilled in that art, further description of such devices is considered unnecessary.

The blades and arbor having been secured in predetermined position, the body member 16 is formed by casting metal about the portions of the blades and arbor which are shown to be within the body in Fig. 1, and as the cast metal is permitted to cool, it contracts and is forced into the anchoring formations such as the holes 20 in the blades, the groove 31 of the arbor and the grooves formed by the milling 30, 32, thereby permanently securing these parts together.

The arbor 14 may be provided with the bore 38 and threads 39 before or after the casting operation, and a pilot stem 15 is now preferably placed in the arbor 14 and the cutting surfaces 19 of the blades are trued and sharpened with respect to the stem 15. If desired, this operation of truing and sharpening may be done with reference to the arbor itself, but the truing of the blades is preferably done with the pilot stem since the pilot stem is to be employed for holding the blades to rotate axially of the valve stem guide 13.

It will thus be observed that I have invented a novel valve seat tool structure in which the cutter blades may be formed of ordinary stampings of sheet metal and the body of cast metal so that these parts may be manufactured and assembled at an extremely low cost.

My invention also comprises a novel method of manufacture whereby tempered steel cutters may be secured in cast metal without drawing the temper of the cutters, and my cutter blades may be trued and sharpened with relation to the pilot stem with which they are to be employed, thereby assuring the accuracy of the tool.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim is new and desire to secure by Letters Patent of the United States, is:

5 1. A valve seat reconstruction tool, comprising an arbor having anchoring formations thereon, a blade having anchoring formations, and a body of cast metal formed about said formations, to provide a support for said arbor and blade.

10 2. A valve seat reamer, comprising a cast metal body, an arbor provided with an annular groove to anchor said arbor in said body, said arbor being secured in said body by interengagement of the adjacent parts
15 of said body in the groove of said arbor, and a plurality of radially extending blades having apertures secured in said body by integral parts of said body passing through said apertures in said blades.

20 3. A valve seat reamer, comprising a cast metal body, an arbor provided with an annular groove to anchor said arbor in said body, and a threaded bore for receiving a pilot, said arbor being secured in said body
25 by interengagement of the adjacent parts of said body in the groove of said arbor, a plurality of radially extending blades having apertures, secured in said body by integral parts of said body passing through said apertures in said blades, and an axially extending
30 pilot stem threaded in the bore of said arbor.

In witness whereof, I hereunto subscribe my name this 6 day of October, 1928.

NORRIS F. McNAUGHT.

35

40

45

50

55

60

65