Sept. 20, 1938. E. O. RUBEL 2,130,778

MECHANICAL PENCIL

Filed March 13, 1935

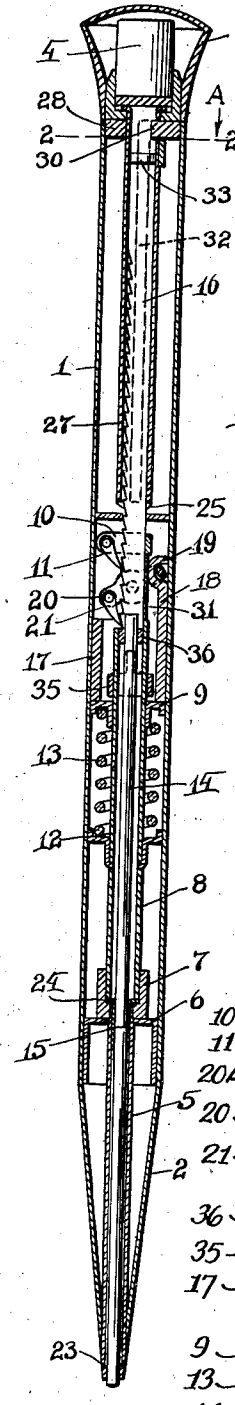


FIG. 1.

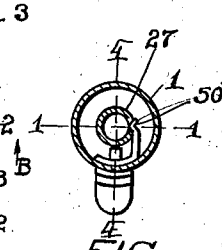


FIG. 2.

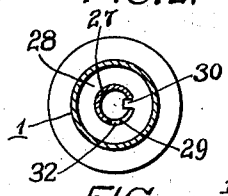


FIG. 3.

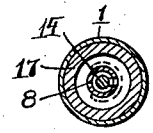


FIG. 5.



FIG. 7.

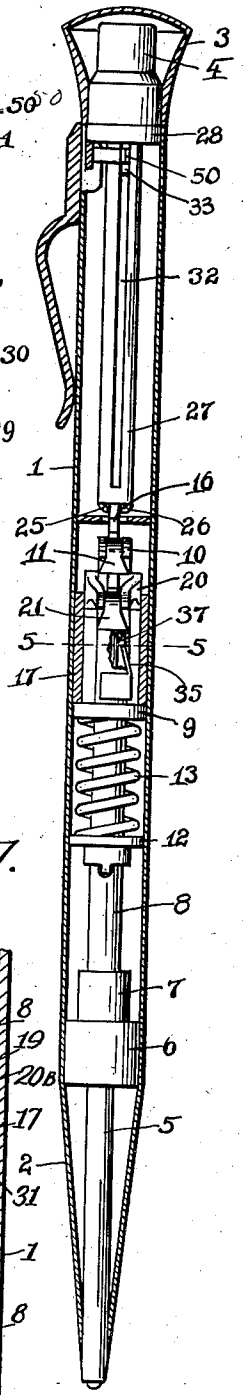


FIG. 4.

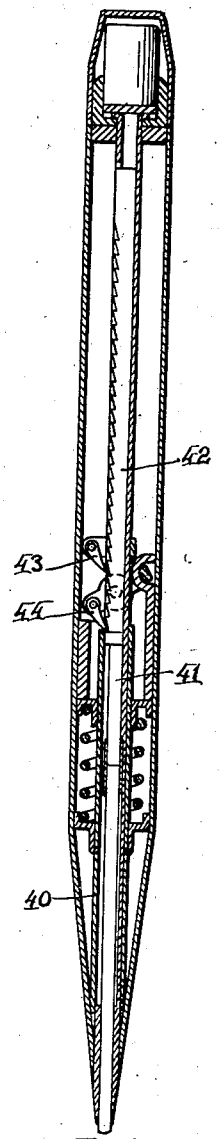


FIG. 6.

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MECHANICAL PENCIL

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Application March 13, 1935, Serial No. 10,870

2 Claims. (Cl. 120—17)

This invention relates to mechanical pencils and has for its object to provide a novel feeding mechanism for such a pencil which operates to feed the lead out of the pencil by simply exerting pressure against the lead or the holder thereof to force the lead and its holder a short distance into the shaft of the pencil and then releasing it to allow the holder of the lead to return to its normal position with an additional length of lead forced out of the holder.

This and other objects of this invention will become more readily apparent from the detailed description thereof which follows, reference being had to the accompanying drawing in which

Figure 1 is a longitudinal sectional view of the pencil and feeding mechanism, the section being taken on the line 1—1 in Figure 2.

Figure 2 is a cross section of the pencil, the section being taken on the line 2—2 in Figure 1 looking in the direction of the arrow marked A.

Figure 3 is a cross section of the pencil, the section being taken on the line 2—2 in Figure 1 looking in the direction of the arrow marked B.

Figure 4 is a longitudinal section of the pencil, the section being taken on the line 4—4 of Figure 2.

Figure 5 is a cross section of the pencil, the section being taken on the line 5—5 of Figure 4.

Figure 6 is a longitudinal sectional view of a modified form of the pencil.

Figure 7 is an enlarged longitudinal sectional view of the feeding mechanism portion of the pencil illustrated in Figure 1.

In the several figures of the drawing like reference numerals indicate like parts.

As illustrated in the several figures of the drawing the hollow shank 1 of the pencil may be made in the conventional form of mechanical pencils having a tapered front 2 and a suitable cap 3 at the rear thereof. The latter is removable to uncover the eraser 4 and is used to provide a handle for the operation of the mechanism in renewing the lead in the pencil as will hereinafter be described.

The feeding mechanism of the pencil includes the tube or pencil holder 5 which is slidably mounted between the tapered end of the pencil and fixed partition 6 thru which it projects to have the socket member 7 fastened thereto. A sleeve 8 in turn is fastened into the socket member 7 which sleeve extends thru the fixed partition 9 and a yoke 10 is formed at the end thereof in which the spring pressed pawl 11 is journaled.

A flange 12 is suitably fastened to the outside of the sleeve 8 between the fixed partitions 6 and 9 and a compression spring 13 is interposed between the flange 12 and the fixed partition 9 so as to normally force the sleeve 8 in the direction toward the front of the pencil with the socket member 7 resting against the partition 6 to act as the stop for the movement of the sleeve in this forward direction.

Within the sleeve 8 is mounted to slide the feeding rod 14 which carries the lead holder 15 at one end and is attached to the ratchet bar 16 with its other end. The inner end of the lead of the pencil engages into the lead holder 15 and the tube 5 surrounds the lead except for the portion which is fed out to project therefrom for writing purposes.

Behind the fixed partition 9 within the shaft 1 of the pencil is fixedly mounted to the shaft the hollow holding member 17 which is provided with an extension 18 having a substantially hook shaped end 19 formed thereon. The sleeve 8 is surrounded by the yoke 20 and 20A. The closed end of this yoke passes thru the hooked end 19 of the holding member 17 so as to pivotally rock therein. The opposite end of the yoke 20 carries the spring pressed pawl 21 which is adapted to engage the ratchet teeth of the ratchet bar 16. Intermediate the ends, the yoke 20 is engaged by the sleeve 8 by means of the pin 20A so that as the ratchet bar is forced toward the rear of the pencil by the sleeve 8 the yoke 20 is rocked with its end 20B pivotally held in the hooked end 19 so that the spring pressed pawl 21 is swung rearwardly a distance substantially double that of the rearward movement of the ratchet bar 16. This moves the pawl 21 out of engagement with one of the ratchet teeth and into engagement behind the next ratchet tooth. The sleeve 8 is operated to secure the movement of the pawl 21, as above described, by forcing the tube 5 or the portion of the lead which projects from it against the writing surface or any other fixed surface so as to have the tube 5 move into the pointed end of the shaft of the pencil a distance substantially equal to half the length of one of the ratchet bar teeth so that a length of lead is fed out of the tube as will hereinafter be described.

The spring pressed pawl 11 at the inner end of the tube 8 engages one of the ratchet teeth of the ratchet bar so that when pressure is applied against the projecting end of the lead, the lead cannot be forced separately into the tube 5 but will only move with the tube. When the lead and tube is forced to move into the shaft of the pencil, the spring 13 is compressed thereby so that on the release of the pressure against the lead

and tube this spring acts on the sleeve **8** and moves it back with the tube **5** to its starting position. During this return movement of the sleeve the yoke **20** is swinging back toward the front end of the pencil and during this movement the pawl **21** thereof forces the ratchet bar ahead of it so as to move this bar a greater distance than the sleeve **8** is moved by the spring **13** and thus forces the feeding rod **14** to push an additional length of the lead out of the tube **5**.

The lead may thus be fed out of the tube **5** whenever it is desired by simply forcing the tube **5** with the lead into the pencil shank and then releasing it and this may be done until all of the lead has been used up and forced out of the sleeve **15** at the end of the feeding rod. The sleeve **15** serves as a collet for the end of the lead to grip the end thereof and allow it to be forced out thereof when the end of the sleeve reaches the shoulder **23** and is stopped thereby while the feeding rod forces the end of the lead out of the sleeve to make room for the insertion of the end of a new lead on the refilling of the pencil.

The pencil is refilled by drawing the feeding rod **14** toward the rear of the pencil shaft until it but slightly projects into the tube **5** and the end of the sleeve **15** thereof has again been moved forward thereon into the position illustrated in Figure 1. The latter is accomplished by the engagement of the end of the sleeve **15** with the washer **24** at the end of the sleeve **8** so that as the feeding rod is drawn back into the pencil the additional movement of the feeding rod after the sleeve has been stopped by the washer **24** draws the end of the feeding rod partially out of the sleeve **15** to again provide a socket for the insertion of the end of the lead thereinto.

In order to permit the rearward movement of the feeding rod **14** and that of the ratchet bar **16** to which it is fastened, the ratchet bar is disengaged from the pawls **11** and **21** by an axial turn of the ratchet bar of 90 degrees. For this purpose the ratchet bar is held between the jaws **25** and **26** at the end of the sleeve **27** (see Figure 4) while the sleeve is mounted to turn in the bearing **28**. A 90° circumferential slot **29** is provided in the sleeve **27** into which engages a suitable key **30** projecting inwardly of the bearing **28** to hold the sleeve against endwise movement in the bearing but permit the quarter turn of the sleeve and the ratchet bar necessary to move the ratchet teeth of the ratchet bar out of engagement with the pawls **11** and **21**. The latter are held against turning, one directly by the holding member **17** and the other indirectly by the engagement of the hooked shaped end **19** of the extension **18** of this member into a suitable longitudinal groove **31** in the outer wall of the sleeve **8** (see Figure 1).

In giving the sleeve **27** a quarter turn the key **30** is brought in line with the longitudinal slot **32** in the side of the sleeve so as to permit the sleeve to be moved longitudinally out of the rear of the pencil by means of the cap **3**. During this movement of the sleeve **27** the ratchet bar **16** and the feeding rod **14** is moved with it by the engagement of the jaws **25** and **26** behind the annular shoulder **33** located at the upper end of the ratchet bar **16**. This shoulder moves toward the jaws as the lead is fed out of the tube so that when all the lead has been fed out of the tube the shoulder **33** is located substantially behind the jaws **25** and **26**. The movement of the sleeve **27**, as above described, thus draws the ratchet bar and the feeding rod with it until they have reached their starting position in which the spring pressed latch **35** snaps behind the shoulder **36** located at the junction of the ratchet bar and feeding rod so as to temporarily prevent a return movement of the ratchet bar and feed rod.

The sleeve **27** is then moved back into the shank of the pencil by the cap **3** without moving the ratchet bar and feeding rod and after the sleeve has reached its starting position it is given a quarter turn to turn the ratchet bar and move its teeth back into engagement with the pawls **11** and **21** and lock the cap **3** onto the shaft **1**. With the feed bar moved back to its starting position a new lead is inserted into the tube **5** until its end is forced into the socket sleeve **15** and held in place therein. The pencil is then ready to be used again. The annular shoulder **36** is provided with a longitudinal slot **37** and this slot is located so that, when the ratchet bar is turned back to feed the lead, the end of the latch **35** can slide therethru past the shoulder and permit the movement of the ratchet bar and feeding rod toward the front of the pencil where before they were held back thereby during the movement of the sleeve **27** back into the pencil with the ratchet teeth of the ratchet bar out of engagement with the pawls **11** and **21**. To hold the sleeve **27** in the position in which the ratchet bar **16** is engaged by the spring pressed pawls **11** and **21**, a spring latch **50** yieldingly engages into the slot **32** until the sleeve is turned by force for the reloading of the pencil in order to cause the latch to slide out therefrom and permit the endwise movement of the sleeve **27** as above described.

In Figure 6 I have shown a simplified form of the mechanism in which the refilling of the pencil is secured by simply forcing the lead into the tube **40** so as to have its end force the feeding rod **41** back into the shank of the pencil into the position illustrated in the figure. The feeding rod **41** has the ratchet bar **42** attached thereto and the pawls **43** and **44** operate thereon to feed the lead out of the tube **40** as described in connection with the pencil illustrated in Figures 1 to 4. Before refilling, the ratchet bar is given a quarter turn to bring its teeth out of engagement with the pawls **43** and **44** and this permits the lead inserted into the front of the tube **40** to force the feeding rod **41** and the ratchet bar back to their starting position after which the ratchet bar is turned back to have its teeth again engaged by the pawls **43** and **44** to operate the ratchet bar as described in connection with Figures 1 to 4.

I claim:

1. A mechanical pencil comprising a hollow shank, a sleeve member mounted to reciprocate within said shank, a ratchet bar projecting from said sleeve member and movable in and out thereof, a spring pressed holding pawl carried by said sleeve so as to move therewith and engage the tooth on said ratchet bar to normally keep it against movement out of said sleeve member, a yoke mounted to swing within said hollow shank and operatively connected with said sleeve member to cause said yoke to swing in the direction of movement of said sleeve member, a spring pressed feeding pawl carried by said yoke so as to swing therewith and engage behind spaced teeth on said ratchet bar, a pencil holder movably mounted in said shank and forming a continuation of said sleeve member with a portion of the holder projecting from the end of said shank to provide for the movement of said sleeve member in one di-

rection by said pencil holder when pressure is applied thereto to force the projecting portion of the pencil holder into the shank so as to move said sleeve member and swing said yoke to cause its feeding ratchet to move over said ratchet bar a distance greater than that of the movement of said sleeve member and said pencil holder and have said feeding pawl engage behind a ratchet tooth at the end of its movement, and spring means for returning said sleeve member and pencil holder to its normal position and cause said yoke to move its feeding pawl again a distance greater than that of the returning sleeve member and pencil holder so as to give said ratchet bar a movement into said sleeve member and force a portion of the pencil held in the pencil holder out of the pencil holder.

2. A mechanical pencil as set forth in claim 1 including means for rotating said ratchet bar to move its teeth out of engagement with said spring pressed holding pawl and spring pressed feeding pawl and permit a movement of said ratchet bar away from said sleeve member for the insertion of a lead into said lead holder.

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