Jan. 27, 1931. L. A. LANOIE 1,790,430

MECHANICAL PENCIL

Filed Jan. 28, 1930

Fig. 1.

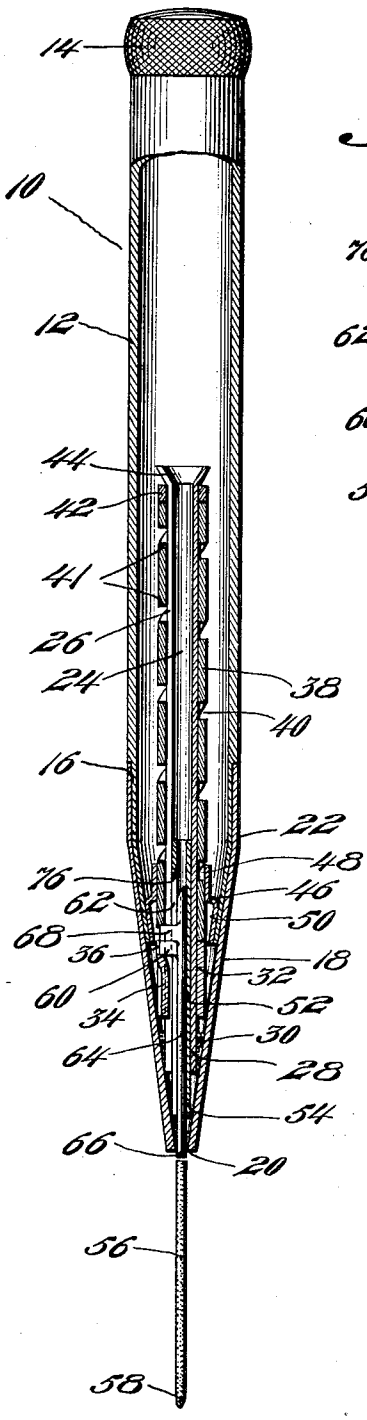


Fig. 3.

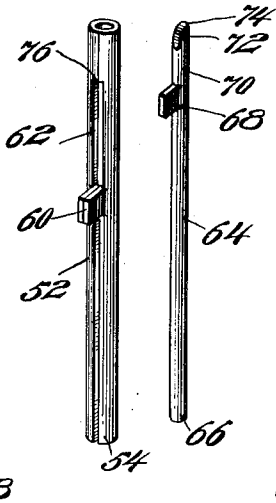
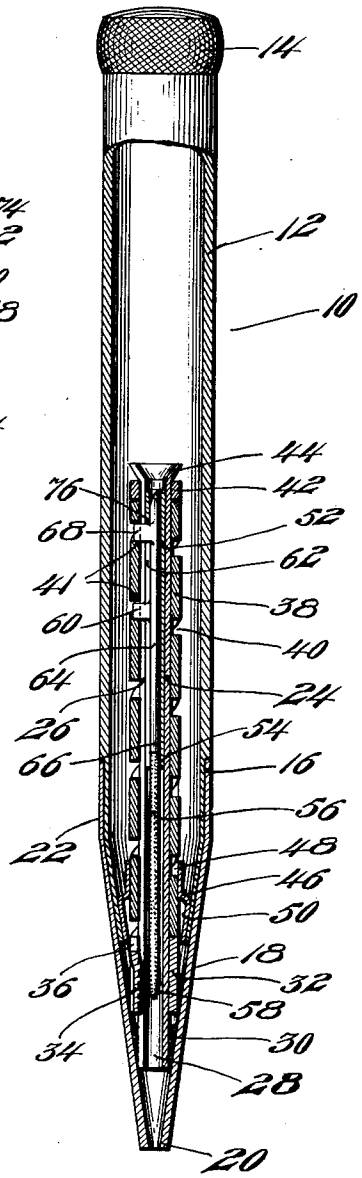


Fig. 2.



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MECHANICAL PENCIL

Application filed January 28, 1930. Serial No. 424,055.

My invention relates to improvements in mechanical pencils, particularly improvements in the lead ejecting rod thereof.

My invention is particularly adapted for use in mechanical pencils having an outer tube, a hollow cap member relatively rotatably mounted on the lower end of said outer tube, tapered to a lower lead advancing end, a longitudinally slotted receiving tube preferably having the lower end thereof non-rotatably secured within the lower end of said cap member, a helically slotted turning tube rotatably mounted on said receiving tube, a slotted bridge member having a portion thereof secured to said outer tube and a portion thereof secured to said helically slotted tube preferably within said cap member to cause rotation thereof on rotation of said outer tube, a tubular lead carrier longitudinally slidable within said receiving tube having a lower lead receiving end, a radial turning lug near the center portion thereof adapted to ride in the helical groove in said receiving tube of a length to pass underneath the hollow bridge member and an axial slot therein extending upwards from said lug to near the upper end thereof of a length substantially the distance between the winds of the helical slot in said receiving tube and a lead ejecting rod axially slidable within said tubular lead carrier having a lower lead ejecting end and a radial turning lug near the upper end thereof adapted to ride in the helical slot in said receiving tube and also of a length to pass normally underneath the bridge member.

An object of my invention is to provide an axial extension projecting upwardly from the lug of said ejecting rod and preferably beveled away from said lug to an upper pilot edge and adapted to strike the upper edge of the slot in said tubular lead carrier and guide it within. Formerly lead ejecting rods have been provided without this upper axial extension and there has been considerable tendency as the lug thereof moves to the upper portion of the slot in the tubular lead carrier to work radially outwardly in said slot, thus causing said lug to strike against the bridge member and prevent complete insertion of the lead in the lead carrier.

From a manufacturing point of view it has been extremely difficult to form these lugs of such a radial length as to register in the helical slot and not to project through the slot beyond the edge of the bridge member to cause the clogging mentioned. By providing an axial extension in the lead ejecting rod above said lug, the axial extension at all times guides the lead ejecting rod within the tubular lead carrier without permitting the lug to project radially outwardly therefrom so as to abut the bridge member and cause said clogging. By providing this extension I am enabled to provide a lead ejecting rod which will at all times slide substantially axially within the tubular lead carrier and permit the turning lug thereof to at all times pass underneath the bridge member, thereby eliminating the clogging aforesaid.

In addition, due to the fact that my improved lead ejecting rod will at all times slide axially within the lead carrier, the play caused by the upper end thereof sliding radially outwardly through the slot in the tubular lead carrier is substantially eliminated, thereby permitting the lower end of the tubular lead carrier to firmly retain the lead therein without any play. In this particular type of mechanical pencils it has been quite common to be able to push the lead in the lead carrier if the writer attempts to use the pencil, and an object of this invention is to substantially eliminate this play.

Formerly manufacturers of pencils, due to the difficulty of having the lug in a lead carrier pass underneath the bridge member, have attached the bridge member to the helically slotted tube and the outer tube at a distance from the lower end of the helically slotted tube sufficiently so that the lead may be withdrawn its entire length within the receiving tube without causing the lug on the lead ejecting rod to strike the bridge member, thereby requiring a greater length of receiving tube and rotatable helically slotted turning tube. By providing a construction wherein the radial lug of the ejecting rod may readily at all times pass underneath the

bridge member, I am enabled to attach the bridge member interconnecting the outer tube and the helically slotted turning tube at a point near the bottom of the turning tube and if desired within the cap member itself, thereby from a manufacturing point of view saving considerable stock in length of receiving and slotted tubes. In addition, by providing the bridge member near the lower end of said tubes and preferably within the cap member, I am enabled to provide a firmer support for the slotted turning and receiving tubes thereby making a stronger and more efficient pencil.

These and such other objects of my invention as may hereinafter appear will be best understood from a description of the accompanying drawings which illustrate an embodiment thereof.

In the drawings, Fig. 1 is a longitudinal sectional view of a mechanical pencil constructed in accordance with my invention with the lead ejecting rod in advanced position to eject the lead from the pencil.

Fig. 2 is a longitudinal sectional view similar to Fig. 1 with the tubular lead carrier and lead ejecting rod raised to their uppermost position, showing the lead suitably contained within the lower end of the tubular lead carrier and the lead ejecting rod suitably raised to permit this insertion.

Fig. 3 is a disassembled perspective view of the tubular lead carrier and the improved lead ejecting rod I preferably employ.

In the drawings, wherein like characters of reference generally indicate like parts throughout, 10 generally indicates a mechanical pencil of the type in which my invention may be employed. 12 indicates the outer tube thereof which may be suitably rotated by the turning cap 14 on the upper end thereof. In my preferred embodiment the lower end of the outer tube is preferably inset as at 16 for a purpose to be described. Said type of pencil also employs a hollow turning cap 18 preferably tapered to a hollow lower writing end 20 through which the lead is adapted to advance and rotatably mounted on the lower end of said tube 12. In the embodiment shown the upper end 22 of said cap member 18 is rotatably mounted over the inset lower end 16 of the tube 12. Said pencils also employ a receiving tube 24 having a longitudinal slot 26 therein non-rotatably secured within the cap member 18. In my preferred embodiment the lower end 28 of said receiving tube 24 is non-rotatably secured within the lower end of said cap member 18 by means of the solder 30. For a purpose to be described said mechanical pencils may also be provided with a stop tube 32. Said stop tube is of slightly larger diameter than the lower end of said receiving tube and is non-rotatably mounted thereon, in the embodiment shown, by means of the longitudinal rib 34 therein fitting within the slot 26 of the receiving tube. Said stop tube is also preferably provided with the relatively short axial slot 36 near the upper end thereof for a purpose to be described.

Said mechanical pencils also have a turning tube 38 rotatably mounted on said receiving tube 24. In the embodiment shown said tube 38 has the lower end thereof abutting said stop tube 32 and is secured against axial movement on tube 24 by providing the receiving tube 24 of a greater length than said turning tube 38, inserting the stop collar 42 on the upper end of said receiving tube to abut the upper end of said turning tube 38 and holding it against said stop tube 32 by outwardly flaring the upper end of said receiving tube as at 44 to secure said stop collar 42 against the upper end of said turning tube 38. Said turning tube 38 is provided with the helical slots 40 therein.

The turning tube 38 is adapted to be rotated on rotation of the outer tube 12. For this purpose a hollow bridge member 46 is preferably provided. In my preferred embodiment I provide the downwardly flaring bridge member 46 having the hollow upper end 48 thereof secured to the lower end of the helically slotted turning tube 38, preferably by means of friction and the lower end 50 thereof secured preferably by friction within the inner wall of said outer tube 12, preferably adjacent said stop tube 32 and within said cap member 18 whereby rotation of said outer tube 12 will also cause rotation of said helically slotted turning tube 38. Said pencils are also provided with the tubular lead carriers 52 which lead carriers are usually longitudinally slidable within the receiving tube 24. Said lead carrier 52 is provided with the lead receiving lower end 54 adapted to hold the upper end of the lead 56 therein and advance the writing point 58 thereof as needed through the lower end 20 of said cap member. Said tubular lead carrier 52 is provided near the center portion thereof with the radial turning lug 60 adapted to ride in the helical groove 40 in said turning tube and preferably of a length to pass underneath the hollow upper portion 48 of said bridge member, and an axial slot 62 therein extending upwards from said lug 60 to near the upper end thereof of a length substantially the distance between the winds of the helical slot in said turning tube.

Said mechanical pencils are also provided with the lead ejecting rod 64 axially slidable within the tubular lead carrier 52 having the lead ejecting lower end 66 and a radial lug 68 projecting radially outwardly near the upper end thereof adapted to project through the slot 62 of said tubular lead carrier 52 to pass through the longitudinal slot 26 in the lead receiving tube 24 and to ride in the helical slot 40 in the turning tube 38.

As stated, in mechanical pencils of this description there has formerly been considerable play of the lug 68 radially outwards through the slots 62, 26 and 40 respectively, thereby causing considerable axial play of the lower end 66 of the rod 64 within the lower end 54 of said tubular lead carrier 52 and as the end 66 has normally abutted the upper end of the lead 56, consequent axial play in the writing end 58 of the lead thereby causing considerable inconvenience when the mechanical pencil is employed in writing. Also, due to the play of the lug 68 through the respective slots 62, 26, and 40, the end of the lug 68 has oftentimes tended to project outwards therethrough so far as to prevent its passing underneath the upper end 48 of the bridge member 46. For this reason it has been necessary to construct the receiving tubes 24 and turning tubes 38 of such a length that the bridge member may be attached between the said outer tube 12 and turning tube 38 at a point well up on the mechanical pencil so as to permit withdrawal of the lug 68 sufficiently and the lead carrier 52 for the complete insertion of the desired length of lead 56. Equipped with my invention, however, which permits the lug 68 to slide axially freely past the connecting portion 48 of the bridge member 46, I am enabled to attach the bridge member 46 as shown near the lower end of the pencil, preferably within the cap member 18, thereby affording not only a stronger mechanical construction but eliminating manufacturing expense in length of receiving tube 24 and turning tube 38. In order that the advantages of my invention may best be understood I will first describe the operation of the pencil.

The outer tube 12 and cap member 18 are first relatively rotated to withdraw the radial lug 68 of the ejecting rod sufficiently within the tubular lead carrier 52 to permit insertion of the upper end 68 of the lead within the lower end 54 thereof. As will be apparent from the drawings, the lower end of the spiral 38 first abuts the lug 68 and withdraws it sufficiently from the stop tube 32 for a purpose of inserting the lead therein. On further rotation of the turning tube 38, the lower end of spiral 38 therein will strike the lug 60 on the tubular lead carrier, the lugs 60 and 68 then being separated substantially the length of a wind 41 of the helical slot 40 and said lug may then as shown in Fig. 2 be drawn to the upper end of the slot 40 and it is obvious that as the outer tube 12 is further relatively rotated to the cap member 18 both the tubular lead carrier 52 and lead ejecting rod 64 will be moved axially upwardly in said mechanical pencil through the medium of the lugs 68 and 60 respectively thereof riding in the helical groove 40 until only the desired portion of the lower end 58 of the lead 56 may protrude from the lower end 20 of the cap member as is needed for writing purposes.

It is thus obvious that on a turning movement of the turning tube 38 to revolve the groove 40 thereof one wind that the lug 68 will ride to the upper portion of the slot 62. In Fig. 2 I have shown the lugs 60 and 68 after they have respectively withdrawn the tubular lead carrier 52 and lead ejecting rod 64 to their uppermost position.

When the lead 56 has become so shortened in use that it will not protrude sufficiently from the lower end of the lead carrier 54 to project through the hollow lower end of the cap member 18, it becomes desirable to eject the lead. It is obvious that as the lead becomes worn down it is merely necessary to relatively turn the outer tube 12 to force the turning tube 38 to move the lead carrier 52 and ejecting rod 64 downwards a sufficient amount. As the lead becomes almost worn down, it is obvious that the lug 68 will move to a position near the lower end of the groove 40. To eject the lead, the turning tube 38 is further revolved until the lug 60 lies within the slot 36 in the stop tube 32. It is then obvious that further turning of the turning tube 38 with the lug 60 resting within the slot 36, will cause the lug 68 to move axially towards said lug 60 thereby forcing the lower end 66 of the lead ejecting rod 64 downwards within the tubular lead carrier 52 until the lower end 66 projects beyond the lower end 54 thereof and if desired, through the lower end 20 of the cap member 18, thereby ejecting the lead 56 as shown in Fig. 1.

Prior to the insertion of a new lead, it is then obvious that the turning member 38 is then turned in the opposite direction preferably one full wind of the slot 40 to cause the lower end 66 to withdraw within the tubular member 52 and up to the upper end of the slot 62 prior to the insertion of the lead within the lower end 54 of said tubular lead carrier 52 and that when it is desired to draw the lead further after insertion thereof, the turning tube 38 is further turned to cause the lower end thereof to raise the lug 60 upwards, thereby also raising the lead carrier and its contained lead upwards until a sufficient amount of lead projects from the lower end 20 for writing purposes.

To overcome the objections mentioned above, I preferably construct my improved lead ejecting rod 64 so that it functions in an improved manner with the various elements heretofore described. I preferably provide the lead ejecting rod with the aligning extension 70 projecting axially upwardly from said lug 68 and preferably bevel its upper end as at 72 away from said lug 68 into an upper pilot edge 74.

It is then obvious that in use as the lead ejecting rod 64 is withdrawn in the tubular lead carrier 52 by moving the lug 68 axially

away from the lug 60 on turning movement of the turning tube 38 that said beveled edge 72 will strike the upper edge 76 of the slot 62 and compactly retain the lead ejecting rod in axial alignment within the lead advancing tube 52, so that there will be no radial play of the lug 68 outwards in the slots 62, 26 and 40 respectively to abut the portion 48 of the bridge member and prevent the lug 68 from readily passing by it and also no axial play in the lower end 66 of the ejecting rod 64 to substantially eliminate the axial play of the writing point heretofore mentioned in pencils of this description and at all times providing a firm writing point. The pencil is so constructed that the extension 70 will abut the edge 76 of the lead carrier before it has to pass underneath the portion 48 of the bridge member. Due to this construction it is also apparent that the bridge member may be moved lower in the pencil, even if desired within the cap member 18, thereby providing a stronger structure.

It is understood that my invention is not limited to the specific embodiment shown and that various deviations may be made therefrom without departing from the spirit and scope of the appended claims.

What I claim is:

1. In a mechanical pencil, an outer tube, a hollow cap member relatively rotatably mounted on the lower end of said outer tube tapered to a lower lead advancing end, a longitudinally slotted receiving tube having the lower end thereof non-rotatably secured within the lower end of said cap member, a stop tube of larger diameter non-rotatably secured to the lower end of said receiving tube, having a relatively short axial slot in the upper end thereof, a helically slotted turning tube rotatably mounted on said receiving tube above said stop tube, a hollow bridge member having a portion thereof secured to said outer tube within said cap member and a portion thereof secured to said helically slotted tube to cause rotation thereof on relative rotation of said outer tube, a tubular lead carrier longitudinally slidable within said receiving tube having a lead receiving lower end, a radial turning lug near the center portion thereof adapted to ride in the helical groove in said turning tube of a length to pass underneath the hollow bridge member and an axial slot therein extending upwards from said lug to near the upper end thereof, of a length substantially the distance between the winds of the helical slot in said turning tube and a lead ejecting rod axially slidable within said tubular lead carrier, having a lower lead ejecting end, a radial turning lug near the upper end thereof adapted to ride in the helical slot in said receiving tube also of a length to pass normally underneath the bridge member and an aligning extension projecting axially upwardly from said lug to retain said rod within said lead carrying tube and bevelled away from said lug to an upper pilot edge end to strike the upper edge of the slot in said tubular lead carrier and guide it within.

2. In a mechanical pencil, an outer tube, a hollow cap member relatively rotatably mounted on the lower end of said outer tube tapered to a lower lead advancing end, a longitudinally slotted receiving tube having the lower end thereof non-rotatably secured within the lower end of said cap member, a stop tube of larger diameter non-rotatably secured to the lower end of said receiving tube, having a relatively short axial slot in the upper end thereof, a helically slotted turning tube rotatably mounted on said receiving tube above said stop tube, a hollow bridge member having a portion thereof secured to said outer tube and a portion thereof secured to said helically slotted tube to cause rotation thereon on relative rotation of said outer tube, a tubular lead carrier longitudinally slidable within said receiving tube having a lead receiving lower end, a radial turning lug near the center portion thereof adapted to ride in the helical groove in said turning tube of a length to pass underneath the hollow bridge member and an axial slot therein extending upwards from said lug to near the upper end thereof, of a length substantially the distance between the winds of the helical slot in said turning tube and a lead ejecting rod axially slidable within said tubular lead carrier, having a lower lead ejecting end, a radial turning lug near the upper end thereof adapted to ride in the helical slot in said receiving tube also of a length to pass normally underneath the bridge member and an aligning extension projecting axially upwardly from said lug to retain said rod within said lead carrying tube and bevelled away from said lug to an upper pilot edge end to strike the upper edge of the slot in said tubular lead carrier and guide it within.

3. In a mechanical pencil, an outer tube, a hollow cap member relatively rotatably mounted on the lower end of said outer tube tapered to a lower lead advancing end, a longitudinally slotted receiving tube having the lower end thereof non-rotatably secured within the lower end of said cap member, a helically slotted turning tube rotatably mounted on said receiving tube, a hollow bridge member having a portion thereof secured to said outer tube and a portion thereof secured to said helically slotted tube to cause rotation thereof on relative rotation of said outer tube, a tubular lead carrier longitudinally slidable within said receiving tube having a lead receiving lower end, a radial turning lug near the center portion thereof adapted to ride in the helical groove in said turning tube of a length to pass underneath the hollow bridge member and an axial slot

therein extending upwards from said lug to near the upper end thereof, of a length substantially the distance between the winds of the helical slot in said turning tube and a lead ejecting rod axially slidable within said tubular lead carrier, having a lower lead ejecting end, a radial turning lug near the upper end thereof adapted to rise in the helical slot in said receiving tube also of a length to pass normally underneath the bridge member and an aligning extension projecting axially upwardly from said lug within said lead carrying tube above said slot to retain said rod within said tube so that said lug may pass underneath said bridge member.

4. In a mechanical pencil, a longitudinally slotted receiving tube, a helically slotted turning tube rotatably mounted on said receiving tube, a tubular lead carrier longitudinally slidable within said receiving tube having a lead receiving lower end, a radial turning lug near the center portion thereof adapted to ride in the helical groove in said turning tube and an axial slot therein extending upwards from said lug to near the upper end thereof, of a length substantially the distance between the winds of the helical slot in said turning tube and a lead ejecting rod axially slidable within said tubular lead carrier, having a lower lead ejecting end, a radial turning lug near the upper end thereof and an aligning extension projecting axially upwardly from said lug to retain said rod within said lead carrying tube and bevelled away from said lug to an upper pilot edge end to strike the upper edge of the slot in said tubular lead carrier and guide it within.

5. In a mechanical pencil, a longitudinally slotted receiving tube, a helically slotted turning tube rotatably mounted on said receiving tube, a tubular lead carrier longitudinally slidable within said receiving tube having a lead receiving lower end, a radial turning lug near the center portion thereof adapted to ride in the helical groove in said turning tube and an axial slot therein extending upwards from said lug to near the upper end thereof, of a length substantially the distance between the winds of the helical slot in said turning tube and a lead ejecting rod axially slidable within said tubular lead carrier, having a lower lead ejecting end, a turning lug and an aligning extension projecting axially upwardly from said lug within said lead carrying tube above said slot.

6. A lead ejecting rod for use in mechanical pencils having a radial turning lug near the upper end thereof and an aligning extension projecting axially upwardly from said lug bevelled away from said lug to an upper pilot edge end.

7. A lead ejecting rod for use in mechanical pencils having a turning lug and an aligning extension projecting axially upwardly from said lug bevelled away from said lug to an upper pilot edge end.

In testimony whereof I affix my signature.

LOUIS A. LANOIE.