

J. DE KONING.
GRINDING MACHINE.
APPLICATION FILED MAR. 11, 1920.

1,363,194.

Patented Dec. 21, 1920.
2 SHEETS—SHEET 1.

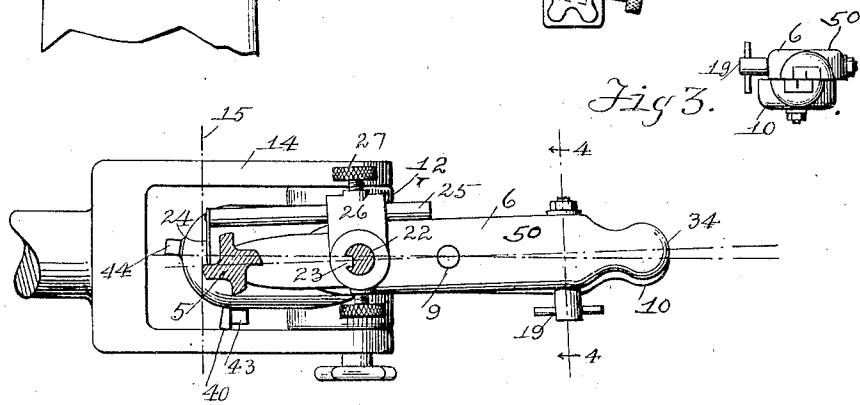
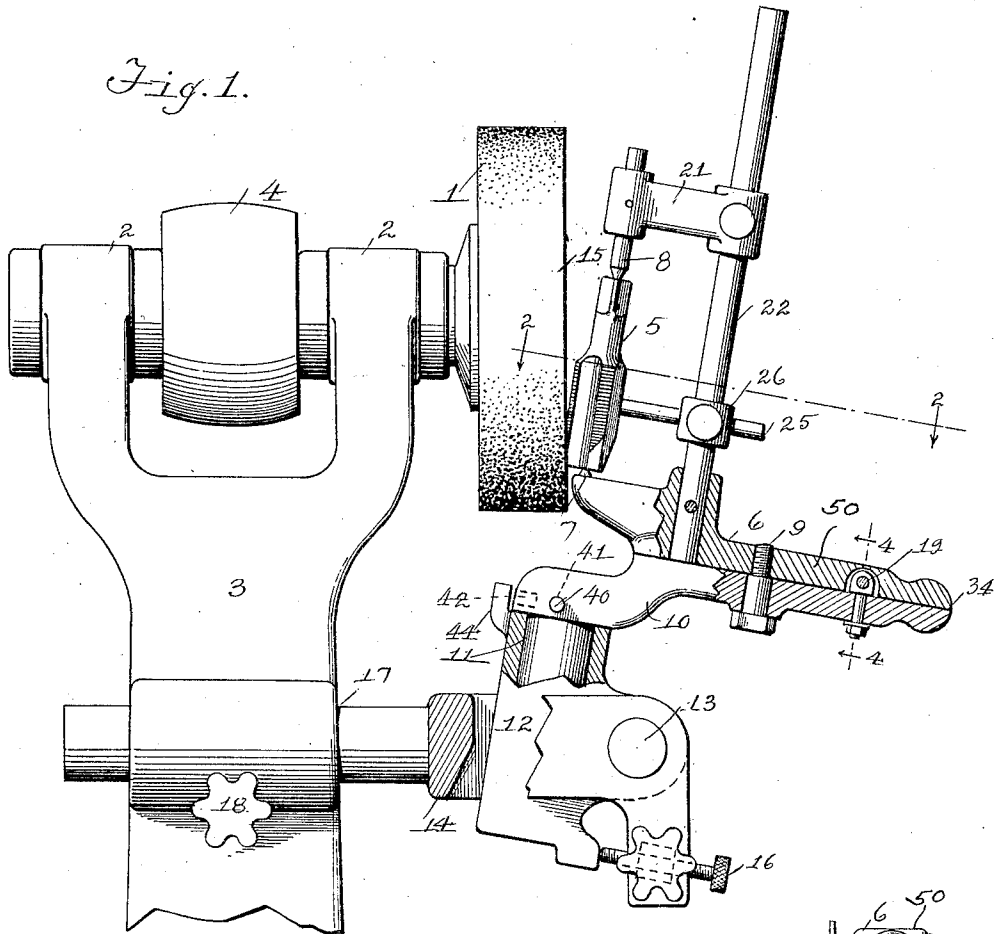


Fig. 2.

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Jacob De Koning
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his Attorney

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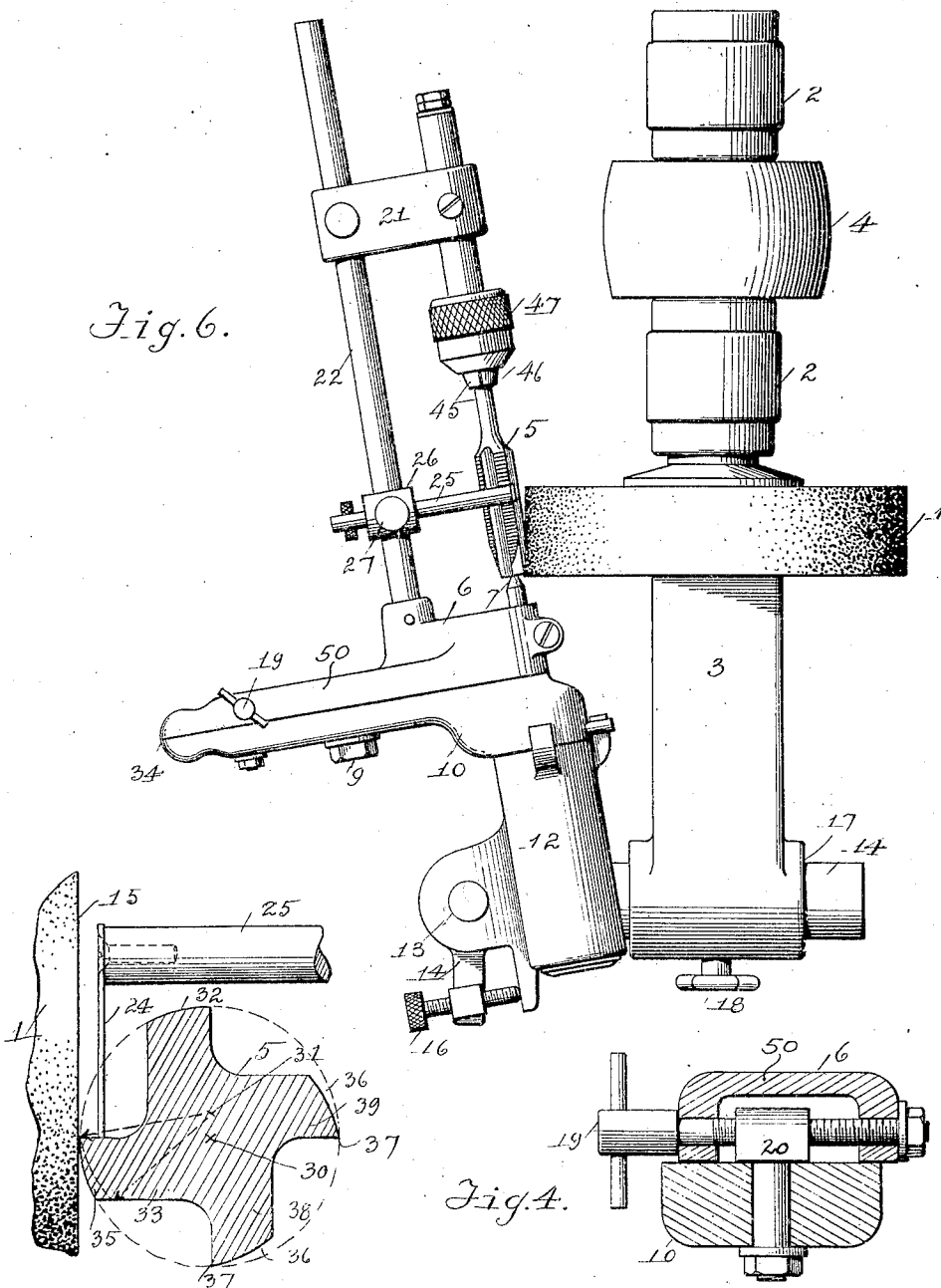


Fig. 6.

Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

JACOB DE KONING, OF GRAND RAPIDS, MICHIGAN, ASSIGNOR TO GRAND RAPIDS GRINDING MACHINE COMPANY, OF GRAND RAPIDS, MICHIGAN, A CORPORATION OF MICHIGAN.

GRINDING-MACHINE.

1,363,194.

Specification of Letters Patent. Patented Dec. 21, 1920.

Application filed March 11, 1920. Serial No. 364,905.

To all whom it may concern:

Be it known that I, JACOB DE KONING, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented new and useful Improvements in Grinding-Machines, of which the following is a specification.

The present invention relates to grinding machines, particularly such as are employed for grinding rotary cutting tools, as thread-cutting taps and the like; and its object is to provide a machine of that character whereby the outward faces of the tool's flutes may be ground convexly and in such manner as to provide a clearance between the tool and its work extending increasingly from the flute's cutting edge; and further, to provide such a machine whereby all the flutes may be ground uniformly; and further, to provide such a machine whereby said faces may be tapered and such a clearance provided.

These and any other objects hereinafter appearing are attained by, and the invention finds preferable embodiment in, the structure or structures hereinafter particularly described and illustrated by the accompanying drawings, in which:—

Figure 1 is a side view of a grinding machine, certain parts being shown in vertical section and certain parts being broken away;

Fig. 2 is a sectional view of parts thereof taken on a plane corresponding to line 2—2 of Fig. 1;

Fig. 3 is an end view of parts of said machine;

Fig. 4 is a transverse sectional view (enlarged) of said parts taken on a plane corresponding to line 4—4 of Figs. 1 and 2;

Fig. 5 is a view of parts of the said machine, partly in section, illustrating the effect of the grinding operation; and

Fig. 6 is top plan view of a slightly modified construction of the grinding machine.

In the embodiment of the invention chosen for illustration by the drawings and for detailed description in the body of this specification, the grinding wheel 1 is journaled at 2 on the machine's body 3 and is driven by the pulley 4. The rotary tool to be ground—as the tap 5—is secured, ro-

tatably on its axis of operative rotation, to the tool-holder, designated generally 6, as by the fixed mandrel 7 and the axially adjustable mandrel 8 carried by the tool-holder and engaging in bearings provided for this purpose in the ends of the tool. The tool-holder's upper member 50 is pivotally mounted at 9 on a support 10 which is swingably mounted at 11 on a block 12. This block is swingably mounted at 13 on a carrying member 14, on an axis transverse to that of the mounting 11, so that the block 12 and parts carried thereby including the tool may be swung toward and away from the grinding face 15 of the grinding wheel, such swinging movement toward the grinding wheel being limited by the adjustable screw stop 16. The carrying member 14 is slidable on the body 3 of the machine in a split bearing 17, to move the tool toward and away from the grinding wheel, said member being clamped in desired position by a set screw having the handle 18, which screw is adapted to compress the bearing 17. The member 50 of the tool-holder 6 is swung on the axis 9 and held in swung position by a screw 19 journaled in the tool-holder and threaded in a nut 20 pivotally mounted on the support 10. The tool-holder is adapted to hold rotary tools of different lengths by reason of the slidable mounting of the arm 21 of the mandrel 8 on the rod 22 of the tool-holder, said arm being held against rotary movement on this rod by a keyway 23. The tool is held against rotation in one direction on the mandrels by a leaf spring 24 whose extremity abuts that side of the flute which is adjacent its cutting edge, and which springs over the outer face of the flutes as the tool is turned in the opposite direction. This spring is mounted on a bar 25 slidable in a bearing in the bracket 26 on the rod 22 and clamped in desired position by a set screw 27. The machine is operated in the following manner: The rotary tool 5 is secured in the tool-holder by means of the mandrels 7, 8, and the carrying member 14 is slid in its bearing 17 to the position required for grinding a tool of the diameter of tool 5. The screw 19 is turned to swing the tool-holder's member 50 and thus offset the axis (see Fig. 5) of the tool's operative rota-

tion from the axis 31 of the swingable mounting 11 of the tool-holder's support 10, sufficiently to provide the desired clearance for the outward faces 32 of the flutes. The screw stop 16 is turned to limit the swinging movement of the block 12 and the parts carried thereby (including the tool) toward the grinding wheel, in order to provide the desired degree of the taper of the tool's forward end. The tool is now turned on the mandrels by hand so as to bring each flute to the position shown by flute 33 in Fig. 5, in which position the tool is held by the stop spring 24 against rotation in the opposite direction. The tool-holder's support 10 is now swung on the axis 31 of its pivotal mounting 11 by the support's handle portion 34, sufficiently to grind off the portion 35 of the flute and thus provide the convex clearance 36, between the tool and its work extending increasingly from the flute's cutting edge 37, as shown in the flutes 38 and 39. After all the flutes are thus ground, the screw stop 16 may be loosened slightly and the operation repeated, whereby the outward faces of the flutes are ground to a slightly additional degree and a perfectly finished product is attained. To grind taps having left-hand threads the bracket 26 is turned half way around on the bar 22, and the rod 25 is so adjusted as to cause the extremity of the spring 24 to engage the side of the flute adjacent the cutting edge of such a tool; the pin 40 is also withdrawn from its socket 41 and inserted in its other socket 42, thus limiting the swinging movement of the support 10 between the stops 43 and 44.

In Fig. 6, the periphery of the grinding wheel engages the tool, instead of its side engaging the tool as in Fig. 1. The parts however are essentially the same in both constructions. In Fig. 6 the outer end of the tool is clamped between jaws 45, 46 pressed into such clamping engagement by a nut 47.

It will be seen that by my machine the flutes are all uniformly tapered and the same clearance is provided for each.

The axis 31 of the tool-holder's swinging movement, being produced, intersects the tool's transverse planes which intersect its surface being ground.

The invention being intended to be pointed out in the claims, is not to be limited by or to the details of construction of the par-

ticular embodiment thereof illustrated by the drawings or hereinbefore described.

I claim:

1. In a machine for taperingly grinding the outward faces of the flutes of a laterally-cutting rotary tool; a grinding wheel; a tool-holder adapted to hold the tool in such position that its axis of operative rotation is inclined relatively to the grinding surface of the wheel and its cutting side is presented thereto, the tool-holder being swingably mounted on an axis offset from the tool's said axis and as produced intersecting the held tool's transverse planes which intersect its surface being ground.

2. In a machine for taperingly grinding the outward faces of the flutes of a laterally-cutting rotary tool; a grinding wheel; a tool-holder adapted to hold the tool in such position that its axis of operative rotation is inclined relatively to the grinding surface of the wheel and its cutting side is presented thereto, the tool-holder being swingably mounted on an axis adjustably offset from the tool's said axis and as produced intersecting the held tool's transverse planes which intersect its surface being ground.

3. In a machine for taperingly grinding the outward faces of the flutes of a laterally-cutting rotary tool; a grinding wheel; a tool-holder adapted to hold the tool turnably on the axis of its operative rotation and in such position that its said axis is inclined relatively to the grinding surface of the wheel and its cutting side is presented thereto, the tool-holder being swingably mounted on an axis offset from the tool's said axis and as produced intersecting the held tool's transverse planes which intersect its surface being ground.

4. In a machine of the character described; a grinding wheel; a block mounted swingably toward and away from the wheel; a tool-holder support mounted on the block swingably on an axis transverse to the block's axis of swinging; a tool-holder carried by said support and adapted to hold a rotary tool in grinding relation with the wheel in a position wherein the axis of said support's swinging is offset from the axis of the tool's operative rotation.

In testimony whereof I have hereunto set my hand at Grand Rapids, Michigan this 5th day of March, 1920.

JACOB DE KONING.