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Sept. 2, 1941. J. K. BURLEIGH ET AL 2,254,772

PENCIL SHARPENER

Filed July 31, 1940 2 Sheets-Sheet 1

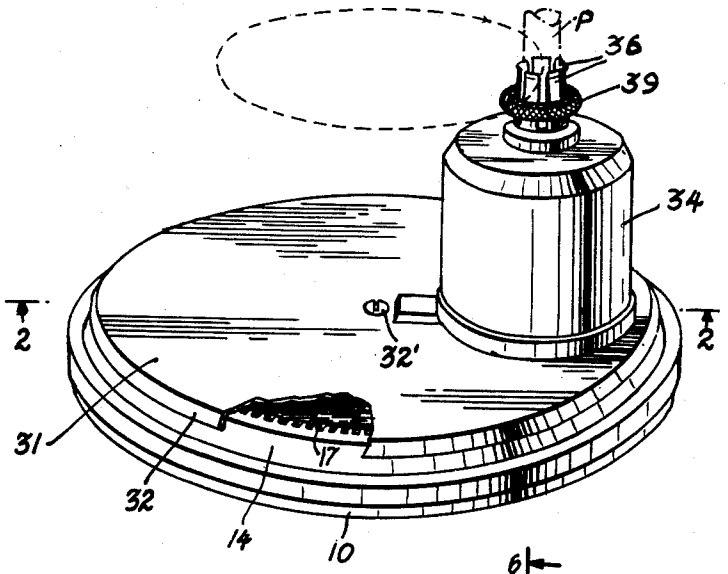


Fig. 1

1781
1775

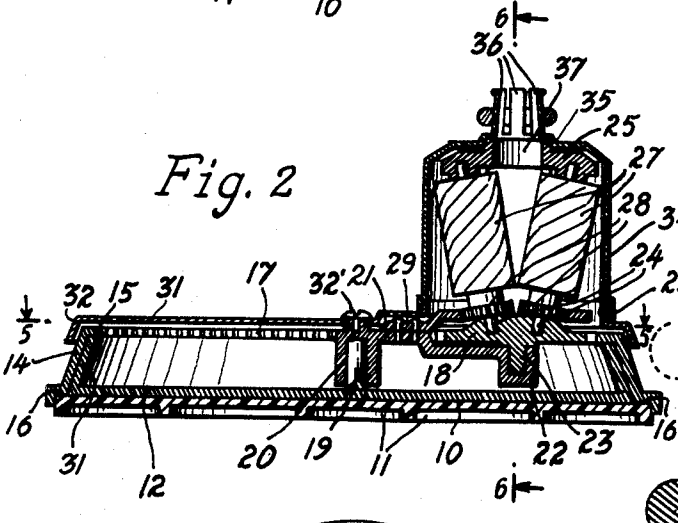


Fig. 2

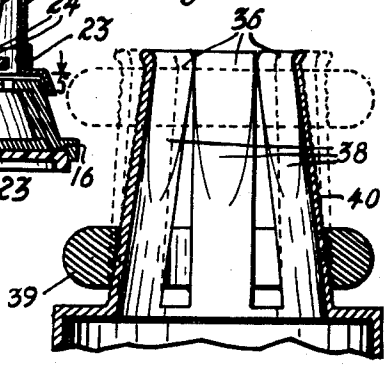


Fig. 3

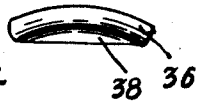


Fig. 4

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PENCIL SHARPENER

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Fig. 5

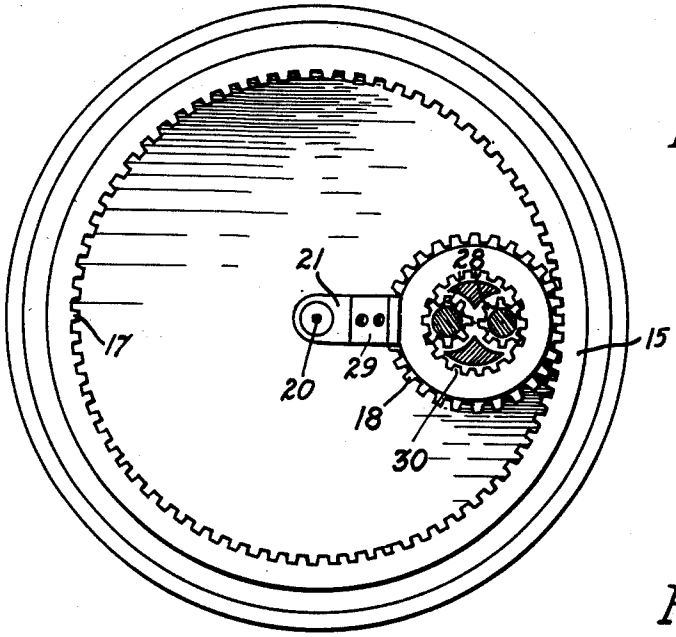


Fig. 7

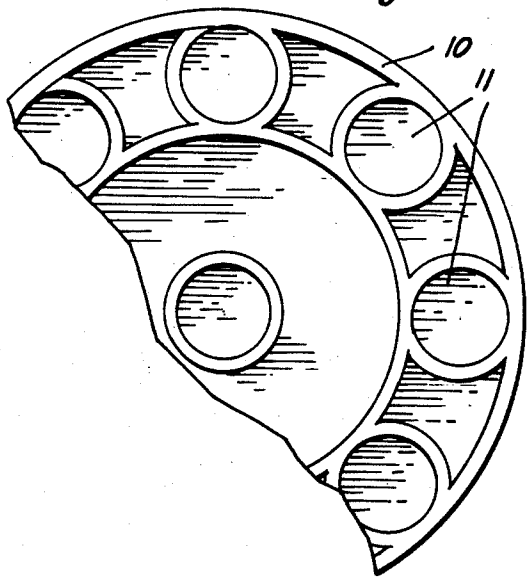
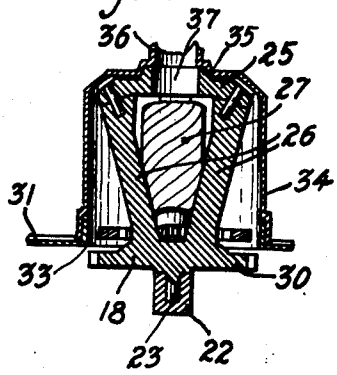


Fig. 6



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UNITED STATES PATENT OFFICE

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PENCIL SHARPENER

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Application July 31, 1940, Serial No. 348,626

5 Claims. (Cl. 120—96)

This invention relates to pencil sharpeners and more particularly to a portable high speed type of sharpener.

The invention described herein is an improvement over the type of pencil sharpener which employs the use of a pair of angularly disposed cutter elements driven by a crank handle. This type of sharpener must be permanently mounted upon the wall or suitable place and when it is desired to sharpen a pencil one end of the same is inserted through an opening, in the housing, and brought into cooperative relation with the cutter elements. The pencil is retained in the above position while the crank is given the required amount of turns. Also, owing to the structure of the type of sharpener, the gear ratio between the crank and the cutter elements is very limited thereby necessitating a considerable amount of turns of the crank before the proper result is obtained. Another disadvantage in using the above type of sharpener is that the opening through which the pencil is inserted, to bring the same in contact with the cutters, is of such limited size that a pencil of large diameter cannot pass through said opening. Or, when a pencil of smaller diameter is inserted through the opening, the pencil will not contact the cutters properly and, therefore, the desired result is not obtained.

The present invention overcomes the above disadvantages by mounting the cutter elements in a housing which is provided with an adjustable throat through which a pencil of any diameter within reasonable limits may be inserted therethrough and into contact with the cutters and while in such position the pencil is prevented from being laterally displaced. The housing is movable in an arcuate path about a pivot and when so moved a stationary internal gear, concentric with the pivot and meshing with a series of gears of the cutter elements, will drive said cutter elements about their own pivots in a much greater speed than the arcuate movement of the housing. The sharpener is provided with a suction base which when slight pressure is applied thereto, against a flat surface such as a desk, the sharpener is held firmly thereon. However, when it is desired to sharpen a pencil and it is not necessary to firmly hold the sharpener on a desk, the sharpener may be held in one hand while the housing is moved with the other hand.

Therefore, it is an object of this invention to enable the sharpening of a pencil quickly and conveniently without the use of both hands.

It is another object to enable one end of a pencil to be brought into proper cooperation with the cutter elements at all times.

Another object is to increase the speed of the cutters so that a pencil may be sharpened with the least amount of effort of the operator.

Still another object is to sharpen a pencil by moving the housing, through means of the pencil, in an arcuate or predetermined path.

Other objects and structural details will be apparent in the following description when read in connection with the accompanying drawings, in which:

Fig. 1 is a perspective view disclosing the general outline of the sharpener with a portion of the movable housing broken away to disclose part of the stationary internal gear;

Fig. 2 is an elevational cross sectional view taken substantially along the lines 2—2 of Fig. 1 and disclosing the cutters and gearing for driving the same;

Fig. 3 is an enlarged elevational cross sectional view of the throat through which the pencil is inserted into the housing;

Fig. 4 is an enlarged top plan view of one of the throat members;

Fig. 5 is a cross sectional view taken substantially along the lines 5—5 of Fig. 2;

Fig. 6 is a cross sectional view taken substantially along the lines 6—6 of Fig. 2; and

Fig. 7 is a bottom view showing a portion of the base and disclosing the suction cups.

Referring to Figs. 1, 2, 5, and 7, a disc 10 made of any suitable resilient material, such as rubber, is provided at the underside thereof with a plurality of inverted suction cups 11 (Figs. 2 and 7) adapted, when the disc is pressed upon a flat surface, such as a desk, to hold said disc firmly against displacement. Secured concentrically to the upper side of the disc 10 is a cup-shaped member 12 of smaller diameter than the disc 10 and whose wall portion 13 is inclined slightly inward. The outer periphery of the wall portion 13 has secured thereto the wall portion 14 of an inverted cup-shaped member 15, the wall portion 14 of which is shouldered at 16 to fit over the periphery of the disc 10. For reasons which will hereinafter appear the base of the inverted cup-shaped member 15 is cut to form an internal gear 17 which is constantly in mesh with a gear 18.

The disc 10 is provided at its center with a stud or pivot 19 which extends upwardly therefrom and is adapted to receive a downwardly extending boss 20 formed on an arm 21. The arm 21 extends to the right (Figs. 2 and 5) and is provided at its extreme end thereof with a bearing 22 to loosely receive a stub shaft 23 protruding from the gear 18. The gear 18 is provided with a raised portion for supporting one end of two upwardly extending shafts 24 which are angularly disposed from each other to form a V as shown in Fig. 2. The other end of the shafts 24 are supported in a bearing 25 suitably secured to a pair of upwardly extending arms 26 (Fig. 6) formed integral with the gear 18. Each

shaft 24 has rotatably mounted thereon a pencil cutter 27 of the usual type and which has secured thereto a gear 28.

The above construction is such that when the arm 21 is rotated about its pivot 19 the gear 18, supported by the arm 21, is also moved. As the gear 18 is in constant mesh with the internal gear 17, arcuate movement of the gear 18 causes said gear to be rotated about its pivot 23. This rotation of the gear 18 causes the entire assembly, including the cutters 27, to move with the gear 18. As the internal gear 17 is larger than the gear 18 by the ratio of about three to one it will be seen that one revolution of the above assembly about the pivot 20 causes the assembly to revolve about its pivot 23 three revolutions.

Secured to the upper side of the arm 21 is an arm 29 which extends to the right (Figs. 2 and 5) and is formed with an internal gear 30 concentric with the gear 18. The internal gear 30 is offset in such a manner as to mesh with the gears 28 secured to the cutters 27. The ratio between the gears 27 and the internal gears 30 is about two to one, and, since the gear 18 rotates three times for one revolution about the pivot 19, it will be seen that the gears 27 will rotate six times about the shafts 24 for each revolution of the gear 18 about its pivot 19. It will be noted at this time that the above ratio may be increased or decreased without departure from the scope of this invention.

The above gear assembly is enclosed in a housing which consists of a disc 31 concentric with the inverted cup-shaped member 15, and having a downwardly extending annular flange 32 which fits over the member 15 to prevent pencil shavings from falling out of the container formed by the members 12 and 15. The disc 31 is secured to the rotatable arm 21 by a screw 32' and is provided with an opening concentric with the gear 18.

This opening is provided with an upwardly extending annular flange 33 to the outer periphery of which is secured a housing 34. The housing 34 extends upwardly and is provided with an annular shoulder 35 to form a support for the rotatable bearing 25. Formed integral with the housing 34 and extending upwardly therefrom is a plurality of resilient strips 36 adapted to guide a pencil P (Fig. 1) through an opening 37 in bearing 25 and into cooperative relation with the cutters 27. To insure a more proper grip for the pencil the strips 36 are formed with a radial shape 38 beginning at the top, going down and gradually tapering out at about the center thereof. In order that the strips 36 may guide the insertion of pencils of different diameters they are threaded at 40 so as to cooperate with threads in a collar 39. It will be seen that turning the collar in one direction will move the upper ends of the strips 36 in close relation and turning the collar in the other direction the strips will spread further apart.

The device may be used in the following manner:

The throat formed by the resilient strips 36 is adjusted to the desired diameter according to the size of the pencil to be sharpened by turning the collar in either direction. One end of the pencil P is then inserted in the throat and through the opening 37 of the bearing 25 and into contact with the cutters 27. While the pencil is in the above position, it is moved in an arcuate or predetermined path as shown in dotted lines in Fig. 1. It will be noted that the housing 31—34 is moved with the pencil about pivot 19 causing the gear 18, which meshes with the stationary internal gears 17, and the cutters to be rotated in a counter-clockwise direction about the pivot 23. This planetary movement of the cutters 27 causes said cutters through their corresponding gears 28, which mesh with the stationary internal gear 30, to be rotated about their corresponding shafts 24. One of said cutters is rotated in a clockwise direction and the other in a counter-clockwise direction to sharpen the pencil. It will be seen that the amount of the arcuate movement of the pencil and housing depends upon the speed ratio of the gearing above described. The shavings of the pencil are adapted to fall and accumulate in the retainer formed in the cup-shaped member 12 and when said retainer is full the shavings may be removed by simply removing the housing assembly from its pivot or stud 19.

We wish it to be understood that we do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

We claim as our invention:

1. In a sharpening device of the class described, the combination of cutting elements mounted upon a rotatable gear, a rotatable support for said gear, an internal gear, the center of which coincides with the pivotal axis of said rotatable support, for driving said first mentioned gear when said support is rotated, and means for rotating said cutting elements when said first mentioned gear is rotated.

2. In a sharpening device of the class described, the combination of cutting elements rotatably supported upon a gear, movable means for supporting said gear, means for rotating said gear when said movable means is moved in an arcuate path, and means on said movable means for rotating said cutting elements when said gear is rotated.

3. In a sharpening device of the class described, the combination of cutting elements mounted within a housing and movable therewith, a normally ineffective train of gears movable with said housing for rotating said cutting elements, and a gear for rendering said normally ineffective train of gears effective when said housing is moved along a predetermined path.

4. In a sharpening device of the class described, the combination of cutting elements mounted within a housing and movable therewith, a gear for each of said cutting elements, a stationary internal gear mounted upon said movable housing and meshing with said first mentioned gears, a gear rotatably mounted upon said movable housing and upon which said cutting elements are mounted, and a stationary internal gear for causing the rotation of said last mentioned gear to rotate said cutting elements when said housing is moved along a predetermined arcuate path.

5. In a sharpening device of the class described, the combination of cutting elements, mounted upon a housing and movable therewith; a train of gears movable with said housing including a gear for each of said cutting elements, a stationary internal gear meshing with said first mentioned gears, and another gear upon which said cutting elements are mounted and with which they rotate, and means for causing the rotation of said last mentioned gear when said housing is moved along a predetermined path.

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