Jan. 28, 1969 P. DZIUK ET AL 3,424,210

CUTTING HEAD FOR A LEAD SHARPENING DEVICE

Filed May 3, 1966

Fig. 1

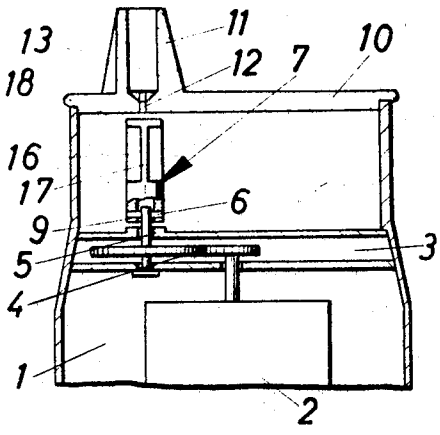


Fig. 2

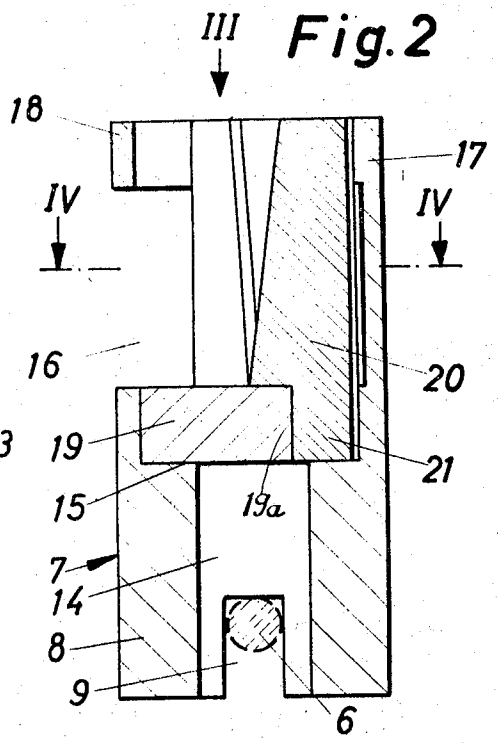


Fig. 4

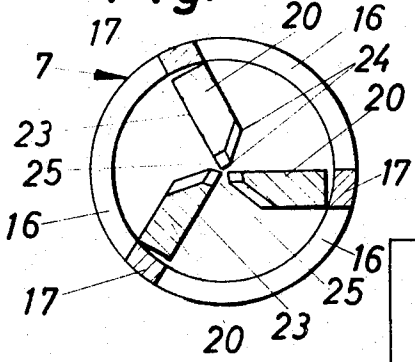


Fig. 3

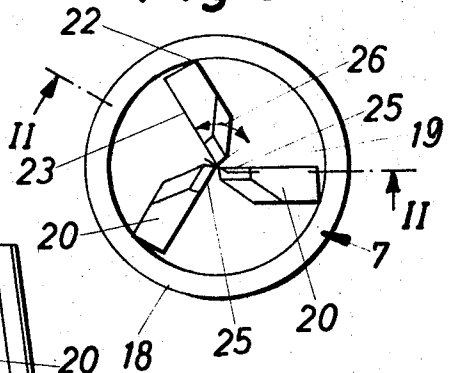


Fig. 5

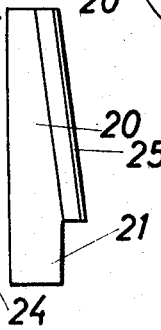
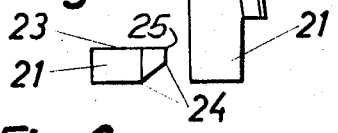


Fig. 6



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CUTTING HEAD FOR A LEAD SHARPENING DEVICE

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Int. Cl. B43l 23/02

ABSTRACT OF THE DISCLOSURE

A lead sharpening device comprising a cutting head in the form of a rotary cylindrical cage in which several cutter blades are mounted in circumferentially spaced relationship and symmetric to the rotational axis of the cage. The cutting edges of the blades constitute a generatrix of an imaginary conical configuration coaxial with the rotational axis of the cage and defining an angle with said rotational axis whereby a lead inserted into the center axis of said imaginary conical configuration obtains a generally conical point by the action of the blades when the cage is rotated.

The present invention relates to a sharpening device for sharpening graphite leads and leads made of compressed powderized dye. Such leads are customarily held in lead holders or also encased in wood (pencil) and are widely used by artists, draftsmen and generally for writing or drawing purposes. More particularly, the invention relates to a sharpening device the cutting elements of which are power driven by a built-in electric motor.

There are known sharpening devices of the general kind above referred to in which a cutting knife acts in a generally tangential plane upon the point of a lead to be sharpened to give the point of the lead a substantially conical configuration. Sharpening devices of this kind sharpen the lead by shaving or chipping the same.

There are also known sharpening devices of the general kind above referred to in which sharpening is effected by means of a rotary cutting head which is driven by the motor of the device. The cutting elements in such cutting head also act upon the lead by shaving or chipping.

Practical experience shows that a smooth generally conical point cannot be achieved with sharpening devices as heretofore known. Moreover, lead dust tends to adhere to the point and removal of the dust after completion of the sharpening operation requires an additional time consuming and correspondingly expensive operational step.

It is a broad object of the invention to provide a novel and improved cutting head of the general kind above referred to which is simple in construction and assembly and which produces a dust free point with a smooth conical surface.

A more specific object of the invention is to provide a novel and improved cutting head of the general kind above referred to including cutting blades which act upon the entire surface portion of the lead to be sharpened with a scraping action thereby assuring a smooth shaping of the same.

Still another object of the invention is to provide a novel and improved cutting head of the general kind above referred to which includes means for continually removing the dust as the same is formed during the sharpening operation. The removed dust may be collected in a separate collecting chamber. Such an arrangement has not only the advantage that the point of the lead itself is kept free of dust but that the environment is also kept clean and jamming or blocking of the sharpening device by accumulation of debris is made practically impossible.

Still another more specific object of the invention is to provide a novel and improved cutting head of the general kind above referred to in which cutting blades are positively retained in predetermined positions in reference to the lead portion to be sharpened so that they cannot be forced out of position by the counter pressure of the lead. As a result, the cutting head of the invention has a useful life considerably longer than was heretofore obtainable.

The afore pointed-out objects, features and advantages of the invention and other objects, features and advantages which will be pointed out hereinafter are attained by providing a rotary generally cylindrical cage having one or several openings in its side wall. The cage is rotatable about its center axis and at least three cutter blades are mounted in the cage for rotation in unison therewith, said blades being disposed symmetric to the rotational axis of the cage and in circumferentially uniformly spaced relationship. The cutting edge of each of the blades faces the rotational axis of the cage and constitutes a generatrix of an imaginary conical configuration whereby a lead portion inserted into the center axis of said configuration is given a generally conical point by the action of the blades. Lead particles freed by the cutting action of the blades are continually removed by centrifugal force through said openings when and while the cage is rotating.

The side of each of the cutter blades leading in the rotational direction of the cage is preferably oriented substantially radially in reference to the rotational axis of the cage and the trailing side of each of the blades has two slanted portions defining an obtuse angle with each other. The cutting angle of each of the blades along the cutting edge thereof is preferably approximately 85°. It has been found that an orientation of the blades and a cutting angle thereof as just described, result in a smooth sharpening action and in a long useful life of the blades.

The blades are preferably guided in circumferentially spaced recesses of a disc secured in the cage coaxially with the center axis thereof. The disc itself is supported by a shouldered portion of the cage and secured against rotation in reference to the cage. The base of the cage may be provided with a plug-in connecter for the drive shaft of the motor so that the cage can be easily exchanged for a new or differently dimensioned cage.

In the accompanying drawing a preferred embodiment of the invention is shown by way of illustration and not by way of limitation.

In the drawing:

FIG. 1 is a fragmentary elevational sectional view of a sharpening device including a cutting head according to the invention.

FIG. 2 is a sectional vertical view of the cutting head on an enlarged scale, taken on line II—II of FIG. 3.

FIG. 3 is a plan view upon FIG. 2 in the direction of arrow III.

FIG. 4 is a section taken on line IV—IV of FIG. 2.

FIG. 5 is a side view of one of the cutter blades of the cutter head, and

FIG. 6 is a bottom view of FIG. 5.

Referring now to the figures more in detail, the illustrated sharpening device comprises a housing **1** in which a motor **2** is mounted. The motor drives a shaft **5** mounting a transverse bolt **6** via a suitable gear train **4** located in a compartment **3** of the housing. Bolt **6** is part of a plug-in connector for mounting a rotary cutting head **7** which has two opposed slots **9** in a base or foot **8**. These slots are engaged by the bolt as can best be seen in FIG. 2 for transmitting the rotation of shaft **5** to the cutting head.

Housing **1** is closed by a cover **10** on which is formed a guide **11** for the holder of a lead to be sharpened. The bore in guide **11** is continued by a bore **12** for receiving

the lead proper. Both bores are in alignment with the rotational axis of cutting head **7**. A groove or cut-out **13** in the outside of guide **11** serves to determine the length of the lead to be sharpened.

The cutting head **7** comprises a substantially cylindrical cage formed by a side wall **17**, base or foot **8** and a head ring **18**. One or several circumferentially spaced openings or windows **16** are provided in side wall **17** separated from each other by the remaining portions of side wall **17**, three windows being shown.

Foot or base **8** has an internal bore **14** shouldered at **15**. The shoulder supports a disc **19** which in turn, constitutes a support for three cutter blades **20**. The cutter blades are shown as being spaced 120° from each other. Each of the blades has a substantially rectangular base **21** engaging a corresponding recess **19***a* in disc **19**. The location and guidance of rear edges **22** of the cutter blades in the cage are clearly shown in FIG. 3.

The leading side **25** of each cutter blade as seen in the direction of rotation of the cutting head is oriented substantially radially in reference to the rotational axis of the cutting head and the trailing side of each cutter blade is doubly angled at **24** in the same direction to provide two blade side portions defining an obtuse angle. Each cutting edge **25** in addition to being radially disposed in reference to the rotational axis of the cutting head is also declined by an angle of about 7° in reference to this axis thereby defining a cone angle of about 14° for the lead point to be sharpened. Finally, the cutting angle of the cutting blades is preferably about 85° as shown in FIG. 3.

While the invention has been described in detail with respect to a certain now preferred example and embodiment of the invention, it will be understood by those skilled in the art, after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended, therefore, to cover all such changes and modifications in the appended claims.

What is claimed is:

1. A cutting head of a lead sharpening device, said cutting head comprising a rotary generally cylindrical cage having at least one opening in its side wall mounting means supporting said cage rotatable about its center axis, several cutter blades mounted in said cage for rotation in unison therewith, said blades being disposed symmetric to the rotational axis of the cage and in circumferential uniformly spaced relationship, the cutting edge of each of said blades facing said rotational axis and constituting a generatrix of an imaginary conical configuration coaxially with the rotational axis of the cage whereby a lead portion inserted into the center axis of said imaginary configuration is given a generally conical point by the action of the blades when the cage is rotated, and a disc secured in said cage coaxially with the center axis thereof and having circumferentially spaced recesses, each of said cutter blades being secured in one of said recesses.

2. A cutting head according to claim **1**, wherein said cage comprises a shouldered wall portion, said disc being supported by said wall portion and secured against rotation in reference thereto.

3. A cutting head according to claim **1**, wherein the side of each of said cutter blades leading in the rotational direction of the cage is oriented substantially radially in reference to the rotational axis of the cage and the trailing side of each of said blades has two slanted portions defining an obtuse angle with each other, the cutting angle of each of said blades along the cutting edge thereof being approximately 85°.

4. A cutting head according to claim **1** and comprising power drive means including a drive shaft and a plug-in connection for releasably coupling said drive shaft to said cage for rotating the latter about its rotational axis.

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