

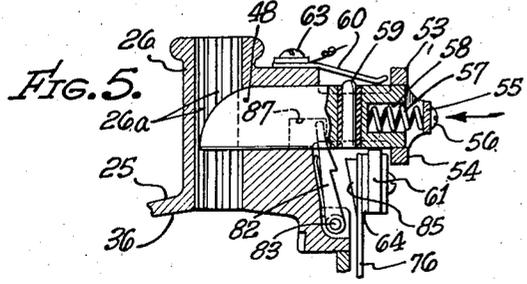
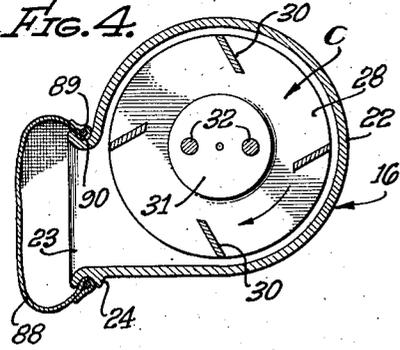
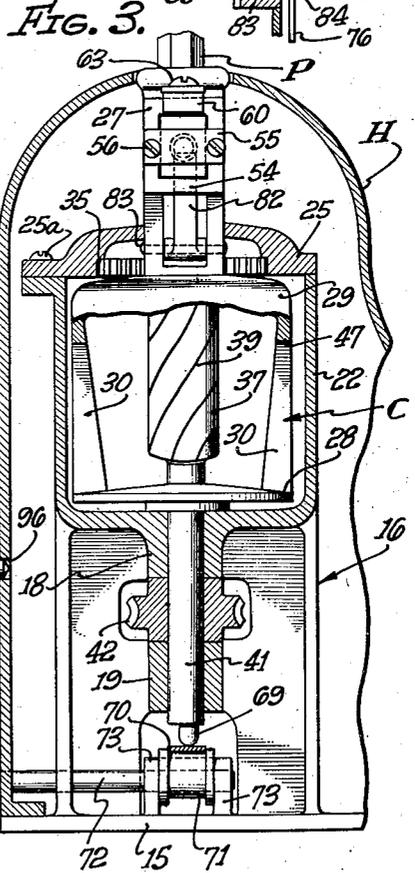
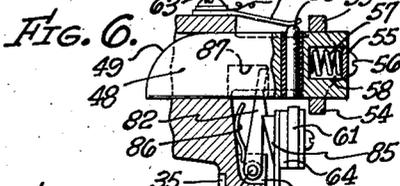
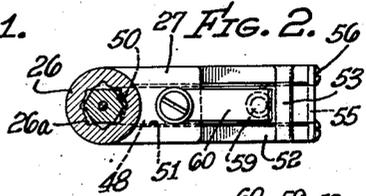
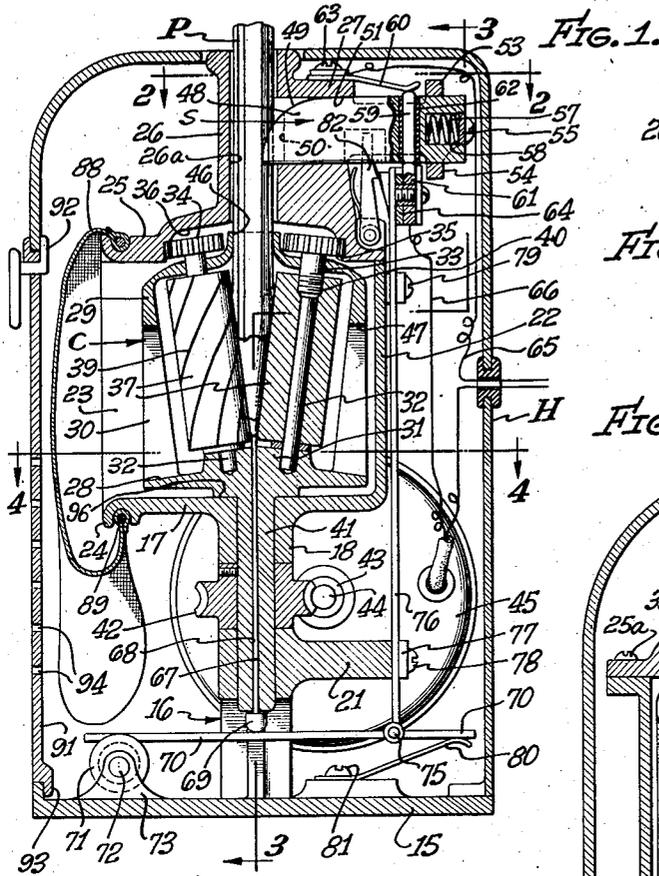
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R. B. FLEMING

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PENCIL SHARPENER

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INVENTOR.
ROBERT B. FLEMING,
BY *Ernest Jones*
ATTORNEY.

UNITED STATES PATENT OFFICE

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PENCIL SHARPENER

Robert B. Fleming, Huntington Park, Calif., assignor to Bert M. Morris Co., Los Angeles, Calif., a firm

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My invention relates to power operated pencil sharpeners of that character having rotary sharpening elements between which the end of a pencil is received so as to be sharpened when the elements are driven.

An object of the invention is to provide an improved means for creating a draft of air to remove the cuttings from the pencil. This is accomplished by employing a blower having a rotor which carries the pencil sharpener. The invention provides a tube coaxial with the rotor for the double purpose of receiving that pencil and admitting air to the blower.

Another object of the invention is to reduce the likelihood that the pencil cuttings will get into pinions employed for driving the cutting elements. This is accomplished by providing the rotor at its inlet end, with a head, and by arranging the cutter pinions on the inlet side of the head, with the cutter elements rotatably mounted in the rotor in the opposite side of the head.

A still further purpose of my invention is the provision of a pencil sharpener in which the component parts are so constructed and arranged as to facilitate assembly and disassembly thereof, and particularly the sharpening elements which are readily removable to resharpen or to permit substitution of new elements.

I will describe only one form of electric pencil sharpener embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawing Fig. 1 is a view showing in vertical section one form of electric pencil sharpener embodying my invention with a pencil in sharpening position therein.

Fig. 2 is a plane section taken on the line 2—2 of Fig. 1.

Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a horizontal sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is a fragmentary vertical sectional view of the motor control switch in advanced position as distinguished from the retracted position shown in Fig. 1.

Fig. 6 is a view same as Fig. 5 but with the switch in the position shown in Fig. 1 and one of the contacts of the switch latched in open position.

Referring specifically to the drawing, my invention in this particular embodiment comprises a base plate 15 fixed to which and rising therefrom is a stator frame 16 having an upper wall 17 from which depend axially spaced bearings

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18 and 19. Bearing 19 is a part of the frame 16 and is vertically aligned with the bearing 18 but spaced therefrom. Bearing 19 is provided with a lateral extension 21. The top wall 17 constitutes the bottom wall of a generally circular casing 22 which may be formed integral with the frame 16, such casing being constructed to provide a tangential discharge opening 23 (Fig. 4) bounded by a collar 24. The upper end of the casing 22 is closed by a cover 25 detachably secured thereto by screws 25a. Cover 25 constitutes part of a casting having a tubular pencil guide 26 which opens into the rotor C and a block 27 the precise construction of which will be described hereinafter. The guide 26 interiorly is formed with grooves 26a to allow air to be drawn into the device when a pencil is within the guide as will be later described. Rotatively mounted in the casing 22 is a cage designated generally at C and comprising a lower head 28 and an upper head 29 rigidly connected to each other by an annular series of impeller blades 30. The lower head 28 which is of disk form has a rising projection or integral boss 31 bored to rotatively receive the lower ends of a pair of upwardly divergent shafts 32.

The shafts 32 at their upper ends are rotatably mounted in suitable opening 33 in the upper head 29, and such ends have pinions 34 fixed thereto to constantly mesh with an internal ring gear 35 formed in the recessed portion 36 of the cover 25. On each shaft 32 is a pencil sharpening element 37 having peripheral blades 39 of spiral form. Each element 37 is fixed to the respective shaft 32 for rotation therewith by the provision of a screw threaded shaft portion 40 which threadedly engages within the upper end of the element 37.

The cage wall 17 serves as a step bearing or thrust bearing for the cage C, the underside of head 28 having a bearing shoulder 36 rotatably supported by the upper face of the stator wall 17. The lower head 28 is formed integral with a shaft 41 that extends downwardly through the bearings 18 and 19. A worm gear 42 is keyed to shaft 41 at a point between the bearings 18 and 19. This gear 42 meshes with a worm 43 fixed on the end of the shaft 44 of the electric motor 45. The motor is suitably secured to the base plate 15.

The arrangement of the sharpening elements 37 by virtue of the angular mounting of the shafts 32, is such as to provide an intervening gap of tapered form coaxial with rotor cage C. To permit extension of the pencil through the

guide 26 and into the gap between the cutter elements 39, the upper head 29 is formed with a coaxial flanged opening 46 aligned with the gap and with guide 26. The height of flange 46 is substantially the same as that of the pinions 34 for a purpose to be described hereinafter. At the perimeter of the head 29 is a depending collar 47 from the lower edge of which the impeller blades 30 depend. This collar 47 is relatively wide so as to cover the upper portions of the sharpening elements 37. The upper head 29 and its depending collar 47 comprise a hood over the upper ends of the sharpening elements 37, the pinions 34 being located outside of this hood, that is on the opposite side of head 29, whereby head 29 shields the pinions 34 from the pencil shavings. The draft of air passing from the inlet tube 26 towards the outlet 23, passes the pinions 34 and ring gear 35 before picking up the pencil cuttings, whereby the pencil cuttings are blown away from, not towards, the pinions 34 and ring gear 35.

The impeller blades 30 may be tapered in width from top to bottom, and disposed at such an angle with respect to the peripheries of the heads 28 and 29 as to impel air and the pencil shavings outwardly of the opening 23 when the cage C is rotated in the direction of the arrow in Fig. 4.

For starting and stopping the motor 45 a control switch designated generally at S, is provided, which includes an operating member 48, in the form of a bar having an inner end rounded on its upper edge as at 49, and concave as at 50 (Fig. 2) to conform generally to the cross sectional contour of the pencil.

The block 27 is formed with a slot 51, the inner end of which is in communication with the pencil guide 26. The switch operating member 48 is slidable in the slot 51 to occupy an advanced position as shown in Fig. 5, wherein its rounded and concave end is extended into the guide tube 26, so that when a pencil is inserted into the tube the member 48 will be moved to the retracted position shown in Fig. 1 to allow the pencil to be extended between the sharpening elements 37 and to hold the pencil against rotation in the tube.

The block 27 is provided with a lateral extension 52 which is so bifurcated as to form an extension of the slot 51. This extension also includes upper and lower cross bars 53 and 54 rigidly connecting the bifurcated portions adjacent their outer ends. These bars serve to confine the member 48 between the arms of the extension in its reciprocating movements. At their outer ends the bifurcated portions are connected by a strap 55 secured thereto by screws 56. This strap forms an abutment or confining element for a coiled expansible spring 57 disposed within a pocket 58 in the outer end of the bar 48. This spring serves to urge the bar 48 inwardly to its advanced position.

The control switch S embodies three contacts 59, 60, and 61. The contact 59 may be in the form of a stick of carbon secured in a transverse opening in the bar 48 by an insulating sleeve 62 so that its opposite ends project from opposite edges of the bar. The contact 60 is in the form of a spring secured at one end to a binding post 63 on the top of a block 27, with its other end positioned to engage the upper end of the contact 59 when the bar is in retracted position. The contact 61 is likewise in the form of a stick of carbon and is secured in a support 64 of suitable

insulating material positioned at the lower side of the bar 48 so that the upper end of the contact will engage the lower edge of the contact 59 when the bar 48 is in retracted position.

From the aforesaid arrangement of the three contacts of the switch S, it will be clear that the contact 59 in the advanced position of the bar 48 disengages the contacts 60 and 61, but that in the retracted position of the bar the contact 59 is moved into engagement with both of the contacts 60 and 61 to close the switch. By means of conductors 65 and 66 connected to the motor 45, to the respective contacts 60 and 61 and to a suitable source of current (not shown) current may be supplied to the motor 45 when the switch is closed as aforesaid to energize the motor and operate the sharpener.

Embodied in my sharpener is means for regulating the sharpening action for the elements 37 so as to sharpen a pencil to a point of predetermined length, and this means is utilized to actuate a mechanism for opening the switch S to discontinue operation of the sharpening elements immediately upon the pencil being sharpened to that predetermined length.

The regulating means comprises a rod 67 movable axially within the shaft 41, such shaft being formed with a bore 68 to receive the rod. The lower end of the rod is provided with a head 69 disposed at the lower end of the shaft 41 and engageable with a cross arm 70. A cam 71 fixed to a shaft 72 mounted in ears 73 and provided at its outer end with a crank 74, is rotatable to adjust the arm 70 vertically. The arm 70 forms an abutment or stop for the rod 67, and through vertical adjustment of the arm the vertical position of the rod can be correspondingly adjusted to vary the degree of extension of the upper end thereof upwardly between the sharpening elements 37.

The mechanism for opening the switch S through the pencil sharpening regulating means comprises, in the present instance, the arm 70 pivotally connected as at 75 to the lower end of a vertical rod 76 slidable in the extension 21 and confined thereon by a strap 77 secured in place by a screw 78. A guide bracket 79 is secured to the upper part of the casing 22 and through which the rod 76 also slides to coact with the extension in properly supporting the rod for vertical axial movement.

The upper end of the rod 76 carries the contact support 64 so that by axial movement of the rod the contact 61 can be moved into and out of engagement with the contact 59 when the bar 48 is in retracted position. The rod 76 is urged upwardly to cause the contact 61 to engage the contact 59, by a spring 80 secured to the base plate 15 by a screw 81. The spring engages one end of the cross arm 70 so as to elevate the rod 76 through the pivotal connection 75. Thus irrespective of the vertical adjustment of the arm 70 by the cam 71 the contact 61 is always urged to a position in which it is engaged by the contact 59 upon movement of the bar 48 to retracted position.

For latching the contact 61 in lowered or open position a latch 82 is pivoted as at 83 in a recess 84 of the block 27, to engage a keeper 85 fixed on the upper end of the rod 76, and urged toward the keeper 85 by a spring 86 at the back of the latch. The location of the keeper in the elevated position of the rod 76 is such that it cannot have latching engagement with the keeper but merely contacts therewith. However, when the rod 76 is lowered

the spring 86 functions to cause the latch to engage the keeper and hold the contact 61 in open position. The latch 82 is movable to disengage the keeper 85 and thus release the rod 76 to allow the contact to return to its elevated position under the action of the spring 80, by making the latch of such length that its upper end projects into a pocket 87 in the bar 48 to be engaged by the bar as the latter returns to advanced position and to thus swing the latch to the released position shown in Fig. 5 where it is retained by the bar under urging of the spring 57.

The opening 23 of the casing 22 is spanned by an air filtering member 88 which may be in the form of a bag of porous fabric and of such size that it depends from the casing to form a storage section for the pencil shavings and lead. This bag 88 is removably secured in place on the casing by a ring or band 89 seated within a groove 90 formed in the casing and partly in the cover 25.

Enclosing all parts of the sharpener including the motor 45 is a housing or cover H which is removably secured to the base plate 15. This housing is formed at one side with a door 91 removably secured in place by a latch 92 at the top and a lip 93 at the bottom. The door 91 is formed with perforations 94 as illustrated in order to allow free discharge of air from the casing opening 23 to atmosphere.

As shown in Fig. 3, the shaft 72 for the adjusting cam 71 extends outwardly through the housing H with the crank 74 fixed to the projecting end of the shaft and having a pin 95 engaging in any one of a series of openings 96 in the housing wall to secure the crank in any position of adjustment.

The operation of the sharpener is as follows:

To sharpen a pencil (indicated at P in Fig. 1) it is extended into the tube 26 and between the sharpening elements 37. Under such inserting movement of the pencil the bar 48 is forced from the advanced position shown in Fig. 5 to the retracted position shown in Fig. 1. This movement of the bar closes the switch S by bringing the contacts 59, 60, and 61 into engagement with each other thereby supplying current to the motor 45. With the motor so energized the shaft 44 is actuated to drive the shaft 41 through the worm 43 and the gear 42, thereby setting the cage C and the elements 37 into rotation in a clockwise direction as when viewed in Fig. 4.

Under such rotational movement of the elements 37 the pinions 34 being in mesh with the ring gear 35 produce rotation of the elements about their own axes as they revolve bodily. With the pencil between the elements 37, the resultant epicyclical movement of the elements operates to initiate a sharpening action on the pencil. As this action proceeds the pencil moves downwardly until the point engages the upper end of the rod 67 when the rod is forced downwardly to depress the arm 70 against the tension of the spring 80. Under this movement of the arm 70 the rod 76 is pulled downwardly to move the contact 61 away from the contact 59 (Fig. 6), thereby opening the switch S and thus discontinuing operation of the sharpening elements.

By the time the rod 67 has been depressed to open the switch sharpening of the pencil has been completed, and thus stopping of the motor and the parts driven thereby occurs simultaneously with completion of the sharpening operation. Manifestly, this conserves current, minimizes wear of the moving parts, and insures sharpening of the pencil to a predetermined point

length in accordance with an adjustment of the cam 71.

During the aforescribed sharpening operation the casing 22 functions as the stator and the cage C as the rotor of an air blower or pump, the impeller blades 30 operating to draw air into the stator along the rotor axis and through the grooves 26a in the tube 26, past ring gear 35 and pinions 34 over the top head 29 of rotor cage C, and through opening 46 between cutters 39 if the pencil is small enough to not fill opening 46 or if the pencil is removed, and around the sharpening elements 37, and finally discharging it to atmosphere through the lateral outlet 23, the bag 88, and the openings 94 in the door 91. The head 29 and the collar 47 function to prevent the pencil shavings and lead particles from being blown upwardly onto the pinions 34 and the gear 35, the air draft being lateral of the rotor C towards the lateral outlet 23. By virtue of this course of air as generated by the blower, all pencil shavings and lead particles resultant of the sharpening operation, are picked up and deposited in the bag 88, and thus the sharpening elements as well as all other parts within the casing 22 are kept clean and clear of the pencil deposits to prevent clogging and insure proper operation of the device at all times.

To reset the parts of the sharpener for a succeeding sharpening operation, the only manual requisite is to remove the sharpened pencil from the tube 26, when the spring 57 returns the bar 48 to advanced position, thus moving the contact 59 out of engagement with the contact 60, and the latch 82 off of the keeper 83 to permit the contact 61 to rise to its original position under the action of the spring 80. Manifestly, the spring 80 also restores the arm 70 to its original vertical position of adjustment as determined by the cam 71, and with it the rod 67.

My invention is also characterized structurally by the arrangement of its various parts to facilitate assembly and disassembly thereof, and more particularly the accessibility of the sharpening elements 37 for the purpose of lubrication, re-sharpening, and substitution. It is only necessary to remove the cover 25 when the shafts can be unscrewed from the elements 37 thus allowing the latter to be removed from the cage C.

Although I have herein shown and described only one form of pencil sharpener embodying my invention, it is to be understood that various changes and modifications may be made therein without departing from the spirit of my invention and the spirit and scope of the appended claims.

I claim:

1. In a pencil sharpener; an air blower having a rotor; sharpening elements carried by said rotor; and an air inlet tube leading into said rotor and through which a pencil may be extended between said elements for sharpening.

2. A pencil sharpener comprising a stator having a tangential air outlet in the periphery thereof, and an axial air inlet, said inlet serving as a pencil guide; a bladed rotor revoluble in said stator coaxially with said inlet; and sharpening elements carried by said rotor and arranged angularly to the axis of said rotor to permit a pencil to be extended therebetween for sharpening through said air inlet.

3. A pencil sharpener, comprising: a stationary casing having an open top; a removable cover for the top of said casing; a pencil guiding tube fixed to said cover and leading into said casing; an internal ring gear on the inner side of said

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cover; a driven shaft journaled in the bottom of said casing; a cage within said casing fixed to said shaft; tool shafts journaled in and removable from the top of said cage; pinions on the upper ends of said tool shafts and meshing with said ring gear; and upwardly diverging sharpening elements detachably secured to said tool shafts, the top of said cage having a pencil opening in alignment with said tube and leading between said sharpening elements.

4. A pencil sharpener as embodied in claim 3, wherein impeller blades are fixed to said cage in a circular series about said sharpening elements; and said casing having an air inlet and a tangential outlet.

5. A pencil sharpener according to claim 3 wherein said pinions are mounted on said tool shafts above the top of said cage, said sharpening elements being below the top of said cage, said casing having an air inlet and a combined air and pencil cuttings outlet, and fan means between said inlet and outlet, said ring gear and pinions being arranged between said sharpening elements and said inlet.

6. A pencil sharpener comprising a blower having a stator and rotor, said stator having an air inlet and said stator having a lateral outlet, said stator having a coaxial pencil guide and said

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rotor having an end wall having a cooperating coaxial pencil guide opening, pencil sharpening elements in said rotor inclined to the rotor axis, gearing coupling said sharpening elements to said stator, and fan blades on said rotor around said sharpening elements.

7. A pencil sharpener comprising a blower having a stator, a rotor, an inlet and an outlet, said rotor comprising a fan cage having heads at its opposite ends and a circular array of axially extending fan blades secured at their opposite ends to said heads, pencil sharpening means inside of said cage, and pencil guiding means for guiding a pencil into said cage in operative relation to said pencil sharpening means.

8. A pencil sharpener according to claim 7 wherein said stator supports said rotor for rotation about a substantially vertical axis, said stator having a step bearing rotatably supporting the lower end of said cage, and gearing between said pencil sharpening means and said stator at the upper end of said cage.

9. A pencil sharpener according to claim 7 comprising a circuit control rod slidable coaxially through one of said heads and terminating interiorly of said array of fan blades.

ROBERT B. FLEMING.