March 24, 1970 E. A. ANDERSON ET AL 3,501,871

BLADE ORIENTING ATTACHMENT FOR GRINDING WHEELS

Filed March 17, 1967 2 Sheets-Sheet 1

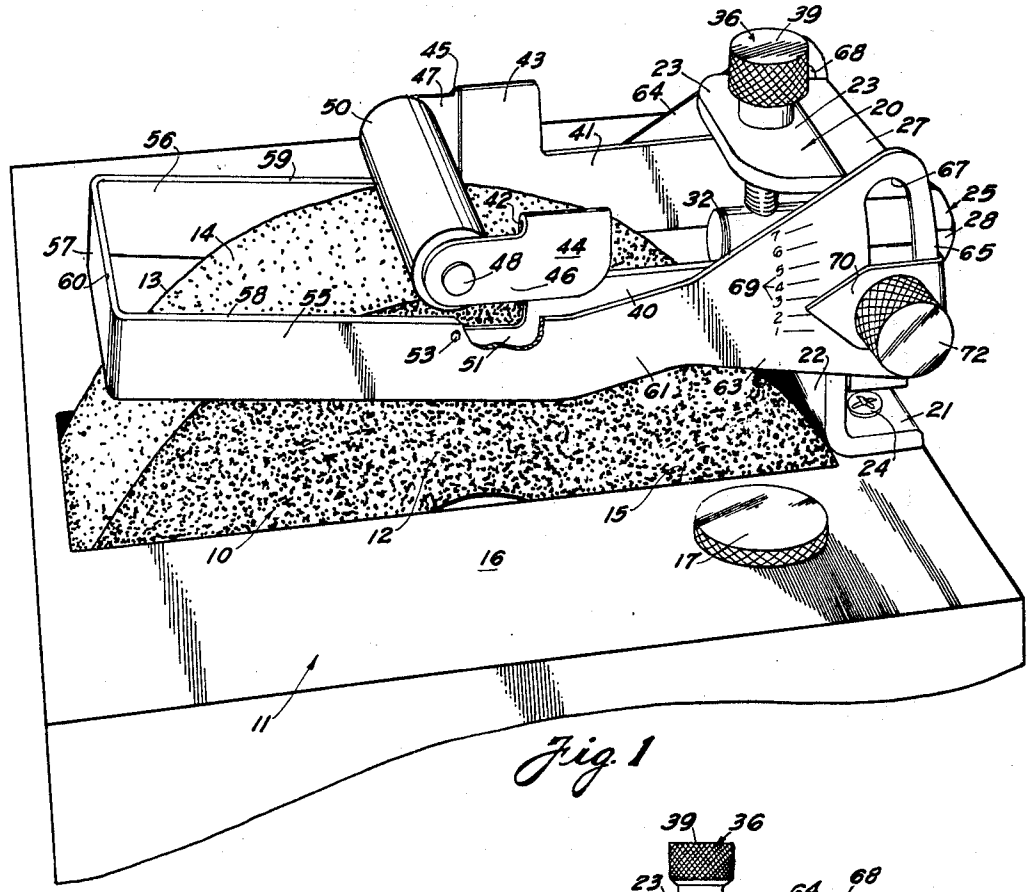


Fig. 1

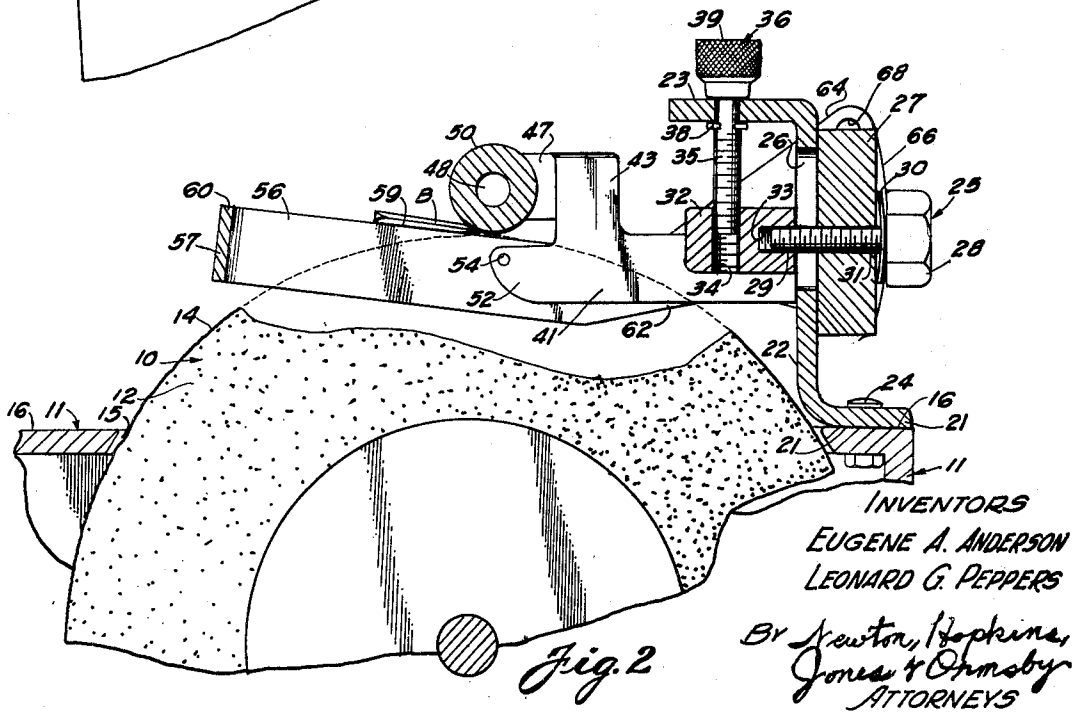


Fig. 2

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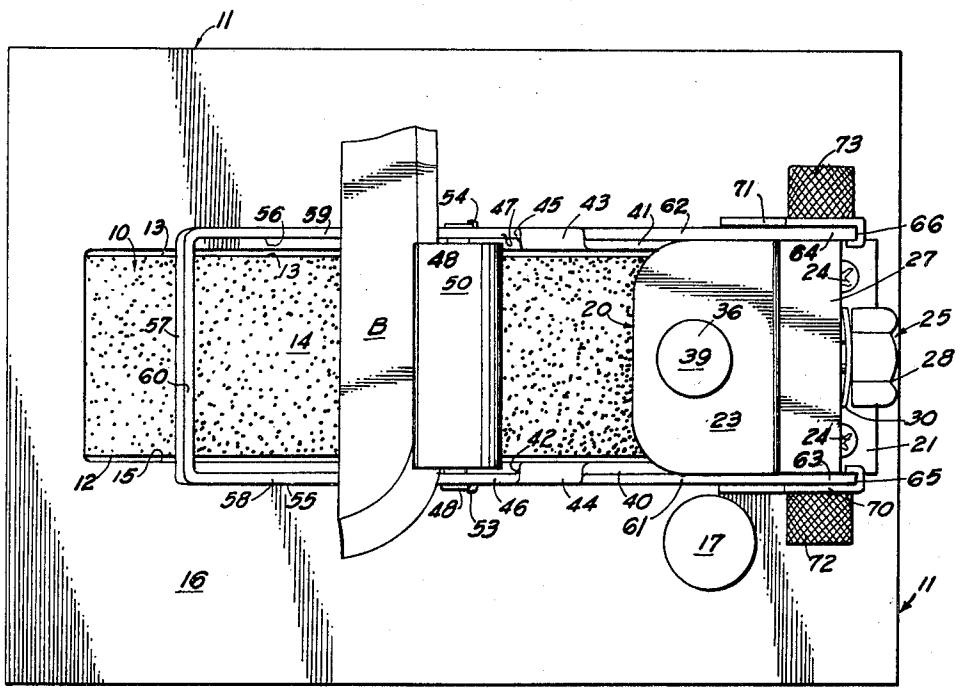


Fig. 3

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BLADE ORIENTING ATTACHMENT FOR GRINDING WHEELS

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U.S. Cl. 51—238 11 Claims

ABSTRACT OF THE DISCLOSURE

Blade orienting attachment mounted on the housing of a grinding wheel for orienting a blade approximately tangential to the periphery of a grinding wheel and having a roller for urging the blade into engagement with the grinding wheel. The guide is tiltable for adjusting the angle of the blade. Both the roller and guide are adjustable toward and away from the grinding wheel to take up for wear of the grinding wheel.

This invention relates to blade orienting attachment for grinding wheels and is more particularly concerned with a blade sharpener having a blade guide for orienting a blade with respect to the periphery of oil impregnated grinding stone.

In the past, blade sharpeners, comprising grinding wheels and guides or supports adjacent thereto for receiving blades, have been widely used. Usually, with such prior art devices, the operator manually holds the blade in place on the stationary flat surface of the guide and then urges the blade into contact with the periphery of the power driven grinding wheel. Adjustment of the angle of the guide is difficult and time consuming and skill is necessary to determine the pressure and orientation of the blade on the guide.

More complicated guides which attempt to orient a blade more positively have been devised; however, these devices are limited with respect to the size and shape of the blades which it will sharpen. U.S. Patent No. 2,562,618 discloses one such device.

When an oil impregnated grinding stone was used, it has been general practice not to employ any guide mechanism for the blade. The grinding of a knife on an oil impregnated grinding stone maintains the knife in a relatively cool condition and enables a sharp edge to be produced thereon. Also, there is some tendency, when using a grinding stone, to create a "hollow grind." It is difficult, however, for the hollow grind to be produced or duplicated in subsequent grinding operations and it is difficult to maintain the proper bevel on the blade being ground.

Briefly described, the present invention, which overcomes the difficulties described above, includes in combination with a conventional oil impregnated, power driven, cylindrical grinding stone, carried in a housing, and exposing the upper periphery of the stone for the purpose of sharpening a blade, a knife guide having a support mounted on the housing and disposed over the upper periphery of the grinding stone. A transversely disposed pressure roller is carried adjacent the stone by the support and may be incrementally moved upwardly and downwardly so as to take up for the wear on the periphery of the grinding stone. The pressure roller acts as an alignment and reaction member to hold the blade against the stone, as a means for aligning the blade transversely of the stone and as a heat conductor to conduct heat away from the stone. Mechanism is also provided for locking the pressure roller in a prescribed position. Carried by the support is a blade guide member

which is disposed to one side and inwardly of the roller, approximately tangential to the grinding wheel. The blade guide member is movable with the roller toward and away from the axis of the grinding wheel and the angle of the guide member with respect to the tangent of the wheel may be varied as desired, without requiring the relocation of the pressure roller.

Accordingly, it is an object of the present invention to provide a blade orienting attachment which will assure that knives sharpened on a grinding wheel with which it is associated will be sharpened with prescribed bevel and that a hollow grind will be imparted to the blade edge.

Another object of the present invention is to provide a blade orienting attachment for grinding wheels which will assure that the sharpening action is substantially duplicated, each time a blade is sharpened

Another object of the present invention is to provide a blade orienting attachment having a blade guide which is easy to adjust and an attachment which can be used by an inexperienced operator

Another object of the present invention is to provide a blade orienting attachment which can be incrementally adjusted to provide for the wear on the grinding wheel.

Another object of the present invention is to provide a blade orienting attachment which will orient a blade properly with respect to a grinding wheel and which is inexpensive to manufacture, durable in structure and efficient in operation.

Another object of the invention is to provide a blade orienting attachment which will cause blades sharpened on grinding wheels equipped with the attachments to wear down evenly the grinding periphery of the wheel.

Another object of the present invention is to provide a blade orienting attachment which will apply even pressure to a blade as it is sharpened, conduct heat away from the blade edge as it is sharpened, and in which the alignment member need not be readjusted in order to vary the angle at which the blade is carried by the blade guide member thereof.

Other objects, features, and advantages of the present invention will become apparent from the following description when taken in conjunction with the accompanying drawings wherein like characters of reference designate corresponding parts throughout the several views and wherein:

FIG. 1 is a fragmentary perspective view of a conventional grinding hone having mounted thereon a blade orienting attachment constructed in accordance with the present invention; and

FIG. 2 is a vertical sectional view of the mechanism illustrated in FIG. 1; and

FIG. 3 is a top plan view of the mechanism illustrated in FIG. 1.

Referring now in detail to the embodiment chosen for the purpose of illustrating the present invention, it being understood that, in its broader aspects, the present invention is not limited to the exact details herein depicted, the grinding hone includes a cylindrical grinding stone or wheel **10** which is disposed for rotation about its horizontal axis within a housing **11**. Wheel or stone **10** is provided with flat parallel sides **12** and **13** and a peripheral grinding surface **14**. The usual equipment for rotating this stone **10** and for continuously impregnating it with oil is contained within the housing **11** and includes an electric motor (not shown), an oil container (not shown), and a doctor roller (not shown) for continuously applying oil to the surface **14** of the grinding stone **10** as it is rotated.

As illustrated, the upper peripheral portion of the grinding stone **10** protrudes through a rectangular opening **15** in the horizontally disposed flat top plate **16** of

housing 11. The vertical position of stone 10 is adjusted by manipulation of knob 17.

Since the mechanism described above is conventional, no detailed description of this mechanism is deemed necessary.

SUPPORT

Forming the sole support for the knife guide and pressure roller to be described hereinafter, is a Z-shaped brace, denoted generally by numeral 20. The brace 20 is an integral member including a flat, rectangular, horizontally disposed base 21 from one edge of which extends an upstanding, vertically disposed, support plate 22. Protruding horizontally in cantilever fashion from the support plate 22 is an adjustment bolt carrying plate 23. It is therefore seen that the base 21 protrudes in one direction, i.e., forwardly, perpendicularly from the lower edge of the plate 22 while the plate 23 protrudes in the other direction, i.e., rearwardly, perpendicularly from the upper edge of the plate 22.

The base 21 is firmly secured by means of bolts 24 to the upper surface of the top plate 16, adjacent the forward end of the opening so as to dispose the plate 23 in a plane above stone 10, parallel to and forwardly of the axis of stone 10. The width of the plates 21, 22, and 23 is approximately equal to the width of the opening 15 so that the plates 21, 22, and 23 are slightly wider than the distance between the opposed parallel sides 12 and 13 of stone 10. The height of plate 22 is such as to dispose the plate 23 in a plane above the upper peripheral surface 14 of stone 10.

In the central portion of plate 22 is a vertically disposed slot 26, the ends of which terminate slightly inwardly of the upper and lower edges of plate 22. A rectangular mounting block 27 is disposed outwardly of plate 22, the mounting block 27 being slightly longer than the width of plate 22.

A set screw 25 having a head 28 and a threaded shaft 29 is provided, adjacent head 28, with a deformed washer 30. This set screw 25 is passed through a hole 31 in the central portion of block 27 and thence through slot 26 and is threadedly received within an internally threaded bore 33 along the axis of a cylindrical locking block 32. When the set screw 25 is loosened, the blocks 27 and 32 may be raised and lowered with respect to the plate 22; however, when the set screw 25 is tightened, the head 28 of the set screw urges the inner surface of block 27 against the front surface of support plate 22 while the threads of shaft 29 urge the inner surface of block 32 against the rear surface of plate 22, thereby locking block 27 in place.

Outwardly of the axial bore 33 of block 32, the block 32 is provided with a radial bore 34 having internal threads which receive the threaded lower end of a shaft 35 of an adjustment bolt 36. The shaft 35 protrudes through a hole 37 in the central portion of plate 23 so that the knurled head 39 of bolt 36 rides on the upper surface of plate 23. A retaining ring 38 received in a circumferential groove in shaft 35 prevents outward movement of the shaft 35 while head 39 prevents inward movement thereof. It is therefore seen that the adjustment bolt 36 is rotatably retained by the plate 23.

When the set screw 25 is loosened, manipulation of head 39 will rotate shaft 35 to raise and lower the block 32 and thereby raise and lower the block 27, incrementally.

It will be remembered that the block 27 is longer than the width of plate 22 and protrudes outwardly from opposite sides of plate 22. These protruding ends of block are provided respectively with recesses which receive the ends of a pair of horizontal, rearwardly extending, opposed, parallel, roller supporting arms 40 and 41. The bracket arms 40 and 41 are flat, vertically disposed members which terminate, outwardly adjacent surfaces 12 and 13 of stone 10, in upstanding flanges 42 and 43, respectively, these flanges 42 and 43 being turned outwardly and then downwardly to provide a pair of downwardly extending flanges 44 and 45.

ALIGNMENT MEMBER ASSEMBLY

A pair of roller supporting arms 46 and 47, which are outwardly and upwardly offset from arms 40 and 41, protrude rearwardly from the flanges 44 and 45 and journal, therebetween, a roller supporting shaft 48. A transversely disposed, cylindrical, steel roller 50 is carried on the shaft 48 between the arms 46 and 47 and is freely rotatable, the roller 50 forming an alignment member which, when a blade B is received on the blade orienting attachment, abuts and holds the edge of blade in proper transverse alignment with surface 14, while conducting heat from the blade B.

From an examination of the drawings, it will be seen that the shaft 48 is disposed parallel to and vertically above the axis of stone 10 and that the length of roller 50 is slightly longer than the width of stone 10 from side 12 to side 13. The arrangement of arms 40, 41; 46, 47 are such that the roller 50 normally is disposed slightly above and spaced from the upper periphery of stone 10, whereby the lower periphery of roller 50 will engage the upper bevel of blade B and prevent further inward movement of that blade.

BLADE SUPPORTING ASSEMBLY

Protruding outwardly from the rear ends of arms 40 and 41, respectively below the end of roller 50, are a pair of opposed pivot supporting fingers 51 and 52 which respectively support a pair of aligned outwardly protruding pivot pins 53 and 54. The pivot pins 53 and 54 are disposed slightly below the lower periphery of roller 50 and below the upper periphery of stone 10, along an axis parallel to the axes of the grinding wheel 10 and shaft 48. The axis of pivot pins 53 and 54 is also in approximately a vertical transverse plane with the axes of stone 10 and shaft 48.

Pivotally carried by the pins 53 and 54 are a pair of opposed blade supporting arms 55 and 56, the rear ends of which are connected by a cross-strap 57, outwardly of the periphery of stone 10. Arms 55 and 56 are disposed outwardly parallel to arms 40 and 41 and extend sidewise, i.e., in a radial or lateral direction from below roller 50, on the side of roller 50 opposite that of the support.

Arms 55 and 56, as well as the cross-strap 57, are provided with straight upper surfaces 58, 59 and 60 which are disposed in a common plane approximately tangential to the lower periphery of roller 50 and upper periphery of stone 10. The pins 53 and 54 pivotally receive the arms 55 and 56 closely adjacent the increments of surfaces 58 and 59 which are below roller 50, so that as the knife guide member, formed by surfaces 58 and 59, pivots about the effective axis of the pivot pins 53 and 54, the arc of rotation of these increments is so close to pins 53 and 54 that these increments are not appreciably shifted from between the adjacent peripheries of roller 50 and stone 10.

Arms 55 and 56, forwardly of the pivot pins 53 and 54, i.e., on the support side of roller 10, extend slightly forwardly and upwardly to provide intermediate portions 61 and 62, respectively, which are outwardly and respectively parallel to arms 40 and 41. The forward ends of the intermediate portions 61 and 62 are provided with fan-like adjustment plates 63 and 64, the upper and lower edges of which extend respectively from the upper and lower edges of the intermediate portions 61 and 62, diverging forwardly and terminating in a pair of curvilinear forward edges 65 and 66, respectively.

Slightly inwardly of the curved edges 65 and 66, the plates 63 and 64 are provided with arcuate slots 67 and 68 having radii originating at the axis of the pivot pins 53 and 54. These slots 67 and 68 are at a radius corresponding to the distance between the central portion of block 27 and the axis of pivot pins 53 and 54.

The outer surfaces of plates **63** and **64** are respectively provided with indicia, such as indicia **69**, which indicate the angle of inclination of the surfaces **58**, **59**, **60**, in a clockwise direction as viewed in FIGS. 1 and 2 from the tangent of stone **10**.

Flat metal pointers **70** and **71** are disposed outwardly of the plates **63** and **64**, the pointed inner ends of pointers **70** and **71** being disposed adjacent the indicia, such as indicia **69**. The pointers **70** and **71**, respectively, wrap around the edges **65** and **66** of the plates **63** and **64** and terminate forwardly of the slots **67** and **68**. Pointers **70** and **71** are provided with central holes through which the shafts of locking bolts **72** and **73** pass. Thence, the shafts of the locking bolts **72** and **73** pass inwardly through the slots **67** and **68**, through appropriate holes in the arms **40** and **41** and are threadedly received in the ends of block **27**. Upon tightening of the locking bolts **72** and **73**, the pointers **70** and **71** are clamped against the plates **63** and **64**, while the plates **63** and **64** are clamped against the arms **40** and **41** and are, to a certain extent, clamped against the ends of block **27**, above and below the recesses which receive arms **40** and **41**.

Hence, the plane of surfaces **58**, **59** and **60** is fixed with respect to the periphery or grinding surface **14** of stone **10**. Of course, upon the loosening of bolts **72** and **73**, the guide member may be pivoted about pivot pins **53** and **54** to increase or decrease the angle of inclination, from the tangential, of the plane of surfaces **58**, **59** and **60**.

Preferably the indicia, such as indicia **69**, are graduated in degrees, for example, from 0° to 7°. Thus, a very finite angle can be established for surfaces **58**, **59** and **60** and once a prescribed angle is established for a particular knife, the knife may be repeatedly sharpened with the same angular disposition. It is a simple matter to inscribe upon each knife to be sharpened with the device of the present invention, an appropriate inscription which would indicate the suitable angle to be employed for sharpening the particular knife.

OPERATION

In operation, a knife blade B is placed flat upon surfaces **58** and **59** and urged forwardly so that the edge side to be sharpened engages the surface **14** of stone **10**, as stone **10** is rotated. The blade is then moved transversely so that the entire length of the blade edge is engaged by surface **14**. The roller **50** aligns the blade B with surface **14** by receiving the back surface of the blade edge. When blade B is properly aligned for frictional engagement of surface **14** with the bottom edge to be sharpened, substantially the entire transverse portion of surface **14** engages the blade edge and roller **50** prevents further inward movement of the blade B, and conducts the heat away from the blade edge. This is inherently accomplished since there is the natural tendency of an operator to align the knife, as best he can, in alignment with the axis of roller **50** and it is a quite simple matter to feel whether or not the blade is disposed in proper transverse alignment with the axis of roller **50**. The roller **50**, itself, acting as a reaction camming member or cushion, tends to urge the edge to be sharpened of blade B against surface **14** gradually, as pressure is applied by the operator to the blade B and by the grinding stone **10** which is rotating in a direction to urge the blade B against roller **50**. With this even pressure applied by roller **50** on the blade B, a hollow grind is imparted to one surface of the edge.

Of course, after one side of the edge of the blade B is sharpened, the blade B is removed and turned over so as to position the other side of the edge, to be sharpened, between roller **50** and surface **14**. Since a hollow grind has been imparted to the surface which has previously been sharpened, this hollow side of the cutting edge will tend naturally to align itself along the periphery of roller **50** and thereby aid to align the side of the cutting edge which is to be sharpened against surface **14** of stone **10**.

Since the movement of roller **50** as the bolt **39** is manipulated is along a prescribed radius of stone **10**, no readjustment of the angle of arms **55** and **56** is necessary when the position of blade guide member and roller is changed for surface wear.

As the surface **14** wears down, it is a simple matter to loosen screw **25** and manipulate bolt **39** to take up for this wear and then to retighten the screw **25** so as to again lock guide member and roller **50** of the blade orienting attachment in place. By rotating bolt **39** until roller **50** touches surface **14** and then backing off by a certain degree of turn on bolt **39**, the proper space between roller **58** and surface **14** is reestablished.

Since the axis of roller **50** remains parallel to the axis of stone **10**, at all times, the roller **50** will assure that the knives being sharpened utilizing the device of the present invention will evenly remove the abrasive material from surface **14** and, therefore, there is little tendency of the surface **14** to wear unevenly. Any high spots on the periphery of surface **14** will abrade the knives being sharpened to a greater extent than the lower spots or areas of surface **14** and hence, itself, be worn down.

It is also quite simple, through manipulation of bolts **72** and **73** to vary the angle of the bevel to be imparted to the blade edge. Since the effective axis of pivot (at pivot pins **53** and **54** in the present embodiment) of the blade guide member, i.e., arms **55** and **56**, is located approximately parallel to the axis of rotation of stone **10** and this effective axis of pivot is at the same time closely adjacent the peripheral surface **14** of stone **10** and also closely adjacent the increment of surfaces **58** and **59** at which the inward movement of the blade edge is stopped by roller **50**, pivoting of arms **55** and **56** between 0° and 7° from the tangent during adjustment does not appreciably alter the position of that increment of surfaces **58** and **59** with respect to the peripheral surface **14** and hence no readjustment through manipulation of bolt **39** need be involved in changing the blade guide member angle.

It will be obvious to those skilled in the art that many variations may be made in the embodiments chosen for the purpose of illustrating the present invention without departing from the scope thereof as defined by the appended claims.

What is claimed as the invention is:

1. A blade orienting attachment for orienting a blade to be sharpened adjacent the periphery of a grinding wheel which is rotated about its axis comprising:

(a) a support disposed adjacent the periphery of said grinding wheel;

(b) a blade guide member having a blade supporting surface disposed in a plane adjacent the periphery of said grinding wheel;

(c) pivot means pivotally connecting said blade guide member to said support, whereby pivoting of said blade guide member about its effective axis does not appreciably alter the position of that increment of said surface adjacent the periphery of said grinding wheel; and,

(d) alignment means carried by said support and positioned outwardly of and adjacent the periphery of the grinding wheel, said alignment member engaging that portion of the beveled surface of the blade adjacent the cutting edge of the blade on the opposite side of the blade from that surface of the blade urged into contact with the grinding wheel to conduct the heat generated in the blade by the grinding wheel away from the cutting edge of the blade;

said alignment member including a roller rotatably carried by said support and extending across the periphery of said grinding wheel, said roller having axis approximately parallel to the axis of said grinding wheel, the axis of said roller being disposed in approximately the same plane with the axis of said grinding wheel and the effective axis of said blade guide member.

2. The structure defined in claim **1** including means for adjusting the distance between the axis of said roller

and the axis of said grinding wheel while maintaining the axis of said roller approximately parallel to the axis of said grinding wheel and in said same plane.

3. A blade orienting attachment for orienting a blade to be sharpened adjacent the periphery of a grinding wheel which is rotated about its axis comprising:

(a) a support disposed adjacent the periphery of said grinding wheel;

(b) a blade guide member having a blade supporting surface disposed in a plane adjacent the periphery of said grinding wheel;

(c) pivot means pivotally connecting said blade guide member to said support, said pivot means providing an effective axis of pivot of said blade guide member located approximately parallel to the axis of rotation of said grinding wheel and located in the close vicinity of the point of contact between the grinding wheel and the blade, the effective axis of said pivot means also being located closely adjacent the plane of said blade supporting surface, whereby pivoting of said blade guide member about its effective axis does not appreciably alter the position of that increment of said surface adjacent the periphery of said grinding wheel; and,

(d) means for locking said blade guide member in selected angular positions;

said blade guide member including a U-shaped strap, having a pair of parallel arms supported by said pivot means, a cross bar connecting the ends of said arms, said means for locking said blade guide member in selected angular positions being connected to said arms and radially spaced from said pivot means, and the upper surfaces of said arms defining said blade supporting surface.

4. A blade orienting attachment for orienting a blade to be sharpened adjacent the periphery of a grinding wheel comprising:

(a) a support disposed adjacent the periphery of said grinding wheel;

(b) a roller;

(c) a blade guide with a blade supporting surface disposed approximately tangential to said grinding wheel for supporting a blade flat against said surface with one side of its edge to be sharpened engaging the periphery of said grinding wheel; and,

(d) means on said support for supporting said roller with its axis approximately parallel to the axis of said grinding wheel and in a radial plane approximately intersecting said surface at the periphery of said grinding wheel and sufficiently close to the periphery of said grinding wheel that the other side of the edge of said blade to be sharpened is contacted by said roller to prevent further movement of said blade along said surface and to conduct heat away from said edge during the sharpening operation.

5. The structure defined in claim 4 including means on said support for simultaneously adjusting the positions of said roller and said blade guide member toward and away from said periphery of said grinding wheel.

6. The structure defined in claim 4 including means carried by said support for adjusting the angle of said surface with respect to the tangent of said grinding wheel.

7. The structure defined in claim 5 including means on said support for adjusting the angular disposition of said surface with respect to the tangent of said grinding wheel.

8. The structure defined in claim 4 wherein said support includes a vertically disposed support plate, a block slidably retained on said support, a pair of brackets extending from said block and supporting said roller, and means connected to said plate for adjusting the position of said block incrementally.

9. The structure defined in claim 8 wherein said blade guide member includes a pair of arms respectively pivotally connected to said brackets and extending outwardly parallel thereto, and means connected between said support and said arms for incrementally adjusting the angle of said arms with respect to the tangent of said grinding wheel.

10. The structure defined in claim 9 wherein last mentioned means includes a pair of opposed plates connected to the ends of said arms and disposed adjacent said block, said opposed plates being respectively provided with aligned arcuate slots, and means projecting through said slots for clamping said plates with respect to said block.

11. A blade orienting attachment for orienting a blade to be sharpened adjacent the periphery of a grinding wheel which is rotated about its axis comprising:

(a) a support disposed adjacent the periphery of said grinding wheel;

(b) a blade guide member having a blade supporting surface disposed in a plane adjacent the periphery of said grinding wheel;

(c) pivot means pivotally connecting said blade guide member to said support, whereby pivoting of said blade guide member about its effective axis does not appreciably alter the position of that increment of said surface adjacent the periphery of said grinding wheel;

(d) alignment means carried by said support and positioned outwardly of and adjacent the periphery of the grinding wheel, said alignment member engaging that portion of the beveled surface of the blade adjacent the cutting edge of the blade on the opposite side of the blade from that surface of the blade urged into contact with the grinding wheel to conduct the heat generated in the blade by the grinding wheel away from the cutting edge of the blade;

(e) means for simultaneously moving said blade guide member and said alignment means radially with respect to the grinding wheel; and,

(f) means for pivoting said blade guide member about said pivot means independently of said alignment means.

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