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POWER OPERATED DRAWING-LEAD SHARPENER

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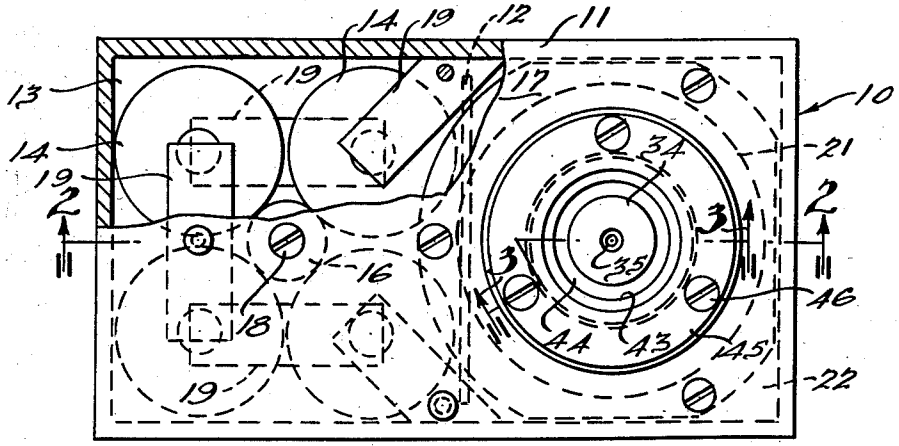


FIG. 1.

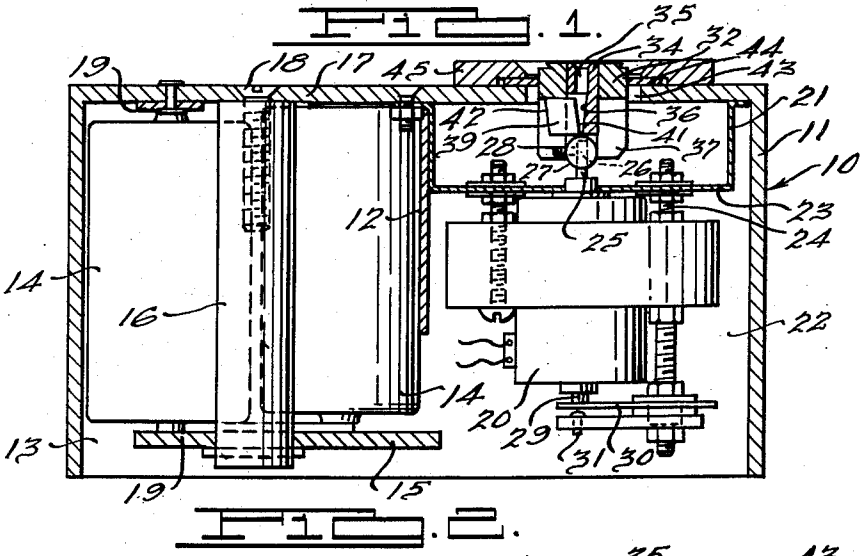


FIG. 2.

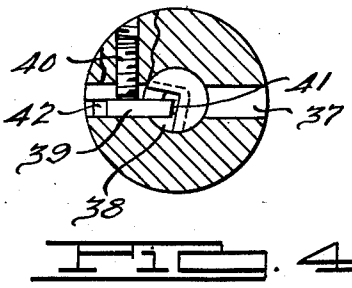


FIG. 4.

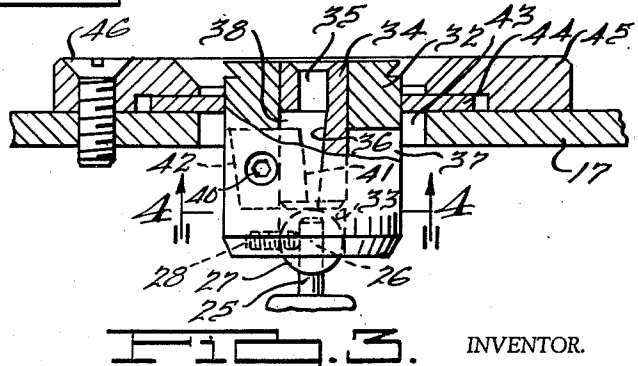


FIG. 3.

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POWER OPERATED DRAWING-LEAD SHARPENER

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5 Claims. (Cl. 120—96)

This invention relates to a power operated device for sharpening or pointing drawing-leads used in a mechanical type holder by draftsmen.

Most present day draftsmen use, in preference to the standard wood encased drawing pencil, a drawing instrument comprising a holder adapted to receive and mechanically chuck or hold a standard size drawing-lead filler. As does the standard wood encased pencil, the drawing-lead requires frequent sharpening or pointing to ensure that the drawing lines may be sharply defined.

Although the prior art discloses many power operated pencil sharpeners for pencils of the wood encased type, there are only a few such devices disclosed which are intended primarily for sharpening the mechanically held drawing-leads. Generally, the desired drawing point is placed on the drawing-lead by manually twirling the holder with the drawing-lead held against a suitable file or a sandpaper sheet. One type of power operated sharpener with which I am familiar comprises a motor operated apparatus having a sandpaper disk which is rotated and adapted to frictionally engage a manually twirled drawing-lead, the drawing-lead and its holder being guided by suitable guide means so as to be presented at approximately the desired angle to the surface of the sandpaper disk. Devices of this type are awkward to operate and do a less than perfect sharpening job. Another device with which I am familiar comprises a bulky power operated apparatus having rotary cutters. In addition to its noticeable bulk and corresponding weight, the particular apparatus has a great propensity for snapping off the drawing-lead which it is attempting to sharpen.

Accordingly, it is an object of my present invention to provide a power operated sharpener having a cutter blade mounted in a novel rotary cutting head. The cutting head is constructed and arranged to be driven at a relatively high speed of rotation and is so mounted that it is freely tiltable within sufficient limits relative to the power shaft which drives it. Thus, if the person holding the drawing-lead within the cutter head is unsteady or inserts or attempts to withdraw the drawing-lead at an angle to the normal vertical axis of rotation of the cutter head, the latter will tilt as it rotates to accommodate the unsteadiness or the improper angle of insertion or withdrawal whereby the drawing-lead will be properly sharpened and will not be inadvertently snapped off.

Other objects and the features of construction of this invention will be apparent in the following description and appended claims, reference being had to the accompanying drawing forming a part of the specification wherein like reference characters designate corresponding parts in the several views, which views are as follows:

Fig. 1 is a plan view of the drawing-lead sharpening apparatus embodied in the present invention;

Fig. 2 is a sectional view taken substantially through line 2—2 of Fig. 1 looking in the direction of the arrows;

Fig. 3 is an enlarged view in part sectional taken substantially through the line 3—3 of Fig. 1 looking in the direction of the arrows; and

Fig. 4 is a sectional view taken substantially through line 4—4 of Fig. 3 looking in the direction of the arrows.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawing, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

The drawing-lead sharpener, generally designated **10**, embodying the present invention comprises a housing **11** of any suitable shape. As illustrated, the housing **11** takes substantially the form of a rectangular box open at the bottom. The housing **11** is longitudinally divided into two compartments by a baffle **12**. The left end compartment **13** accommodates four ordinary flashlight type dry cell batteries **14**. As illustrated, the batteries are supported within the compartment **13** on a platform **15**, the platform being secured to the lower end of a vertically extending post **16** which is centrally located within the compartment **13** and is held against the underside of the upper wall **17** of the housing by a screw **18**. Suitable contact and conductor elements **19** are provided so that the batteries may be electrically interconnected to provide a source of current. The current from the batteries is used to motivate a small, light duty, and relatively high speed electric motor **20**.

The motor **20** is suspended from the underside of a tray or pan **21** which in turn is secured to the underside of the upper wall **17** of the housing. As best seen in Fig. 2, the tray or pan **21** is located in the right end compartment **22** of the housing **11**. It will be noted that the inner bottom **23** of the tray or pan is spaced from the underside of the upper wall **17** of the housing **11**. The motor **20** is supported or suspended from the bottom **23** of the tray **21** by suitable screws and nuts generally designated **24**. The shaft **25** of the motor projects beyond both ends of the motor housing, the upper end **26** projecting through a hole in the bottom of the tray or pan into the tray or pan **21** compartment. The upper end **26** of the motor shaft **25** is provided with a ball **27** which is held in place thereon by means of a set screw **28**.

The lower end **29** of the motor shaft **25** is in contact with an electric conducting spring element **30** which overlies an electrical contact button **31**, for a reason to be hereinafter explained. The ball **27** at the top of the motor shaft **25** is adapted to receive thereon cutting head **32**. As best seen in the enlarged views of Figs. 3 and 4 the cutting head **32** is cylindrical in shape and is provided with a vertically extending bore **33** substantially equal in diameter to the diameter of the ball **27** upon which the cutting head is adapted to be received. The cutting head **32** is provided with an insert member **34**. The insert member **34** is also provided with a vertically extending centrally located bore **35** which for the substantially lower two-thirds thereof is conical in shape. The taper of the conical portion **36** of the bore **35** has been selected to provide a pencil or drawing lead point which is neither too blunt nor too sharp thereby neither subject to rapid wear or easy breakage. It will be noted, see Fig. 4, that the cutting head is provided with a diametrically extending slot **37**. At the lower end of the cutting head **32** the slot **37** receives the screw **28** which holds the ball **27** on the end of the motor shaft **25**. Thus, the screw **28** acts as a driving connection between the motor shaft **25** and the cutting head **32**. It will be noted that the insert member **34** is provided with a cut-away portion **38** at

the lower end thereof which is adapted to be in line with the slot 37 in the cutting head 32. Within the slot 37 and the cut-away portion 38 a cutting blade 39 is mounted, the cutting blade being held in position by a set screw 40 carried within the cutting head and pressing the cutting blade 39 against one side of its slot 37. It will be noted that the leading edge 41 of the cutting blade 39 is at an angle to the upper and lower parallel edges, the angle being the same as the angle of taper of the conical portion 36 or bore of the insert member 34. Preferably, the edge 42 of the cutting blade 39 parallels the tapered edge 41 so that two cutting edges are provided, it only being necessary to rotate the cutting blade 180 degrees should it be deemed that the cuting edge then in use has become dull.

The housing 11 is provided in the upper wall thereof with a bore 43 somewhat larger than the diameter of the cutting head 32. In view of the fact that the cutting head sits on top of the ball 27 carried by the motor shaft 25, it is readily apparent that the cutting head 32 may tilt relative to the vertical axis of the motor shaft. The cutting head is maintained in a relatively vertically stable position by means of a floating seal 44 preferably a felt washer, which is shown slidably seated on the top surface of the upper wall 17 of the housing and as being retained thereon by a cap member 45 mounted on the upper surface of the housing upper wall 17 by means of screws 46.

The operation of the sharpening device 10 is extremely simple. It is only necessary to insert the drawing-lead to be sharpened into the hole 35 in the insert member 34. It will be understood of course that the drawing-lead has been withdrawn from its holder a sufficient distance to enable the proper point to be put thereon.

The distance between the switch spring element 30 and its opposed contact button 31 is very small. Accordingly, as the broken end of the drawing-lead touches the conical portion 36 of the insert member bore 33, the downward pressure will be transmitted through the ball 27 to the motor shaft 25 and will cause sufficient motion of the motor shaft in a vertical direction to cause the spring element 30 to touch the contact button 31 thereby closing the circuit and causing the batteries to feed current to the motor 20 to operate the same. As soon as the switch is closed, the rotation of the motor will cause the cutter head 32 and its blade 39 to revolve about the drawing-lead to be sharpened. The rate of revolution is relatively fast and the cutting blade 39 is thereby able to quickly and efficiently reduce the broad broken end of the drawing-lead to a conical point. As soon as the now sharpened tip of the drawing-lead engages the top surface of the ball 27 the downward feeding movement of the drawing-lead will be halted and the latter cannot be any further sharpened. As soon as it is noticed that the downward feeding movement of the drawing lead is blocked, the operator will naturally lift the drawing-lead from within the cutting head 32. As soon as this is done, the contact between the spring element 30 and the contact button 31 will be broken causing the motor 20 to stop.

The floating seal 44 against which the upper end of the cutting head 32 rests permits the upper end of the cutting head to bodily shift relative to the vertical axis of the motor shaft as much as one-sixteenth of an inch off center. This movement is sufficient to accommodate any unsteadiness of the operator's hand or to accommodate an attempt to insert or withdraw the drawing-lead at a slight angle to the vertical. Without the floating arrangement, any attempt to insert or withdraw the drawing-lead into the cutting head 32 at an angle would result in a premature breakage of the drawing-lead. The float of the cutting head 32 provided by the floating seal 44 is effective to prevent premature breakage under all normal conditions. Only in those cases where the holder and its drawing-lead are shoved violently sideways will premature breakage occur.

Although the device is shown as being battery operated, it will be readily apparent that a small transformer could be housed within the battery compartment so that the device could be used with regular 110 volt A. C. current. However, connecting the device to an electric line spoils the portability thereof. It has been found that the flashlight batteries will last several months even though the device may be used frequently to sharpen drawing-leads. The sharpening action is so quick and the stopping and starting of the motor is so related to the actual time required for sharpening that very little current per sharpening is used. As soon as the drawing-lead is inserted into the receiving hole, the motor automatically starts up. As soon as the drawing-lead hits the top of the ball surface, the operator knows that it is time to withdraw the drawing-lead from the insert member bore 35. And as soon as he does so, the motor stops.

The pan or tray 21 is of sufficient depth to contain a substantial amount of drawing-lead dust. With reference to Fig. 4, it will be noted that there is sufficient clearance on both sides of the cutter blade 39 to permit the dust to be whirled out into the pan or tray 21 from the cutting area. To clean the device, it is only necessary to lift the cutting head out of its normal operative position thereby providing an opening through which the contents of the pan 21 may be dumped. After the pan is emptied, the cutting head is merely dropped onto the ball 27. Even if the screw 28 is not in alignment with the slot 37, only a slight turn will be required to align the two and the device will be wholly operative once more.

Two additional advantages to be derived from the present apparatus are its ability to sharpen colored or crayon type leads and its ability to sharpen short leads used in compasses or the like. With respect to the colored or crayon type leads, they are relatively soft and break easily. The high speed shaving action of the cutter blade 39 as well as the tiltable feature of the cutter head in which it is mounted enables even the delicate crayon-type leads to be efficiently sharpened. With respect to the leads used in drawing instruments such as compasses or the like, the distance from the top of the cutter head 32 to the sharpening area of the cutter blade 39 is so short that even the relatively short leads used in compasses or the like may be sharpened without the necessity of complete removal from their instrument.

I claim:

1. A sharpener adapted to sharpen unencased drawing-leads comprising a housing having top and side walls, a tray member secured to the underside of the top wall of said housing and forming a compartment adapted to receive drawing-lead particles resulting from the sharpening process, an electric motor suspended from the underside of said tray member with the upper end of its shaft projecting into said compartment, a ball member mounted on said upper end, a cutter head having a socket in the lower end thereof adapted to fit over said ball member whereby said cutter head is swivelly supported on said motor shaft, said cutter head being provided with a slotted conical bore therein contoured to the desired shape to be obtained on said drawing-lead, a cutter blade having a single axially extending cutting edge secured within said cutter head slot in sharpening relation to said bore, means drivingly connecting said cutter head to said motor shaft for rotation therewith, the swivel support of said cutter head permitting the latter to compensate for any axial misalignment of the drawing-lead being sharpened relative to the axis of the motor shaft.

2. A sharpener adapted to sharpen unencased drawing-leads comprising a housing having top and side walls, a tray member secured to the underside of the top wall

of said housing and forming a compartment adapted to receive drawing-lead particles resulting from the sharpening process, an electric motor suspended from the underside of said tray member with the upper end of its shaft projecting in said compartment, a ball member mounted on said upper end, a cutter head having a socket in the lower end thereof adapted to fit over said ball member whereby said cutter head is swivelly supported on said motor shaft, said cutter head being provided with a bore therein contoured to the desired shape to be obtained on said drawing-lead, said bore being slotted at one side thereof, a cutter blade positioned in said slot and secured to said cutter head in sharpening position in said bore, means drivingly connecting said cutter head to said motor shaft for rotation therewith, the swivel support of said cutter head permitting the latter to compensate for any axial misalignment of the drawing-lead being sharpened relative to the axis of the motor shaft, and floating seal means limiting the axial misalignment of said cutter head to a pre-determined degree.

3. A sharpener adapted to sharpen unencased drawing-leads comprising a housing having top and side walls, a tray member secured to the underside of the top wall of said housing and forming a compartment adapted to receive drawing-lead particles resulting from the sharpening process, an electric motor suspended from the underside of said tray member with the upper end of its shaft projecting into said compartment, a ball member mounted on said upper end, a cutter head having a socket in the lower end thereof adapted to fit over said ball member whereby said cutter head is swivelly supported on said motor shaft, said cutter head being provided with a conical bore therein contoured to the desired shape to be obtained on said drawing-lead, said bore being slotted to receive a cutter blade, a cutter blade secured within said cutter head slot having its cutting edge projecting into said bore and in axial alignment with the wall of said bore, means drivingly connecting said cutter head to said motor shaft for rotation therewith, the swivel support of said cutter head permitting the latter to compensate for any axial misalignment of the drawing-lead being sharpened relative to the axis of the motor shaft, and floating seal means effectively engageable with said cutter head near the upper end thereof effective to permit a predetermined degree of axial misalignment of said cutter head, and switch means responsive to axial movement of the motor shaft induced by pressure on said cutting head caused by insertion of the drawing-lead within said bore to control the operation of said motor.

4. A sharpener adapted to sharpen unencased drawing-leads comprising a housing having top and side walls, a tray member secured to the underside of the top wall of said housing and forming a compartment adapted to receive drawing-lead particles resulting from the sharpening process, an electric motor suspended from the under side of said tray member with the upper end of its shaft projecting into said compartment, a ball member mounted on said upper end, a cutter head having a socket in the lower end thereof adapted to fit over said ball member whereby said cutter head is swivelly supported on said motor shaft, said cutter head being provided with a conical bore therein contoured to the desired shape to be obtained on said drawing-lead, a cutter blade having a single cutting edge forming a part of said cutter head and adapted to engage a drawing lead within said bore in sharpening relation thereto, means drivingly connecting said cutter head to said motor shaft for rotation therewith, the swivel support of said cutter head permitting the latter to compensate for any axial misalignment of the drawing-lead being sharpened relative to the axis of the motor shaft, and floating seal means effective to limit said cutter head to a predetermined degree of axial misalignment, and switch means responsive to axial movement of the motor shaft induced by pressure on said cutting head caused by insertion of the drawing-lead within said bore to control the operation of said motor, said bore being open at the bottom thereof whereby the sharpened end of said drawing-lead will contact the upper surface of said ball thereby preventing further downward continued feeding movement of the now sharpened drawing-lead.

5. A sharpener adapted to sharpen unencased drawing-leads comprising a housing, an electric motor within said housing, said motor having a shaft extending in a direction normal to the top plane of the housing, a ball member mounted on the upper end of said shaft, a cylindrical cutter head having a socket in the lower end thereof adapted to fit over said ball member whereby said cutter head is swivelly supported on said motor shaft, said cutter head being provided with a slotted bore therein, said bore being contoured to the desired shape to be obtained on said drawing lead, a cutter blade having an axially extending cutting edge, said cutter blade being secured within said cutter head slot in sharpening position within said bore, and means drivingly connecting said cutter head to said motor shaft for rotation therewith, the swivel support of said cutter head permitting the latter to compensate for slight axial misalignment of the drawing-lead being sharpened relative to the axis of the motor shaft.

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