FLUTED-CUTTER SHARPENER

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This invention relates to sharpening devices and relates more particularly to a device for sharpening fluted cutters in which the cutting edge is formed along one of the edges of each flute.

While the invention has particular utility in connection with the sharpening of a spirally fluted device and is shown and described in such connection, it is to be understood that its utility is not confined thereto.

In cutters where the cutting edge is formed along a spiral of a flute, it has been found to be difficult to accurately and quickly sharpen such an edge. Further, it has been uneconomical to sharpen such a tool.

It is, therefore, an object of the invention to provide a cutting device for sharpening cutting edges formed along the edges of flutes in a cutting device.

Another object of the invention is to provide a sharpener for a cutter having its cutting surfaces along the edges of flutes and in which the cutter is guided in the sharpener to automatically properly sharpen a given edge.

It is a further object of the invention to provide a sharpener for fluted cutting edges in which the edge to be sharpened is adjusted to be in proper vertical, horizontal, and rotational positions with respect to the surface performing the sharpening action.

It is a still further object of the invention to provide a fluted-cutter sharpener in which the cutter may be moved along a single fixed path into contact with a sharpening surface.

Another object of the invention is to provide a sharpener of the character described in the previous paragraphs wherein the sharpener operator needs only to easily push and pull the cutter through a fixed path in the sharpening device.

Still another object of the invention is to provide a device of the character described in the preceding paragraphs and which is relatively simple in construction and operation.

A further object of the invention is to provide a device of the character described in the preceding paragraphs and which is relatively easy, economical, and inexpensive to build or manufacture.

Another object of the invention is to provide a device of the character described in the preceding paragraphs and which is sturdy and rugged.

Further objects and advantages of the invention may be brought out in the following part of the specification wherein small details have been described for the competence of disclosure, without intending to limit the scope of the invention which is set forth in the appended claims.

Referring to the accompanying drawings, which are for illustrative purposes only:

FIG. 1 is a plan view of a sharpener according to the present invention, wherein a spirally fluted cutter is in position for sharpening;

FIG. 2 is a fragmentary enlarged, detailed plan view similar to that shown in FIG. 1;

FIG. 3 is a side elevational view taken as indicated along the line 3—3 of FIG. 2;

FIG. 4 is a fragmentary end view, illustrating a cutting guide in the sharpener, taken as indicated by the line 4—4 of FIG. 2;

FIG. 5 is a fragmentary view, partially in section, taken as indicated by the line 5—5 of FIG. 2;

FIG. 6 is a cross sectional view taken as indicated by the line 6—6 in FIG. 1; and

FIG. 7 is a fragmentary view, partially in cross section, taken as indicated by the line 7—7 in FIG. 1.

Referring again to the drawings, in FIGS. 1—3 there are illustrated a fluted-cutter sharpener, generally designated as 10, and a fluted cutter 11 in position to be sharpened. The sharpener 10 is comprised of an elongated base member, shown secured to a work bench 13 by means of bolts 14. At one end of the base member 12 is a pair of spaced, upwardly extending lugs 17 to which clamp 18 is pivotally secured by means of bolt 19. The clamp 18 is formed of two parts which are secured together by a nut and bolt assembly 20 so as to hold motor 23 in position to be pivotable on bolt 19.

To the right of the motor proper in the drawings is a U-shaped yoke 24 having its hook ends 25 engaged in openings 26 in the motor housing and having its bottom portion 29 engaged with one end of a spring 30, the other end of the spring being secured in an opening in lug 31 on the upper side of the base member. The spring 30 serves to bias the right end of the motor 23 downwardly toward the base 12.

Alongside of the spring 30 is an adjusting bolt 32 having its upper end in contact with conical portion 35 of the motor housing, and having its lower end threadedly engaged in a boss 36 extending upwardly from base 12. Coiled around the bolt 32 is a spring 37 serving to lock the bolt in any of its threadedly adjusted positions.

Extending outwardly from the conical portion 35 of the housing is a motor shaft 38 and having on its outer end a grinding wheel 40 connected to be driven by the motor 23.

Under the wheel 40 is a fan-shaped portion 41 of the base, having therein a curved slot 42. Extending upwardly through the slot 42 is an adjusting bolt 43, having its upper end threadedly engaged in elongated block 46. The block 46 is pivotally engaged to the fan portion 41 by means of a pivot pin 47 so that when the bolt 43 is loosened, the block 46 may be pivoted horizontally with respect to the grinding wheel 40, as may be best seen in FIGS. 2 and 5. Secured to the upper V-shaped portion 48 of the block 46 by means of screws 49 is a V-shaped trough 52, having its one end directly under the grinding wheel 40 and so that it may be pivoted for horizontal adjustment on the block pivot pin 47 to the extent of the curved slot 42.

Adjustably secured to the end of the trough 52, adjacent the grinding wheel 40, as best seen in FIG. 4, is a crescent-shaped fluted-cutter guide 53. The guide is secured to the trough by means of a bolt 54, having one end thereof secured in the trough and having the other end thereof extending upwardly through annular slot 55, the bolt head 58 overlapping the slot on the inner side of the guide. Thus, when the bolt 54 is loosened, the guide 53 may be rotated on its axis in the trough to the extent of the annular slot 55. Extending inwardly from the circumferential portion of the guide 53 are annularly spaced, radially extending projections or flute-guiding members 59 which are arranged to fit into the flutes of the cutter to be sharpened.

At the other end of the trough 52 from the grinding wheel 40, as best seen in FIGS. 1, 6 and 7, is a guide sleeve 60, slidably engaged in the trough and being limited in its sliding movement by the grinding wheel at one end of the trough and at the other end by pin 61 extending upwardly into the trough. The sleeve is fitted, through axial opening 64, on shank 65 of the cutter 11 with which it is rotatably engaged. It is secured on the cutter by means of a nut 66 which is tightened on the threads on the end of the shank 65. An upper, central portion

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67 in the sleeve is cut away to provide a hand gripping means on the exposed surfaces of the sleeve.

The cutter 11 has, extending from the shank, a body 68 having two spiral flutes 70 and 71 with respective counterclockwise cutting edges 70a and 71a. As may best be seen in FIG. 4, projections 59 on the cutter guide are annularly spaced to be fitted within the respective flutes.

In operation, to sharpen the cutter the sleeve guide 60 is placed on the cutter shank 65 and the retaining nut 66 is secured on the cutter shank. The cutter is then placed in the trough 52, as indicated in FIG. 1, and is fitted into the cutter guide 53 so that the projections 59 extend into the respective flutes, such as 70 and 71. The height adjustment screw 32 is then turned to the left or right until the grinding wheel 40 just touches the center bottom of one of the cutter flutes. In this adjustment, the spring 38 holds the conical portion 35 of the motor housing in abutment with the top of the screw 32, the screw 32 being held in position by the spring 37.

To horizontally align the flute cutting edge to be sharpened, such as 71a, so that it is parallel with the sharpening surface of the wheel 40, as is shown to be for proper sharpening, the adjustment bolt 43 in the block 46 is loosened and the trough 52 is pivoted along with the block on pivot 47 until the parallel relationship is achieved, at which time the bolt 43 is again tightened.

To then complete the height adjustment, the screw 32 is turned a few turns to raise the grinding wheel so that it just clears the bottom of the flute.

In order to achieve the desired rotational adjustment of the cutting edge to be sharpened, in a spiral cutter of the type shown, an 0.025-inch feeler gauge, for example, is placed between the grinding wheel 40 and the cutting edge, such as 71a, and holding the feeler gauge flush with the face of the grinding wheel, the cutter guide 53 is rotated on the loosened bolt 54 on its axis and on the axes of the cutter and the sleeve guide until the projections 59 force the cutting edge into contact with the feeler gauge. At this time, the cutter guide is then locked in place by tightening the bolt 54 and the cutter in it is in proper rotational alignment. Before the motor 23 is turned on, the cutter should be pushed back and forth in the trough with a hand, gripping the sleeve 60, to rotate the cutter on the guides and to bring the path provided by the guide projections. This step is to determine that an 0.025-inch clearance, for example, is maintained between the grinding wheel and the cutting edge to be sharpened on the forward stroke. The sharpening is accomplished on the backward stroke and, thus, there should be no clearance when the cutter is moved in the direction away from the grinding wheel. Then, to sharpen, the motor is turned on and the cutter is pushed back and forth in the trough, through the cutter guide, until the cutting edge is sharp.

The process is repeated for each cutting edge.

For different types of cutters, that is, for those of different size and having different shapes and different numbers of flutes, different guides are required and different adjustments of the bolts 42 and 43 and of the guide are necessary. Also, fixed nonadjustable cutter guides are provided for individual sizes or types of cutters and no adjustments are required.

The invention and its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the form, construction, and arrangement of the parts of the invention without departing from the spirit and scope thereof or sacrificing its material advantages, the embodiment hereinbefore described being merely for the purpose of illustration.

We claim:
1. In a fluted-cutter sharpener: a base member; a motor secured on said base member; a motor shaft extending from and driven by said motor; a grinding wheel secured on the shaft of said motor to be driven thereby; a trough secured to said base member and extending under said grinding wheel; means to position said trough on said base member; a grinding wheel from and driven by said motor; a grinding wheel secured in position for sharpening; a guide sleeve slidable in said trough for securing to a cutter for moving said cutter in said trough toward away from said grinding wheel surface while said flute edge surface is in position for sharpening; a cutter guide secured in said trough for rotatably guiding the flute edge surface in position for sharpening to maintain it in its proper rotational relationship with respect to said grinding wheel as the cutter is moved toward and away from said grinding wheel; and means to vertically position said grinding wheel with respect to the flute edge surface in position for sharpening.
2. In a fluted-cutter sharpener: a base member; a motor secured on said base member; a motor shaft extending from and driven by said motor; a grinding wheel secured on the shaft of said motor to be driven thereby; an uprightly open trough secured to said base member on a vertical pivot and extending under said grinding wheel; means to horizontally, pivotally adjust said trough on said base member to place a flute edge surface of a cutter therein parallel to a grinding wheel surface for sharpening; a guide sleeve slidable in said trough for securing to one end of a cutter for moving said cutter in said trough toward and away from said grinding wheel surface while said flute edge surface is in position for sharpening, said sleeve being rotatable with respect to said cutter; an adjustable cutter guide secured in said trough for guiding the flute edge surface into position for sharpening to maintain it in its proper relationship with respect to said grinding wheel and to vertically position said grinding wheel with respect to the flute edge surface in position for sharpening.
3. In a fluted-cutter sharpener: a base member; a motor secured on said base member; a motor shaft extending from and driven by said motor; a grinding wheel secured on the shaft of said motor to be driven thereby; a trough secured to said base member on a vertical pivot and extending under said grinding wheel; means to pivotally adjust said trough on said base member to place a flute edge surface of a cutter therein parallel to a grinding wheel surface for sharpening; a guide sleeve slidable in said trough for securing to one end of a cutter for moving said cutter in said trough toward and away from said grinding wheel surface while said flute edge surface is in position for sharpening, said sleeve being rotatable with respect to said cutter; an adjustable cutter guide secured in said trough for guiding the flute edge surface into position for sharpening to maintain it in its proper relationship with respect to said grinding wheel and to vertically position said grinding wheel with respect to the flute edge surface in position for sharpening.
4. In a fluted-cutter sharpener: a base member; a motor having a horizontal shaft secured to said base member; a vertical grinding wheel secured on said shaft to be driven thereby; a horizontal trough secured to said base member on a vertical pivot and extending under said grinding wheel; means to pivotally adjust said trough on said base member to place a flute edge surface of a cutter therein parallel to a grinding wheel surface for sharpening; a guide sleeve slidable in said trough for securing to one end of a cutter for moving said cutter in said trough axially toward and away from said grinding wheel surface while said flute edge surface is in position for sharpening, said sleeve being rotatable with respect to said cutter; a cutter guide secured in said trough for rotatably guiding the flute edge surface into position for sharpening to maintain it in its proper rotational relation-
ship with respect to said grinding wheel as the cutter is moved toward and away from said grinding wheel, said cutter guide comprising radially, inwardly extending spaced members adapted to be fit on flute surfaces of said cutter, said cutter guide being rotationally adjustable about its longitudinal axis and the longitudinal axes of said sleeve and cutter to rotate and position said flute edge surface rotationally toward and away from said grinding wheel; and means to vertically adjust said grinding wheel with respect to the flute edge surface in position for sharpening.

5. In a fluted-cutter sharpener: a generally horizontal base member; a motor secured to said base member on a horizontal pivot, said motor having a horizontal shaft; a vertical grinding wheel secured on said shaft, said motor being biased toward said base member between said horizontal pivot and said wheel; a horizontal trough secured to said base member on a vertical pivot at an angle to said shaft and extending under said grinding wheel; means to pivotally adjust said trough on said base member to place a flute edge surface of a cutter therein parallel to a grinding wheel surface for sharpening; lock-screw means to move said motor on its pivot to vertically adjust said grinding wheel with respect to the flute edge surface in position for sharpening; a guide sleeve slidable in said trough for securing to one end of a cutter for moving said cutter in said trough axially toward and away from said grinding wheel surface while said flute edge surface is in position for sharpening, said sleeve being rotatable with respect to said cutter; and a cutter guide secured in said trough for rotatably guiding a flute edge surface into position for sharpening to maintain it in its proper rotational relationship with respect to said grinding wheel when the cutter is moved axially toward and away from said grinding wheel, said cutter guide comprising radially, inwardly extending spaced members adapted to be fit on flute surfaces of said cutter, said cutter guide being rotationally adjustable about its longitudinal axis and the longitudinal axes of said sleeve and cutter to rotate and position said flute edge surface rotationally toward and away from said grinding wheel.

References Cited in the file of this patent

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Inventor</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>407,577</td>
<td>Cox</td>
<td>July 23, 1889</td>
</tr>
<tr>
<td>1,976,818</td>
<td>Ward</td>
<td>Oct. 16, 1934</td>
</tr>
<tr>
<td>2,051,357</td>
<td>Barrett</td>
<td>Feb. 16, 1936</td>
</tr>
<tr>
<td>2,052,567</td>
<td>Haines</td>
<td>Sept. 1, 1936</td>
</tr>
<tr>
<td>2,595,460</td>
<td>Jabour</td>
<td>May 6, 1952</td>
</tr>
</tbody>
</table>