Nov. 8, 1932. C. W. BOMAN 1,886,371

PENCIL

Filed Aug. 15, 1929

FIG.1.

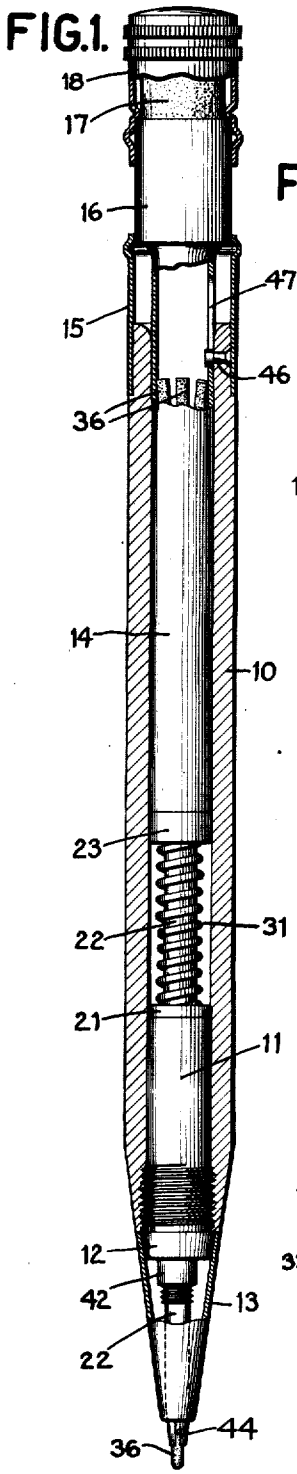


FIG.2.

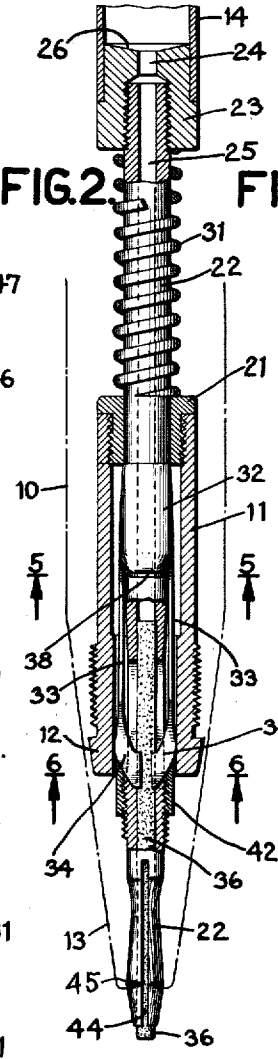


FIG.3.

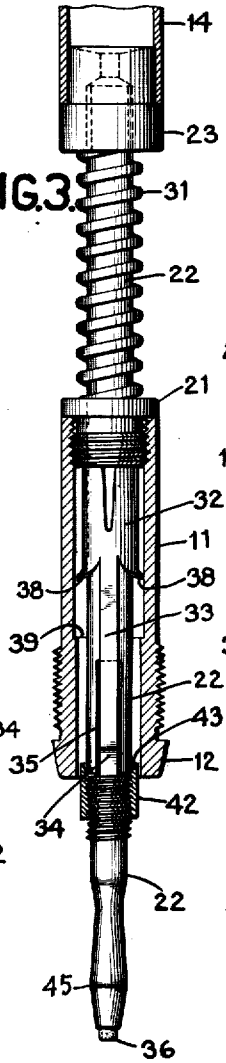


FIG.4.

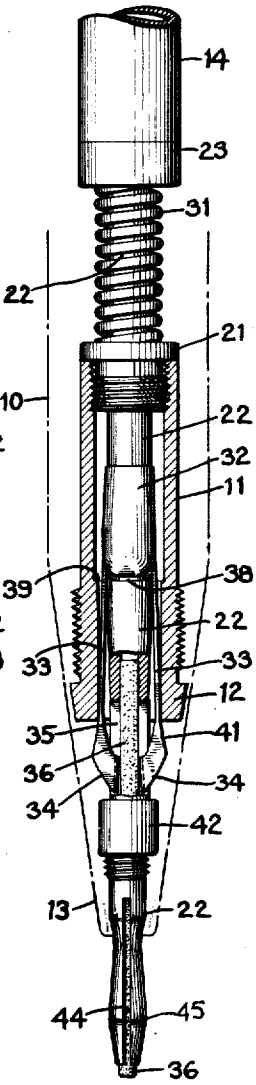
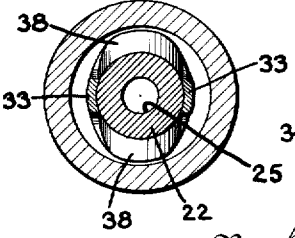


FIG.5.



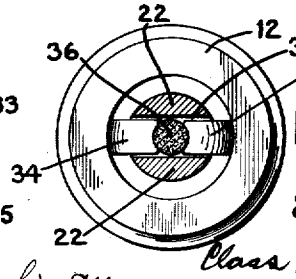


FIG.6.

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UNITED STATES PATENT OFFICE

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PENCIL

Application filed August 15, 1929. Serial No. 386,051.

This invention relates generally to pencils, and has particular reference to what are known in the trade as mechanical pencils.

One object of the invention is to provide a lead feeding mechanism which will feed the lead a step at a time, as distinguished from mechanisms in which the lead is fed by means of a screw and parts cooperating therewith.

Another object is to provide a lead feeding mechanism of the character generally stated, which is simple and sturdy in construction and which will work satisfactorily regardless of variations in the diameter of the lead.

Still another object is to provide a construction in which the lead is firmly held against reverse movement when writing pressure is applied to the exposed end of the lead. Incidentally, the mechanism is so arranged that the lead may be readily freed so that it may be thrust back into the pencil in case it should accidentally be fed too far or if it is desired to return the lead into the pencil to protect it from breakage.

With the foregoing and incidental objects in view, the invention consists in a novel construction and combination of parts, the novel features of which are pointed out in appended claims, a preferred embodiment being hereinafter described with references to the drawing which accompanies and forms a part of this specification.

Of said drawing:

Fig. 1 is a view of a pencil containing the improvements, with some of the parts cut away to expose others to view.

Fig. 2 is a sectional view through the devices in the lower end of the pencil and shows particularly one view of the lead feeding and locking mechanism.

Fig. 3 shows, partly in section, some of the lead feeding and locking devices and from a different angle than in Fig. 2.

Fig. 4 is substantially the same as Fig. 3 except that in Fig. 4 the parts are shown in the positions which they assume at a certain stage in a lead feeding operation.

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

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

The pencil shown in the drawing comprises a tubular body 10 which is tapered toward its writing end and is threaded on its interior adjacent the taper to receive the threads of a sleeve 11. Integral with the sleeve 11 is a tapered portion 12, to which is attached a tapered finishing shell 13. Sliding in the interior of the pencil body 10 is a tubular element 14 which serves as a magazine for the leads and also acts as a connection through which the feeding mechanism is operated. Surrounding the upper end of the body 10 is a collar 15 extending above the end of the pencil body and serving as a guide for an enlarged portion 16 integral with the part 14. This enlarged portion carries the usual eraser 17 and a covering cap 18.

The sleeve 11 is threaded on its interior to receive a bushing 21 which serves as a guide for a lead tube 22 which is threaded at its upper end. A nut 23 is screwed on to the threads of the lead tube 22 and is provided with a tubular opening 24 in alignment with and of approximately the same diameter as the interior 25 of the lead tube. The nut 23 is engaged by the lower end of the tubular member 14 and the top of the nut is inclined inward, as at 26, to direct the leads into the openings 24 and 25, the purpose of this being to enable the leads to drop one after another from the magazine into the tubular member 22. Between the bushing 21 and nut 23 is a spring 31 surrounding the lead tube 22. Surrounding the lead tube 22 below the bushing 21 is a spring collar 32 which is so constructed as to frictionally grip the tube. Extending from the spring collar are thin springs 33 which carry jaws shaped as shown at 34 extending through longitudinal slots 35 in the lead tube. In the normal positions of the parts (the positions shown in Fig. 2) the jaws 34 are held in engagement with the lead 36, to prevent reverse movement of the lead.

The spring collar 32 and the jaws 34 carried thereby tend at all times to move with the lead tube 22 because of the frictional grip of the collar on the tube. The movement of the collar in either direction is, however, substantially only half the movement of the tube so as to cause a movement of the

tube relative to the collar when the tube is reciprocated. This relative movement is obtained in one direction by shoulders 38 on the spring collar striking an internal shoulder 39 in the sleeve 11 and arresting the collar and in the other direction by the end of the collar striking the inner face of the bushing 21. The movement of the tube relative to the spring collar and jaws 34 effects the feeding of the lead as hereinafter explained.

In the normal positions of the parts, as shown in Figs. 1 and 2, the jaws 34 are held in gripping contact with the lead by the engagement of shoulders 41 on the jaws with the interior of the sleeve 11. In addition, the jaws are locked in engagement with the lead by providing a collar 42 which is threaded on the lead tube 22 and beveling the upper edge of the collar, as shown at 43, to engage points on the jaws 34. This bevel serves both to seat the upper end of the collar 32 firmly against the nut 21 and force the jaws 34 together against the lead.

During approximately the first half of the feeding stroke of the tube 22, the friction of the spring collar 32 will cause the collar 42 to hold the portions 34 in gripping contact with the lead 36 to draw the lead along until the shoulders 38 on the spring collar engage the internal shoulder 39 and arrest the collar. The continued movement of the tube 22 will disengage the collar 42 from the portions 34 and allow them to spring open to permit the lead to drop past. When the tube 22 is returned by the spring 31 the frictional engagement of the collar 32 with the tube 22 will cause the portions to be closed against the lead to hold the lead stationary during the rest of the return movement of the tube 22, and the collar or jam nut 42 will reengage the grips 34 on the springs 33 to lock the grips against the lead.

The lower end of the tube 22 is slotted in the usual way, as at 44, to provide a frictional clutch for the lead, thereby causing the lead and tube to move as a unit after the lead has engaged the friction clutch 44 and after the springs 33 have moved outward to the positions shown in Fig. 4. The lower end of the tube 22 is also formed as shown at 45 to provide an additional means for holding the lead against reverse movement. When the tube is in its normal position the enlargement 45 cooperates with the interior of the shell 13 to cause the split end of the tube to firmly grasp the lead more, but when the tube is moved to feed the lead the portions 45 will be carried clear of the shell and leave only the frictional spring grip of the members 44 on the lead until the parts are returned to their normal positions.

A pin 46 in the pencil body extending into a slot 47 in the tubular member 14 serves to limit the tubular member 14 to an endwise movement and also prevent accidental withdrawal of the tubular member from the pencil.

When first placing the pencil in operation it is necessary to hold it point down and depress or push the cap 18 to carry the jaws 34 away from the sleeve 11 and also disengage the bevel 43 from the points of the jaws 34. The springs 33 will then move the jaws 34 apart as shown in Fig. 4 and allow a lead to drop past the jaws and into engagement with the interior of the spring clutch members 44. Another reciprocation or two will firmly engage the lead with the members 44 and the lead can thereafter be fed by reciprocating the lead tube, by means of the cap 18, with the pencil turned to point upward.

Each time operating pressure is applied to the cap 18 the lead tube is moved endwise in one direction relative to the sleeve 11 and then returned in the opposite direction by the spring 31. During the first or feeding movement the frictional clutch members 44 and the jaws 34 will both grip the lead during approximately the first half of the movement or until the shoulders 38 on the spring collar strike the internal shoulder 39, whereupon the collar is arrested and the internal bevel 43 in the nut 42 is carried away from the points of the jaws 34 and the jaws are then released from the lead. During the rest of the feeding movement (approximately the second half of the movement) the frictional clutch members 44 will draw the lead past the jaws 34. When the pressure is released the spring 31 will return the tube 22 to its starting point. During the first part of the return movement the tube 22 and the spring collar 32 will move together until the portions 41 on the jaws 34 engage the interior of the sleeve 11 and cause the jaws to engage the lead and hold it firmly enough to cause the frictional clutch members 44 to slip over the lead so that at the end of the feeding movement a new section of the lead will project as at 36. At the end of this feeding movement the internal bevel 43 will have engaged the end of the jaws 34 to lock the jaws against the lead and the upper end of the spring collar 32 will have been forced firmly against the lower face of the bushing 21, so that the lead will be firmly held against reverse movement when writing pressure is applied at the end of the lead.

From all of the foregoing it is apparent that the pencil can be operated to feed a lead by repeated reciprocations of the lead tube 22, and that between feeding operations the lead is firmly held against reverse movement. If it is desired to release the lead so as to thrust it back in the pencil, the feeding mechanism is operated to about the stage shown in Fig. 4 to free the lead, whereupon

the lead may be forced inward and the feeding mechanism released.

In explaining one embodiment of the invention it has been necessary to describe the parts in detail, but it is not the desire to be limited to such details except as they may be included in the claims which follow.

What is claimed is:

1. In a pencil of the character described, a casing, a lead guiding tube longitudinally movable in the casing, a member mounted upon and moved by said tube constructed to form springs, lead gripping jaws supported on said springs, a stationary tube within the casing surrounding the jaws and their springs and normally holding the jaws in contact with the lead, said jaws being removed from control of the stationary tube when the lead tube is moved in the lead feeding direction, separate means on the lead tube for holding the jaws in engagement with the lead when the jaws are under the control of the stationary tube, said separate means releasing the jaws during the lead feeding movement, and a return spring for restoring the lead tube and feeding mechanism to normal condition.

2. In a pencil of the character described, a plurality of longitudinally movable lead gripping jaws, manually operable means for effecting the longitudinal movement of said jaws in one direction, means normally holding said jaws in gripping engagement with the lead during the major part of the feeding movement of the lead, spring means for disengaging the jaws during the feeding movement, devices comprising a return spring for effecting re-engagement of the gripping jaws with the lead at a higher point, a clutch for gripping the lead near the writing point, and means for holding the clutch in locking engagement with the lead rendered effective by the return spring.

3. In a step-by-step pencil, a lead tube movable longitudinally and a spring for returning it, said tube having a slotted portion, a spring clutch slidable on said tube provided with springs having lead gripping jaws acting through the slots in the tube, a stationary member surrounding said clutch and springs and provided with stops for limiting movement of the clutch by the tube, said member holding the gripping jaws against the lead and freeing said portions and the lead when carried clear of the member by movement of the lead tube, a jam nut on the tube cooperating with the gripping portions to lock the latter against the lead, and a clutch for gripping the lead near the writing point of the pencil.

4. In a step-by-step pencil, a member movable longitudinally and a spring for returning it, a spring carrier slidable on said member, a stationary member surrounding the movable member and carrier and having stops to limit the movements of the carrier, lead gripping jaws on the ends of the springs on the carrier held in engagement with the lead by the stationary member and disengaged when carried from the stationary member by the aforesaid longitudinal movable member, a jam nut on the movable member cooperating with the stationary member to lock the gripping jaws in engagement with the lead between operations of the longitudinally movable member, and a clutch normally engaging the lead near the writing point.

5. In a step-by-step pencil, a reciprocatory lead tube having longitudinal slots in its side, lead gripping springs acting through said slots to grip the lead, a stationary member normally holding said springs flexed to grip the lead, means carried by the lead tube for moving said springs to free them from the stationary member to release them, a jam nut on said tube normally holding the springs in gripping contact with the lead and movable to release the springs after they have been released by the stationary member, a spring clutch on the end of the tube, and means for acting on the clutch to grip the lead near the writing point more firmly after the lead has been fed.

6. In a pencil of the character described, a pencil casing, devices mounted for unitary reciprocatory movement in said casing comprising a lead guiding tube having slots in its sides and a clutch for the lead adjacent the writing point of the pencil, said devices being manually movable in one direction, a return spring between the casing and said devices for moving said devices in the other direction, lead gripping devices extending through the slots in the lead guiding tube, devices for operating the gripping devices during the return movement of the lead guide tube to hold the lead stationary with respect to the tube and the aforesaid clutch, and a member on the tube acting to lock the lead gripping devices against the lead at the end of the return movement.

7. In a pencil of the character described, a pencil casing, devices mounted for unitary reciprocatory movement in said casing comprising a lead guiding tube having slots in its sides and a split clutch for the lead adjacent the writing point of the pencil, said devices being manually movable in one direction, a return spring between the casing and said devices for moving the devices in the other direction, a member frictionally engaging the lead guiding tube and carrying lead gripping devices extending through the slots in the lead guiding tube, devices stationary with respect to the casing and cooperating with the gripping devices to cause said gripping devices to hold the lead stationary with respect to the split clutch during a part of the return move-

ment of the lead guiding tube and split clutch, and a jam nut on the lead guiding tube acting to lock the gripping devices against the lead near the end of the return movement of the tube.

In testimony whereof I hereto affix my signature.

CLAES W. BOMAN.

CERTIFICATE OF CORRECTION.

Patent No. 1,886,371. November 8, 1932.

CLAES W. BOMAN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 24, beginning with the word "During" strike out all to and including "lead." in line 42; same page, line 56, strike out the word "firmly" and insert same to follow the word "more" in the same line; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 27th day of December, A. D. 1932.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)

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