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MECHANICAL LEAD PENCIL WITH FINGER
OPERABLE LEAD PROJECTING AND RE-
TRACTING MEANS

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Various structural types of mechanical pencils having means for projecting and retracting the lead are known, but in such pencils the lead is not always clamped firmly, especially at the moment when it is propelled from the interior of the pencil, so that frequently it happens that the lead is always projected to the same extent, even though, when retracted, it ought to assume a definite starting position.

The object of the present invention is to provide a mechanical lead pencil with finger pressure controlled means for projecting and retracting the lead in which the above-mentioned defect is obviated.

According to the invention a mechanical lead pencil having a retractable lead and consisting of a guide tube, a presser tube, a presser cap and a tapered split head to cooperate with a clamping tube has the presser tube firmly attached to the clamping tube and the tapered split head carried by a tube secured to the bottom of a lead magazine, said bottom being provided with a pin which projects through two diametrically opposite longitudinal slots in the presser tube, and into two shorter corresponding longitudinal slots in the guide tube, which longitudinal slots control the displacement of the clamping tube and the split tapered head in such a manner that the split tapered head is opened before the presser cap is depressed.

A typical embodiment of the invention is illustrated in the accompanying drawings in which Figure 1 is a longitudinal section of a mechanical lead pencil, with the lead in position for writing, Fig. 1a is a longitudinal half section on an enlarged scale of the middle portion of Fig. 1, Fig. 1b is a view similar to Fig. 1a showing the relationship of parts when the presser cap is fully depressed, Figure 2 is a longitudinal section partly in elevation, of the mechanical lead pencil shown in Fig. 1 in the position prior to the depression of the presser cap, the writing lead being omitted for the sake of clarity, and Fig. 2a is a longitudinal section on an enlarged scale of the middle portion of Fig. 2.

In the shell 1 of the pencil is a guide tube 2, the lower end of which abuts against a ring 3 secured to a locking member 4 consisting of an annular series of hooked spring fingers. The upper end of the guide tube 2 is in threaded engagement with the shell 1 as at 5 and is formed with two diametrically opposite longitudinal slots 6', 6''. 7 is a presser tube slidable inside the guide tube 2 and has threaded on its upper end as at 8, a presser cap 9 which is slidable in a sleeve 10 threaded into the upper end of the shell 1 and clamping thereagainst a ring on which is

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formed a clip 11. The lower end of the presser tube 7 is firmly secured to the upper end of a clamping tube 12, and is formed with two diametrically opposite longitudinal slots 13', 13'' which are shorter than the slots 6', 6''. Secured to the clamping tube 12 is a so-called safety sleeve 14, which serves to hold together the out-turned end of the clamping tube 12 and the in-turned end of the presser tube 7, and, at the same time, serves also as a stop for a ring 15, which is slidable freely on the clamping tube 12 and serves to facilitate the unlocking of the locking member 4. The movement of the ring 15 which is of slightly larger diameter than a collar 16 fast on the clamping tube 12 is restricted by said collar and serves to splay out the fingers of the locking member 4. 17 is an externally flared head at the lower end of a split tube 17a formed with a spiral slit 18, to give the requisite resilience during writing. The presser tube 7 provides a magazine 19 for leads and the bottom 20 of said magazine 19 has secured thereto the tube which carries the tapered head 17, is movable in the presser tube 7 and has a cross pin 21 movable along the slots 13', 13'' in the presser tube 7 and the slots 6', 6'' in the guide tube 2. Between the inturned lower end of the presser tube 7 and the bottom 20 of the magazine 19, is disposed a closing spring 22 which abuts against the inturned lower end of the presser tube 7 and tends to slide the bottom 20 and pin 21 upwards with respect to tube 7 to an extent limited by the upper ends of the slots 13', 13''. The externally flared head 17 is adapted to cooperate with, and be gripped by, the lower end of the clamping tube 12 and is movable in a space in the tip 23, which is screwed into the shell 1 as at 24.

The normal, non-writing or rest position is shown in Figure 2 and it will be observed that the tapered head 17 is clear of the lower end of the clamping tube 12 and therefore does not exert any grip on the writing lead (not shown in Figure 2), the cross pin 21 is situated at the tops of the slots 6', 6'' in the guide tube 2 but is below the tops of the slots 13', 13'' in the presser tube 7 and the closing spring 22 is compressed. In this position a lead can freely move in the split tube 17a. If the pencil is held with its point upwardly, the lead can drop back into the magazine 19, but if held with its point downwardly, the lead can slide through the tube 17a and through the head 17 and the end of the lead will come to rest in abutting relation to the mouth end of the slit tip 23, the bore through which is of a size to prevent the lead from passing therethrough unless subjected to a certain force. Hence, it is not possible for the lead to

drop out of the pencil when held with the point directed downwardly. If in this position of the pencil, the presser cap 9 is pressed down, first of all the presser tube 7 is displaced against the action of spring 25 in connection with which the clamping tube 12, which is connected to the presser tube 7, is shifted to a position over the split, tapered head 17 so that in this way the lead is held fixed in said head. The head 17 itself, however, still remains in raised position until the clamping tube 12 abuts said head, whereupon, upon the further pressing down of the presser cap 9 and the shifting of the clamping tube 12, the head 17 is also carried along together with the held-fast lead. This carrying along of the head 17 is brought about by the engagement of the ends of the slits 13' and 13'' in the presser tube 7 with the pin 21 so that the presser tube 7, clamping tube 12 and the head 17, together with the lead, are moved downwardly and the lead is pressed through the bore of the tip 23. The collar 16 in this operation moves in front of the locking member 4 so that a moving back of the parts is normally prevented. The lead has now been pushed out to a certain extent from the tip 23 and thus prepared for writing. Upon the pushing out of the lead, therefore, the pressure cap 9 is pressed down to an extent sufficient to permit the locking member 4 to snap in behind the collar 16 which, when operating the pencil, can easily be felt by a counter pressure. When the collar 16 is forced through the hooked ends of the locking member 4, the ring 15 follows the collar 16, but, being of larger diameter than collar 16 and being free, it is stopped by member 4, allowing the hooks to snap in behind collar 16 and the ring 15. When the pressure cap is pressed further downward, the ring 15 is forced between the snap hooks of the locking member but not beyond them. Consequently, upon release of the pressure, the ring 15 keeps the hooks spread apart so that they slide over the gap between the ring and the collar and do not catch this time behind the collar 16.

When the lead is to be retracted into the pencil, the cap 9 must be depressed as far as possible.

Accordingly, if the presser cap 9 is pressed further downwardly, the ring 15 slides between the snap hooks of the locking member 4 and rests against the fixed collar 16. Upon the release of the presser cap 9, there occurs, due to the action of the spring 25, a displacement of the head 17 together with the lead, and of the clamping tube 12, together with the presser tube 7 in an upward direction until the pin 21 reaches the ends of the slots 6' and 6''. The head 17 thereupon remains stationary and only the presser tube 7, together with the clamping tube 12, continue to move upwardly away from the head 17. In this way the lead is again freed. In this position the lower end of the lead rests unclamped at the mouth of the tip 23. It will thus be appreciated that to project a lead to writing position, the presser cap is depressed a predetermined distance and released, and to retract the lead the presser cap must be depressed to its limit and released.

I claim:

1. A mechanical pencil comprising a shell, a guide tube fixedly mounted within the shell, a presser cap movable axially within one end of the shell, a tip member carried at the other end of the shell and having an axial passage therein through which a writing lead can only pass against friction, a clamping tube carried by the

presser cap and movable therewith, a lead magazine slidable in the guide tube and having depending from the inner end thereof an extension tube extending within the clamping tube, the remote end of said extension tube being formed with a split flared head adapted to clamp a writing lead when said head is engaged by the adjacent end of the clamping tube, means on the extension tube for cooperation with the guide tube and with the clamping tube whereby the extension tube can be moved by the guide tube toward the tip end of the pencil, latching means within the shell adapted for cooperation with means on the clamping tube to hold said tube in clamping relation with the split flared head on the extension tube whereby to grip a lead after the presser cap has been moved axially toward the tip end of the shell a predetermined distance, a collar movable by the clamping tube when it is moved a further axial distance, to disengage the latching means, and spring means for moving the clamping tube and the extension tube toward the presser cap end of the shell when the presser cap is moved the further axial distance.

2. A mechanical pencil comprising a shell, a guide tube fixedly mounted within the shell, a presser cap movable axially through one end of the shell, a tip member carried at the other end of the shell and having an axial passage therein through which a writing lead can only pass against friction, a clamping tube carried by the presser cap and movable therewith, said guide tube and said clamping tube each having a pair of diametrically opposed longitudinal slots in overlying relation, with the slots in the guide tube extending beyond the slots in the clamping tube in a direction toward the top end of the shell, a lead magazine slidable in the guide tube and having depending from the inner end thereof an extension tube extending within the clamping tube, the remote end of said extension tube being formed with a split flared head adapted to clamp a writing lead when said head is engaged by the adjacent end of the clamping tube, pin means on the extension tube engaging in the slots in the guide tube and clamping tube, spring means acting on said pin means for urging said extension tube toward the top end of the slots in the presser tube, additional spring means acting on said clamping tube to urge it toward the top end of the slots in the guide tube, latching means fixedly held within the shell adapted for cooperation with an enlargement on the clamping tube to hold said tube in clamping relation with the split tapered head on the extension tube whereby to grip a lead after the presser cap has been moved axially toward the tip end of the shell a predetermined distance and a slide ring movable by the clamping tube when it is moved a further axial distance, to disengage the latching means and permit the clamping tube and the extension tube to move toward the presser cap end of the shell under the action of the additional spring means and to disengage the clamping tube from the split flared head.

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