

[54] **USEFUL WRITING INSTRUMENT**

[76] Inventors: **Ya-Mei Hung**, 52, Sec. 1, Shing N. Rd.; **Yen-Ping Hsiao Liu**, 33, Ln., 170 Twng. Hwa St., both of Taipei, China /Taiwan

Primary Examiner—Lawrence Charles
Attorney, Agent, or Firm—Lane, Aitken, Dunner & Ziems

[22] Filed: **July 17, 1972**

[57] **ABSTRACT**

[21] Appl. No.: **272,095**

A writing instrument comprises a tubular casing with a writing unit which is frictionally interfitted with the front end of the casing, and an ejector means for ejecting the writing unit from the casing as its writing point becomes blunt for replacement by a sharpened unit. Each writing unit carries a sharpened lead pencil element or the like at its front portion and includes a suddenly enlarging and gradually reducing portion at its middle portion, while its rear portion has substantially the same shape as the front section. The ejector means further comprises a tubular casing in which the remaining writing units of a plurality of writing units are stored, with an ejector at its closed end and a plurality of annular flexible projections at its opened end to prevent the stored writing units therein from slipping out from behind the ejector tube.

[52] U.S. Cl. **401/57, 401/65**

[51] Int. Cl. **B43k 21/02, B43k 21/22**

[58] Field of Search 401/57, 65, 82-84, 401/69, 89

[56] **References Cited**

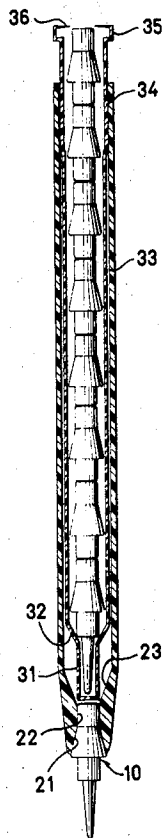
UNITED STATES PATENTS

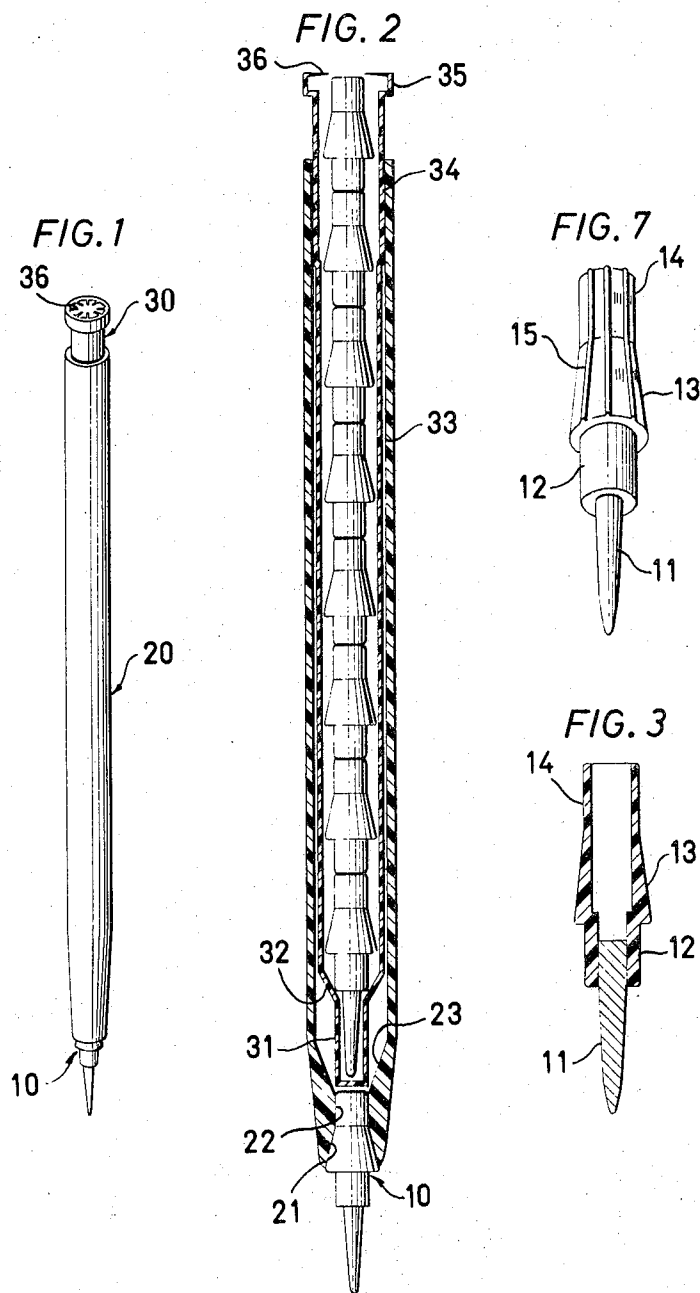
650,078	5/1900	Keck	401/65
584,999	6/1897	Goldsmith et al.	401/67
512,954	1/1894	Goldsmith et al.	401/67
1,378,174	5/1921	Kaiser	401/57 X

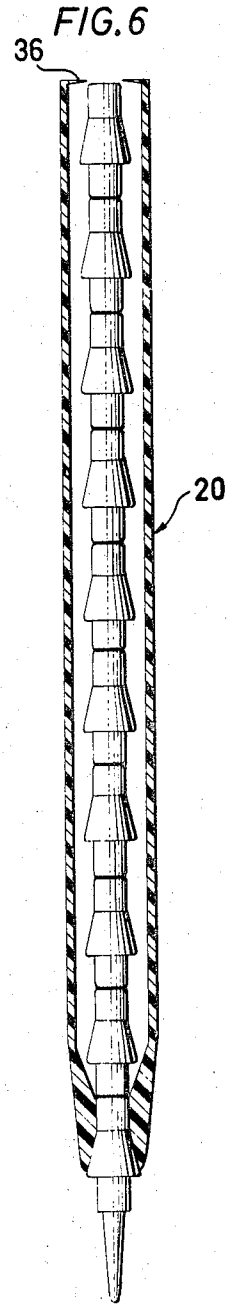
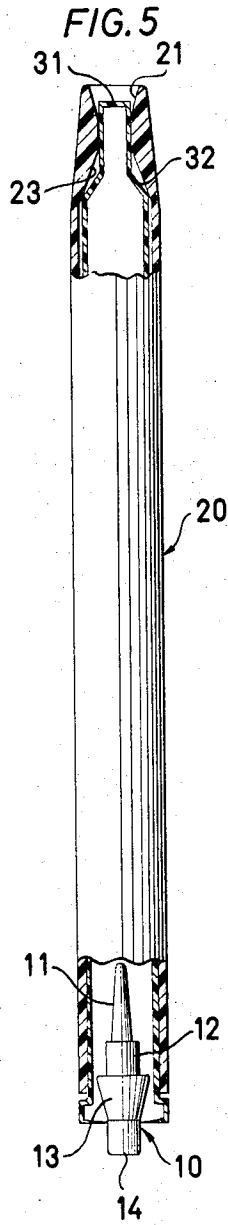
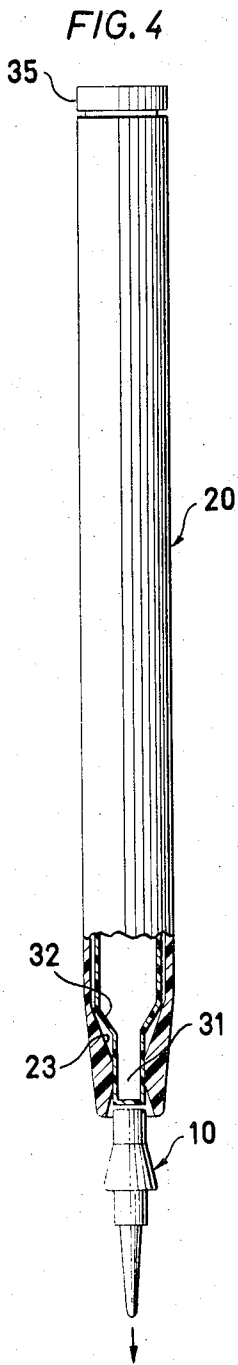
FOREIGN PATENTS OR APPLICATIONS

1,550,725	11/1968	France	401/57
1,501,056	10/1967	France	401/57

8 Claims, 7 Drawing Figures







USEFUL WRITING INSTRUMENT

BACKGROUND OF THE INVENTION

In a conventional writing instrument with a pre-sharpened lead pencil element, such as that shown in U.S. Pat. No. 3,338,215, a number of pre-sharpened lead cartridges or writing units are contained in a tubular holder or casing to form the pencil body. At its rear end, the casing is provided with locking means to prevent the foremost writing unit from retracting into the casing during use.

These cartridges are then connected in the casing with the front end of one unit received in a recess at the rear end of the next adjacent cartridge.

This arrangement has the disadvantage that when the pencil is in use, the foremost writing unit is supported only at the end where the unit projects out of the casing. Consequently, the foremost writing unit is unstable and wobbly, which causes discomfort in writing.

Another disadvantage with this type of pencil is the difficulty encountered in inserting the last writing unit into the locking means at the rear end of the casing whenever the replacement of a fresh cartridge is required.

Furthermore, because it is difficult to control the inner diameter of the locking means at both ends of the pencil during manufacturing, especially when plastic material is used to form a casing, the inner diameter of both locking means is always either larger or smaller than the outer diameter of the cartridge to be fitted. A larger diameter of the locking means will generally result in the writing unit slipping out from the casing.

Still another disadvantage of this type of pencil is that, if one of the writing units or cartridges is accidentally lost, the remaining writing units contained in the tubular casing will not be able to retain the cartridge assembly, and the entire pencil becomes unusable.

In another conventional writing instrument with a pre-sharpened lead pencil element, shown in Austrian Patent No. 68637 to Herold, a number of pre-sharpened leads are contained in an inner front barrel and a push stem *r* is supported by a fixed inner rear barrel, inside which a movable barrel is provided for pushing the push stem *r* so as to project one writing unit each time out of the casing. In addition, a guide ring *e* securely fitted in the casing for the guidance of the movable barrel, spring *h*, supporting union *i* and the pressing end *g* are still particularly needed to perform its functions. One of the disadvantages of this type of pencil is that many parts are required to form a pencil body. This complicated construction will always be accompanied by manufacturing difficulties thus increasing the cost of the pencil. Another disadvantage of this type of pencil is that each writing unit is cylindrically fitted with the casing, between which a critical tolerance is necessary; otherwise, the writing unit will fail in use.

The present invention thus generally relates to a useful and improved writing implement and, more particularly, to a pencil adapted to avoid the disadvantages of the pencils of the prior art.

An object of the present invention is to provide a means for securely interfitting the writing unit with a tubular casing or a holder without vibration or retraction into the casing upon the application of pressure on the writing point during use.

It is another object of the present invention to provide each individual cartridge or writing unit with its casing or holder serving as an operable writing instrument so that a loss of a writing unit of the writing instrument will no longer result in the unusability of the writing instrument and no specified number of the writing units in the casing are required.

It is still another object of the present invention to provide an ejecting and storage means inside the casing of the writing instrument which comprises a tube with a closed end and an opened end, the closed end serving as an ejector for the change of the used writing unit, the opened end having an enlarging portion thereon for frictional engagement with the inner surface of the casing to reduce the friction therebetween and eliminate the additional mechanism required in the prior art, and the rearmost end of the enlarging portion of the ejector member further comprises a sudden enlargement wherein annular flexible projections are provided for preventing the remaining writing units stored within the ejector tube from slipping out of the tube, but permitting each rearmost cartridge to be pulled out by hand from the end of the ejector tube as desired.

It is still another important object of the present invention to provide a writing instrument with an excellent interengaging means to eliminate the need for critical tolerances between the outer surface of the writing unit and the inner surface of the casing so as to reduce substantially the loss of production and to simplify the manufacture of the writing instrument of the present invention.

Other objects and further applicability of the present invention will become more apparent when taken in conjunction with the accompanying drawings.

BRIEF SUMMARY OF THE INVENTION

The writing instrument according to the invention comprises a casing member, a writing member operatively projecting a writing portion from the casing member, and means for ejecting the writing member from the casing member, the ejecting means further defining means for storing a plurality of writing members therein. The stored writing members are operatively isolated from the writing members which project the writing portion from the casing. In a preferred embodiment, the casing member is tubular and adapted at the front end for securely receiving the writing unit. Each writing unit comprises a writing portion and a writing body, the writing body including a front portion for securing the writing portion, a middle portion for providing a secure interfitting engagement with the interior of the front end of the tubular casing, and a rear portion capable of being grasped and extracted from the storage means of the writing instrument. The middle portion of the writing unit is conically tapered comprising a suddenly enlarging and gradually reducing portion. The front end of the casing also defines an inwardly directed, rearwardly contracting conical taper to form an internal hollow corresponding to the taper on the middle portion of the writing unit to secure the interfitting of the writing unit with the casing to prevent the writing unit from retracting into the casing and to prevent vibration of the casing upon the application of pressure to the writing unit during use.

The removal of the writing unit from the front portion of the casing is accomplished by applying a pressure to the top of the storage means, which acts as a de-

pressable ejector tube to reject the writing unit from the casing. A replacement writing unit is then withdrawn from the end of the ejector tube and manually inserted into the front end of the casing for writing. In a preferred embodiment, the storage means which also acts as the ejector tube, is a tubular member slideably engaged within the tubular casing and defines a closed end for engaging the rear portion of the writing unit and an enlarged portion at the open end thereof opposite the closed end. The enlarged portion includes a plurality of flexible, radially inwardly extending projections for retaining the writing units within the tubular member and being capable of permitting withdrawal of the writing units from the tubular member.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of one embodiment of a writing instrument according to the present invention;

FIG. 2 is an enlarged vertical longitudinal sectional view through the writing instrument in FIG. 1;

FIG. 3 is an enlarged longitudinal sectional view of one embodiment of a writing unit which may be used in the writing instrument of FIG. 2;

FIG. 4 is a partial sectional view of FIG. 2 illustrating one type of writing unit being ejected out of the front end of the casing when the top of ejector tube is pressed by a thumb;

FIG. 5 is a upside-down view of FIG. 4 with the used writing unit having been ejected and illustrating that one of the plurality of fresh writing units stored in the ejector means is ready to be pulled out for insertion into the front end of the casing;

FIG. 6 is a longitudinal sectional view of the entire writing instrument of a second embodiment according to the present invention;

FIG. 7 is a perspective view of a writing unit used in the second embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Throughout the written description of the invention, like reference numerals indicate like parts throughout the drawings.

The term "writing instrument" described herein is not limited only to a pencil, but encompasses all kinds of writing bodies, such as ball pens, crayons or markers and the like.

Referring now particularly to FIGS. 1 to 3, the writing instrument of the present invention mainly comprises a writing unit 10, a casing 20 and an ejector tube 30. The writing unit 10 include a front portion 12, a middle portion 13 and rear portion 14. The outer diameter of the front portion 12 and the rear portion 14 are substantially equal, while the inner diameter of the rear portion 14 through the middle portion 13 is larger than the inner diameter of the front portion 12. The front portion 12 is provided for holding the writing point 11. The rear portion 14 is provided to be easily grasped by hand when a change of the writing unit is required.

According to the present invention, an important feature of the writing unit 10 is that the middle portion 13 has an expanded portion which is suddenly enlarged and then gradually reduced and tapered down to the rear portion 14, thus a step is formed between the front portion 12 and the middle portion 13. The function of the middle portion 13 will be described in conjunction with the front end of the casing 20 hereinafter. The cas-

ing 20 comprises a tubular casing with an internal hollow having a corresponding rearwardly conical taper 21 to adapt for receiving the expanded middle portion 13 and the rear portion 14 of the writing unit 10 in a secure press-fitted or frictionally engaged relation. In this manner, the writing unit 10 is securely interfitted by its expanded middle portion 14 with a conically tapered front end 21 of the casing 10 thereby to form a secure engagement with each other. Accordingly, any shortcomings, such as vibration at the front end of the writing unit or the writing unit retracting into the casing upon the application of pressure on the writing point, in the prior art writing instrument as described above, are eliminated. The front end of the casing further comprises an internal hollow of corresponding frontwardly conical taper 23 for accepting the ejector 31 when the top of the ejector tube is pressed. Between both conical tapers 21 and 23, a hollow 22 is provided which is interfitted with the rear portion 14 of the writing unit 10.

The ejector tube 30 comprises a tubular body with a closed end and an opened end. The closed end serves as an ejector 31 with substantially the same diameter as the rear portion 14 of the writing unit. The ejector 31 further comprises a tapered portion 32 for restricting the movement of the ejector tube 30 within the casing in conjunction with an enlargement 35 at its rearmost end, as shown in FIGS. 2 and 4. The opened end includes a rearmost enlargement 35, and an enlarged rear portion 34. The rearmost enlargement 35 further comprises a plurality of annular flexible projections 36 therein (FIG. 1) to prevent the remaining writing units stored therein from slipping out of the tube, but either permit the rear or front sections of the remaining writing units to project out of the rear end of the ejector tube when the casing or the ejector tube is upside-down or inclined for the purpose of taking one of said writing units therefrom to press-fit the unit into the front end of casing to replace the used one, as shown in the manner of FIG. 5. The enlarged rear portion 34 is provided to enable the ejector tube 30 to engage frictionally with said casing 20. Therefore, the whole length of said ejector tube 30 is frictionally independent of said casing 10 except for the enlarged rear portion 34 to reduce thereby the friction therebetween to the minimum.

FIGS. 6 and 7 illustrate a second embodiment of the present invention wherein the ejector tube 30 has been removed out of the casing 20, and the rear end of the casing 20 is formed with a plurality of annular flexible projections in the manner of the ejector tube described in connection with FIGS. 1-3. In this arrangement, if the change of the writing unit is required, the change is simply made by grasping the front portion of the writing unit held at the front end of the casing, and pulling the unit out of the casing. According to this embodiment, in order to easily pull out the writing unit from the front end of casing, a plurality of longitudinal ribs 15 (as shown in FIG. 7) are provided on the periphery of the expansion middle portion or/and the rear portion of the writing unit to reduce thereby the friction therebetween.

As will be apparent, the present invention may be embodied in some other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended

claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

We claim:

1. A writing instrument comprising:

a tubular casing member adapted at the front end thereof for securely receiving a writing unit therein;

a writing unit operatively projecting a writing portion thereof from said casing member, said writing unit comprising said writing portion and a writing body, said writing body including a front portion for securing said writing portion, a middle portion for providing a secure interfitting engagement with the front end of said casing member, and a rear portion capable of being grasped and extracted from a storage means, wherein the middle portion of said writing unit and the front end of the casing member are structurally interfitted to prevent vibration upon the application of pressure to said writing unit during use, and wherein the interior of the casing member at the front end thereof defines an inwardly directed, rearwardly contracting, conical taper for receiving a corresponding conical taper on the expanded middle portion of said writing unit in an interfitting relationship; and

means for ejecting said writing member, said ejecting means further defining means for storing a plurality of said writing members therein in a manner which is operatively isolated from said writing member projecting a writing portion from said casing member.

2. The writing instrument as set forth in claim 1 wherein the interior of said tubular casing member adjacent said inwardly directed, rearwardly contracting conical taper defines a cylindrical section for receiving and securing the rear portion of said writing unit when

said writing unit is positioned in the front end of said casing.

3. The writing instrument as set forth in claim 1 wherein said ejecting and storage means is a tubular member slideably engaged within said tubular casing, said tubular member defining a closed end for engaging the rear portion of said writing unit when said tubular member is depressed to expel said writing unit from said casing.

4. The writing instrument as set forth in claim 3 wherein the closed end of said tubular member is sized to pass through said cylindrical section of said casing member for a predetermined length to eject a used writing unit from said casing member.

5. The writing instrument as set forth in claim 3 wherein said tubular member further includes an enlarged portion for slideably and frictionally engaging the interior of said tubular casing member.

6. The writing instrument as set forth in claim 5 wherein the tubular member is free from frictional engagement with the interior of said tubular casing member except at said enlarged portion of said tubular member.

7. The writing instrument as set forth in claim 3 wherein said tubular member includes a second enlarged portion at an open end thereof opposite said closed end, said second enlarged portion including a plurality of flexible, radially inwardly extending projections for retaining said writing units within said tubular member and being capable of permitting withdrawal of said writing units from said tubular member.

8. The writing instrument as set forth in claim 5 wherein said flexible projections extend inwardly to an extent to define a free space capable of permitting the rear portion of said writing member to extend therefrom to be grasped for removal from said tubular member when said writing instrument is inverted.

* * * * *

40

45

50

55

60

65