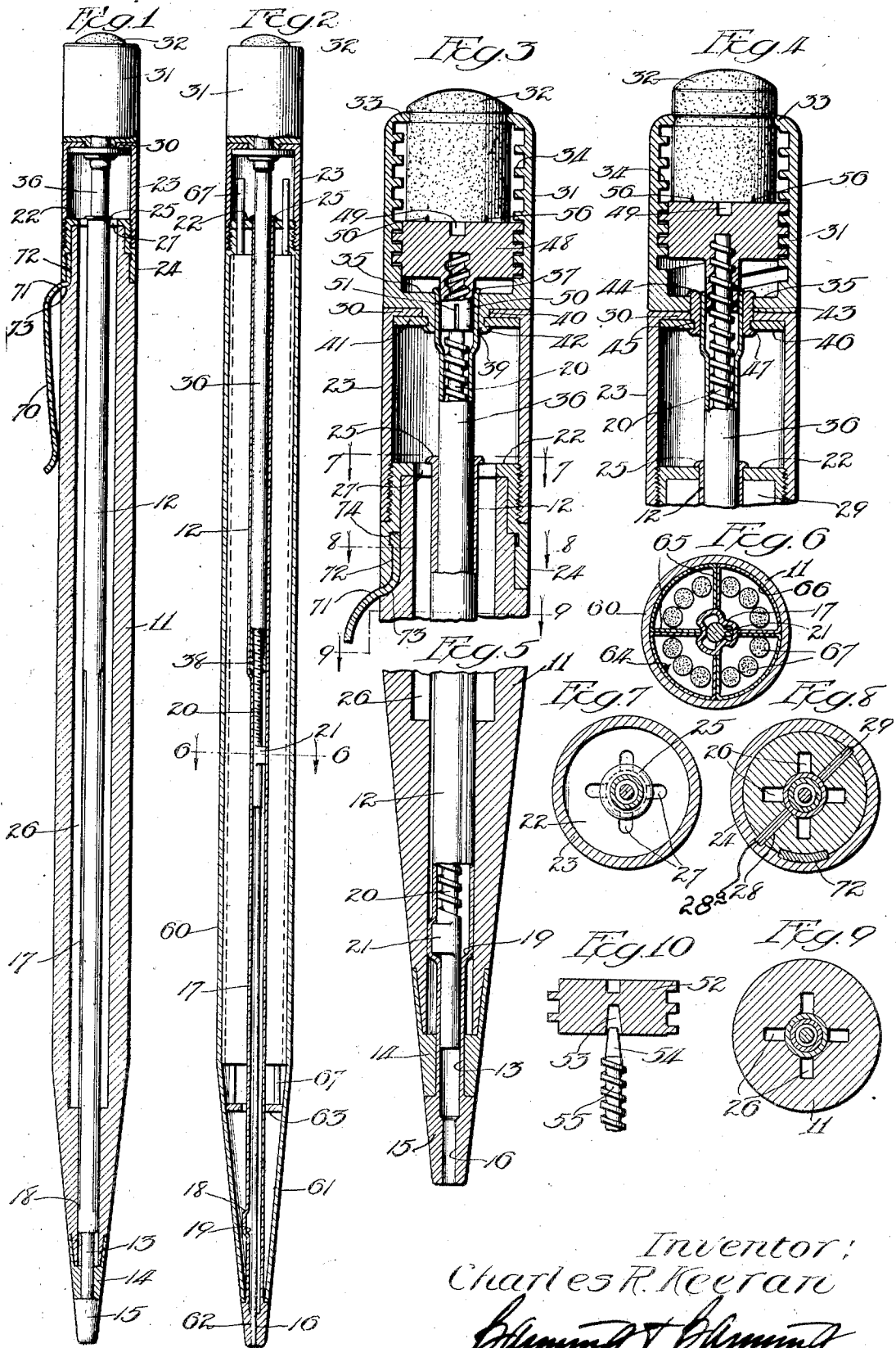


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PENCIL.

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PENCIL.

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To all whom it may concern:

Be it known that I, CHARLES R. KEERAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pencils, of which the following is a specification.

This invention relates to a pencil equipped with propelling mechanism interiorly of its body, and operable by means exteriorly thereof, for advancing into operative position a lead at one end, and an eraser at the other end.

For its objects, my invention aims to provide an improved and simplified lead propelling mechanism; to use the same mechanism for propelling an eraser; to accommodate in the pencil body a relatively long lead; to provide a magazine of ample capacity for reserve leads; to devise a combined lead and eraser propelling mechanism capable of use, without modification, with pencils either of the magazine or non-magazine types; and, generally, to strengthen the construction, reduce the number of parts and arrange them in a more compact relation, and cheapen the cost of manufacture of the pencil.

The general construction of the present pencil is similar to the ones disclosed in my pending applications, Serial Nos. 213,241 and 272,054, and, to some extent, this application is concerned with subject matter divided out of the former. This invention, however, exhibits certain distinct improvements over my previous constructions, particularly as to details of manufacturing and assembling. It is to be understood, therefore, that the pencil to be herein described embodies many of the features claimed in my co-pending applications aforesaid, as well as certain other improvements which will be hereinafter described and claimed. Reference will now be made to the accompanying drawing, wherein are shown certain exemplifications of this invention, as follows:

Figure 1 is a longitudinal section through a pencil having a solid body; as distinguished from one which is formed with a hollow tubular body, the operating parts being shown in elevation;

Fig. 2 is a similar view through a pencil having a hollow tubular body, the operating parts being shown mostly in section;

Fig. 3 is an enlarged detail, in longitudinal section, exhibiting the parts in the upper end of the pencil, the propelling plunger being shown as retracted close to its limit;

Fig. 4 is a similar view showing the relation of the parts during propulsion of the eraser;

Fig. 5 is an enlarged detail, in longitudinal section, exhibiting the parts in the lower end of the body, the propelling plunger being shown as advanced to its limit;

Figs. 6, 7, 8, and 9 are transverse sections through the pencil, taken respectively on lines 6-6 of Fig. 2, and lines 7-7, 8-8, and 9-9 of Fig. 3; and

Fig. 10 is a detail illustrating a modified form of connection between the plunger and eraser plate.

In the use presently to be made of the terms "upper" and "lower," it should be understood that I am referring to the pencil as it is pointed in use,—that is, with the eraser end up, and the writing end down.

It may be stated at the outset that the body of the pencil may be of metal, wood, or any other material suitable for the purpose. Certain of the present improvements are especially adapted to pencils in which wood, fiber, or some other appropriate substance is used for the making of a relatively solid body, as distinguished from tubular bodies which are generally made of metal. As illustrative of a desirable construction, I have shown in Fig. 1 a pencil whose body may be regarded as formed of wood, fiber, or some analogous material, and provided with a central bore adapted to receive a tube 12 extending for the major portion of the body, propelling mechanism being housed within the tube. At its lower extremity the tube may be reduced as at 13 so as to pass through a ferrule 14 to connect with a tip 15, to which it is secured in any convenient manner. As shown in Fig. 1, the walls of the ferrule are tapered in conformity with the tapered lower end of the pencil and with the sides of the tip as well, the surfaces of these three parts being pref-

erably arranged in flush relation so as to present a smooth and neat appearance. According to this construction, the ferrule overlies the lower end of the pencil body, and affords an abutment for the larger end of the tip which may take on the form of a truncated cone. A bore is formed within the tip which is suitably constricted as at 16 (see Fig. 5 for this feature) to provide a passage of proper size to frictionally engage the lead being used in the pencil.

The tube 12 which is arranged centrally within the pencil body is non-rotatably secured therein by a friction fit or otherwise. Throughout its lower portion the tube is provided with internal ribs 17, preferably in the form of flutings, which may terminate as at 18 just short of the shoulder 19 (see Fig. 5) that results from reducing the tube end to form its lower extremity 13. These flutings may conveniently be formed by the use of appropriate rollers, or by the action of a die, the purpose being to deform the tube walls sufficiently to provide internal ribs extending longitudinally thereof, it being preferred that the ends of these flutings should merge into the body of the tube in such a manner as to present beveled or rounded surfaces. A threaded plunger 20 is arranged centrally within the tube, having a lateral fin 21 projecting between two of the flutings, the relation of the parts being such that the several flutings act to guide the plunger in longitudinal movements, but prevent its rotation, within the pencil body. The beveled or rounded ends of the flutings are intended to facilitate movement of the plunger and its fin into correct operative relation within the tube. When the plunger has traveled to its lowermost position, as indicated in Fig. 5, the fin 21 will abut the shoulder 19 at the reduced end of the tube, and be clear of all the flutings therein; it may then, and then only, be freely rotated within the tube.

As already stated, the tube 12 is immovably arranged within the pencil body. The ferrule abutting the tip and overlying the lower end of the body acts to hold the tube in correct position relative to the pencil at that end. At its other end, however, I secure the tube in place by means of a cap 22 which is placed over the upper end of the body with its sides offset, as shown, to provide an upper part that is externally threaded to receive in flush relation with the body a collar 23; the lower portion 24 of the sides of the cap, by preference, lies flush with the collar, and with the body as well, which is suitably recessed for this purpose. The upper side of the cap is centrally apertured to receive the upper extremity of the tube 12 whose end may be conveniently upset or hammered down as at 25 to overlie the cap. Through the medium of the ferrule and tip

at the lower end, and the cap at the other end, the tube is firmly secured against longitudinal movement within the body.

The pencil, as exhibited in Fig. 1, is characterized by one feature of importance which is novel, as far as I am aware, in a pencil having a solid body, that is, a body formed of wood, fiber, or other material suitable for producing a non-shell-like structure—this being a magazine for reserve leads. To embody this in the present pencil I have arranged in the body a number of slots 26 extending downwardly from the upper end thereof as far as desired, preferably to a point near the lower end, so as to provide chambers each of sufficient length to receive two leads, end to end. In the drawing, these slots are represented as four in number, and are cut in radial fashion from the central opening that receives the tube 12. When the tube is fitted into the pencil, these slots become closed on all four sides, as viewed in cross section (see Fig. 9), and when the cap 22 is arranged in place the upper ends of these slots are likewise closed, in part at least. Access to the chambers of the magazine is obtained through a suitable opening formed in the top side of the cap, which, in the form shown, has a central circular portion occupied by the tube and four slotted portions 27 radiating therefrom, each in register with one of the slots 26. Such an opening, best shown in Fig. 7, presents four holes permitting leads to pass in or out of the four magazine chambers, as required, the collar 23, together with its associated parts, acting normally to prevent loss of these reserve leads in case the pencil should be inverted.

In arranging the threaded connection between the collar and cap it is important that these parts last mentioned should not be permitted to turn together. To prevent this, slits 28 may be arranged in the upper end of the body in line with grooves 28^a formed interiorly of the cap (see Fig. 8), keys 29 of suitable formation being extended radially within the grooves to lock with the cap so as to prevent its rotation relative to the body. In practice the formation and assembly of the parts in this manner may be very expeditiously accomplished, and on this account this construction possesses special advantages.

Referring again to the collar 23 which is threaded to the cap 22, it will be noted that I have inturned its upper end to provide a flange 30 which affords on its upper surface a bearing for a sleeve 31 which acts as a retainer for an eraser 32. At its upper end the sleeve is provided with a flange 33 which grips the eraser, and interiorly is formed with threads 34 which, by preference, are square-cut in cross section, as clearly appears in Figs. 3 and 4. The lower end of

the sleeve is formed with a wall 35 in abutting relation to the flange 30 of the collar 23, an opening being formed therein for receiving the enlarged upper end of a sleeve 36. As shown in Fig. 3, the extremity 37 of the sleeve 36 is upset or spread over the wall 35 in such a way as to lock the sleeve thereto, the connection between the sleeve 36 and eraser sleeve 31 being non-rotatable. A substantially similar connection obtains in the construction of Fig. 4, although in respect of other features certain modifications, presently to be described, are exhibited. The sleeve 36 extends within the tube 12 and is internally threaded as at 38 (see Fig. 2) to cooperate with the threads of the plunger 20 so as to transform the sleeve rotary movements into longitudinal movements of the plunger.

As a means of connection between the collar 23 and the eraser sleeve, two suggested constructions are shown. In Fig. 3, the end wall 35 of the sleeve is formed with a depending thimble 39 having a shoulder as at 40 adapted to engage with the intumed flange 30 of the collar 23, and also to afford a rest against which may seat a washer 41 which may be conveniently secured in place by upsetting or spreading the lower end of the thimble as at 42 in underlying relation to the washer. According to the construction shown, the eraser sleeve is non-removably secured to the collar 23 but is free to rotate thereon so as to impart turning movements to the sleeve 36. Another form of connection between the eraser sleeve and collar 23 is shown in Fig. 4, wherein the end wall 35 does not directly engage the sleeve 36, but cooperates instead with a bushing 43 whose upper end 44 may be upset or spread over as shown, and which is formed with a shoulder 45 affording a rest for a washer 46 which underlies the flange 30 of the collar 23, the washer being held in place by an upset 47 at the lower end of the bushing. The effect of the connection shown in Fig. 4 is precisely the same as in Fig. 3 and need not be further dwelt upon.

In the connection between the eraser sleeve and collar 23, whether formed as per Fig. 3 or per Fig. 4, I employ an assembly which is simple, dependable, and readily attachable as a unit to the upper end of the pencil; it assures at all times an operative connection with the sleeve 36 by which the lead propelling mechanism is actuated. These parts—the eraser sleeve and its associated collar—constitute what may be termed the head of the pencil, which with the sleeve 36, and plunger 20 therein, may be freely removed from the body whenever refilling is required.

A threaded plate 48 is arranged within the eraser sleeve having a connection therewith

that is relatively loose, this being accomplished conveniently by forming square-cut threads on the plate having a slight longitudinal play within the eraser sleeve. The upper side of the plate, which may be slotted as at 49, lies in abutting relation to the eraser so as to force it outwardly whenever the plate is turned relative to the eraser sleeve. I prefer that the under side of the plate should be provided with a hollow boss 50 interiorly threaded to receive the upper end of the plunger 20 whenever it is retracted sufficiently for this purpose. To facilitate register of the plunger threads with those within the boss 50, the plate 48 is arranged for slight play, as already explained, but supplementary to this, or independently thereof, other means for the same purpose may be employed such as the formation of slits 51 extending upwardly from the lower end of the boss to provide sections which may be sprung outwardly as required to permit the plunger end to move across the boss threads until a registration is effected therewith. Preferably the depth of the boss threads is reduced toward its lower end to facilitate such movement of the plunger prior to registration of its threads with those interiorly of the boss.

After threading the plunger end into the boss, the parts may be further rotated, with the result that the plate being locked non-rotatably to the plunger, both of these parts are moved upwardly to force out the eraser. This rotative movement may be continued as far as necessary to advance the eraser the distance desired, whereupon the parts should be reversely rotated to disengage the plunger from the plate. This engaging action of the plunger relative to the plate is facilitated by the loose threaded connection between the plate and the eraser sleeve, which results in a minimum of friction between these parts, and tends accordingly to induce disengagement therebetween rather than between the plunger end and the plate; or if pressure be applied to the end of the eraser so as to develop a friction between the threads of the eraser sleeve and plate which exceeds that obtaining between the plate and plunger, the eraser sleeve may be then rotated so as to propel the plunger downwardly, this latter element tending to disengage itself freely from the plate, and leaving the plate in advanced position to properly support the eraser. Whenever the eraser has been used up sufficiently to require replacement, the worn down piece is removed, and a screw driver, knife, or similar instrument is then inserted within the slot 49 so as to turn the plate back to its initial position, after which a new eraser is placed within the sleeve.

The plate and proximate end of the plunger may be formed otherwise than as already described, as will be apparent by ref-

erence to Fig. 10 wherein these two parts, detached from the associated mechanism, are shown in detail. In this construction the plate designated as 52 is provided on its under side with a socket 53, shaped by preference other than round, and the proximate end 54 of the plunger to which the numeral 55 is applied is formed in a manner to cooperate therewith, the purpose being that these parts—the plate and plunger—shall not be rotatable relative to each other when engaged. In all other respects these parts may be constructed and operated as previously described. In the form shown in Fig. 10, the plunger, when retracted sufficiently, will direct its end 54 into the socket 53 so as to lock therewithin to hold the plate 52 against rotation when the sleeve 31 is turned, this action resulting in a propulsion of the eraser. This alternative construction shown in Fig. 10 is typical of several that might be resorted to where it is not desired to use a threaded connection, such as is shown in Figs. 3 and 4.

The means for propelling the eraser in each of the constructions described makes use of the plunger which acts also to propel the lead. Reference to Figs. 3 and 4 will disclose the provision upon the upper side of the plate 48 of a plurality of fine projecting points 56 adapted to bite into the bottom end of the eraser so as to lock the eraser non-rotatably to the plate. By use of such a connection, the eraser may be propelled in either direction simply by applying pressure to its upper end such as to hold stationary the eraser and plate 48 while a turning movement is imparted to the sleeve 31, or by holding this sleeve 31 stationary while bearing down upon the eraser end with a rotary movement, the effect in either case being to induce relative rotation between the sleeve and plate therewithin. Such eraser propelling movements, it should be noted, may be effected with entire independence of the plunger.

The preceding description has been concerned in large part with a pencil having a relatively solid body, as distinguished from a hollow tubular body such as is generally formed of metal. This invention is applicable, however, to a pencil having a tubular body such as is exhibited in Fig. 2, in which the operating parts are in all respects the same as those described in connection with the remaining figures. Accordingly the same reference numerals have been applied to the corresponding parts, and it is unnecessary to specifically advert to them again.

Referring now to the construction shown in Fig. 2, the body, designated as 60, is tubular in form, being provided with a tapered lower end 61 having at its extremity a tip 62 which may conveniently be con-

nected to the tube 12 within the body. In the construction shown, the shoulder on the upper end of the tip abuts the lower extremity of the pencil so as to prevent an upward movement of the tube therewithin. In the region where the taper commences, I have arranged a brace plate 63 which affords a bottom for the magazine of the pencil which, by preference, is divided into four compartments (see Fig. 6) through the use of partition members each designated by the numeral 64. Each of these partition members may consist of radially disposed walls 65 connected by an arc-shaped wall 66 extending from near the upper end of the pencil down to the brace plate 63. In practice, I prefer to form these partition members of some material that is light, thin, and slightly resilient, such as aluminum, so that they may be sprung into place and be held firmly therein against movement by their own spring action.

In Fig. 2 I have shown the upper ends of the reserve leads, designated as 67, as protruding through the cap that is secured to the upper end of the body. This result is attained by having the chambers of the magazine of proper depth to project the topmost leads into position where they may be grasped whenever the head is removed from the pencil. It should be noted in this connection that the collar 23 forming part of the head is arranged to provide a chamber above the cap such that the reserve leads may protrude from the body end and receive protection at the same time.

In connection with the present pencil, whether made of wood, metal, or other material, I have devised a pocket clip which is exceedingly simple in its construction and in the manner of its attachment to the pencil body. As will be seen by reference to Fig. 1, the clip designated as 70 is of the conventional form, being curved toward the pencil at its upper end as at 71, from which extends in nearly right angular relation thereto a tongue 72 which lies inside of the lower portion 24 of the cap (see Fig. 3). The cap and body may each be suitably recessed to accommodate the tongue in the manner described, the recess in the body terminating in a sort of shoulder 73 which coöperates with the lower end of the tongue to hold the clip from moving downwardly. It will be noted that at the upper end of the tongue is a head 74 adapted to lie within an annular chamber formed interiorly of the cap, this channel facilitating the punching of the recess for the tongue and the two grooves 28^a. By preference the tongue 72 is curved in conformity with the inside of the wall 24 (see Fig. 8) so as to fit snugly in place. With the pencil parts completely assembled, it will be manifest that the clip is also attached permanently to the body.

In use of the pencil, the head, together with the sleeve 36 and plunger 20, are removed from the pencil whenever new leads are required. After inserting a lead of proper length into the upper end of the tube 12, the parts are replaced so as to become operative for propelling the lead. It will be noted that the lead inserted into the tube tends to drop through to the lower end of the pencil where it is held by friction in the constricted passage through the tip. In replacing the head upon the pencil, the plunger should, of course, be guided into the tube, after which its fin 21 is automatically directed into one of the longitudinal slots therein formed between two of the flutings 17. By rotating the head the plunger may be advanced to propel the lead; when advanced to its limit the plunger fin lies within the clearance below the flutings, permitting the plunger to revolve with the head. This action is desirable in that it affords an indication of conditions interiorly of the pencil, and is preferable to the usual construction in which the parts bind when their limit of movement has been reached. To retract the plunger again, the head may be removed from the pencil which is then inverted, this operation causing the plunger to slide out; access to the magazine is afforded at the same time enabling the user to refill the pencil in the manner explained.

I claim:

1. A pencil having means within its body for propelling a lead, actuating means therefor, including a collar detachably secured to the body and a sleeve adjacent to the collar operatively connected with the propelling means within the pencil, and means independent of the connection with the propelling means for locking the sleeve to the collar to establish a freely rotatable but inseparable connection therebetween, substantially as described.

2. A pencil having means within its body for propelling a lead, and actuating means therefor consisting of a collar and sleeve arranged end to end, the former stationary and the latter rotatable with respect to the body, and means providing a freely rotatable and inseparable connection between the collar and sleeve invisible when the parts are assembled upon the pencil, the sleeve being operatively connected to the lead propelling means, and the collar being detachably secured to the pencil body, substantially as described.

3. A pencil having means within its body for propelling a lead, and actuating means therefor including a collar and sleeve arranged end to end, the former stationary and the latter rotatable with respect to the body, and an inseparable but freely rotatable connection between the collar and sleeve consisting of an end wall on each, one being

formed with a central aperture and the other with a thimble extended through the aperture and turned in underlying relation to the aperture wall, the sleeve having means extended through the thimble, but independent thereof, connecting with the lead propelling means, and the collar being detachably secured to the pencil body, substantially as described.

4. A pencil having means within its body for propelling a lead, and actuating means therefor including a collar detachably secured to the body and a sleeve rotatably secured thereto having connection with the lead propelling means, and a connection between the collar and sleeve consisting of an end wall on each, one having a central aperture and the other being formed with a thimble extended through the aperture and provided with a shoulder, and a washer adjacent the collar wall on its side remote from the sleeve and resting against the shoulder, the thimble end being upset upon the washer to secure the parts permanently together in a freely rotatable relation, substantially as described.

5. A pencil having means within its body for propelling a lead, the body being hollowed to provide a magazine for reserve leads in the form of a chamber open upon one end of the body, the chamber being adapted to receive the major portion of a reserve lead whose end remains protruded beyond the body, and actuating means for the lead propelling means arranged exteriorly of that same end of the body, and means for detachably securing the actuating means in place, there being within said securing means an extension chamber within which the protruding end of the reserve lead may lie, substantially as described.

6. A pencil having means within its body for propelling a lead, and exteriorly of its body actuating means rotatably connected with a collar within which is a circular chamber, means for securing the collar detachably to the body, the body being hollowed to provide a magazine in the form of a chamber having an open end communicating with the circular chamber in the collar, the magazine being adapted to receive one or more leads whose ends are projected into the chamber of the collar, whereby said leads are protected during use of the pencil, substantially as described.

7. In a pencil, lead propelling mechanism including two relatively rotatable parts, the first of which is threaded and the second of which is tubular with its walls deformed to provide flutings longitudinally thereof, and a third part having a threaded engagement with the first part and arranged for travel longitudinally of both parts, the third part having an element projecting laterally between the flutings of the second part, where-

by rotation of the first part induces a non-rotatable travel of the third part, substantially as described.

8. In a pencil, lead propelling mechanism including two relatively rotatable tubular parts, one interiorly threaded and telescoped within the other whose walls are deformed to provide a longitudinal fluting, and a third part adapted for longitudinal travel having means for engaging with the threads of the one and for cooperating with the fluting of the other whereby relative rotation between these latter two parts induces a longitudinal travel of the third part, substantially as described.

9. A pencil having in its body lead propelling mechanism including in combination a non-rotatable tube whose walls are formed to provide longitudinal flutings internally thereof, a plunger arranged for longitudinal travel within the tube to propel a lead in advance of itself, means extending to the exterior of the pencil body mounted for rotation within the tube and having a

threaded connection with the plunger therein, and a member on the plunger adapted to lie between certain of the flutings to hold the plunger against rotation during its propulsion through the tube, substantially as described.

10. In a pencil, lead propelling mechanism including two relatively rotatable tubular parts, one having its walls deformed for a portion of its length to a cross-sectional form other than round, and the other being interiorly threaded and telescoped within the undeformed portion of the first part, and a third part adapted for longitudinal travel within both parts having means for engaging with the threads of the one and having means for cooperating with the walls of the other to oppose rotation relative thereto whereby relative rotation between the first two parts induces a longitudinal travel of the third part, substantially as described.

CHARLES R. KEERAN.

Witness:

EPHRAIM SHUNING.