United States Patent [19]

Kamo

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[54] **EVER-SHARP PENCIL**

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[73] Assignee: **Mitsubishi Pencil Co., Ltd.**, Tokyo, Japan

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[52] **U.S. Cl.** **401/94**

[51] **Int. Cl.** **B43k 21/22**

[58] **Field of Search** 401/92–94, 401/65–67

[56] **References Cited**

UNITED STATES PATENTS

1,748,229	2/1930	Katz	401/89
1,803,695	5/1931	Garankin	401/93 X
2,523,568	9/1950	Haverson	401/65

FOREIGN PATENTS OR APPLICATIONS

1,202,796	7/1959	France	401/94
336,739	1/1939	Italy	401/92

Primary Examiner—Lawrence Charles

[57] **ABSTRACT**

In an automatic lead storage pencil lead is extensible by means of a force translating means operatively arranged in a side portion of a body casing. The force translating means comprises an actuator means operated by radially directed forces and a camming means which translates the radially directed forces into axially directed forces thereby to urge a lead tube of the pencil downwardly extend and thus lead is extended beyond a cap nozzle of the pencil.

3 Claims, 5 Drawing Figures

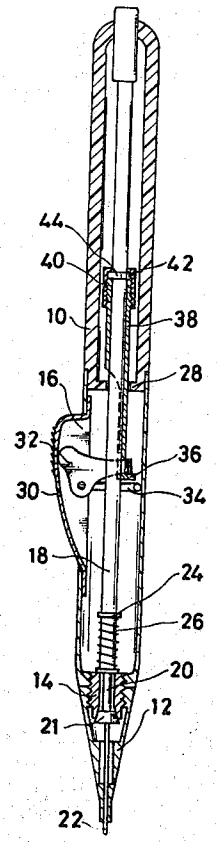


FIG.1

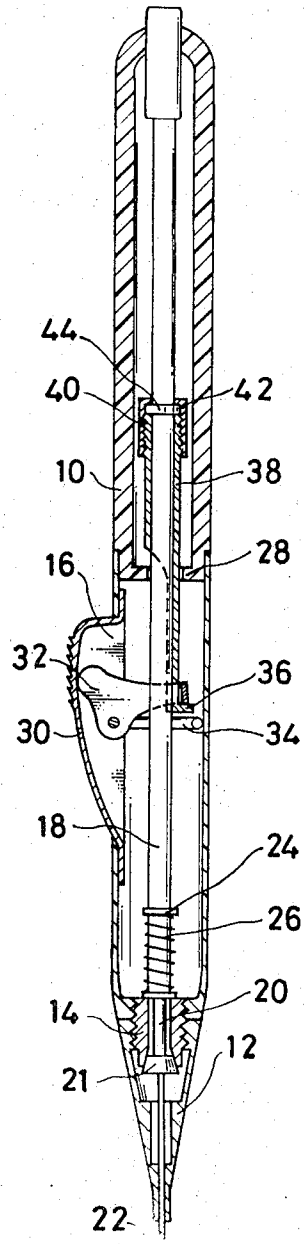


FIG.2

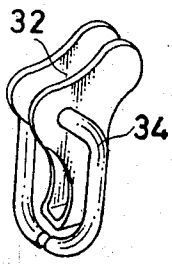


FIG.3

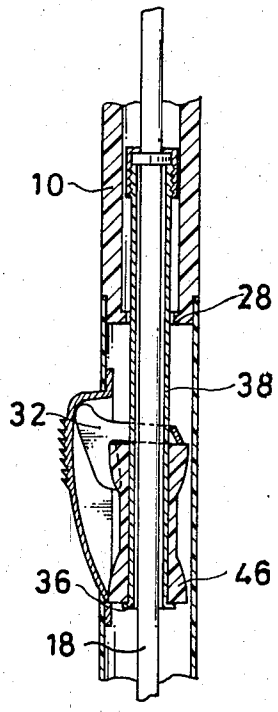


FIG.4

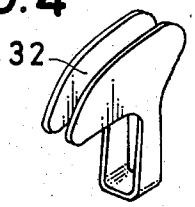
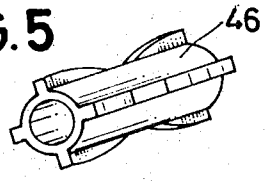


FIG.5



EVER-SHARP PENCIL

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to improvements in an automatic lead storage type pencil, and more particularly to a pencil providing at its side portion a resilient means for effecting an extension of lead from the tip of the pencil.

Heretofore, the actuating means for effecting an extension of lead has generally been provided at the tail end of the body casing. When an extension of lead is desired during the writing operation, the user grips a portion of the pencil body casing with four fingers except the thumb and then depresses the actuating means downwardly with the thumb for purpose of extending the lead. This operation is cumbersome for the prolific writer and rather inconvenient for the draftsman as a change of orientation or angle of lead abrasion during the drawing operation brings undesired variations in size and density of the line to be drawn.

A principal object of the invention is to provide a novel pencil in which a desired extension of lead may be effected in the normal finger positions with gripping the pencil body without entailing any turning of the latter.

It is a feature of the present invention that the lead is extensible by a gentle depression of a resilient means which is operatively arranged in a side portion of the pencil body.

It is another feature of the invention to provide a pencil of lead storage type comprising an outer body casing having an elongated recess at its side portion, a lead tube coaxially and slidably arranged in said outer body casing and providing at its one end a lead chucking means for selectively chucking or releasing the lead and a first flange means integrally formed on the periphery of the lead tube and being slidably supported at its opposite end by a support ring fixed to an inner circumferential wall of said outer body casing, a spring means mounted between said flange means and an inwardly facing shoulder formed in the inner sleeve means for always urging the lead tube upwardly, a resilient means operatively associated with the lead tube for urging the lead tube downwardly against the function of the spring means, an intermediate sleeve means of elastic material for enclosing the lead tube and having at its one end a second flange means for engagement with the resilient means, and a cap nozzle threadedly connected to an open end of the outer body casing.

The resilient means in accordance with the present invention is generally comprised of a push means and a force turning means cooperative with said push means to turn a radial force manually applied to said push means into an axial force for urging the lead tube downwardly against the function of the spring means. This resilient means is preferably positioned in the finger gripping zone on the pencil body for ensuring a smooth and quick depression of the pushing means.

A further feature of the invention is to provide a pencil of lead storage type comprising an outer body casing having elongated recess at its side portion, a lead tube coaxially and slidably arranged in said outer body casing and providing at its one end a lead chucking means for selectively chucking or releasing the lead and a first flange means integrally formed on the periphery of the lead tube and being slidably supported at its opposite

end by a support ring fixed to an inner circumferential wall of said outer body casing, a spring means mounted between said flange means and an inwardly facing shoulder formed in the inner sleeve for always urging the lead tube upwardly, a resilient means providing a push means operatively arranged in the elongated recess provided on the side portion of the body casing and a force turning means cooperative with said push means to turn a radial force applied onto said push means into an axial force for urging the lead tube downwardly against the function of the spring means, an intermediate sleeve means of elastic material for enclosing the lead tube and having at its one end a second flange means for engagement with the resilient means, and a cap nozzle threadedly connected to an open end of the outer body casing.

The force turning means is most preferably comprised of a pair of cam plates symmetrically arranged across the lead tube and having top corner portions resiliently bearing the push means usually comprising a push cover and lower corner portions in engagement with the second flange means of the elastic intermediate sleeve. When the push means is subjected to a gentle depression, the lower corner portions urges the second flange under the camming action against the function of the spring means mounted between the first flange means and the inwardly facing shoulder formed in the body casing thereby to urge the lead tube along an axis of the pencil.

It is therefore an additional feature of the invention to provide a pencil of lead storage type comprising an outer body casing having an elongated recess at its side portion, a lead tube coaxially and slidably arranged in said outer body casing and providing at its one end a lead chucking means for selectively chucking or releasing the lead and a first flange means integrally formed on the periphery of the lead tube and being slidably supported at its opposite end by a support ring fixed to an inner circumferential wall of said outer body casing, a spring means mounted between said flange means and an inwardly facing shoulder formed in the inner sleeve means for always urging the lead tube upwardly, a resilient means for extending the lead providing a push means operatively arranged in the elongated recess provided on a side portion of the body casing and a force turning means cooperative with said push means and including a pair of cam plates symmetrically arranged across the lead tube and having top portions for resiliently bearing the push means and lower corner portions, an intermediate sleeve means of elastic material for enclosing the lead tube and having at its one end a second flange means for engagement with said lower corner portions of the cam plates, and a cap nozzle threadedly connected to an open end of the inner sleeve means.

Instead of making the second flange provided at the open end of the elastic sleeve into a direct contact with lower portions of the cam plates, a toothed hollow adapter of comparatively hard material is mounted around the elastic intermediate sleeve in abutment with the second flange for ensuring a positive transmission of the depression or radial force applied on the push means to the lead tube for advancement thereof.

It is therefore a further additional feature of the invention to provide a pencil of lead strage type comprising an outer body casing having an elongated recess at its side portion and terminating at an open end, a lead

tube coaxially and slidably arranged in said body casing and providing at its one end a lead chucking means for selectively chucking or releasing the lead and a first flange means integrally encompassing the periphery of the lead tube and being slidably supported at its opposite end by a support ring fixed to an inner circumferential wall of the body casing, a spring means mounted between said flange means and an inwardly facing shoulder formed in the body casing for always urging the lead tube upwardly, a resilient means operatively associated with the lead tube for urging the lead tube downwardly against the function of the spring means, an intermediate sleeve means of elastic material for enclosing the lead tube and having at its one end a second flange means for engagement with the resilient means, a toothed hollow adapter means mounted around the elastic sleeve in abutment with the second flange for ensuring a positive transmission of the radial force applied on the push means to the lead tube for advancement thereof and a cap nozzle threadedly connected to an open end of the inner sleeve means.

Objects and advantages of the invention will in part be obvious and will in part appear hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature and object of the invention a reference should be had to the following detailed description taken in connection with the accompanying drawing, in which the same reference numerals designate the same or similar parts throughout the drawings:

FIG. **1** is a longitudinally sectioned view of the first embodiment of the lead storage pencil according to the invention;

FIG. **2** is a perspective view of the force turning cam with a support ring;

FIG. **3** is a partially and longitudinally sectioned view of the second embodiment of the lead storage pencil according to the invention;

FIG. **4** is a perspective view of the force turning cam of another embodiment in accordance with the invention;

FIG. **5** is a perspective view of the toothed adapter used in the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now in more detail to the drawings, wherein like parts are indicated by like reference numerals and initially to FIG. **1**, there is illustrated therein in longitudinally sectioned view an outer body casing of the lead storage pencil **10** made of steel, synthetic resin and other materials and shaped into a hollow tube of predetermined diameter and length.

The outer body casing at its open end is connected with a cap nozzle **12** through a threaded connection **14** and at its one side portion and usually in the finger gripping zone is provided with an elongated opening **16** for receiving a resilient means hereinafter described.

In the body casing is coaxially and slidably arranged a lead tube **18** having at its one end a chuck member **20** with a clamp ring **21** for selectively chucking or releasing a lead **22.** Around the periphery of the lead tube **18** is integrally provided a first flange **24.** Between the flange **24** and an inner face of the threaded connection **14** is mounted a spiral spring **26** which always urges the lead tube **18** upwardly against a function of the resilient mean for urging the lead tube downwardly hereinafter described.

The lead tube **18** at its opposite end is slidably supported by an annular support ring **28** fixed to an inner circumferential wall of the outer body casing **10** in adjacent to the opening **16.**

The resilient means operative to extend the lead includes a depression cover **30** which is operatively arranged in the elongated recess **16** provided in the body casing **10** and a cam member **32** comprising two symmetrically arranged plates which are interconnected integrally at their bottom ends. The cam member **32** is pivoted to a ring pivot **34** having a straight portion traversing within the outer casing **10.**

As best shown in FIG. **1,** the curved top corner of the cam **32** supports resiliently an inner surface of the depression cover **30** whereas the bottom end thereof is in engagement with a second flange **36** formed at one end of the elastic sleeve **38** enclosing the lead tube **18.** The elastic sleeve at its opposite end is provided with a threaded portion **40** to fit with a cap **42** in engagement with a ring **44** encircling the lead tube **18.**

When an extension of lead is desired, the depression cover **30** is pushed downwardly by the user of the pencil and then a radial force applied on the depression cover **30** is converted through the cam plates **32** into an axial force along an axis of the pencil so that the bottom corner portion of the cam plates **32** urges the second flange **36** against the function of the spiral spring **26** to allow disengagement of the chuck member **20** from a clamp ring **21** thereby to release the lead for permitting an extension of the latter.

In FIG. **3,** between the second flange **36** and the cam **32** is mounted a toothed hollow adapter **46** as shown in FIG. **5** for ensuring a positive transmission of the depression or radial force applied on the depression cover to the lead tube for advancement of the latter. In this embodiment, the cam **32** is preferably made in a beak as shown in FIG. **4** to adequately fit with one end of the adapter **46.**

According to the invention, a lead extension may be effected in a simple construction and with an easy operation.

While certain preferred embodiments of the invention have been illustrated by way of example in the drawings and particularly described, it will be understood that modification may be made in the construction and that the invention is in no way limited to the embodiments shown.

We claim:

1. A lead storage pencil comprising an outer body casing formed with an elongated opening in a side wall thereof, an axially reciprocable lead tube supported within said casing coaxially therewith and terminating in lead chucking means for selectively chucking or releasing lead from the tube, said lead tube being slidably supported for reciprocal movement within said casing by ring means therein positioned distant from said lead chucking means and having integrally formed thereon first flange means in a region thereof between said lead chucking means and said ring means, said ring means and flange means being located proximate the opposite ends of said elongated opening in said casing side wall, spring means mounted between a fixed member in said casing and said flange means for normally urging said lead tube upwardly and said chucking means into its chucking position, and force translating means for

translating radially applied forces through said elongated opening into axially applied forces on said lead tube and comprising a resilient member over and covering said elongated opening, means operatively related to said lead tube and providing a second flange means between said first flange means and said ring means, and camming means having a camming surface and an extension portion, said camming means having its camming surface projecting through said elongated opening in confronting relation to said resilient member and being mounted relative thereto for clockwise movement of said extension portion upon radial displacement of said resilient member, said extension portion upon clockwise movement thereof being adapted to bear against said second flange means to urge said lead tube downwardly against the action of said spring means.

2. A pencil according to claim 1, wherein said flange providing means comprises an intermediate sleeve of elastic material disposed about the lead tube, said camming means comprising a pair of cam plates straddling the lead tube, each of the cam plates providing a camming surface at the top portion thereof which bear against said resilient member, said extension portion of the camming means comprising lower corner portions of the cam plates.

3. A pencil according to claim 1, wherein a toothed hollow adapter is provided between said second flange means and the projecting portion of the camming means.

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