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L. SMALL
DIAMOND TOOL
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2,581,609

FIG. 2

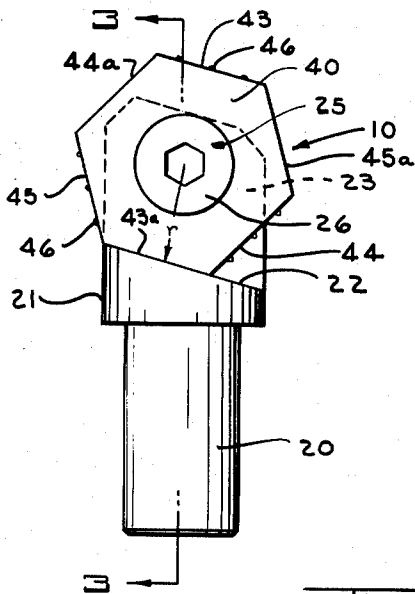


FIG. 3

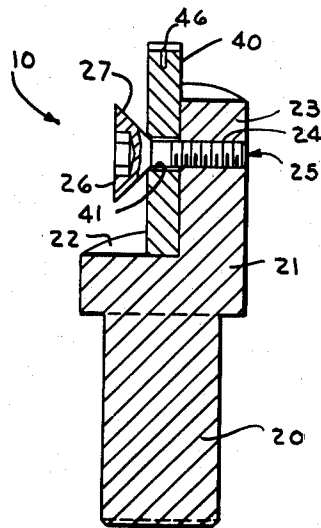


FIG. 1

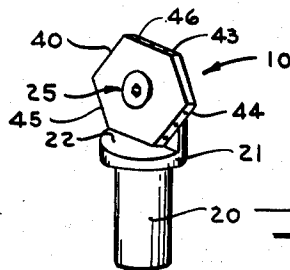


FIG. 5

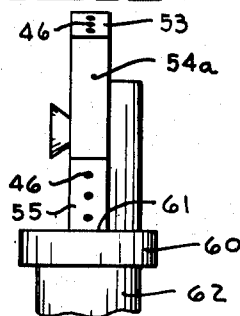
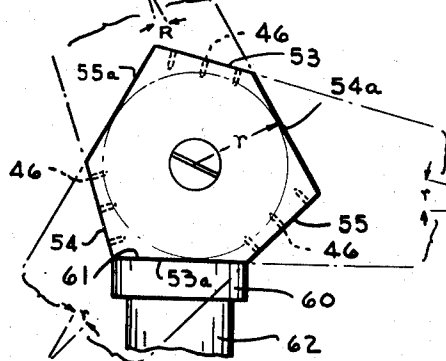


FIG. 4



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2,581,609

DIAMOND TOOL

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6 Claims. (Cl. 125—39)

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The present invention relates to a diamond tool and particularly to such tools used for dressing or truing grinding wheels of abrasive materials.

Such tools are used in wheel truing devices and fixtures of various types and are designed to hold a diamond or a plurality of diamonds in surface contact with a grinding surface of an abrasive wheel, either to develop a desired contour therein or to restore a desired contour thereto.

Since such abrasive wheels are used to a great extent in high precision work, it is important that the dressing or truing operation be accurately performed. This requires that the diamond tool be held in a suitable holding fixture and be moved into an adjusted position with the diamonds therein in a predetermined position relative to the abrasive wheel surface to be dressed.

In many of the tools used for this purpose, a diamond or plurality of diamonds is held in a fused or sintered powdered metal matrix secured, as by brazing, to the end of the tool shank. Frequently, distortion occurs in the mounting of the diamond and metal matrix in the tool shank which makes difficult the attainment of an accurate precision adjustment of the tool in the abrasive wheel dressing or truing fixture. When the diamonds in such tool are worn off in use, it is necessary to replace the entire tool and reset it in the fixture. This is an uneconomic operation, not only because of the time lost in changing the tool, but also in the loss of materials which are expensive.

The present invention is more particularly concerned with improving the diamond tool construction such as is disclosed in prior United States Patent No. 2,353,236, issued to Donald R. Hammill and myself as joint inventors, which includes an adjustable and removable diamond set member having a plurality of diamond-studded grinding surfaces. With this construction, the diamond set member is rotatably supported on a clamping member which is secured or formed integral with a shank, and which, upon loosening of a set screw in the clamping member, is rotatable to any of its adjusted positions. In the prior tool, the diamond set member is held against rotation solely by frictional engagement with the sides of the clamp and the tool is not provided with any means to easily, quickly, and accurately locate the diamond-studded surface relative to the axis of the shank of the tool.

It is, therefore, an object of the present invention to provide a diamond tool for dressing

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or truing an abrasive wheel and which is of a novel design and construction to provide a plurality of diamond set dressing faces in a single tool-holding shank, the tool being readily adjusted and dressing faces being accurately located while in a wheel dressing or truing fixture to bring into surface contact with the abrasive wheel any desired diamond set face.

It is a further object of the present invention to provide a diamond tool for dressing or truing an abrasive wheel and in which the several diamond set faces are formed as a part of an adjustably movable member, the movable member being mechanically and rigidly held in the tool shank without brazing.

It is a further object of the present invention to provide a diamond tool for dressing or truing an abrasive wheel, and in which the diamond set movable member may be removed from or replaced in the tool while the shank is held in its adjusted position and location in the wheel dressing or truing fixture. This allows the use of various types of diamond set members in the same tool, thus giving the tool a wider application in commercial use than is the case with conventional tools in which the diamond set matrix is brazed into the shank.

It is a further object of the present invention to provide a diamond tool for dressing or truing an abrasive wheel and in which the novel design and construction permits efficient and economical manufacture of the tool by production methods, with the maximum utilization of the materials employed.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawing forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In the drawings:

Fig. 1 is a perspective view of a tool embodying the features of the present invention.

Fig. 2 is a front elevation of the tool shown in Fig. 1.

Fig. 3 is a sectional view of the tool taken substantially on the line 3—3 of Fig. 2.

Figs. 4 and 5 are front and side elevations, respectively, of a modification of the tool embodying the features of the present invention.

Before explaining in detail the present invention, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawing, since the

invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Referring to the drawings, the diamond tool 10 illustrated therein is provided with a tool-holding shank 20 which is adapted to be received in a tool-holding jig or fixture (not shown) and which has a clamp 21 for holding and locating a diamond set member 40. The clamp 21 has a body portion provided with an accurately finished locating surface 22 and an upwardly extending clamp arm 23 which is drilled and tapped, as at 24, to receive a suitable screw-threaded clamping member, such for example as an Allen set screw 25.

The screw 25 passes through an enlarged opening 41 in the diamond set member 40 and is provided with a flat head 26 having a frusto-conical shoulder 27 which is adapted to engage around the edge of the opening 41 in the diamond set member, when the screw is threaded into the clamp arm 23, to accurately locate the diamond set member relative to the axis of the screw.

As shown in the drawings, the locating surface portion preferably extends in one direction at an angle to the axis of the shank and extends normal thereto in a transverse direction. This angle is determined by the angle at which it is desired to present the diamonds to the grinding wheel to be dressed and also by the particular geometric design selected for the diamond set member. The locating surface also extends in a plane parallel to and spaced from the axis of the screw 25.

The diamond set member 40 is preferably formed of a metallic material such as a metal matrix and has a plurality of sides 43, 44 and 45 provided with diamonds 46 embedded in the surface thereof. The diamond set member may be rotated or otherwise adjusted when removed from the clamp 21 to selectively bring into surface contact with an abrasive wheel or the like, any of the plurality of diamond-studded faces 43, 44 and 45.

The diamond set member 40 is also provided with an individual flat finished side or surface 43a, 44a, and 45a for each of the diamond-studded faces which is accurately finished and located relative to its respective diamond-studded face and relative to the plane of the diamonds 46 therein. The diamond-studded and finished faces may be parallel to each other or positioned at some definite predetermined angle R (Fig. 4) relative to each other, depending on the particular position of the locating surface 22 on the clamp, and the angle at which it is desired to present the diamond face to the abrasive wheel. However, the surface is so finished that, in assembly with the clamp 21, it is automatically located and positioned relative to the axis of the shank 20 upon tightening of the set screw 25 into the clamp arm 23.

As shown particularly in Figs. 1 and 2, the diamond set member has a hexagon-shape in which the three alternate sides are each provided with three diamonds. The sides may be selectively moved into operative position upon removal of the diamond set member 40 from the clamp 21, such that a fresh set of diamonds 46 are available for use on the grinding wheel when the diamonds of one of the other faces have become worn. The opposite faces of the diamond set member are finished to permit engagement of the same with

the locating surface portion of the clamp. With this construction, one of the finished faces of the diamond set member is held flush with the locating surface in any of its adjusted positions to accurately locate the opposite diamond-studded face relative to the shank of the tool when the screw is tightened into the clamp arm.

In employing a symmetrically-shaped diamond set member 40, such as a hexagon-shaped member, wherein the diamond-studded faces are in parallelism with the corresponding finished faces, the angle of the locating surface relative to the axis of the shank 20 determines the angle at which the diamonds are presented to the grinding wheel.

A modification of the diamond set member is shown in Figs. 4 and 5, which has a non-symmetrical shape and which is adapted to be used with a clamp 60 having a locating surface 61 disposed normal to the axis of the shank 62. In this modification, the alternate faces 53, 54 and 55 of the diamond set member are each provided with three diamonds 46 and the opposite sides 53a, 54a and 55a of the diamond set member are finished to provide a definite and constant angle R with the corresponding diamond-studded faces. In this modification, the angle R of the diamond set member is the angle at which the diamonds are presented to the grinding wheel.

While the various shapes of the diamond set members have been described and shown having equal angles or alternately equal angles, it should be apparent that any configuration for the diamond set member is suitable provided that all of the angles formed by each diamond-studded face with its corresponding finished face are equal and provided that the finished faces are tangent to a circle having a radius r equal to the distance from the locating surface to the axis of the threaded opening (Fig. 2).

Upon removal from the clamp 21 or 60, the diamond set member may be turned in any desired position to bring any one of the diamond set faces into contact with the surface of an abrasive grinding wheel. By virtue of the locating surface 22 or 61 and the finished surfaces on the diamond set member, the tool is immediately adjusted to the desired angle to automatically provide the accurate and close adjustment which is required for truing an abrasive wheel within the normally desired precision. Also, it will be observed that the tool may be held in the jig or fixture and the entire diamond set member replaced by a diamond set member of a different design or with different diamond settings so that the single tool shank and clamping member may, if desired, be used with a plurality of different types of diamond-holding, surface-contacting members.

From the foregoing, it will be seen that the tool of the present invention is of a novel design and construction, and provides a plurality of diamond set dressing faces in a single tool-holding shank, the construction of the tool being such that it is readily adjusted and accurately located while the shank is in a wheel dressing or truing fixture to selectively bring into surface contact with the abrasive wheel any desired diamond set face. The tool also is such that the diamond set faces are formed as part of an adjustable movable member, which is rigidly held mechanically in the tool shank both by the set screw and also by engagement with the locating surface portion of the clamp.

The diamond set movable member may be re-

moved from and replaced in the tool while the shank is held in its adjusted position and location in the wheel dressing or truing fixture. This allows the use of various types of diamond set members in the same tool, thus giving the tool a wider application in commercial use than is the case with conventional tools in which the diamond set matrix is brazed in the shank. The tool is of novel design and construction and is such as to permit efficient and economical manufacture by mass production methods, providing for the maximum utilization of all of the materials employed.

Having thus described my invention, I claim:

1. A tool for dressing an abrasive grinding wheel and comprising a shank, a clamp at one end thereof comprising a fixed clamping arm, an adjustable screw threaded into said fixed clamping arm, and a locating surface portion disposed in a plane parallel to and spaced from the axis of said screw, and a multi-sided diamond set member having a plurality of diamond-studded sides and also a plurality of sides providing an individual finished surface for locating and positioning each of said diamond-studded sides relative to the axis of said shank, said diamond set member being secured relative to said shank in any of its adjusted positions by said screw and held with one of said finished surfaces in intimate engagement with said locating surface portion.
2. A tool for dressing an abrasive grinding wheel as claimed in claim 1 and being further characterized in that said diamond set member is provided with an opening for freely receiving said screw and said screw is provided with a conical shoulder portion adapted to engage said diamond set member adjacent said opening to locate said diamond set member and to maintain the finished surface thereof in intimate contact with said locating surface portion.
3. A tool for dressing an abrasive grinding wheel and comprising a shank; a clamp on one end thereof comprising a fixed clamping arm, an adjustable screw threaded into said fixed clamping arm and a locating surface portion extending parallel to and spaced from the axis of said screw; and a diamond set member having a central opening therein freely receiving said screw and selectively secured relative to said shank by said screw, said screw having a conical shoulder portion partially extending into said opening and engaging said diamond set member to locate the same relative to said locating surface portion and to maintain the finished surface thereof in intimate contact with said locating surface portion to prevent rotation thereof, said diamond set member having a plurality of diamond-studded sides and a finished surface for each of said diamond-studded sides for locating and positioning each of said diamond-studded sides relative to the axis of said shank.

4. A tool for dressing an abrasive grinding wheel and comprising a shank, a clamp at one end of said shank having a locating surface portion, and a diamond set member comprising a multi-sided body portion, alternate sides of which provide diamonds mounted for selective surface contact with the abrasive wheel, the remaining sides providing an individual flat finished surface for locating and positioning each of said sides having diamonds mounted therein relative to the axis of said shank, said clamp also including means securing said diamond set member to said shank and maintaining one of the finished surfaces of said diamond set member in intimate contact with said locating surface portion to prevent rotation thereof.

5. A tool for dressing an abrasive grinding wheel in accordance with claim 4 and being further characterized in that said multi-sided body portion is provided with an even number of sides and in that the individual finished surface for each side having diamonds therein is disposed diametrically opposite thereto.

6. A tool for dressing an abrasive grinding wheel and comprising a shank, a clamp on one end thereof comprising a fixed clamping arm, an adjustable screw threaded into said fixed clamping arm and a locating surface portion extending parallel to and spaced from the axis of said screw, and a multi-sided diamond set member having a central opening therein freely receiving said screw and selectively secured relative to said shank by said screw, said screw having a conical shoulder portion partially extending into said opening and engaging said diamond set member to locate the same relative to said locating surface portion and to maintain the finished surface thereof in intimate contact with said locating surface portions to prevent rotation thereof, said diamond set member having a plurality of diamond-studded sides and a finished surface for each of said diamond-studded sides and diametrically opposite the same for locating and positioning each of said diamond-studded sides relative to the axis of said shank.

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REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
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