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BATTERY OPERATED PENCIL SHARPENER

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The instant invention generally relates to sharpening devices for pencils of the wood encased type. More particularly, this invention relates to a novel construction for a pencil sharpening device which is battery operated. While the prior art discloses many power operated pencil sharpeners the power for driving the sharpener was usually obtained from a source other than batteries. This restriction on devices of the prior art was necessitated by the fact that the prior art constructions required exceptionally great amounts of power and were bulky even in the absence of a battery power source.

While the prior art discloses battery operated means for sharpening drawing leads utilized with a mechanical type holder, the teachings embodied in the constructions have proven to be less than satisfactory. That is, the cutter was driven at high speed directly from the motor output shaft. Since commercial grades of writing leads contain a substantial portion of abrasive clay the cutter soon dulled and the sharpener ceased to function.

Briefly, the device of the instant invention comprises a battery operated motor which rotates a receptacle for receiving the pencil shavings. The driving connection between the motor and receptacle is made by means of a speed reducing gear train. Thus, a high speed low torque motor is utilized so as to produce a high torque output.

A sharpener head assembly is removably secured to one end of the receptacle so as to form a closure for this end. The rotation of the receptacle drives the sharpener head assembly and in this manner the blade of the sharpener head assembly performs the sharpening operation when a pencil is inserted into the head and maintained against rotation. The shavings are removed from the receptacle by merely removing the shaving head assembly and thereafter inverting the remainder of the device.

With the construction outlined above, the receptacle is mechanically secured to the low speed output drive member of the gear train. There is no necessity to provide shaft seals as in the prior art between the shaving receptacle and the means for supplying rotational power to the sharpener head assembly. In prior art devices the seals were required so that the shavings would not jam or otherwise contaminate the driving mechanism. The shaft seals were a constant source of trouble since the high speed operation of the device resulted in rapid wear. Wear was not apparent until such time as the shavings had damaged the driving mechanism at which stage repairs were excessively expensive.

Accordingly, a primary object of the instant invention is to provide a novel construction for a battery operated pencil sharpener.

Another object is to provide a construction for a power operated pencil sharpener wherein all shaft seals are eliminated between the driving means and the area for receiving the shavings produced by the sharpener head.

Still another object is to provide a novel pencil sharpener construction wherein the sharpener is driven through the rotation of the receptacle which receives the pencil shavings.

A further object is to provide a novel pencil sharpener construction wherein the sharpener head is threadably secured to the shaving receptacle so as to be readily removable therefrom and when so removed conveniently enables the receptacle to be emptied.

A still further object is to provide a novel construction for a power operated pencil sharpener wherein there is no axial thrust on the motor shaft.

These as well as other objects of the instant invention shall become readily apparent after reading the following description of the accompanying drawings in which:

FIGURE 1 is a side elevation of the sharpening device constructed in accordance with the instant invention with the case sectionalized so as to expose the mechanism.

FIGURE 2 is a cross-section, with the dry cells and the top portion of the casing removed, taken through line 2-2 of FIGURE 1 looking in the direction of the arrows 2-2.

In FIGURE 1 the motor energizing circuit is open while in FIGURE 2 the motor energizing circuit is closed.

FIGURE 3 is a fragmentary cross-section taken through line 3-3 of FIGURE 1 looking in the direction of the arrows 3-3.

FIGURE 4 is an exploded perspective of the sharpener head assembly.

Now referring to the figures, pencil sharpening device generally comprises sharpener head assembly removably secured to cylindrical receptacle. Assembly and receptacle are rotatable as a unit by a driving means comprising D.C. motor 13 and dry cells 14-16 and operatively connected through rotating gear train 17 to shaft 18 which is rigidly secured to receptacle 12 and defines an axis of rotation for receptacle 12. Motor 13 is of the type illustrated in our U.S. Patent 2,894,156.

Sharpening device 10 includes a hollow casing molded in two sections with upper section 19 interlocking with lower section 20 and being cemented thereto. The bottom 21 of lower housing section 20 is flush with insulating base plate 22. Screw 98, passed through a clearance opening in upper housing section 19, is threaded into engagement with a tapped aperture of upper plate 24 thereby securing casing 19, 20 in place. Insulating intermediate plate 23 as well as insulating upper plate 24 are secured to base plate 22 by means of studs 25. An additional stud 26 secures intermediate plate 23 to base plate 22. Cushions 99 are cemented to the heads of studs 25, 26 to serve as a three point support for sharpening device 10.

The spacing between base plate 22 and intermediate plate 23 is established by sleeves 27 through which studs 25 and 26 are passed. Nuts 28, threaded to studs 25 and 26, maintain intermediate plate 23 in place. The spacing between upper plate 24 and base plate 22 is maintained by nuts 29 and 30 threaded to studs 25 and 26 above and below upper plate 24.

Conducting straps 31, 32 extend between base plate 22 and upper plate 24, being riveted thereto, and are provided with offset contact portions whereby dry cells 14-16 are connected in series aiding relationship when all of the positive terminals thereof are oriented in the same plane.

The negative terminal of dry cell 14 is in operative engagement with spring terminal 33 which is riveted to the bottom side of upper plate 24. Wire 34 extends from terminal 33 to one terminal 35 of D.C. motor 13. The positive terminal of dry cell 16 is in engagement with spring terminal 36 which is riveted to base plate 22. Wire 37 extends between terminal 36 and contact member 38 which is riveted at 40 to intermediate plate 23. The other end of terminal member 38 is provided with a central slot 40 into which shaft 18 is inserted. The other terminal 41 of D.C. motor 13 is connected through wire 42 to one end of contact member 43 which is riveted at 44 to intermediate plate 23.

Members 38 and 43 are both constructed of electrical conducting spring material with the ends opposite the connections to wires 37 and 42 being raised above the
top surface of intermediate plate 23. These ends of contact members 38 and 43 form normally open cooperating contacts 45, 46, respectively, with contact 46 being essentially stationary and contact 45 being movable into engagement therewith, as will be hereinafter explained.

Motor 13 is secured to intermediate member 23 by stud 48 and speed nuts 49, with the output shaft 49 extending through intermediate plate opening 56. The input spur gear 51 of gear train 17 is keyed to motor output shaft 49 with the position of gear 51 relative to intermediate plate 23 being established by spacing disk 52 which is interposed between the lower end of motor 12 and the top surface of intermediate plate 23. Gear train 17 further includes two vertical idler stub shafts 53, 54 each having a large and a small diameter gear keyed thereto. Stub shafts 53, 54 are journaled for rotation at the opposite ends thereof in bearings mounted to the base 22 and intermediate 23 plates.

The large gear 55 keyed to shaft 53 is driven by input spur gear 51. This in turn causes gear 56, keyed to shaft 53, to drive large gear 57 which is keyed to shaft 18 near the lower end thereof.

The lower end of shaft 18 is guided for rotation as well as axial movement by bearing 60 inserted in base plate 22. Shaft 18 then extends upward through bearing 61 of intermediate plate 23 with the top end of shaft 18 being entered into central opening 62 of lower closure member 63 for receptacle 12. Set screw 64 fixedly secures the upper end of shaft 18 to closure member 63. Receptacle 12 is an elongated cylindrical body with lower closure member 63 being secured thereto by screws 65, 66.

The upper end of receptacle 12 is provided with external threads which cooperate with internal threads of upper closure member 67 forming part of sharpener head assembly 11 to secure assembly 11 to receptacle 12. The upper end of receptacle 12 extends through clearance aperture 97 in the top of casing 19, 20 to project above the top of upper housing section 19.

Screws 68, 69 pass through clearance openings 70, 71, respectively, in the top of upper closure member 67 and are entered into tapped openings 72, 73, respectively, of sharpener block 74. Sharpener block 74 is provided with a tapered guide aperture 75, the larger end of which is in alignment with upper closure member apertures 76. One side of the wall defining tapered opening 75 is longitudinally slotted at 94 so as to receive the cutting edge 77 of blade 78 which is secured by means of screw 79 to body 74.

Pencil sharpening device 10 is operated by inserting a wood encased type pencil 96 into guide aperture 75 and moving pencil 96 downward in the direction of arrow A (FIGURE 2) until cooperating contacts 45, 46 are in engagement. This closes the energizing circuit for motor 13 through dry cells 14—16. Motor 13 drives speed reducing gear train 17 causing rotation of shaft 18.

Shaft 18 is rigidly secured to receptacle 12 so that receptacle 12 is caused to rotate. This in turn causes rotation of sharpener head assembly 11 and in so doing cutting edge 77 produces a sharp point on pencil 96 as pencil 96 is maintained against rotation. During the sharpening operation the shavings pass through slot 94 and are received by receptacle 12.

When the required point has been formed on pencil 96 it is removed from block guide aperture 75. Since contact member 38 is comprised of spring material and the lower portion thereof bears against the bottom of closure extension 95 the self biasing action of movable contact 45 causes contacts 45, 46 to open and at the same time raises receptacle 12 to the position of FIGURE 1. The shavings are readily removed from receptacle 12 by merely removing sharpener head assembly 11 and thereafter inserting sharpening device 10.

It is noted that the threads securing sharpener head assembly 11 to receptacle 12 are constructed in aiding relationship to the rotation of receptacle 12. That is, right hand threads secure assembly 11 to receptacle 12 and motor 13 operates so as to cause shaft 18 to rotate counter-clockwise with respect to FIGURE 3. Thus, the connection between receptacle 12 and assembly 11 is tightened during sharpening.

It is also to be noted that construction hereinafter described does not require shaft seals between the output shaft of motor 13 nor at the shaft of motor 13 nor the shaft which drives cutter 78. Even in the absence of shaft seals the shavings are effectively confined within receptacle 12 where they cannot contaminate the driving means.

Although I have here described preferred embodiment of my novel invention, many variations and modifications will now be apparent to those skilled in the art, and I therefore prefer to be limited, not by the specific disclosure herein, but only by the appended claims.

1. A sharpener device comprising a supporting structure including a base plate and a first plate parallel to said base plate and positioned thereabove, a chip receiving and retaining receptacle positioned above said first plate, a shaft extending through said first plate and defining an axis of rotation for said receptacle, said shaft being fixedly secured to said receptacle at a first closed end thereof, a cover removably mounted to a second open end of said receptacle, a sharpener means fixedly mounted to said cover and disposed within said receptacle, a driving means comprising the series connection of a battery means, a normally open switch, and a D.C. motor, speed reducing gear means disposed between said plates and connecting said shaft to said motor for rotation of said receptacle by said motor when said switch means is closed, a case removably secured to said supporting structure, said receptacle being disposed substantially wholly within said case and extending external to said case through an opening thereof, said shaft and said driving means being disposed within said case, biasing means within said case urging said shaft along its axis to a first position wherein said switch is open, said receptacle being movable along said axis to a second position by the application of force upon a pencil inserted into a guide aperture of said sharpener means, said receipletal when in said second position operatively engaging said switch for closing thereof thereby energizing said motor from said battery means, thread means carried by said receptacle cooperating with thread means carried by said cover for securiture of said cover to said receptacle, said thread means constructed so that rotation of said cover relative to said receptacle, in a direction opposite to the direction of rotation of said receptacle by said gear means, is effective to tighten the connection between said cover and said receptacle.

2. The sharpener device set forth in claim 1 in which the motor and the switch are mounted to the first plate on the top side thereof, said biasing means comprising a contact of said switch, a single screw securing said case to said supporting structure.

3. A sharpener device comprising a supporting structure including a first member and a second member each having a generally plate-like portion; means maintaining said plate-like portions in spaced substantially parallel relationship with one of said portions above the other of said portions; a chip receiving receptacle positioned above said one portion; a shaft extending through said one portion and defining an axis of rotation for said receptacle; means fixedly securing said shaft to a first closed end of said receptacle; a cover removably mounted to a second open end of said receptacle; a sharpener means affixed to said cover for rotation in union therewith; said sharpener means disposed within said receptacle; a driving means comprising the series connection of a battery means, a D.C. motor, and normally open switch means which when closed completes a circuit between said battery means and said motor; speed re-
ducing gear means supported by said plate-like portions and disposed therebetween; said motor mounted to said one portion on the upper side thereof; said motor having an output shaft extending through an aperture of said one portion and operatively engaged to said gear means; said gear means connecting said shaft to said motor output shaft for rotation of said receptacle by said motor when said switch means is closed; an enclosure; means removably securing said enclosure and said supporting structure to each other; said receptacle being disposed substantially wholly within said enclosure with the second open end extending through an opening in said enclosure and said cover positioned externally of said enclosure; said shaft and said driving means disposed within said enclosure; biasing means within said enclosure urging said contact means open and also urging said receptacle in a first direction to a first position; said receptacle and said shaft being bodily movable as a unit in a second direction opposite to said first direction to a second position wherein said switch means is closed; movement of said receptacle to said second position being brought about by the application of force, directed toward said first plate-like portion, upon a pencil inserted into a guide aperture of said sharpener means; securing formations carried by said cover in engagement with complementary securing formations of said receptacle; said cover formations and said receptacle formations cooperating in a manner such that said cover when secured to said receptacle rotates in unison therewith as the latter is rotated about its said axis by operation of said motor.

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