

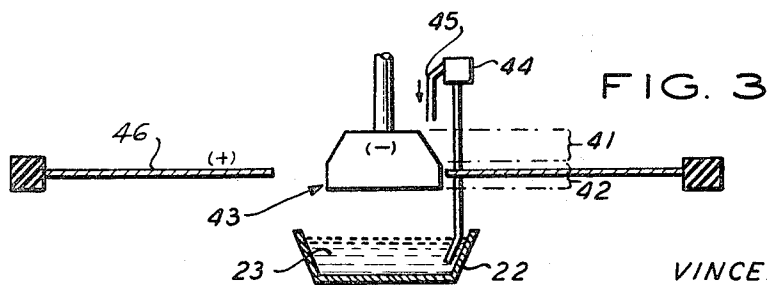
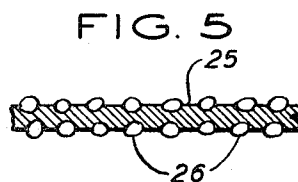
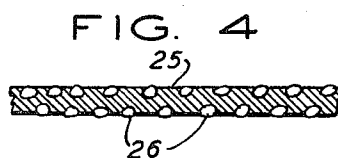
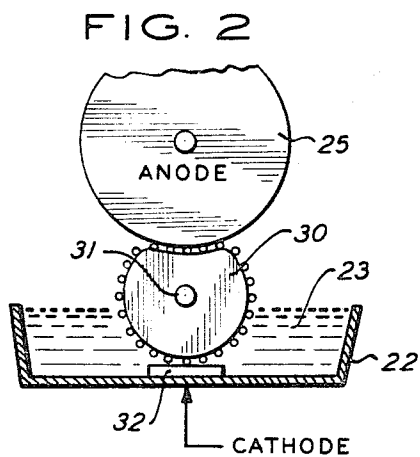
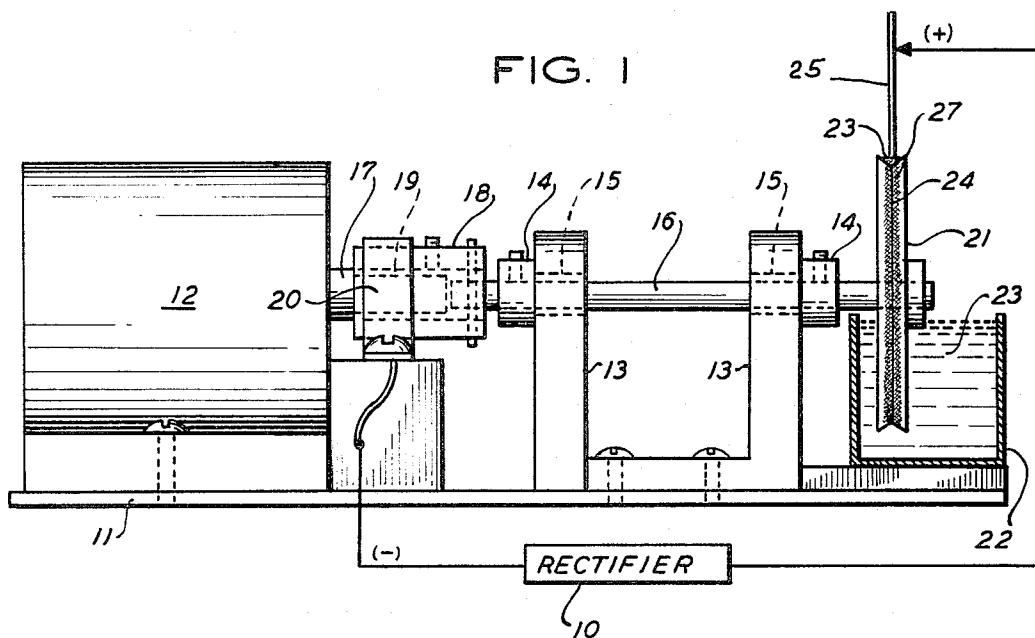
July 30, 1968

V. RIBES

3,395,092

DRESSING APPARATUS FOR DIAMOND WHEELS

Filed May 24, 1965



INVENTOR
VINCENT RIBES

BY
Norman N. Popper
ATTORNEY

1

3,395,092

DRESSING APPARATUS FOR DIAMOND WHEELS

Vincent Ribes, 432 Clifton Ave.,

Newark, N.J. 07104

Filed May 24, 1965, Ser. No. 457,958

9 Claims. (Cl. 204-212)

2

This invention relates generally to dressing diamond wheels and particularly to performing such work electrolytically, without removing the wheel from the cutting apparatus upon which it is mounted.

It is an object of this invention to dress a diamond wheel, but without removing the wheel from the cutting apparatus upon which it is mounted.

It is yet another object of the invention to avoid loss of time incidental to demounting cutting wheels for truing and dressing.

It is yet another object of the invention to provide practically automatic, speedy, efficient and safe means for dressing diamond cutting wheels.

Among the further objects of the invention is to provide an electrolytic dressing apparatus which only involves a peripheral area of a diamond cutting wheel to be dressed.

Yet a further object of the invention is to provide a truing and dressing device which can perform with precise and accurate control, to accomplish the proper degree of electrolytic reduction where the diamonds are on the wheel, and exposing them to the proper degree.

These objects and advantages, as well as other objects and advantages may be attained by the device shown by way of illustration in the drawing in which,

FIGURE 1 is a vertical partial sectional view showing a truing and dressing device in which the diamond wheel is disposed vertically;

FIGURE 2 is a side elevational view of another species of the truing and dressing device in which the diamond wheel is disposed vertically in engagement with a compressible electrolytic wheel;

FIGURE 3 is a schematic view of another species of the truing and dressing device in which the diamond wheel is disposed horizontally;

FIGURE 4 is a partial cross-sectional view of a diamond wheel which has been trued;

FIGURE 5 is a partial cross-sectional view of a diamond wheel that has been dressed to expose the imbedded diamonds sufficiently to cut.

Metal bonded diamond wheels are usually dressed on special machines to which they are transferred from the machine on which they have been used. Some grinding machines are especially equipped to handle electrolytes, so that on these electrolytic machines, truing and dressing can be electrolytically accomplished. But in the case of machines not so equipped, a mechanical grinding device is used for truing, and then dressing is accomplished with an abrasive stick. An alternative procedure is to use powerful etching agents to eat away the metal bonding a portion of the diamond to the wheel so that they are exposed sufficiently to perform the cutting function. This alternative is frequently necessary as a supplemental step, because in mechanical truing and dressing, the diamonds frequently are not sufficiently exposed to enable them to effectively perform their cutting function.

After the etching by chemical action, the diamond wheel usually has to be trued again, by reason of the alteration of its peripheral configuration accomplished by the etching agent. Another disadvantage of the electrolytic etch is that the action is not confined to a particular area of the wheel but proceeds over the entire emerged surface of the wheel. When electrolytic procedures are applied to ultra thin I.D. or O.D. wheels, the life of the wheel is drastically shortened or immediately terminated. Ordinary electrolytic dressing is therefore not suitable for ultra-thin wheels.

It has been found that if ultra-thin wheels are treated by the present apparatus and procedure, they may be trued mechanically, and then dressed electrolytically in situ, without reduction in their life other than that normally arising from the use of conventional, acceptable electrolytic methods. Furthermore, the present method and apparatus is ideally suitable for ultra-thin diamond wheels and is also suitable for the coarser variety. This is accomplished by the apparatus shown by way of illustration in the drawings.

A platform 11 is provided upon which is mounted a motor 12. This motor revolves at a speed of approximately 10 r.p.m. A pair of brackets 13, 13 are mounted on the platform 11. A high-precision ground shaft 16 is mounted upon two bearings 14, 14 which are mounted on insulated sleeves 15, 15 carried by the brackets 13, 13. The shaft 16 is attached to the motor shaft 17 by loose coupling 18. The coupling 18 is insulated from the motor shaft 17, by the dielectric sleeve 19. The coupling 18 and the shaft 16 are electrically conductive. A contact spring 20 rides on the coupling 18. At the other end of the shaft 16, an electrolyte-wheel 21 is mounted. This wheel is preferably provided with a channeled cross-sectional configuration. The wheel 21 or rotatable assembly revolves with at least a peripheral portion of the wheel 21 (and preferably a portion up to its center) emerged in electrolyte 23 contained in the cup 22. As the wheel 21 revolves, it picks up the electrolyte 23 which substantially fills the channel as shown by the profile of the wheel 21 in FIGURE 1. The electrolyte 23 is a somewhat viscous material available commercially. It adheres to the revolving wheel and is conveyed in a relatively deep layer in the channel 24 into engagement with the diamond cutting wheel 25. An appropriate circuit established from the rectifier 10 through the contact spring 20, coupling 18, shaft 16, the electrolyte wheel 21, the electrolyte 23 from the cup 22, back to the rectifier 10, is completed as shown in FIGURE 1 to the wheel 25. The diamond wheel 25 has already been trued by the usual mechanical means, and is in the undressed state shown in FIGURE 4. By electrolytic action, the wheel 25 being the anode, and the electrolyte wheel 21 being the cathode, is etched to the point where the diamonds 26 are sufficiently exposed to the state in which they are said to be dressed i.e. suitably freed of surrounding metal in which they are mounted so that they may perform their cutting function. (See FIG. 5.) It has been found to be useful, although it is an optional expedient, to line the channel of the electrolyte wheel 21 with insulating, or semi-insulating layer of material such as nylon cloth 27. If the cutting wheel inadvertently touches the surface of the channel in the wheel 21, no violent short circuit will occur. The contact to the cutting wheel 25 may be accomplished in many ways, as for example, a copper spring (not shown) touching the surface of the revolving wheel 21. The cutting wheel is also revolved at approximately 10 r.p.m., and this may be done by hand or by a small auxiliary motor. The spring contact is of course connected to the positive terminal of the rectifier 10, and the cutter wheel is anodically dissolved. This device is suitable for dressing I.D. diamond cutting wheels having a 3 1/8 inch center hole into which the electrolyte wheel 21 is intruded. The same device can be used for dressing O.D. cut-off wheels.

Compressible dielectric dressing wheel

In FIGURE 2, a compressible dielectric dressing wheel 30 is shown, mounted for rotation on the shaft 31. The wheel is provided with numerous small protuberances so as to present a larger external surface for picking up and retaining the viscous electrolyte from the electrolyte cup 22. The cathode 32 is immersed in the electrolyte 23 and the cutting wheel to be dressed is connected as the anode

3

in the circuit. The wheel 30 is considerably compressed by strong contact with the cutting wheel 25. In this form of the invention, the compressed wheel 30 picks up large amounts of electrolyte and the surface of the anode cutting wheel 25 is more largely involved, so that electrolysis proceeds more rapidly.

Electrolytic dressing wheel driver

Another form of the invention is shown in FIGURE 3. This form of the invention is especially suited for thicker straight wheels. This form of dressing wheel has its axis of rotation disposed in a vertical direction and has an upper section 41 in the shape of a truncated cone. The bottom section 42 is coaxial with the top section and is cylindrical. This dressing wheel 43 may be made of plastic material and is shown actually in contact with the inner peripheral edge of the annular cutter wheel 46, which is the anode. Beneath the dressing wheel 43, there is an electrolyte cup 22 from which a pump 44 draws electrolyte 23 and discharges it from a tube 45, to flow viscously over the surface of the electrolyte wheel 43. The electrolyte must contact a cathode electrode (not shown) such as the cathode 32 (see FIGURE 2) somewhere in its flow path. The physical contact of the driven electrolyte wheel 43 with cutter 46 is also believed to disturb the ionic oxide layer that is formed on the surface of the anode cutting wheel 46, thereby promoting a more rapid electrolytic reduction. The driving of the cutting wheel 46 by the electrolytic wheel 43 also has the advantage of eliminating a motor to drive the cutter 46.

The foregoing apparatus represents a mere illustration of several embodiments of the invention, for many changes may be made in the construction, selection, and arrangement of the parts all within the scope of the appended claims, and many changes may be made as well in the steps performed, within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed:

1. An apparatus for dressing a metal bonded diamond cutting wheel comprising.

- (a) means for mounting said wheel for rotation about its axis.
- (b) means for impressing an anodic potential on said wheel,
- (c) a rotatably mounted, electrically conductive dressing wheel arranged with its peripheral edge disposed in closely spaced radial relation to the peripheral edge of said cutting wheel,
- (d) means for impressing a cathodic potential on said dressing wheel, and
- (e) means for continuously supplying a viscous electrolyte to the peripheral edge of the rotatably mounted

4

dressing wheel, whereby upon rotation of the said wheels, said viscous electrolyte will be continuously supplied to the interspace between the peripheral edges of said wheels.

2. An apparatus for dressing a diamond wheel comprising, the device according to claim 1 in which the cutting wheel is driven by the dressing wheel.
3. An apparatus for dressing a diamond wheel comprising, the device according to claim 1 in which the cutting wheel is mounted on a shaft driven by a motor.
4. An apparatus for dressing a diamond wheel comprising the device according to claim 1 including a cup for containing the viscous electrolyte; a lower portion of said dressing wheel dipping into said cup.
5. An apparatus for dressing a diamond wheel comprising, the device according to claim 1 including a pump for supplying the electrolyte to the surface of the dressing wheel.
6. An apparatus for dressing a diamond wheel comprising, the device according to claim 1 and, the dressing wheel being formed of compressible material deflected by the cutting wheel.
7. An apparatus for dressing a diamond wheel comprising, the device according to claim 1 in which the axis of the dressing wheel is horizontal.
8. An apparatus for dressing a diamond wheel comprising, the device according to claim 1 in which the axis of the dressing wheel is vertical.
9. An apparatus for dressing a diamond wheel comprising the device according to claim 1 including a layer of cloth material on the peripheral edge of said dressing wheel for preventing inadvertent direct contact with said diamond wheel.

References Cited

UNITED STATES PATENTS

2,020,117	11/1935	Johnston	204—143
2,411,867	12/1946	Brenner	204—143
2,798,846	7/1957	Comstock	204—143
2,905,605	9/1959	Keeler et al.	204—224 XR
2,920,026	1/1960	Kistler	204—224 XR
3,161,576	12/1964	Teichner	204—224 XR

50 ROBERT K. MIHALEK, *Primary Examiner*.

D. R. VALENTINE, *Assistant Examiner*.