Oct. 5, 1937. R. BACK 2,095,091

MECHANICAL PENCIL

Filed March 25, 1935

Fig. 1

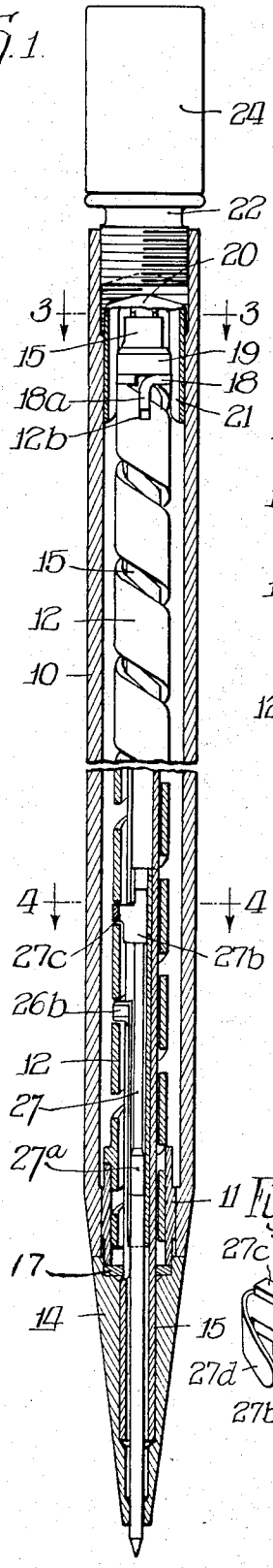


Fig. 2

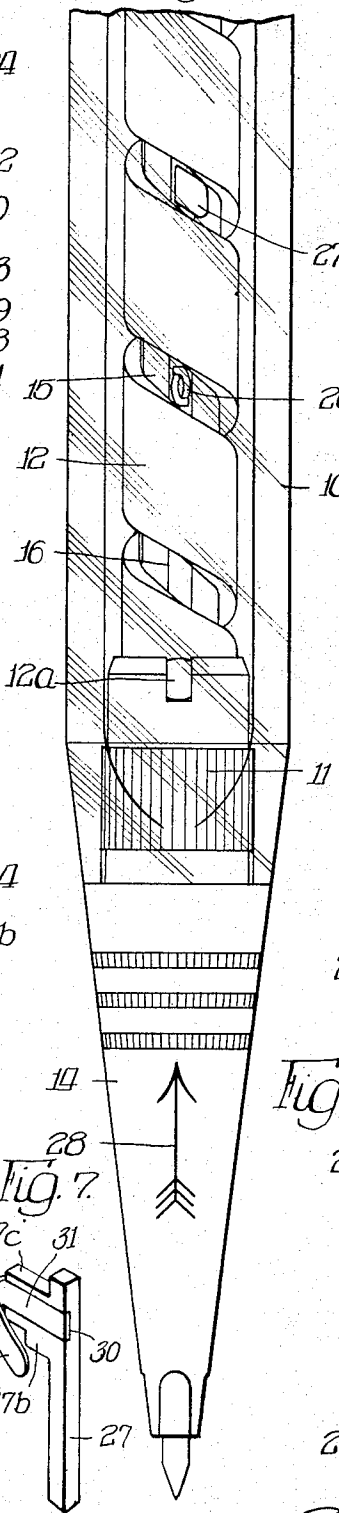


Fig. 3

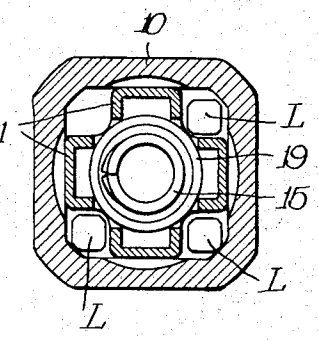


Fig. 4

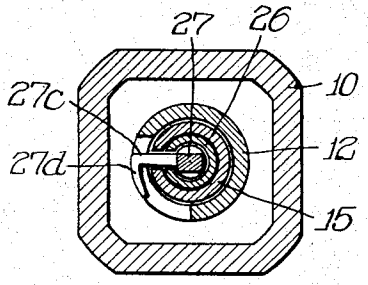


Fig. 5

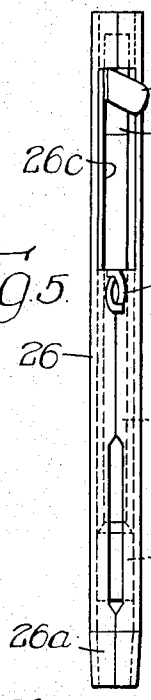


Fig. 6

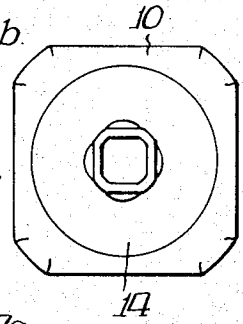


Fig. 7

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UNITED STATES PATENT OFFICE

2,095,091

MECHANICAL PENCIL

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Application March 25, 1935, Serial No. 12,814

11 Claims. (Cl. 120—18)

This invention relates to mechanical pencils of the screw feed type wherein the lead stick is adapted to be propelled or retracted, as desired.

One of the objects of the invention is the provision of improved construction for a pencil of this character adapted to handle comparatively long lead sticks (e. g., four inches) although its utility is not limited to pencils of that particular characteristic.

Another object of the invention is the provision of improved construction for a mechanical pencil of the kind above specified which permits the length of the lead stick in the feeding mechanism to be ascertained immediately by visual inspection and without special manipulation of the parts for that purpose.

Another object of the invention is the provision of improved construction for a mechanical pencil of the type specified which affords a magazine for storage of a plurality of long lead sticks and effectively protects them against breakage, yet permits them to be removed with ease for purpose of reloading the feeding mechanism.

Yet another object is the provision of an improved construction for a mechanical pencil of the type specified which is effective to safeguard the operating parts against strain or distortion incident to normal use and operation of the pencil, and which is adapted to safeguard long lead sticks against breakage within the feeding mechanism.

Other objects include the provision of improved construction of various parts for purpose of obtaining certainty and accuracy in their operation, and reducing their cost.

Other and further objects will be pointed out or indicated hereinafter or will be apparent to one skilled in the art upon an understanding of the invention or its employment in use.

For purpose of aiding in an explanation of the invention, I show in the accompanying drawing forming a part of this specification, and hereinafter describe, one form in which it may be embodied. It is to be understood, however, that this is presented merely for purpose of illustration and hence is not to be interpreted in any fashion calculated to limit the appended claims short of the true and most comprehensive scope of the invention in the art.

In said drawing,

Fig. 1 is a broken longitudinal section of a form of pencil embodying the present invention;

Fig. 2 is a part elevational view of the lower end of the pencil, shown on considerably larger scale;

Fig. 3 is a cross section on substantially line 3—3 of Fig. 1;

Fig. 4 is a cross section on substantially line 4—4 of Fig. 1;

Fig. 5 is a side view of the lead-holding clutch or traveler;

Fig. 6 is a lower end view of the pencil; and

Fig. 7 is a fragmentary perspective view of the upper end portion of the lead ejecting plunger, illustrating a modified construction.

The nature of the invention will be ascertained most quickly from a consideration of this illustrative embodiment, which will now be described.

The pencil includes a tubular barrel 10 which is made of transparent material. In the form illustrated this barrel is of primarily square cross-sectional form with beveled or rounded corners. Fixedly mounted in the lower end of the barrel 10 is a bushing or collar 11 which holds a screw-like or helical tubular member 12, said helical member being tightly fitted within the bushing and held against rotation by engagement of a lug 12*a* within a notched portion of the bushing.

The lower end portion of the barrel is tapered downwardly, and a tapered tip member 14 is formed to fit flush against the terminal edge of the barrel. This tip member is provided with an axial bore which, at its upper portion, is of a size to hold, with a tight pressed fit, a lead guide tube 15, said bore at the lower end of the tip being reduced in size and formed to accommodate the contemplated lead stick with a close sliding fit. As seen in Fig. 6, this terminal portion of the tip bore is of primarily square contour with rounded or beveled corners.

The lead guide tube 15 is of a diameter adapting it to be received freely within the helical tubular member 12, and the two extend throughout substantially the entire length of the barrel. The lead guide tube is slotted longitudinally throughout its full length above the tip member 14, said slot being designated by the reference numeral 16. The lower end of the bushing 11 projects slightly from the lower end of the barrel and fits into a depression in the upper end of the tip member 14, where it rides in contact with a packing washer 17.

The upper end portion of the guide tube 15 extends a short distance above the upper end of the helical member 12, and the latter, adjacent its upper end, is provided with a notch 12*b*. A stop member 18 is provided, same being in the form of a flat washer, which fits closely about the guide tube 15 and is formed with a depending lug 18*a* which fits within the notch 12*b*, said lug extending longitudinally of the helical member across the upper end portion of the helical slot. A collar 19 closely embraces the upper end portion of the lead guide tube and is seated upon the stop member 18. The projecting end portion of the lead guide tube 15 is slightly spread above the collar 19, so as to hold the collar and the

stop member 18 on the tube. The construction provides a centering connection for the helical member and lead guide tube, holding them against relative longitudinal movement, but permitting rotation of the lead guide tube within the helical member, the collar 19 rotating on the stop member 18.

In the upper portion of the barrel is inserted a spacing member which has a top portion 20 that covers the upper end of the lead guide tube and helical member, and depending leg portions 21 which engage the barrel walls and the helical member on four sides and hold the helical member centered in the barrel (see Fig. 3). The peripheral contour of the top portion 20 corresponds to that of the leg portions as shown in Fig. 3, so that spaces are afforded for reception of four lead sticks L within the barrel between said leg portions. The upper end of the barrel is closed by a screw-seated plug 22 which supports an eraser and a removable eraser-protecting cap 24.

Within the lead guide tube is operably mounted the lead carrier, which is shown in sectional elevation in Fig. 1, and at a different angle and on an enlarged scale in Fig. 5. This lead carrier comprises a hollow member 26 and a plunger 27. The hollow portion is made of a sheet formed up into a tube, the lower end being somewhat contracted to form a resilient clutch 26*a*. The sheet has projecting ears which are bent up against each other and their margins overlapped to form an outstanding rigid lug 26*b*. The outer overlapped portions of the ears provide smooth uninterrupted surfaces on the sides of the lug toward the ends of the carrier, for riding on the helical margins of the helical member. Above this lug the tube is formed with a longitudinally extending slot or opening 26*c* which terminates short of the upper end of the tube. The lug 26*b* is of such size as to extend through and ride freely in the longitudinal slot 16 of the lead guide tube and in the helical slot or groove of the helical member, as seen in Fig. 2. The clutch portion 26*a* is of such size as to receive and resiliently grasp the contemplated lead stick.

The plunger 27 fits slidably within the hollow member 26 and is adapted to reciprocate longitudinally therein for a distance corresponding approximately to the length of the opening 26*c*. At its lower end the plunger has a cylindrical head 27*a* which slidably fits the bore of the member 26, and at its upper end it has a laterally extending flat guide portion 27*b* adapted to extend through the slot 26*c* and fit slidably in the slot 16 of the lead guide tube. It also has a lug portion 27*c* which extends outwardly beyond the flat guide portion 27*b* and is of such size as to extend into and fit freely within the helical groove or slot of the helical member. From the outer end of the lug 27*c* extends an indicator element 27*d*, of arcuate form corresponding to the spiral of the helical slot in the helical member. The plunger is inserted in the hollow member 26 at the upper end thereof, before the parts of the latter are closed together.

As disposed in the lead guide tube and helical member, the carrier lug 26*b* and the propeller lug 27*c* are spaced apart longitudinally the distance of one full turn of the helix. The tip member is provided with an index marking 28 which is aligned with the longitudinal slot of the lead guide tube.

A manner of mounting the indicator element on the lead ejecting plunger is illustrated in Fig. 7. Here the plunger or lead ejector 27 is provided with a lateral groove 30 of approximately the width of the lug 27*c* and the indicator element is formed of a thin strip 31 of material of a contrasting color and is seated in the groove 30, the material of the plunger adjacent the groove and/or the material of the said strip being swaged so as to secure the strip in place in the groove. The end portion of the strip is bent laterally to form the indicator element 27*d*. The indicator element is of shape and width such as to permit it to travel in the slot of the helical member and the lug 27*c* and guide portion 27*b* form shoulders for riding upon the margins of adjacent helixes and for abutting the ends of the opening 26 and preventing the indicator element from becoming dislodged from its position on the plunger.

With the parts assembled as above described, the pencil affords a magazine adapted to hold four lead sticks each almost as long as the barrel. These occupy the corner portions of the barrel and are spaced apart by the helical member and by the legs 21, and will run out of the magazine when the pencil is inverted after removal of the closure 22.

The lead carrier is caused to move in either direction longitudinally in the lead guide tube by rotation of the tip relative to the barrel in the appropriate direction. When the carrier lug 26*b* reaches the lower end of the slot 16, further downward movement of the member 26 is thereby prevented and said lug may revolve in the annular space below the lower end of the helical member, whereupon further relative rotation of the tip and barrel will cause the plunger to be fed downwardly within the member 26 and eject any remaining portion of the lead stick from the clutch portion and out of the tip.

The pencil is loaded, after the carrier has been retracted part way or all the way, by inserting the lead stick through the lower end of the tip and seating its upper end portions within the clutch member, the propeller having been retracted, to so accommodate the lead stick, by reverse rotation of the barrel relative to the tip incident to which retraction of the plunger the feeding back of the lead carrier lug 26*b* into the lower end of the helical slot is accomplished. With the pencil thus loaded, the lead stick may be propelled or projected from the tip to the length desired and when desired, by rotation of the barrel relative to the tip in a clockwise direction, or the lead stick may be retracted by rotation of the barrel relative to the tip in the reverse or counterclockwise direction.

The length of the lead stick within the feeding mechanism may be immediately ascertained at any time by observation of the position of the indicator 27*d* through the transparent barrel. To facilitate such observation, the indicator 27*d* is finished in a color contrasting to that of the helical member. The index 28 facilitates the locating of the indicator.

The stop member 18*a* provides an abutment for the plunger lug 27*c* when the lead carrier reaches its upper limit of travel, and prevents the helical member being stressed or compressed longitudinally by forcible effort toward further counterclockwise rotation of the barrel relative to the tip member. This is of importance in avoiding straining or distortion of the relatively flexible helical member.

In addition to those above indicated, the above described construction has the further advantage that it facilitates the building of a pencil of very

slender form but having a large magazine capacity.

What I claim is:

1. In a mechanical pencil having a relatively rotatable tip and barrel, a helical member secured to the barrel at its lower end and provided with a helical slot, a longitudinally slotted lead guide tube rotatable in the helical member and connected at its lower end to the tip, a lead carrier movable longitudinally in the lead guide tube and having a projection riding in the slot of the latter and in said helical slot, and a stop member rotatably mounted on the lead guide tube at the upper end of the helical member and having a portion extending longitudinally of the helical member across said helical slot at the upper end thereof to provide an arresting abutment for said projection of the lead carrier.

2. In a mechanical pencil, in combination, a hollow barrel having a transparent wall, lead propelling mechanism operably mounted in the barrel and including a tubular member having a helical slot therein and a lead carrier movable rotatably and longitudinally therein, and an indicator carried by said lead carrier for movement in the slot of the tubular member, said indicator presenting toward the barrel a surface contrasting in appearance with that of the tubular member and being visible through the transparent wall of the barrel.

3. In a mechanical pencil, in combination, a hollow barrel having a transparent wall, lead propelling mechanism operably mounted in said barrel and including a lead carrier movable longitudinally of the barrel, said lead carrier being adapted to position a lead stick, and a conspicuous indicator within the barrel and movable longitudinally with the lead carrier and visible through the transparent wall of the barrel for the purpose described.

4. In a mechanical pencil, a tubular lead carrier made of a sheet of resilient material formed into substantially cylindrical shape, the meeting margins of the sheet having projections extending outwardly thereon and having marginal portions overlapped to provide a projecting lug presenting smooth uninterrupted surfaces on the sides toward the ends of the carrier.

5. In a mechanical pencil, in combination, a tubular barrel, a helical member positioned axially therein, a bushing securing said helical member to the barrel at its lower end, a longitudinally slotted tube rotatably fitted within the helical member, an annular stop member encompassing said tube and abutting the upper end of the helical member, said stop member having a portion interengaged with the helical member and extending across the slot thereof, said tube being provided with means for preventing movement of said stop member away from the helical member.

6. In a mechanical pencil, in combination, a tubular barrel, a relatively rotatable tip member at the lower end of the barrel, a tubular helical member mounted within the barrel and secured thereto at its lower end, a slotted lead guide tube affixed to the tip member and fitting rotatably within the helical member, a lead carrier slidably fitting in the lead guide tube and movable longitudinally thereof by rotation of said tube relative to the helical member, and an annular member rotatably mounted on the upper portion of the lead guide tube above the helical member, said annular member and helical member having cooperating interengaging means serving as a stop for the lead carrier at the upper end portion of the helical member.

7. In a mechanical pencil, in combination, a tubular barrel, a bushing secured in and projecting from the lower end of the barrel, a rotatable tip riding on the projecting end of the bushing, a lead guide tube secured to the tip and extending axially through the bushing and within the barrel, a helically slotted member encompassing the lead guide tube and having its lower end received in the bushing and engaged therewith by a slot and pin connection which limits downward movement of the helically slotted member relative to the bushing, and a stop member mounted on the upper end portion of the lead guide tube abutting the upper end of the helically slotted member said stop member and helically slotted member having interengaging means intercepting the slot in the helical member, said lead guide tube having means thereon securing the stop member against upward movement thereon but permitting relative rotational movement of the lead guide tube and helically slotted member.

8. In a mechanical pencil having a helically-slotted rotary propelling member, a tubular lead carrier made of a thin sheet of resilient material formed into substantially cylindrical shape to receive and grasp a lead stick, the meeting margins of the sheet having radially extending ears cooperating to form a stiff projecting lug, marginal portions of said ears being bent laterally and overlapped one across the other, said laterally bent portions being arranged for camming cooperation with margins of the helical slot of the propelling member.

9. A mechanical pencil comprising, in combination, a tubular barrel having a bore of generally polygonal cross-sectional form, a generally cylindrical lead-feeding element disposed axially in the bore of the barrel and secured to the barrel at its lower end, said cylindrical element cooperating with the barrel to form the walls of lead-receiving spaces located at the corner portions of the barrel bore and extending substantially the entire length thereof, and a spacing member seated in the upper end of the barrel and engaging the upper end portion of the cylindrical member to center it in the bore, said spacing member affording passages for insertion of lead sticks into the lead-receiving spaces, the spacing of said cylindrical member relative to the barrel wall being such as to maintain lead sticks therein spaced apart from one another.

10. In a mechanical pencil, a tubular lead carrier made of a sheet of resilient material formed into a substantially cylindrical shape, the meeting margins of the sheet having projections extending outwardly thereon, said projections having their radial margins overlapped so that the projections mutually support each other against longitudinal thrust.

11. In a mechanical pencil, in combination, a barrel having a transparent wall portion, lead propelling mechanism operably mounted in the barrel and including a longitudinally movable lead positioning element, and an indicator movable in the barrel with the lead positioning element and visible through the transparent wall portion, for indicating the working length of lead in the propelling mechanism.

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