Jan. 28, 1969 K. F. SCHISCHKOW 3,424,535

SELF-FEEDING PENCIL

Filed Oct. 18, 1966 Sheet 1 of 2

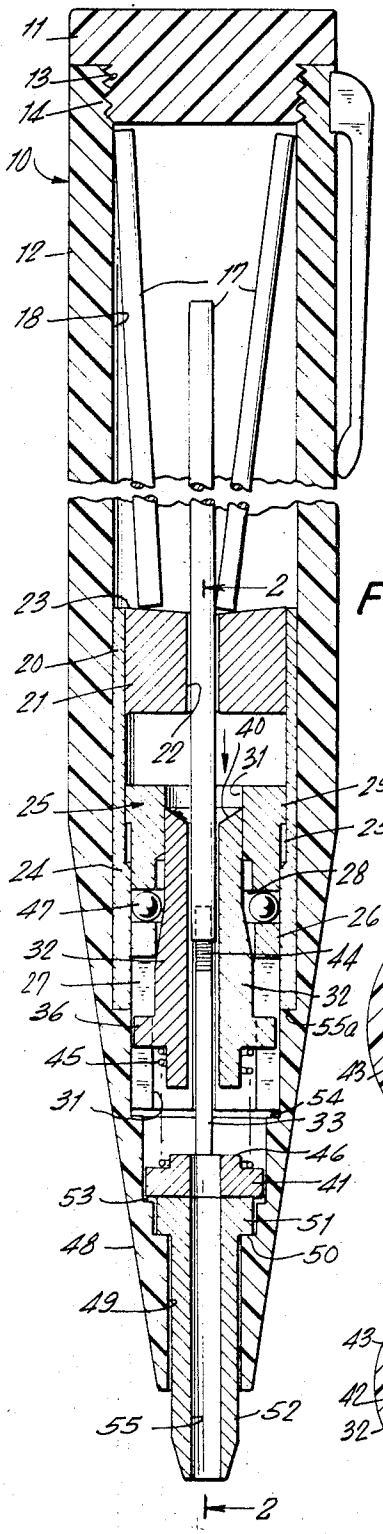


FIG. 1

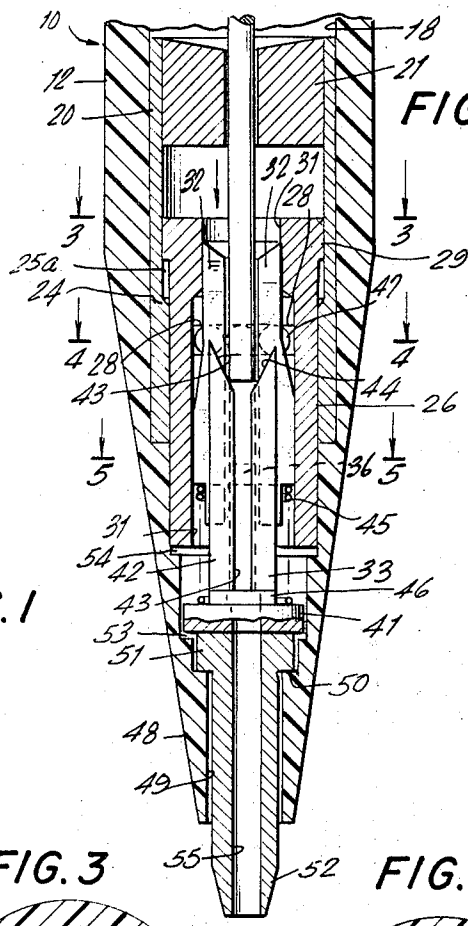


FIG. 2

FIG. 3

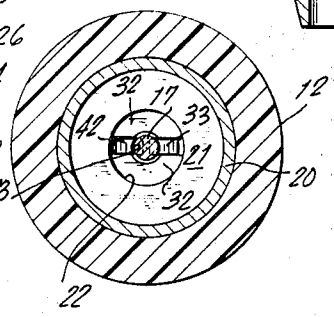
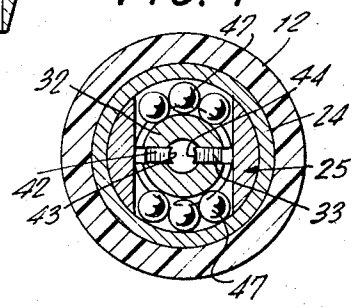


FIG. 4



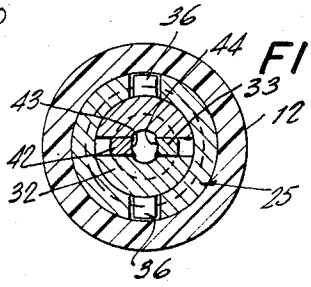


FIG. 5

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FIG. 6

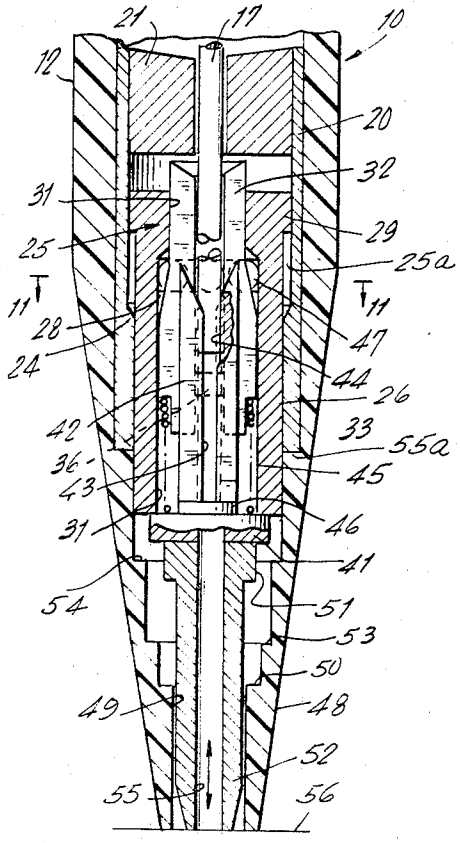


FIG. 7

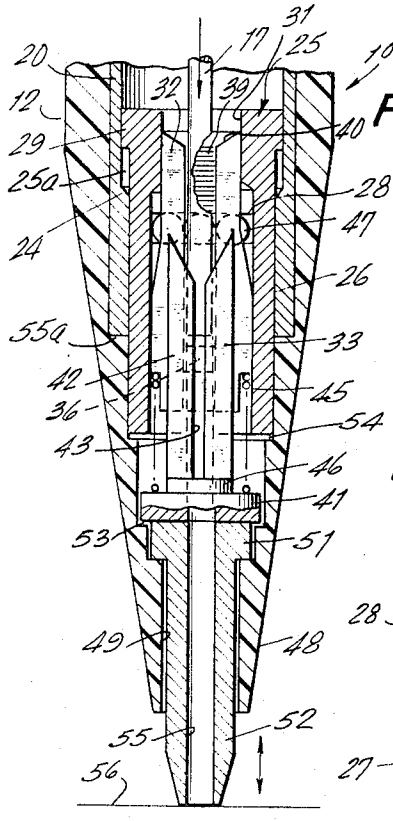


FIG. 10

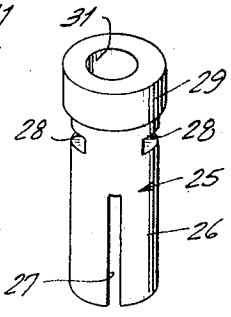


FIG. 8

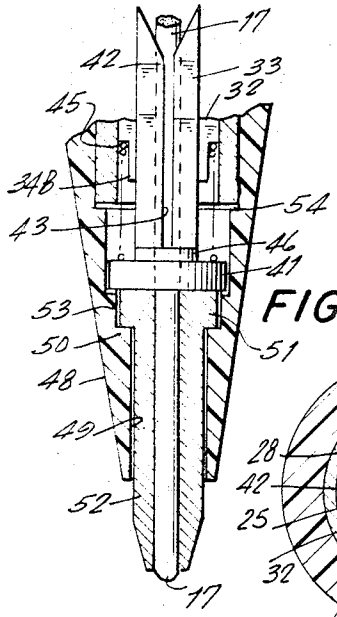


FIG. 9

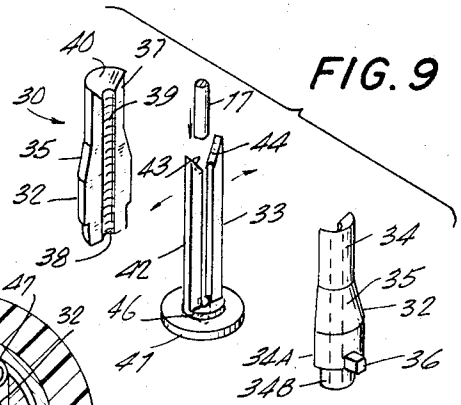
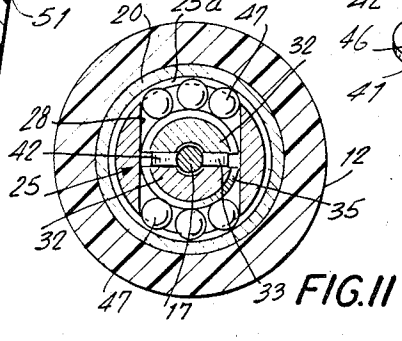


FIG. 11



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SELF-FEEDING PENCIL

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Int. Cl. B43k 21/20

ABSTRACT OF THE DISCLOSURE

A self-feeding writing instrument is disclosed in which the elongated marking members are received within the central bore of a clutch guide freely carried within a casing. Lateral clutch plates receive the marking members within the guide and restrict the movement of the marking members to the feed direction through the instrument. A clutch jaw responsive to pressure upon the point of the writing instrument slides within the clutch plates and along the marking member therein. Release of the pressure upon the instrument tip permits the clutch guide, plates and jaw to fall toward the writing tip carrying the marking member into writing position.

This invention relates to self-feeding pencils and more particularly to a pencil which will advance a supply of lead therethrough as required without adjustment by the user.

In my Patent No. 2,866,438, issued Dec. 30, 1958, there is disclosed a self-feeding pencil in which the lead is advanced an amount necessary for writing when required without any action on the part of the user other than the normal writing movements. The lead is initially loaded through the tip of the pencil case and is held therein by a spring-like chuck. However, only one length of lead can be carried within the pencil at a time and writing has to be interrupted when each length of lead is used up. If the pencil is shaken sharply along its vertical axis, the lead will often feed out of the pencil an undesirable amount. This uncontrolled self-feeding action often results in wasted lead.

Accordingly, it is an object of the present invention to provide a self-feeding pencil which will be free of the shortcomings of prior art devices.

Another object of the present invention is to provide a self-feeding pencil which will accept a large number of leads and continue to advance them through the pencil until they have all been used without the need for loading at the end of each lead.

A further object of the present invention is to provide a self-feeding pencil which will require no attention with respect to its readiness for writing for extremely long intervals of time.

An object of the present invention is to provide a durable trouble-free simplified self-feeding pencil.

Still another object of the present invention is to provide a self-feeding pencil which will not advance the lead except when writing requires it.

A feature of the present invention is its clutch and friction clutch assembly for advancing the lead through the pencil.

Another feature of the present invention is its axial lead path from the magazine to the writing tip.

A further feature of the present invention is its means for gripping the lead as it is fed out of the pencil to prevent breakage.

Still another feature of the present invention is its large lead capacity.

The invention consists of the construction, combination and arangement of parts, as herein illustrated, described and claimed.

In the accompanying drawings, forming a part hereof there is illustrated one form of embodiment of the invention, in which drawings similar reference characters designate corresponding parts, and in which:

FIGURE 1 is a view in vertical section of a complete embodiment of the present invention on an enlarged scale.

FIGURE 2 is a fragmentary view partly in vertical section of the writing tip of the pencil taken on line **2—2** of FIGURE 1, looking in the direction of the arrows.

FIGURES 3, 4 and 5 are cross-sectional views taken on lines **3—3**, **4—4**, and **5—5**, respectively of FIGURE 2, looking in the direction of the arrows.

FIGURE 6 is a fragmentary view of the writing tip in the lead advancing position with certain parts shown in vertical section and others in dashed lines for the sake of clarity.

FIGURE 7 is a view similar to FIGURE 2 showing the second step in advancing lead through the pencil.

FIGURE 8 is a view similar to FIGURE 7 showing the result of successive steps in advancing lead through the pencil.

FIGURE 9 is a somewhat exploded view of the combined clutch and friction clutch shown in FIGURES 1, 2, 7 and 8.

FIGURE 10 is a somewhat isometric view of the clutch guide member shown in FIGURES 1, 2, 6 and 7.

FIGURE 11 is a cross-sectional view taken on line **11—11** in FIGURE 6.

The present invention provides a self-feeding pencil in which a quantity of elongated leads are caused to slip one by one from a magazine into an axially slideable clutch mechanism. The clutch mechanism is responsive to the pressure exerted upon the writing tip of the pencil which is forced into the pencil casing, when no lead is projecting from the tip. As the tip moves inwardly it causes the clutch mechanism to slide up along the lead coming from the magazine. When the tip is lifted from the writing surface, the lead and the clutch mechanism which grasps the lead and moves downwardly of the pencil casing. Successive tip movements will bring the lead into writing position thereby preventing the tip from being pushed into the casing and causing further lead feed. When the exposed lead is worn down, additional lead will be fed out by the normal action of raising and lowering the pencil tip during writing.

Referring to the drawings and particularly to FIGURE 1, **10** indicates a pencil casing having an upper cap portion **11** and a hollow lower portion **12**. Male and female threads **13**, **14** join the two casing portions. When the upper casing portion **11** is unscrewed from the lower casing portion **12** there is exposed a magazine chamber **18** to receive a quantity of pencil leads **17**. An elongated sleeve **20** is secured, as by press fitting, within the lower casing portion **12**. The upper end of the sleeve **20** has a funnel shaped plug **21**. The plug **21** is provided with a central opening **22** large enough for a single lead **17** to slide therethrough but too small for more than one lead at a time. The tapered upper surface **23** of the plug **21** will always guide a single lead into the opening **22** as the preceding lead is fed through the pencil in the hereinafter more fully described manner. The plug **21** thus forms the bottom of the magazine chamber **18**.

The lower end of the sleeve **20** is thickened as indicated at **24** to receive a clutch guide member **25**, best shown in FIGURE 10. The guide member **25** has a tubular body portion **26**, the walls of which have opposed longitudinal slots **27** and opposed lateral windows **28**. A flanged portion **29** at the top of the guide overlies the thickened portion **24** of the sleeve **20** and moves freely within the sleeve **20**.

A clutch assembly **30**, best shown in FIGURE 9, is received within the bore **31** of the guide **25** and is provided with spaced plate members **32**, and a lead receiving jaw **33**. The plate members **32** have a substantially semi-cylindrical body portion **34** with a tapered portion **35** interconnecting a thickened body portion **34A** with the upper body portion. A lug **36** extends outwardly from the thickened portion of each plate and serves to guide and maintain the orientation of the clutch as it slides within the guide member **25**. The lugs **36** are received within the slots **27** of the guide **25**.

Each plate is formed with a flat inner face **37** into which there is cut an axial groove **38**. The groove **38** is arcuate in cross-section and may be provided with knurled or roughened lead engaging surfaces **39**. The top of each plate **32** is machined to form a portion of a cone as indicated at **40** so that the lead **17** is guided into the jaw **33** as it passes through the plug **21**.

The jaw **33** has a washer-like base **41** and two spaced leaf members **42** extending upwardly therefrom. The jaw **33** is preferably made of steel or bronze having spring-like properties and the leaves **42** slightly sprung so as to be further apart at the base **41** than at the top. An axial passage **43** is provided through the jaw **33** extending between the leaves **42** and through the base **41**. The passage **43** is of a size which will just permit the lead **17** to slide therethrough with slight frictional contact. Each leaf **42** is beveled at its top as shown at **44** to lead the leads **17** into the passage **43**.

When the clutch **30** is assembled the plates **32** are disposed on each side of the leaves **42** and a small coil spring **45**, best shown in FIGURES 6, 7 and 8, placed between the plates **32** and the base **41** of the jaw **33**. The upper portion of the coil spring **45** is fitted loosely around the bottom **34B** of the plates **32**, and bears against enlarged portion **34A**. The lower portion of the coil spring **45** rests upon the base **41** and is positioned by a small stepped portion **46** thereon.

A plurality of small spherical members such as steel balls **47**, best shown in FIGURES 1 and 4, completes the clutch assembly. The balls **47** are slipped into the lateral windows **28** of the guide member **25** and bear against the tapered portion **35** of the plates **33**. The balls **47** are retained in place, when the pencil is assembled, by the sleeve **20**, as best shown in FIGURE 1.

The bottom of the lower casing **12** is tapered as indicated at **48** and its internal bore **49** formed with a series of steps to conform to the pencil elements. The first step **50** from the writing end of the pencil serves as a seat for a flange **51** on the writing tip **52**. The tip **52** is freely received within the bore **49**. The second step **53** is adjacent the base **41** of the clutch.

The flange **51** acts as a stop for the downward movement of the base. The third step **54** lies beneath the guide **25** within the casing **12**. The fourth step **55***a* acts as a stop to position the sleeve **20** within the casing **12**. The steps **50** and **55***a* serve to facilitate the asembly of the pencil by insuring the proper relationship between the parts as they are placed within the casing.

With the pencil assembled as shown in FIGURE 1, the operation of the pencil will become clear from an examination of FIGURES 6, 7 and 8.

Starting with the condition where leads **17** have been placed in the chamber **18** but there is no lead in the writing tip **52**, as shown in FIGURE 2, the writing tip is pushed inwardly of the casing tip **48**, as the pencil is brought into contact with the writing surface **56** (see FIGURE 6). As the tip **52** moves into the casing the flanged portion **51** of the tip slides the clutch jaw **33** and the guide **25** upwardly. The coil spring raises the clutch plates **32** which are quickly engaged by the steel balls **47** bearing on the tapered portion **35** to stop the upward travel of the plates. If there is no lead in the jaw **33**, the writing tip **52** moves further into the housing **12**, the clutch jaw **33** continues to move upwardly together with the guide **25** until the assembly assumes the condition shown in FIGURE 6, where the balls enter the space **25A** above the thickened portion **24** of the sleeve **20**. At this juncture the upward travel of the clutch jaw will have been stopped by the bottom of the casing **12** bearing against the surface **56**. The clutch assembly **30**, and the leaves **42** are raised and the clutch plates **32** slightly parted to permit the lead **17** to slide therebetween, and into the bevel **44** of the jaws **33**. As the tip **52** is raised from the writing surface **56** it drops, the coil spring **45** is released and returns to its original position thereby allowing the clutch assembly **30** to drop to its original position. This cycle is hereinafter called a "fast-feed" cycle and occurs when there is no lead between the jaws.

As soon as the lead **17** slips between the beveled surface **44**, the roughened surfaces **39** of the plates **32** bear against the lead as the clutch assembly **30** drops into the position shown in FIGURE 7. The balls **47** press the plates **32** against the lead **17** as they fall into position between the sleeve **20** and the tapered portion **35** of the plates **32**.

The feed mechanism then enters what is hereinafter termed "normal-feed" to advance the lead through the friction clutch jaws **33**. Normal feed action begins with the movement of the writing tip **52** into the casing **12** in response to pressure of the pencil upon the writing surface **56**. The coil spring **45** is raised by the flange **41** and in turn raises the clutch plates **32**. However, a small upward motion of the plates **32** causes the steel balls **47** to force the plates **32** against the lead **17** and lock the plates **32** in position against upward travel by bearing against both the tapered portion **35** and the inner surface of the fixed sleeve **20**.

With the plates **32** and lead **17** locked in place, continued pressure on the writing tip **52** will raise the clutch jaw **33**, sliding it between the plates **32** and along the lead **17** until an additional amount of lead enters the jaw **33**. The spring **45** will compress to permit this action.

At the end of the upward travel of the tip **52** the pencil is raised from the writing surface **56**, whereupon the clutch jaw **33**, lead **17** and plates **32**, drop to the position as shown in FIGURE 1. It will be apparent that successive raising and lowering of the writing tip **52** will advance the lead **17** through the pencil and out of the bore **55** in the tip **52** to the position shown in FIGURE 8, where it extends sufficiently beyond the tip **52** for writing purposes.

Once the lead **17** has been fed beyond the tip **52**, pressure on the lead as in writing will cause it to lift the plates **32**. The steel balls **47** will then bear against the tapered portion locking the plates and lead and permit writing without additional lead feed.

If the lead **17** should wear down or break at the tip **52** so that no lead projects, the tip **52** will slip into the casing **12** to repeat the normal feeding operation. When one length of lead is completely used a succeeding length of lead **17** will have slipped into the clutch jaw **33** from the chamber **18** in the manner described above.

By reason of the large bearing surface of the groove **38** the leads can be held within the pencil during writing without crushing or breaking. The steel balls permit the leads to slip downwardly through the clutch assembly **30** and also apply an even positive pressure to the clutch plates when they are moved upwardly.

It will be apparent from the foregoing that there has been provided a self-feeding pencil capable of accepting a large number of leads and feeding them successively and continuously through the pencil as writing conditions require. While the description has been confined to the use of lead (graphite) and the device characterized as a "pencil" it is to be understood that any elongated writing material such as crayon, compacted ink or the like may be substituted without departing from the spirit of the invention.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent of the United States, is:

1. A self-feeding writing device comprising a hollow casing, a tapered writing end on said casing, a chamber to receive elongated marking members, means to lead the marking members individually toward the writing end of the casing, an axially bored cylindrical clutch guide freely carried within the casing, lateral windows in the clutch guide in communication with the axial bore, a plurality of small spherical members carried by the windows and extending partially into the axial bore and partially into the clutch guide bore, a clutch assembly slidable within the clutch guide to receive marking members from the chamber, opposed clutch plates in said clutch assembly disposed adjacent the spherical members, an axially bored writing tip slidably carried in the tapered writing end of the casing axially movable in said end and extending therefrom, means responsive to axial movement of the writing tip to activate the clutch assembly, and spring means carried by the clutch assembly to move the clutch plates axially upward in the clutch guide in response to axial movement of the writing tip whereby the clutch assembly will successively grasp and advance the individual marking members through the writing device and out of the writing tip bore.

2. A device according to claim 1 in which the clutch guide is provided with opposed longitudinal slots, the clutch plates are formed with outwardly extending lugs slidably received within the slots, and a sleeve is fixedly carried within the casing between the spherical members and the casing.

3. A device according to claim 1 in which the clutch assembly includes a clutch jaw comprising a washer-like base, upstanding opposed leaf members on said base and an axial bore to receive the marking members therethrough.

4. A device according to claim 1 in which the clutch plates are provided with a thickened portion connected to the body of the plates by a tapered surface, said tapered surface being disposed so as to bear against the spherical members when the plates are urged upwardly in the direction of the marking member chamber.

5. A device according to claim 3 in which the spring means is disposed between the base of the clutch jaw and the clutch plates.

6. A device according to claim 3 in which the clutch plates are substantially hemi-spheric in cross-section, have a substantially flat bearing face disposed against the leaf member and an axial groove in said bearing face for frictional contact with the elongated marking members.

7. A device according to claim 3 in which the opposed leaf members are formed of spring-like material and are slightly sprung apart further at their fixed ends than for the remainder of their length.

8. A device according to claim 1 in which the clutch plates are provided with a thickened portion connected to the body of the plates by a tapered surface, said tapered surface being disposed so as to bear against the spherical members when the plates are urged upwardly in the direction of the marking member chamber and the writing tip is in abutting relationship with the bottom of the clutch assembly.

9. A device according to claim 6 in which the surface of the axial groove of each plate is roughened to increase frictional contact with the marking members.

10. A device according to claim 2 in which the clutch guide and clutch assembly are formed with a funnel-like configuration whereby individual marking members are lead from the chamber into the clutch assembly, and the sleeve is thickened for a portion of its length adjacent the guide windows whereby raising the guide will permit the spherical members to move into the space between the sleeve and the guide to further release pressure on the clutch plates and permit lead to fall therebetween.

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401—57