Dec. 16, 1947. L. M. McBRIDE 2,432,534

KNIFE SHARPENER

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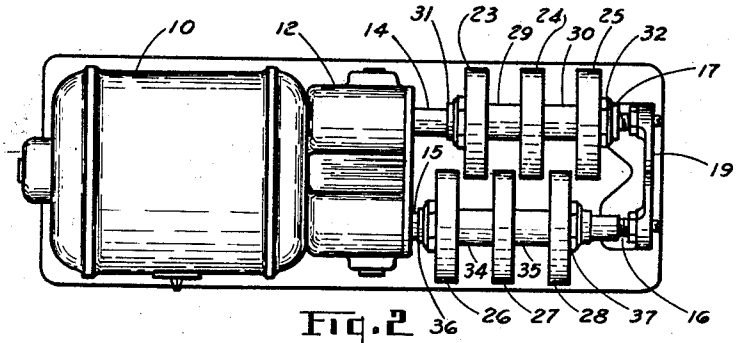


FIG. 2

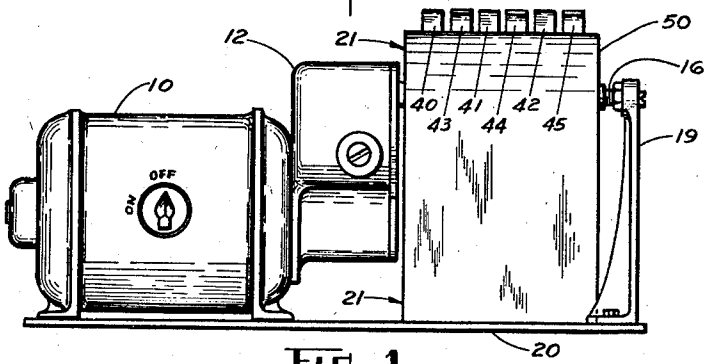


FIG. 1

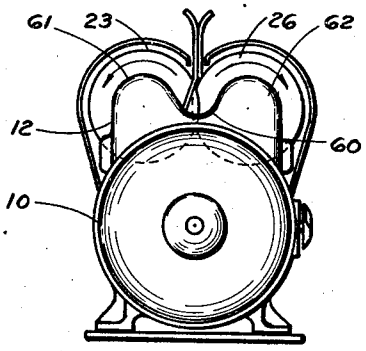


FIG. 5

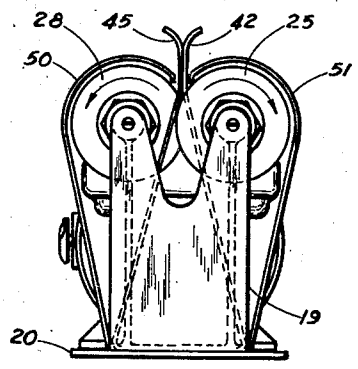


FIG. 3

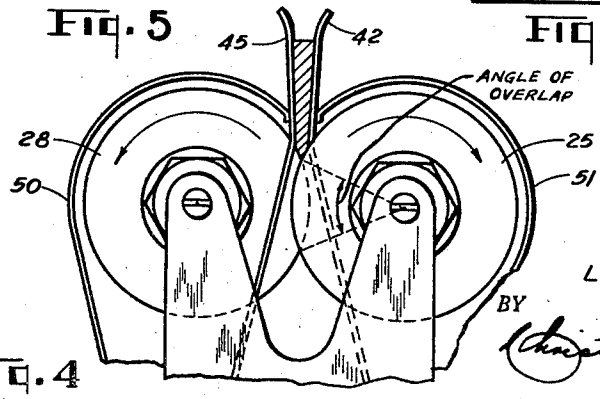


FIG. 4

INVENTOR.
LEWIS M. McBRIDE
BY
Christie & Angus
ATTORNEYS

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KNIFE SHARPENER

Lewis M. McBride, Arcadia, Calif.

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4 Claims. (Cl. 51—81)

1

This invention is concerned with knife-sharpening and particularly with the sharpening of knives for use in the cutting of food. leather and similar relatively soft substances. The invention provides an improved sharpener that is particularly adapted for use in households, restaurants, grocery stores, butcher shops, leather-working establishments and the like, because it is so designed that even in the hands of unskilled labor it automatically imparts to the knife a uniform cutting edge that is optimum for the cutting of food, leather, and the like.

Conventional practice in households, butcher shops, etc., is to sharpen a knife one side at a time, with the cutting edge and the grinding media coming in contact with each other at relatively slow speed. This practice of one-sided sharpening, especially at slow speeds, causes the metal to be carried or turned over to the opposite side and tends to leave a rough, jagged, or feathered edge, even when the work is done by an experienced mechanic. Moreover, in such an operation, not even an experienced mechanic can obtain exact or equal bevels on both sides of the blade throughout its length, and the tendency is to sharpen the blade with an excessive bevel, i. e., to impart a razor-type edge which dulls rapidly and is not adapted to food cutting, etc.

In unskilled hands, the conventional sharpening devices such as stones, "steels," files and the usual types of grinding wheels, both hand- and power-operated, tend to mar the side of the blade above the cutting edge. Much expensive table cutlery and the like has been disfigured in this manner. Moreover, conventional practice of the type described tends to cause "glazing," "loading," or dulling of the grinding media, for example, a stone or steel.

As a result of my investigations, I have developed an improved sharpening device for use with knives intended for the cutting of food, etc., and which, even in the hands of an unskilled operator, imparts a proper, symmetrical and uniform bevel to the blade without scarring of the sides. The apparatus permits the attainment of a proper cutting edge with a minimum of grinding, so that the blade has a long life. Further advantages attendant upon the apparatus of my invention are:

(1) Safety,

(2) Ability to secure optimum results with little skill,

(3) The grinding media does not become "glazed" or "loaded,"

(4) The abrasive dust from the grinding media is caught and prevented from contaminating the surroundings.

In essence, my invention contemplates the combination (in a knife grinder) of a plurality

2

of grinding wheels mounted respectively upon substantially parallel axes spaced from each other with the wheels overlapping, guide means adapted to hold a knife to be sharpened with its edge substantially parallel to the axes of the wheels and in contact with the peripheries thereof and with the flat of the knife transverse (and preferably substantially perpendicular) to a line drawn between the axes, and means for turning the wheels in opposite directions to each other but toward the knife edge from the overlapping portions of the wheels.

The wheels preferably are of the same size and turned at the same speed. In any case the peripheral speed of the several wheels should be substantially the same.

The apparatus is designed to be power-driven, since the optimum peripheral speed of the wheels, for sharpening of the type contemplated, is 3500 to 4000 feet per minute. Slower peripheral speeds may be employed, although speeds below 1500 feet per minute are not recommended.

The degree of overlap of the wheels determines the bevel to be obtained on the knife edge. I have found that the overlapping may vary from 20 to 50 degrees, the optimum being about 40 degrees. By degrees of overlap, I mean the angle formed at the axis of a wheel by lines drawn to the points at which the overlapping begins and ends (see Fig. 4).

In the preferred form of my device, at least two wheels are mounted on each axis, with the wheels on one axis interposed between those on the other axis. It is possible to construct the device with only two wheels, one mounted on each axis. However, three wheels, one mounted on one axis with two wheels on the other, gives better operation. Still better results are obtained if a plurality of wheels is mounted on each axis. Thus, I have found that a device with four or six wheels is to be preferred.

The wheels must turn toward the knife edge from the region of overlap (see Fig. 4). Otherwise, the metal tends to be carried away from the blade to form a jagged or feathered edge.

The guides which hold the knife in proper position for sharpening may be of various forms. Preferably however, they are made of a springy material which is softer than the knife blade and are in the form of a plurality of fingers interposed between the several grinding wheels and in line with each other or overlapping slightly when they are in the unsprung condition. The outer ends of the fingers, i. e., the ends at which the knife blade is introduced, preferably are bent outwardly to facilitate the insertion of the blade. When the blade is inserted it is pressed down toward the wheels and the guides are so positioned that the flat of the blade is held sub-

stantially perpendicular to a line drawn between the two axes upon which the wheels revolve.

The preferred form of my apparatus is motor driven through a gear box from which project the two shafts upon which the grinding wheels are mounted. To facilitate movement of the knife through the grinding wheels in a direction parallel to the axes, the motor and the gear box should be placed outside the path of the knife.

These and other features of my invention will be more thoroughly understood in the light of the following detailed description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a side view of a preferred form of the knife sharpener of my invention;

Fig. 2 is a plan of the knife sharpener of Fig. 1, with wheel guards and guide fingers removed;

Fig. 3 is an outer end view of the mechanism of Figs. 1 and 2;

Fig. 4 is a fragmentary end view of the mechanism showing a knife blade in place for sharpening, and

Fig. 5 is a motor end view of the apparatus.

Referring now to the drawings, it will be observed that the apparatus comprises an electric motor 10, of conventional design provided with a transmission or gear box 12, the housing of which is integrally connected to the end of the motor. The transmission contains a gear train (not shown), adapted to drive a pair of parallel spindles 14, 15 in opposite rotational directions at high speed. The outer ends of the spindles are supported in adjustable outer end bearings 16, 17 of conventional type mounted in a bracket 19. The motor, and the bracket supporting the end bearings are both mounted on a base plate 20 which also carries a combination wheel guard and dust collector 21.

A set of three grinding wheels 23, 24, 25, is mounted concentrically on one spindle 14, with space between them sufficient to permit the interposition and overlapping of another set of three grinding wheels 26, 27, 28, mounted on the other spindle 15. The grinding wheels of the first set are held in position by longitudinal annular spacers 29, 30 disposed between the wheels, and secured by annular end nuts 31, 32 threaded on the spindle. Another set of annular spacers 34, 35 and another set of annular end nuts 36, 37 serve the same functions with respect to the other set of grinding wheels mounted on the other spindle.

It will be observed (see Fig. 4) that the two sets of grinding wheels overlap each other, the angle of the overlap being approximately 42°.

The apparatus is provided with two sets of guide fingers 40, 41, 42 and 43, 44, 45. One set of guide fingers is fastened to the base of the machine on one side and slants upwardly between the grinding wheels to a point just above the top of the overlap. At this point the fingers are bent so that the portion extending above the overlap is substantially perpendicular to a line joining the centers of the two spindles. The upper end of the fingers are bent outwardly. The second set of fingers is likewise fastened to the base plate but on the opposite side, and these fingers slant upwardly in symmetry with the first pair, being interposed between those of the first pair. When no knife blade is inserted, the guides of one set are so positioned that their inner surfaces line up with the inner surfaces on the guides of the other set.

The guides should be made of a relatively springy material, for example, steel or brass, so that they tend to be sprung out when a knife blade is inserted between them. That portion of the fingers which comes in contact with an inserted knife blade (i. e. the inner surfaces immediately above the overlap), should be made of a material (for example a metal or plastic), which is softer than the knife to be sharpened. This prevents scarring of the sides of the blade.

The dust catcher and safety guard 21 is composed of two symmetrical halves 50, 51. The upper portion of each half is curved with a radius slightly greater than the radius of the grinding wheels. The lower portion of the guard half is a straight plate formed integrally with the curved portion. The lower portion is fastened to the base plate, for example by a flange (not shown). The guard halves are fastened over the respective sets of grinding wheels with a slight clearance therebetween. Thus, the guard halves enclose the wheels, except that they are cut short enough to permit the guide fingers to move out to accommodate an inserted knife blade.

The guard protects the operator and also protects the wheels from damage from exterior sources. Thus, the guard halves prevent the flying of fragments in the case of accidental breakage of a wheel, but also collect abrasive dust particles.

As indicated hereinbefore, the guard fingers are forced apart when the blade is inserted. The guard halves are preferably resilient and the guide fingers may move these slightly when they come in contact therewith. In any case, the guide fingers and the wheel guards effectively close the opening. Abrasive dust formed in the grinding operation is deflected by the wheel guards. Otherwise, it might be thrown in the face of the operator.

The motor and the transmission should be such that the grinding wheels are driven at a peripheral speed ranging between 3500 and 4000 feet per minute.

As viewed in Figs. 3 and 4, the left-hand set of grinding wheels turns counter-clockwise, while the right-hand set turns clockwise. Both sets turn upwardly toward the knife edge from the overlapping portion of the grinding wheels.

It will be observed (see in particular Fig. 5), that the motor and the transmission are so positioned that they do not interfere with drawing a knife longitudinally through the sharpener. As shown in Fig. 5, the transmission is conveniently constructed with a cut-out portion 60 between the two spindle housings 61, 62 of the transmission or gear box.

If desired, the motor or the transmission or both may be higher. In such case, the spindles carrying the grinding wheels should be longer than those shown, to give sufficient space between the grinding wheels and the gear housing to permit a knife to be moved longitudinally. However, the arrangement shown is much to be preferred, since it permits the apparatus to be constructed in a compact fashion.

The apparatus illustrated may be used in a horizontal position or may be fastened to a wall with the spindles vertical. In either case, the apparatus is used in the same way. The switch of the motor is turned on and as soon as the wheels have come to speed, a knife is pressed into the space between the guide fingers and is moved longitudinally through the wheels. The knife edge should be pressed gently against the grinding wheels as it is moved through. The

guide fingers hold the knife in the correct position for imparting a double symmetrical bevel of correct character for food cutting.

From the standpoint of abrasive dust, the apparatus is best operated in a horizontal position, but the dust may be collected by placing felt pads or the like inside the dust guards at the base of the machine, in which case the apparatus may be mounted in a vertical position, for example by hanging the base plate on a wall.

The apparatus may be used to grind various types of knives. As originally manufactured, many knives are plain or flat ground. Others have a thin or bevel edge. Still others are hollow ground, and some such as bread knives are provided with a saw-tooth edge. Irrespective of the original type of knife edge, all may be resharpened satisfactorily with the apparatus of the invention.

It will be observed that the angle of overlap, i. e. the included angle on the wheel, is substantially the same as the included angle of the sharpened blade, i. e. if the angle of overlap is 40°, the included angle on the blade will be 40° or twice the angle of bevel, 20°.

I claim:

1. In a knife grinder, the combination which comprises a plurality of grinding wheels mounted respectively upon substantially parallel axes spaced from each other, with the wheels overlapping, guide means adapted to hold a knife to be sharpened with its edge substantially parallel to the axes of the wheels and in contact with the peripheries thereof and with the flat of the knife transverse to a line drawn between the axes, the guide means being in the form of substantially flat-sided members of relatively high heat conductivity between which the knife fits with a large proportion of it flat in contact with the flat sides of the members, means for compressing the members toward each other against the flat of the knife, means for turning the wheels in opposite directions to each other but toward the knife edge from the overlapping portions and a case disposed substantially around the peripheries of the wheels, said case being composed of opposed members between which the guide means is disposed, the members being sufficiently resilient to permit the guide means to move out to accommodate a knife blade.

2. Apparatus according to claim 1 in which the means for compressing the flat-sided guide members toward each other are elongated leaf springs disposed within the case and attached at their free ends respectively to the guide members.

3. Apparatus according to claim 1 in which the means for compressing the flat-sided guide members toward each other are elongated leaf springs of high heat conductivity disposed within the case and attached at their free ends respectively to the guide members in good heat conductive relationship.

4. Apparatus according to claim 1 in which the means for compressing the flat-sided guide members toward each other are springs disposed within the case.

LEWIS M. McBRIDE.

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