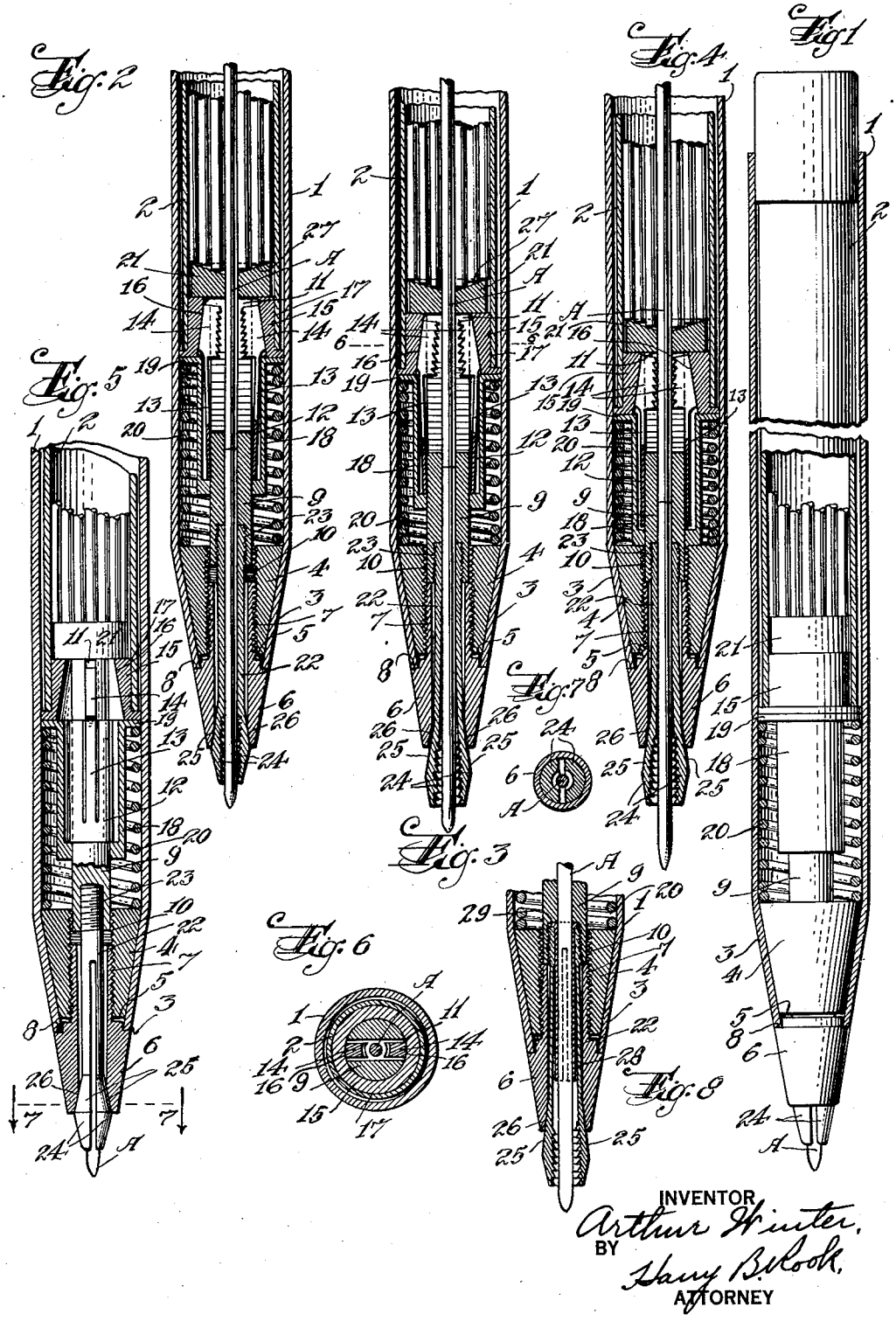
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LEAD FEEDING PENCIL

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LEAD FEEDING PENCIL

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6 Claims. (Cl. 120—17)

This invention relates in general to mechanical lead feeding pencils of the step by step type, wherein leads are fed from the magazine to a lead holding and advancing mechanism for projecting the leads step by step longitudinally from one end of the pencil casing, and more particularly the invention relates to pencils of the character described and claimed in my copending application Serial No. 743,673, filed September 12, 1934. The pencil described in said application comprises two telescopically associated inner and outer tubular sections, a lead holding tube mounted in the outer section, a clutch to grip and release the lead in said tube upon relative reciprocation of said sections in opposite directions to move a lead step by step through the tube, and a second clutch mounted within the outer section and actuated to cooperate with said outer section upon disengagement and engagement of the first clutch from and with the lead respectively, to grip and release the projected lead.

One object of the present invention is to provide a novel and improved combination of a lead advancing clutch and a clutch for holding the lead in projected position, wherein the lead holding clutch is disposed within but projects from the outer section so that the pencil shall be simpler, easier to make and assemble and more reliable in operation.

Another object is to provide a novel and improved lead advancing clutch mechanism which shall be positive and reliable in operation and simple and inexpensive in construction.

Other objects, advantages and results of the invention will appear from the following description when read in conjunction with the accompanying drawing.

Referring to said drawing in which corresponding and like parts are designated throughout the several views by the same reference characters,

Figure 1 is a view on a greatly enlarged scale, partially in section and partially in side elevation, of a pencil embodying my invention.

Figure 2 is a fragmentary vertical longitudinal sectional view through the lead advancing and holding mechanism, showing the parts in their normal lead holding position.

Figure 3 is a similar view showing the parts in the positions assumed during release of the lead by the lead holding mechanism just prior to gripping of the lead by the advancing mechanism.

Figure 4 is a like view showing the completion of the lead advancing movement of the advancing mechanism.

Figure 5 is a view similar to Figure 2 taken on a plane at right angles to the plane upon which the section of Figure 2 is taken, and illustrating the lead advancing clutch in side elevation.

Figure 6 is a horizontal sectional view on the line 6—6 of Figure 3.

Figure 7 is a similar view on the line 7—7 of Figure 5, and

Figure 8 is a fragmentary vertical longitudinal sectional view through the lead holding end of the pencil, showing a modification of the invention.

Specifically describing the illustrated embodiment of the invention, the pencil comprises a casing which includes telescopically associated outer and inner tubular sections 1 and 2 respectively. One end of the outer section is tapered at 3, while the inner section is slid into the other end of the outer section.

Within the outer section is mounted a lead advancing and a holding mechanism which is shown as including a body sleeve 4 tapered to approximately conform to the inner wall of the tapered portion 3 of the outer section, and with one end terminating short of the end of the outer section as at 5. This body sleeve 4 is secured in the outer section by a tip 6 which is screw threaded at 7 into the body sleeve and has a shoulder 8 to abut the end of the outer section.

A lead holding tube 9 is mounted within the body section with one end loosely slidable in the opening 10 through the body sleeve 4. The other end of the lead holding tube has a pair of slots 11 and has slidable thereover, a lead advancing clutch sleeve 12. This sleeve is longitudinally slitted to form a pair of diametrically opposite resilient arms 13 at the free ends of which are lead gripping jaws 14 which project through the respective slots 11.

The sleeve 12 is longitudinally slidable on the tube 9 and is operatively connected to the inner section 2 of the casing so that upon sliding of the inner section into the casing, the jaws 14 are pressed into engagement with the lead A, and the sleeve is slid along the tube to advance the lead, while when the inner section is retracted or moved outwardly of the outer section, the jaws are disengaged from the lead. As shown, an actuating collar 15 is telescopically fitted over the tube 9 and has a cam surface 16 to cooperate with the jaws 14, and this collar 15 is connected at 17 to the inner section 2 of the casing. Assuming the parts to be in the normal lead holding position shown in Figure 2 with the inner section retracted, the collar 15 is in position to

permit the jaws 14 to be sprung outwardly away from the lead by the arms 13. When the inner section is pressed inwardly of the outer section, the cam surfaces 16 slide upon the tapered jaws 14, so as to force the jaws inwardly against the lead, and continued movement of the inner section and the collar 15 in the same direction then slides the sleeve 12 on the tube 9 to advance the lead as shown in Figure 4. As the inner section 2 and collar 15 are retracted the cam surface 16 moves away from the jaws to permit them to spring outwardly away from the lead. The sleeve 12 has a frictional engagement with the tube 9 so as to initially hold the sleeve against movement upon movement of the collar 15 in either direction to permit the surface 16 to engage and disengage the jaws to force the jaws against the lead and permit the jaws to withdraw from the lead respectively. A thimble 18 is loosely slidable upon the tube 9 and surrounds the end of the clutch sleeve 12 opposite the jaws 14 with its ends to abut respectively the collar 15 and the end of the clutch sleeve opposite the jaws. The end of the thimble which abuts the collar has a flange 19 between which and the body sleeve 4 is interposed a compression spring 20 which normally actuates the thimble and collar in the direction to retract the inner section 2 and release the collar from the jaws 14. Outward movement or retraction of the inner section and collar is limited by abutment of the collar with a shoulder 21 on the end of the lead holding tube 9, while inward movement of the collar and inner section is limited by engagement of the end of the thimble with the body sleeve 4; and the thimble engages the clutch sleeve 12 upon retraction of the inner section to move the clutch sleeve and jaws to their initial position shown in Figure 2 after a lead has been advanced.

The lead holding tube 9 has a limited longitudinal movement in opposite directions, the movement inwardly of the outer casing being limited by engagement of the end of the tube with the inner end of the tip 6 as shown in Figure 3. A lead holding clutch is connected to and movable with the tube 9 and comprises a tube 22 screw threaded at one end into the tube 9 as at 23 and having its other end projecting from the outer casing through the tip 6 and provided with lead gripping jaws 24. These jaws are resilient and are formed by longitudinal slitting of the tube 22, and the tube has a passage for the lead in alinement with the opening in the tube 9, the inherent resiliency of the jaws tending to spring them away from or out of engagement with the lead. The outer surfaces of the jaws are tapered at 25 to cooperate with corresponding tapered surfaces 26 on the inner walls of the outer end of the tip, and this engagement of the jaws with the tip limits movement of the lead holding tube in the direction of retraction of the inner section. The limited longitudinal movement of the tube 9 is just sufficient to permit clamping and release of the lead by the jaws 24.

In operation, upon beginning of the inward movement of the collar 15 and inner section 2 to cause the jaws 4 to grip a lead, the compression of the spring 20 is released from the shoulder 21 on the tube 9 so that the tube may longitudinally move to disengage the jaws 25 from the lead. Should the tube not move upon simple release of the compression of the spring, the frictional engagement of the collar 15 with the jaws and the sleeve 18 with the tube will positively move the tube. This motion will continue until the end of the tube 9 abuts the end of the tip 6, and this motion preferably takes place slightly before the gripping of the lead by the advancing jaws 14. Then continued movement of the collar 15 inwardly of the outer section will cause the jaws 14 to grip the lead and slide the sleeve along the tube to advance the lead therethrough. Upon release of the inner section under the influence of the spring 20 the retraction of the collar 15 and inner section 2 moves the tube 9 to cause the jaws 24 to engage the tapered surfaces 26 on the outer section and clamp the lead, this movement of the tube 9 being caused in the first instance by frictional engagement between the collar 15 and the jaws 14 and the engagement of the thimble 18 with the sleeve 12 which frictionally engages the tube. The lead is thereupon held against retraction, and this action preferably takes place at about the same time or slightly before the release of the jaws 14 from the lead. Continued retraction of the collar 15 will then release the jaws 14 from the lead, and engagement of the thimble with the sleeve 12 will carry the sleeve with the collar to their initial position so as to cause abutment of the collar with the shoulder 21 under influence of the spring 20 and exert a positive pull on the tube 9 to hold the jaws 24 in engagement with the lead.

With this construction it will be noted that the lead may be projected from the tip step by step upon relative reciprocation of the inner and outer sections 1 and 2, the clutch 24, 26 releasing the lead to permit advance thereof, and holding the lead in projected position against retraction by the advancing mechanism as the latter retracts. Also, on each step the lead may be ejected any desired amount up to the limit of the advance in movement of the sleeve 12. It is also important that by slightly moving the inner section into the outer section as shown by Figure 3, the lead can be released from both the clutch 25 and the advancing jaws 14, so that the lead freely can be pushed into the casing to adjust the length of the projecting portion should the lead be projected too far.

It will be obvious from the foregoing that the leads may be deposited in the tube 9 in any suitable manner, but as shown, the outer end of the inner section 2 serves as a magazine, the bottom of which is conically concave at 27 concentric with the opening through the tube so that the leads will fall by gravity into said opening.

It will be observed that the lead holding clutch tube 22 has its passage in alinement with the opening through the lead holding tube 9 so that the projected lead is slid through the clutch tube 22. It is desirable that the lead be frictionally held against dropping from the clutch tube in case the lead has been released from both the advancing jaws 14 and the holding jaws 25 as shown in Figure 3. Accordingly, I may insert some friction producing means in the clutch tube; for example a thin walled longitudinally slit resilient tube 28 may be secured in the clutch tube as shown in Figure 8. As shown, the friction tube 28 has a flange 29 clamped between the end of the clutch tube 22 and the lead holding tube 9.

While I have shown and described the pencil as embodied in certain details of construction, it should be understood that many modifications and changes may be made in the structure of the pencil without departing from the spirit or scope of the invention.

Having thus described my invention, what I claim is:

1. A mechanical pencil comprising telescopically associated inner and outer tubular sections, a slotted lead holding tube mounted in said outer section, a clutch on and slidable longitudinally of said tube and having jaws passing through the slots therein to engage a lead in the tube, an operative connection between said inner section and said clutch to cause engagement and disengagement of said jaws with a lead in said tube to advance and release the lead upon movement of said inner section into said outer section and retraction of said inner section respectively, and a second clutch including a member in said outer section and projecting therefrom with a passage therethrough in alinement with said tube, means actuated by the first clutch to actuate the second clutch to cooperate with said outer section upon disengagement of the first clutch from the lead to grip and hold the projected lead and to be positively operated upon engagement of the first clutch with the lead to release the projected lead, whereby the projected lead is held by the second clutch against retraction as the lead is released by the first clutch upon retraction thereof, and the lead is slid through the second clutch when the lead is gripped and advanced by the first clutch.

2. A mechanical pencil comprising telescopically associated inner and outer tubular sections, a slotted lead holding tube mounted for longitudinal movement in opposite directions in said outer tube, a clutch on and slidable longitudinally of said tube and having jaws passing through the slots therein to engage a lead in the tube, an operative connection between said inner section and said clutch to cause engagement and disengagement of said jaws with a lead in said tube upon movement of said inner section into said outer section and retraction of said inner section respectively, whereby said lead is slid through said tube by said clutch toward projected position from said outer section and released by said clutch upon movements of the clutch in opposite directions respectively, said tube carrying gripping jaws through which the lead is longitudinally movable and projecting from the end of said outer section, said tube being movable longitudinally to a limited extent in opposite directions as said clutch is moved and said jaws being movable with said tube out of and into engagement with the end of said outer section upon movement of said inner section into said outer section and retraction of said inner section respectively, to cause said gripping jaws to release said lead and to grip and hold said lead in advanced position, respectively.

3. A mechanical pencil comprising two telescopically associated inner and outer tubular sections, a lead holding tube mounted in the outer section, a clutch to grip and release a lead in said tube upon relative reciprocation of said sections in opposite directions to move a lead step-by-step through said tube, said tube having limited longitudinal movement in opposite directions as said clutch is moved, and a second clutch including a tube connected to and movable with said lead holding tube and having gripping jaws through which the lead is movable and projecting from the end of said outer section, said jaws being movable into and out of engagement with said end of the outer section and cooperating therewith upon movement of the first clutch to release and grip a lead respectively, to cause said jaws to grip and hold a lead in advanced position and release said lead, respectively.

4. A mechanical pencil comprising two telescopically associated inner and outer tubular sections, the latter of which has a tapered end, a body sleeve mounted within said tapered end, a tip threaded into said body sleeve and exteriorly abutting the end of said outer casing, a lead holding tube longitudinally slidable in said body sleeve and tip and having a shoulder to abut the inner end of the tip for limiting movement of said tube in one direction, said tube having lead gripping jaws projecting from said tip and cooperating therewith to limit movement of the tube in the other direction and to grip and release a lead upon movement of the tube in opposite directions respectively, and a lead advancing clutch mechanism operable by said inner section to grip and release a lead in said holding tube upon relative reciprocation of said casing sections in opposite directions, said clutch mechanism also operatively connected to move said lead holding tube to cause said jaws to release and grip a lead as a lead is gripped and released respectively by said clutch.

5. A mechanical pencil comprising two telescopically associated inner and outer tubular sections, the latter of which has a tapered end, a body sleeve mounted within said tapered end, a tip threaded into said body sleeve and exteriorly abutting the end of said outer casing, a lead holding tube longitudinally slidable in said body sleeve, a lead holding clutch tube separably connected to and movable with said holding tube having a passage for a lead from said holding tube and formed with gripping jaws projecting from and cooperating with said tip upon movement of said clutch tube in opposite directions to grip and release a lead, and a lead advancing clutch mechanism operable by said inner casing to grip and release a lead in said holding tube upon relative reciprocation of said casing sections in opposite directions, said clutch mechanism also operatively connected to move said lead holding tube to cause said jaws to release and grip a lead as a lead is gripped and released respectively by said clutch.

6. A mechanical pencil comprising telescopically associated inner and outer tubular sections, a lead holding tube mounted in said outer tube, one end of said tube having longitudinal slots, a sleeve on and slidable longitudinally of said tube and having resilient arms carrying jaws projecting through said slots to engage a lead in said tube, and an actuating collar slidable on said sleeve and connected to said inner section, said collar having an interior cam surface to engage said resilient arms and force said jaws into engagement with said lead and slide said sleeve on said tube to advance said lead in said tube upon movement of said inner section into said outer section and to release said jaws from engagement with said lead upon retraction of said inner section, a thimble slidable on said tube and surrounding said sleeve with one end to abut the end of said sleeve opposite said jaws and with a flange at the other end to abut said collar, a compression spring interposed between said flange and said outer section to retract said thimble, collar and clutch sleeve into normal position after a lead has been advanced, and means for limiting retraction of said parts.

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