May 10, 1955 M. I. FILLWEBER 2,707,852

KNIFE SHARPENER

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Fig. 1.

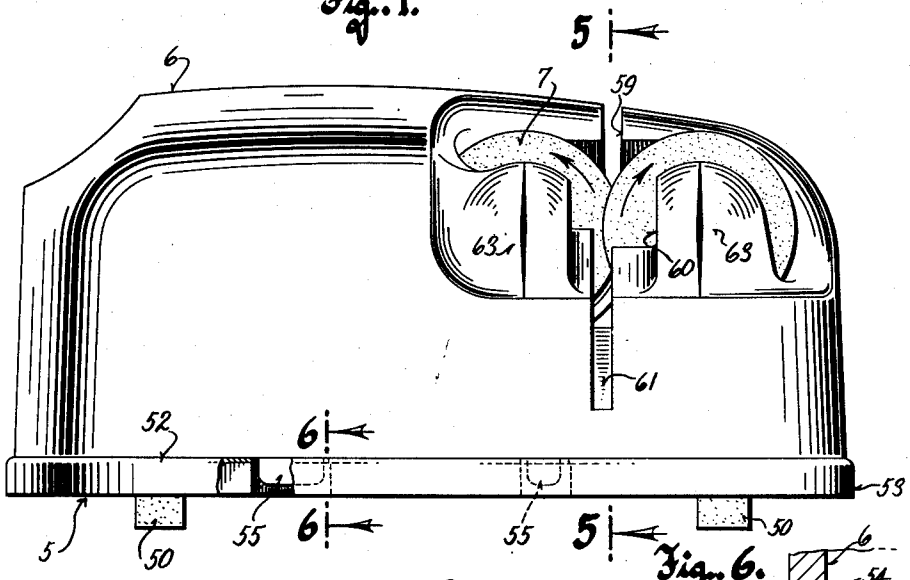


Fig. 6.

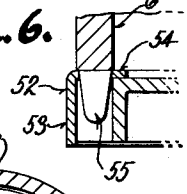
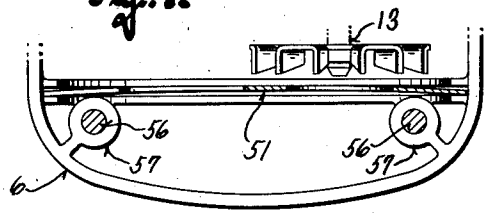


Fig. 2.

Fig. 7.



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Fig. 3.

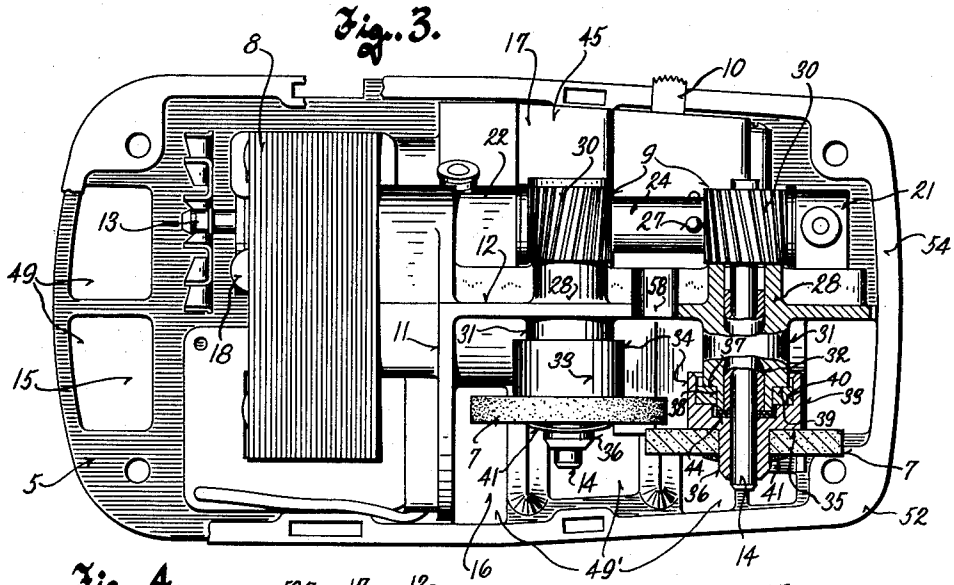


Fig. 4.

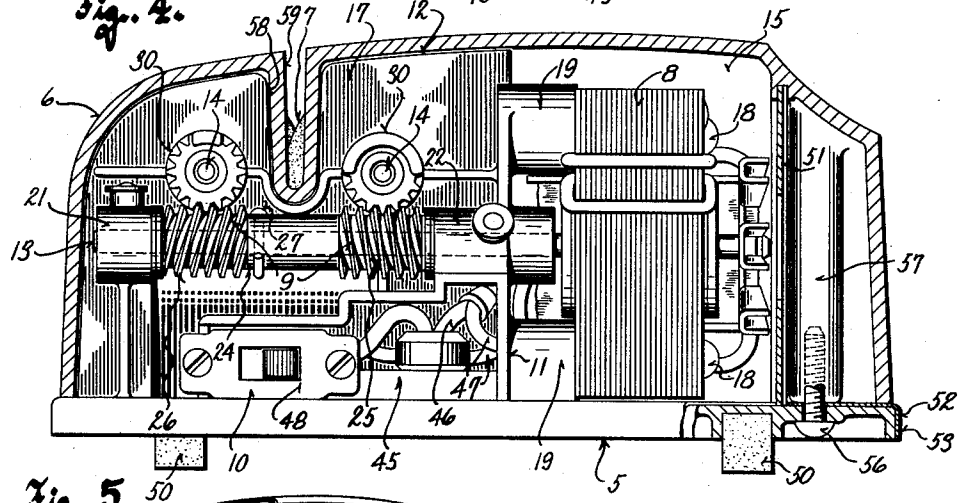
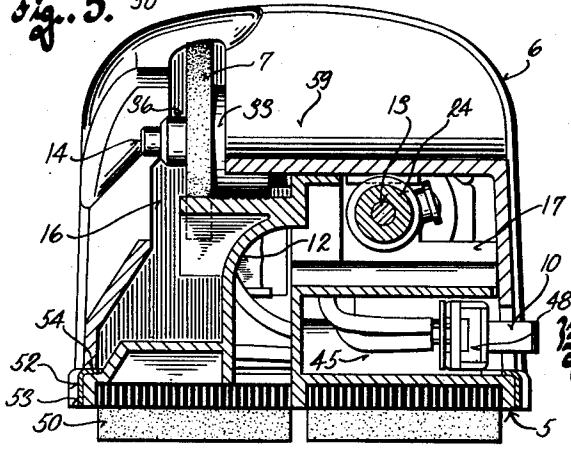


Fig. 5.



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2,707,852

KNIFE SHARPENER

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Application July 7, 1951, Serial No. 235,611

4 Claims. (Cl. 51—80)

This invention relates to knife sharpeners and refers more particularly to an electric motor operated knife sharpener especially intended for home use and having a pair of slightly overlapping abrasive sharpening wheels rotatable in opposite directions on parallel spaced apart axes.

In general, the object of this invention is to provide an improved knife sharpener of the character described having a number of unusual features and advantages, many of which will become apparent from the following description and the annexed claims.

Among the more important advantages of the knife sharpener of this invention, however, is the fact that the abrasive wheels are isolated from the remainder of the sharpening mechanism in such a manner that steel filings and material abraded from the wheels are prevented from entering the mechanism.

Another very important advantage of the knife sharpener of this invention resides in the fact that the motor by which the sharpening wheels are driven is located well to one side of the axes of the wheels, rather than in line with them, so that its bulk will not interfere with proper transit of a knife blade across the grinding surfaces of the wheels.

Another object of this invention resides in the provision of a knife sharpener of the character described wherein the sharpening mechanism is enclosed in an attractive housing, and wherein the housing interior is divided by walls into isolated compartments containing, respectively, a motor, sharpening wheels, and gear mechanism whereby rotation of the motor is translated into rotation of the wheels, with the walls also providing supports for the bearings which journal the wheel and motor shafts.

A further advantage of the present knife sharpener, comprising an object of this invention, resides in the novel unitary base structure which may be fabricated as a single die casting including the walls and bearings above referred to and to which a cover or housing for the sharpener and a base trim may be very readily attached.

Other objects of this invention are realized in novel means for mounting the abrasive wheels on their shafts and novel means for protecting the bearings of the abrasive wheels against the entry of filings and abrasive dust from the wheels.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a front elevational view of the knife sharpener of this invention, with a portion of the trim broken away and shown in section;

Figure 2 is a view similar to Figure 1, but with the housing shown in section and portions of the abrasive wheels broken away to show detail;

Figure 3 is a top view of the knife sharpener mechanism mounted on its base with the housing removed and with portions of the mechanism and base trim broken away to show detail;

Figure 4 is a view similar to Figure 2 but taken from the rear of the sharpener;

Figure 5 is a transverse sectional view taken substantially along the plane of the line 5—5 in Figure 1;

Figure 6 is a fragmentary sectional view taken substantially along the plane of the line 6—6 in Figure 1; and

Figure 7 is a fragmentary sectional view taken along the plane of the line 7—7 in Figure 2.

Referring now to the accompanying drawings, in which like numerals designate like parts throughout the several views, the numeral 5 designates generally an elongated substantially flat horizontal base upon which the entire knife sharpener of this invention is mounted. This base, which is preferably fabricated as a metal die casting, is substantially rectangular in outline, although its side edges are curved slightly and its corners are rounded to enhance its appearance.

A hollow cover 6, preferably of plastic and open at its bottom, fits on the base and coacts therewith to provide a housing which encloses all of the knife sharpener mechanism with the exception of the working areas of the abrasive wheels 7. In general, the mechanism of the knife sharpener of this invention, which is mounted on the base and enclosed within the housing, comprises an electric motor 8, the abrasive wheels 7, drive gears 9 by means of which rotation of the motor is translated into rotation of the wheels, and a switch 10, together with the necessary wiring for the electric motor.

A pair of intersecting upright walls 11 and 12, integral with the base, divide the interior of the housing into compartments and provide supports for the motor shaft 13 and the shafts 14 of the abrasive wheels. One wall 11 extends transversely across the base intermediate the ends thereof, while the other wall 12 extends longitudinally, intermediate the side edges of the base, from the transverse wall 11 to one end of the base. The two walls thus cooperate to divide the base into three areas or spaces, namely: a motor space 15 which occupies one end portion of the base, and laterally adjacent wheel and gear spaces 16 and 17, respectively, which occupy the other end of the base and are separated from one another by the longitudinal wall 12 and from the motor space by the transverse wall 11. The walls cooperate with the housing to define compartments corresponding to the spaces just mentioned, and those which define the wheel compartment extend upwardly substantially to the top wall of the cover and endwise to the side walls of the cover to thus completely isolate the wheel compartment with respect to the other compartments.

The motor 8 may be of the shaded pole type and is preferably mounted on the transverse wall 11 by means of screws 18, or other suitable fasteners, passed through the field laminations into threaded bosses 19 on said wall. The motor has a very much elongated shaft 13 which extends through the transverse wall 11 into the gear compartment, where it parallels the longitudinal wall 12. The motor shaft is journaled in spaced apart bearings 21 and 22 carried by the walls, one bearing 21 being carried by the longitudinal wall at the end thereof remote from the transverse wall and the other bearing 22 being jointly carried by the two walls at their intersection. Between the bearings the motor shaft has a sleeve 24, preferably

of plastic, having a pair of oppositely threaded worms 25 and 26 integral therewith, and this sleeve is secured to the shaft for rotation therewith, as by means of a pin 27.

The longitudinal wall also carries the bearings 28 for the abrasive wheel shafts 14 and thus mounts the wheels 7 for rotation in the wheel compartment on parallel spaced apart axes, with one wheel spaced slightly ahead of the other and their peripheries overlapping so that a knife blade drawn across the wheels will have both of its sides hollow ground simultaneously. A driven worm gear 30 is secured to the rear portion of each wheel shaft in meshing relation with one of the worms on the motor shaft, and it will be seen that by reason of the opposite threading of the worms rotation of the motor shaft in one direction is translated into rotation of the abrasive wheels in opposite directions, the wheels moving away from one another at their tops as indicated by the arrows in Figure 1. The driven worm gears, like the worms, are preferably made of plastic to eliminate the necessity for lubricating the gears.

Because the worms and driven gears are situated in the gear compartment, isolated by the longitudinal wall 12 from the wheel compartment, filings and abrasive material from the wheels cannot get into the gears to interfere with proper operation of the drive mechanism.

Each of the bearings comprises a boss 31 cast integrally with the base and walls and having a suitable bushing 32 of bearing material fitted therein. Each of the abrasive wheel bearings 28 is protected against the entry of filings and abraded material by means of a protector 33 on the abrasive wheel shaft. This protector is cup-like at its rear, having a cylindrical skirt 34 surrounding the front end portion of the boss, and its forward portion is turned down to provide an abrupt forwardly facing shoulder 35 against which the abrasive wheel seats and a tubular neck 36 on which the wheel is received and which is fixed to the wheel shaft to form a part thereof. A felt washer 37 surrounds a reduced portion 38 at the front of the boss to serve as a seal against the entry of foreign material into the bearing and is retained between a forwardly facing shoulder 39 on the boss, provided by the junction of said reduced portion with the rear of the boss, and a rearwardly facing shoulder 40 inside the skirt, defined by the junction of a bore and counterbore therein.

The abrasive wheel is retained in place on the reduced front end portion 36 of the protector and against the shoulder 35 by means of a speed nut 41 comprising a rectangular spring clip curved in cross section along its length (as best seen in Figure 3) and having its straight end edges firmly engaged with the front face of the wheel. The central portion of the clip is slit and apertured as at 42 (Figure 2) to provide inner tongues 43 having edge portions which engage the tubular neck 36 in front of the wheel. Since these central edge portions are spaced from the wheel a distance such as to slightly flatten the clip from its normal curvature, they are biased into secure biting engagement with the tubular neck in consequence of the tendency of the clip to resume its normal curvature.

It will be seen that the wheel shaft is held in place in the bearing by cooperation of the driven worm gear 30 and the protector just described, with axial floating of the shaft held to a minimum by means of thrust washers 44 interposed between the bottom of the cup-like protector and the front of the boss.

Formed integrally with the base and in part defined by the upright walls is a junction box 45 in which are housed the wiring connections connecting the power supply cord 46 with the motor conductors 47, together with the electric switch 48 by means of which starting and stopping of the motor is controlled.

The base is of course apertured below the junction box to permit the cord 46 to enter the junction box, and it also has apertures 49 in the motor space for motor cooling air and apertures 49' in the wheel space to permit abraded matter and filings to drop out of the machine. To clear the supply cord and admit cooling air, the base is mounted on resilient pads 50 which raise it slightly above the surface upon which it rests. The flow of cooling air to the motor is further improved by a baffle 51 across the housing in the motor compartment, which baffle has a hole therein substantially in line with the motor armature.

The appearance of the base is enhanced by a bright chromium plated trim 52 formed as a unitary stamping comprising a skirt 53 which surrounds the edge of the base and an inwardly extending flange 54 which overlies the marginal edge portion of the top of the base. Both the base and the flange of the trim have aligned holes which receive tit-like lugs 55 on the lower edge of the cover to hold the latter in place on the base. Screws 56, inserted through aligned holes in the base and trim flange and into threaded bosses 57 at the insides of the cover corners, retain the cover in place with the trim flange clamped between its lower edge and the upper surface of the base.

The cover, as stated above, encloses all of the knife sharpener mechanisms with the exception of the working surfaces of the wheels 7. In order to provide clearance to enable a knife blade to be passed across the working surfaces of the wheels the longitudinal wall 12 is provided with a deep slot 58 opening to its top and aligned with the area in which the wheels overlap one another. The cover is provided with wall portions 59 which extend down into this slot to define a channel in which a blade to be sharpened on the wheels may be guided and which also cooperates with the longitudinal wall to close off the wheel compartment from the gear compartment.

The slot in the cover is relatively wide immediately in front of the wheels, as at 60, to admit the front end portion of the handle of a knife to be sharpened and thus permit sharpening of all of the butt end portion of the knife blade. A narrower slot 61 extends downwardly from this wide slot portion to provide further clearance for a knife blade being sharpened as the same is drawn forwardly across the wheels. Bosses 63 on the cover extend upwardly in front of the wheels to serve as partial guards for them and also to serve as a tool rest upon which a scissors blade may be steadied to enable its edge to be ground along the flat front faces of the wheels.

From the foregoing description, taken together with the accompanying drawings, it will be readily apparent that this invention provides an electric motor operated knife sharpener having a number of improvements and novel advantages, including the fact that walls within the housing of the sharpener isolate the abrasive wheels from the remainder of the mechanism to thereby preclude entry of foreign matter into the mechanism, and the same walls also provide bearing supports for the motor shaft and the wheel shafts.

I claim:

1. A knife sharpener comprising: a housing formed jointly by a body member and a shell-like cover open at its bottom; the body member having a substantially flat base snugly engaged by the bottom edge portion of the cover; upright walls on the base cooperating with it and the cover to define a wheel compartment in the housing isolated from the remainder of the housing interior; a pair of shafts journaled in one of said walls for rotation on spaced parallel axes, with one end portion of each shaft projecting into the wheel compartment and its other end portion projecting beyond the side of said wall remote from the wheel compartment; an abrasive wheel on the first-named end portion of each shaft, said wheels being axially offset with respect to one another in said wheel compartment and having their peripheral portions overlapping; said wall having a notch in line with the overlapping portions of the wheels to provide clearance for a knife blade aligned with the

wheel axes and engaged with the wheels; said cover having an opening therein through which said overlapping portions of the wheels are exposed; gears on said other end portions of the shafts; an electric motor in the housing outside the wheel compartment; transmission means in the housing drivingly connecting the motor with said gears to translate rotation of the motor into rotation of the abrasive wheels in opposite directions, said transmission means being disposed at the side of said wall remote from the abrasive wheels; and spaced wall portions on the cover substantially parallel to the wheel axes extending substantially across the cover in line with the overlapping portions of the wheels and extending downwardly from the top wall of the cover substantially to the wheel axes, said wall portions being joined at their bottoms and defining a clearance and guidance trough for a blade to be sharpened, said trough fitting snugly in said notch in said wall to cooperate with said wall in precluding the passage of abraded matter from the wheel compartment into the transmission means.

2. The knife sharpener of claim 1, further characterized by the fact that said base has an aperture therein beneath the overlapping portions of the wheels through which abraded matter may fall out of the housing.

3. The knife sharpener of claim 1, wherein said walls are disposed at right angles to one another, with said one wall extending from the other wall to one edge of the base, and said other wall extending entirely across the

base, so that said walls cooperate to define a transmission compartment in the housing, on the side of said one wall remote from the wheel compartment, but on the same side of said other wall as the wheel compartment, and a motor compartment in which the motor is mounted; and wherein said other wall has a bearing in which the motor shaft is journaled and through which the motor shaft projects into the transmission compartment.

4. The knife sharpener of claim 3 wherein said transmission means comprises worms mounted on the motor shaft, in the transmission compartment, meshing with the gears on the wheel shafts.

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