Dec. 9, 1941. P. S. HAUTON 2,265,162

MECHANICAL PENCIL

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Fig. 2.

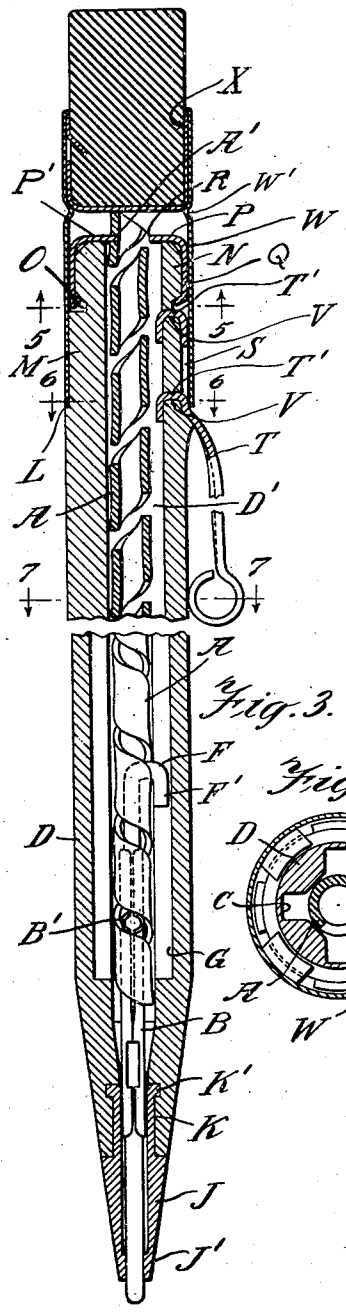


Fig. 1.

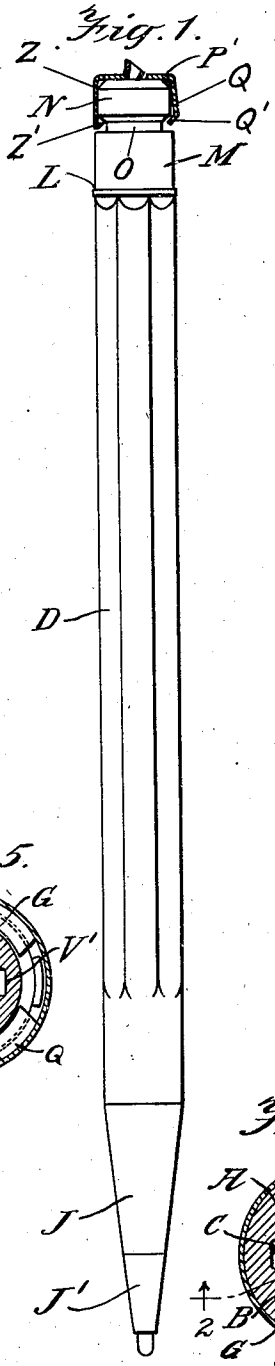


Fig. 4.

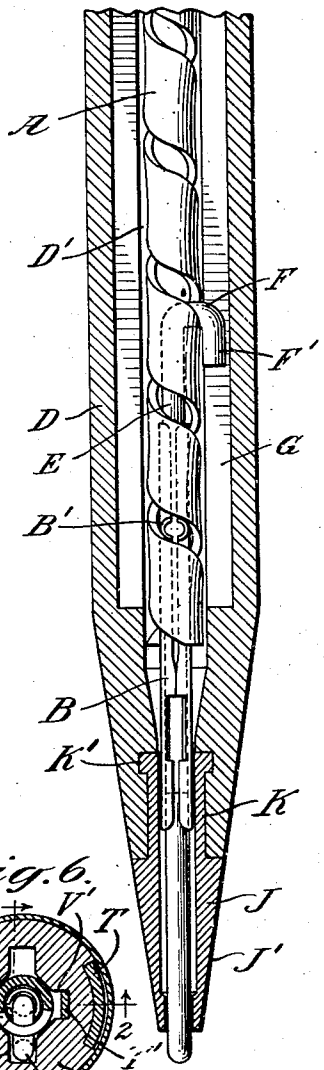
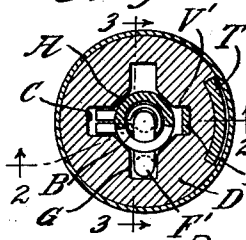


Fig. 3.

Fig. 5.

Fig. 6.



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Fig. 10.

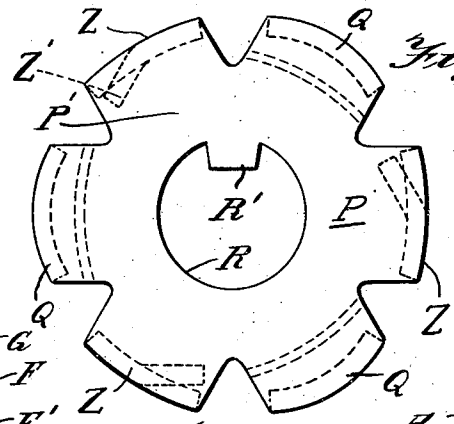


Fig. 8.

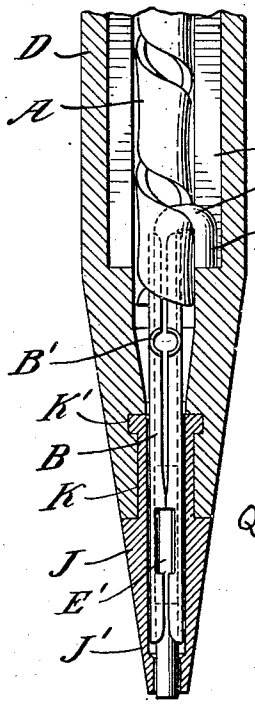


Fig. 9.

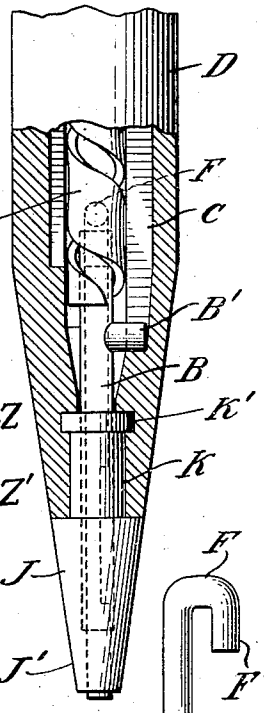


Fig. 11.

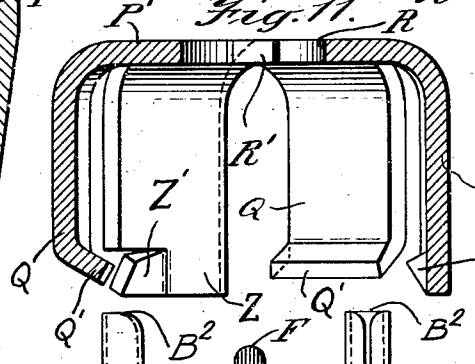


Fig. 14.

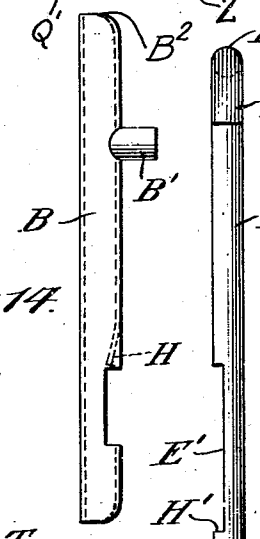


Fig. 15.

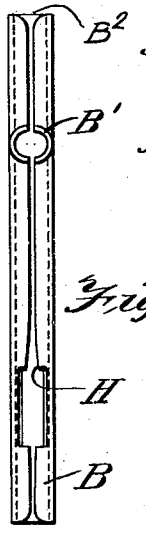


Fig. 7.

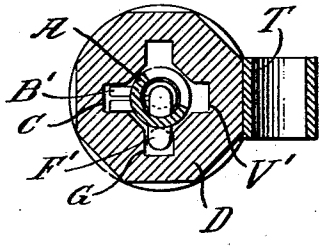
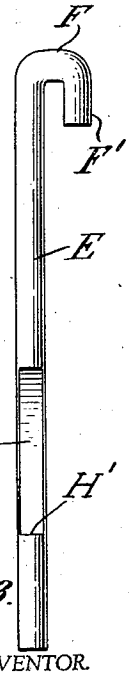


Fig. 12.

Fig. 13.



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UNITED STATES PATENT OFFICE

2,265,162

MECHANICAL PENCIL

Paul S. Hauton, Atlanta, Ga.

Application March 3, 1939, Serial No. 259,535

14 Claims. (Cl. 120—18)

This invention relates to mechanical pencils, and more especially to pencils adapted for use with leads of a length substantially co-extensive with the pencil casing.

An object of the invention is to provide a simplified pencil with a long lead feed which operates with certainty, particularly in connection with an ejector mechanism. To this end, the pencil and more particularly its casing, its lead drive mechanism and tip is so constructed that the lead gripping member can be fed to a position close to the tip orifice, and positively retracted from that position and the parts connected so as to avoid overdrive particularly at each end of the lead feed stroke.

Other objects and advantages of the invention will become apparent as the description proceeds.

While one embodiment of this invention is illustrated in the accompanying drawings, it is to be understood that such embodiment merely serves as an illustration of the underlying principles of the invention so that it may be readily comprehended by those skilled in the art, and is not intended as limiting the invention to the specific details disclosed therein.

In said drawings:

Fig. 1 is a front elevation, party in section, of an assembled pencil, without the ferrule and clip.

Fig. 2 is a vertical section of the upper part of a fully assembled pencil taken on line 2—2 of Fig. 6.

Fig. 3 is a vertical section of the writing end of the pencil, taken on line 3—3 of Fig. 6, with the lead moving mechanism shown in elevation.

Fig. 4 is an enlargement of the view of Fig. 3.

Fig. 5 is a section on line 5—5 of Fig. 2.

Fig. 6 is a section on line 6—6 of Fig. 2.

Fig. 7 is a section on line 7—7 of Fig. 2.

Fig. 8 is a vertical section through the writing end, showing the lead moving mechanism in elevation at the end of the lead ejecting stroke.

Fig. 9 is a similar partly section view, taken at right angles to Fig. 8.

Figs. 10 and 11 are, respectively, a top plan and vertical sectional view of one form of a helix driving cap.

Figs. 12 and 13 are, respectively, elevations at right angles to one another, of one form of a lead ejector pin, and

Figs. 14 and 15 are elevations at right angles to one another, of one form of a lead grip sleeve.

Continuing now by way of a more detailed description, one part of the lead moving mechanism comprises a helix A preferably consisting of coiled metal strip and a lead grip sleeve B movable relatively to the helix, the sleeve B having a laterally extending lug B′ projecting through and beyond the coil spacing or thread track between the adjacent turns of the helix. The lug B′ engages a slot or guide channel C preferably formed in the casing D and extending below the end of the helix at the writing end of the pencil, so that the sleeve B is constrained to move in a longitudinal direction, within the casing. The guide slot is preferably disposed parallel to the axis of the casing, as shown in its preferred form. Lug B′ is disengaged from the helix A at the end of the lead ejecting stroke, its further movement being stopped by engagement with the casing shoulder formed at the end of the slot C. (See Fig. 9.)

The lead grip sleeve preferably consists of a split tubular member whose front end is shaped to grip the lead firmly. In order that the lead grip sleeve may be cleared of the piece of lead remaining after the sleeve has stopped moving forward, an ejector mechanism cooperates with the lead grip sleeve and comprises a pin E slidable in the lead grip sleeve B. Pin E has a yoke or follower F projecting laterally between the turns of the helix A, and a dependent lug or leg F′, exterior to the helix A, engaging a longitudinal slot or channel G formed in the casing and constraining the lug F′ to move in a longitudinal direction when actuated by the helix A. The guide slot G preferably terminates at a point immediately above the lower end of the helix, so that without unduly increasing the length of the dependent leg F′ the ejecting pin E remains permanently engaged by the helix and continues to move longitudinally within the sleeve B after the latter is disengaged from the helix to completely eject the lead from the sleeve. Pin E has also a notch E′ which is used to stop the movement of E in sleeve B.

Sleeve B has inwardly projecting lips H which engage with shoulder H′ of the notch E′ on ejector pin E. The location of shoulder H′ gives the correct spacing of clutch lug B′ in relation to lug F of ejector pin E for engagement with helix A on the backward travel of pin E from the foremost or ejecting position of pin E and clutch B. To prevent lug B′ from entering helix A too soon the end B^2 of clutch B strikes lug F of pin E and spaces B′ and F at a distance which will prevent entrance of B′ on the first complete turn of the helix A.

The casing D is, in its preferred construction, molded to the form shown, and at its writing end has a lead guide tip J having an exposed tapered portion J′, and a reduced cylindrical end K, fitted

in the writing end of the casing, and keyed thereto by the annular flange K'.

The upper end of the casing is formed into cylindrical head M which is further reduced in diameter to form cylindrical head N. Annular groove O is located between M and N and serves as means for holding connecting cap P in engagement with casing D.

The connecting cap P is comprised of a circular disk P' and downwardly projecting fingers Q and Z. Disk P' is provided with an opening R concentric with the helix receiving opening D' in the casing D and has a lug R' projecting into opening R. Lug R' fits snugly into slot A' cut near the driving end of helix A. The ends of fingers Q and Z are bent into projections Q' and Z' which fit into groove O. Fingers Z spring inwardly to frictionally engage cylindrical head N. This friction prevents helix A from turning and retracting the lead into the casing under heavy writing pressure. Projections Q' also will engage the upper shoulder of groove O as soon as pressure is applied to the writing end of the lead. This is an additional safeguard against the lead being pushed into the casing accidentally. Fingers Q spring outwardly to frictionally engage with driving ferrule W. To prevent cap P from disengaging from head N when ferrule W is removed, projections Z' engage with the upper shoulder of groove O. To prevent up and down movement of connecting cap P on head N when the ferrule W is pushed over fingers Q, the projections Q' press against the upper shoulder of groove O and pull disk portion P' of cap P against the upper end of head N, thereby stopping all up and down movement of helix A in casing D.

The reduced barrel portion M is provided with an arcuate peripheral recess or seat S to receive the base of a pocket clip T so that its surface is flush with the surface of the reduced portion M. The clip is formed with a pair of longitudinally spaced lugs T', which are received in openings V in the casing wall, and pressed downwardly into the slot V formed in the casing, to thereby retain the clip firmly and rigidly on the casing.

In order to provide a manual drive for the feed mechanism, a manually operable ferrule W is fitted over the reduced portion M of the casing and thru fingers Q frictionally engages the helix connecting cap P to rotate the cap and its associated helix A. The ferrule W is open at both ends, one end abutting against the shoulder L on casing D, and the other end extending above the cap P to form a housing for an eraser cup X. An annular indent W', forming an inwardly projecting annular rib, is provided on the ferrule extension to stop and seat the eraser cup X thereon.

Although the invention has been described in its preferred embodiment, modifications will suggest themselves to those skilled in the art, and it is my intention to cover all such modifications as come within the scope of the appended claims.

It is claimed:

1. A pencil comprising a lead feeding means including a hollow casing having a plurality of longitudinally extending channels, a plurality of relatively movable lead actuating parts, each of said parts being guided in an individual channel, each of said channels having a stop for the movable part guided therein, at a different level from the stop in the other channel.

2. A mechanical pencil comprising lead feeding means including a plurality of relatively movable lead actuating members, each having a lug, a helix movably engaging each of the said lugs, in a super-posed relation, means exteriorly of the helix for constraining the said lugs to move longitudinally of the helix, each of said lug constraining means having a lug stop, one of said lug stops being at a point below the end of the helix, and adapted to permit the discharge of the lowermost lug from the helix at the end of the lead ejecting movement; the other of said lug constraining means having a lug stop in position to continuously retain the uppermost lug within the helix.

3. A lead carrying and ejecting mechanism for mechanical pencils, comprising a lead grip sleeve having a stop, an ejecting pin having a lug formed near one end and provided with a stop engaging member near the other end, said pin being slidably mounted in the sleeve with the lug extending therebeyond, the lead grip sleeve stop striking one end of the stop engaging member and the opposite end of the sleeve striking the projecting lug on the ejector pin, whereby movement of the ejector pin in relation to the sleeve is limited in either direction.

4. In a mechanical pencil having a hollow casing in combination, a connecting cap comprising a disc having means for attaching thereto a propelling helix, flexible fingers extending from said disc, some of said fingers being shaped for frictional engagement with the pencil casing, and other fingers being shaped for flexible driving engagement with a manually operated ferrule.

5. In a mechanical pencil construction, a hollow casing having a reduced cylindrical head at one end, an annular groove formed adjacent said head, a driving mechanism in said casing, a connecting cap for said driving mechanism for manipulating a lead fed from said pencil casing, said cap comprising a disk member having a central aperture which engages the driving mechanism, resilient fingers projecting from said cap, some of said fingers engaging the groove on said head, other fingers frictionally engaging a manually operable ferrule fitted over the end of the casing.

6. A casing for a mechanical pencil having a bore and a plurality of longitudinal slots opening into said bore, two of said slots having different lengths, determined by shoulders in said casing, said slots being adapted to guide therein lugs of a pencil mechanism and said shoulders being suited to determine different lengths of lug movements in said casing.

7. A mechanical pencil comprising lead feeding means including a hollow casing having a plurality of channels and a plurality of relatively movable lead actuating parts, each of said parts being guided in an individual channel and a lead grip sleeve, the casing having a tip adapted to receive the lead grip sleeve.

8. A mechanical pencil comprising a helix, a lead grip member having a lug engaged by the helix and adapted to disengage from said helix, a lead ejecting member in continuous engagement with the helix, means exteriorly of the helix for arresting the movement of the lead grip sleeve after said lug is disengaged from the helix and means exteriorly of the helix for arresting the movement of the lead ejecting member after the movement of the lead grip sleeve is limited.

9. A lead grip sleeve and ejector mechanism for mechanical pencil comprising a hollow sleeve, an ejector pin having a notch in the sleeve, the sleeve having a stop adapted to engage the notch to limit relative movement of the pin and sleeve.

10. In a mechanical pencil, a fixed member, a helix revoluble with respect to said member, a

lead holder and a lead ejector, each having a follower for engagement with the helix for movement longitudinally thereof as the helix is rotated, the fixed member having a key-way for the ejector follower, and a follower-stop therein to prevent disconnection of the ejector from the helix; the holder being disengageable from the helix for relative movement of ejector and holder to eject lead.

11. In a mechanical pencil, a fixed member, a helix revoluble with respect to said member, a lead holder and a lead ejector, followers on the holder and ejector for engagement with the helix, the fixed member having separate key-ways for said followers, whereby to cause the holder and ejector to move longitudinally of the fixed member as the helix is rotated, means in the fixed member for arresting and holding to the helix the element guided by such key-way, and the other key-way providing for release from the helix of the element guided thereby after a predetermined lead feeding movement of the parts.

12. A lead carrying and ejecting mechanism for mechanical pencils comprising a lead grip sleeve having a lug, an ejecting pin having a lug slidable in the lead grip sleeve, a helix for engaging said lugs, means carried by the ejector pin and lead grip sleeve for limiting the maximum spacing of the lugs and means other than the last named means and carried by the ejector pin and lead grip sleeve for limiting the minimum spacing so that the difference between the minimum and maximum spacing is less than one turn of the helix thread.

13. A mechanical pencil comprising a casing having a center bore with longitudinally extending channels, a lead grip sleeve having a lug engaging both the helix and a channel and adapted to disengage from the helix, a lead ejecting pin slidable in the lead grip sleeve and having a lug in continuous engagement with both the helix and a casing channel, means carried by the ejector pin and lead grip sleeve for limiting the maximum spacing of said lugs, that is, greater than one turn of the helix thread when both lugs are engaged by the helix and means other than the last named means for limiting the minimum spacing of said lugs, when the lug on the lead grip sleeve is disengaged from the helix, to a distance which will prevent entrance of the disengaged lug into the helix during the first reverse turn of said helix.

14. In a pencil the combination of a casing, a helix having spaced turns in the casing, and an ejector pin having a hook end comprising a transverse portion and a dependent end, the transverse portion of the hook end passing through the spaced turns of the helix and means in the casing to serve as a stop against which the dependent end of the hook strikes to arrest movement of the ejector pin.

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