

March 4, 1941.

N. H. SWANSON

2,233,681

PENCIL SHARPENER

Filed April 18, 1938

2 Sheets-Sheet 1

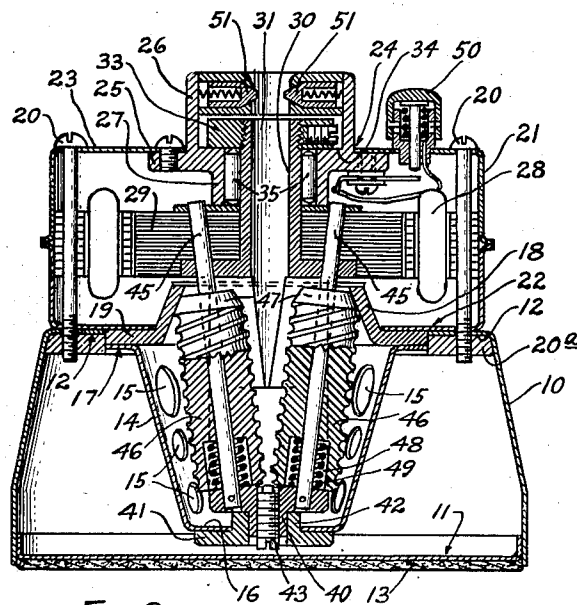
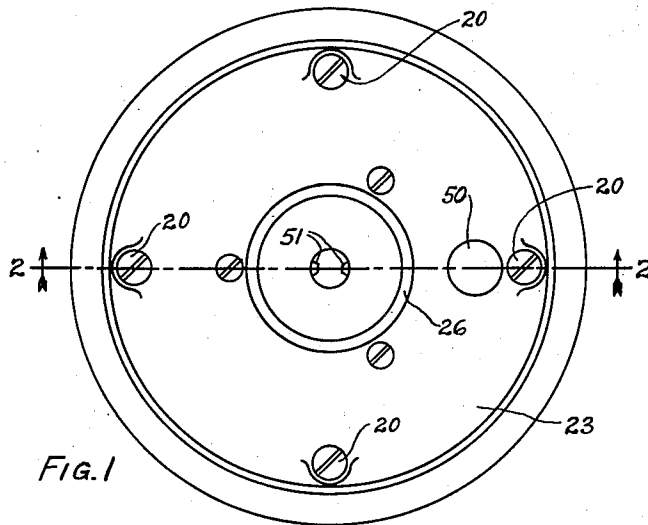


FIG. 2

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2 Sheets-Sheet 2

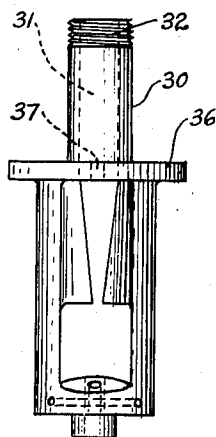


FIG. 3

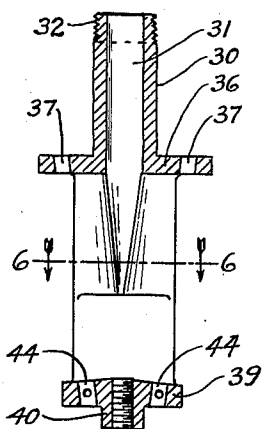


FIG. 5

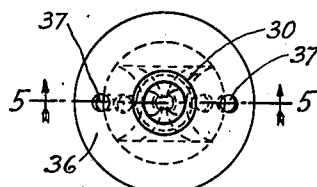


FIG. 4

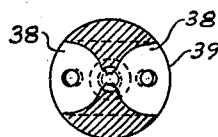


FIG. 6

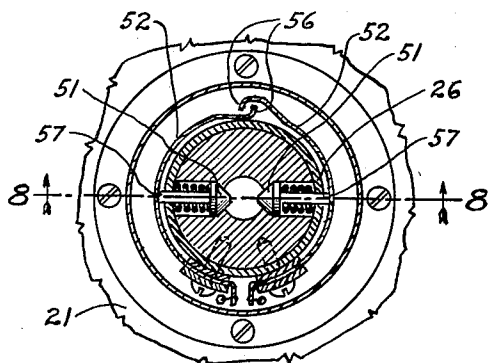


FIG. 7

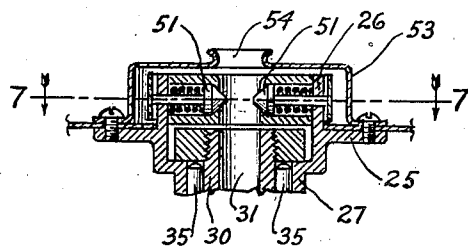


FIG. 8

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2,233,681

PENCIL SHARPENER

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13 Claims. (Cl. 120—96)

This invention relates to pencil sharpeners of the type employing rotatable cutters and has for its object the improvement of the construction thereof and the use of a motor for its operation and manipulation.

With the above and other objects in view, as will be apparent, this invention consists in the construction, combination and arrangement of parts all as hereinafter more fully described, claimed, and illustrated in the accompanying drawings, wherein:

Figure 1 is a plan view of a pencil sharpener constructed in accordance with the present invention;

Figure 2 is a central vertical section there-through taken along line 2—2 of Figure 1;

Figure 3 is a side elevation of the rotary cage in which the individually rotatable cutters are mounted and carried;

Figure 4 is an outer end elevation thereof;

Figure 5 is a central vertical section through the cage being taken along line 5—5 of Figure 4;

Figure 6 is a horizontal section taken along line 6—6 of Figure 5;

Figure 7 is a horizontal section along line 7—7 of Figure 8 through a modified form of this invention where the insertion of the pencil into the sharpener automatically initiates the operation thereof; and

Figure 8 is a vertical section of this modification taken along line 8—8 of Figure 7.

This invention contemplates a pencil sharpener of the type employing individual rotary cutters angularly disposed one to the other and bodily rotatable as a unit about the pencil being sharpened and proposes to operate and control these cutters by a motor contained within and forming an integral part of the sharpener thereby eliminating manually driving or operating the cutters.

Reference being had more particularly to the drawings, 10 designates a hollow base of metal or other suitable material designed to rest loosely or freely upon a supporting surface, to contain the cutters and to receive the shavings and cuttings removed from a pencil, as well as to support the operating motor. This base 10 is provided with a relatively flat removable bottom 11 having a sheet of felt or equivalent material 13 on its outer surface and a top 12. Any means may be used for emptying the base 10 of refuse and is here illustrated as so constructing and mounting the bottom 11 that it may be removed and replaced without disturbing the remainder of the device or the elements thereof.

Within the base 10 and suspended from the top 12 thereof is a housing 14 shaped like a truncated inverted cone. The lower or smaller end of this housing 14 is closed as at 16 while the larger or upper end thereof is unobstructed and has an outstanding flange 17 formed thereon. This housing 14 is provided with a plurality of openings 15 in its wall to permit the shavings and cuttings from the pencil operated upon to pass into the base 10 and to the exterior of said housing. Any suitable means, such as screws (not shown) may be employed to removably fasten the flange 17 to the flange 19 and the bottom 22 of the shell 21. The top 12 of the base 10 has a central opening therein in registration with the open or larger and upper end of the housing 14.

A collar 18, having an outwardly projecting flange 19, is positioned with the space defined by the collar in alignment with and forming a continuation of the interior of the housing 14 and with the flange 19 of the collar seated or resting flush on the flange 17 of said housing. It is to be observed that the collar 18 slopes inwardly in an upward direction from the flange 19 thereof and that the wall of the housing 14 slopes inwardly in a downward direction from its flange 17. (See Figure 2.)

Disposed above the base 10 is a hollow motor shell 21, the bottom side 22 of which rests flush upon the top 12 of the base 10 and extends over and upon the flange 19 of the collar 18. The bottom side of the shell 21 is apertured to permit the passage therethrough of the collar 18 and associated elements and snugly engages and bears against said collar. The top side 23 of the shell 21 is provided with a central opening 24 in alignment with the collar 18 and housing 14.

In order to secure the shell 21 to the base 10 and to maintain the assembly of the entire structure a plurality of bolts or elongated screws 20 pass through the top side 23 of the shell, the interior of said shell and its bottom side 22 to engage the top 12 of the base 10, and the anchoring member or members 20^a on the interior of the base. Manifestly, by removing the screws or bolts 20 the entire device may be taken apart for cleaning or repair and may also be conveniently reassembled and so maintained by replacing the same.

The centers of the opening 24 in the top side 23 of the shell 21 and the opening in the bottom side 22 lie on axes of the housing 14 and collar 18 which are coextensive. Within the aperture 24 of the top side 23 of the shell 21 is mounted

a cylindrical bearing having an outstanding flange 25 centrally of its length which is secured to the inner face of the top side 23 of the shell 21 adjacent to and surrounding the aperture 24 therein. An outer end portion 26 of this bearing projects above the top side 23 of the shell 21 while an inner end portion 27 projects inwardly from the inner face of said top side 23 and from the flange 25 fixed thereto. It will be noted that the diameter of the outer end portion 26 of the bearing is somewhat greater than that of the inner end portion 27 thereof. Manifestly this bearing being fixed to the shell 21 is also stationary or immovable.

In the shell 21 is an electric motor 28, the rotor 29 of which is fixed to the cage, illustrated in Figures 3 to 6, inclusive, that carries the cutters. This cage extends through the shell 21 and the rotor 29 of the motor 28 as well as the housing 14 in the base 10 and is free to rotate with the rotor 29. The upper end of the cage comprises a cylindrical neck 30 having a passage 31 extending completely through it of sufficient diameter to receive the largest size pencil the device is designed to sharpen. The inner end of this neck 30 is fixed to the rotor 29 of the motor 28 for rotation therewith and the neck passes through the inner end portion 27 of the bearing to project into the outer end portion 26 thereof. The outer terminal of the neck 30 is threaded as at 32 to receive a locking member 33 which is secured against being unthreaded from the neck by means of a set screw and which bears upon and operates over the shoulder 34 formed by the junction between the end portions 26 and 27 of the bearing. Between the inner end portion 27 of the bearing and that portion of the neck 30 passing through said portion 27 are a series of roller bearings 35 to facilitate the rotation of the neck within the bearing.

At its lower end the neck 30 has an outstanding flange 36 upon which the rotor 29 of the motor 28 rests. This flange 36 is provided with the diametrically opposed openings 37, the axes of which converge downwardly, for the mounting of the cutter pins as will be hereinafter described.

The lower end of the cage is provided with opposed convergent pockets 38 which terminate at the base member 39 of the cage. This base member 39 is provided on its outer surface with a stud 40 which passes through a central opening in the closed end 16 of the housing 14. A stationary clamping member 41 is disposed against the outer face of the closed end 16 of the housing 14 and is provided with a boss 42 which surrounds the stud 40 and passes through the opening in the closed end 16 of said housing. This clamping member 41 is secured to the end 16 of the housing 14 by welding or by any other suitable means but is not fixed to the stud 40. A set screw 43 is threaded into the stud 40 and passes completely therethrough and is designed to operate against the end or point of a pencil positioned within the cutter and by its adjustment regulate and determine the position thereof with respect to the base member 39 of the cage. The base member 39 of the cage is also provided with a pair of diametrically opposed angularly positioned openings 44, the axes of which lie upon the respective axes of the similar openings 37 in the flange 36 of the cage.

These aligned openings 37 and 44 provide mountings for the cutter pins 45 which are seated in the lower openings 44 and are there held by transverse pins against rotation relative to the

base member 39 of the cage. The upper ends of these cutter pins 45 project through the apertures or openings 37 of the flange 36 and through the rotor 29 of the motor 28. Thus when the rotor rotates, the entire cage rotates, carrying with it the pins 45 which do not rotate about their own axes.

A cutter 46 is mounted for rotation upon each cutter pin 45 and these cutters converge toward the base member 39 of the cage. The upper ends of the cutters 46 are provided with the beveled surfaces 47 which bear against the inner angularly positioned surface of the sloping collar 18. Thus when the rotor 29 of the motor 28 rotates carrying with it the pins 45 about the central axis of the device, the contact between the beveled surfaces 47 and the collar 18 causes the cutters to individually rotate. To insure an operating connection between the collar 18 and the beveled surfaces 47, each cutter is provided with a pocket 48 in its lower end, in which is positioned a compressed coil spring 49 surrounding the pin 45 and expanding between the base member 39 of the cage, and the bottom of the pocket. These springs 49 operating on the cutters 46 increase the normal friction between the beveled surfaces 47 of the cutters and the collar 18 and also take up any wear incidental to the operation of the device.

A spring pressed switch button 50 of any suitable construction is provided in the top surface of the shell 21 to close the circuit by which the motor 28 is energized. The switch button 50 may be closed and the motor energized until the rotor 29 has built up a sufficient operating momentum whereupon a pencil may be inserted in the passage 31 of the neck 30 until its point is positioned between the cutters. It has been found that the momentum of the rotor 29 is such that it will continue to rotate after the circuit controlling the motor 28 is opened until the pencil has been properly sharpened with its point resting against the inner end of the set screw 43, no pressure upon the pencil being ordinarily necessary to complete the sharpening. On the other hand it is possible of course to insert the pencil into the passage 31 of the neck 30 and maintain the button closed until the pencil has been sharpened. The construction of the helical cutting elements of the cutters 45 is such that the operation thereof on the pencil tends to draw the pencil downwardly through the passage 31 rather than to repel the pencil.

In order to prevent any rotation of the pencil in the passage 31 during the sharpening operation, a pair of spring-pressed plungers 51 are mounted in the outer projecting end 26 of the bearing, and when the pencil is inserted in the passage 31 of the cage, bear against the outer surface thereof and tend to prevent the rotation thereof relative to the entire structure. In other words, the plungers 51 hold the pencil fixed relatively to the shell 21 and the bearing carried thereby.

In Figures 7 and 8 is disclosed a modified form of the present invention wherein the circuit controlling the operation of the motor 28 is automatically closed by the insertion of a pencil into the passage 31 of the neck 30, and this circuit is maintained closed so long as the pencil is in the passage. A pair of opposed spring switch members 52 are mounted within a casing 53 secured to the exterior of the top side 23 of the shell 21 and enclosing the projecting end portion 26 of the bearing. This casing 53 is provided with an

opening 54 in alignment with the passage 31 of the neck 30 of the cage, whereby a pencil may be inserted as in the preferred form of the invention. Surrounding the projecting end portion 26 of the bearing is the pair of switch members 52 connected to the circuit controlling the motor 28. At their free terminals these switch members are provided with contacts 56 which when brought together close the circuit for the operation of the motor 28. The plungers 51 heretofore described, in this form of the invention are provided at their outer ends with projecting tits 57 which bear against the spring switch members 52. When a pencil is inserted through the aperture 54 of the casing 53 and projected into the passage 31 of the neck 30, the plungers 51 contact with the pencil and are thereby forced outwardly, the tits 57 thereof operating against the normal spring action of the switch members 52. This action brings the contacts 56 of the switch members together, closing the circuit, and as long as a pencil is so positioned in the sharpener, the contacts are closed and the motor continues operation. When the pencil is removed, the normal resiliency of the switch members 52 causes the contacts 56 thereof to separate and the device to cease operation.

It is manifest from the foregoing that the present invention provides a pencil sharpener which may be positioned anywhere and does not have to be anchored or firmly mounted. It merely rests on a supporting surface and will operate to sharpen the pencil either automatically by the insertion of the pencil, or controlled by closing the circuit through the button 50. It may be moved from place to place without requiring any mechanical adjustments or mounting operations.

What is claimed is:

1. In a pencil sharpener the combination with a hollow base, of a shell superposed on said base, said shell and base having aligned apertures therein, a bearing mounted in and secured to said shell and situated in one of said apertures, a cage mounted for rotation in said bearing and projecting into said base, a motor within said shell, a connection between the rotor of said motor and said cage whereby the latter rotates with the rotation of said rotor, a pair of rotary cutters carried by said cage with the major portion thereof positioned in said base, and means cooperating with the upper portion of said cutters to rotate them individually upon the rotation of said cage.

2. In a pencil sharpener the combination with a hollow base, of a shell superposed on said base, said shell and base having aligned apertures therein, a bearing mounted in and secured to said shell and situated in one of said apertures, a vertical cage mounted for rotation in said bearing with substantially its lower half projecting into said base, a motor within said shell, a connection between the rotor of said motor and said cage whereby the latter rotates with the rotation of said rotor, a pair of rotary cutters carried by that portion of said cage projecting into the base, a stationary, angularly disposed collar positioned adjoining the upper ends of said cutters, and friction means on the upper ends of said cutters to cooperate with said collar for the individual rotation thereof when bodily moved by and with the rotor of said motor.

3. In a pencil sharpener the combination with a hollow base, of a shell superposed on said base, said shell and base having aligned apertures

therein, a bearing mounted in and secured to said shell and situated in one of said apertures, a cage mounted for rotation in said bearing and projecting substantially one-half of its length into said base, a motor within said shell, a connection between the rotor of said motor and said cage whereby the latter rotates with the rotation of said rotor, a pair of rotary cutters carried by that portion of said cage projecting into the base and diverging upwardly toward said shell, the divergent ends of said cutters being provided with beveled surfaces, and a stationary collar so positioned that the beveled surfaces of the cutters operate against one face thereof as said cage rotates with the rotor of said motor.

4. In a pencil sharpener the combination comprising a hollow base, a shell above the base, a motor within said shell, of a cage having a tubular neck fixed to and passing through the rotor of said motor, said cage projecting into the base, a plurality of convergent, individually rotatable cutters carried by said cage with divergent ends at the top, each cutter having a beveled surface on its divergent end, a stationary friction collar adjoining the divergent ends of said cutters and so cooperating with the beveled surfaces thereof that the rotation of the cage with the rotor of the motor causes the individual rotation of the several cutters, and means coacting with the convergent ends of the cutters for insuring frictional cooperation between the beveled surfaces of said cutters and collar.

5. In a pencil sharpener the combination comprising a hollow base, a shell above the base, a motor within said shell, of a cage having a tubular neck fixed to and passing through the rotor of said motor, said cage projecting into the base, a plurality of convergent, individually rotatable cutters carried by said cage with divergent ends at the top, each cutter having a beveled surface on its divergent end, a stationary friction collar adjoining the divergent ends of said cutters and so cooperating with the beveled surfaces thereof that the rotation of the cage by and with the rotor of the motor causes the individual rotation of the several cutters, and springs interposed between the cage and the convergent ends of the cutters for insuring driving frictional coupling between the beveled surfaces of said cutters and the collar aforesaid.

6. In a pencil sharpener the combination of a hollow base, a shell superposed on said base, a motor, of a cage having a tubular neck passing through and fixed to the rotor of said motor, said cage projecting into said base, a plurality of convergent pins carried by said cage and fixed thereto against rotation, a cutter mounted for rotation upon each pin, having a beveled surface at its upper end and a pocket in the other, an angularly disposed stationary collar at the upper ends of said cutters surrounding and contacting with the beveled ends of the several cutters, and a compressed spring in the pocket of each cutter operating between the cage and the bottom of said pocket to maintain frictional driving coupling between said contacting surfaces.

7. In a pencil sharpener the combination with a hollow base, of a shell superposed on said base, the top and bottom of said shell and the top of said base having aligned openings therein, a conical housing suspended in said base, a collar at the openings in the top of the base and bottom of the shell and projecting into the shell at an angle to the planes of the top of the base and

bottom of the shell, a motor within said shell having a rotor the axis of which lies on a line through the centers of the opening in the shell and base, a bearing fixed to the top of the shell and projecting through the opening therein, a cage extending through the shell and projecting into the housing in the base having a tubular neck projecting through the rotor of the motor and the bearing aforesaid, means for suspending the cage from said bearing, a base member on said cage within said housing, a plurality of convergent pins fixed to said base member and projecting into and secured to the rotor of said motor, an individually rotatable cutter mounted on each pin having a beveled surface contacting said collar and a pocket in the end thereof adjacent the base member, a coil spring operating between said base member and the bottom of each pocket, and a set screw operating through said base member to regulate the position of a pencil inserted in the neck of the cage and projected between said cutters aforesaid.

8. In a pencil sharpener the combination with a hollow base, of a shell superposed on said base, the top and bottom of said shell and the top of said base having aligned openings therein, a conical housing suspended in said base, a collar at the openings in the top of the base and bottom of the shell and projecting into the shell at an angle to the planes of the top of the base and bottom of the shell, a motor within said shell having a rotor the axis of which lies on a line through the centers of the opening in the shell and base, a bearing fixed to the top of the shell and projecting through the opening therein, a cage extending through the shell and projecting into the housing in the base having a tubular neck projecting through the rotor of the motor and the bearing aforesaid, means for suspending the cage from said bearing, a base member on said cage within said housing, a plurality of convergent pins fixed to said base member and projecting into and secured to the rotor of said motor, an individually rotatable cutter mounted on each pin having a beveled surface contacting said collar and a pocket in the end thereof adjacent the base member, a coil spring operating between said base member and the bottom of each pocket, a set screw operating through the base member of said cage at a point between the convergent ends of the cutters to act as a stop for the point of a pencil positioned between the cutters, and means carried by the bearing aforesaid for cooperation with a pencil being sharpened to counteract any tendency thereof to rotate within the sharpener during the operation thereof.

9. The combination with a motor including a rotor, a cage having a neck in and fixed to said rotor, and a portion projecting from one side of said rotor, a series of individually rotatable cut-

ters mounted on the projecting portion of the cage, a partition separating said cutters from said motor, and means fixed to said partition for individually rotating said cutters upon the rotation of the cage in unison with said rotor.

10. The combination with a motor including a rotor, a cage having a neck in and fixed to said rotor and a portion projecting from one side of said rotor, a series of individually rotatable cutters mounted on the projecting portion of the cage, a partition separating the cutters from the motor, frictional means fixed to said partition for individually rotating said cutters upon the rotation of the cage in unison with said rotor, and a perforated housing surrounding said cutters.

11. In a pencil sharpener, a base, an electric motor supported on the upper portion of said base, said motor including a stator and rotor, a plurality of rotary pencil sharpening cutter elements extending downwardly from and rotatable as a unit with said rotor, and means located beneath said rotor in the vicinity of the upper extremities of said pencil sharpening cutters for effecting individual rotation of said cutters when rotation is experienced by said rotor, said base providing an area located beneath said motor and surrounding a substantial portion of said cutters for receiving pencil shavings removed thereby.

12. In a pencil sharpener, a base, an electric motor supported on the upper portion of said base, said motor including a stator and rotor, a plurality of rotary pencil sharpening cutter elements converging downwardly from and rotatable as a unit with said rotor, and means located beneath said rotor in the vicinity of the upper extremities of said pencil sharpening cutters for effecting individual rotation of said cutters when rotation is experienced by said rotor, said base providing an area located beneath said motor and surrounding a substantial portion of said cutters for receiving pencil shavings removed thereby.

13. In a pencil sharpener, a base, an electric motor supported on the upper portion of said base, said motor including a stator and rotor, a plurality of rotary pencil sharpening cutter elements extending downwardly from and rotatable as a unit with said rotor, and means located beneath said rotor in the vicinity of the upper extremities of said pencil sharpening cutters including coacting beveled friction surfaces for effecting individual rotation of said cutters when rotation is experienced by said rotor, said base providing an area located beneath said motor and surrounding a substantial portion of said cutters for receiving pencil shavings removed thereby.

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