Feb. 1, 1966 J. W. McPHEE 3,232,277

SELF SHARPENING PENCIL

Filed July 24, 1964

FIG. 1.

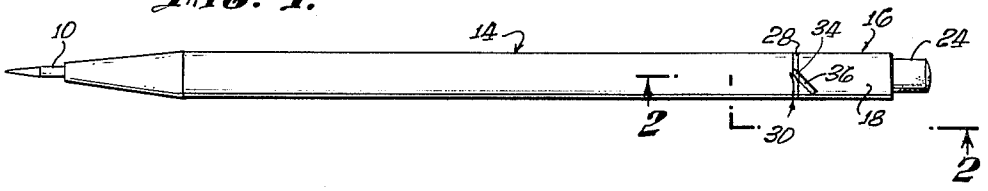


FIG. 2.

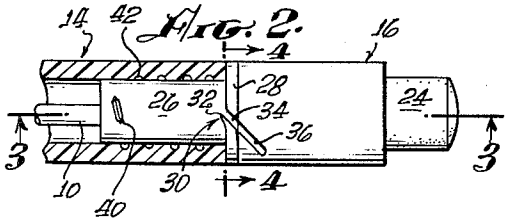


FIG. 4.

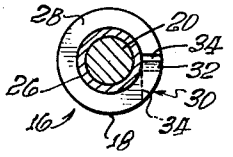


FIG. 3.

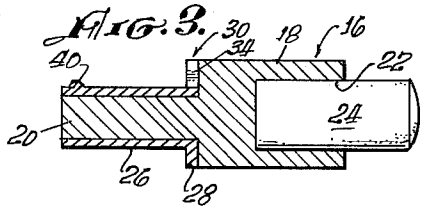


FIG. 5.

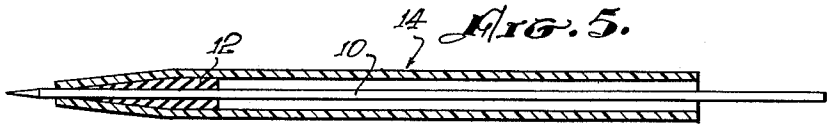


FIG. 6.

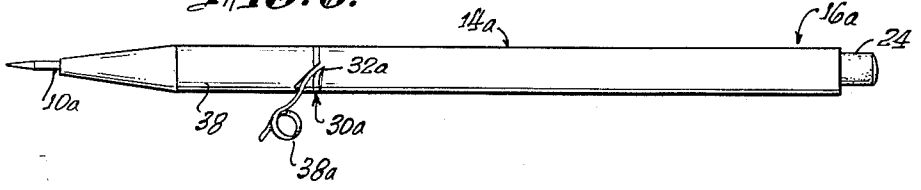


FIG. 7.



INVENTOR.
JAMES W. McPHEE,

By Fulwider, Patton, Rieber, Lee & Utecht.
ATTORNEYS.

United States Patent Office 3,232,277 Patented Feb. 1, 1966

3,232,277

SELF SHARPENING PENCIL

James W. McPhee, P.O. Box 312,
Laguna Beach, Calif.

Filed July 24, 1964, Ser. No. 384,891
9 Claims. (Cl. 120—15)

This application is a continuation-in-part of copending application Serial No. 133,363 filed August 23, 1961, now abandoned.

This invention relates to pencil devices and more particularly to a pencil device which is quickly and easily self-sharpened.

In the past, there have been many varieties of pencil devices designed to fill the needs of writers and the like users. These have ranged from the conventional wooden shaft pencil which usually requires separate mechanical means such as a pencil sharpener to cut the wood from the end of the shaft to expose additional writing lead whenever the lead is worn down, to mechanical pencils which employ complicated mechanisms to feed the lead down the center of the pencil holder and out the end of the pencil shaft whenever a longer point is needed. These past designs have certain undesirable features. The conventional wooden pencil requires a pencil sharpener, either the stationary type or a portable type, to correct a worn down lead point. Mechanical pencils are difficult and expensive to manufacture, often lack desirable durability, and also have a tendency to break the lead somewhere along its length when dropped or pressed too hard against the paper or writing material.

It is, therefore, an object of this invention to provide an improved self-sharpening pencil.

It is another object of this invention to provide an improved self-sharpening pencil in which the disadvantages of lead breakage are substantially eliminated.

It is a further object of this invention to provide an improved self-sharpening pencil which can be easily and inexpensively manufactured.

Other objects, advantages and features of novelty of this invention will become apparent from the following description taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a side elevational view of an assembly of the preferred embodiment of the pencil contemplated by this invention;

FIGURE 2 is an enlarged, fragmentary detailed side elevational view of the cap end portion of the pencil shown in FIGURE 1 and showing details of the cap utilized therewith;

FIGURE 3 is a longitudinal sectional view of the cap of FIGURE 2 taken along line 3—3 of FIGURE 2, with the casing of the pencil removed;

FIGURE 4 is a cross sectional view taken on line 4—4 of FIGURE 2;

FIGURE 5 is a longitudinal sectional view of the main body of the pencil of FIGURE 1 taken along the center line thereof;

FIGURE 6 is a side elevational view similar to FIGURE 1, showing a modified form of the embodiment of the pencil contemplated by this invention; and

FIGURE 7 is a cross sectional view, enlarged for purposes of illustration, of the lead or other marking substance for use in the self-sharpening pencil contemplated by this invention.

Referring now to FIGURES 1 through 5, the preferred self-sharpening pencil, contemplated by this invention is there shown. In this embodiment of the invention, an elongated element hereinafter usually referred to as the lead **10**, is the marking substance of the pencil device. This elongated element or lead **10** may

be a so-called pencil lead, comprising graphite material and construction in the conventional manner, or it may be made or composed of any other suitable substance which is to be used to make marks or supply a desired coating, such as, for example, lipstick, eyebrow pencil, crayon, and the like. Lead **10** is supported and normally extends coaxially through a central passage in a positioning spacer **12**, contained within the pointed lower end of a thin walled tubular outer casing **14**. Spacer **12** may be constructed of rubber or other resilient elastomeric material and is preferably fixed within casing **14** by suitable means such as glue, cement or other suitable adhesive. It is, however, not necessary to rigidly attach spacer **12** within the casing **14** since the action of the resilient or elastomeric material of which the spacer is composed will normally maintain the position thereof, as shown in FIGURE 5. Spacer **12** is not attached to lead **10**, but grips it only with sufficient frictional force, normally to support it in position within the casing **14** while permitting longitudinal adjusting movements thereof, when a sufficient force is exerted in a longitudinal direction on the upper end of the lead **10**. Casing **14** is preferably constructed of a fairly rigid but easily cut plastic material. The thickness of the wall of casing **14** is preferably as thin as possible commensurate with the desired rigidity of the pencil body.

Casing **14** is closed at its upper end by a cap member shown generally at **16**, having a main body portion **18**, carrying a downwardly extending shank portion **20** of reduced diameter relative to the body portion **18** and having an upwardly facing cylindrical recess **22** in the upper end thereof containing a conventional eraser body **24**. Cap body **18** preferably has substantially the same maximum outside diameter as that of casing **3**. Press fitted onto or otherwise suitably fixed to the cap shank **20** is a cutter carrier sleeve member **26** made of metal, preferably of aluminum alloy, having an outside diameter slightly greater than the inside diameter of casing **14** and having formed on the upper end thereof, a radially outwardly extending flange **28**. When the sleeve member **26** is inserted into the right or upper end of casing **14**, as viewed in FIGURES 1, and 2, and 3, a light press fit thereby results between the cylindrical outside surface of the sleeve member **26** and the adjacent inside surface of casing **14**, and the cap member **16** is thereby securely retained in the top end of the main body of the pencil. A knife **30** is formed from a portion of flange **28**, and is provided with an axially slanted, radially extending cutting edge **32**, extending radially across the thickness of the wall of casing **14**, as shown in FIGURES 2 and 4. The knife **30** is formed by making a relative thin saw cut obliquely through the flange **28**, as shown at **34** in FIGURES 2 and 4, and bending the resultant lower V-shaped, sharp edge projection thereby formed slightly axially downward relative to the plane of the flange **28**, as shown at **34** in FIGURES 2 and 4, and bending the resultant lower V-shaped, sharp edge projection thereby formed slightly axially downward relative to the plane of the flange **28**, a best shown in FIGURE 2. The aforesaid saw cut is continued on the same angle into the adjacent portion of the cap body portion **18** to form a clearance or relief slot **36** for passage out therethrough of the shaving cut from the end of the casing **14** by the cutting edge **32** of the knife **30**.

In operation when the cap member **16** is in inserted position on the upper end of the main body or casing **14** of the pencil, the top end of the lead **10** extends upwardly into abutment with the bottom end of the cap shank **20**. After the pencil has been used for a period of time and the point **11** of lead **10** has been worn down and needs lengthening, the operator grips the casing **14**

with one hand and the body 18 of the cap member 16 with the other hand, and rotates the main body of the pencil and the cap member relative to one another about their common longitudinal axis such that the cap member 16 rotates in a clockwise direction, relative to the casing 14, as viewed from the top or right hand end thereof as viewed in FIGURE 1. In so doing, a slight amount of axial pressure is preferably applied to force the cap member 16 downwardly against the top end of the casing 14 of the pencil, such that the beforementioned relative rotation of the two parts, namely the cap member 16 and the casing 14, causes the cutting edge 32 of knife 30 to cut into the upper end edge of the wall of casing 14. As a result of such cutting action, a thin shaving of plastic material is carved off of the upper end edge of the casing 14 resulting in shortening of the axial length of casing 14.

The rotation of the cap member 16 against the upper end of the casing 14 is continued by the operator until the desired amount of material is removed from the end of the casing 16. While such relative rotation and cutting is being performed, the cap member 16 is moving downwardly or to the left as viewed in FIGURE 1, along the axis of the pencil as the axial length thereof is thereby shortened. As previously pointed out, the right or upper end of the lead 10 is maintained in abutment against the bottom end of shank 20 of the cap member 16. As the cap member moves down or to the left, as the casing is shortened, the bottom of shank 20 bears against the upper end of lead 10, forcing it to move longitudinally downward relative to the casing 14, thereby causing it to be pushed corresponding distance out through the positioning spacer 12 and the pointed lower end of the casing 14. When the distance the lead is thus caused to move is the required amount for the desired extension of the writing point 11, the aforementioned cutting rotation is discontinued. The casing shaving thereby produced by the cutting knife 30 moves outwardly through the relief slot 36, where, if desired, may be torn or broken off adjacent the outer end thereof, and the pencil is thereby reconditioned in readiness for continued use.

The sharpening or lead advancing operation as herebefore described may be repeated as often as necessary until the pencil becomes so short, as not to be conveniently useable. The resultant stub of the pencil casing 14 may then be discarded.

Referring next to FIGURE 6, an alternative embodiment of the self-sharpening pencil construction, contemplated by this invention is shown. The construction and operation of this alternative embodiment is substantially the same in principle as the embodiment previously described in connection with FIGURES 1 through 4, the only difference being that the knife 30*a* there shown is supported by the pointed end portion 38 of the pencil, and cutting edge 32*a* is directed against and cuts into the lower end edge of the thin wall plastic casing 14*a*, which in this case, constitutes, in effect, a lower extension 16*a* of the upper end cap portion containing an eraser body 24. Rotation of the two parts of this alternative construction of the pencil namely the lower end portion 38 and the upper casing portion 14*a*, in a manner previously described, results in the progressive cutting off of the lower end edge of the casing 14*a*, shortening the casing 14*a* and thereby producing the cutting or shaving shown at 38*a*. As the length of casing 14*a* is thus reduced, lead 10*a* is pushed downwardly or to the left as viewed in FIGURE 6, by abutment of the upper end of the lead with the inside top end of the casing 14*a* in a manner similar to that previously described in connection with FIGURES 1–5 inclusive.

Although the light press fit of sleeve member 26 into the bore of the casing 14 operates satisfactorily under most conditions, it is preferable that additional means be provided to insure that cap 16 does not, or is made

fairly difficult to dislodge from the upper end of the pencil. In the preferred embodiment of this invention such retaining of the cap member 16 within the upper end of the casing 14, is accomplished by utilizing a small radially outwardly extending cutting blade 40 positioned near the inner or lower end of the sleeve member 26. The cutting blade 40 is attached to, or is formed from, a portion of the cutter carrier sleeve 26 and is positioned with its outer cutting edge at a slight angle to a plane normal to the longitudinal axis of the pencil casing 14. When the shank 20 of the cap member 16 is inserted into the upper end of the casing 14, the sleeve member 26 moves comparatively freely into the bore of casing 14, until the cutting blade 34 encounters the upper end of the casing 14 at which the broad side thereof resists further axial movement into the casing bore. The operator then commences turning the cap member 16 in a clockwise direction, relative to the casing 14, as viewed from the eraser end of the pencil. As the cap member 16 is thus turned, the knife blade 40 cuts a small spiral groove, as illustrated at 42, into the inner surface of the bore of casing 14, thereby drawing the sleeve member 26 of the cap member into the upper end of the casing 14.

The knife blade 40 is limited in size such as to be too short radially to cut entirely through the wall of casing 14, but in effect, cuts a small spiral thread groove in the inner surface of the casing, having a pitch substantially the same as the effective pitch of the cutting action of the knife 30. This turning operation is continued until cap member 16 is fully drawn into and coupled into the upper end of the casing 14 with the cutting edge 32 and the knife 30 in cutting contact with the top end thereof, and the pencil is then ready for operation. The broad side surface of the cutting blade 40 in the normal plane contained in the self formed thread like groove 42, resists to a great degree any tendency of the cap to be dislodged or to be easily pulled out of the top of the casing 14. For removing the cap member 16, the operation is reversed. The cap member 16 being turned in a counter clockwise direction relative to the casing 14 until it is removed from the top thereof.

Referring now to FIGURE 7 a cross-section of a preferred lead construction for the self-sharpening pencil contemplated by this invention is shown. If the lead is of conventional construction containing graphite or other similar substance, it is usually relatively easily broken when subjected to a mechanical jar or shock. To lessen the tendency of such breakage of the leads or the like marking or coating materials, the outer surface of the leads 10 may be covered with a thin coating of a suitable plastic material as shown at 44. Thus lead 10 is provided with an additional stiffening support along its length which will reduce breakage and help maintain its alignment in the pencil, in spite of possible breaks or cracks in the graphite or other contained marking material itself. Whereas graphite is quite brittle, such coating 44 is flexible and shock resistant, and thus is better able to withstand the shocks to which the leads of pencils of this kind are subjected.

Although this invention has been illustrated and described in detail, the same is by way of illustration and example only, the scope of this invention being limited only be the appended claims.

What is claimed is:

1. A pencil device comprising:

an elongated, hollow, relatively thin walled tubular casing having a forward end, a rearward end, and a passage extending axially therethrough;

an end member frictionally coupled to said rearward end of said casing with freedom for rotational and longitudinal sliding movement relative thereto;

a cutting blade fixed to an intermediate portion of said end member, said blade having a cutting edge extending laterally of the longitudinal axis thereof and positioned at an angle such as to be positionable in cut-

ting contact with and progressively cut away the rearward end edge of said casing upon rotational and longitudinal sliding movement of said end member and said casing relative to one another, whereby the length of said casing may be progressively shortened;

an elongated, rigid body of material contained within said passage of said casing and to be dispensed from the forward end thereof, said rigid body, having an outside diameter substantially less than the inside diameter of said passage, said body extending normally from the forward end throughout the length of said casing into contact with an inner portion of said end member;

and resilient means contained within said passage adjacent the forward end of said casing normally making frictional sliding engagement with said rigid body, whereby upon such progressive shortening of said casing, as aforesaid, said material is progressively projected outwardly past said resilient means through said forward end of said casing.

2. A pencil device comprising:

an elongated, hollow, plastic tubular casing having a passage extending axially therethrough;

an end member having a body portion and an axially extending shank portion of reduced diameter relative to said body portion, thereby forming an axially downwardly facing annular shoulder at the junction thereof;

a tubular sleeve member having a radially extending flange on one end thereof, said sleeve member being fixed on said shank member with the upper surface of said flange in abutment with said annular shoulder;

said tubular member being longitudinally and rotationally, slidably coupled into said passage in one end of said casing, with the lower surface of said flange axially adjacent said one end of said casing;

a lateral slot cut through said flange at an angle relative to the longitudinal axis thereof, thereby forming a thin edge at the intersection of said slot with the said lower surface of said annular flange, said edge extending laterally of the longitudinal axis of said end member intermediate said annular shoulder and said one end of said casing and said edge being bent axially downward at an angle to make cutting contact with said end edge of said one end of said casing, whereby said one end of said casing may be progressively cut away along a spiral path upon rotational movement of said end member and said casing relative to one another, thereby progressively shortening said casing;

and an elongated body of material contained within said passage of said casing and to be projected from the other end thereof, said body extending normally substantially axially throughout the length of said casing, with one end thereof in abutment with an inner end portion of said end member whereby upon such progressive shortening of said casing, said body of material is projected by said end member longitudinally outwardly through the other end of said casing.

3. A pencil device according to claim 2 and a short blade member extending laterally outward from the exterior surface of said sleeve member and of an angle relative to the longitudinal axis thereof, into spiral groove cutting engagement with the adjacent inner surface of said passage of said tubular casing, the angle of said blade member being such as to assist in drawing and retaining said end member and said tubular casing together in the aforesaid coupling and cutting relationship with one another.

4. A pencil device comprising:

an elongated, hollow, relatively thin-walled tubular casing having a forward end, a rearward end, and a passage extending axially therethrough;

a generally cylindrical end member having a rearward portion, and a forward portion of reduced diameter relative to said rearward portion, thereby forming at the juncture thereof a forwardly facing shoulder, said forward portion being longitudinally and rotationally slidably coupled into said passage with said shoulder normally positioned adjacent said rearward end of said casing;

a cutting blade fixed to said end member along said forwardly facing shoulder intermediate said forward portion and said rearward portion, said blade having a cutting edge extending laterally of the longitudinal axis of said end member and angularly directed such as to make cutting contact with and progressively cut away the rearward end edge of said casing upon rotation of said end member and said casing relative to one another, whereby the length of said casing may be progressively shortened;

and an elongated, consolidated body of material contained within said passage of said casing and extending normally from the forward end throughout the length of said casing into contact with an internal portion of said end member, whereby upon such progressive shortening of said casing, as aforesaid said body of material may be projected thereby outwardly through the said forward end of said casing.

5. A pencil device according to claim 4 and a relatively radially short blade member extending laterally outward from the exterior surface of said forward portion of said end member into cutting engagement with the adjacent inner surface of said passage of said tubular casing, said blade being set at an angle relative to the longitudinal axis of said forward position such as to cut a spiral groove in the inner surface of said passage in said tubular casing, upon rotation of said end member and said casing relative to one another as aforesaid, to assist in pulling and retaining said end member and said tubular casing together in the aforesaid coupling and cutting contact with one another.

6. A pencil device in accordance with claim 1 in which said body of material comprises concentric inner and outer portions, said outer portion forming a relatively thin coating having greater rigidity and shock resistance to breaking than said inner portion.

7. A pencil device comprising:

an elongated, hollow, tubular casing member having opposite ends, and a passage extending axially therethrough;

a generally cylindrical end member having a first portion, and a second portion of reduced diameter relative to said first portion, said portions extending coaxially opposite one another, thereby forming at the juncture thereof an axially facing shoulder, said second portion being longitudinally and rotationally slidable coupled into said passage with said shoulder normally positioned adjacent one of said ends of said casing member;

a cutting blade fixed to said end member along said axially facing shoulder intermediate said second portion and said first portion, said blade having a cutting edge extending laterally of the longitudinal axis of said end member and angularly directed such as to make cutting contact with and progressively cut away the end edge of said adjacent one of said ends of said casing member upon rotation of said end member and said casing member relative to one another, whereby the length of said casing member may be progressively shortened;

and an elongated, consolidated body of material contained within said passage of said casing member and extending normally from one end thereof throughout substantially the length of said casing member into contact with an opposite, internal portion of one of said members, whereby upon such progressive shortening of said casing, as aforesaid, said body of ma-

terial may be projected thereby outwardly through said one of said ends of said casing.

8. A pencil device comprising:

an elongated, hollow, relatively thin-walled tubular casing having a forward end, a rearward end, and a passage extending axially therein;

a generally cylindrical end member having a passage extending axially therethrough and having a forward portion, and a rearward portion of reduced diameter relative to said forward portion, thereby forming at the juncture thereof a rearwardly facing shoulder, said rearward portion being longitudinally and rotationally slidable coupled into said passage with said shoulder normally positioned adjacent said forward end of said casing;

a cutting blade fixed to said end member along said rearwardly facing shoulder intermediate said rearward portion, and said forward portion, said blade having a cutting edge extending laterally of the longitudinal axis of said end member and angularly directed such as to make cutting contact with and progressively cut away the forward end edge of said casing upon rotation of said end member and said casing relative to one another, whereby the length of said casing may be progressively shortened;

and an elongated, consolidated body of material contained within said passage of said casing and extending normally through said passage in said end member and substantially throughout the length of said

casing into contact with an internal abutment fixed in said casing adjacent the rearward end thereof, whereby upon such progressive shortening of said casing, as aforesaid said body of material may be projected thereby outwardly through said passage through said end member.

9. A pencil device according to claim 8 and a relatively radially short blade member extending laterally outward from the exterior surface of said forward portion of said end member into cutting engagement with the adjacent inner surface of said passage of said tubular casing, said blade being set at an angle relative to the longitudinal axis of said forward position such as to cut a spiral groove in the inner surface of said passage in said tubular casing, upon rotation of said end member and said casing relative to one another as aforesaid, to assist in pulling and retaining said end member and said tubular casing together in the aforesaid coupling and cutting contact with one another.

References Cited by the Examiner

UNITED STATES PATENTS

562,303	6/1896	Kaiser	120—15 X
2,022,789	12/1935	Steinmann	120—15 X

EUGENE R. CAPOZIO, *Primary Examiner.*

LAWRENCE CHARLES, *Examiner.*