

Feb. 1, 1944.

D. P. JACOBS

2,340,665

MECHANICAL PENCIL

Filed Oct. 15, 1942

2 Sheets-Sheet 1

Fig. 1

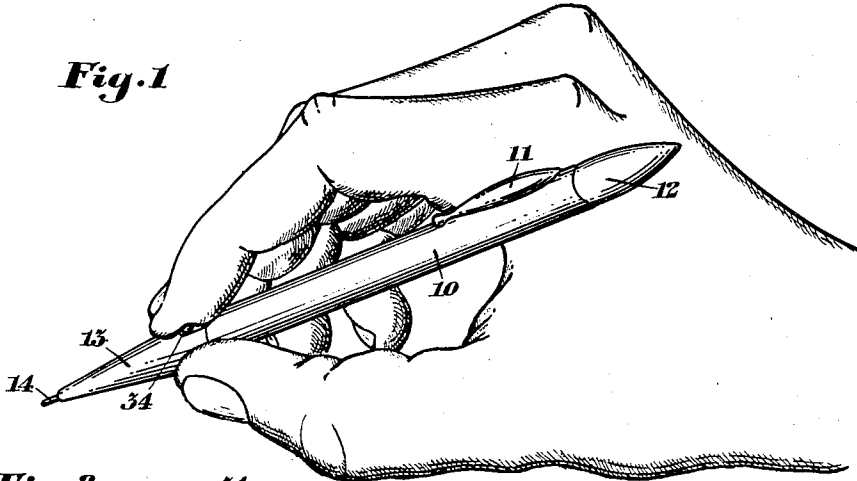


Fig. 2

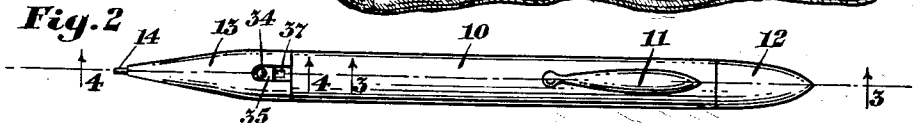


Fig. 3

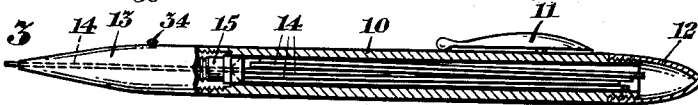
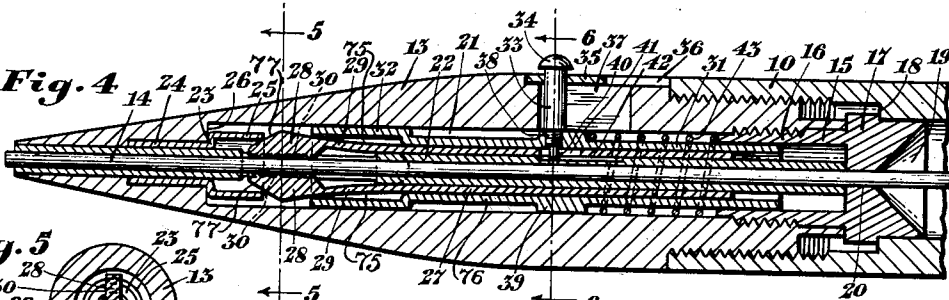


Fig. 4



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2 Sheets-Sheet 2

Fig. 8

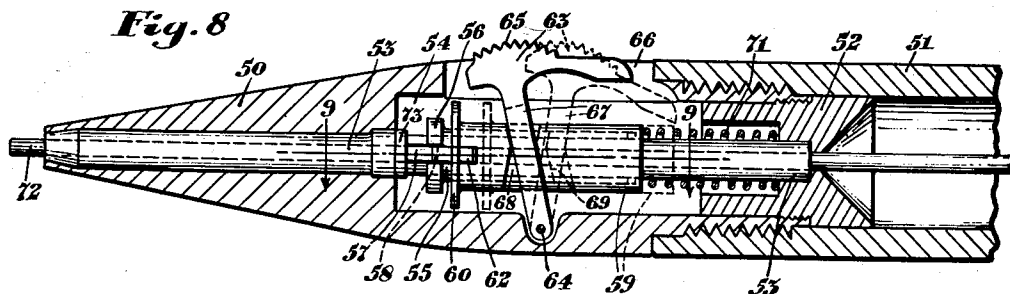


Fig. 9

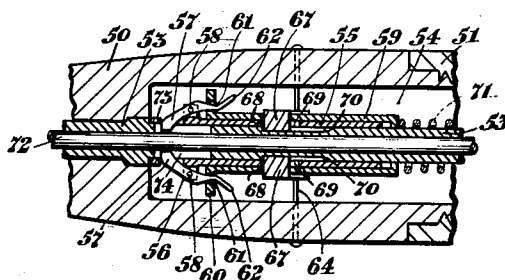


Fig. 10

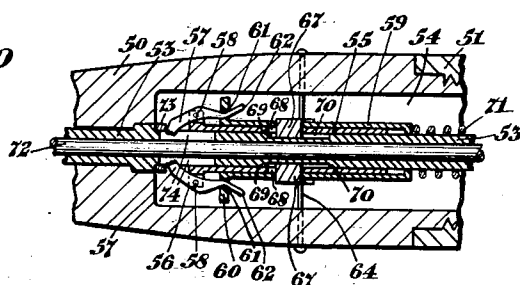
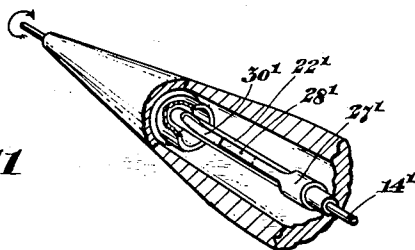


Fig. 11



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UNITED STATES PATENT OFFICE

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MECHANICAL PENCIL

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14 Claims. (Cl. 120—17)

The present invention relates to mechanical pencils, and more particularly to pencils having manually operable mechanisms for advancing the leads therein to writing position.

The primary objects of the invention are to provide such a mechanical pencil having a tubular body adapted to contain a supply of leads, and a writing tip associated with said body for receiving and advancing the leads to writing position; to provide such a pencil having a manually operable control mechanism for advancing the leads including a button or lever so positioned in the writing tip of the pencil that it may be operated with the index finger when the pencil is held in writing position, thus facilitating advancement of the lead as it is consumed while writing; to provide such a control mechanism which is especially well adapted for use with thin leads which give a fine line of writing; to provide such a control mechanism which, when too much pressure is applied while writing, will permit a slight inward movement of the lead thus to prevent wasteful breakage of lead; to provide such a mechanical pencil having means whereby the lead is slightly rotated during advancement thereof to insure even wear on the point of the lead; and in general to provide such a mechanical pencil which is economical in manufacture, efficient in use, and attractive in appearance.

Illustrative embodiments of the invention are shown in the accompanying drawings, wherein:

Figure 1 is a perspective view of a pencil constructed according to the present invention and being held in writing position;

Figure 2 is a front elevational view of the pencil per se;

Figure 3 is a side elevational view of the same shown partly in section taken on line 3—3 of Figure 2;

Figure 4 is an enlarged fragmentary sectional view of certain parts thereof taken on line 4—4 of Figure 2;

Figure 5 is a sectional view thereof taken on line 5—5 of Figure 4;

Figure 6 is a sectional view thereof taken on line 6—6 of Figure 4;

Figure 7 is a sectional view similar to Figure 4 but showing certain parts of the pencil in different positions;

Figure 8 is a fragmentary sectional view, similar to Figure 4, of a modified form of control mechanism, certain inner parts thereof being shown in side elevation;

Figure 9 is a fragmentary sectional view of said modification taken on line 9—9 of Figure 8;

Figure 10 is a sectional view similar to Figure 9 but showing certain parts of the modified control mechanism in different positions; and

Figure 11 is a fragmentary perspective view of another modification of the invention.

Referring now in detail to these drawings wherein like parts are designated by the same numerals in the several views, and referring first particularly to Figures 1 to 7, inclusive, the mechanical pencil therein illustrated generally comprises a tubular barrel or body 10 having a conventional pocket clip 11 thereon, a cap 12 detachably screw-threaded onto one end of said body 10, and a writing tip 13 screw-threaded into the other end of said body 10. The cap 12 may be of different formation and provided with a conventional eraser (not shown), and said cap may be removed from the tubular body 10 of the pencil for the purpose of inserting a supply of thin leads 14 into said body. The body 10 may if desired conveniently be made of a transparent plastic material so that the quantity of leads therein may be seen without removing the cap 12.

A guide member generally designated 15 has an annular portion 16 threaded into the writing tip 13, an enlarged middle portion 17 interposed between the inner end of the writing tip 13 and a shoulder 18 in the body 10, and an internally conical portion 19 snugly fitted into the body 10 for guiding successive leads 14 from the body 10 through an axial bore 20 in the middle portion 17 of the guide member 15 and into a cylindrical chamber 21 in the writing tip 13.

A guide sleeve 22 is axially disposed within the chamber 21 in the writing tip 13 of the pencil for guiding the leads 14 through the writing tip. This guide sleeve 22 abuts the middle portion 17 of the guide member 15, extends the entire length of the writing tip 13, and is secured within the chamber 21 by means of an annular stop member 23 having a portion 24 secured as by welding on the guide sleeve 22 and an enlarged cylindrical portion 25 which abuts the end wall 26 of the chamber 21.

A second, or operating sleeve 27 is slidably mounted on the guide sleeve 22, and has its forward end milled to form a pair of oppositely disposed jaws 28 integrally connected to the main body of the sleeve by flexible or springable portions or arms 29 whose outer sides 75 are inclined forwardly and radially-outwardly as shown in Figures 4 and 7. The jaws 28 are thus movable, through oppositely disposed slots 30 in the guide sleeve 22, from their normally sprung position

out of contact with a lead 14 within the guide sleeve 22 into gripping contact therebetween with said lead 14. The gripping surfaces of the jaws 28 are preferably serrated to insure a secure grip on the lead therebetween.

A third, or control sleeve 31 is slidably mounted on the operating sleeve 27 and has an enlarged cylindrical forward portion 32 which slidably bears within the cylindrical chamber 21 in the writing tip and which is adapted to engage the jaws 28 to force them together. The rearward end of the control sleeve 31 slidably bears within the annular portion 16 of the guide member 15.

A control member or pin 33 has a head or button 34 which is positioned exteriorly of the writing tip 13 at the approximate location of the index finger when the pencil is held in writing position (see Figure 1). The pin 33 is mounted in a plate 35 movable in a way 36 in the writing tip 13, and said pin extends through, and is longitudinally movable in, a slot 37 through the wall of the writing tip. The inner end of the pin 33 has a portion 38 threaded into an enlarged medial portion 39 of the control sleeve 31 and a stud 40 extending through a slot 41 through the operating sleeve 27 and into a groove 42 in the guide sleeve 22.

A coil spring 43 is interposed between the annular portion 16 of the guide member 15 and the enlarged medial portion 39 of the control sleeve 31.

Operation

The parts of the control mechanism hereinbefore described are normally maintained in forward positions as seen in Figure 4 by the action of the coil spring 43. When it is desired to advance the lead 14 in the writing tip 13, the control button 34 is moved rearwardly by means of the index finger. The control sleeve 31 is thus moved rearwardly independently of the operating sleeve 27, and the forward cylindrical portion 32 of the control sleeve 31 is thus disengaged from the jaws 28 which in turn are permitted to disengage the lead 14 as indicated in full lines in Figure 7. Further rearward movement of the pin 33 brings the stud 40 into contact with the rearward end of slot 41 in the operating sleeve 27 and thereafter the control sleeve 31 and operating sleeve 27 move rearwardly together until the stud 40 contacts the rearward end of groove 42 in the guide sleeve 22, whereupon rearward movement of the control button 34 is stopped.

When the control button 34 is released, the coil spring 43 presses the control sleeve 31 forwardly and independently of the operating sleeve 27 until the forward cylindrical portion 32 of the control sleeve engages the jaws 28 forcing the latter together to grip the lead 14 therebetween. Thereafter the control sleeve 31, the operating sleeve 27, and the lead 14 are moved forwardly together by the action of the spring 43 until the jaws 28 engage and seat within the cylindrical portion 25 of the stop member 23, and the lead 14 is thus firmly held in its advanced position.

A lag thus occurs between the relative movements of control sleeve 31 and operating sleeve 27, which may be effected by various means as by making sleeve 27 fit somewhat more tightly on guide sleeve 22 than sleeve 31 fits on sleeve 27 so that friction in the movement of sleeve 27 is greater than friction in the movement of sleeve 31; furthermore, it will be seen that, in the forward movement of sleeve 31, its medial portion 76 slides along the slightly-inclined rear portions

of the arms 29 and increasingly presses them into contact with guide sleeve 22 thus increasing the friction of sleeve 27 on the guide sleeve, and that thereafter the enlarged forward portion 32 of sleeve 31 reaching and sliding along the more steeply inclined forward portions of these arms forces the jaws 28 into their gripping engagement with the lead, whereupon the forward movement of sleeve 31 on and relatively to sleeve 27 is stopped or limited by reason of the inability of its hollow portion 32 to receive the inclined arms farther thereinto, and both sleeves 31 and 27 with the lead are moved forwardly together by the spring 43 until stopped by the stop member 23 whose enlarged hollow cylindrical portion 25 receives the forward ends of the jaws 28 and by engaging their forwardly and radially-inwardly inclined outer sides 77 forces or holds the jaws in gripping engagement with the lead additionally to, or independently of, the gripping action exerted by portion 32 of control sleeve 31. While a pair of opposite arms and jaws, as shown may be preferable, a single arm and jaw may be employed.

The jaws 28 may either be pointed or serrated as shown to positively prevent any rearward slippage of the lead 14 therebetween. It will readily be seen that when undue pressure is applied at the point of the lead, the same will be forced slightly inwardly and with it the operating sleeve 27 and control sleeve 31, against the pressure of spring 43. This limited resilience prevents wasteful breakage of the lead and also produces uniformness in writing, and the action is especially desirable in connection with thin lead which is superior for writing purposes but highly frangible.

It will be seen that in thus forcing the lead and the sleeves 27 and 31 rearwardly together, the inclined forward ends of the jaws are readily disengaged from the stop member 23, although the jaws remain in gripping engagement with the lead under the action of portion 32 of sleeve 31, and that this rearward movement of sleeve 27 carries with it the control sleeve 31 held in its said forwardly-stopped position thereon, so that the pressure of the jaws on the lead is not increased in this rearward movement of the lead and the sleeves 27 and 31, and the lead is not crushed or broken.

Modifications

In the modified form of the invention illustrated in Figures 8 to 10, inclusive, the manually operable control mechanism is similarly housed within a writing tip 50 screw-threaded into the forward end of a tubular barrel or body 51. A guide member 52 similar to the guide member 15 previously described is screw-threaded into the rearward end of the writing tip 50. A guide sleeve 53 is fixedly, axially disposed within the writing tip 50, extending from end to end of said tip and through a cylindrical chamber 54 therein. An operating sleeve 55 is slidably mounted on the guide sleeve 53 and has a laterally extending flange 56 at its forward end. A pair of oppositely disposed jaws 57 are pivotally mounted on pins 58 set in the flange 56. A control sleeve 59 is slidably mounted on the operating sleeve 55 and has a laterally extending flange 60 on its forward end, said flange 60 being provided with a pair of oppositely disposed apertures 61 there-through, through which rearwardly extend curved arm portions 62 of the pivotally mounted jaws 57.

A control member or lever 63 is pivotally mounted on a pin 64 extending through the writ-

ing tip 50, said control lever 63 having a serrated portion 65 extending through a slot 66 in the wall of the writing tip 50 and conveniently formed and positioned for manipulation with the index finger. The lower portion of the control lever 63 within the chamber 54 is bifurcated to form arms 67 which extend into oppositely disposed X-shaped slots 68 through the control sleeve 59, through similar but larger X-shaped slots 69 through the operating sleeve 55, and into grooves 70 in the guide sleeve 53. A coil spring 71 is interposed between the control sleeve 59 and the guide member 52.

In operation, the several parts of this modified structure are normally maintained in their forward positions shown in solid lines in Figure 8 and in Figure 9, by the action of the coil spring 71. When it is desired to advance the lead 72, the control lever 63 is manually moved rearwardly. The initial rearward movement of said lever 63 moves the control sleeve 59 rearwardly from its position shown in Figure 9 to its position shown in Figure 10, during which movement the arms 62 are engaged by the flange 60 on said control sleeve 59 and are turned thereby so that the jaws 57 are disengaged from the lead 72. Further rearward movement of the lever 63 engages its lever arms 67 with the X-shaped slots 69 in the operating sleeve 55, and thereafter the control lever 63, control sleeve 59 and operating sleeve 55 are moved rearwardly together to a position indicated by dotted lines in Figure 8, the rearward movement of the control lever 63 being stopped when its arms 67 engage the rearward ends of the grooves 70 in the guide sleeve 53.

When the control lever 63 is released, the coil spring 71 presses the control sleeve 59 forwardly independently of the operating sleeve 55 until the flange 60 engages arms 62 to turn the jaws 57 into gripping engagement therebetween of the lead 72, and thereafter the control sleeve 59, the operating sleeve 55 and the lead 72 are moved forwardly together until the forward movement is stopped by engagement of the jaws 57 with a washer 73 on the guide sleeve 53. If desired the washer 73 may be slightly forwardly tapered internally to insure a firmer grip of the jaws 57 on the lead 72. As illustrated the jaws 57 are operable through oppositely disposed slots 74 through the guide sleeve 53.

In the modification of the invention shown in Figure 11, the construction and operation of the control mechanism are identical to that shown in Figures 1 to 7 inclusive and hereinbefore described, except that the oppositely disposed slots 30¹ in the guide sleeve 22¹ through which slots the jaws 28¹ of the operating sleeve 27¹ extend and in which slots said jaws travel, are slightly curved. It will be seen that when the lead 14¹ is gripped between the jaws 28¹ and advanced, said lead is slightly rotated as indicated by the arrow in this view, and the writing point of the lead is thus intermittently turned to insure evenness of wear thereon.

It will thus be seen that the invention provides an economical and attractive mechanical pencil of simple construction and operation, and while but several specific embodiments of the invention have been herein shown and described, it will be understood that numerous details of construction thereof may be altered or omitted without departing from the spirit of the invention as the same is defined by the following claims.

I claim:

1. In a mechanical pencil, a body adapted to

contain a plurality of leads, a writing tip associated with said body having a chamber therein and a slot through a wall thereof, a guide sleeve mounted in said chamber for guiding leads from the body into and through said writing tip and having opposite slots therethrough and a groove therein, an operating sleeve slidably mounted on said guide sleeve for forward-rearward movement thereon and provided with a pair of jaws movable through the slots in the guide sleeve into or out of gripping engagement with a lead in said guide sleeve and said operating sleeve having a slot therethrough, a control sleeve slidably mounted on said operating sleeve for forward-rearward movement and having means thereon for moving said jaws into gripping engagement with a lead in said guide during forward movement of the control sleeve, and a manually operable control member mounted for forward-rearward movement in the writing tip and extending through the slot in said writing tip, said control member having a portion engaging the control sleeve and movable therewith and a portion movable in the slot in the operating sleeve and in the groove in the guide sleeve.

2. In a mechanical pencil, a body adapted to contain a plurality of leads, a writing tip associated with said body having a chamber therein and a slot through a wall thereof, a guide sleeve mounted in said chamber for guiding said leads from the body into and through said writing tip and having a longitudinally extending curved slot therethrough, operating means movable in said curved slot for engaging a lead in the guide sleeve to rotate the lead and move the same forwardly, and a manually operable control member extending through the slot in the writing tip and operably connected to said operating means for moving the same forwardly or rearwardly and into engagement with said lead.

3. In a mechanical pencil, a body adapted to contain a plurality of leads, a writing tip associated with said body having a chamber therein and a slot through a wall thereof, a guide sleeve mounted in said chamber for guiding said leads from the body into and through said writing tip and having a pair of opposite longitudinally extending curved slots therethrough, an operating sleeve slidably mounted on said guide sleeve for forward-rearward movement thereon and provided with a pair of jaws movable in the curved slots in the guide sleeve for gripping therebetween a lead in the guide sleeve to rotate the lead and move the same forwardly, and a manually operable control member extending through the slot in the writing tip and operably connected to said operating sleeve for moving the same forwardly or rearwardly and for moving the jaws into gripping engagement with said lead.

4. In a mechanical pencil, a body adapted to contain a plurality of leads, a writing tip associated with said body having a chamber therein and a slot through a wall thereof, operating means disposed in said chamber for advancing leads from said body into and through said writing tip, a control member extending through said slot for manually actuating said operating means, and said operating means including a guide for rotating the leads as the same are advanced.

5. In a mechanical pencil of the class described which includes a hollow body and a guide therein, means for moving a lead longitudinally in the guide, said means comprising an operating sleeve having a limited movement on the guide and forwardly and radially-outwardly inclined flexible

arms with lead-gripping jaws adjacent their free ends, a control sleeve having a limited forward movement on the operating sleeve and having means for engaging and moving the arms into gripping engagement of their jaws with the lead and a manual reverse movement for releasing the arms to permit disengagement of their jaws from the lead and having means for engaging the operating sleeve to move the same rearwardly, and a spring normally urging the control sleeve forwardly.

6. In a mechanical pencil of the class described which includes a hollow body and a guide therein, means for moving a lead longitudinally in the guide, said means comprising an operating sleeve having a limited movement on the guide and a forwardly and radially-outwardly inclined flexible arm with a lead-gripping jaw adjacent its free end, a control sleeve having a limited forward movement on the operating sleeve and having means for engaging and moving the arm into gripping engagement of its jaw with the lead and having a manual reverse movement for releasing the arm to permit disengagement of its jaw from the lead and having means for engaging the operating sleeve to move the same rearwardly, and a spring normally urging the control sleeve forwardly.

7. In a mechanical pencil of the class described which includes a hollow body and a guide therein, means for moving a lead longitudinally in the guide, said means comprising an operating sleeve having a limited movement on the guide and a forwardly and radially-outwardly inclined flexible arm with a lead-gripping jaw adjacent its free end, a control sleeve having a limited forward movement on the operating sleeve and having means for engaging and moving the arm into gripping engagement of its jaw with the lead and having a manual reverse movement for releasing the arm to permit disengagement of its jaw from the lead and having means for engaging the operating sleeve to move the same rearwardly, a spring normally urging the control sleeve forwardly, and means for creating a lag between the movement of said sleeves.

8. In a mechanical pencil of the class described which includes a hollow body and a guide therein, means for moving a lead longitudinally in the guide, said means comprising an operating sleeve having a limited movement on the guide and a forwardly and radially-outwardly inclined flexible arm with a lead-gripping jaw adjacent its free end, and a control sleeve having a limited forward movement on the operating sleeve and having means for engaging and moving the arm into gripping engagement of its jaw with the lead and having a manual reverse movement for releasing the arm to permit disengagement of its jaw from the lead and having means for engaging the operating sleeve to move the same rearwardly.

9. In a mechanical pencil of the class described which includes a hollow body and a guide therein, means for moving a lead longitudinally in the guide, said means comprising an operating sleeve having a limited movement on the guide and a forwardly and radially-outwardly inclined springable arm with a lead-gripping jaw adjacent its free end, a control sleeve having a limited forward movement on the operating sleeve and having means for engaging and springing the arm into gripping engagement of its jaw with the lead and having a manual reverse movement for releasing the arm to permit disengagement of its

jaw from the lead and having means for engaging the operating sleeve to move the same rearwardly, and a spring normally urging the control sleeve forwardly.

10. In a mechanical pencil of the class described which includes a hollow body and a guide therein, means for moving a lead longitudinally in the guide, said means comprising an operating sleeve having a limited movement on the guide and a forwardly and radially-outwardly inclined flexible arm with a lead-gripping jaw adjacent its free end, a control sleeve having a limited forward movement on the operating sleeve and having means for engaging and moving the arm into gripping engagement of its jaw with the lead and having a manual reverse movement for releasing the arm to permit disengagement of its jaw from the lead and having means for engaging the operating sleeve to move the same rearwardly, the lead gripped by the jaw being movable rearwardly with the sleeves by excess pressure on the lead's forward end and without increasing the jaw's pressure on the lead.

11. In a mechanical pencil of the class described which includes a hollow body and a guide therein, means for moving a lead longitudinally in the guide, said means comprising an operating sleeve having a limited movement on the guide and a forwardly and radially-outwardly inclined flexible arm with a lead-gripping jaw adjacent its free end, a control sleeve having a limited forward movement on the operating sleeve for pressing its arm inwardly into braking engagement with said guide and for pressing the arm into gripping engagement of its jaw with the lead and having a manual reverse movement for releasing the arm to permit disengagement of its jaw from the lead and releasing the arm's friction on the operating sleeve and having means for engaging the operating sleeve to move the same rearwardly, and a spring normally urging the control sleeve forwardly.

12. In a mechanical pencil of the class described which includes a hollow body and a guide therein, means for moving a lead longitudinally in the guide, said means comprising an operating sleeve having a limited movement on the guide and a forwardly and radially-outwardly inclined flexible arm with a lead-gripping jaw adjacent its free end, a control sleeve having a limited forward movement on the operating sleeve for pressing its arm inwardly into braking engagement with said guide and for pressing the arm into gripping engagement of its jaw with the lead and having a manual reverse movement for releasing the arm to permit disengagement of its jaw from the lead and releasing the arm's friction on the operating sleeve and having means for engaging the operating sleeve to move the same rearwardly, a spring normally urging the control sleeve forwardly, and means for creating a lag between movement of said sleeves.

13. In a mechanical pencil of the class described which includes a hollow body and a guide therein, means for moving a lead in the guide longitudinally and rotatably said means comprising an element adapted to releasably grip the lead and having an operative helical movement along and about the axis thereof.

14. In a mechanical pencil of the class described which includes a hollow body and a guide therein, means for moving a lead longitudinally in the guide, said means comprising an operating sleeve having a limited movement on the guide and for-

wardly and radially-outwardly inclined flexible arms with forwardly and radially-inwardly inclined free ends and lead-gripping jaws adjacent said ends, a control sleeve having a limited forward movement on the operating sleeve, a stop member in the forward portion of the body for limiting the forward movement of the operating sleeve and for engaging the free ends of the arms thereof to move the same radially-inwardly into

gripping engagement of their jaws with the lead, the control sleeve having a manual reverse movement for releasing said forward ends from the stop member to permit disengagement of their jaws from the lead and having means for engaging the operating sleeve to move the same rearwardly, and a spring normally urging the control sleeve forwardly.

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