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DUAL FINISHING WHEEL

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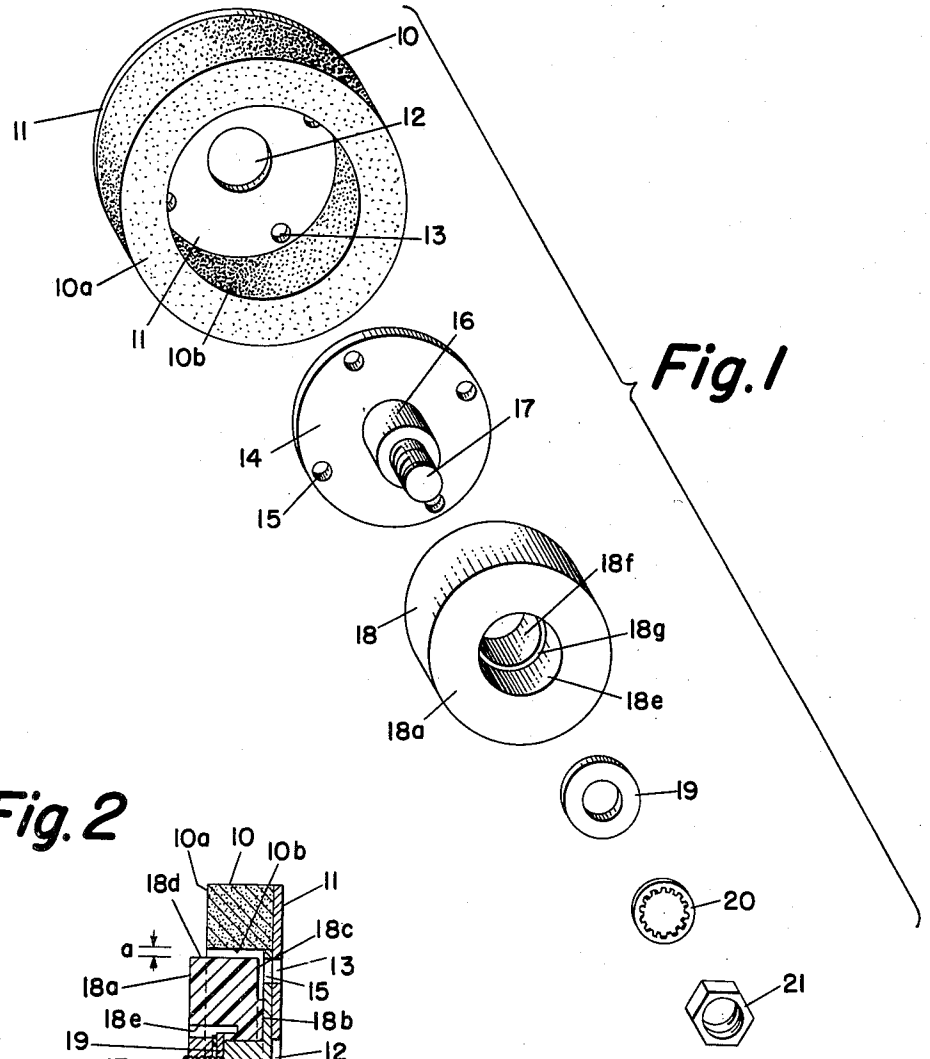
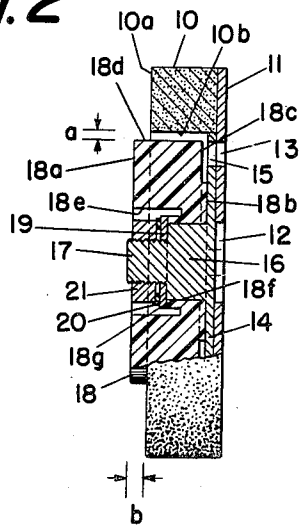


Fig. 1

Fig. 2



INVENTOR.
ROLAND D. KARNELL
BY Joseph Rossman
ATTORNEY

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DUAL FINISHING WHEEL

Roland D. Karnell, Philadelphia, Pa.

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This invention relates to a dual tool finishing wheel. More specifically, the invention relates to a dual wheel having a finish grinding portion and a lap cutting portion mounted on a single rotary shaft.

Considerable difficulty has been encountered previously in sharpening single point tungsten carbide cutting tools without the use of diamond wheels. It is also desirable to have a high finish around the cutting edges of such tools to improve their cutting ability and increase their life.

The present invention provides a dual finishing wheel which is provided with an outer cup-type grinding wheel, such as a bonded silicon carbide wheel and an inner rotary diamond lapping wheel, both adapted to be mounted on a single rotary shaft so as to be instantly available for use as desired in finishing cutting tools.

Further details and advantages of my invention will be apparent from the following specification and appended drawings, wherein

Figure 1 is an exploded perspective view of the component parts of my dual finishing wheel, and

Figure 2 is a transverse sectional axial view of the assembled dual finishing wheel.

Referring to the drawings, the dual finishing wheel consists of an outer cup-type grinding wheel **10**, mounted on a circular backing plate **11**, having a central opening **12** and spaced bolt receiving openings **13** for mounting the plate on a suitable rotary spindle mount of a tool grinder in the usual way. The grinding wheel **10** is preferably made of silicon carbide, vitrified bonded or resinoid bonded, having a grit size ranging from about 60 to about 180. It may also be made of aluminum oxide or other suitable abrasive material.

The hollowed cup portion of the grinding wheel is adapted to snugly receive a circular auxiliary insert plate **14** provided with a plurality of spaced bolt receiving openings **15** which are adapted to mate with the openings **13** in plate **11** for securing same to the spindle mount of a tool grinder. The insert plate **14** is also provided with an extending hub or bearing portion **16** terminating in a threaded post **17**. The insert plate **14** is adapted to support an inner lap cutting wheel **18** as shown in Figure 2 and is retained in place by means of washer **19**, lock washer **20** and nut **21** mounted on threaded post **17** as shown in Figure 2. This assembly is thus adapted to rotate as a unit when suitably mounted on the spindle mount of a rotary tool grinder.

The rotary lap wheel **18** is preferably made of molded laminated paper bonded with a suitable phenolic resin. The lap wheel **18** is provided with a bore **18e** having a flat seat **18g** at the

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bottom thereof for supporting washer **19** thereon as shown in Figure 2. The lap wheel **18** is also provided with an axial bore **18f** which is adapted to snugly receive the hub **16** of insert plate **14**. The rear face **18c** of wheel **18** is also provided with an offset portion **18b** which is adapted to be supported on insert plate **14** as shown in Figure 2. The offset portion **18b** provides a sufficient space between the auxiliary insert plate **14** and the face **18c** of the lap wheel **18** to receive the heads of fastening bolts positioned in holes **15** of plate **14**. It will also be noted that the cup-type inner surface **10b** of the grinding wheel **10** is spaced a short distance "*a*" from the outer surface **18d** of the lap wheel **18** as shown in Figure 2 for a purpose to be explained later.

In using the assembled dual finishing wheel as described to finish a tungsten carbide single point tool, the tool is first ground dry on the grinding wheel **10** by bringing the desired tool surface against the lateral surface **10a** of wheel **10**. The surface **10a** of wheel **10** is preferably dressed back and trued so as to allow the lateral surface **18a** of the inner lap wheel **18** to extend out or forward a distance "*b*" of at least $\frac{1}{16}$ to $\frac{1}{8}$ inch. The distance "*a*" between the inner surface **10b** of grinding wheel **10** and the surface **18d** of the lap wheel **18** should preferably be at least about $\frac{1}{8}$ inch so as to permit dressing of the entire lateral surface **10a** of grinding wheel **10**. If desired the grinding wheel **10** may be dressed with a suitable sharp diamond dressing tool to prepare the surface thereof. The tool to be finished is first finish ground on the grinding wheel **10**. This ground tool is then finished by bringing the desired surfaces thereof in contact with lateral surface **18a** of the lap wheel **18** so as to produce the desired finish. Before doing this the surface **18a** is coated or charged with a suitable diamond paste which is first spread with a finger and then rolled into the surface of the lap wheel with a suitable metal roller under suitable pressure. The grit size of diamond paste applied depends upon the type of cutting action or finish desired as given in the following table:

Grade No. U. S. Bur. Standards C. S. 123-49	Particle Size (Microns)	Grit Size (Mesh Equivalent)	Results of Cutting Action
150		100	Very Coarse.
120		120	Extra Coarse.
90		170	Coarse.
60	35-85	230	Medium Coarse.
45	30-60	325	Medium Cut.
30	20-40	600	Light Cut.
15	8-22	1,200	Medium Micro.
9	6-12	2,000	Light Micro.
6	4-8	3,000	Fine Micro.

In utilizing the procedure as described it is possible to produce a mirror finish on the surfaces of tungsten carbide cutting tools. The life of such tools can be extended as much as three or more times that of the same carbide tools having a conventional finish. Measurements with a profilometer show that this finishing refines the surfaces from a range of 15 to 20 R. M. S. mu in., produced with conventional grinding, to 1 to 2 R. M. S. mu in., when finish-lapped with a U. S. Standard #30 or 600 grit equivalent diamond grit size. The effect on the cutting edge is a reduction from around 30 R. M. S. mu in. with conventional grinding, to as little as 8 R. M. S. mu in. after refined finishing.

My dual finishing wheel makes it possible to achieve the aforementioned results with a minimum of time and effort because both the grinding wheel and lap wheel are instantly available on a single rotary shaft for the necessary finishing operations.

It is to be understood that modifications and changes may be made in the specific details of the construction of the dual finishing wheel which are intended to be included within the scope of the appended claims.

I claim:

1. A dual finishing wheel comprising an outer cup-type grinding wheel and an inner lap wheel retained within the cup portion of said outer grinding wheel, wherein the outer cup-type grinding wheel is made of silicon carbide and the inner lap wheel is made of laminated paper bonded with a phenolic resin, said lap wheel being charged with diamond paste for finishing action.

2. A dual finishing wheel comprising a cup-type grinding wheel, a supporting plate for supporting said cup-type grinding wheel thereon, said supporting plate being adapted to be affixed to a rotary shaft, and an auxiliary supporting plate adapted to be positioned within the cup portion of said grinding wheel, said auxiliary plate being adapted to retain thereon a lap wheel, said auxiliary plate being provided with an axially extending hub, a lap wheel made of laminated paper bonded with a phenolic resin and charged with diamond paste for finishing action, said lap wheel being bored and snugly received on said hub and provided with a seat for supporting a locking washer and nut and a recessed portion in the rear face thereof for receiving the heads of bolts fastening same to the said auxiliary plate.

ROLAND D. KARNELL.

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