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MECHANICAL PENCIL

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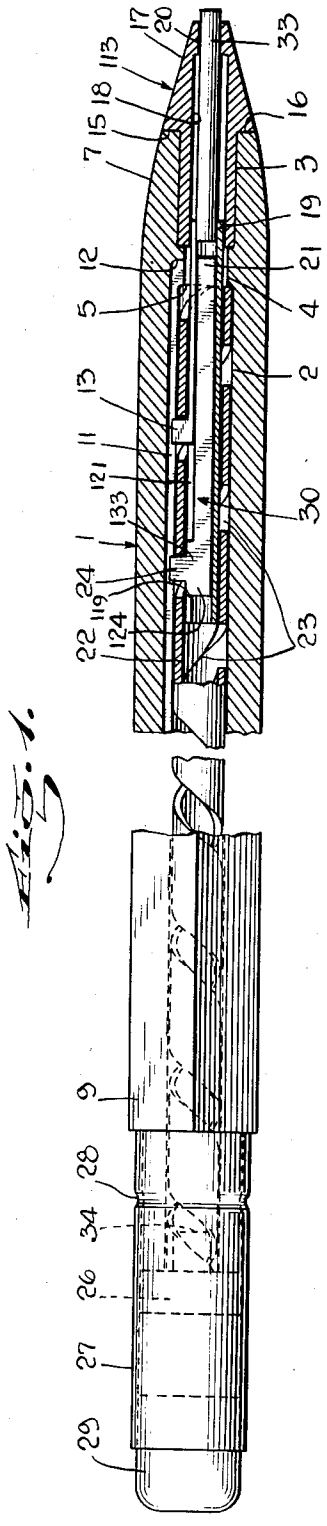


Fig. 1.

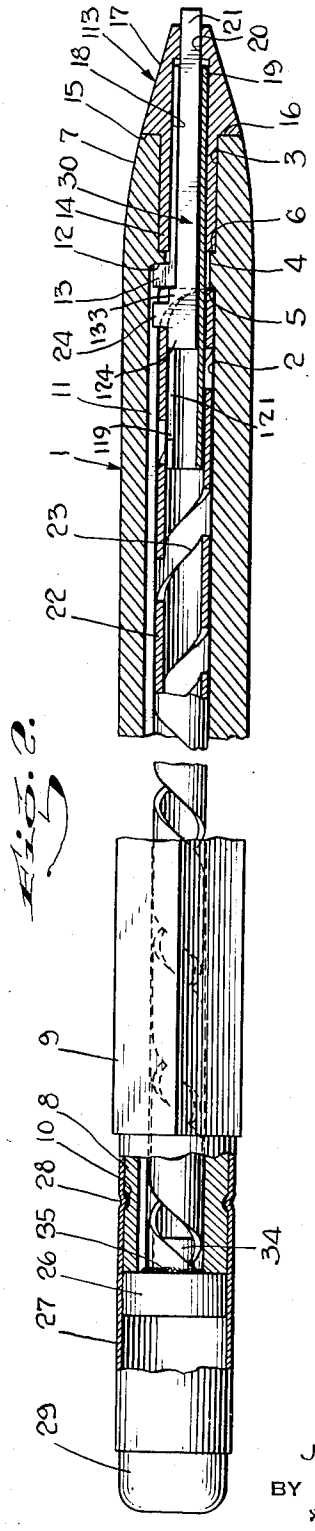


Fig. 2.

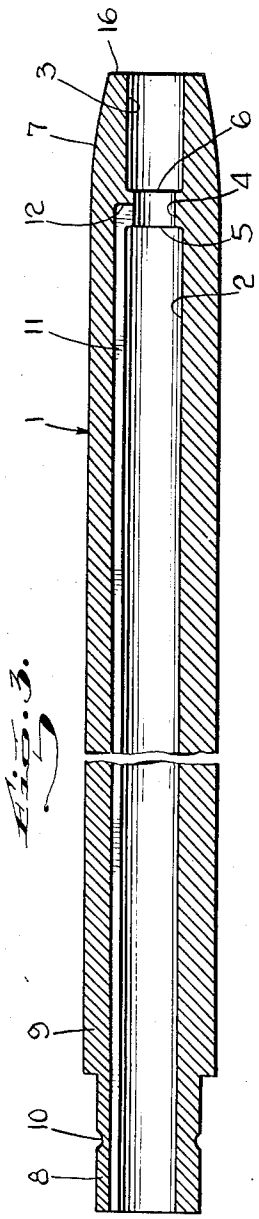


Fig. 3.

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MECHANICAL PENCIL

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2 Claims. (Cl. 120—18)

This invention relates to mechanical pencils.

Among the objects of the present invention it is aimed to provide an improved mechanical pencil including in addition to the pencil tip and cap, as the lead controlling mechanism, merely a casing, a spiral actuator, and a clutch for gripping the lead and cooperating with the casing and actuator either to control the length, if any, of the protruding portion of the lead or else to eject the lead entirely.

It is a further object of the present invention to provide a three piece control for the lead of a mechanical pencil including a casing, a spiral actuator, and a clutch, in which the casing is provided with a longitudinally extending slot to cooperate with the clutch to insure its movement along the barrel by the cooperation of the clutch with the spiral actuator when rotated, and in which such slot extends beyond the spiral actuator to receive a part of the clutch clear of the spiral actuator and enable the other part of the clutch to eject or expel the lead.

More specifically, it is a still further object of the present invention to provide a plastic casing to cooperate with a cap or control finger at one end, to receive a pencil tip at the other end and cooperate with a spiral actuator and a clutch, characterized by a groove formed in one end of the casing to receive the bead of a metal ferrule rolled into the same and allowing free rotation of the ferrule relative to the casing, a first bore at the other end of the casing to receive the diminished end of the pencil tip in relatively immovable relation to the casing, a second bore formed in the casing to receive the spiral actuator, and a longitudinally extending slot formed in the casing receding from the second bore and extending beyond the second bore at one end thereof to receive the projection or projections of the clutch extending through the spiral opening in the actuator, and the portion of the longitudinally extending slot extending beyond the second bore enabling one of the projections of the clutch to clear the spiral actuator and thus enable the other projection to continue to be actuated to eject the lead.

These and other features, capabilities and advantages of the invention will appear from the subjoined detailed description of one specific embodiment thereof illustrated in the accompanying drawings, in which

Fig. 1 is a side elevation of a mechanical pencil made according to the present invention partly broken away and partly in section showing the lead in position to be used for writing.

Fig. 2 is a similar side elevation showing the clutch in final ejecting position after the lead has been ejected or expelled from the pencil tip.

Fig. 3 is a section of the casing detached.

In the embodiment shown, the casing 1 composed as an instance of a thermal plastic material, such as cellulose acetate, cellulose acetate butyrate, ethyl cellulose, or the like, is formed with a long central bore 2, a short central bore 3, and an intermediate diminished bore or opening 4, defined from the bore 2 by the shoulder 5 and from the bore 3 by the shoulder 6.

Preferably the portion of the casing 1 adjacent to the bore 3 is tapered as shown at 7. The portion 8 at the other end of the casing 1 is diminished as compared to the portion 9, and furthermore is cylindrical in its outer contour as distinguished from polygonal in cross section as is the case in the present instance with the portion 9. The diminished portion 8 in the present instance is provided with an annular groove 10 and from the outer free end of the diminished portion 8 up to and beyond the shoulder 5, the casing 1 is provided with a longitudinally extending recess or slot 11 receding outwardly from the inner periphery of the bore 2 and extending beyond the shoulder 5 up to the shoulder 12, a distance at least equal to the width of the projection 13. The groove 10, bores 2, 3 and 4 and slot 11 may be cut into the casing 1 if it is composed of a thermal plastic material in accordance with accepted conventional machine shop practice, and on the other hand, in some instances, molded, extruded or die pressed, or at least partly molded, extruded or die pressed.

The pencil tip 113 is preferably composed of a suitable metal, such as brass, and has a diminished cylindrical portion 14 frictionally pressed into the bore 3 with its shoulder 15 abutting against the outer annual face 16 of the portion 7. From the shoulder 15, the tip 113 extends outwardly in the tapered conical portion 17. The tip 113, as shown, preferably has an enlarged bore 18 to receive the split tubular portion 19 of the clutch and a narrow bore 20, too narrow to receive the portion 19, but sufficiently large to clear the strip 21 of the clutch.

The spiral actuator 22 is preferably composed of a suitable metal, such as brass, and consists of a wound strip formed to leave a spiral opening or slot 23 between successive portions of the strip to receive the projections 24 and 13 of the clutch. This actuator 22 corresponds in length to the distance from the shoulder 5 to the outer free end of the diminished portion 8, one end of which has secured thereto, as an instance by welding, see the cylindrical metal plug 26, composed of a suitable metal such as brass, so that the end thrust, when extending or advancing the strip 21, will be taken up by the reaction of the bead 28 of the cap 27 in the annular groove 10 of the casing 1, and when withdrawing the strip 21 the end thrust will be distributed between the reaction of the shoulder 5 on the front free end of the actuator 22 and by the plug 26 on the rear free end of the casing 1. The outer periphery of this plug 26 has a friction fit with the inner periphery of the cap 27 which is composed of a suitable sheet metal tubular material, such as brass. When so frictionally fit into the cap 27, the plug 26 will rotate with the cap 27, and in turn since the spiral actuator 22 is fixed to the plug 26, the actuator 22 will be rotated with the cap 27.

The cap 27 in turn may be anchored against longitudinal displacement but merely rotatable on the diminished portion 8 by the bead 28 of the cap 27 rolled into the groove 10. Preferably as shown, the outer free end of the cap 27 has fitted into the same the cylindrical rubber plug 29, partly protruding from the cap 27 as shown, to serve as an eraser in accordance with convention.

The clutch 30 consists essentially of the split outer tubular portion 19 from which, and integral with the portion 19, the projection 13 extends radially outwardly and the strip 21 slidably mounted in the tubular portion 19 from which extends outwardly the projection 24, the strip 21 being captured in the portion 19 due to the cooperation of the short auxiliary front projection 133 and the main projection 13 in one direction and the cooperation of the shoulder 119 and the short auxiliary rear projection 124 in the opposite direction. The short auxiliary front projection 133 is part of the strip 21 and disposed immediately in front of the main rear projection

24, and the short auxiliary rear projection 124 is part of the strip 21 and disposed immediately to the rear of the main projection 24. The main projection 24, as well as the auxiliary projections 133 and 124 extend through the axially extending slot 121 formed between the main front projection 13 and the shoulder 119 of the tubular portion 19. The portions 21 and 19 of the clutch 30 are composed of a suitable metal, such as brass. The projections 13 and 24 are preferably narrow enough longitudinally of the casing 1 to clear the width of the spiral groove 23. Consequently, in accordance with convention the clutch 30 is threaded into operative relation with the actuator 22 where the projections 13 and 24 are spaced from one another by successive spaced apart portions of the spiral groove 23 as shown in Fig. 1. On the other hand, when the cap 27 is turned to actuate the actuator 22, and thereby in turn to actuate the projection 13 into the clearance portion of the slot 11, between the end of the spiral actuator 22 and the shoulder 12 where the projection 13 clears the spiral actuator 22, and the rotation of the cap 27 is then continued, then the projection 24 will be actuated toward the projection 13 until it engages the auxiliary projection 133 as shown in Fig. 2 where the strip 21 will move into a position where it will partly protrude from the tip 113 and eject the lead 33, the position shown in Fig. 2.

Obviously the plug 26 may assume any number of conformations for connection to the spiral actuator 22 without departing from the spirit of the invention. In the present instance the plug 26 is provided with a diminished portion 34 which extends into the spiral actuator 22 as shown in Fig. 2 and is soldered in place as shown by the upset metal accumulation 35.

Although the dimensions of the several parts may of course vary without departing from the general spirit of the invention, it is believed desirable to mention that excellent results have been achieved when the diameter of the bore 20 of the pencil tip 113 is about .050 inch to clear the lead 33 having a diameter of about .046 inch, and the width of the strip 21 has a width of about .046 inch. In turn the bore 18 of the pencil tip 113 in this case will be about .070 inch in diameter, when the outer diameter of the tubular portion 19 is about .063 inch.

It is obvious that various changes and modifications may be made to the details of construction without departing from the general spirit of the invention as set forth in the appended claims.

I claim:

1. In a mechanical pencil, a casing composed of a thermal plastic material having a rear end and a front end, said casing having a long central wide cylindrical bore open through said rear end, a short central wide cylindrical bore open through said front end, and an intermediate short central narrow cylindrical bore affording communication between said wide bores terminating in front and rear annular, radially extending shoulders, said two wide bores and narrow bore being concentric to one another, there being a single elongated groove extending the full length of the long central bore and having a portion extending for a short distance along the intermediate narrow bore, said groove extending radially outward from said long wide bore and said intermediate narrow bore, a metal pencil tip having a central bore frictionally fitting into the short wide bore of said casing, a tubular sheet metal actuator having a spiral clearance corresponding in effective length to said long wide bore and at its front end engaging said rear shoulder, a metal plug fixedly secured to the rear end of said actuator engaging the rear end of said casing, means rotatably anchoring said plug to the rear end of said casing, and a clutch for the writing lead including a tubular portion having a front main projection, a rear shoulder, and an axially extending slot between said front main projection and said latter rear shoulder, a strip slidably mounted in said tubular portion and having a rear main projection, an auxiliary short front projection in front of said rear main projection and an auxiliary short rear projection to the rear of said rear main projection, all extending through said slot, and said strip being captured in said tubular portion by the cooperation of said front main projection and said front auxiliary projection on the one hand and by said latter shoulder and said rear auxiliary projection on the other hand, said front and rear main projections extending into said groove, said tubular portion and said strip being movable in said actuator and actuatable along said actuator by the cooperation of said front and rear main projections with said spiral clearance, the front main projection conforming in length to the portion of said elongated groove extending along said intermediate narrow bore to enable said front main projection when received in said latter portion of said elongated groove to clear said spiral clearance, the rear main projection being axially movable relative to the front main projection when said front main projection enters said portion of the groove receding from said intermediate central bore, and said front main projection and said front auxiliary projection maintaining said rear main projection in said spiral clearance when said front main projection leaves said spiral clearance.

2. The combination as set forth in claim 1 in which said anchoring means comprises an annular groove formed in the diminished end of said casing, a cap frictionally secured to said plug, and a bead formed in said cap extending into said groove axially anchoring said cap to said casing, but permitting rotatable movement of said cap relative to said casing.

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