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MECHANICAL PENCIL

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2 Claims. (Cl. 120—18)

This invention relates to mechanical pencils and has more special reference to pencils in which the lead holding member travels the entire length of the pencil so that a lead substantially as long as the pencil may be used.

Comprehensively stated, the invention aims to provide a simplified mechanical pencil which is so balanced and constructed as to afford writing ease and correct finger position. In order to achieve writing ease, the portion of the pencil remote from the writing end should be as light as possible and to accomplish this in a pencil in which the lead holder travels substantially the entire length of the pencil is one of the objects of the invention. While my copending application Serial No. 644,612, discloses an auxiliary sleeve of resilient material adapted to be slipped over the end of the pencil for promoting ease and correctness of finger grip, the present invention aims to utilize the auxiliary sleeve as a manually operable shell or casing part for driving one of the lead moving members and forming a pencil having a smooth exterior except for an annular protuberant portion in the region of the exposed lead guide tip. In order to maintain the flexible resilient sleeve in shape to withstand the finger pressure exerted thereon during the writing operation, a stiffening sleeve is utilized which, however, not only stiffens the resilient member but also affords a drive connection to one of the lead moving members and locks an exposed writing tip in place. In this manner, a mechanical pencil is achieved which affords writing comfort, which has a simplified construction at the writing end and which requires such a small space for the driving and aligning locking arrangement that the appearance of the pencil is not impaired.

While one embodiment of the invention is shown in the drawing accompanying this application and forming part thereof, it is to be understood that such embodiment is merely illustrative of the underlying principles of the invention so as to afford a clear understanding thereof to those skilled in the art and is not intended as limiting the invention to the specific form disclosed therein.

In said drawing:

Fig. 1 is a vertical section through a mechanical pencil made according to the present invention.

Fig. 2 is an outside view of the same, and Fig. 3 is a section of Fig. 1 on the line 3—3.

Referring now more in detail to the illustrations shown, in which similar parts throughout the different views are indicated by similar characters, one part of the lead operating mechanism is formed by the threaded helix 10 which is shown in Fig. 1 and whose lower part is represented in section, exposing the spirally arranged inner threads 10a. The helix may be formed in any convenient manner, for instance as described in my application Serial No. 561,829, by winding a strip of metal which is preferably provided with an end plate 10b to lock the free end of the helically wound strip in place. This helix encloses a rotatable slotted feed tube 11, presenting a slot 11a on one side which is closed off near the writing end of the pencil to stop the travel of one of the longitudinally moving wings of the pencil holder, as will be described hereafter. This feed tube 11 just clears and forms a sliding fit with the inner edge of the helical thread of the surrounding barrel, but as the latter is rigidly supported by the outer shell of the pencil stem while the feed tube is fixedly connected with the writing tip, both are movable in relation to each other in the same way as the writing tip is movable in relation to the outer shell of the stem, i. e., they can be rotated around their common axis in relation to each other, as will be hereafter more fully explained. The outer shell or barrel of the pencil is formed by a conically tapered tube 12, preferably of some light weight material such as paper, thin sheet metal or the like, the taper running toward the top of the pencil, as Figs. 1 and 2 indicate. The extremities 12a and 12b, however, are spun or pressed out into straight cylindrical ends to form seats for cylindrically formed members 13 and 14. Member 13 is a bushing or spacer, driven flush with the edge 12c of the inner end 12a of the shell and having its interior end 13a contracted so as to form a tight fitting collar around the helix 10, fixedly supporting the latter and keeping it in axial alignment with the shell 12. Into the straight end portion 12b, the cap 14 is inserted. This cap is preferably a spun metal thimble with a bead 14a formed around it to serve as a stop or shoulder abutting the end of the shell 12. The annular hollow space 15 between the outer shell and the helix 10 may, if desired, be utilized as a magazine for loose pencil or crayon bars and the inserted inner sleeve of the thimble below the bead may, with a slight modification of the parts concerned (not shown) be so shaped that it forms a tight fitting bushing between the helix and the shell, in that way

providing a second support to the former. At any rate, said helix and the shell constitute a rigid fixed combination. In axial alignment therewith, but manually rotatable in relation thereto is provided the writing end, indicated in its entirety by 16. This end comprises essentially two parts; the point or lead guide tip 16a and the finger grip sleeve 16b. The former part is essentially a conical frustum, preferably made of metal, axially perforated in suitable manner to enclose the members presently to be described. The taper of the front end of this guide tip is advantageously eased off toward a cylindrical extremity, as shown in Fig. 1, to provide a handy and slender writing tip from which the lead protrudes, the broad base 16c of the conical frustum abuts the holder in such a way that the abutting exterior surfaces of the holder and the guide tip form a flush even conical mantle. The holder is a resilient member with which the fingers of the writer contact. The front end of the holder, which as aforesaid, first forms a conical continuation of the guide tip, is restricted at a short distance further up by a polygonal surface 16' intersecting with the lower circular cone 16a, its taper running in the opposite direction and forming an obtuse angle with the first named taper. The top part of the holder is cylindrical and runs flush into the cylindrical portion 12a of the shell 12, above described. The outer form of the holder, as illustrated, forms an annular stop or protuberant portion to prevent the fingers from slipping toward the point and to prevent the pencil from rolling as described in my copending application Serial No. 644,612. It was pointed out before that the writing tip 16, which carries the slotted feed tube 11 is in rotatable connection with the shell 12 which, as shown, rigidly holds the internally threaded helix 10 in position, thereby bringing these two parts 10 and 11 into similar respective motive relation, and these connecting means will now be considered in detail. Where the cylindrical part of the holder 16b abuts the shell portion 12a and the bushing 13, there is interposed an anti-friction washer 17 of suitable material, whose outer rim is flush with both surfaces of shell 12 and holder 16b. The bore of the non-metallic holder 16b has an inner stiffening lining 18 which protrudes at both ends. The upper protruding sleeve 18a forms a loose fit around the helix 10 and projects into the clearance space between the bushing 13 and the tubing of the helix. The lower protruding end of the sleeve 18b is contracted into a smaller tube nozzle and is tightly fitted or driven into the lead guide tip 16a. The slotted feed tube 11, formerly described, is swaged over at its bottom end 11b, and this swaged over rim is firmly clamped between the lower edge of the sleeve 18b and a shoulder or offset in the bore which perforates the point or guide tip 16a. In

this way, a firm yet dismountable connection is effected between the writing tip 16 and the feed tube, telescoped into the threaded helix 10, as formerly described. The remaining members of the pencil controlling mechanism are the winged lead holder 19 which is adapted to ascend or descend inside the inner spiral thread of the helix 10 by means of a wing 19a, projecting through the slot in the feed tube 11 and engaging with the thread 10a; furthermore, the ejection or follower pin 20, slidably mounted within said feed tube and provided with a wing or lug 20a, projecting likewise through the tube slot and engaging with the thread. The threaded tube or helix 10 terminates, as in the formerly described invention, short of the closed portion of the slotted tube 11 and also before the lining 18 is contracted, so as to provide a clearance where the wing of the lead holder 19 may disengage from the thread and be arrested in its longitudinal downward movement while the ejector pin propels the stub end of the lead out of the lead holder. It will be observed that members 12 and 16 form relatively rotatable juxtaposed manually operable members, the member 12 driving the helix and the member 16 driving the lining member or sleeve 18, which also affords an interlocking connection to the slotted tube 11 and holds the tip 16a in place.

I claim:

1. A mechanical pencil combining an exposed tip, lead moving means comprising a threaded helix, a member having a longitudinal slot concentrically arranged therewith and rotatable relatively thereto, a lead engaging member having a wing engaging the helix with means comprising relatively rotatable members for enclosing the lead moving means, a tubular member snugly fitted within one of the relatively rotatable members and locking with the tip, and a bushing between one of said members and the helix to lock the two together, the bushing having a tubular portion spaced from the helix to provide clearance for receiving the end of the tubular member.
2. A mechanical pencil comprising a tip having a lead guide orifice, lead moving means comprising a threaded helix, and a slotted member, means comprising relatively movable exterior members arranged end to end for housing and driving the lead moving means, a cylindrical liner fitting the inside of one of the exterior members and extending beyond the end of said member and into the other exterior member and having a reduced lower cylindrical end for seating and locking with the slotted member beyond the end of said one exterior member, and a tapered tip having a friction fit on the said reduced end of the liner and abutted against the opposed end of the said one exterior member.

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