

June 15, 1948.

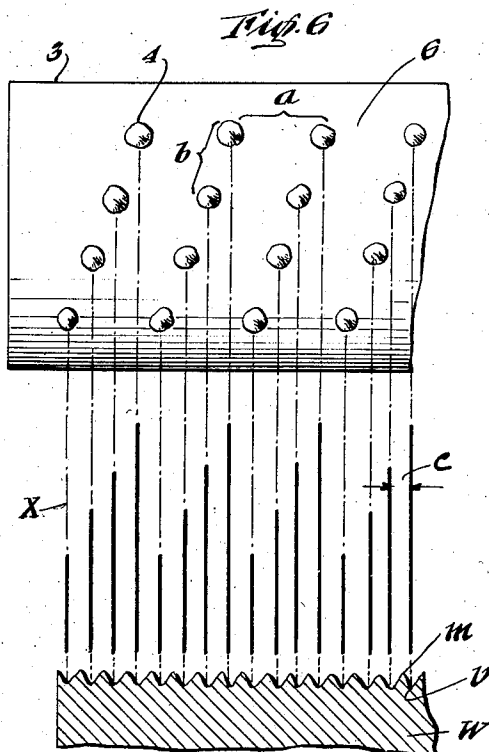
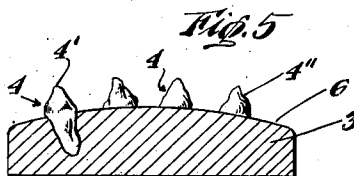
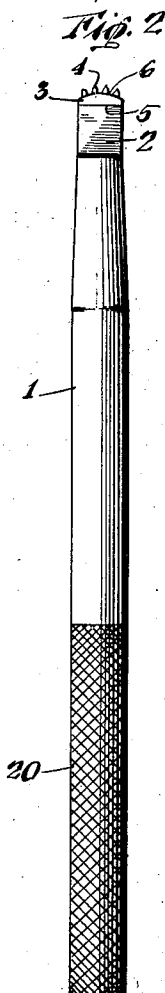
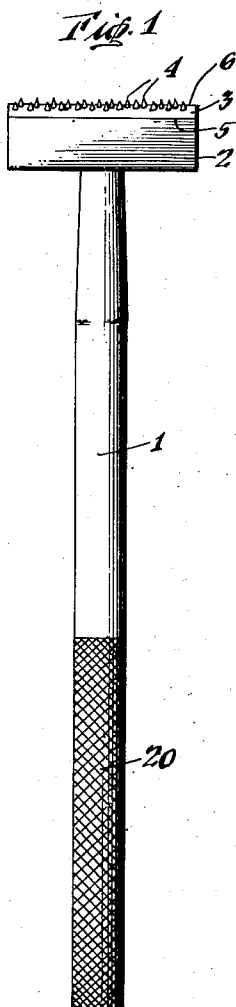
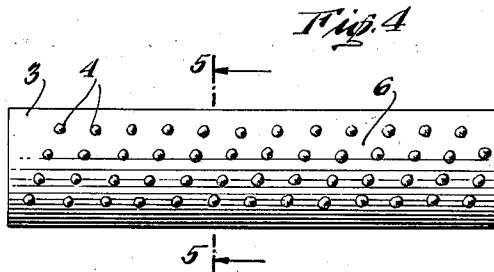
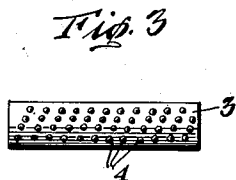
J. BAKKER

2,443,370

WHEEL-DRESSING TOOL

Filed March 1, 1945

2 Sheets-Sheet 1



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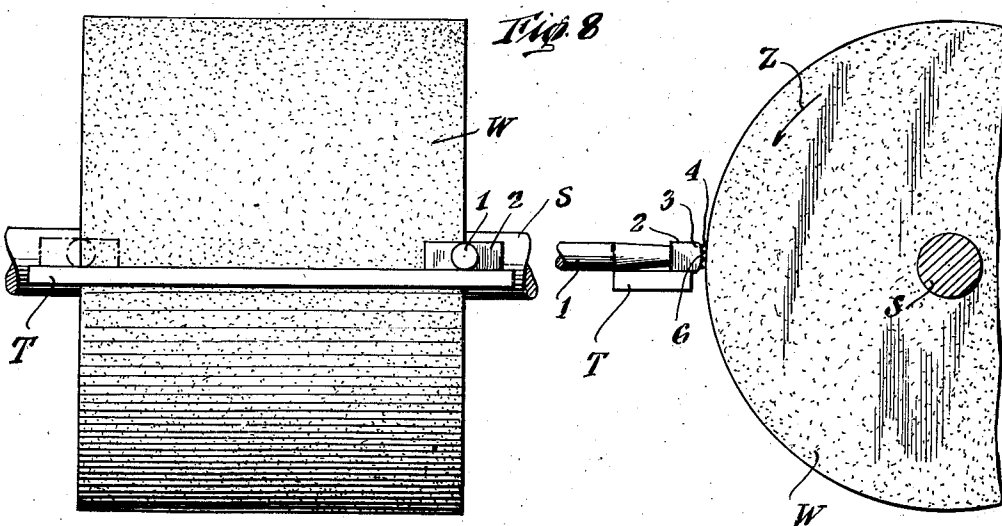
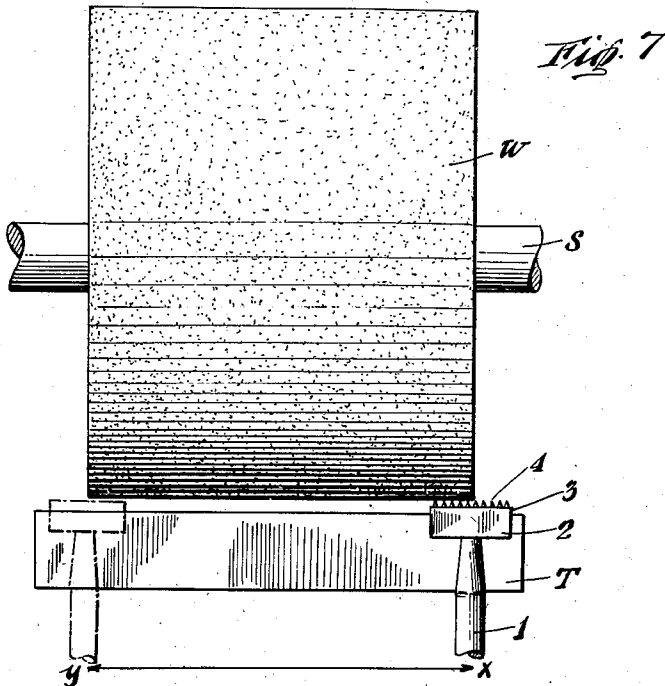
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WHEEL-DRESSING TOOL

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12 Claims. (Cl. 125—39)

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This invention relates to a wheel-dressing tool adapted for cleaning, sharpening and dressing abrasive-grinder wheels.

Grinder wheels formed from Carborundum and other sharp abrasive and extensively used in machine shops, fabrication plants, and metal working generally, usually require periodic dressing to reshape and true-up the worn grinding surfaces thereof, to sharpen the grinding surfaces and to clean the grinding surfaces and remove therefrom foreign material which interferes with its grinding efficiency. Heretofore it has been common practice to dress such wheels by the use of metallic dressers and abrasive sticks which have the draw-back of feeding metal and foreign materials into the grinding surfaces of the wheel which impairs its grinding efficiency.

This invention is directed to the provision of an improved wheel-dressing tool which is especially efficient and advantageous in free-hand dressing of grinder wheels of various types. The tool is so designed and constructed as to safely permit its use by relatively inexperienced operators to not only clean and sharpen the grinding surfaces and remove foreign material therefrom, but to re-shape and true-up the worn grinding surfaces with precision and accuracy, and in a minimum of time and with a minimum of effort. By the use of this tool the grinder wheel may be maintained at a high degree of cutting and grinding accuracy and efficiency.

In order that a clear understanding of this invention may be had, attention is directed to the accompanying drawings wherein:

Fig. 1 is a side elevational view of the improved wheel-dressing tool;

Fig. 2 is an end elevational view of the tool shown in Fig. 1;

Fig. 3 is a top plan view of the dressing tool showing the diamond studded operating face thereof;

Fig. 4 is an enlarged top plan view of the diamond studded operating face of the tool showing more particularly the arrangement and setting of the diamond cutting elements;

Fig. 5 is an enlarged transverse cross-sectional view of the matrix block showing the cutting diamonds embedded therein;

Fig. 6 is a diagrammatic illustration, greatly enlarged, showing the manner in which the diamond-cutting elements trim, dress and sharpen the wheel without tracking;

Fig. 7 is a top plan view of a grinding wheel illustrating the manner in which the dressing

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tool may be held and supported to properly dress the wheel during rotation thereof;

Fig. 8 is a side elevational view of the grinding wheel, shown in Fig. 7, illustrating the position of the dressing tool and tool rest during the dressing operation; and

Fig. 9 is an end elevational view of the grinding wheel, the dressing tool and the tool rest during the dressing operation.

Similar reference characters refer to similar parts throughout the several views of the drawings and specification.

There is illustrated in Figs. 1 to 5, inclusive, the improved wheel-dressing tool constructed in accordance with this invention. The tool generally comprises a rigid block 2 preferably formed from suitable steel which is securely attached to the end of a convenient handle 1, by means of which the operator holds the tool in dressing position. A matrix block 3 in which the diamond-cutting elements 4 are embedded, is securely affixed, as by brazing, to the relatively flat face 5 of the supporting block 2, so that the supported block 2 and the matrix block 3 presents a substantially unitary operating head.

The matrix block 3, in which the diamonds 4 are embedded, is preferably formed from a relatively hard wear-resistant material such as tungsten carbide or similar strong mouldable and wear-resistant material in which the cutting diamonds are firmly embedded. The outer face 6 of the matrix block 3 is preferably given a slightly curved or rounded contour.

High grade industrial diamonds 4 are selected and graded so that the shape and size of the cutting points 4' are relatively uniform. It has been found that relatively small diamonds effect the best results for wheel-dressing purposes. As a general rule it is found that graded diamonds not substantially larger than approximately twenty diamonds to the carat and not substantially smaller than seventy diamonds to the carat produce the best results. It will be appreciated that for rough wheel-dressing, the relatively larger graded diamonds may be used while for truing fine grinding abrasive wheels, relatively smaller graded diamonds should be used. The diamonds, however, should be carefully graded so that the cutting points thereof are relatively similar in shape.

The diamonds 4 may be set in the matrix block 3 while the metal or compound which is to form the matrix block is in mouldable form. The diamonds can be set in the matrix block by a method which is generally known in the art as

suction casting, or by methods employed in powdered metallurgy. The diamonds should be set so that approximately two-thirds of each diamond is embedded in the matrix block, as shown more particularly in Fig. 5, leaving exposed the cutting point 4' extending above the curvilinear surface 6 of the matrix block. Each diamond is so set and arranged that the exposed one-third thereof presents a tapered or pyramidal shaped point 4'. The pyramidal shaped points 4' of all the diamonds should be of relatively similar shape and extend approximately the same distance above the curvilinear surface 6 of the matrix block 3. The matrix compound should be of such a character that when cast or hardened it will maintain a rigid grip on the embedded portions of the diamonds so that the diamonds will not loosen during use. Tungsten carbide has been found to be an excellent material from which to form the matrix block, since it is hard and wear-resistant, and maintains a firm hold on the portions of the diamonds embedded therein. It will be appreciated, however, that other matrix materials formed from hard metal alloys or other hard compounds which will firmly grip the embedded diamonds may be used.

A further important feature of this invention is the spacing and arrangement of the individual diamonds in the matrix block. As shown more particularly in Fig. 4, the diamonds may be arranged in relatively straight rows extending longitudinally of the face 6 of the matrix block 3. Any desired number of rows of diamonds may be provided, depending upon the type and size of the grinding wheel to be dressed. In usual practice, however, it is found that from 3 to 5 diamond rows are satisfactory for most purposes. It will be further noted that the diamonds in each row are substantially equally spaced, but that the diamonds in the respective rows do not align with each other transversely of the matrix block. As shown in Fig. 4, for example, only one diamond would fall in an imaginary transverse straight line extending at right angles to the rows, as for example line 5-5, shown in Fig. 4. Thus when the operating face of the tool is in working position with respect to the grinding face to be trimmed, the exposed diamond points will not track or follow the same path. For example, as illustrated in Fig. 6, the diamond points are so arranged that, if an imaginary line x drawn from each diamond point at right angles to the longitudinal rows of diamonds, the lines x will be spaced apart an equal distance c and each diamond point 4' will operate to form a minute individual cut line or mark v in the grinding face of the wheel W.

The manner in which the wheel-dressing tool is used is illustrated more particularly in Figs. 7, 8 and 9, which show a grinding wheel W supported upon and affixed to a grinding wheel shaft S. Assuming that the peripheral grinding face of the grinding wheel W is to be dressed, a flat metal bar T is rigidly supported directly adjacent the wheel periphery to extend substantially parallel to the wheel shaft S. The supporting block 2 of the operating head of the tool is positioned to rest flatly upon the upper surface of the tool rest T and is so held by the operator. As the grinder wheel is rotated, the operator slides or moves the operating head along the tool rest bar T, keeping the diamond points pressed against the wheel grinding face while the wheel is rotating in the direction of the arrow z , as shown in Fig. 9. The tool head can be easily held by the

operating handle 1 to rest flatly against the upper surface of the tool rest bar T while the head is moved lengthwise along the bar. The operating head of the tool is moved back and forth along the tool rest bar T a sufficient number of times to effect the required dressing of the cutting face. If the side faces of the grinding wheel are to be dressed, the bar T may be positioned to extend radially of the wheel and closely adjacent the side face thereof to be dressed. The dressing tool supported by the tool rest bar thus arranged is moved along the bar as above described until the side face of the wheel had been properly dressed. It will be appreciated that the grinding wheel W, shown in Figs. 7, 8 and 9, is merely illustrative of one type of grinding wheel which may be dressed by this improved tool, since grinding wheels having concave as well as convex peripheries may also be dressed by a dressing tool made in accordance with this invention. For special uses, the working face 6 of the matrix block 3 may be given any desired contour to shape the working periphery of the grinder wheel as desired.

By supporting and manipulating the dressing tool, as above described, it will be noted that each individual diamond point traces an individual path over the surface of the working face of the grinder wheel with which it is in contact, the diamond points 4' being so set that no two diamond points will follow the same path or track. When the tool is properly manipulated, as above described, the diamond points will trace substantially parallel tracks over the operating face of the grinder wheel, spaced apart a substantially equal distance c , so as to form extremely minute valleys or line marks v in the working face of the wheel W. It will be appreciated that the valleys or line marks v , as illustrated in Fig. 6, are greatly enlarged and distorted for purposes of illustration and that in actual practice the line marks or valleys v are almost infinitesimal in size so that when the dressing operation has been completed the valleys v are invisible and the operating face of the grinder wheel has the desired smooth and finished cutting contour. The cutting points of the diamonds are so arranged and spaced that the distance c between adjacent line marks v is approximately $1/100$ of an inch to $3/100$ of an inch.

While the working face of the grinder wheel, shown in Fig. 6, is illustrated as having ridges m separating the valley lines v , it will be appreciated that no such ridges are discernable when the dressing operation has been completed, since such ridges are broken down by the diamond points 4' when the tool head is moved along the supporting bar T transversely of the working face of the wheel. Thus by a proper application of the dressing tool to the wheel as above described, the working face of the wheel is given a smooth and even finish, accurately sharpened to the contour desired and thoroughly cleansed of all metallic and other foreign matter clinging thereto. When the grinder wheel has been dressed by this improved dressing tool, maximum grinding and cutting production and efficiency from the grinder wheel is obtained.

It will be appreciated that the matrix block 3 and its associated supporting block 2 may be made in any desired length or width to perform the work desired. The matrix block 3 may also be equipped with any desired number of uniformly spaced diamond points, as above described. By way of example, it has been found that a matrix block equipped with 50 to 60 high-

quality industrial diamonds will efficiently and expeditiously dress grinder wheels of the size normally used in machine shops. It will be appreciated, however, that the matrix block may be set with a substantially greater number, or substantially less number, of diamonds, depending upon the size or character of the grinding wheels to be dressed. The handle 1 may also be made of any convenient size, sufficiently long to permit an operator to obtain a firm grip thereon. For most uses it is sufficient if the handle is made from 8 to 12 inches in length and a whole or a part thereof may be provided with suitable knurling 20, as illustrated in Figs. 1 and 2, to provide a friction hand grip.

The dressing tool, as herein described, can be manufactured at relatively low cost, is strong and robust in construction and can be safely entrusted to relatively inexperienced grinder-wheel operators for dressing and trimming the grinding wheels which they operate. High quality industrial diamonds can be used with economy since the diamonds are of very small size and therefore only one or two carats need be incorporated into the tool. When the diamond points have been worn or damaged to the point where the tool is no longer efficient, the tool can then be repaired by removing the matrix block 3 from the supporting block 2, remelt or soften the matrix block, and remove the diamonds for further use and reorientation. A new matrix block equipped with the same or new diamonds, properly reorientated, may then be made for re-attachment to the supporting block 2. An economical and low-cost dressing tool is thus provided which is highly efficient and accurate in dressing, trimming, sharpening, pointing and truing various types of grinding wheels, and which is so designed that it can be safely entrusted to a relatively inexperienced operator with the assurance that the grinder wheel which he operates may be maintained in sharp cutting and accurate grinding condition with a minimum of loss of time.

While certain novel features of the invention have been disclosed and are pointed out in the claims, it will be understood that various omissions, substitutions and changes may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. An improved wheel dressing tool for shaping, truing, sharpening and cleaning the working face of grinder wheels, said tool having a handle stem, an elongated operating head secured to said handle stem, said operating head having a relatively flat side face adapted to flatly rest upon a relatively flat supporting surface positioned adjacent the working face of the grinder wheel to be dressed, said operating head having an operating face which is substantially straight longitudinally of the operating face and slightly curvilinear transversely of the operating face, said operating head having not less than 20 cutting diamonds imbedded in said working face with the cutting point of the diamonds projecting from the operating face thereof, each of said cutting diamonds being not substantially larger than $\frac{1}{20}$ of a carat, said cutting points being arranged to prescribe a plurality of individual and substantially equally spaced cutting paths over the working face of the wheel when said cutting points are placed in dressing contact therewith.

2. An improved wheel dressing tool for shaping, truing, sharpening and cleaning the working face

of grinder wheels, said tool having a handle stem, an elongated operating head secured to said handle stem and having its longitudinal axis extending substantially at right angles thereto, said operating head having a relatively flat side face adapted to flatly rest upon a relatively flat supporting surface positioned adjacent the working face of the grinder wheel to be dressed, said operating head having an operating face which is substantially straight longitudinally of the operating face and slightly curvilinear transversely of the operating face, said operating head having from 20 to 70 cutting diamonds presenting exposed cutting points imbedded in the operating face thereof, each of said cutting diamonds being not substantially larger than $\frac{1}{20}$ of a carat, said cutting points being arranged to define a plurality of individual and substantially equally spaced cutting paths over the working face of the wheel when said cutting points are placed in dressing contact therewith.

3. An improved wheel dressing tool for shaping, truing, sharpening and cleaning the working face of grinder wheels, said tool having a handle stem, an elongated operating head secured to said handle stem and having its longitudinal axis extending substantially at right angles thereto, said operating head having an operating face opposite said handle stem and a relatively flat side face upon which the operating head may be flatly supported upon a flat surface positioned adjacent to the working face of the wheel to be dressed, said operating head having an operating face which is substantially straight longitudinally of the operating face and slightly curvilinear transversely of the operating face, said operating head having not less than 20 cutting diamonds imbedded in the operating face thereof, each of said cutting diamonds being not substantially greater than $\frac{1}{20}$ of a carat, said cutting diamonds presenting exposed cutting points arranged to define a plurality of individual and substantially equally spaced cutting paths over the working face of the wheel when said cutting points are placed in dressing contact therewith, said cutting paths being spaced approximately $\frac{1}{100}$ to $\frac{3}{100}$ of an inch apart.

4. An improved dressing tool for shaping, truing, sharpening and cleaning the working faces of grinder wheels, said tool including an elongated operating head, a handle stem fixed to the mid-section of said head and extending substantially at right angles to the longitudinal axis thereof, said operating head having a diamond studded working face positioned opposite said handle stem, said working face being substantially straight longitudinally of the working face and slightly curvilinear transversely of the working face, said working face having not less than 20 diamonds imbedded therein, each diamond being not substantially larger than $\frac{1}{20}$ of a carat, the cutting points of said diamonds being arranged in rows extending substantially parallel to the longitudinal axis of the head and with the diamond points in the respective rows arranged in staggered relationship so that not more than one diamond point will be bisected by an imaginary line extending transversely of the head at right angles to the respective rows, said cutting points being operative to define individual and equally spaced cutting tracks over the working face of the grinder wheel being dressed, said cutting tracks as formed being spaced approximately $\frac{1}{100}$ to $\frac{3}{100}$ of an inch apart.

5. An improved dressing tool for shaping, tru-

ing, sharpening and cleaning the working faces of grinder wheels, said tool including an elongated operating head, a handle stem fixed to the mid-section of said head and extending substantially at right angles to the longitudinal axis thereof, said operating head having a relatively flat side face adapted to flatly rest upon a relatively flat supporting surface positioned adjacent the working face of the grinder wheel to be dressed, said operating head having a diamond studded working face positioned opposite said handle stem, said working face being substantially straight longitudinally of the working face and slightly curvilinear transversely of the working face, said working face having not less than 20 diamonds imbedded therein, each diamond being not substantially larger than $\frac{1}{20}$ of a carat, the cutting points of said diamonds being arranged in substantially straight rows extending substantially parallel to the longitudinal axis of the head with the diamond points in each row substantially equally spaced and with the diamonds in the respective rows arranged in staggered relationship so that not more than one diamond point will be bisected by an imaginary line extending transversely of the head at right angles to the respective rows, whereby the diamond points will rake individual and substantially equally spaced paths over the working face of the wheel being dressed to define individual cutting tracks equally spaced approximately $\frac{1}{100}$ to $\frac{3}{100}$ of an inch apart.

6. An improved dressing tool for shaping, truing, sharpening and cleaning the working face of grinder wheels, said tool including an elongated operating head, a handle stem fixed to the mid-section of said head and extending substantially at right angles to the longitudinal axis thereof, said operating head having a diamond studded working face positioned opposite said handle stem, said working face being substantially straight longitudinally of the working face and slightly curvilinear transversely of the working face, said working face having not less than 20 diamonds imbedded therein, each diamond being not substantially larger than $\frac{1}{20}$ of a carat, the cutting points of said diamonds being arranged in substantially straight rows substantially paralleling the longitudinal axis of the head with the diamond points in each row substantially equally spaced and with the diamonds in the respective rows arranged in staggered relationship so that not more than one diamond point will be bisected by an imaginary line extending transversely of the head at right angles to the respective rows, said cutting points being operative to define individual cutting tracks substantially equally spaced approximately $\frac{1}{100}$ to $\frac{3}{100}$ of an inch apart.

7. An improved dressing tool for shaping, trimming, cleaning and sharpening the working faces of grinder wheels, said tool including an elongated metal supporting block, a handle stem fixed to one face of said supporting block, a matrix block brazed to the opposite face of said supporting block, said matrix block having a working face which is substantially straight longitudinally of the working face and slightly curvilinear transversely of the working face, said working face having from 50 to 70 diamonds imbedded therein with the cutting points thereof arranged in staggered relationship whereby the diamond points will collectively rake individual and substantially equally spaced paths approximately $\frac{1}{100}$ to $\frac{3}{100}$ of an inch apart over the working face of the

wheel being dressed, each of said diamonds being not substantially larger than $\frac{1}{20}$ of a carat.

8. An improved dressing tool for shaping, trimming, cleaning and sharpening the working faces of grinder wheels, said tool including an elongated metal supporting block having a substantially rectangular cross section, a handle stem fixed to one face of said supporting block, a matrix block brazed to the opposite face of said supporting block, said supporting block having relatively flat side faces adapted to flatly rest upon a relatively flat supporting surface position adjacent the grinder wheel to be dressed, said matrix block having a working face which is substantially straight longitudinally of the working face and slightly curvilinear transversely of the working face, said working face having not less than 20 diamonds imbedded therein, in spaced relationship with the cutting points thereof arranged in staggered relationship whereby the diamond points will collectively rake individual and substantially equally spaced tracks over the working face of the wheel being dressed, each of said diamonds being not substantially larger than $\frac{1}{20}$ of a carat.

9. An improved dressing tool for shaping, trimming, cleaning and sharpening the working faces of grinder wheels, said tool including an elongated metal supporting block having a substantially rectangular cross section, a handle stem fixed to one face of said supporting block, a tungsten carbide matrix block brazed to the opposite face of said supporting block, said supporting block having relatively flat side face adapted to flatly rest upon a relatively flat supporting surface position adjacent the grinder wheel to be dressed, said matrix block having a working face which is substantially straight longitudinally of the working face and slightly curvilinear transversely of the working face, said working face having from 50 to 70 diamonds imbedded therein with the cutting points thereof arranged in staggered relationship whereby the diamond points will collectively rake individual and substantially equally spaced paths approximately $\frac{1}{100}$ to $\frac{3}{100}$ of an inch apart over the working face of the wheel being dressed, each of said diamonds being not substantially larger than $\frac{1}{20}$ of a carat.

10. An improved dressing tool for shaping, truing, cleaning and sharpening the operating face of grinding wheels, said tool including an elongated supported block, a handle stem fixed to approximately the mid-section of said supporting block and extending substantially at right angles to the longitudinal axis thereof, a matrix block fixedly secured to said supporting block, said matrix block having a working face which is substantially straight longitudinally of the working face and slightly curvilinear transversely of the working face, said working face having more than 20 cutting diamonds imbedded therein with the cutting points of said diamonds arranged in a plurality of rows extending longitudinally of said matrix block with the diamonds in the respective rows arranged in non-tracking relationship whereby the cutting points will rake individual and substantially equally spaced tracks over the working face of the wheel being dressed to define individual cutting tracks equally spaced approximately $\frac{1}{100}$ to $\frac{3}{100}$ of an inch apart, said diamonds being not substantially smaller than $\frac{1}{70}$ of a carat, and not substantially larger than $\frac{1}{30}$ of a carat.

11. An improved dressing tool for shaping, truing, cleaning and sharpening the operating face of grinding wheels, said tool including an elongated

gated operating head comprising an elongated steel supported block, a handle stem fixed to approximately the mid-section of said supporting block and extending substantially at right angles to the longitudinal axis thereof, a matrix block fixedly secured to said supporting block, said matrix block having an elongated operating face which is substantially straight longitudinally of the operating face and slightly curvilinear transversely of the operating face, said matrix block having forty or more cutting diamonds securely imbedded in the operating face thereof with the cutting points of said diamonds projecting from the operating face thereof, said diamond points being arranged in a plurality of rows extending longitudinally of such operating face with the diamond points in the respective rows arranged in non-tracking relationship whereby the diamond points will rake individual and substantially equally spaced paths over the working face of the wheel being dressed to define individual cutting tracks equally spaced approximately $\frac{1}{100}$ to $\frac{3}{100}$ of an inch apart, said diamonds being not substantially smaller than $\frac{1}{70}$ of a carat, and not substantially larger than $\frac{1}{30}$ of a carat.

12. An improved dressing tool for shaping, truing, cleaning and sharpening the operating face of grinding wheels, said tool including an elongated operating head comprising an elongated metal supported block having a relatively flat side face adapted to flatly rest upon a relatively flat supporting surface positioned adjacent the grinder wheel to be dressed, a handle stem fixed to approximately the mid-section of said supporting block and extending substantially at right angles to the longitudinal axis thereof, a tungsten carbide matrix block brazed to said support-

ing block, said matrix block having an operating face which is substantially straight longitudinally of the operating face and slightly curvilinear transversely of the operating face, said operating face having forty or more cutting diamonds securely imbedded therein with the cutting points of said diamonds projecting approximately equidistantly and uniformly from the operating face thereof, said diamond cutting points being arranged in plurality of rows extending longitudinally of such operating face with the diamonds in the respective rows arranged in non-tracking relationship whereby the cutting points will rake individual and substantially equally spaced paths over the working face of the wheel being dressed to define individual cutting tracks equally spaced approximately $\frac{1}{100}$ to $\frac{3}{100}$ of an inch apart, said diamonds being not substantially smaller than $\frac{1}{60}$ of a carat and not substantially larger than $\frac{1}{20}$ of a carat.

JAN BAKKER.

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