Nov. 24, 1959 W. H. BEHRENS 2,914,030

SHARPENER FOR LEADS OF PENCILS OR THE LIKE

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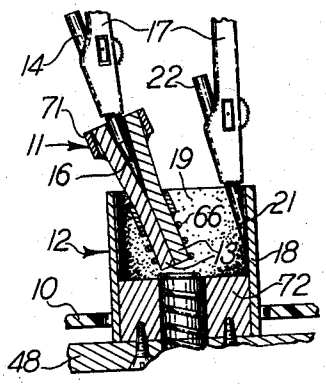


FIG. 5

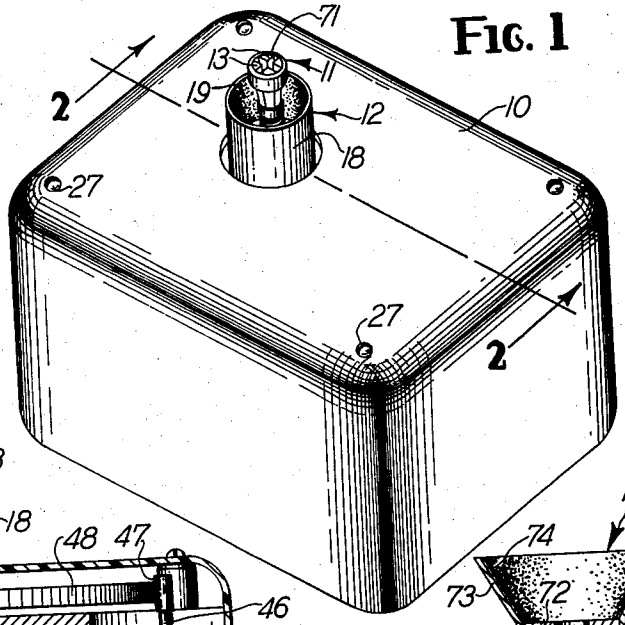


FIG. 1

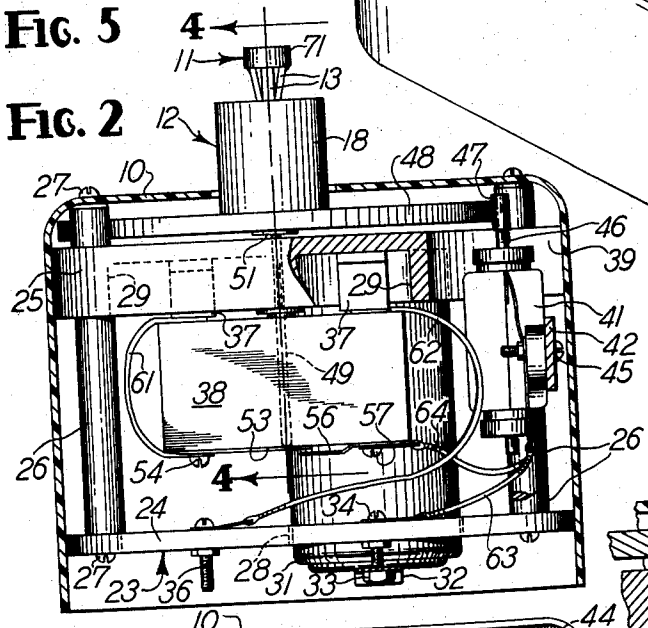


FIG. 2

FIG. 6

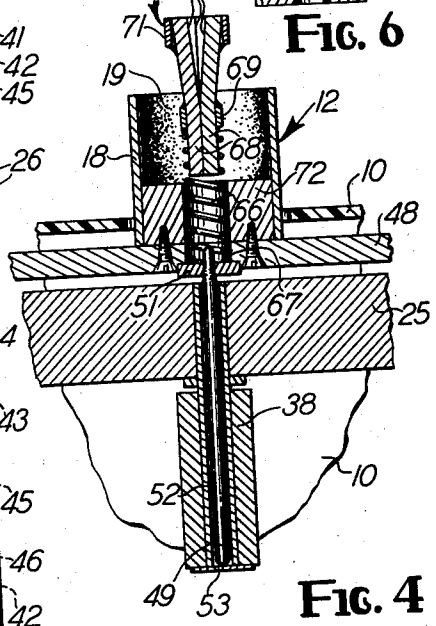


FIG. 4

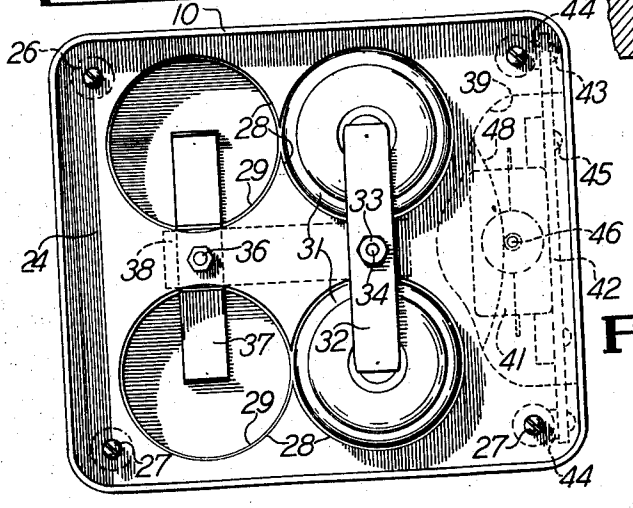


FIG. 3

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SHARPENER FOR LEADS OF PENCILS OR THE LIKE

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7 Claims. (Cl. 120—96)

This invention relates to a sharpener for leads of pencils or the like, and, more specifically, it is designed for sharpening the leads of draftsmen's instruments, particularly a compass.

Lead sharpeners are generally known, but those of the type which are powered normally require electric cords which are inherently a nuisance in that the sharpeners should be located near an electrical outlet, and the cord is usually in the way. Examples of this type of sharpener or pointer are found in U.S. Patents Nos. 836,712, 1,079,312, and 2,618,240; the present invention is an improvement over this patented type of sharpener.

Another improvement of the present invention over the prior art is that most of the automatic or powered sharpeners on the market today are expensive, and it is submitted that the powered sharpener of this invention is less than half the cost of the prior art sharpeners of the automatic type.

Further, the devices of the prior art are not designed for the sharpening of the leads of a draftsman's compass, for example, since the actual sharpening elements, whether they be cutters or sandpaper, are normally located within the interior of the housing, and no provision is made for permitting the insertion of the lead-retaining leg of a draftsman's compass into the housing. Therefore, the draftsman's lead must be either removed from the compass or extended therefrom in order to permit the lead to reach the sharpening elements. Even the type of sharpener shown in U.S. Patent No. 2,188,130 fails to provide for the entrance of the end of a compass leg which retains the drawing lead, since the cutters are disposed well within the interior of the housing.

It is a general object of this invention to provide a drawing lead sharpener which is an improvement over the prior art, particularly the art referred to above.

A specific object of this invention is to provide a powered type of drawing lead sharpener which does not require any electric cord, and it is, therefore, completely portable, and it is also compact, inexpensive to manufacture and assemble, and easy to operate.

Another object of this invention is to provide a powered type of drawing lead sharpener which operates automatically upon insertion of the lead against the sharpening elements.

Another object of this invention is to provide a powered type of drawing lead sharpener which forms either a conical point or a chisel shaped point on the end of the lead, according to the selection of the user.

Another object of this invention is to provide a drawing lead pointer wherein the cutting elements are self-aligning with the lead to be sharpened, and thereby the pointer does not tend to break the point of the lead.

Still a further object of this invention is to provide a powered type of drawing lead sharpener which is particularly designed for reception and sharpening of the lead which is being retained in its normal position in a draftsman's compass.

Still another object of this invention is to provide a

drawing lead pointer which has the above mentioned characteristics and yet does not leave the dust or shavings on the finished point and, further, to provide a means of retaining and subsequently easily removing the dust or shavings from the pointer.

Other objects and advantages will become apparent upon reading the following description in conjunction with the accompanying drawings, wherein:

Fig. 1 is a top perspective view of a preferred embodiment of the sharpener of this invention.

Fig. 2 is a side elevational view showing the interior of the sharpener but with parts removed and other parts broken away and with the casing sectioned along the line 2—2 of Fig. 1.

Fig. 3 is a bottom view of the sharpener shown in Fig. 2 but showing two batteries, and the casing in full.

Fig. 4 is an enlarged sectional view of a fragment of the sharpener and taken along the line 4—4 of Fig. 2.

Fig. 5 is a fragment of the sharpener shown in Fig. 4, but showing parts in a different position and with two compass legs shown.

Fig. 6 is a sectional view of a modified part useful in this invention.

Similar reference numerals refer to similar parts throughout the several views.

At the outset, it should be understood that the sharpener of this invention is used in sharpening leads of pencils, draftsmen's pencil compasses of all types, and like instruments. It is particularly useful in sharpening the lead of draftsmen's compasses since the lead can be sharpened without removing or extending it from its normal position in one leg of the compass, and the sharpening is accomplished with only one hand. Further, the lead of any instrument can be sharpened to either a conical point or to a taper shape which is referred to as a chisel or wedge point.

Fig. 1 shows the exterior of the sharpener which includes the casing or housing **10**, made of a plastic, and the conical pointer **11** and the chisel sharpener **12**. It will be noted that both members **11** and **12** project through an opening and above the top of the housing **10**, and this feature permits the sharpening of a draftsman's compass lead since there is ample clearance around the members **11** and **12** for the other or pin-point leg of the compass. It will be further noted that the pointer **11** consists of four cutters **13** which are angularly disposed to converge at their lower ends, as best shown in Fig. 4. Of course, the cutters or elements **13** thus define a conical opening, particularly upon rotating about the axis of the cone, and the radially inward edge **15** of each cutter **13** is pointed to serve as a cutting edge against the lead **14** when the latter is inserted as shown in Fig. 5. Here the lead **14** is shown being formed to a conical point **16** while the lead is retained in the leg **17** of a conventional draftsman's compass. It is further preferred that the cutters **13** be made of carbide to retain their cutting edges and last a long time in use.

The sharpener **12** is shown to be comprised of a cylinder **18** which is lined with an abrasive, such as the shown sand paper **19**. Fig. 5 shows the function of the sharpener **12** in forming a chisel point **21** on the end of a lead **22** in the leg **17** of the conventional draftsman's compass. Thus, the pointer **11** and the sharpener **12** are rotated to form the respective points on the ends of the leads.

The means for rotating the sharpening members are shown in Figs. 2 and 3. The sharpener frame **23**, preferably of wood or the like, is shown to include a base **24** and a top **25** with four intermediate dowels **26** securing the base and the top in their positions relative to each other. A screw **27** engages each end of the four dowels **26** with the four screws in the upper ends of the dowels

serving to secure the frame 23 upwardly in the casing 10, in the obvious manner, while the four screws in the lower ends of the dowels secure the base 24 to the dowels. Both the base and the top are each provided with four circular openings 28 and 29, respectively, for receiving four conventional storage batteries 31. The batteries can pass through the openings 28, while the openings 29 are only countersunk and therefore provide pockets for the ends of the batteries 31. In this manner, the batteries 31 are positioned within the casing 10 and on the frame 23. It will be noted that while four batteries of the flashlight type are preferred, only one of the four batteries is shown in Fig. 2, and only two of the four batteries are shown in Fig. 3. In each view the batteries are not all shown since they would block the view of other parts of the sharpener. To secure the batteries in position, a brass strip 32 is anchored to the base 24 by a nut 33 on a bolt 34 extending through the base 24. Figs. 2 and 3 show one of the two strips 32 employed, and it will be further seen that strip 32 extends at each end to the center of the two batteries 31 to make electrical contact therewith. Here also for completeness in showing the sharpener, one of the strips 32 and the two batteries with which it connects are removed from Figs. 2 and 3. However, there is shown a bolt 36 which provides the electrical and physical connection for the unshown strip 32, all in the same manner as accomplished with the bolt 34 and the nut 33.

The opposite and upper ends of the batteries 31 have brass strips 37 extending between the tops of the same pairs of batteries. The two strips 37 are suitably secured to the underside of the frame top 25 and, of course, the ends of the strips are bent to be disposed in the base of the openings 29, as viewed in Fig. 3. Other electrical conductors which serve to complete the electric circuit will be described later.

Another piece of the frame 23 is the block 38 which is suitably secured to the underside of the top 25. The block 38 is disposed between the batteries, as shown by the dotted lines in Fig. 3. It should also be noted that the top 25 has a cut-out 39 in one side thereof and a direct current motor 41 extends into the cut-out. The motor 41 is mounted on two of the dowels 26 through a piece 42 secured to the two dowels by screws 43 with rubber cushions 44 disposed between the dowels and the piece 42. Two bolts 45 in turn secure the motor 41 to the piece 42. In this manner, the motor 41 is slightly resiliently mounted on the frame 23. A rotatable shaft 46 projects from the motor and thereabove, and it is preferably provided with a rubber sleeve 47 which is in rolling contact with a disc 48 which rotates the sharpening members 11 and 12.

Of course, the disc 48 is rotating only when the sharpener is being used and Figs. 2 and 4 show the position of the disc when it is not rotating. A shaft or stem 49 is attached to the disc 48 to rotate therewith as a nut 51 is countersunk into the disc, and the stem 49 is secured in the nut 51 to be rotatable together. The stem extends through a sleeve 52 disposed in the top 25 and the block 38, and the stem is rotatable in the sleeve. The lower end of the stem is preferably pointed or rounded to present a minimum area to an electrical terminal or contact 53 which is attached to the underside of the block 38 by a screw 54. The contact 53 is made of the usual flexible material, and downward movement of the stem 49 will cause the contact 53 to flex and touch the second electrical terminal or contact 56 secured to the block 38 by a screw 57. Thus, the contacts are normally spaced apart, as shown, and the contact 53 supports the weight of the stem 49 and the disc 48 and other parts, and thereby maintains the contacts spaced apart. Of course, the contacts comprise a switch between the power supply and the motor along with the drive means to the pointer 11 and sharpener 12. The resiliency of the contact 53 provides a means for automatic operation of the switch since a downward force on the stem 49 will close the switch, while relieving the force will automatically open the switch as the contact 53 returns the rotating parts to their shown positions.

To complete the description of the electric circuits, it is noted that a wire 61 connects between the contact 53 and the strip 37; a wire 62 connects between the bolt 36, which is connected to a strip in the identical manner as bolt 34 and the strip 32, and the other strip 37; a wire 63 connects between the bolt 34 and one side of the motor 41; and a wire 64 connects between the contact 56 and the opposite side of the motor 41. Thus, when the switch is closed, there is a complete electric circuit from one side of the motor 41, through the four batteries 31, through the switch, and then back to the other side of the motor.

When the switch is closed, the motor 41 is operated and the shaft 46 with its rubber sleeve 47 rotate to in turn rotate the disc 48 at the desired reduced r.p.m. compared to the r.p.m. of the shaft 46. Fig. 4 shows a coil spring 66 soldered at 67 to the nut 51 to rotate therewith, and the spring extends to the cutters 13 to connect thereto by receiving the parallel and lower ends 68 of the cutters. The embodiment shown includes a ring 69 which encircles the cutters and is soldered to both the cutters and the spring. It will also be noticed that a larger ring 71 is soldered to the upper and spaced apart ends of the cutters 13. Thus, the upper edge of the ring 71 presents a smooth surface for the top of the element 11, and, since the ring diameter is small, it has been found that the operator's fingernail can press down on the ring top to activate the switch but yet simultaneously allow the disc 48 to rotate while the abrasive 19 is being used. With this arrangement, the flexible connector 66 is interposed between the driving means and the cutters 13 such that the latter rotate with the disc 48 about the axis of the cone of the cutters, but the cutters are free to be laterally offset, such as shown in Fig. 5. The lead being pointed will not break when the cutters are offset, and there is no requirement for perfect alignment of the axis of the lead with the axis of rotation of, for example, the disc 48. This feature immeasurably simplifies pointing of the lead without the danger of breaking it. This is perhaps particularly important in pointing compass lead since the leg of the compass holding the lead is at an angle to the center of the compass, and the lead itself is at an angle to the compass leg, both factors making it difficult to readily notice the direction of the axis of the lead for vertical insertion into the pointer 11. The flexibility of the connector 66 is such that a standard drawing lead, that is, a type commonly used by draftsmen, can angle the rotating cutters at least ten degrees, as in Fig. 5, without causing the lead to break. Also, the connector specification is such that a one-half inch length of lead can angle the cutters without breaking the lead while the latter is being pointed by the rotating cutters. Further, the connector is sufficiently stiff to support the cutters in the upright position shown in Fig. 4, to rotate the cutters against the lead as in Fig. 5, and to transmit a sufficient compressive force from the cutters to the stem 49 to flex the contact 53 until it touches the contact 56. The latter is, therefore, also a specification for the relation between the flexibility of the contact 53 and the axial stiffness of the connector 66, as the contact 53 must flex under a force transmitted thereto by the connector 66.

As mentioned, the cutters 13 are angled at their upper ends to form a cone. The upper ends of the cutters are thus spaced apart, as shown in Figs. 1 and 2, and this spacing permits the filings or shavings of the drawing lead to fall outside of the cutters, thereby keeping the cutting edges 15 clear at all times. Further, the edges 15 actually clean the conical point of the lead along with the pointing operation by wiping the shavings off the surface of the cone of the point. This latter feature is in distinct contrast to the results obtained by the previously known means which leave dust on the sharpened lead

and that dust falls onto the drawing paper when the lead is first used, unless the lead is separately cleaned.

Fig. 4 also shows a cylindrical block 72 suitably secured to the disc 48 for rotation therewith. The block has the shown central opening through which extends the spring 66. Of course, the disc 48 has an aligned central opening for the spring 66, as shown. The cylinder 18 is thus snugly but removably disposed around the block 72 such that the cylinder 18 and its abrasive 19 rotate with the disc 48 and the cutters 13. The cylinder 18 serves as a receptacle for the lead shavings produced by both the cutters 13 and the abrasive 19. Upon removal of the cylinder 18, the shavings can be easily shook off the block 72.

As mentioned, pressing the lead 14 into the conical opening of the cutters 13 will automatically close the switch and rotate the cutters as the rotating parts are moved axially downward until the switch is closed. Withdrawal of the lead from the cutters will automatically stop the rotation as the switch automatically returns to its open position. When it is desired to form a chisel-shaped end on the lead 22, for example, the operator can press a finger down on either the top of the cylinder 18 or on the ring 71 and this will again close the switch and cause the parts to rotate until the finger pressure is relieved. It has been found that the finger nail is very suitable for pressing down on any one of the parts mentioned, as the nail will permit that part to slide across the nail while the part is rotating.

Fig. 6 shows a modification of the sharpener 12 wherein a conical member 73 can be employed in place of the cylinder 18. Here an abrasive 74 is disposed around the interior of the element or member 73, and a pin 76 secures the member 73 to the block 72. With the cone member 73, the chisel point can be provided on a lead while the latter itself is employed for depressing the cone 73 and the disc 48 and the stem 49 to close the switch. No separate depressing by the operator's finger is required and the sharpener 12 is automatic like the sharpener 11.

While a specific embodiment of this invention has been shown and described, it should be understood that certain changes could be made without deviating from the scope of this invention which should, therefore, be limited only by the appended claims.

What is claimed is:

1. A lead pointer comprising a lead pointing element having a conical opening for receiving and sharpening the end of a drawing lead upon insertion of said end into said opening and rotation of said element about the conical axis of said opening, means attached to said pointing element for transmitting force thereto to cause said pointing element to rotate about said axis, a cylinder connected to said pointing element to be co-axial and rotatable therewith for receiving the filings from said lead upon pointing of the latter, and an abrasive secured to said cylinder for rotation therewith and forming a chisel-shaped end on said drawing lead when the latter is held against said abrasive.

2. A lead sharpener for use in sharpening the end of a drawing lead, comprising in combination a housing, a shaft rotatably and axially movably mounted in said housing, a coil spring having one end thereof connected to one end of said shaft for rotation and axial alignment of said coil spring with said shaft and being flexible transverse to the axis of said shaft, a lead sharpening first member attached to the other end of said coil spring for rotation therewith and projecting beyond the limits of said housing to be movable a distance in all directions transverse to said first member, a lead sharpening second member connected to said one end of said shaft for rotation therewith and being annularly formed to encircle said first member for receiving the lead deposits therefrom and being spaced therefrom said distance for the transverse movement of said first member, a lead sharpening abrasive disposed endlessly around the interior of said second member, a direct current battery, a direct current motor, drive means connected between said shaft and said motor, a first electrical contact attached to said frame and extending across the other end of said shaft and being flexible for urging said shaft axially to a first position, a second electrical contact attached to said frame and spaced from said first electrical contact when said shaft is in said first position and said second electrical contact being engageable with said first electrical contact when said shaft is axially moved toward said second contact, said battery and said motor being electrically connected together with said contacts forming an electrical switch in the connection between said battery and said motor.

3. A drawing lead sharpener comprising a frame, a hollow conically shaped member rotatably and axially movably mounted on said frame with the larger diameter end of said member disposed upwardly and of a size several times larger than the diameter of said lead sharpened by said sharpener, an abrasive disposed on said member endlessly around the conical interior of the latter, a conically shaped lead pointing element connected to said member and disposed on the axis thereof for depositing lead filings in said member and being rotatable therewith and having its larger diameter end disposed upwardly and of a size equal to said diameter of said lead, power means for rotating said member, and a switch connecting said power means and said member for rotation of the latter and disposed with respect to said conically shaped member on the apex side thereof for automatic actuation upon axial movement of said member on said frame.

4. A lead sharpener comprising a casing including a normally horizontally disposed top wall having an opening therein, an electric power supply disposed in said casing including a driving shaft vertically disposed adjacent the interior of a side wall of said casing, an electric switch included in said power supply for actuation to a closed position in response to downward pressure and being centrally disposed in said casing, a second shaft vertically and centrally disposed in said casing with the lower end in communication with said switch and with said second shaft being rotatable and axially movable, a circular disc attached to the upper end of said second shaft to rotate therewith and be in driven rolling contact with said driving shaft and be vertically movable with said second shaft and along said driving shaft, conical lead sharpening means attached to said disc to project thereabove and through said opening in said casing, said means including sharpening surfaces disposed at an inclined angle to induce vertically downward movement of said means and said disc and said second shaft in response to downward pressure of the lead to be sharpened so that said electric switch is actuated to said closed position, the upper surface of said conical lead sharpening means being smooth for rotation thereof when being depressed by the operator's fingernail, and a wedge lead sharpening cylinder attached to said disc below and concentric to said sharpening means for sharpening lead upon rotation of said cylinder and for catching lead filings from both sharpening elements.

5. A lead sharpener comprising a casing including a normally horizontally disposed top wall having a central opening therein, an electric power supply disposed in said casing including a driving shaft vertically disposed adjacent the interior of a side wall of said casing, an electric switch included in said power supply for actuation to a closed position in response to downward pressure and being centrally disposed in said casing, a second shaft vertically and centrally disposed in said casing with the lower end in communication with said switch and with said second shaft being rotatable and axially movable, a circular member centrally attached to the upper end of said second shaft to rotate therewith and be in driven rolling contact with said driving shaft and be ver-

tically movable with said second shaft and along said driving shaft, conically disposed lead pointing means attached to said member and extending thereabove and through said opening in said casing with the apex of the cone on the axis of said member and directed downwardly to induce vertically downward movement of said means and said member and said second shaft in response to downward pressure in said means of the lead to be sharpened so that said electric switch is actuated to said closed position, and an abrasive circularly disposed around and spaced below said means and attached to said member for rotation therewith.

6. A lead sharpener comprising a casing including a normally horizontally disposed top wall having an opening therein, an electric power supply disposed in said casing, a resiliently urgable electric switch included in said power supply for actuation to a closed position in response to downward pressure and being centrally disposed in said casing, a shaft vertically and centrally disposed in said casing with the lower end in communication with said switch and with said shaft being rotatable and axially movable, a flexible connector attached to the upper end of said shaft and projecting thereabove to rotate therewith and be vertically movable with said shaft, conically disposed lead sharpening means attached to the upper end of said connector to rotate therewith and projecting thereabove for downward movement of said means and said shaft in response to downward pressure of the lead to be sharpened so that said electric switch is actuated to said closed position, rotative drive transmission connected between said power supply and said sharpening means for transmitting rotation to the latter,

an annular member removably attached to the top of said means and concentric therewith for catching the lead filings cut by said means and for removal of said filings upon removal of said annular member, and an abrasive circularly disposed around said means and attached to said shaft for rotation therewith.

7. A lead sharpening device comprising a casing, a prime mover disposed in said casing, conically disposed lead sharpening means rotatably mounted in said casing with the apex directed down and said means being drivingly connected to said prime mover for conical sharpening of a stick of drawing lead, a circularly shaped member vertically disposed and coaxial with said means and connected therewith to said prime mover for rotation with said means and being cup-shaped to form a container for collecting the filings of said lead sharpened by said means, and an abrasive circularly disposed around the interior of said member for rotation with the latter and for wedge-sharpening of said lead.

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