Dec. 14, 1926. 1,611,141

A. FISHER

ELECTRICAL PENCIL SHARPENER

Filed Jan. 9, 1926

FIG. 1.

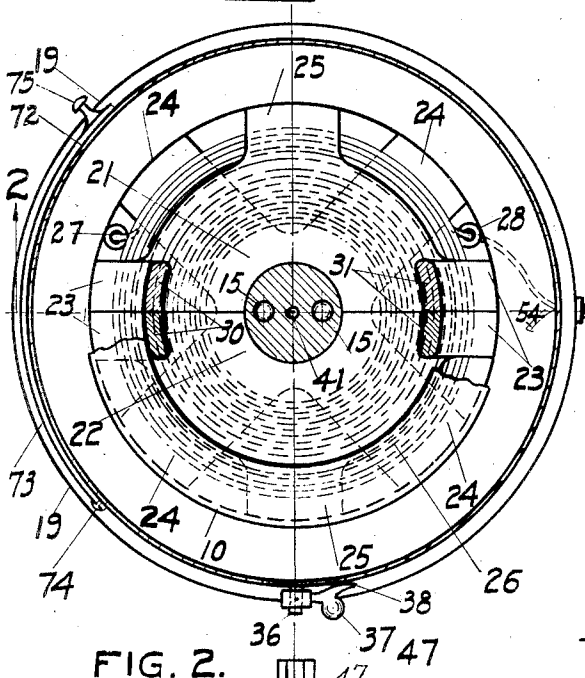


FIG. 3.

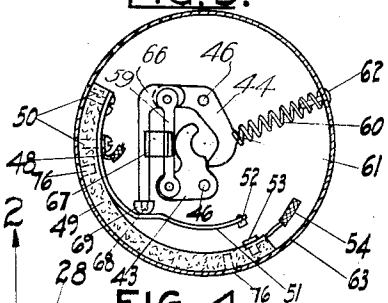


FIG. 4.

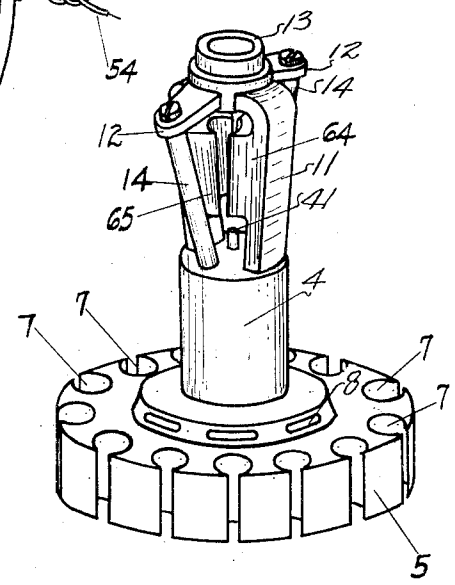


FIG. 2.

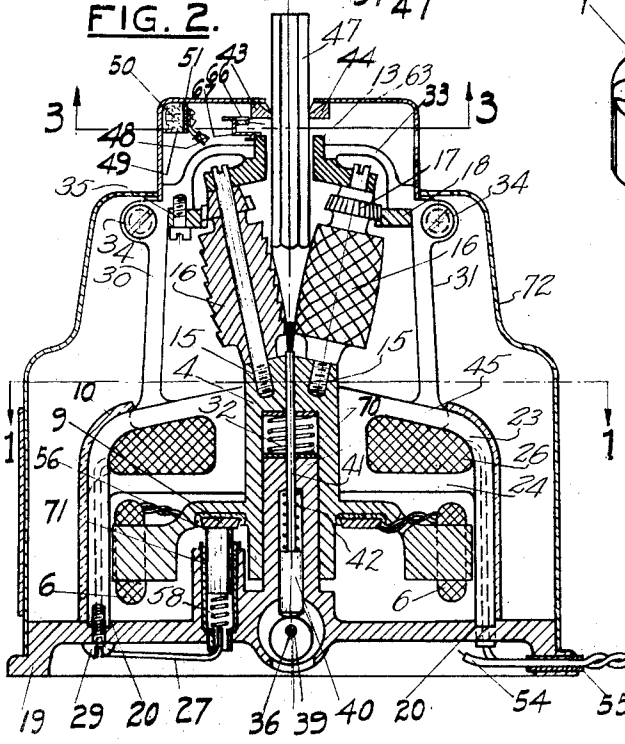
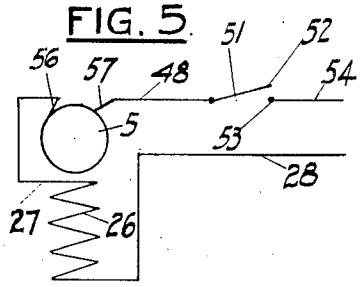


FIG. 5.



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UNITED STATES PATENT OFFICE.

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ELECTRICAL PENCIL SHARPENER.

Application filed January 9, 1926. Serial No. 80,234.

Some of the improvements constitute a modification of my former invention, the patent number of which is 1,546,538, through means of which I desire to eliminate certain objectionable features and as a result of which, to render the device more efficient, simpler, durable and cheaper.

There are also added improvements not featured in my former invention and each of the changes and features will be more fully described during the course of the description following but are merely alluded to now as a means of comparison.

In the cutting head of this device the gears operating the cutters have been changed from the bottom of the cutters to the top of the cutters, at the same time having them also engage an internal circumferential gear mounted in the head portion of the pencil sharpener.

This constitutes the first important object and by means of this change the circumferential enveloping gear located in the rotatable shield of my former invention, together with other shafts and gearing, have been eliminated greatly reducing the cost, making the device more simple and aiding in the conserving of electrical energy.

Another important advantage obtained by this change is: Formerly the particles rasped off the pencil during the sharpening thereof clogged up the gearing at the lower end of the cutters, and the particles were consequently chewed up, which resulted finally in having the point of the pencil chipped. This objection is now positively eliminated, which, in addition to the aforementioned advantage, also tends to the further conservation of electrical energy and waste.

Another important object is the provisional means of operating the cutters before the pencil comes in contact with the cutting edges. Formerly the rotating parts were depressed, with the pencil in contact with the cutting edges of the cutters, making switch contact before the cutters started rotating. Upon the rotating of the cutters, the sharp edges immediately gouged into the wood and often choked the machine and sometimes produced an uneven sharpening of the pencil. Particularly was this noticeable when the cutters became dull.

By substituting a switch element into the cutting head of the machine which starts the motor as soon as the pencil is inserted and the interruption of the switch when the pencil is sharpened, the sharpening qualities and longevity of the cutting elements are greatly enhanced.

The electrical motor operating the rotating parts is a specially designed multi-pole motor with only one field coil winding.

Special attention has also been given to the elimination of parts and the re-arrangement of new parts which will reduce the cost of manufacture of the article.

The foregoing features have been pointed out and many others will be apparent in the description following and the drawing forming a part of the same; like reference numbers referring to the same parts throughout the several views.

In the drawing: Figure 1 is a transverse section taken on the line 1—1 of Figure 2.

Figure 2 is a longitudinal vertical section taken on the line 2—2 of Figure 1.

Figure 3 is a section taken through the head on the lines 3—3 of Figure 2.

Figure 4 is a perspective view of the rotating portion of the sharpener with the cutters and wiring removed.

Figure 5 is a wiring diagram.

Referring to the drawing, Figures 1 and 2, I show in section a field magnet, which, for the sake of the easier assembly of the rotating parts, is vertically split into two halves, 21 and 22. A circular field coil 26 is surrounded by iron pole fingers, 23 and 25, on the upper side protruding downwardly and surrounding a portion of the armature iron 5. Pole fingers 24 of opposite polarity surround the field coil 26 on its under side, which also protrude downwardly and are located between pole fingers 23 and 25, also surrounding a portion of the armature iron 5.

The field magnet as shown is of the eight pole type, having four north poles 24 and four south poles 23 and 25.

Although the type of motor designed is for 6, 8 or more poles, I do not wish to be limited to this number as a 2 or 4 pole type with only one field coil may be used.

The aforementioned magnets 21 and 22 are joined together by suitable fastenings 34 at the top, while the lower portion, consisting of the iron pole fingers, 23, 24, 25 and 26, are fastened in an annular groove 20 machined in the base 19 which is made from some non-magnetic metal and fastened to the pole fingers by screws 29.

By inserting these pole fingers into the annular groove and providing therewith a cover 10 adequately insures a dust proof compartment for the rotating parts of the motor.

The base 19 aforementioned is circular in shape, corresponding to the circular configuration of the armature 5 and the outer cover 72.

Centrally and vertically extending from the base 19 is an extension 45 which projects inwardly into the armature core 5 upon which the armature and the parts carried by the armature rotate.

Between the top of said extension and the bottom of the cavitated portion of the core of the armature, is a yielding pressure means 32 with a thrust washer 70 on the top and under side thereof.

This yielding pressure means is provided for consuming the initial pressure placed on the pencil when it comes in contact with the cutters thus allowing the cutters a gradual feeding pressure. It also affords a means for using a softer wood in the pencil without showing imperfections in sharpening and also eliminates choking of the cutters when the pencil is forcibly introduced.

Into the said base extension 45 is housed the adjustable lead lengthening apparatus, consisting of a pencil point lengthener plunger 40 with a shaft extension 41 and a compression spring 42. The spring 42 forces the plunger 40 to ride on a cam 39 mounted on a shaft 36 and on the shaft 36 on the outside of the cover 72 (see Figure 1) is carried an indicator 38 with a knob 37 for adjusting the indicator and the cam which governs the length of lead on the pencil desired to be cut.

The armature core (iron) 5 consisting of a circular base, has a central slot into which the central projection 45 of the base 19 is inserted, thus forming a bearing for the armature.

In the periphery of the armature 5 are cored the armature grooves 7 (16 in all) and slots 8 provide a means through which to fasten commutator wires from the commutator segments 9 insulated from each other and from the armature. The armature wiring 6 occupies the armature grooves 7 and the commutator segments 9 communicate with commutator brush 56 insulated by 71 and actuated by commutator spring 58.

Projecting upwardly in the center of the armature 5 is an arbor 4 which has two side supporting brackets 11, having conical inside faces into which the pencil is inserted and side conical surfaces 64 and 65 which permit of the mounting of the cutting rasps 16 on the shafts 14 slightly inclined to the perpendicular axis of rotation of the armature, there being a slight gap between the two brackets 11 so that a small portion of the pencil can come in contact with the cutting edges of the rasps. The upper portion of the brackets 11 terminate into a circular top 13 from which extend two wings 12 into which the shafts 14 are journaled. The lower portion of the shafts 14 are threaded and are screwed into the tapped holes 15 (see Figure 2) in the arbor 4 of the armature.

The top 13 wherein the pencil 47 is inserted is journaled in the cup shaped top 33 of the field magnet iron which is a continuation of the upright extensions of the field magnet iron 30 and 31.

By referring to Figure 2 it will be noticed that there is provision for a slight vertical adjustment of all rotating parts when the pencil is inserted and this portion is forced downwardly, the same returning to its normal state of rest through the tension stored in the compression spring 32.

Splined on the shafts 14 with the cutting rasps 16 are pinions 17 which mesh with the circumferential gear 18 fastened at the juncture of the cup shaped top 33 and the upright extensions of field magnet iron 30 and 31 by screws 35, the teeth on the pinions being mitered to insure a perfect mesh.

The cutting rasps are easily removable by unscrewing the shafts upon which they are mounted, provision being made on the end of each shaft for accomplishing this purpose.

Contained within the head portion of this device are the switch connections and pencil guiding means insuring vertical contact means with the cutting rasps during the sharpening of the pencil and the automatic starting and stopping of the device.

The said apparatus is mounted between the cup shaped top 33 of the field magnet iron and the cover shell 63. The cover shell 63 is expanded over the cup shaped top 33 and over this and the base 19 is telescoped the outer cover 72. This outer cover is removable for cleaning purposes or the shavings may be removed through a clean out door provided for this purpose 73, hinged on the outer cover. This door is provided with a knob 75 and hinges 74 for the door to swing on.

The combination switch and pencil holding means comprise a pair of jaws 43 and 44 pivotally mounted on pins 46 fastened in the top of cover shell 63.

The switch consists essentially of a crescent shaped fiber base 49 fastened to the shell 63 by screws 76, a tungsten point or contact screw 53, terminal wire 54 insulated by 55 (see Figure 2) a leafspring 51 with tungsten point 52, fastened to fiber base 49 by screws 50, these also serving as connection screws for wire 48.

This switch is a quick interrupting switch to quench the arc of the interruption and is designed to start the motor at the moment

when a pencil is inserted between the pivotal jaws 43 and 44 and again disrupt the switch when the cutters 16 are moving upwardly during the finishing cut actuated by spring 32.

The opening and closing of leaf spring 51 is operated by a push knob 69 (bakelite) which is fastened on the terminal 68 of a U-shaped leaf spring 66 placed beneath the connecting link 59 and having a trip wing 67 which rides on the horizontal face of the protruding portion of the circular top 13 extending through the top portion of field magnet iron and then only in the half time when the entire cutter frame moves upward actuated by spring 32 forcing the knob 69 sidewise off the leaf spring 51 producing a fast interrupting motion of contact point 52. After this the trip wing 67 of spring 66 snaps off and downward from the horizontal part of the rim 13. This movement takes place during the second half time of the upward motion of the cutter frame during which time the motor will about arrive at a complete stop.

The pencil is now sharpened and upon its withdrawal from the opening the jaws 43 and 44 close together moving the connecting link 59 to the right, pulling knob 69 back again into its normal position as shown in Figure 3.

The bent portion of trip wing 67 in Figure 2 of spring 66 will snap back again into position and ride on the horizontal surface of the rim 13 when a new pencil is inserted and the cutter frame 11 is pushed down into its lowest position.

After the pencil 47 has been removed from the device the jaws 43 and 44 are closed by means of a coil spring encircling a knob 61 on cutter 44 and fastened to a pin 62 in the cover shell 63.

The spring forces the jaw 44 about its pivotal axis 46, a portion of the jaw being in contact with jaw 43, forcing it about its pivotal axis 46, thus manipulating the switch element and providing a gripping means for holding the pencil in alignment during the sharpening thereof.

In Figure 5 is a wiring diagram showing the indication of the armature 5 commutator brush 56, (see Figure 2) and at 90 degrees therefrom a commutator brush 57 not visible from which runs wire 48 to the switch 51, (see Figure 3). The tungsten points of the switch are represented by 52 and 53, 53 being connected to the terminal of switch wire 54 as shown in Figures 2 and 3. Connecting to commutator brush 56 is one stationary terminal 27 of the mutual field coil 26, the other terminal being 28, and they are likewise shown in Figure 1.

Operation.

The operation of my improved electrical pencil sharpener consists of inserting a pencil in the apertured opening in the head portion thereof and it is obvious that only one hand is necessary in operating the sharpening of a pencil using this device.

The pencil opens the jaws 43 and 44 each of which operates on its own pivotal axis 46, at the same time gripping the pencil 47.

During the expanding of the jaws, the coil spring 60 stores up energy to be utilized in returning the jaws to their neutral position at the same time the operation of the device is accomplished by the switch 51, making contact at points 52 and 53.

The pencil is pushed downward until it comes in contact with the rotating cutters, the spring 32 permitting of a gentle contact with the rotating elements.

The pencil will be sharpened until the point comes in contact with shaft extension 41 of the pencil point lengthener plunger 40. As soon as this is accomplished, the compression spring will have exerted its final push on the cutters, forcing the top terminal 13 with opening for pencil against the trip 67 of the switch 51 disrupting the switch 51 and thereby stopping the rotation of the cutting elements. Were this trip not provided for and the motor continued to operate there would be not only a waste in the pencil but a loss in electricity.

As soon as the pencil is withdrawn a trigger action is accomplished whereby the automatic condition is awaiting for continued action.

The large compartment provided for the shavings and the means for quick and simple removal of the same will be obvious.

From the foregoing, it will be evident that I have devised simple, reliable and positive improvements over my former invention and, while the structural embodiments of my improvements as herein disclosed are what I at the present time consider preferable, it will be understood that the same are subject to changes, variations and modifications of parts, etc., without departing from the spirit of the invention or sacrificing any of its advantages. I, therefore, do not intend to restrict myself to such particular construction and arrangement of parts, but reserve the right to make such changes, variations and proportion of parts as come properly within the scope of the appended claims.

Having thus fully described my improved invention, I claim:

1. An electrical pencil sharpener comprising a base, a shaft centrally and vertically projecting therefrom; a rotatable armature containing a circular core, an arbor centrally and vertically projecting therefrom, said armature and arbor containing a slot wherein to project aforesaid shaft and means to rotate aforementioned armature on aforementioned shaft.

2. An electrical pencil sharpener of the class described, comprising a rotatable armature, a vertical shaft whereupon to rotate the same, a yielding pressure means mounted upon the top of aforesaid vertical shaft and forming a cushiony seat for said rotatable armature and a means associated with the armature for rotating the same substantially as herein set forth and described.

3. An electrical pencil sharpener comprising a circular base, a vertical shaft centrally projecting therefrom, a rotatable armature carried by the shaft and a yielding pressure means whereby the rotatable armature is vertically adjustable on said shaft.

4. An electrical pencil sharpener comprising a circular base, a circular shaft containing a vertical cavity, a shaft contained in said cavity, a hole in the top of first said shaft whereupon to project second said shaft and a means whereby second said shaft is vertically adjustable on first said shaft.

5. An electrical pencil sharpener comprising a circular base, a circular shaft vertically projecting from the center thereof, a cavity contained in said shaft, a shaft mounted in said cavity, a horizontal opening located at right angles with aforesaid cavity, a cam in said opening and supporting aforesaid second named shaft, a shaft whereupon to rotate said cam whereby to vertically adjust aforesaid second named shaft, said shaft supporting said cam being journaled in said circular base, one end of last said shaft protruding through the side of said base, an indicator mounted upon said protruding portion whereby to raise and lower second named shaft in first said shaft and a yielding pressure means whereby second named shaft is held in contact with aforesaid cam upon which said second mentioned shaft is adjustable.

6. An electrical pencil sharpener comprising a base, a vertical shaft integral with said base, a rotatable armature vertically slidable upon and carried by said shaft, said armature having a vertical extending arbor, shafts carried by the arbor, said shafts being slightly inclined to the perpendicular axis of revolution of the armature, cutting rasps mounted on said shafts, each said rasp being rotatable upon its individual shaft and orbital in relation to the rotating axis of said armature supporting said shafts; pinions mounted on aforesaid shafts with aforesaid rasps, and a circumferential gear with which to engage said pinions thereby rotating said rasps in said orbit and a means associated with the armature for producing a rotation thereof.

7. In an electrical pencil sharpener, a rotatable armature core, an arbor vertically extended therefrom, upright members having their inner faces and sides of conical shape carried by said arbor, shafts slightly inclined to the perpendicular axis of revolution of aforesaid armature carried by the arbor, cutting rasps mounted on said shafts and rotatable on their individual axes in said conical faces; means associated with the armature whereby to rotate said arbor substantially as set forth and for the purpose described.

8. In an electrical pencil sharpener comprising a field magnet, a frame in which to house said field magnet, said frame being divided into two halves, each said half jointly housing a rotatable armature, a socket in the core of said armature, a base having a central extension projecting in said socket whereupon to support said rotatable armature and means associated with the armature for rotating the same.

9. In an electrical pencil sharpener comprising a base, said base having a vertical shaft centrally and upwardly extending therefrom, an armature having a socket, said shaft adapted to project into said socket, yielding pressure means between the end of the shaft and the armature socket for supporting the armature whereby the armature may be elevated or depressed during the rotation thereof and means associated therewith for rotating the armature.

10. In an electrical pencil sharpener, a frame, a stationary field magnet and a rotatable armature within the frame, an internal gear mounted in the upper portion of said frame, said armature comprising a core, an arbor vertically extending therefrom, shafts slightly inclined to the perpendicular axis of revolution carried by said arbor, cutting rasps mounted on said shafts, said rasps having pinions integral therewith and meshing with aforesaid internal gear, means to energize said field magnet and armature whereby to rotate said rasp, substantially as herein set forth and described.

11. In an electrical pencil sharpener, comprising a vertical rotatable armature, a pair of shafts mounted in said armature, cutters mounted on the shafts for individual rotation thereupon, said cutters having their axes slightly inclined to their perpendicular axis of revolution, pinions integral with the cutters, an internal circumferential gear meshing with said pinions, means to rotate the armature about its vertical axis whereby to rotate aforesaid cutters in a plane orbital in relation to the vertical axis of the rotating armature, yielding pressure means for advancing the cutting edges of the cutters in an upward direction and a switch controlled means for limiting the rotation of said armature in said upward direction.

12. In an electrical pencil sharpener, an adjustable gripping and guiding means adapted to receive a pencil axially therein and a spring carried by said means to engage a switch positioned remote therefrom to be

closed when the pencil is inserted therein before contact of the pencil with its cutting elements, and means for disrupting the switch after contact with said cutting elements before removal of said pencil from said device.

13. In an electrical pencil sharpener, comprising in combination a base with a shaft of an armature rotatably mounted thereon, means for rotating said armature, a pair of shafts, the axes of said shafts being inclined to the vertical axis of the armature, a pair of cutters secured to the shafts and rotating thereon, said cutters being egg shaped, the peripheries of which terminate in a V-shape, an opening in first said shaft, an adjustable plunger projecting through said opening and means to limit the extension of said plunger through said opening.

14. In an electrical pencil sharpener the combination of a casing, a frame mounted in said casing, a rotatable armature journaled in the frame, said armature being slidably and revolubly mounted in said frame, and means for limiting the sliding movement within the frame.

15. In an electrical pencil sharpener, the combination with a frame and a base of a bearing extension on said base, an armature slidably and rotatably mounted on said bearing, means between the armature and the bearing for vertical adjustment of the armature, means for rotating said armature and a switch operated means controlled by said vertical adjustment for stopping the rotation of the armature.

16. An electrical pencil sharpener comprising in combination with a base having a vertical extending shaft projecting centrally therefrom of a vertically adjustable and rotatable armature carried by the shaft, an adjustable shaft positioned in first said shaft, a pair of slightly inclined shafts revolvable with and carried by the armature, cutters mounted on said shafts, pinions keyed to said shafts, aforesaid rotatable armature housed in a frame, a motor in the frame, means to energize said motor whereby to rotate said armature, thereby rotating said cutters, a circumferential gear mounted in the top of aforesaid frame and meshing with aforesaid pinions whereby to rotate aforesaid cutters on their individual axes, means for depressing the revolvable armature upon contact of a pencil with the cutters aforementioned and means for limiting the sharpening of the pencil in the direction of the depression.

17. An electrical pencil sharpener, comprising in combination with a base of a frame mounted on the base, a motor contained within the frame, a cover housing said frame mounted on said base, said base having a vertically extending shaft, an armature supported by said shaft, a means to rotate said armature, cutters with their axes slightly inclined mounted on said armature, pinions carried by said shafts, an internal gear meshing with said pinions whereby to rotate said cutters and a switch controlled means whereby upon the insertion of a pencil in the device to start said motor and an automatic trip whereby to disrupt the switch upon the completed sharpening of the pencil.

18. An electrical pencil sharpener, comprising in combination with a base and a frame mounted thereon of a motor carried in the frame, the armature of said motor supporting a pair of revolvable cutters, said armature being rotatable and supported by aforementioned base, yielding pressure means between the armature and its seat whereby upon the depressing of the armature to return the same to its normal position of rest, substantially as herein described and set forth.

19. An electrical pencil sharpener, in combination with a base and a frame of a multipole motor housed in the frame and supported by said base, said motor comprising a rotatable armature and a stationary field coil, said rotatable armature being adapted to be pushed downwardly upon the insertion of a pencil in contact therewith and a means to retard the force acting on said rotatable armature in the direction from whence it was first depressed; means to actuate said rotatable armature and a trip means co-operating therewith whereby to stop the rotation of the same.

20. In an electrical pencil shorpener comprising a rotatable armature, a pair of cutting rasps epicyclically revolvable therewith, means for depressing the armature during the rotation thereof and means for actuating said rotatable armature during the depressing thereof.

21. In an electrical pencil sharpener a vertical rotating armature, cutters with their axes slightly inclined to the vertical axis of said rotating armature supported thereupon, means to actuate said rotating armature and means remote therefrom for rotating said cutters epicyclical in relation to the axis of said rotating armature.

22. In an electrical pencil sharpener, a vertical rotating armature adapted to be pushed downwardly upon contact therewith of a pencil to be sharpened with cutters rotatably mounted for epicyclical movement on said rotating armature and a yielding pressure means to initiate contact of said cutters with said pencil during the process of sharpening.

23. In an electrical pencil sharpener comprising in combination with a pencil holding means of a switch, said switch being closed upon the insertion of a pencil in said holding means whereby to operate said device before

contact of the pencil with its cutting elements and means for disrupting the switch after contact with said cutting elements before removal of said pencil from said device.

24. In an electrical pencil sharpener a switch, means whereby to operate said device upon the insertion of a pencil therein before contact of the pencil with its cutting elements, and means for disrupting the switch after contact with said cutting elements before removal of said pencil from said device.

25. In an electric pencil sharpener motorial means contained therein for operating said device and a switch means co-acting therewith for setting said device in operation, before contact of a pencil with the cutting elements and a means for disrupting the switch after contact with said cutting elements before removal of said pencil from said device.

26. In an electrical pencil sharpener, a base and a frame, a multiple pole motor housed in the frame, the armature of said motor being revolvable upon a vertical axis projecting from said base and supporting cutters revolvable therewith epicyclical in relation to the axis of said rotating armature, a switch contained in the head portion of said device whereby to start and stop the same, a gripping and guiding means adjacent thereto and adapted to close said switch upon the insertion of a pencil in said gripping and guiding means; manual means for depressing said rotatable armature, yielding pressure means acting oppositely thereto, said oppositely acting means co-acting with said rotatable armature in disrupting aforesaid switch in its return travel from whence it was first depressed.

27. An electrical pencil sharpener comprising a base, a frame and a multi-pole motor housed in the frame, the armature of said motor having an axis of rotation at right angles to the base first mentioned, a pencil gripping and guiding means housed in the head of said device, a switch remote therefrom, means for closing the switch upon the insertion of a pencil in the gripping and guiding means aforementioned, whereby to rotate said armature and an automatic disrupting of the switch when the pencil is removed therefrom.

28. An electric pencil sharpener comprising in combination with a casing containing a door, of a base and a frame with a motor in the frame, a central extending bearing extension on said base, an armature containing a core rideable thereon, said armature being rotatable, cutters mounted on shafts slightly inclined carried by the armature, said cutters being rotative about the axis of said armature, gears mounted on said shaft with said cutters, a stationary circumferential gear intermeshing therewith whereby to produce an epicyclical rotation of aforesaid cutters about the axis of aforesaid armature; manual means for depressing said armature upon contact of a pencil with aforesaid cutters, yieldable means between aforesaid extension and armature for resisting the force produced between contact of pencil with cutters aforementioned; a switch to close the circuit with aforesaid motor whereby to actuate the rotation of the armature before pencil makes contact with aforesaid cutters and a means for disrupting said switch during the upward travel of said armature after said pencil has been sharpened.

Signed at Los Angeles, in the county of Los Angeles and State of California, this fourth day of January, A. D. 1926.

ANDREW FISHER.