June 19, 1934. I. YASSENOFF 1,963,394

TOOL GRINDER

Filed Nov. 29, 1929 2 Sheets-Sheet 1

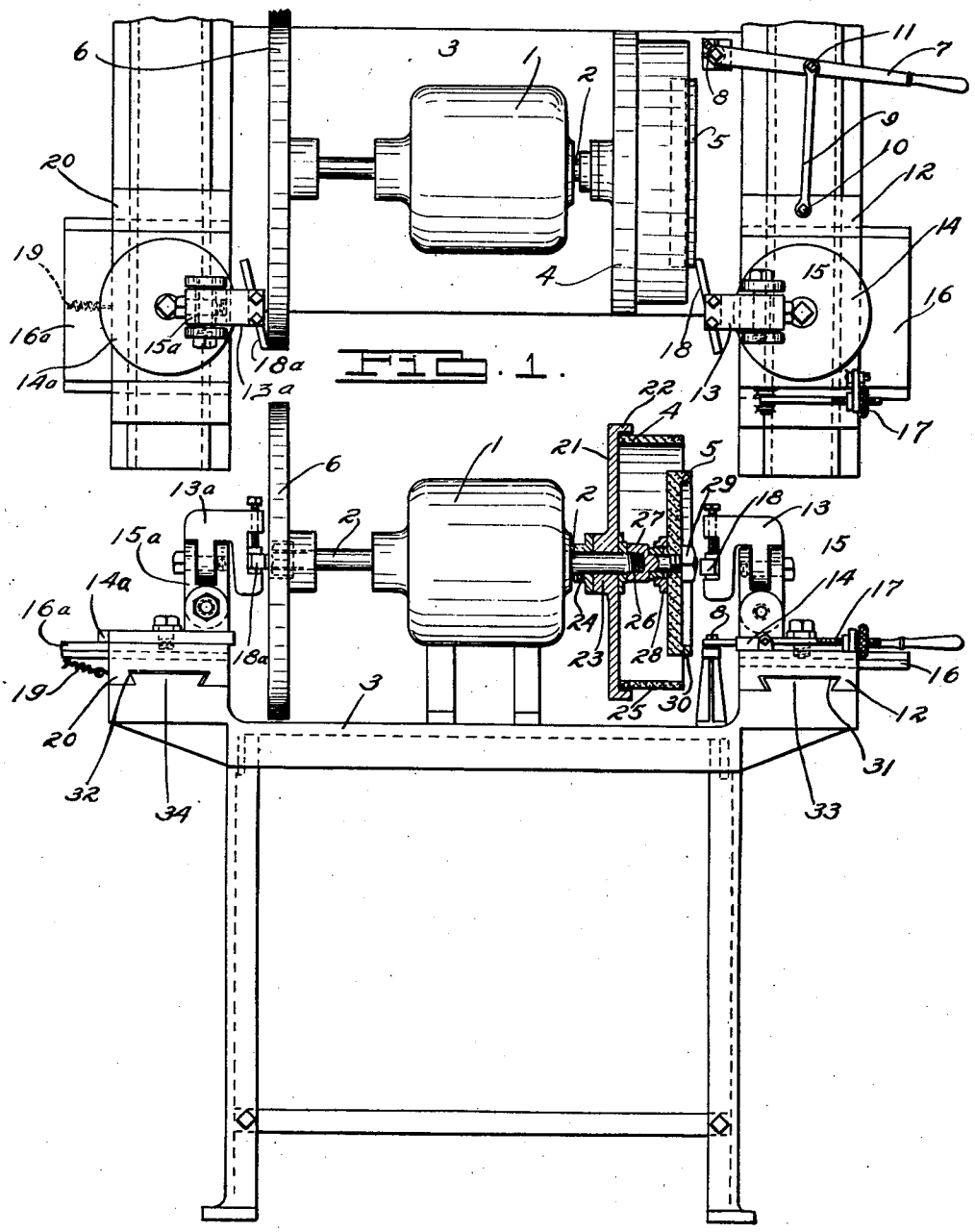


Fig. 1.

Fig. 2.

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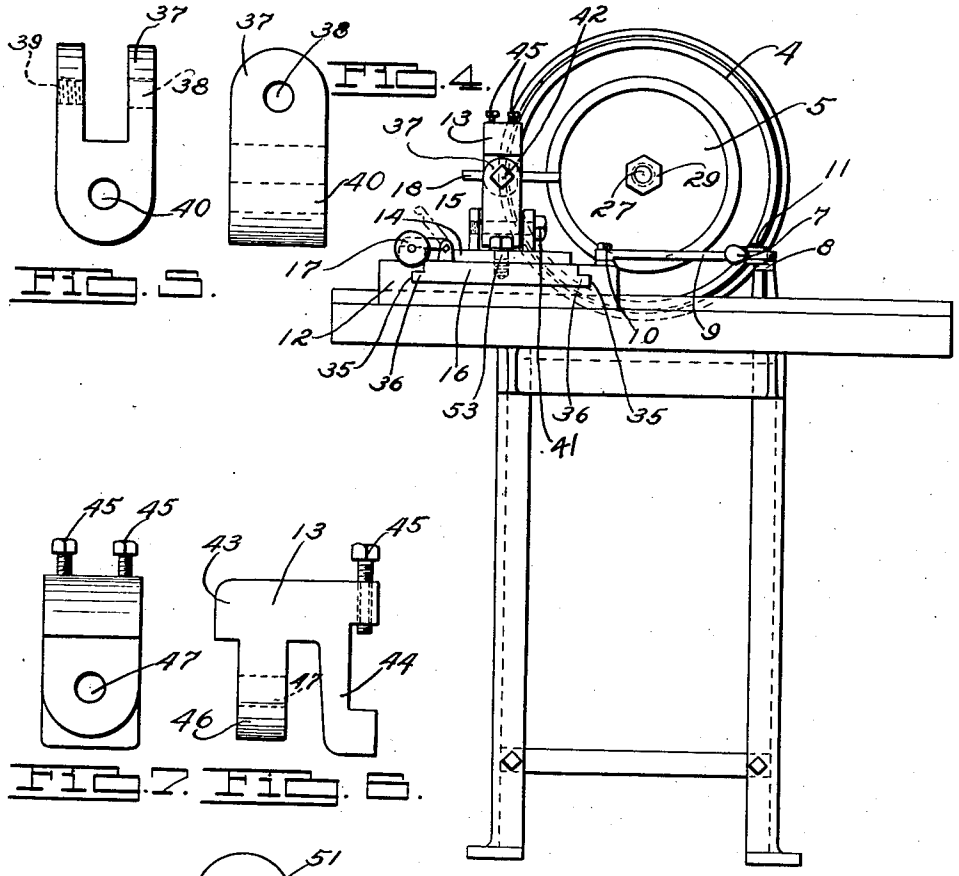


FIG. 3.

FIG. 5.

FIG. 4.

FIG. 7.

FIG. 6.

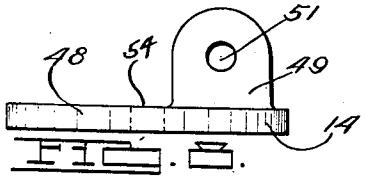


FIG. 8.

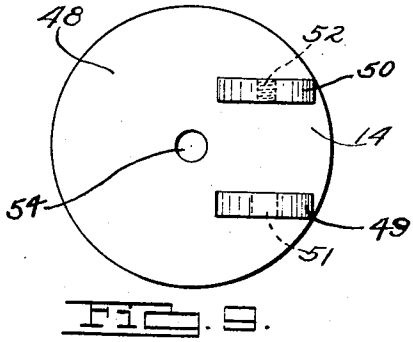


FIG. 9.

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TOOL GRINDER

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Application November 29, 1929, Serial No. 410,422

3 Claims. (Cl. 51—3)

My invention relates to tool grinders and particularly to tool grinders adapted for grinding, sharpening and honing or lapping, tools having a cutting edge of very hard material, such as tungsten carbide metal. In grinding or sharpening such tools, there are many problems to be overcome which do not exist in the case of tools made from ordinary tool steel. In the first place, tungsten carbide metal is very expensive and it becomes essential, in grinding and sharpening tools having a cutting edge formed from this material, to avoid grinding away more than the minimum amount of the material consistent with shaping or sharpening the cutting surface. In addition to this, tungsten carbide metal is very hard and the extreme hardness of the material is such that the tool tends to cut away the abrasive used to grind or sharpen it. In view of these facts, it has been found advisable in the grinding and sharpening of such tools to use a coarse abrasive for the preliminary grinding, then to use a finer abrasive for the finish grinding, and then to hone or diamond lapp the tool. In view of the fact that these tools may have very irregularly shaped cutting surfaces and the necessity for three separate operations to grind such tools successfully, it is impossible under the present methods and present machines to grind these tools in such a way as to retain the original angularity of the cutting surface of the tool.

Under present methods the tool to be ground is first set up and ground on a grinder using a coarse abrasive. This is followed by a second operation on a second grinder using a fine abrasive. Following this, the tool is again set up for lapping or honing on a third machine. By reason of the fact that it is impossible to secure the same adjustment of the tool on the three separate machines in carrying out each operation, the result is that the grinding produces an irregular cutting surface, which causes the tool to wear very rapidly and requires frequent regrinding. The rapid deterioration of the tools, due to the present grinding methods and machines, makes the use of such tools very expensive and the three separate operations, requiring as they do three separate machines and adjustments of the tool to the machines, make the grinding of these tools a most expensive operation.

An object of my invention is to provide a tool grinder which will grind or sharpen tools, having a cutting edge of hard material, such as tungsten carbide metal, with a minimum amount of loss of material in the cutting surface.

Another object of my invention is to provide a tool grinder which will grind or sharpen tools, having hard cutting surfaces, such as tungsten carbide metal, with a minimum amount of wear to the abrasive wheels.

Another object of my invention is to provide a tool grinder which will grind or sharpen tools, having a cutting edge of hard material, such as tungsten carbide metal, on which the rough grinding, finished grinding and lapping or honing of such tools may be carried out without the necessity of having separate machines and separate adjustments made for each operation.

Another object of my invention is to provide a tool grinder on which tools having a cutting edge of hard material, such as tungsten carbide metal, may be ground, lapped or honed, without changing the angularity of the cutting surface of the tool during the three operations.

These and other various objects, features of arrangement, construction and operation are plainly shown and described and will be best understood by reference to the accompanying drawings, in which

Fig. 1 is a top plan view of the assembled grinder.

Fig. 2 is a side elevation of the grinder in which the abrasive wheels are shown cut away and in partially in cross-section in order to show the arrangement of the parts.

Fig. 3 is an end elevation showing more plainly the arrangement of the abrasive wheels.

Figs. 4, 5, 6, 7, 8 and 9 are detailed views showing the construction of the tool holding jig.

Similar numerals refer to similar parts throughout the several views.

Referring to Fig. 1, an electric motor 1, having a shaft 2, is rigidly mounted on a table or platform 3. On one end of the shaft 2 are mounted abrasive wheels 4 and 5. On the other end of said shaft is mounted a lapping disk 6. The abrasive wheels and the lapping disk are mounted directly on the shaft 2 and rotate with said shaft. A lever arm 7, pivoted on a support 8, is fastened by means of the arm 9 and bolts 10 and 11 to the slidable table 12, enabling it to be moved backward and forward during the grinding operation. A tool holding jig 13 is mounted on a platform 14 and is adapted to be adjusted so as to present the tool to the grinding wheels at any desired angle by reason of the universal joint mounting 15. The platform 14 is mounted on a member 16 which slides in grooves cut in the slidable table 12. The tool holding jig 13 and its platform and table may be pushed toward the abrasive wheels 4 and 5 or pulled away from said

wheels by means of the screw threaded adjustment 17. When the tool holding jig platform and table are advanced toward the abrasive wheels 4 and 5 the tool 18 to be ground is put in intimate contact with the abrasive wheels and may be carried forward and backward across the surface of the abrasive wheels by means of the slidable table 12, actuated by the lever 7. At the opposite end of the machine is shown the lapping wheel 6. The tool holding jig platform and table there shown is identical in size and arrangement of parts with the tool holding jig platform and table as shown in use with the abrasive wheels 4 and 5 and is interchangeable with the tool holding jig platform and table there shown. The parts on the tool holding jig platform and table, when used on the lapping wheel, are designated at 13*a*, 14*a*, 15*a* and 16*a* respectively. The table 16*a* is slidable backward and forward relative to the lapping disk 6 precisely as the table 16 is slidable backward and forward relative to the abrasive wheels 4 and 5.

A tension spring 19 is provided which keeps the tool to be lapped 18*a* in intimate contact with the lapping disk at a substantially constant pressure. As shown, the tool holding jig platform and table, when used in connection with the lapping disk, is mounted on a slidable table so that said tool 18*a* may be moved forward and backward across the face of the lapping disk 6.

Referring to Fig. 2, the foregoing enumerated parts are shown in side elevation. In this view, the mounting and construction of the abrasive wheels 4 and 5 is shown. The abrasive wheel 4 is constructed on a wheel 21 carrying a rim 22, the wheel and rim being mounted on a collar 23, which is rigidly attached to the shaft 2 by means of the set screw 24. Fastened to the rim 22 and the wheel 21 is a circular band of abrasive material 25, which surrounds the inner abrasive wheel 5 and may be of any desired thickness as long as there remains sufficient room for mounting the inner abrasive wheel 5, which is attached to the end of the shaft 2. As shown, the shaft 2 terminates in a male screw threaded end 26, over which is fastened the female screw threaded extension 27. The extension 27 carries an adjustable nut 28, which supports the inner abrasive wheel 5, and is locked in place by means of the nut 29. By this arrangement the inner abrasive wheel 5 may be adjusted so as to be substantially in line with the outer edge of the band of abrasive material 25 on the abrasive wheel 4. The inner abrasive wheel 5 may be constructed in the manner of the usual abrasive disk but I have shown a slight modification in which a rim 30 is provided which extends out from the surface of the wheel 5. While it is immaterial whether the coarser abrasive wheel is the outer one or the inner one, I prefer to use a coarse abrasive substance for the construction of wheel 4 and a finer abrasive substance for the inner wheel 5.

As shown in this view, the base of the sliding tables 12 and 20 are constructed with slots 31 and 32, which allow the members 33 and 34 to slide in them. This allows the tables 12 and 20 to be moved forward and backward in order to bring the tools in contact with the entire surface of the abrasive wheels 4 and 5 or of the lapping disk 6.

The end view of my tool grinder, as shown in Fig. 3, illustrates clearly the concentric arrangement of the abrasive wheels 4 and 5. As shown in this view, the slidable table 12 is provided with slots 35—35 in which the projections 36—36 of the member 16 are allowed to slide, thus allowing the tool holding jig 13 and tool 18 to be advanced toward or withdrawn from the surface of the abrasive wheels, and also allows the removal of the tool holding jig and tool from the slidable table 12 in order to be inserted in the table 20 (shown in Fig. 2) when lapping the tool on the lapping disk 6, the table 20 being provided with the identical kind of slotted arrangement as just described for the table 12.

The tool holding jig 13 and the universal joint mounting 15 are shown in detail in Figs. 4, 5, 6, 7, 8 and 9. As shown in Figs. 4 and 5, a member 37, in which has been placed an orifice 38 and a screw threaded orifice 39, is adapted to receive a screw threaded bolt 42 (shown in Fig. 3), thus making a pivotal connection with the tool holding jig member 13. At the base of member 37 is an orifice 40 through which a bolt 41 (shown in Fig. 3) passes and secures the member 37 to the member 14.

The tool holding jig member 13, as shown in Fig. 6, consists of a body portion 43, provided with a recessed portion 44, adapted to receive the tool to be ground, said tool being held rigidly in place by means of set screws 45—45, which pass through the body 43 and extend into the recess 44. A portion of the body 43 is cut away to provide the extension 46, which enables it to fit in the slotted portion of the member 37. As shown in Fig. 7, an orifice 47 is provided to receive the bolt 42, (shown in Fig. 3), to establish a pivotal connection between the members 37 and 43.

The platform 14 as shown in Figs. 8 and 9 consists of a body member 48 in the center of which an orifice 54 is provided. Rigidly mounted on the body member 48 are two extension members 49 and 50. In extension member 49 is an orifice 51 adapted to receive the bolt 41 (shown in Fig. 3). A screw threaded orifice 52 is provided in extension member 50 and is adapted to receive the screw threaded end of the bolt 41 (shown in Fig. 3). The whole member 14 is pivotally connected with the sliding table 16 (shown in Fig. 3) by means of the screw threaded bolt 53 (shown in Fig. 3), which passes through the orifice 54 and into the table 16.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention as, for example, a honing disk may be used in place of a lapping disk when one desires to hone the tools which have been ground, or one may use various modifications of the abrasive wheels shown and described in this specification, or all of the abrasive wheels and the lapping or honing disk may be mounted on one end of the shaft. I do not wish, therefore, to be limited to the precise details of construction set forth but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. A tool grinder for grinding tools having a cutting edge of tungsten carbide and including a rotatable shaft, means for rotating said shaft, abrasive wheels mounted on said shaft, a jig supporting member adjacent said abrasive wheels, a tool holding jig including a turntable secured to a base, a tool clamp, a universal joint connecting said turntable and said tool clamp, and a spring maintaining the tool in yielding intimate contact with the abrasive wheels.

2. A tool grinder for grinding tools having a

cutting edge of tungsten carbide and including a rotatable shaft, means for rotating said shaft, abrasive wheels mounted on said shaft, a jig supporting member adjacent said abrasive wheels, a tool holding jig supported by said jig supporting member and including a turntable pivotally mounted on a base, a tool clamp, a universal joint connecting said tool clamp and said turntable, and a spring for maintaining the tool in yielding intimate contact with the abrasive wheels at a constant pressure.

3. In a tool grinder, the combination of means for rough grinding tools with means for smooth grinding of said tools, and means for lapping or honing said tools, said grinding means and said lapping or honing means being mounted on a rotatable shaft and actuated from a source of power, a slidable table mounted adjacent to said grinding means, a second slidable table mounted adjacent to said lapping or honing means, means integral with said sliding tables and adapted to receive a base member, a turntable secured to said base member, a tool holding clamp, a universal joint connecting said tool holding clamp and said turntable, and a spring for maintaining a tool held in said tool holding clamp in yielding contact with said grinding, lapping or honing means.

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