June 30, 1942. J. P. LYNN 2,287,894

MECHANICAL PENCIL

Original Filed June 15, 1938

Fig. 1.

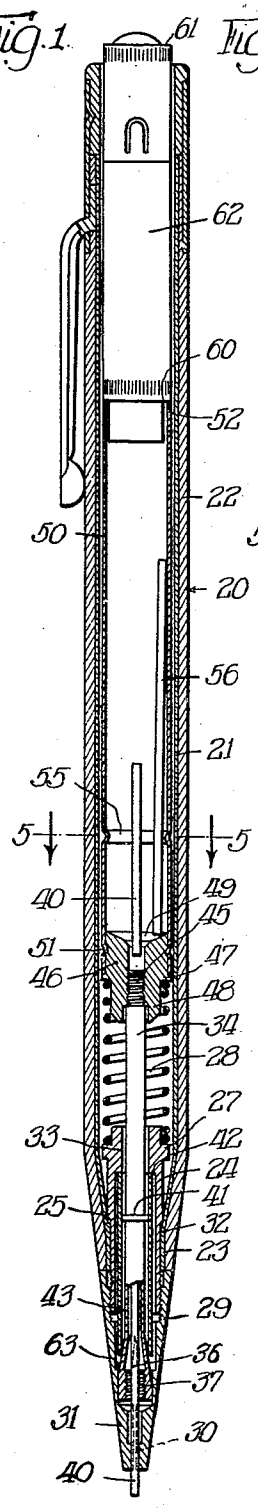


Fig. 3.

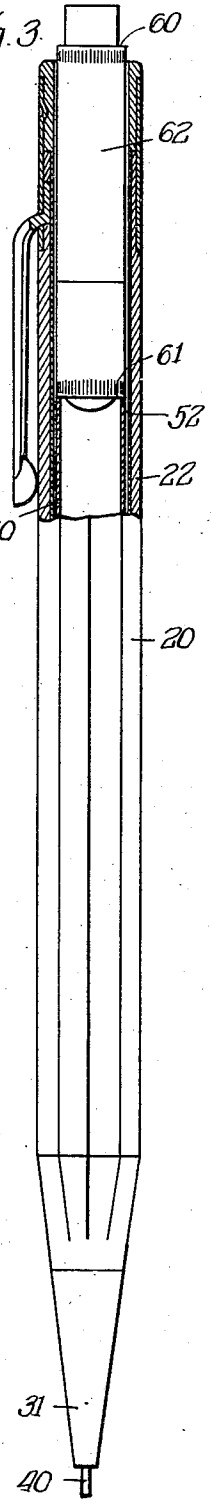


Fig. 2.

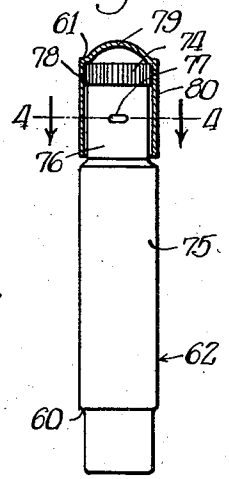


Fig. 6.

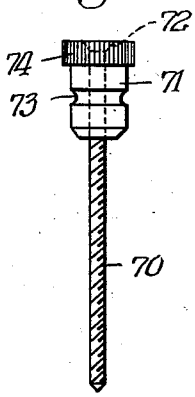


Fig. 4.

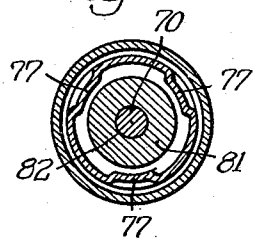


Fig. 7.

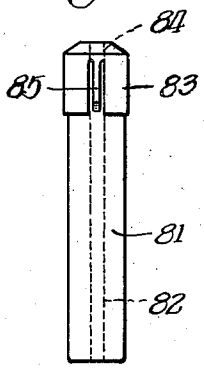
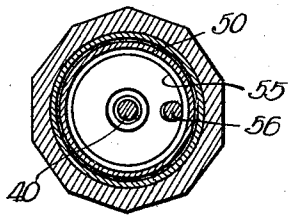


Fig. 5.



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MECHANICAL PENCIL

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Continuation of application Serial No. 213,754, June 15, 1938. This application October 10, 1941, Serial No. 414,398

1 Claim. (Cl. 120—17)

This is a continuation of applicant's copending application Serial No. 213,754, filed June 15, 1938.

This invention relates to improvements in mechanical pencils and particularly to a novel pencil construction of the type which feeds or propels the lead by a step-by-step movement, as by a pumping action exerted on a movable member carried in the upper end of the pencil.

It is an object of this invention to provide a novel pencil of the type referred to, in which the movable pumping or actuating member mounted in the upper end of the pencil is removable therefrom and is capable of being inserted into operative position with either of its ends innermost, whereby the actuating member referred to is adapted to constitute not only the pumping member for actuating the lead feeding mechanism, but is also adapted to form an auxiliary part of the pencil, such as, for instance, an eraser thereof, or an eraser magazine or lead magazine as may be desired in any particular case.

In the pencil of this invention, however, the pumping or actuating member may be entirely removed from the pencil, in which event the lead feeding mechanism will not be accessible for operation while the pumping or actuating member itself is made readily available to present an eraser or a magazine, as may be the case, for use by or accessibility to the operator. Furthermore, the pumping or actuating member is adapted to be inserted into an upper chamber in the pencil and in the inserted position to coact by abutment or similar engagement with the associated part of the pencil mechanism, whereby the pumping movement of the actuating member will be entirely imparted to the lead feeding mechanism for the advancement of leads in a manner characteristic of this type of feeding mechanism.

It is also contemplated that the pumping or actuating member may be inserted with either end innermost, or, in other words, it is intended that the actuating member be reversible, end for end, and in either position be adapted to have coacting engagement with the associated pencil mechanism whereby it functions in the pumping or lead advancing action with equal facility in either position. When the actuating member is formed as an eraser, the reversibility permits one end thereof to be provided with a decorative cap for the pencil and the other end to hold an eraser, with the result that either the eraser or the decorative cap may be positioned outermost, as may be desired by the operator.

The full nature of this invention will be better understood by referring to the accompanying drawing, in which—

Figure 1 is a longitudinal cross sectional view of a mechanical pencil constructed in accordance with this invention.

Figure 2 is an elevational view, partly in cross section, of the actuating or pumping member utilized in the construction shown in Figure 1, and here illustrated as a propelling and repelling eraser assembly.

Figure 3 is an elevational view, partly in cross section, of the pencil shown in Figure 1, illustrating the same construction but with the pumping or actuating member inserted in reverse position.

Figure 4 is a cross sectional view taken on the line 4—4 of Figure 2.

Figure 5 is a cross sectional view taken on the line 5—5 of Figure 1.

Figure 6 is a side elevational view of a threaded stem and head-piece utilized in an eraser assembly which constitutes the actuating member illustrated in Figure 2; and

Figure 7 is a side elevational view of an eraser and cap member utilized in the assembly constituting the actuating member shown in Figure 2.

By referring to the drawing, and particularly Figure 1 thereof, it will be noted that the form of the invention illustrated comprises a pencil having a body 20 composed of a metallic tube 21 and a finishing sleeve or tube 22, which preferably may be formed of a decorative material such as pyroxylin, molded resin, or any other material suitable for this purpose.

The lower end of the tube 21 tapers inwardly, as shown in Figure 1, and terminates in a cylindrical end portion 23 of reduced diameter, and the outer finishing tube tapers likewise. Fixed within the reduced portion 23 of the metallic tube 21 is a guide block member 24, preferably provided with a shoulder 25 disposed in abutment with the inner tapered surface of the tube 21 so as to hold the guide block against movement in the direction of the tip of the pencil but permits the guide block to be withdrawn in the opposite direction.

The guide block further has a shoulder 27 adjacent its upper end to provide a seat for the coil spring 28 disposed thereabove. The lower end of the block projects beyond the end of the tube 21 and is preferably threaded to form an attachment for the pencil tip 29. The tip is recessed in the manner shown and is preferably

provided with slots 30 at its lower end 31 to provide a pair of fingers to press inwardly in a manner to frictionally grip the lead for the purpose well understood in connection with this type of pencil.

The guide block 24 is provided with a recess 32 and a guide bearing 33 adjacent its top. Disposed within the guide bearing 33 is an elongated clutch member 34 which is substantially cylindrical in cross section and extends from a point well above the guide block down through the bearing 33 to a point below the end of the guide block and into the upper recess of the tip 29. This clutch is slotted, as at 36, adjacent its lower end to form a plurality of fingers which are normally sprung outwardly and which are provided with gripping teeth 37 on their inner surfaces. The clutch fingers are further constructed with outer surfaces which assume a tapered or inclined position when the fingers are sprung outwardly to their normal positions. The clutch member is hollow, as illustrated in Figure 1, and has an internal bore of a size to accommodate a writing lead 40 which is caused to feed and pass therethrough during the operation of the pencil.

On the outer surface of the elongated clutch is a small flange 41, or other suitable abutment, which is adapted to engage the upper shoulder 42 on the inner surface of the guide block 24 so as to prevent further upward movement of the clutch member when no lead is disposed between the clutch fingers.

Mounted within the recess provided in the guide block 24 and the tip 29 is a floating sleeve 43 which has an internal diameter at its upper portion of sufficient size to freely pass over the flange 41, and is of such length that it is permitted to have a limited movement within the recess in which it is located. The sleeve 43 is so constructed that its internal diameter is smaller than the diameter of the bottom of the lead-gripping clutch when the fingers thereof are in expanded position, so that when the clutch member is forced into the sleeve 43, the lower end of the sleeve will engage the outer tapered surfaces of the clutch fingers and cause the fingers to be moved inwardly in a manner to firmly grip the lead disposed therebetween.

The upper end of the clutch member is threaded, as at 45, and is attached to a lead guide block 46. This block is provided with a shoulder 47 and a hub 48, the latter of which forms a seat for the upper end of the coil spring 28. The guide block 46 is further provided with a threaded recess providing an attachment for the upper end 45 of the clutch member 34. The upper surface of the lead guide block is preferably provided with a tapered recess 49 which forms a base for a lead magazine of funnel-like shape, which, in cooperation with the means hereinafter described, will assure an accurate feeding of the lead pieces in succession, one after the other, into the upper end of the clutch tube. It will be noted that the clutch member 34, which is centrally bored to receive the lead, presents its upper end at the base of the funnel-like member, whereby an unobstructed passage is provided for automatically feeding by gravity the leads into the upper end of the clutch member.

The lead guiding block 46 has attached to its outer surface a metallic tube 50, which is connected thereto by any suitable means, such as by punch marks 51. This tube is slidably positioned within the body tube 21 and serves as a magazine for spare leads and also as a part of the actuating mechanism for pumping the lead during the lead feeding operation.

The upper end of the tube 50 extends upwardly to a point adjacent the upper end of the pencil, but terminates within the body of the pencil, or, in other words, below the upper edge of the pencil body. The upper end of the lead magazine tube 50 is shown at 52 in Figure 1, and is of such construction that it forms an abutment for engagement with a cooperating abutment 60 or 61 of the pumping or actuating member 62.

As particularly shown in Figure 1, the actuating member here illustrated is an eraser assembly which is inserted in the upper end of the pencil, that is, in a manner to occupy the space above the upper end 52 of the lead magazine tube 50, and in such manner that its lower end 60 engages the upper end 52 of the magazine tube, so that the eraser assembly serves as a means extending outwardly beyond the end of the pencil for receiving the manual pumping action and to, in turn, impart the same to the lead magazine tube and thence to the guide block 46 and clutch member 34.

In the form here illustrated, the lower end of the lead magazine is provided with a circular bead 55 which may be rolled into the metallic tube 50 or otherwise formed therein and which provides an annular support or seat for engaging the stored leads a short distance above the lower ends thereof. The action of this support is best illustrated in Figure 1, wherein a new piece of lead 56 is shown in the magazine awaiting subsequent use after the lead 40 has been advanced to a point where its upper end passes below the funnel portion 49 of the lead guide block 46. The circular bead 55 prevents the leads 56 from becoming positioned flatly against the sides of the lead magazine and, by virtue of its location near the bottom of the magazine, causes the lower feeding end of the lead to be disposed well onto the inclined portion of the funnel-shaped base 49. Thus, each of the leads in the magazine is caused to be tilted toward the lead feeding opening so that each lead in succession is caused to be automatically fed into the clutch member 34 without liability of the leads of the magazine becoming stuck against the wall of the magazine, or the leads becoming inadvertently held one by the other against proper feeding movement. This structure eliminates the necessity for excessive shaking or other haphazard attempts to feed the leads.

With this understanding of the above construction, it will be apparent that when the lead 40, projecting from the lower end of the pencil, becomes sufficiently short to require feeding, the upper end of the eraser or actuating mechanism 62 may be pumped downwardly, preferably by the thumb of the operator, and then permitted to return to its normal position under the influence of the spring 28. The downward movement of the actuating or eraser mechanism 62, carried in the top portion of the pencil, is imparted to the upper end of the magazine tube 50 by the contact between shoulders 60 and 52, with the result that the lead guide block 46 is also moved downwardly against the action of the spring 28 and carries with it the clutch member 34, which, by virtue of the constricting action of the sleeve 43, is in tight holding engagement with the lead disposed between the clutch fingers.

Further, as the clutch member moves downwardly, the sleeve 43 is caused to move down-

wardly also, due to its tight frictional engagement with the tapered portions of the clutch fingers. As shown in Figure 1, there is an adequate space in the recesses of the tip **29** to accommodate the clutch and the sleeve **43** in their lowermost positions, but it is to be observed that after the parts have been moved downwardly a predetermined distance the lower end of the sleeve **43** will engage the shoulder **63** provided in the recess of the tip **29**, with the result that downward movement of the sleeve **43** is arrested. However, the space in the tip is nevertheless adequate to permit a further downward movement of the clutch member **34**, whereby the continued downward thrust causes the clutch member to free itself from the lower end of the sleeve **43** and to move down into position where the spring fingers of the clutch member are free to expand under the influence of their normal resilience and to thereby release their grip on the lead.

It will be observed that the downward movement thus effected has caused the lead to move downward bodily with the clutch member against the friction at the outer end of the tip. This movement of the lead is so adjusted that its degree of advancement is just sufficient to lengthen the lead the desired amount to renew the available leads for writing purposes.

Upon the release of the actuating member **62**, the magazine tube, lead guide block, clutch and sleeve are all caused to return to their upper positions by the action of the spring **28**, so that upon such release the pencil parts are promptly restored to their normal positions. In such normal position, it will be apparent that the sleeve **43** rides upwardly in advance of the tapered portions of the clutch fingers and continues such upward movement until its upper end abuts the shoulder **42** of the block member **24**, which abutment causes the sleeve to come to rest and the clutch fingers to be wedged into the sleeve in a manner to cause the clutch fingers to grip upon the lead at a new portion thereof.

The clutch mechanism is now in tight engagement with the lead and is, therefore, ready for the next successive downward thrust of the actuating member when the lead is to be advanced. During the return movement, when the clutch is out of engagement with the lead, the lead is tightly held by the friction gripping fingers at the tip end of the pencil. During the use of the pencil for writing purposes, the lead is not only held by friction at the end of the pencil, but is also held against inward movement by the holding action of the clutch itself. It will be apparent that as the particular lead is advanced a number of times through a succession of step-by-step movements, that its end will ultimately become disposed below the funnel portion **49** of the lead guide block, after which a new lead, held in the magazine in a position tilted toward the lead feeding opening, will automatically feed itself by gravity into the lead-receiving opening, with the result that all of the leads stored in the magazine will automatically be fed successively, one after the other, until the lead magazine is exhausted.

This type of pencil is capable of holding a relatively large number of leads, and as they are fed successively and entirely automatically the supply of lead lasts an extremely long time.

The actuating member may be of any suitable construction, but as above pointed out, it is intended that it be freely removable from the chamber in the upper portion of the pencil located above the upper end of the lead magazine and, being removable and reversible, it may be constructed in the form of an eraser which, in turn, may be of usual construction or some special construction, such as that illustrated here.

The illustrated form comprises an eraser which is best illustrated in Figures 2, 4, 6 and 7, from which it will be noted that the assembly comprises a threaded screw **70** which is permanently attached to a head **71**. The head is preferably drilled and inserted over the screw member, with the screw end enlarged, as at **72**, in the opening at the top of the head so as to hold the members in fixed relationship. The head is also provided with an annular groove **73** and a flange **74** preferably having a knurled outer surface.

Surrounding the threaded member **70** is a tubular body portion **75** having its upper end reduced, as at **76**, for engaging that portion of the head below the flange **74**. The fit at this point is so adjusted that the sleeve may turn relative to the head when desired. The tube has indented portions **77** which fit within the groove **73** of the head, whereby the sleeve is held against axial displacement, while at the same time being free to rotate on the head.

Preferably, a cap member **78** having a domed or other decorative end **79** is fitted over the knurled flange **74** and fixedly attached thereto. The depending portion **80** of the cap **78** is of such diameter that it forms a continuaton of the cylindrical surface of the tubular body portion **75**, from which it will be apparent that the eraser assembly may be inserted into the upper chamber of the pencil with either end innermost. It will further be apparent that the eraser assembly which constitutes the pencil actuating member may be entirely withdrawn from the pencil by an endwise pull thereof, and when it is so removed the tube **75** may be held in the fingers of one hand while the cap **80** is turned by the other hand, and that such operation will produce a relative turning movement between the tubular body **75** and the screw **70**.

Disposed within the tubular body **75** is an elongated eraser **81** having a central opening **82** therein. This eraser has one end fitted in a cap **83** which has a central screw threaded opening **84** at the top for threaded engagement with the screw **70**. The cap further has spring fingers **85** for tightly gripping the eraser, whereby the eraser is held against axial and rotational movement relative to the cap member. Furthermore, the spring fingers **85**, by virtue of their construction, are caused to project slightly outwardly beyond the exterior of the cylindrical surface of the cap member **83**, whereby they provide a slight frictional drag on the interior of the cylindrical body **75**.

The construction described is such that although the eraser is not positively held against rotation in the body tube **75**, it will, nevertheless, resist such rotation due to the frictional action of the spring fingers **85**, whereby the turning of the cap **78** with reference to the body **75** will cause the eraser to be projected from the tubular body or drawn into the tubular body, depending upon the relative direction of rotation. Furthermore, when the eraser is turned into the tube to the maximum extent possible, the parts will not strike or bind in such manner as might strip the threads of the screw, but, instead, the eraser will turn bodily in the holding tube and thus avoid all damage to the device.

The opening **82** in the eraser is at all times

sufficiently free to accommodate the screw without interference. Preferably the opening 82 in the eraser does not extend all the way through, but this is immaterial because the eraser functions in a satisfactory manner irrespective of whether it is or is not provided with a central hole.

It will thus be apparent that when the eraser wears down it may be withdrawn from the end of the pencil and the cap thereof may be turned relative to the body to cause it to project from the body a sufficient amount to enable it to be readily used again. If desired, the eraser may be retracted into the body of the tube or it may be left in its adjusted position.

From the above description it will be noted that the eraser assembly or other actuating member is capable of being reversed in position so that the cap member 78 is inside of the pencil and the end of the eraser projects beyond the end of the pencil. When in this position, the end of the eraser is presented in a manner to be used in the customary way, but at the same time the eraser assembly is still capable of functioning as the actuating member for the lead feeding mechanism. In such position, the outer edge 61 of the cap 80 abuts the upper end 52 of the lead magazine tube so as to transmit the operating thrust in exactly the same manner as when the eraser assembly is in reverse position.

What is claimed is:

A mechanical pencil having, in combination, lead feeding means at the lower portion thereof and an upper chamber, a lead magazine slidably mounted in said chamber and having its upper end terminating short of the upper end of said chamber, actuating means for causing an up and down motion to said magazine mounted in said chamber and extending beyond the upper end of said pencil, means connecting said magazine and said lead feeding mechanism, and said magazine and actuating means having abutting engagement inside of said chamber and below the upper end thereof, and further having free sliding contact against the inside walls of said chamber, and said actuating means being held in operative position in said chamber by frictional engagement with the inside walls of said chamber, and being removable from said chamber by an endwise pull but being reversible in said chamber end to end for actuating said pencil in either position thereof, and said actuating means further having a space therein adapted to house an eraser.

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