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POWER DRIVEN PENCIL SHARPENERS

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Fig. 1.

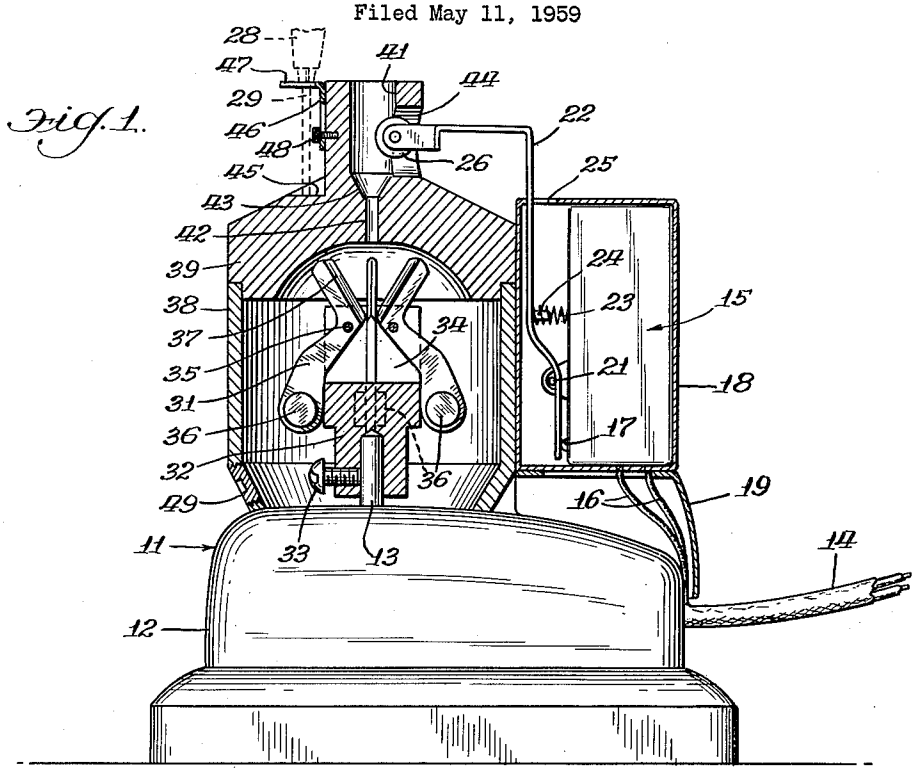


Fig. 2.

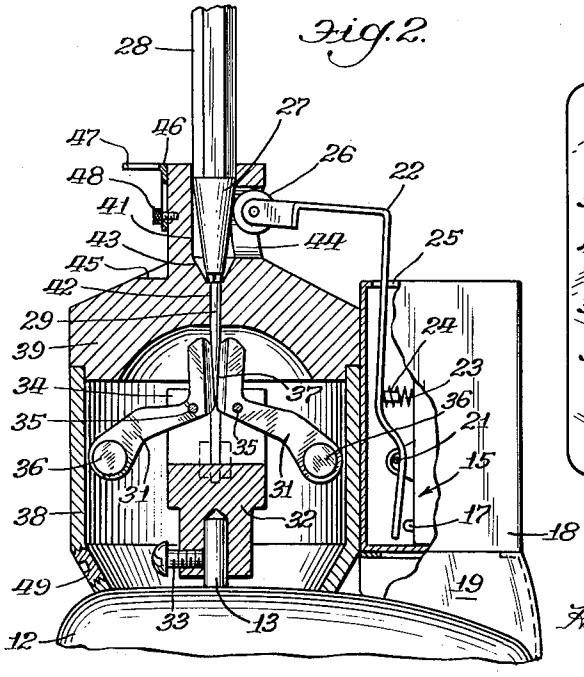
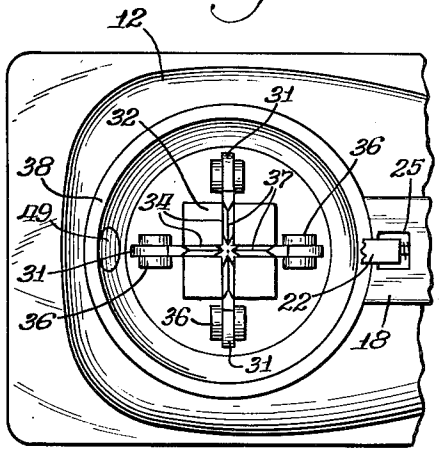


Fig. 3.



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POWER DRIVEN PENCIL SHARPENERS

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This invention relates in general to power driven pencil sharpeners, and more particularly to such devices which are capable of sharpening the lead in a mechanical or automatic pencil.

The use of automatic or mechanical pencils by draftsmen in all fields of drawing has increased to the point of substantially supplanting use of the ordinary wooden pencil, but with the mechanical pencils only the old manual methods of sharpening have been available, which are notoriously slow and dirty.

A principal object of this invention, therefore, is to provide a clean, quick and easy way in which to reduce the end of a lead in a mechanical pencil to a point, or a substantially conical shape of selected length, so as to cause lines drawn thereby to be of a desired width. This object is attained by providing a portable electrically driven sharpener with enclosed cutter means for reducing the end of the lead to the desired shape, and means for receiving the lower end of the body of a mechanical pencil and the lead extending therefrom to present the latter to the cutter means while preventing contact of the pencil body therewith.

Another object of the invention is to insure a clean lead after sharpening and one always having the desired selected shape, and to prevent breaking thereof during sharpening. This object is assured by providing a cutter means comprising a rotor having a vertical axis and carrying cutter elements pivoted on horizontal axes for movement between a normal, at rest position and an operative position in response to centrifugal forces developed by rotation of the rotor.

A further important object is to avoid scattering of lead dust from or by such a sharpener by enclosing the cutter means in a suitable housing for collecting the lead dust, and providing the housing with an aperture through which the end of the lead may be introduced for reduction by the cutter means, with such aperture being only large enough to accommodate the lead.

Another object of the invention is to eliminate the necessity of manually operating a motor controlling switch as a separate operation in the use of such a pencil sharpener by providing means automatically operable to cause energization of the sharpener motor in response to movement of a pencil with respect thereto in introducing the exposed end of its lead into position for reduction by the cutter means.

A further object of the invention is to facilitate reduction of the exposed end of the lead in a mechanical pencil, so as to cause lines subsequently drawn thereby to be of a desired selected width, by providing guide means adjustably mounted on the pencil sharpener housing to enable presetting of the pencil to expose the proper length of lead to result in the desired selected shaping of the end thereof when presented to the cutter means.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, when taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

In the drawings:

FIGURE 1 is a side elevation of a pencil sharpener embodying the features of this invention, with those portions thereof above the motor shown in vertical section, and the operating parts in inoperative position;

FIG. 2 is a vertical sectional view similar to the upper

portion of FIG. 1 showing the cutter elements and switch closing means in operative or active position; and

FIG. 3 is a top plan view of the sharpener with the cover member removed and part of the switch controlling lever broken away.

Referring more particularly to FIG. 1 of the drawings, reference numeral 11 indicates in general a portable, electrically driven sharpener for automatic pencils which comprises a base portion 12 of any suitable construction housing an electric motor having a vertically extending shaft 13 protruding upwardly through a suitable motor housing comprising part of the base portion 12 and supplied in well-known manner by electrical energy from a suitable source, comprising the cord or leads 14, through the agency of a microswitch 15 interconnected in series therewith by means of leads 16. This motor switch 15 is of well-known construction and includes a member 17 normally spring-urged outwardly (to the left in FIGS. 1 and 2) to maintain the switch closed and thereby to provide the motor with electrical energy from the line 14. The switch 15 is enclosed within a housing 18 that is mounted upon the motor enclosing portion of the base 12 by any desired means, such as a bracket 19. It should be noted that the lower part of the base 12 preferably is weighted in any suitable manner, as by means of lead or other heavy metal.

Pivotally mounted at 21 on the switch 15 proper or its housing 18 is a switch controlling or opening means comprising an angular lever 22 with which a suitable spring 23 cooperates. As shown, the spring 23 is mounted upon a stud 24 extending outwardly from the lever 22 and is interposed between the latter and the casing of the switch 15 above the pivot 21 so as normally to urge the lower end of the lever 22 outwardly, or to the right in FIGS. 1 and 2, to move the switch member 17 against the action of its spring to open the switch 15. The motor thus normally is maintained de-energized as a result of the spring 23 resiliently retaining the lever 22 in its active, switch opening position of FIG. 1.

Above the stud 24, the lever 22 extends upwardly through a suitable aperture 25 in the top of the switch housing 18, and terminates in an inwardly extending horizontal portion preferably provided with a roller 26 pivotally mounted in any suitable manner at its inner end. The leftmost portion of this roller 26 is disposed substantially in vertical alignment with the axis of the motor shaft 13 so as to be in the path of movement of the lower end 27 (FIG. 2) of the body portion of a mechanical pencil 28 during the movement of the latter to present its lead 29 to the sharpener, in a manner to be described hereinafter. During such movement of the pencil 28, the lower end 27 thereof will contact the roller 26 to move the switch controlling lever 22 in a clockwise direction about its pivot 21 from its normal position of FIG. 1 and against the action of spring 23 to its inoperative position of FIG. 2. The switch member 17 thus will be released to close the switch 15 and cause the motor to be energized.

Rotary cutter means comprising a plurality of cutter elements 31 and a mounting block 32 therefor are secured to the upper end portion of the motor shaft 13 in any suitable manner. As herein illustrated, the lower portion of the mounting block or rotor 32 is provided with a bore centrally thereof which slidably receives the upper end of the motor shaft 13, and the rotor is secured to the shaft by means of a suitable horizontally disposed set screw 33. In the present embodiment of the invention, four cutter elements 31 are employed. To accommodate these cutter elements, the upper portion of the mounting block or rotor 32, as best seen in FIG. 3, is provided with two vertically extending slots 34 at right angles to each other and intersecting coincident with the vertical center

line of the rotor and of the motor shaft 13. Each slot 34 accommodates two of the cutter elements 31, each of which is pivotally mounted therein intermediate its ends by means of a horizontal pin 35 subtending the slot and rigidly secured to the mounting block 32 in any suitable manner.

Each cutter element 31 comprises a first-class lever with respect to its pivotal mounting 35, with its lower arm having a weight 36 secured thereto in any suitable manner and, when in its inoperative position or position of rest of FIG. 1, being maintained thereby in contact with the adjacent peripheral surface of the rotor or mounting block 32. The upper arm of each element 31 above its pivot 35 is angularly disposed with respect to the lower arm thereof as best illustrated in FIG. 1, and is formed as a cutter blade 37. The angular relationship between these upper portions of the cutter elements 31 and their lower weighted arms 36 and the disposition of the cutter blades 37 relative to their respective pivots 35 are such that upward swinging movement of the weights 36 is positively limited by abutting engagement of the lower inner end portions of the several cutter blades 37 with each other, as illustrated in FIG. 2.

Completely surrounding and enclosing this cutter means is a hollow receptacle comprising an annular body portion 38 and a cover member 39 removably mounted thereon. The body portion 38 preferably is disposed coaxially with the motor shaft 13 and the cutter means, and is either secured in any suitable manner at its lower end to the motor housing base portion 12 or formed integrally therewith. The cover member 39 preferably is made considerably thicker than the annular body portion 38 to provide sufficient weight to prevent its accidental displacement, while obviating any necessity for any special means for removably retaining the same on the body portion of this receptacle.

The central portion of the cover member 39 is provided with pencil guide and lead inlet means comprising a stepped bore coaxial with the motor shaft 13 and the cutter means, when the cover is in place, and consisting of an upper main portion 41 for receiving and guiding the lower end of a mechanical pencil, and a reduced lower portion 42 interconnected at its upper end therewith to provide a shoulder 43. The lower portion 42 of this bore is of such diameter as to slidably receive the largest size of lead 29 normally employed in a mechanical pencil, and the shoulder 43 functions to limit downward movement of the lower end of the pencil, as illustrated in FIG. 2.

The neck portion of the removable cover member 39 through which the enlarged part 41 of its bore extends is provided at one side with an aperture 44 extending therethrough and communicating with the bore 41 to accommodate the inner end of the switch controlling or opening lever 22 and its roller 26. This aperture 44 is made only sufficiently large to permit free movement of the members 22, 26 between their positions of FIGS. 1 and 2, and to enable removal of the cover member 39 when the parts are in their positions of FIG. 1 without disturbing or actuating the members 22, 26. This neck portion of the cover member 39 also is provided, preferably opposite the aperture 44, with a flat or horizontally disposed shelf 45 above which is adjustably mounted a gauge bracket 46. This bracket 46 is a right-angled member having a horizontally extending arm with a slot 47 therein of a width substantially equal to the diameter of the smaller portion 42 of the cover bore and which is open at its outer end. The vertical portion of the bracket 46 is slotted for vertically adjustable movement on, and relative to, a suitable set screw 48.

When the annular body portion 38 of the cutter enclosing receptacle is permanently secured to or formed integrally with the base portion 12, mounting of the cutter means on the motor shaft 13 by means of the set screw 33 might present some difficulties. Consequently, a suitable access plug 49 may be provided in the lower portion of the container body 38 in horizontal alignment with the screw 33, so that removal of this plug will enable the screw 33 readily to be tightened or loosened.

Operation

It will be appreciated that the sharpener unit 11 hereinbefore described is portable but is of sufficient weight to prevent accidental displacement from a supporting surface to eliminate the possibility of any movement of the unit or malfunctioning as a result of the rapid rotation of the cutter elements 31 and rotor 32 by the motor. It will also be readily understood that rotation of the motor, through its shaft 13 and the rotor 32, rotates the several cutter elements 31 about the vertical axis of the cutter unit and the shaft 13, and that when the unit thus is rotated, centrifugal force will cause the weights 36 to move outwardly from their at rest or inoperative position of FIG. 1 to swing the cutter elements about their horizontal pivots 35 to their terminal position of FIG. 2. As previously explained, such terminal position of the cutter elements is determined by abutting engagement between the lower inner ends of the several cutter blades 37. In this terminal position of the cutter elements, the blades 37 opposite each other define a definite angle, as shown in FIG. 2, which is that which will be given to the lower end portion of any piece of lead 29 presented to the cutter unit.

While any pencil lead 29 presented to the cutter means thus will be cut at its lower end to this particular angle, any pencil lead may be sharpened to cause lines drawn thereby to be of a desired width by presenting only a certain predetermined end length of lead to the cutter means. This can be accurately determined because of the shoulder 43 and its cooperation with the lower end 27 of a pencil to definitely limit downward movement of the pencil relative to the cutting means, and the position to which the upper horizontal leg of the gauge bracket 46 is adjustably set relative to the shelf 45. With this guide bracket in its uppermost position, as illustrated in FIGS. 1 and 2, the operator places the lead 29 of the pencil 28 in the slot 47 of the guide means, as illustrated in broken lines in FIG. 1, and extends the lower end of the lead 29 until it rests upon the shelf 45. With the lead so adjusted, it will be sharpened to the finest possible point when the pencil and lead are moved through the guide and supporting means 41, 42 to their lowermost position of FIG. 2. The shorter the length of lead presented to the cutter means, the broader will be the lines drawn by the pencil, because the wider will be the resulting end surface of the sharpened lead. Thus, to sharpen any lead to a particular desired degree or condition less than a sharp point, it is only necessary to reset the guide bracket 46 to some suitable position lower than that shown in the instant drawings. Since the shoulder 43 of the cover member 39 definitely limits the lowermost position to which a pencil 28 may be moved, when the same is placed in the unit as illustrated in FIG. 2, the distance between the newly set and lower position of the horizontal portion of the gauge bracket 46 and its uppermost position of the drawings will be directly proportional to the degree of bluntness to which the pencil lead will be trimmed.

After the lead has been set to the desired length, insertion downwardly of the lower end 27 of the pencil 28 into the unit will cause the lower end 27 of the pencil automatically to displace the motor switch controlling lever 22 from its normal position of FIG. 1 to its inactive position of FIG. 2, against the action of the spring 23, to permit spring closing of the switch 15 to cause energization of the motor. Conversely, removal of a pencil from its position of FIG. 2 will result in automatically de-energizing the motor in response to the action of spring 23 returning the lever 22 to its active position

of FIG. 1 in which the lower end of the lever contacts the switch member 17 to open the switch.

It will be appreciated that the cutting action of the elements 31 is not positive, since it depends not only upon their rotation about the vertical axis of the motor shaft 13, but also upon the action of centrifugal force upon the weights 36. Consequently, a smooth clean cutting action upon the pencil lead presented thereto will result with this mechanism. And because of the manner in which such sharpening is effected, the sharpened lead will be clean and completely free of any residual lead dust. This eliminates any necessity for the operator to clean or wipe the lead off after it has been sharpened. And the lead removed in sharpening, or any resulting dust, cannot escape from the enclosing receptacle 38, 39, since the only opening therefrom, the reduced bore portion 42, is substantially filled by the lead and is closed by the lower portion 27 of the pencil.

This pencil sharpener may readily be cleaned and the accumulated lead and lead dust removed therefrom merely by removing the cover member 39 and tipping the unit toward, or turning it over above, a waste receptacle, or the like, adapted to receive such cuttings. While the present embodiment of the invention has been designed specifically for use with automatic pencils, it will be appreciated that the same could be adapted for use with the ordinary wooden lead pencil by changing the shape of the cover aperture or guide and inlet means 41—43.

It is thought that the invention and many of 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 without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A sharpener for the lead extending from the lower end of the body of a mechanical pencil, comprising rotatable cutter means, and a receptacle surrounding said cutter means for collecting lead in dust form resulting from operation of said cutter means in sharpening said lead, said receptacle having a readily removable cover frictionally mounted thereon with vertically disposed guide means for receiving the lower end of said pencil to present said lead to said cutter means and having a portion with a diameter intermediate those of said lead and said pencil body terminating in a substantially horizontal shoulder for limiting downward movement of said pencil body to prevent contact between the latter and said cutter means, said cutter means comprising a rotor having a vertical axis coaxial with said guide means, and a plurality of cutter elements pivotally mounted on said rotor on horizontal axes, each of said cutter elements comprising a weighted lower end and a cutter blade at its upper end of lesser weight than, and held in an outer inoperative position by, said weighted lower end when said rotor is at rest and swingable inwardly into active position in response to rotation of said rotor.

2. In a sharpener according to claim 1, means for limiting movement of said cutter blades in their inward swinging when they assume a predetermined angular relationship with respect to each other.

3. In a sharpener according to claim 2, gauge means mounted on said receptacle for cooperation with said pencil to determine the proper length of lead extending therefrom to effect the desired shaping by said cutter means of the end of the lead when the latter is presented to the cutter means and movement of the pencil is limited by said guide means.

References Cited in the file of this patent

UNITED STATES PATENTS

836,712	Rush	Nov. 27, 1906
2,618,240	Haase	Nov. 18, 1952
2,657,672	Angell	Nov. 3, 1953

FOREIGN PATENTS

284,427	Germany	May 26, 1915
402,079	Germany	Sept. 13, 1924
266,661	Switzerland	May 1, 1950
753,531	Great Britain	July 25, 1956
958,815	Germany	Feb. 21, 1957