

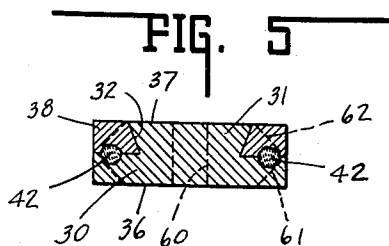
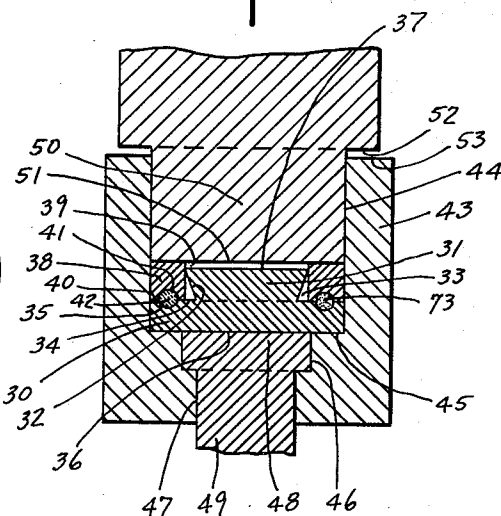
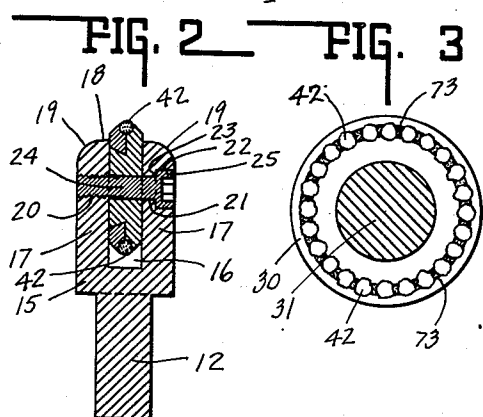
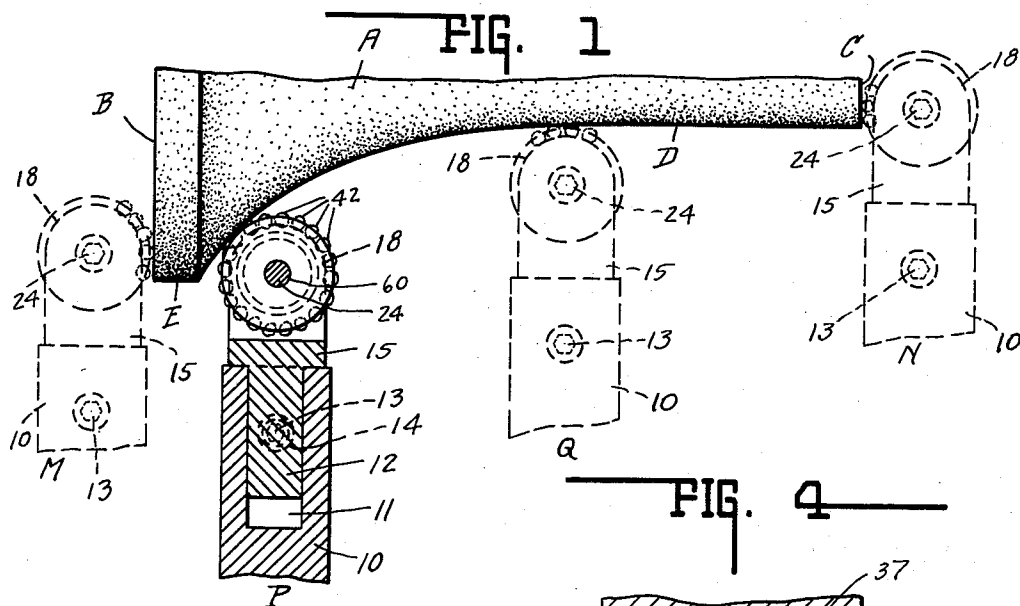
Feb. 6, 1945.

R. G. WILLIAMS

2,368,696

DIAMOND DRESSING TOOL AND METHOD OF FORMING SAME

Filed Nov. 18, 1942



INVENTOR.
 ROLLA G. WILLIAMS.
 BY *Lockwood, Coldsmith & Selt*
 ATTORNEYS.

UNITED STATES PATENT OFFICE

2,368,696

DIAMOND DRESSING TOOL AND METHOD
OF FORMING SAME

Rolla G. Williams, Thorntown, Ind.

Application November 18, 1942, Serial No. 466,027

4 Claims. (Cl. 125—11)

This invention relates to a grinding wheel dressing tool and its method of fabrication.

Industry has long used grinding wheels of carborundum with certain contours for grinding an article presented thereto, or vice versa, to the complementary contours. Hand grinding or dressing of the wheel is laborious and not always exact. Hence, grinding automatically has been practiced, the dressing tool being moved according to a template having the exact contour of the article's contour.

In munition manufacture, for example, the conoidal portion of the shell is ground by the wheel. If the wheels have so-called flat spots, these, or rather their complements, appear on the shell so that it, when passing through the air, will deflect same. This means loss of range due to shell retardation for a perfectly contoured shell does not deflect air but passes through it without such action.

Dressing tools, accordingly have required shifting of position to eliminate the flat spot effect in or on the wheel.

The present dressing tool can automatically follow the template, as is the customary practice, and fully dress the wheel, including the side faces thereof and leave no flat spots on the wheel, and at one sitting.

The chief object of the present invention is to provide a dressing tool capable of functioning as aforesaid and to form the same in a simple manner, insuring perfect tool formation without loss or cracking of the diamonds used as cutting elements of the tool.

One chief feature of the invention resides in providing the tool with a wheel which carries a peripheral series of dressing diamonds, in slightly spaced and annular relation and wherein during use the wheel is capable of functioning until all the diamond cutting portion is exhausted.

Another chief feature of the invention resides in so mounting the diamond dressing wheel in its holder so that the wheel may be annularly adjusted to successively present for dressing purposes other sections of the wheel.

A further feature of the invention resides in providing the dressing wheel with a plurality of cutting diamonds when used for dressing other than a flat face or a cylindrical surface.

Still a further feature of the invention resides in constructing the dressing wheel such that, as long as any diamond is available for cutting purposes, the parts of said wheel are permanently held together and loss of diamonds is prevented.

Another chief feature of the invention resides

in the relatively simple positive method of forming the dressing tool by utilizing heat and pressure as required, and in a manner that produces a wheel that will not fracture the diamonds or result in their "blowing up" either in wheel formation or in subsequent use of the wheel.

Other objects and features of the invention will be set forth more fully hereinafter.

The full nature of the invention will be understood from the accompanying drawing and the following description and claims:

Fig. 1 illustrates in plan a part of a grinding wheel of the character described, the dressing tool being shown in central section, dotted lines indicating other dressing positions of said tool; the tool therein being shown in plan.

Fig. 2 is a central section of the dressing tool shown in Fig. 1, but is taken at right angles to the section in that figure.

Fig. 3 is a plan view of the dressing wheel base blank, the dressing diamonds and associated matrix material.

Fig. 4 is a diagrammatic central sectional view through the parts shown in Fig. 3, the locking washer blank completing the dressing wheel, the blank holder, pressure applying plunger and the ejector for removing the completed dressing wheel blank from the holder.

Fig. 5 is a central sectional view through the aforesaid completed blank, the dotted lines indicating the blank stock to be removed to form the finished wheel shown in Figs. 1 and 2.

In view of the preliminary description, no further reference to tool use will be had except to point out, as illustrated in Fig. 1, that the dressing tool can, at one setting, be used to dress three surfaces of a grinding wheel or the like. In said figure, A indicates such a wheel having parallel, but not necessarily so, faces B and C, and an intermediate contoured periphery D with a cylindrical portion E. The dressing tool when positioned at M can dress face B; when positioned at N can dress face C, and when positioned at P can dress surface D. Similarly, surface E can be dressed. It is to be understood that the tool is moved in and out to dress faces B and C, is moved crosswise to dress surface E, and is simultaneously moved in and crosswise or out and crosswise to dress surface D, a second position of the tool in this action being illustrated at Q. The grinding wheel A, of course, rotates while it is being dressed or trued to shape.

Since dressing tool holder structures, template mountings, template followers and connections therefrom to the structures, are well known in

the wheel dressing art, no illustration thereof or further description is believed necessary.

In Fig. 1, 10 indicates a socketed holder structure having socket 11 therein to receive the shank or stem 12 of the dressing wheel support and clamp. A headless set screw 13 threaded into the socket at 14 engages the stem 12 and rigidly holds the wheel support in place.

The body portion 15 of the wheel support member is slotted at 16 forming two ears 17. These have rounded ends 18, see Fig. 1, reduced at 19, see Fig. 2. One ear is apertured and threaded as at 20, while the other, in alignment with aperture 20, is apertured at 21 and enlarged at 22 to form bearing shoulder 23. A headed bolt 24 has its head 25 seated in enlargement 22 and bearing on shoulder 23. Its shank extends through aperture 21 across slot 16 and threads into aperture 20 for dressing wheel clamping purposes. By releasing this bolt and retightening the same, the dressing wheel can be repeatedly adjusted annularly as required or desired. The dressing wheel normally is rigid with the support.

Reference will now be had to the dressing wheel and its construction, and more particularly Figs. 2 to 5, inclusive. A blank of suitable metal has a base portion 30 and an upwardly extending central portion 31 with an inwardly inclined wall 32 forming a reentrant channel or groove 33 therebetween. The resulting shoulder forming face 34 is provided with an annular groove 35 of the desired width and depth, preferably being semi-circular in radial section. 36 and 37 indicate respectively the outer substantially parallel faces of the blank base and central portion.

A collar or washer 38 of the same outside diameter of the base blank has a central opening 39 therethrough of a diameter slightly greater than the maximum diameter of the central portion 31. The lower face 40, confronting face 34 of the base, is channeled at 41 like channel 35 and registers therewith. A circular outlined annular bore is the result when said base and collars are in facial contact.

Positioned in said annular bore is a series of similarly sized commercial diamonds 42. These are first seated in the groove 35 and matrix material, 73 such as powdered copper or brass, is applied and heated to the softening point. About 1300 degrees F. has been found sufficient. This matrix material completely fills the bore and serves as a diamond spacer and heat conductor. Following such heating, or prior thereto, the collar may be applied.

The heated, initially assembled blank is then seated in a cylindrical holder 43 having the bore 44 therein terminating in the blank supporting face 45. This face is recessed as at 46 and the same is extended as bore 47. Therein is seated head 48 and stem 49 of a blank ejector. A pressing member 50 has the collar engaging face 51 and is telescopically associated with the holder filling bore 44. The member 50 is laterally enlarged to form shoulder 52 adapted to engage the confronting face 53 of the holder to limit the telescopic travel.

Either or both members, holder 43 or member 50, may be moved to separated relation to load the initially assembled heated blank in the holder. Then the members are caused to apply pressure so that the collar is reduced in width but enlarged laterally at its central opening 39 and in an amount sufficient to fill the undercut groove 33. The collar is thus pressure locked to the base and all voids are eliminated. Surplus matrix will

distribute evenly between the confronting faces after filling up the diamond unoccupied portions of the groove or channel 41 in the collar.

Following such pressure application, matrix distribution and collar deformation, the holder and press member are separated and the ejector operated to elevate the now finally assembled blank to the mouth of the holder for removal therefrom.

This finally assembled blank, see Fig. 5, may then be coaxially drilled as at 60 to form a bore through the blank for passage of bolt 24, see Fig. 2. It is then mounted in an arbor and the edges of the base and collar chamfered as at 61 and 62, respectively. The surfaces 37 and 36 may be refaced so that the resulting wheel has the specified width. The wheel is then in the form illustrated in Fig. 2 and substantially ready for use. It is then mounted in the clamp holder, see Fig. 2, and utilized as described. The chamfering is sufficient to just conceal the diamonds. When the tool is initially used, the surplus metal of the wheel adjacent the diamond is ground away until the diamonds are exposed for grinding wheel truing purposes.

From the foregoing it is noted that a solid wheel structure results, devoid of all voids. Also the wheel may be used until all the diamond cutting portion is worn away without release of the washer from the base. Also, two or more diamonds, in contour grinding, are available for simultaneous dressing which not only eliminates flat spotting but distributes diamond wear. Since the diamond wheel can be adjusted annularly, the life of this tool, as compared with that of conventional diamond dressing tools is many fold.

While the invention has been illustrated and described in great detail in the drawing and foregoing description, the same is to be considered as illustrative and not restrictive in character.

The several modifications described herein, as well as others which will readily suggest themselves to persons skilled in this art, all are considered to be within the broad scope of the invention, reference being had to the appended claims.

The invention claimed is:

1. A diamond dressing wheel including a centrally apertured base with a reentrant face projecting stem, a collar mounted thereon and enveloping the stem and completely filling the reentrant formation, said base and collar having registering coaxial grooves in confronting faces, a plurality of diamonds nested in the registering grooves and pressure seated therein, and heat and pressure consolidated matrix material spacing said diamonds from each other and completely filling the resulting groove formed annular bore.

2. A diamond dressing wheel including a centrally apertured base with a reentrant faced projecting stem, a collar mounted thereon and enveloping the stem and completely filling the reentrant formation, said base and collar having registering coaxial grooves in confronting faces, a plurality of diamonds nested in the registering grooves and pressure seated therein, and heat and pressure consolidated matrix material spacing said diamonds from each other and completely filling the resulting groove formed annular bore, the number of diamonds being such that a substantially circular peripheral series is provided on the wheel periphery except for the

requisite slight matrix spacing therebetween necessary to adjacent diamond contact.

3. The process of forming a diamond dressing wheel including providing a blank with a grooved formation in one face thereof, disposing a plurality of diamonds in the formation in annularly separated relation, applying matrix material to fill the remainder of the formation and maintain the proper diamond positioning, and then pressing a collar against the diamonds for pressure seating same in the confronting faces of the collar grooved blank.

4. The process of forming a diamond dressing wheel wherein diamonds project from the circular periphery thereof, comprising providing a pair of relatively soft metal blanks, at least one having recessing in one face for diamond reception, one blank being centrally apertured and the other blank on the confronting face includ-

ing a central projection with a reentrant grooved sidewall formation, the projection being slightly smaller than the central aperture, applying the diamonds to the recessing in an annularly spaced series, applying matrix to the recessing for diamond position maintenance, seating the projection in the central aperture with the diamonds and matrix between the confronting faces, and then pressure seating the diamonds and matrix in the confronting faces of blanks and simultaneously deforming the apertured blank by reducing the thickness thereof, while peripherally confined for forcing the stock of the apertured blank into the reentrant groove of the projection for substantially filling the groove for locking the blanks together and retention of the diamonds and matrix therebetween to form a permanent wheel assembly.

ROLLA G. WILLIAMS.