Dec. 13, 1955 M. FAILLA 2,726,650

GRINDING WHEEL DRESSER

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Fig. 1

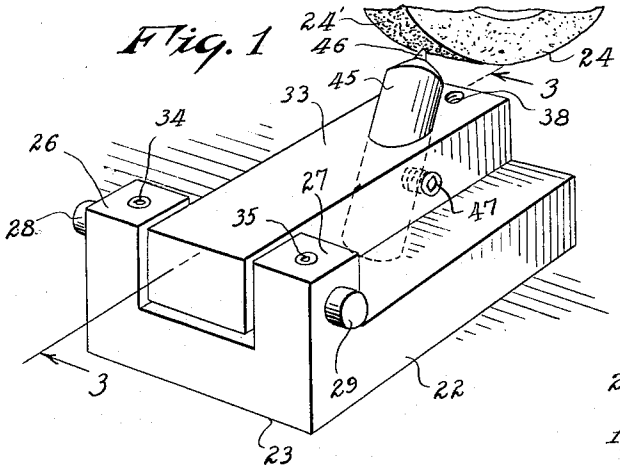


Fig. 2

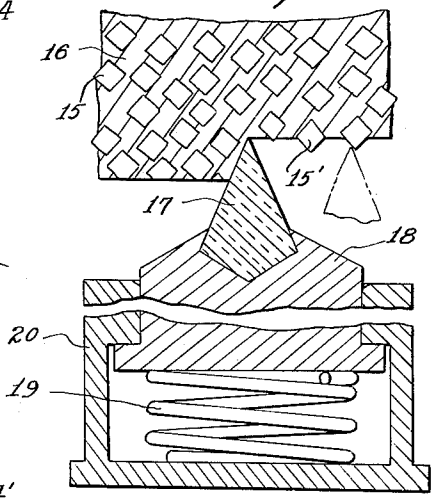


Fig. 3

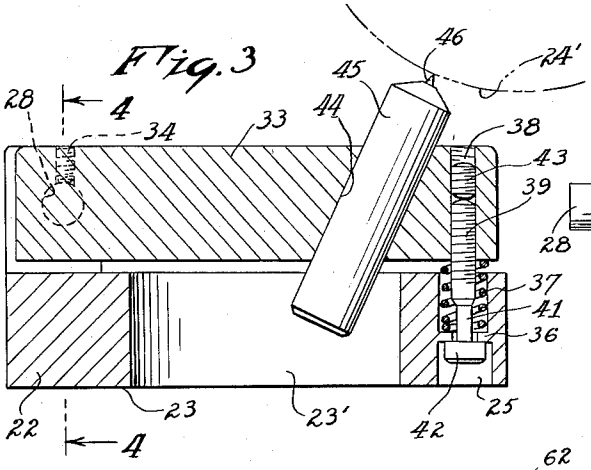


Fig. 4

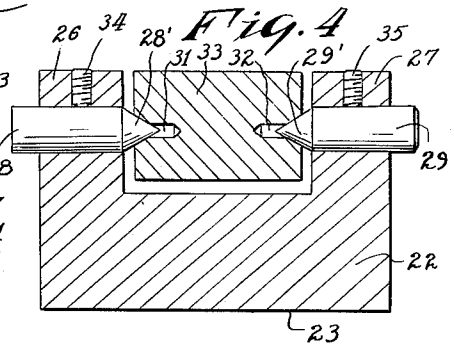


Fig. 5

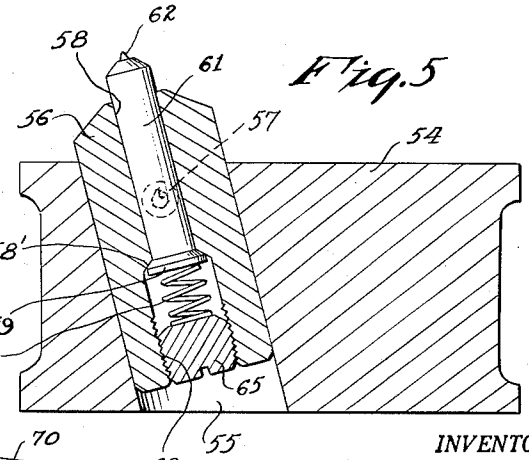
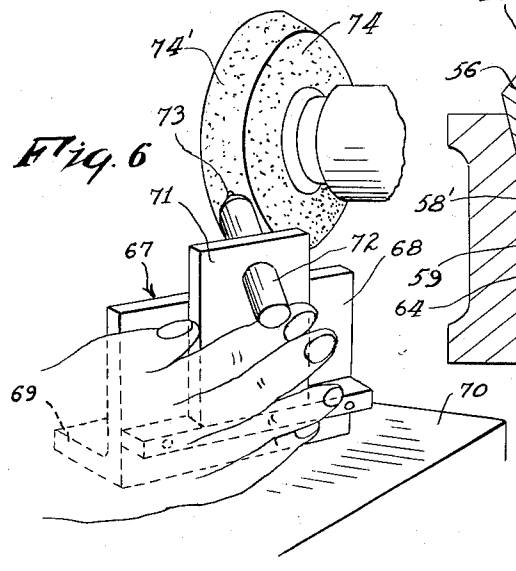


Fig. 6



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Fig. 7

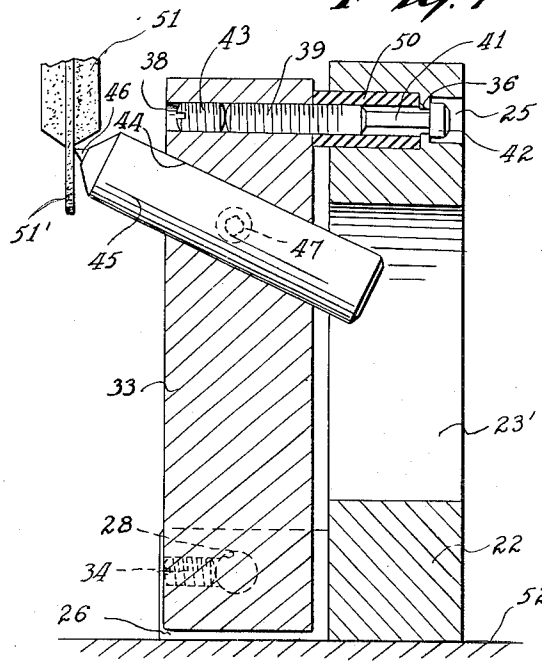


Fig. 8

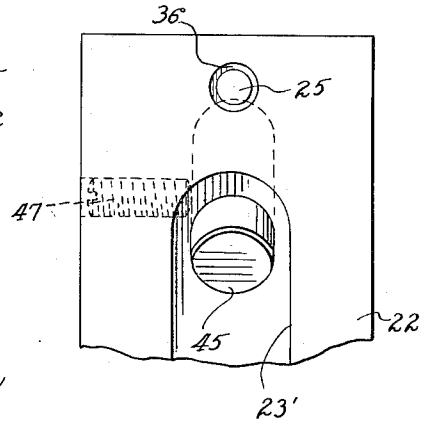


Fig. 10

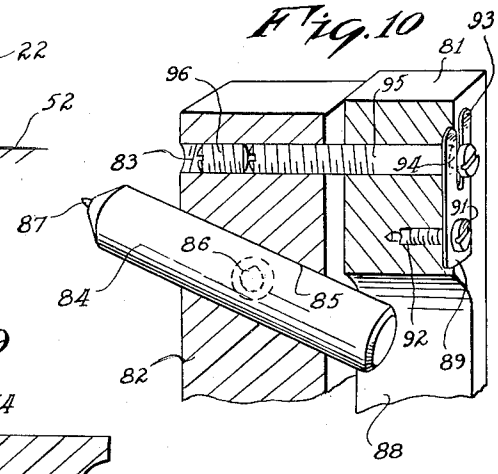
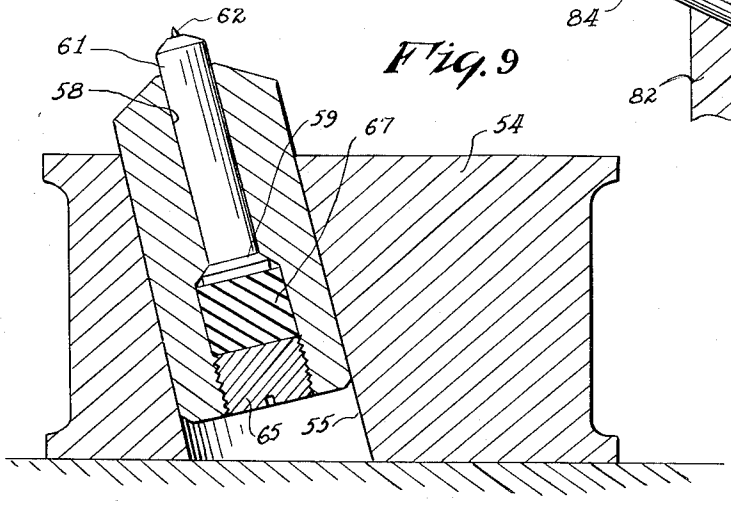


Fig. 9



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GRINDING WHEEL DRESSER

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1 Claim. (Cl. 125—11)

This invention relates to a method and apparatus for dressing a grinding wheel.

According to the present day method of dressing grinding wheels, the new fresh layer of abrasive grits has been obtained by holding the diamond tool element as rigidly as possible and the apparatus carrying out this method has been so constructed that the diamond tool element does not give as the grinding wheel is turned. The diamond tool element travels rigidly in a perfectly straight line and destroys the cutting edges of any grits that are slightly above the surface of the sharp grits, because the diamond tool element cannot ride over these slightly raised grits. About one half of the grits of the cutting surface are accordingly destroyed and only one half of the grits remain with sharp edges to do the cutting. When using the grinding wheel after it has been dressed by this method great pressure is required when cutting in order to overcome the resistance of the dull or destroyed grits and thereby causing heat to be generated.

Other disadvantages of the present day method are that it is difficult to dress a wheel accurately and with all the grits having relatively sharp points, the grinding wheel gives less service per dressing, that it is difficult to grind a flat surface, that more strain is placed on the spindle because the wheel cuts with heavy pressure, hard steel is difficult to grind, that it is difficult to dress a hard grinding wheel and thus soft wheels are often substituted for a work operation when a hard grinding wheel should be used, that the diamonds break, chip and wear out fast thereby increasing greatly the diamond costs, that the work will be deformed due to heat and the overall grinding wheel cost is high.

It is accordingly one object of the invention to provide a method and apparatus for dressing grinding wheels wherein a thinner and sharper grinding wheel can be had than with the method and apparatus used heretofore.

It is another object of the invention to provide a method and apparatus for dressing grinding wheels that requires less effort than required by prior methods and wherein the wear upon the diamond is brought to a minimum.

It is another object of the invention to provide a method and apparatus for dressing grinding wheels wherein hard grinding wheels can be dressed as easily as soft grinding wheels may be dressed.

It is another object of the invention to provide a method and apparatus for dressing grinding wheels which will provide a sharper cutting surface on the grinding wheel, thereby requiring less pressure to effect a cutting action with a grinding wheel and also a grinding wheel that may grind a flat surface.

Other objects of the invention are to provide a method and apparatus for dressing a grinding wheel which is simple in the performance thereof and in the construction of the apparatus, minimizes diamond breakage and chipping, reduces grinding wheel costs, provides a grinding wheel which will not overheat the work so as to deform the same, permits the use of a small and simply constructed holder for the diamond tool element, easy to

set up on the dressing machine, inexpensive and compact, efficient and convenient to use.

For other objects and for a better understanding of the invention reference may be had to the following detailed description taken in connection with the accompanying drawing, in which

Fig. 1 is a perspective view of one form of the apparatus with the diamond tool element being applied to the periphery of the grinding wheel,

Fig. 2 is an enlarged sectional and illustrative view showing the diamond working on the enlarged surface of the grinding wheel, the diamond tool holder being biased by a spring element,

Fig. 3 is a longitudinal sectional view of the apparatus shown in Fig. 1, the view being taken on line **3—3** thereof,

Fig. 4 is a transverse sectional view taken on line **4—4** of Fig. 3 and looking upon the center bearing element,

Fig. 5 is a longitudinal sectional view of a modified form of the invention wherein the diamond tool element is slidable in the block holder,

Fig. 6 is an illustrative view showing a still further form of the invention wherein the pressure for effecting the cutting action is supplied by the hand,

Fig. 7 is a longitudinal sectional view of a still further form of the invention, similar in shape and arrangement of parts to the form of the invention shown in Fig. 1 but utilizing a rubber cushioning sleeve as the resilient means instead of a compression spring such as used in the form of the invention shown in Fig. 1 and as shown in Fig. 3 in detail,

Fig. 8 is a fragmentary bottom plan view of the device shown in Fig. 7,

Fig. 9 is a longitudinal sectional view of a still further form of the invention, similar to the form of the invention shown in Fig. 5 but utilizing a rubber cushion block element instead of a compression spring.

Fig. 10 is a fragmentary perspective view of a still further form of the invention with the parts thereof being shown in section and in which there is utilized a forked flat spring element for effecting the biasing action between the tool holder part and the support therefor.

According to this invention the diamond cutting element when used upon the grinding wheel surface is not held rigid. The diamond element is held against the surface by resilient or biasing means. As the diamond strikes a projected grit on the grinding wheel surface it will ride outwardly over the same to leave it undestroyed and unflattened. As illustrated in Fig. 2 some of the grits as indicated at **15** within the bonding material **16** that binds the grits into a solid mass, have their body thicknesses higher than others. When the diamond is held rigid and travels in a straight line, the ends of these grits are destroyed and flattened by the prior procedure so that by removing the ends of the grits the effective cutting edge or face of the wheel becomes higher than the surface of the grits that are sharp. With the present method the diamond element upon striking a grit will ride over the same to leave the protruding sharp edges of that grit rather than destroy the same and leave in the end a smooth surface. Such a protruding grit is shown extended as indicated at **15'**. The surface of the grinding wheel will accordingly be rough and all of the exposed grits will have sharp edges. This makes the grinding wheel free cutting and less pressure is required to make it cut, thereby causing less generation of heat upon the work piece. Theoretically when the grinding wheel is cutting perfectly with sharp grits, the work will not heat up and should be absolutely cold.

One of the most difficult operations to perform in grinding is to dress or shape a grinding wheel accurately to size, regardless of the thinness or hardness of the grind-

ing wheel and so as to adapt the grinding wheel for the grinding of slots in the work piece. This can be done easily and effectively, without difficulty with the present method and apparatus.

As illustrated in Fig. 2 a sharp diamond element 17 lying in a holder 18 is held against the grinding wheel surface by compression spring 19 contained in a support 20 is slidably connected.

Referring now particularly to Figs. 1, 2, 3 and 4, 22 represents a base of steel having a flat bottom face 23 adapted to engage with a magnetized supporting surface whereby the support 22 will be held rigid beneath the grinding wheel 24 which is to be dressed. The supporting block 22 has a longitudinally-extending elongated opening 23' and a vertically-extending hole 25 spaced therefrom in one end of the block 22. At the opposite end of the block 22 are upstanding spaced projections 26 and 27 containing centering pins 28 and 29 having respectively pointed ends 28' and 29' opposing one another and entering respectively openings 31 and 32 in the opposite sides of a holder block 33 which may thus swing up and down. The center pins 28 and 29 are respectively held in place in the respective projections 26 and 27 by set screws 34 and 35.

In the opening 25 of the base support is an annular shoulder 36 which supports a compression spring 37 which extends outwardly from the top of the opening and engages with the under face of the holder 33. The pivotal holder 33 has a vertically-extending threaded opening 38 into the lower end of which is threaded an adjustable screw 39 that extends downwardly through the compression spring 37 and into the opening 25. The adjusting screw 39 has a reduced diameter portion 41 that extends downwardly through the shoulder and on which is a screw head 42 that engages with the underside of the shoulder 36 and serves as a stop to limit the upward movement of the adjusting screw 39 and the pivotal holder 33 against the action of the compression spring 37. The spring pressure can be regulated by adjustment of screws 39 and the holder 33 raised or lowered as desired. A set screw 43 is adjusted in the upper end of the threaded opening 38 to lock the adjusting screw 39 in its adjusted position.

Extending vertically through the pivotal tool holder 33 is an inclined opening 44 in which is adjustably mounted a diamond tool element 45 having a diamond point 46 brazed on the tapered upper end thereof and adapted to engage with peripheral surface 24' of the grinding wheel 24. The diamond tool holder 45 is held in its adjusted position by set screw 47. The diamond tool element 45 may project into the elongated opening 23' of the base 22 and thus will not interfere with the upward motion of the holder 33.

It will be seen that with the underside 23 of the base support 22 fixed magnetically to a surface under the grinding wheel 24 that the diamond point 46 will be held under the action of the spring 37 against the peripheral surface 24' of the grinding wheel 24. The grinding wheel 24 will be moved axially as it is rotated so that a cut is made in the manner illustrated in Fig. 2. Because of the action of the spring, the diamond point 17 or 46 will ride over the projected grits 15' to leave the sharp projected corners or points unflattened and available for effective cutting action. Since the diamond point is not obliged to cut through the grits which are harder than the bonding material, the diamond point will thus not be overheated and will have long life.

Referring now particularly to Figs. 7 and 8, there is shown generally the same form of invention that is shown in Figs. 1, 3 and 4 that has just been described except that a rubber sleeve 50 is used as the cushioning or pressure means instead of the compression spring 37, Fig. 3, that was used in the first form of the invention. This same device is placed on end so as to grind a grinding wheel 51 having thin annular portion 51' that is dressed

from the side in the manner illustrated in Fig. 7. This grinding wheel 51 with its thin flange 51' is used for grinding slots of narrow dimensions in the work piece. Since the diamond point 46 is not held rigid and is biased only by the spring action of the rubber sleeve 50, a thin annular flange 51' can be provided on the grinding wheel 51 without being broken. By this method thin and better cutting slot grinding wheels may now be provided. The grinding wheel can be moved vertically while under rotation. If the wheel 51 is not moved vertically but only rotates, the magnetized rest indicated at 52 will be moved across the face of the thin flange 51' with the diamond point 46.

Referring now particularly to Fig. 5, there is shown a modified form of the invention in which there is provided a single block support 54 which can be placed on the magnetic surface with its large bottom face down or on end depending upon the type of grinding wheel that is being dressed. In this block support is an upwardly inclined through opening 55 in which a tool holder 56 is slidably adjustable. This tool holder is held in its adjusted position by a set screw indicated at 57. This tool holder has a central opening 58 extending therethrough that is enlarged to provide a tapered seat 58' intermediate its length thereof for engagement of a tapered head 59 of a diamond tool element 61 having a diamond point 62. The element 61 is adjustable in the opening 56.

Below the tapered seat 58' of the opening 56 is an enlarged threaded space 63 for receiving a compression spring 64 engaging with the tapered end 59 of the diamond tool element 61 and supported by a screw plug 65 that is adjustable in the space 63 to vary the pressure of the spring 64.

This tool or device shown in Fig. 5 can be disposed on a magnetic support so that its diamond tool element 61 is projected upwardly against the peripheral face of the diamond tool in the same manner as the tool element 45 of the form of the invention shown in Fig. 1 is projected upwardly to engage with the peripheral surface 24' of the grinding wheel 24. Likewise the device shown in Fig. 5 can be turned up on end and used in the manner as illustrated in Fig. 7 to grind flange 51' of the grinding wheel 51.

In Fig. 9 there is shown a device similar to the device shown in Fig. 5 but instead of using a compression spring 64 a rubber cushion block 67 is used. This block is held in place by the screw plug 65 and bears against tapered head 59 of the tool element 61. In both of these devices diamond point 62 will roll over the projected grits to leave them sharp and unflattened.

In Fig. 6, there is shown a device where the resilient action is provided by hand pressure. A vertical guide member 67 having a flat guide face 68 and an angle turned base portion 69 which is seated on a magnet traveling support 70. A tool holder plate 71 is provided with a diamond tool element 72 having a diamond point 73 and this holder plate 71 is held flatwise against the guiding surface 68 in such a manner as to locate the diamond point 73 against a conical peripheral surface 74' of a grinding wheel 74. The grinding wheel 74 is rotated while the traveling magnetic base support is moved. The diamond point 73 will ride over the projected grits in the manner above-described and the plate 71 can be pushed outward against the action of the hand tending to hold the plate 71 in flush engagement with the guiding surface 68. It will thus be seen that the method provided by this invention is simply and easily carried out by hand in the manner as just now described.

Referring now to Fig. 10, there is shown a modified form of the device, wherein there is provided a vertical support 81 similar to the support 22 of Fig. 7 and to the lower end of which there is pivotally connected a pivotal holder 82 in the same manner as shown in Fig. 7. The pivotal holder 82 has a threaded opening 83 and a diamond tool element 84 retained in an inclined opening

85 by a set screw 86. This diamond tool element has a diamond point 87. The lower end of the tool element 84 projects into an elongated slot 88 in the support 81.

On the back face of the support 81 there is fixed a leaf spring 89 by means of a screw 91 attached to a small threaded opening 92 extending inwardly from the back face of the support 81. The upper end of this leaf spring is bifurcated or forked as indicated at 93 to receive a reduced portion 94 of an adjustable screw 95. This screw 95 is threaded into opening 83 of the holder 82 and is held in its adjusted position therein by a lock screw 96. The adjustable screw 95 fits loosely within the opening extending through the base support 81 so that the screw 95 can react against the leaf spring 89 on the back face of the support 81.

It should now be apparent that there has been provided a method and apparatus for dressing a thin grinding wheel accurately without breakage. Harder wheels can now be used when necessary as this method and apparatus permits the easy dressing of hard wheels. It will also be seen that there will be less strain on the spindle inasmuch as the grinding wheel can be cut with less pressure and there are more grinding grits available for the cutting action.

There will also be free cutting and thus less overheating of the work. The diamond costs will be greatly reduced as the diamond will last longer and there is little breakage or chipping of the same. The diamond tool in all instances is held in a non-rigid manner and such that the protruding grits are unflattened as the diamond point rolls over the same.

While various changes may be made in the manner in which the method is carried out and in the apparatus for effecting this method, it shall be understood that such changes shall be in the spirit and scope of the present invention as defined by the appended claim.

What is claimed is:

A dressing device for grinding wheels comprising a base support, a tool holder member pivotally connected to the base support, a diamond tool element connected to the pivotal member, said diamond tool element having a diamond point, said pivotal member having a threaded opening therein, an adjusting screw connected to the threaded opening, said base support having an opening receiving the adjusting screw, said latter opening having a shoulder thereon, said adjusting screw extending upwardly through the opening in the base support, said adjusting screw having a head engaging with said shoulder, and a biasing element disposed in the opening in the support, reacting against the shoulder and surrounding the adjustment screw, said biasing element projecting outwardly from the opening in the base support and engaging with the under face of the pivotal member whereby to urge the diamond point of the diamond tool element toward the grinding wheel.

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