

Oct. 7, 1958

W. LADINSKY

2,854,966

DIAMOND TRUING DEVICES FOR ABRASIVE CUTTERS

Filed April 17, 1956

Fig. 1

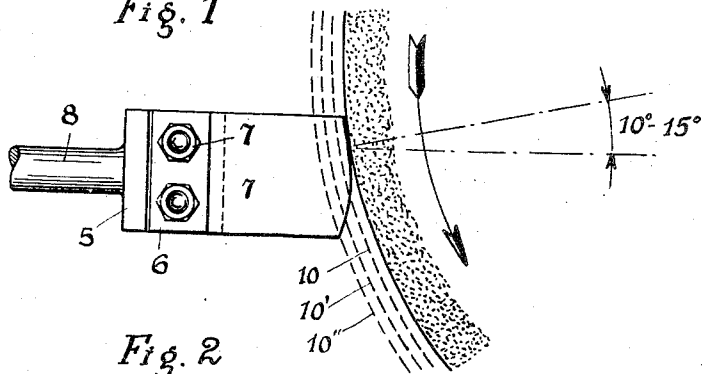


Fig. 2

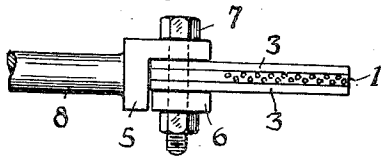


Fig. 3

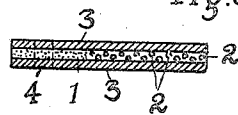


Fig. 4

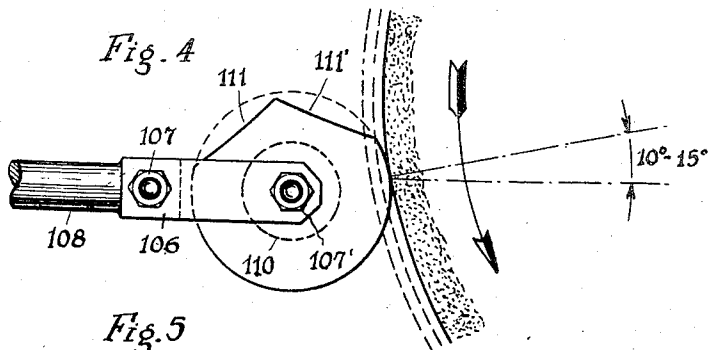


Fig. 5

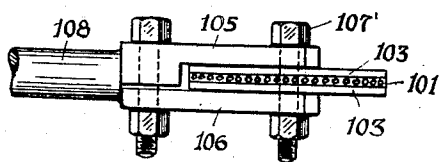


Fig. 6

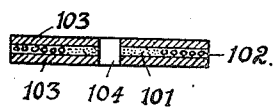


Fig. 7

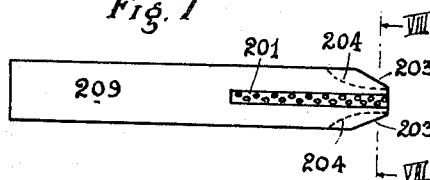


Fig. 8

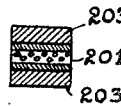
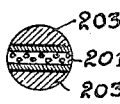


Fig. 9



INVENTOR
WOLDENAR LADINSKY

BY
W. H. H. H. H. H.

1

2,854,966

DIAMOND TRUING DEVICES FOR ABRASIVE CUTTERS

Woldemar Ladinsky, Antwerp, Belgium

Application April 17, 1956, Serial No. 578,606

Claims priority, application France April 21, 1955

2 Claims. (Cl. 125—39)

The present invention relates to diamond bearing plates or discs particularly for truing abrasive cutters and to tools comprising such diamond bearing plates or discs.

Heretofore the truing of the active surface of abrasive cutters was in general performed by means of a diamond of octahedral form mounted in a suitable holder. Diamond tools of this character were fixed in a tool holder forming part of the truing device and the truing operation was performed by means of a more or less high pressure exerted by the salient point of the diamond on the surface of the cutter to be trued.

Since diamond points even of octahedral form are by their nature more or less rounded, contact with the surface of the cutter is in practice produced by a part of the surface of this blunt point. This active surface becomes blunted and enlarged as a result of and according to the amount of wear of the diamond and as soon as it becomes relatively large it can no longer exert a sufficiently effective cutting action on the surface of the abrasive cutter. The use of such diamonds always involves numerous difficulties which are well known so that they need not be repeated.

For a long time attempts have been made to replace these diamonds by a diamond-containing composition, that is to say an aggregation having a certain degree of granulation distributed in a metal matrix. Tools of this composite form generally comprise a diamond block in the form of a small cylinder of required length fixed to the end of the holder. Diamond blocks or tips of this form cannot however provide the necessary cutting action. They rub against and polish the surface of the abrasive cutter and a cutter trued in this way does not have the "bite" required for efficient working.

The present invention permits the aforesaid disadvantage to be avoided and offers a solution to the problem set out above. It consists in using plates or discs for truing abrasive cutters, having internally a thin flat layer formed by an aggregation or composition of diamonds of suitable properties.

It has been found that by utilising a series of diamond grains fixed at a certain distance one from the other in the working plane, that is to say contrary to the direction of rotation of the abrasive cutter, the diamonds thus positioned provide operational results similar to those obtained with a single diamond, that is to say a cutting action is obtained on the surface of the abrasive cutter and objectionable polishing on the surface of this cutter is avoided.

By utilising diamonds in the form of selected grains fixed in a definite plane of aggregation which is brought into an intersecting position in relation to the surface of the cutter to be dressed, in practice only one of these grains, namely that projecting to the maximum extent, is the effective cutting element and at the moment when it is worn away and leaves the mass of the matrix, another diamond located in the same plane comes into action immediately in place of the formerly operative grain.

2

By appropriate choice of the grain sizes of the diamonds utilised for the formation of the aggregate mass the result is obtained that these grains correspond virtually to a desired diamond point and they are sufficiently effective to provide a cutting action on the surface of the cutter to be trued.

Three embodiments are shown by way of example on the accompanying drawing but these embodiments are not intended to limit the scope of the present invention.

In said drawings:

Fig. 1 is a view in elevation of a diamond truing plate in the working position.

Fig. 2 is a view from above of the diamond truing plate of Fig. 1 and its mounting.

Fig. 3 is a longitudinal section through said plate.

Fig. 4 is a view in elevation of a diamond truing disc in elevation.

Fig. 5 is a view from above of the disc shown in Fig. 4 and its mounting.

Fig. 6 is a transverse section taken across a diameter of the said disc.

Fig. 7 is a view from above of a diamond truing tool formed in one piece in the form of a simple rod.

Fig. 8 is a transverse section of a tool taken on the line VIII—VIII of Fig. 7 and shown of square section; and

Fig. 9 is a view similar to Fig. 8 showing a rod of round section.

The diamond truing plate shown in Figs. 1 to 3 is formed by a plate of approximately rectangular shape having a thin flat layer of a diamond aggregate composition 1 and comprising one of the known materials including one or several layers 2 of diamond grains, the layers being parallel one to the other. This thin diamond-bearing layer 2 is held and protected on its lateral faces by strips 3 of a solid material, preferably steel, having any suitable thickness and shape.

According to the invention the diamond bearing layer may be sintered between the facing strips or the rigid connection of the lateral strips with the diamond bearing aggregated layer may be obtained subsequently by soldering, brazing or otherwise.

It should be noted that the layer or layers of diamond grains is/are incorporated solely in the active portion of the plate intended to be worn away during operation; the dimensions of the active portions in length and width ensure a useful working life. The active part of the plate terminates at some distance from the means for fixing said plates in their mounting as shown clearly in Figs. 2 and 3.

The diamond-bearing plate being fixed in a holder, it will be seen that the assembly comprises a novel tool for truing abrasive cutters or similar operations. The connection of the diamond-bearing plate with a suitable holder may be effected in any known way, for example the rear part of the plate may be soldered or brazed to the mounting or the whole may be made in one piece. It is however more advantageous to fix the diamond-bearing plate in a removable manner as shown on Figs. 1 and 2.

For this purpose the rear part, i. e. that opposite to the active part, of the said plate embodies two circular holes 4, Figs. 2 and 3, which may be traversed by bolts or set screws 7, Figs. 2 and 3, fixing the plate in the mounting. The latter is formed by a rectangular holder having a rebate 5 on which the rear end of the plate 6 is fitted and against which it is clamped by two bolts 7, thus clamping the plate assembly 1-3 in place. The back of the rebated member 5 carries a cylindrical stem 8 permitting the assembly to be fitted to and fixed in the tool holder of the truing machine.

When mounted in the tool holder as described the

3

diamond-bearing plate 1-3 is applied against the active face of the cutter 9 to be trued as shown by Fig. 1.

The said diamond-bearing plate wears in course of use in the manner indicated by the chain lines 10, 10' and 10'' in Fig. 1.

As hereinbefore described, by using diamonds of selected grains spaced from each other in the layer 2, the active surface of the cutter 9 is acted upon in practice by one only of the diamond grains incorporated in the aggregate composition from which the diamond-bearing plate is formed and it is this grain having the maximum projection which performs the required trueing action; as soon as it is worn or pulled out of the matrix holding it another diamond situated in the same plane comes into action and so on until the diamond-bearing active part of the plate 1-3 is worn completely away.

If it is found desirable to have a smaller contact area between the active tip of the plate and the surface of the cutter, having regard to the work to be done, it is sufficient to rotate the mounting plate 5 through 180° around its support axis or stem 8 so as to invert the cutter.

In another very convenient form of construction the diamond-bearing plate instead of being rectangular as in the construction previously described has the form of a disc as shown in Fig. 4.

The diamond-bearing disc 101 comprises one or more layers of diamond grains 102 although the construction shown on the drawings only comprises a single layer. Just as in the form of construction previously described the layer or layers of diamond grains is/are incorporated only in the active part of the diamond-bearing disc and stop at some distance from the center of this disc as indicated by the broken line 110 in Fig. 4 and as shown on Fig. 6.

The thin diamond-bearing layer 101 is supported and protected by the discs 103 of any suitable thickness formed of a rigid material, preferably for example of steel, and the diameter of which corresponds to that of the diamond-bearing layer 101. Rigid connection of the diamond-bearing layer 101 with the facing discs is obtained by one of the methods described in connection with the first embodiment of the invention.

The diamond-bearing disc 101-103 has a circular or polygonal e. g. hexagonal, octagonal or the like, aperture 104 at its center.

The diamond-bearing discs according to the invention may be utilised in the same way as the diamond-bearing plates described above, that is to say they may be mounted in a fixed position relatively to the surface of the abrasive surface under treatment and may be mounted and fixed in a suitable holder or a like device so that rotation in use is made impossible.

As shown on Figs. 4 and 5 of the drawing the holder is formed by a rectangular clamp the side arms of which are formed by a holder 105 and a plate 106 held in the gripping position by bolts or set screws 107, 107'. The back of the clamp 105 embodies a cylindrical stem 108 permitting fitting and fixing in the tool holder of the trueing machine. The disc 101-103 is fitted between the parts 105, 106 and is held by one of the bolts or set screws 107 passing through holes provided near the free ends of the parts 105, 106. Tightening the bolt 107' secures the disc 101-103 in its holder.

To prevent rotation in use the disc may be fixed in any convenient manner and for example and as stated above it may embody a polygonal central hole and the stem of the bolt or set screw 107' may have a similar cross section.

After the part of the disc pressed against the abrasive cutter to be trued has become worn this disc may be rotated in its holder by one-sixth or one-eighth of a revolution as indicated by the lines 111 and 111' on Fig. 4 and thus presents a new active part of the disc to the surface of the cutter to be trued until the diamond-bearing part of the tool has been completely worn away.

4

Figs. 7 to 9 show an embodiment of a diamond-bearing tool according to the invention which is formed from a single component in the form of a rod 209. This form of construction may be required for special technical reasons, for example when the spacing between the tool holder and the surface of the cutter is limited or for any other reason.

In this particular case the thin flat layer of diamond-bearing material 201 is located in a slot cut at one end of the rod and extending for part of the length thereof. The transverse section of such a tool which has the form of a rod may be rectangular, square, circular or other shape, as shown in Figs. 8 and 9. For use such a diamond-bearing tool of rod shape is fitted or fixed in the tool holder of the rectifying machine in such manner that the diamond-bearing section is in an intersecting position in relation to the surface to be treated and the active surface is caused to advance progressively as wear occurs.

The construction of a diamond-bearing tool in the form of a rod as described is one embodiment of the application of the principle of a diamond-bearing plate or other element according to the invention but the basic characteristics remain the same; that is to say a thin flat diamond-bearing layer 201 is supported and protected on its side faces by outer lateral parts of rigid material. In the present embodiment of the invention the only modification is the thickness and the shape of the lateral protecting parts 203. Further the thickness of these faces at the active end of the rod may always be reduced according to the wear at this end as indicated by the dotted lines 204 in Fig. 7.

The lateral parts of these diamond-bearing discs and plates are intended to ensure the rigidity and stability necessary for the diamond-bearing elements while work is in progress it being understood that by reason of the traversing of the tool across the face of the cutter the said plates and discs are subjected to substantial lateral forces. The material chosen for these lateral parts should thus be solid having regard to their function and should preferably be of steel.

It is however a result of the use of these outer lateral parts that it becomes possible to realise a technical construction which permits the practical use of a thin layer of a diamond-bearing aggregate composition containing diamond grains fixed in a given plane. The assembly provides means for carrying out this new principle and new means for employing diamond grains under conditions ensuring effective work to be performed over a long period and in a uniform manner.

The thickness of the thin layer of a diamond-bearing aggregate composition formed of one of the known materials suitable for this purpose, depends on the size of the diamond grains utilised and these grains should correspond to the properties of the abrasive cutter to be trued. The thin diamond-bearing layer may be formed by diamond grains which are all placed in a single plane. This arrangement may be considered theoretically and for certain purposes of use as the ideal solution, but in practice since the diamond grains disposed in a single plane are subjected to attack and to a certain extent subjected to a pulling-out action on two sides as a result of the lateral traverse across the abrasive cutter, they may leave the matrix prematurely and it is therefore more advantageous if the thin diamond-bearing layer comprises at least two layers of diamond grains positioned parallel one to the other since this arrangement provides an enhanced resistance to wear.

The diamond-bearing aggregate composition employed in particular for the preparation of these new trueing tools is thus characterized by the fact that the diamond grains are not distributed randomwise throughout the aggregate but are disposed in planar layers so that the diamond-bearing element comprises one or several layers of diamond grains arranged in parallel planes.

5

To ensure the connection with the lateral protecting parts as well as perfect fixing of the diamond grains in the material forming the matrix of the diamond-bearing layer, the procedure used for the preparation of these diamond-bearing plates and discs is characterised in that the thin layer of diamond aggregate composition is sintered between the lateral parts or is soldered, brazed or otherwise subsequently fixed to these lateral parts.

The external dimensions of the discs and plates described above as well as their geometrical form, and the choice of the sizes of the diamond grains as well as their concentration in the diamond-bearing layers may vary according to requirements, the method of use or the technical requirements of the work to be done.

It should be noted that the presence of the lateral metallic parts of these plates or discs does not inconvenience the truing action on abrasive cutters. In effect at the commencement of each traverse a thin layer, corresponding to the feed applied for effecting the truing operation, is ground off by the surface of the cutter before the latter comes into contact with the diamond grain. In consequence the trued surface of the abrasive cutter does not carry any traces or embedded portions of metal.

The use of diamond-bearing plates or discs according to the invention for truing abrasive cutters has several technical and practical advantages which cannot be realised with aggregated diamond tools or tools with multiple diamonds known heretofore. The most important advantage is the fact that the characteristics of these diamond-bearing plates or discs as above defined permits the diamond grains of the thin flat layer internally of these new tools to be brought into an intersecting position in relation to the surface to be treated and always exert, due to the layering of the grains of substantially the same size, the desired cutting action on the surface of the cutter, and that these conditions of work were held permanently and in a uniform manner for the whole period and for each use of these discs or plates until the diamond bearing part is worn away.

One of the important advantages of these diamond bearing plates and discs is that they may also be successfully

6

employed for truing abrasive cutters of profiled form, even of complicated forms, since the thickness of the diamond-bearing layer may be made sufficiently thin to correspond to the precision required for this work.

It should be understood that the invention is not exclusively limited to the forms of construction described and shown and it includes constructional improvements and modifications applicable thereto without departing from the scope of the invention as defined by the following claims.

What I claim is:

1. A diamond truing tool comprising a pair of spaced, parallel rigid supporting plates, said plates having means for mounting on a support for edge engagement with a work surface, and a very thin diamond layer sandwiched between said plates and supported thereby, said diamond layer including a planar layer of diamonds embedded in and fixed relative to said plates by a matrix, said layer of diamonds extending throughout the area between said mounting means and the work engaging edge portions of said tool, the diamonds in said layer being of substantially uniform size and uniformly and closely spaced throughout the layer with the diamond layer substantially parallel to said plates and perpendicular to the work engaging edge portions thereof, whereby the exposed diamonds form a substantially continuous knifelike edge operatively engaging the work surface to be trued in a direction longitudinally of the relative movement therebetween.

2. A diamond truing tool according to claim 1 wherein said thin diamond layer comprises a plurality of said planar layers of diamonds substantially parallel to each other.

References Cited in the file of this patent

UNITED STATES PATENTS

1,587,805	Taylor	June 8, 1926
2,368,696	Williams	Feb. 6, 1945
2,435,916	Windsor	Feb. 10, 1948
2,545,676	Small	Mar. 20, 1951
2,581,609	Small	Jan. 8, 1952
2,766,565	Robison	Oct. 16, 1956