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APPARATUS FOR DRESSING WHEELS OF GRINDING MACHINES

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APPARATUS FOR DRESSING WHEELS OF GRINDING MACHINES

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3 Claims. (Cl. 125—11)

This invention relates to a method of and apparatus for dressing wheels of grinding machines, such as used for sharpening milling cutters, bobs, reamers, taps and so forth. Grinding machines of this type generally include vertically rotatable grinding wheels adapted to be swung around a vertical axis, and adjustably mounted tool dressers permitting of proper shaping, forming and truing of the grinding wheels. As well known, wheel dressing operations for grinding machines, particularly, dressing of a wheel for true circular relief grinding on reamers, taps and cutters, must be effected so that the dressing tool passes across the wheel at a right angle to the center line of the tool to be ground, otherwise grinding operations might injure the cutting edge of the tool, or even effect a complete destruction of such a cutting edge. The above defined requirement for dressing a wheel together with the customary requirement that a grinding wheel should rotate about an axis substantially parallel to the surface to be ground will prevent the use of the full width of a wheel, unless such wheel exactly fits the tool to be ground, and makes it necessary to have at hand a large number of grinding wheels of different widths so as to avoid excessive waste of wheel material.

It is the primary object of the present invention to provide an improved method for wheel dressing, which method permits the dressing tool to pass across a wheel at a right angle to the center line of the tool to be ground, even though the axis of rotation of the wheel is arranged obliquely to the surface to be ground while simultaneously shaping substantially the entire peripheral surface of the wheel in spite of excessive width for a particular job, all for the purpose of eliminating excessive waste of wheel material and effecting proper and efficient grinding operations.

This general object of the invention is attained by turning the axis of the wheel in a horizontal plane to any desired angle with respect to the center line of the tool to be ground and thereupon setting the dressing tool at a right angle to the center line of the tool to be ground, so that the wheel will be dressed to the true curve of such a tool. The procedure of setting a grinding wheel angular and not rectangular with respect to the center line of a tool to be ground permits of dressing the entire peripheral surface of a grinding wheel for grinding operations without special consideration of the size of a tool, and, in addition, eliminates the danger of cutting a groove in the grinding wheel and grinding imperfect circular relief on a tool.

Another object of the invention is to provide a machine for grinding tools, such a machine including in combination a horizontally disposed wheel supporting spindle journaled in a vertically rotatable head, with a horizontally and vertically pivotally mounted dressing tool permitting of setting of the wheel of the grinding machine at any desired angle with respect to the center line of a tool mounted on the machine and setting of the dressing tool at a right angle to the center line of the mounted tool.

Still other objects and advantages of the invention will be indicated in the following description of an exemplified form of a grinding machine embodying the invention and are rendered apparent therefrom in connection with the annexed drawing depicting a preferred typical tool grinding machine.

In the drawing:

Figure 1 is a fragmentary side elevation of a tool grinding machine constructed in accordance with the invention and adapted to operate in accordance with the grinding method disclosed herein.

Figure 2 is a plan view of a tool dresser mounted in a bracket for pivotal support on intersecting vertical and horizontal axes, the figure showing in addition in dotted lines the rectangular relation of the thus mounted dressing tool to the center line of a tool to be ground and the angular, not rectangular relation of the grinding wheel to such a center line.

Figure 3 is a side view of Figure 2 showing the same relation between the dressing tool, the grinding wheel and the center line of the tool to be ground.

Figure 4 is a perspective view of the dressing tool longitudinally shiftably mounted in a base, which base is rotatably supported in the tool dresser bracket.

Referring now to the exemplified form of the invention reference numeral 2 denotes a grinding machine embodying a suitably adjustable stand 3, which stand vertically adjustably supports a bed 4. This bed is vertically shiftably mounted on stand 3 by means of a threaded shaft 5 and gearing 6, and mounts a slide 7 carrying a pair of lengthwise adjustable centers 8 and 9 for axial support of a tool. Stand 3 also mounts a grinding wheel 10 secured to a spindle 11 in a head 12, which head is vertically rotatably secured to stand 3. A scale 14 on stand 3 cooperates with a mark 15 on head 12 and permits of
proper setting of the wheel supporting head 12 with respect to the tool to be ground. Head 12, in addition mounts a bracket 16 which adjust-
ably carries a specific wheel dressing device 17. This device permits the wheel dressing tool 18 carried thereby to be set at any horizontal angle with respect to the grinding wheel 10, and em-
body a bracket member 19 and a tool support-
ing member 20. The bracket member 19 consists of a slitted ring-shaped bearing 21 with perfo-
rated flanges 22 permitting of contraction of said bearing by a screw member 23 threaded through said flanges, and a slotted supporting arm 24 longitudinally adjustably securing said bracket member to bracket 16 on head 12. The tool sup-
porting member 20 is formed as a cylindrically
shaped block, the upper enlarged portion 25 of
which rests on a circular shoulder 26 of bearing
21. Member 20 pivotally mounts crosswise there-
of a short shaft 27 which carries shiftably in a
bore 28, arranged at a right angle to the axis of
said shaft, the graduated dressing tool 18, the
latter being held in its set position by a set screw
29. It will now be seen that the tool supporting
member 20 can be freely rotated in its ringshaped bearing 21 and thus be set to any desired
horizontal angle in said bearing, such setting
being facilitated by a scale 30 on bearing 21 and
a mark 30 on member 20.

To properly dress the wheel of a tool grind-
ning machine with the structure described above,
head 12 is vertically rotated so that wheel 10
and bracket 16 with wheel dressing device 17
are shifted from position A (see Fig. 2, full lines)
to position B (see Fig. 2, dash-dotted lines). This
rotation of head 12 shifts wheel 10 and wheel
dressing device 17 so that wheel 10 and dressing
device 17 form with the center line (b) of the
tool to be ground an angle (α), which is the angle
under which wheel 10 in grinding operations
approaches the tool. Dressing of wheel 10 by
dressing device 17 in this latter position of wheel
10 and dressing device 17 is unsatisfactory, as
dressing tool 18 will pass across wheel 10 at an
oblique angle, not at a right angle to the center
line of the tool to be ground. This undesir-
able condition is overcome by moving tool sup-
porting member 20 in wheel dressing device 17
backwards the angular extent of rotation of head
12 an angular extent (−α), so that dressing tool
18 during dressing operations passes across wheel
10 at a right angle to the center line of the
tool to be ground.

The above described method permits the use
of the entire width of a wheel for grinding pur-
poses without considering the width of the wheel
with respect to the size of the tool to be ground,
furthermore eliminates excessive waste of wheel
material, and finally prevents imperfect grinding
due to high particles in the peripheral surface of
a dressed wheel.

Having thus described my invention, what I
claim is:

1. In a tool grinding machine with a horizon-
tally rotatable supporting head a grinding wheel
vertically rotatably supported by said head, a
dressing tool supporting device having axially
rotatable tool supporting means and supported
on said head, and a dressing tool pivotally mount-
ed in said supporting means in axial alignment
with respect thereto, said dressing tool support-
ing device permitting oscillation of said dressing
tool crosswise of said grinding wheel and rotation
of the plane of oscillation of said dressing tool by
axial rotation of said tool supporting means with-
out change in the relation of the axis of said
dressing tool with respect to the axis of said
grinding wheel in any adjusted position of said
supporting head.

2. A tool grinding machine as described in
claim 1, wherein said dressing tool supporting de-
vice includes a ring-shaped split bearing, where-
in said tool supporting means consists of a cylin-
drical block horizontally rotatably mounted in said
bearing, and wherein means are provided to
lock said block in its rotatably adjusted position.

3. A tool grinding machine as described in
claim 1, wherein said dressing tool supporting
device includes a horizontally arranged, ring-
shaped bearing, wherein said tool supporting
means consists of a ring-shaped member axially
rotatably mounted in said bearing, wherein said
ring-shaped member pivotally supports a shaft
diametrically thereof, and wherein the said dress-
ing tool is adjustably supported in a bore aligned
with the axes of said bearing and said ring-
shaped member.

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