

(No Model.)

L. H. SONDHEIM.  
PENCIL.

No. 452,242.

Patented May 12, 1891.

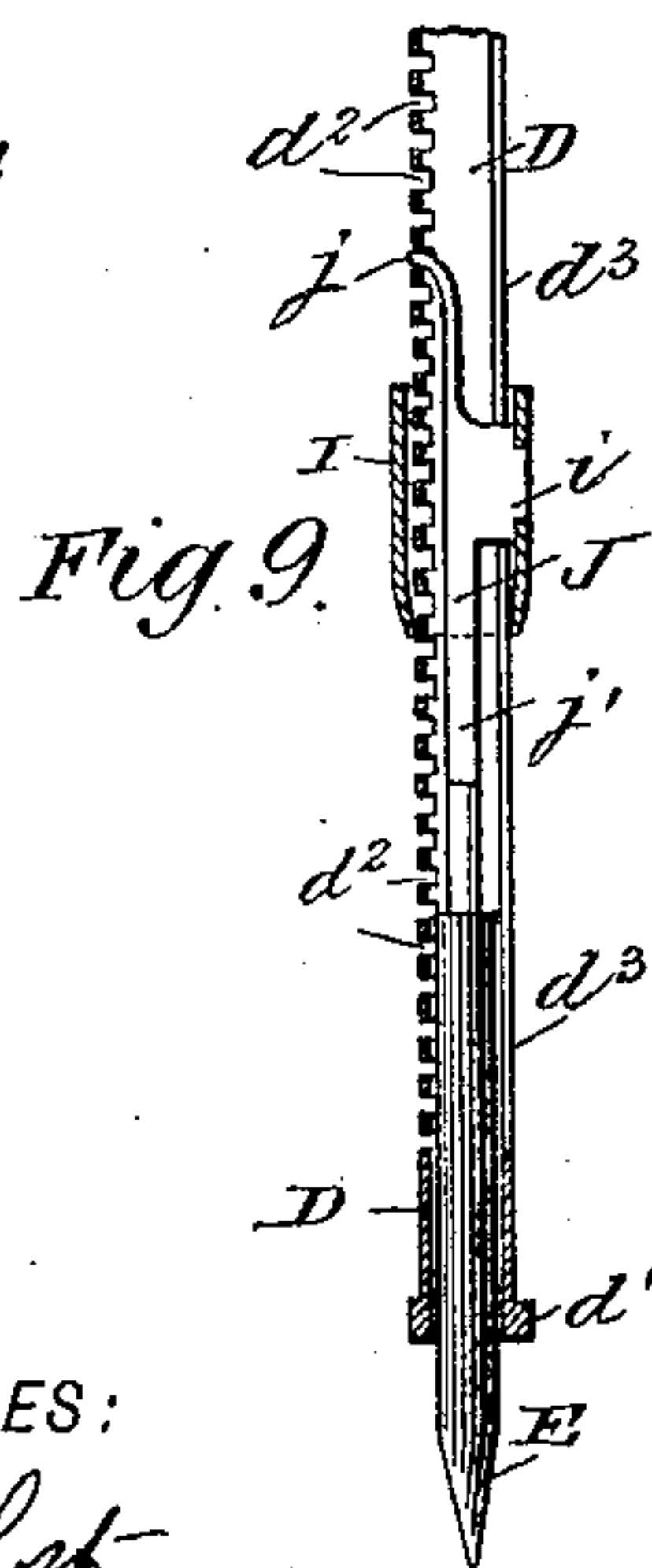
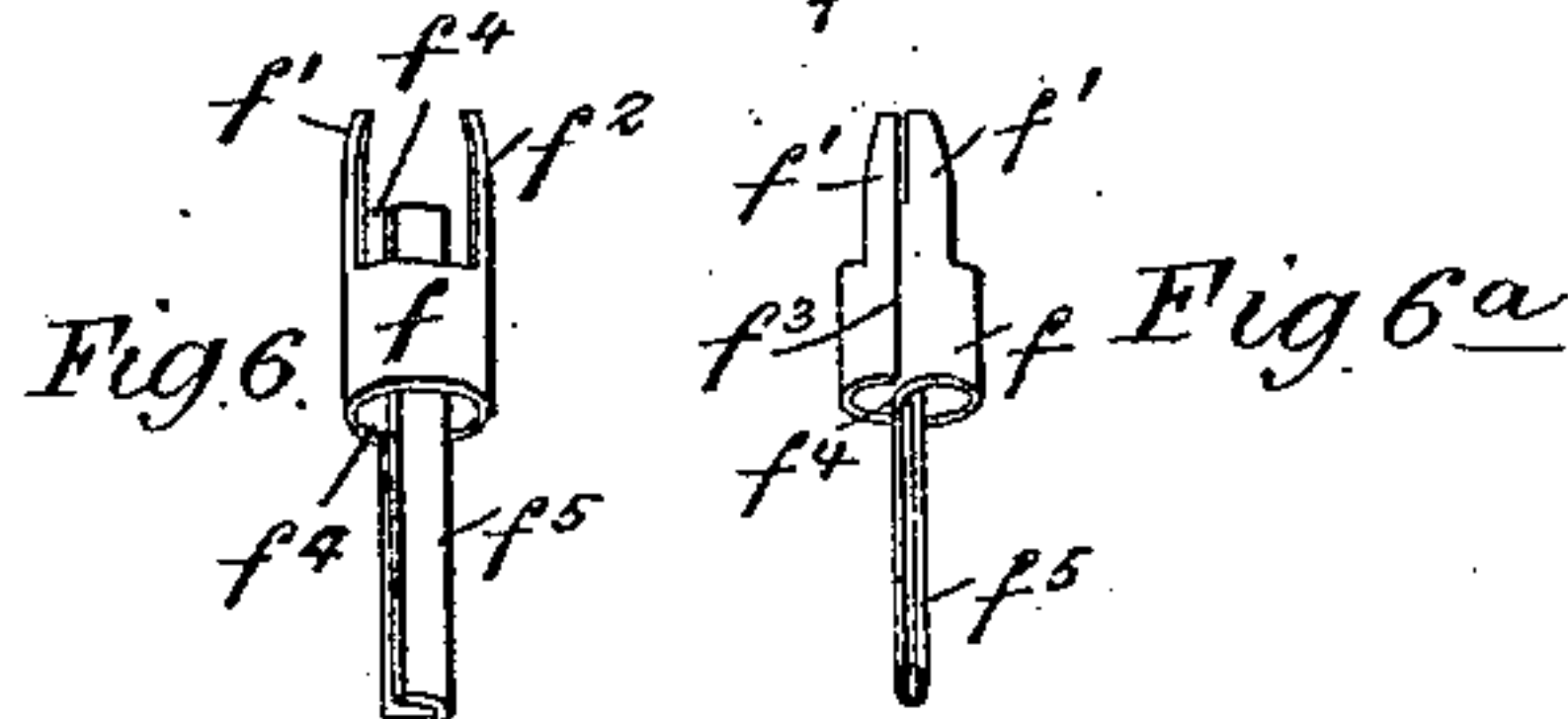
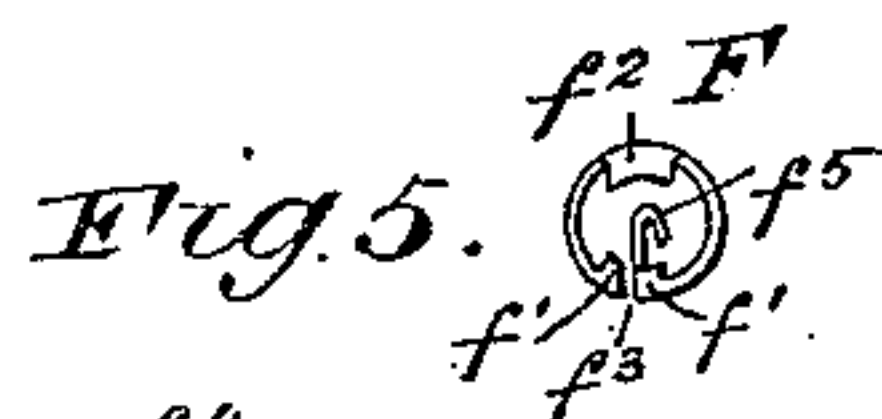
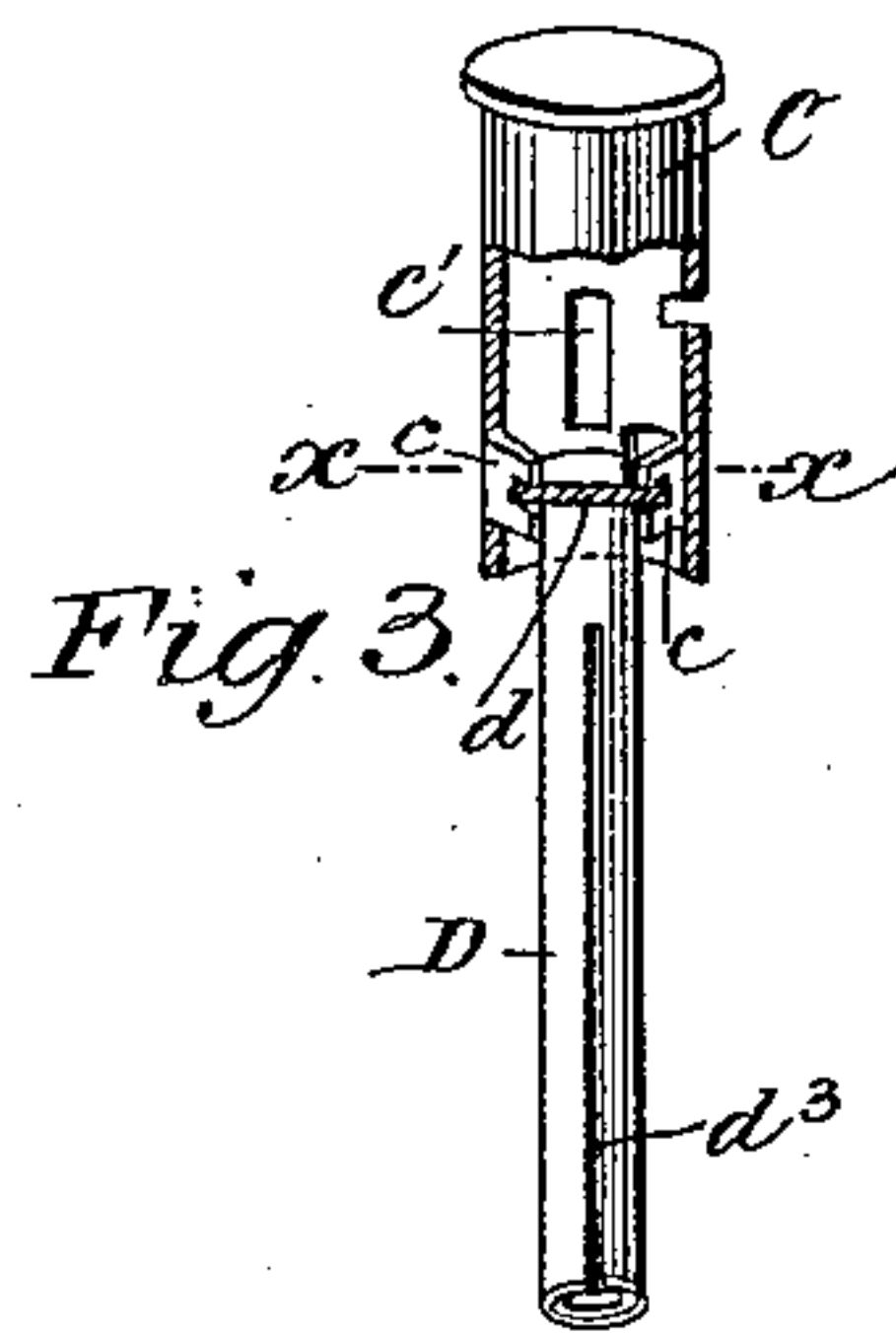
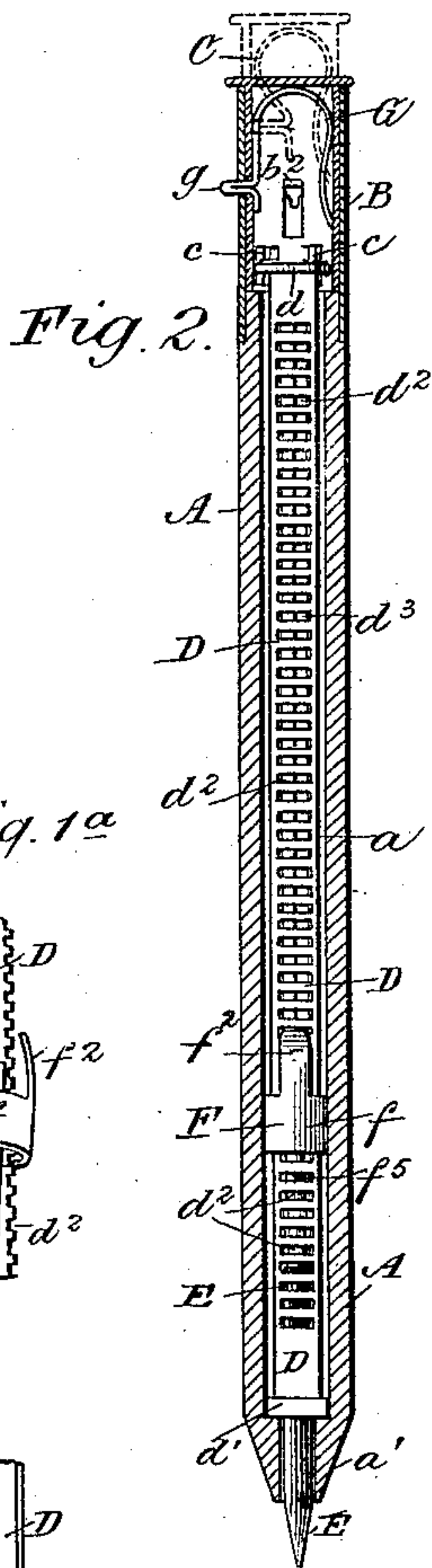
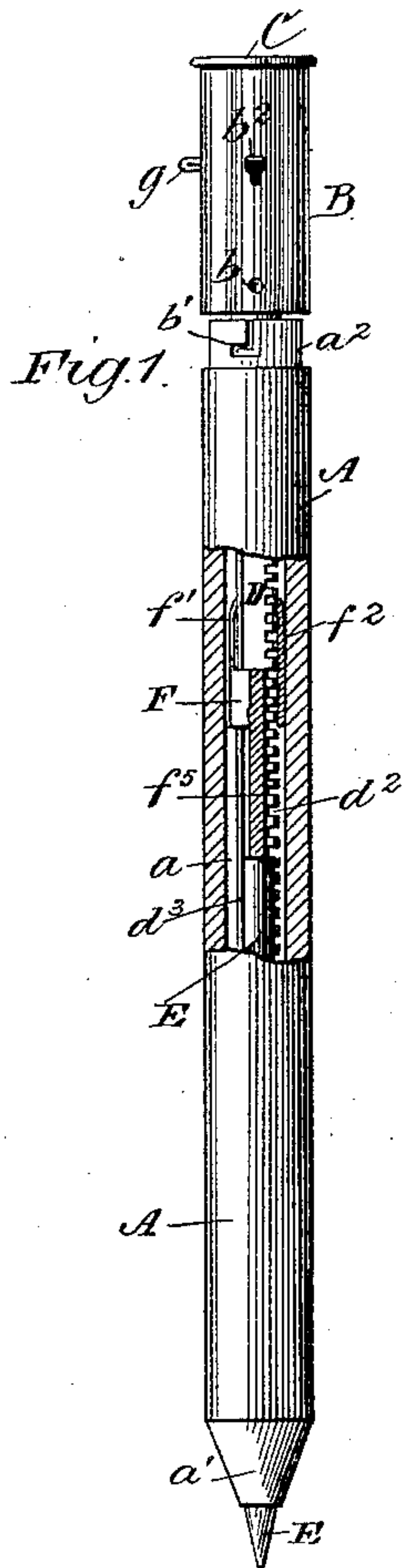
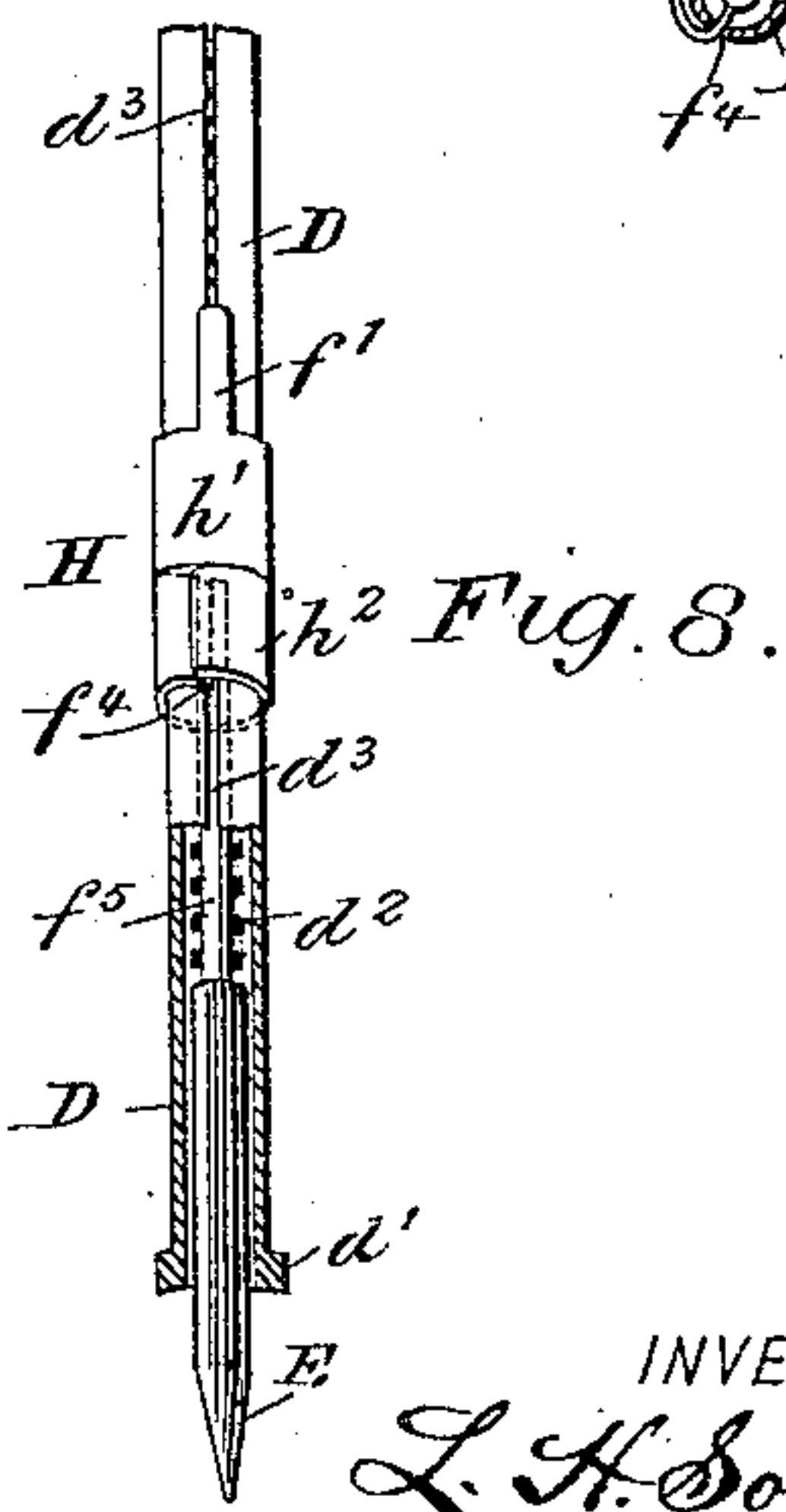
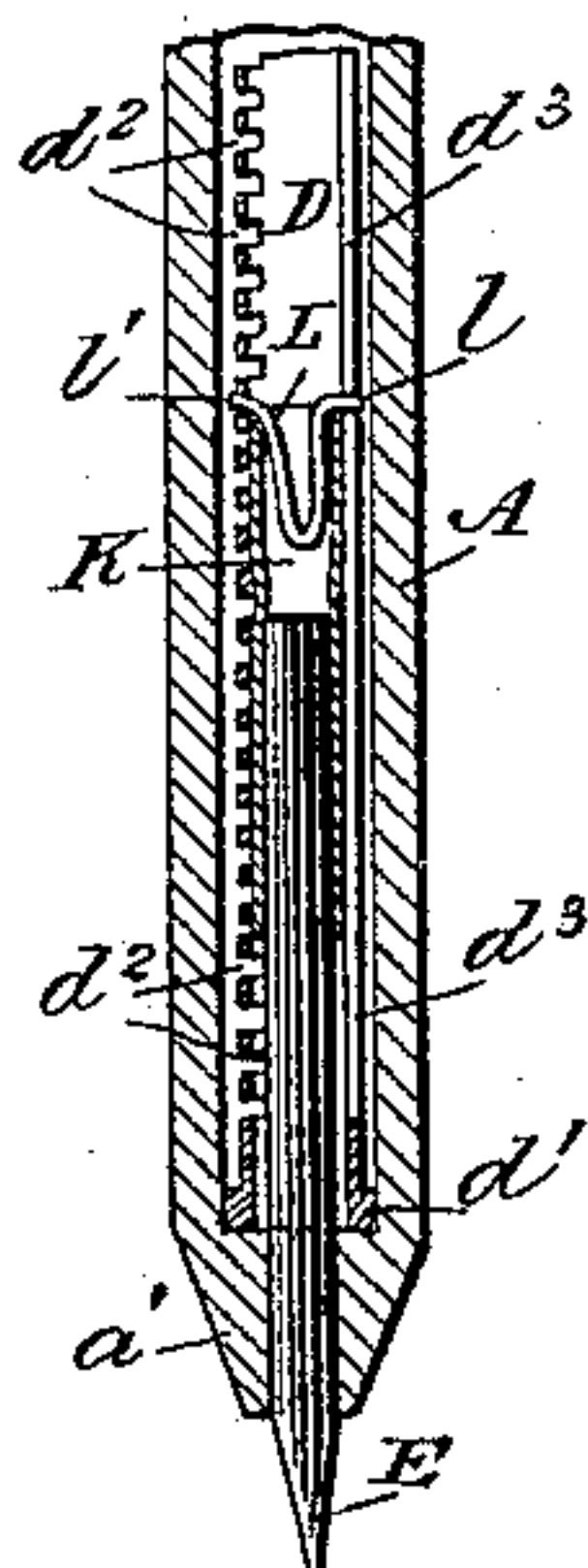


Fig. 10.



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# UNITED STATES PATENT OFFICE.

LEWIS H. SONDEHEIM, OF NEW YORK, N. Y.

## PENCIL.

SPECIFICATION forming part of Letters Patent No. 452,242, dated May 12, 1891.

Application filed April 10, 1890. Serial No. 347,338. (No model.)

*To all whom it may concern:*

Be it known that I, LEWIS H. SONDEHEIM, of the city, county, and State of New York, have invented a new and Improved Pencil, of which the following is a full, clear, and exact description.

My invention has for its object to provide a simple, inexpensive, and efficient pencil having a casing preferably made of wood and which is not to be cut away or removed as the lead wears away, and is adapted to hold a movable lead, which is fed forward to furnish new writing-points as required. The lead may also be pushed backward by pressure on its point to protect it within the pencil-casing when not in use.

The invention will first be described, and then will be particularly pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of my improved pencil partly broken away and in section and with the end ferrule and cap device drawn slightly back from the normal position. Fig. 1<sup>a</sup> is a detail view of the preferred form of shuttle in its tilted position relatively to the lead holding and actuating tube. Fig. 2 is a central longitudinal sectional view of the pencil, taken at a right angle to Fig. 1. Fig. 3 is a perspective view of the inner movable end cap and adjacent connected portion of the slotted lead-holding tube of the pencil. Fig. 4 is a transverse section taken on the line  $xx$  in Fig. 3. Fig. 5 is a front end view of the preferred form of lead-feeding shuttle or traveler device. Figs. 6 and 6<sup>a</sup> are side perspective views of the shuttle, taken at right angles to each other. Fig. 7 is a sectional plan view illustrating a modification of the shuttle as fitted upon the slotted lead-holding tube of the pencil. Fig. 8 is a partly sectional view of the lead-tube and lead and a modified or two-part shuttle device. Fig. 9 is a sectional view of part of the slotted lead-holding tube shown at right angles to a like part in Fig. 8, and with another modified form of lead-feeding shuttle applied; and Fig. 10 is a sectional side view illustrating another modification of a pencil in which the slotted tube and its op-

erating-cap may be pushed back by pressure on the point of the lead, while allowing the lead to be fed forward by reciprocation of the cap and slotted tube.

In particularly describing the invention I will refer at first to Figs. 1 to 7, inclusive, of the drawings and afterward explain the modifications shown in the other views.

The pencil-casing A, which is preferably made of wood, having a central longitudinal bore  $a$ , is tapered at the forward end  $a'$  and at the back end is reduced a little to provide a shoulder  $a^2$ , which receives a thin metal ferrule B, which has an impressed nib or projection  $b$ , adapted to lock with an angular groove or slot  $b'$ , made in the casing-shoulder  $a^2$  after the manner of a bayonet-joint, and which allows removal of the ferrule and attachments from the casing. Any other suitable lock or latch device permitting this detachment of the ferrule and connected parts may, however, be employed.

To the ferrule B, and preferably within it, is fitted for longitudinal sliding movement a cap C, to which is held a forwardly-ranging slotted tube D, which enters the pencil-casing bore  $a$  and accommodates within it the lead or crayon E, and also loosely supports or sustains a lead-feeding device F, which I call a "shuttle." The cap C may be connected to the slotted tube D in any suitable manner, assuring simultaneous sliding movement of both cap and tube. A preferred connection, however, is made by providing the back end of the tube with a fixed flange or an end plate, forming a flange  $d$ , which is engaged and rigidly held by a series, preferably three, of forked or edge slotted lips  $c$ , punched inward from the main body of metal of the cap. The cap also has slots  $c'$ , into which enter the usual metal lips  $b^2$ , punched inward from the metal of the ferrule to limit the backward longitudinal sliding movement of the cap in the ferrule.

I provide the sliding cap C with a suitable latch device, which will lock it to the ferrule when pushed forward, and thereby hold the lead or crayon E projected from the tapering point of the casing when it is desired to write with the pencil. This latch device I prefer to make in the form of the common bow-spring G, which is placed within the cap and



has a lip  $g$ , which extends outward laterally through the cap and is adapted to enter or latch into a side perforation of the ferrule B, as shown in Figs. 1 and 2 of the drawings.

5 The lead-tube D is provided at its forward end with a lateral projection or detent, preferably made in the form of a collar or enlargement  $d'$ . The prime office of this projection or detent is to form a holdback or resistance-  
10 point against which the shuttle F will rest to allow it to be drawn from the back end of the pencil-casing by and with the lead-tube. The round collar or shoulder or one fitting the interior bore of the pencil-casing is preferable as a detent over a simple pin, in that the  
15 collar fits the walls of the casing-bore all around and steadies the lead-tube therein, and also steadies the protruding point of the lead, which, however, fits snugly within the  
20 bore of the tapered end  $a'$  of the casing to prevent the lead slipping forward or downward out of the casing when it is not clamped to the plunger. The lead-tube D is provided along one side with a series of transverse  
25 notches or slots  $d^2$ , forming a rack, and along its opposite side the tube has a slot  $d^3$ .

The preferred form of shuttle or lead-feeding device which I employ is the one F. (Shown in Figs. 5, 6, and 6<sup>a</sup> of the drawings.) This shuttle is made with a cylindrical or partly cylindrical body portion  $f$ , from the forward end of which at one side project, preferably, two  
30 spring-fingers  $f' f'$ , while from the opposite side projects one spring-finger  $f^2$ , which is adapted to work in the rack notches  $d^2$  of the lead-tube D, around which the shuttle body fits loosely enough to allow it to be tilted relatively to the tube, as shown in Fig. 1<sup>a</sup> of the drawings, while the two opposite fingers  $f' f'$  bear on  
40 the tube, one at each side of its slot  $d^3$ . The body portion  $f$  of the shuttle is preferably left open along one side at  $f^3$ , and this not only allows circumferential enlargement of the shuttle to cause it always to fit closely or with  
45 considerable friction against the wall of the bore  $a$  of the pencil-case, but it allows one end  $f^4$  of the part  $f$  to be bent inward radially and travel in the lead-tube slot  $d^3$  to hold the pawl  $f^2$  in proper position relatively  
50 to the lead-tube rack, while said part  $f^4$  also affords a means of rigidly connecting to the shuttle-body a forwardly-projecting stem or plunger  $f^5$ , which slides within the lead-tube D for feeding the lead forward, while the body  
55  $f$  of the shuttle surrounds the lead-tube either entirely or passes more than half-way around it to hold the shuttle to the tube, and to enable the outside of the shuttle to have frictional bearing on or contact with opposite or  
60 diametrically-opposite parts of the walls of the bore of the pencil-casing.

The plunger  $f^5$  may be formed of a doubled or bent-over portion of the metal projecting from the radial part  $f^4$ , so that the whole  
65 shuttle is made of one piece of stamped or shaped sheet metal, and this bent plunger portion may be made to clamp the back end

of the lead E in the tube D; but I at present prefer to have the plunger separate from or independent of the lead in this construction  
70 of the pencil. The plunger may also be a piece of solid wire soldered onto the end of the radial piece or fin  $f^4$  of the shuttle, as shown in Fig. 7. It will be understood that the radial portion  $f^4$  of the shuttle which  
75 extends through the lead-tube slot  $d^3$  to the interior of the tube would itself answer as a plunger to feed the lead forward; but I prefer to provide the front prolongation  $f^5$  of this radial part  $f^4$ , which allows the shuttle  
80 to push the last remnant of the lead entirely through the tapering point  $a'$  of the pencil-casing.

Fig. 7 of the drawings illustrates how the body portion  $f$  of the shuttle may be extended  
85 but a little more than one-half way around the lead-tube D, or only enough to hold it loosely thereon. The spring-fingers  $f'$  opposite the pawl-finger  $f^2$  are not essential, but their use is preferable as a steadiment to the  
90 shuttle on the lead-tube and an aid to the engagement of the pawl with the rack of the tube. This rack may also be formed in or on the lead-tube in any preferred manner. Figs. 1 and 2 of the drawings clearly show the  
95 relative arrangement of the slotted lead-tube D, the shuttle F, and the lead E within the pencil-casing, the shuttle and lead being farther advanced toward the pencil-point in Fig. 2 than in Fig. 1.  
100

The operation of the pencil is very simple and effective. When a new long lead E is first put into the slotted tube D of the pencil and the ferrule B is locked to the casing A at the nib and slot  $b b'$ , the shuttle or traveler F  
105 will engage one of the outer or back notches or teeth  $d^2$  of the lead-tube rack. The action of the lead-tube and shuttle in feeding the lead forward one writing-point or length of about one-quarter of an inch is the same un-  
110 til the lead is quite used up or worn away, and is as follows: Suppose that the lead requires feeding forward. It is only necessary to press back the lug or lip  $g$  of the spring G to disengage or unlock the cap C  
115 from the ferrule B, and then draw back the cap as far as its slot  $c'$  and the ferrule-stop  $b^2$  will allow. As the lead tube D is held to the cap, it moves backward with it; but the friction of the outer walls or faces of the shut-  
120 tle or traveler F on the walls of the bore  $a$  of the pencil-casing is sufficient to hold it at rest in the casing and also to prevent backward movement of the lead in the tube D, while this tube moves back through the shut-  
125 tle and the shuttle-pawl  $f^2$  clicks on or over a few notches or teeth of the lead-tube rack and again engages one of its notches. If now the cap C is pushed forward again, the lead-tube D will also be carried forward by it, and  
130 as the shuttle-pawl is engaged with the tube-rack the shuttle will necessarily be carried forward with the tube and cap and its plunger  $f^5$  will protrude or project the lead E a



distance corresponding with the forward lengthwise movement of the cap. As the cap reaches the extreme of its forward movement after projecting or feeding the lead or crayon, as above described, the cap-detent—in this instance the lug or lip *g*—of the bow-spring *G* will snap into the opening made for it in the ferrule, (which in this regard is substantially a part of the pencil-casing,) and the detent will then hold the cap and lead-tube against backward movement. As the shuttle or traveler engages the lead-tube rack and backs up the lead *E* by its plunger the lead or crayon will be held against backward movement to allow it to be used for writing or other purposes.

After using the pencil it is desirable to protect the lead by returning its writing-point within the casing, and this may be done by simply pressing in the spring-lip *g* and pressing the point of the protruding lead *E* onto a desk, table, or other resisting-surface, which will push back the shuttle-plunger *f*<sup>5</sup> by the lead and cause the pawl *f*<sup>2</sup> or any other detent on the shuttle engaging the lead-tube to push back this tube, and also push back the pencil-cap *C* to the position shown in dotted lines in Fig. 2 of the drawings. It will be noticed that the lead, plunger, shuttle, lead-tube, and cap are all moved backward together or simultaneously by pressure on the point of the lead. To again advance the lead for use it is only necessary to push the cap forward again until the detent *g* again engages the locking-slot in the ferrule to hold the lead projected for use. During this forward movement of the lead the cap, lead-tube, shuttle, and lead all move together or simultaneously.

I make special mention of these two distinct duplex operations of the pencil, the first to project the worn lead to provide a new writing-point by drawing back the slotted tube by the cap while the shuttle remains at rest within the casing, thereby changing the relative positions of the tube and shuttle, and then pushing the cap, tube, and shuttle forward simultaneously to project the lead, and the second operation, to push back and protect the lead within the casing by pressure on the point of the lead, thereby pushing back the cap, lead-tube, shuttle, and lead without disturbing or changing their relative positions, and then carrying the lead forward again by pressure on the cap in the same way as in the first operation. I am not aware that a pencil has heretofore been made which embodies these two principles of operation. Hence I broadly claim such a pencil independently of the particular form of shuttle or traveler device engaging the lead-tube and pencil-casing for feeding the lead. Various modifications of the shuttle or traveler device may be made within the scope of my invention, and I will presently describe a few with reference to the drawings.

To put a new long lead *E* into the pencil

shown in Figs. 1 and 2 of the drawings it is only necessary to uncouple the bayonet-joint *b b'* and draw the ferrule *B*, with the cap *C* and lead-tube *D*, from the pencil-casing *A*, the holdback or shoulder *d'* of the tube then pulling the shuttle *F* also from the casing. The shuttle, which while within the casing is held parallel with the lead-tube, may now be sufficiently tilted upon the withdrawn tube to disengage its pawl or detent from the tube notches or rack, and will be slid by hand along the tube to its back end next the cap, while the radial part *f*<sup>4</sup> of the shuttle slides along the lead-tube slot *d*<sup>3</sup>. After the new lead is inserted in the tube from its forward end and the tube is slipped forward again into the pencil-casing, the ferrule *B* will again be locked to the casing. If the lead point does not now project into position for writing, it may be so adjusted by one or more reciprocations of the cap *C*, as will be understood from the aforesaid description. When the lead-tube and shuttle are replaced in the pencil-casing, the shuttle cannot then tilt on the tube, as its body part then bears on the walls of the casing.

In the modification shown in Fig. 8 of the drawings the shuttle *H* at its body portion is made in two separate pieces *h' h*<sup>2</sup>, which abut each other. The piece *h'*, which has frictional contact with the pencil-casing, carries the backwardly-extending fingers *f' f*<sup>2</sup>, like those of the shuttle *F*, and for similar purposes, and the other part *h*<sup>2</sup>, which does not need to have frictional contact with the pencil-casing, has the radial part or pin *f*<sup>4</sup> entering the lead-tube slot *d*<sup>3</sup>, and also has an attached plunger *f*<sup>5</sup> working in the lead-tube. With this construction it is not necessary to remove the lead-tube and shuttle from the pencil-casing to insert a new lead, as the ferrule *B* may be unlocked at *b b'* and drawn slightly outward, as shown in Fig. 1 of the drawings, and then turned a little axially, which, while causing the part *h*<sup>2</sup> of the shuttle to turn with the lead-tube, will allow the part *h'* to be retained at rest by its friction on the walls of the bore of the pencil-casing. By turning the cap the pawl-finger *f*<sup>2</sup> on the part *h'* will be disengaged laterally from the lead-tube rack *d*<sup>2</sup>, which will allow a new lead to be inserted from the pencil-point and pushed fully in, carrying the entire shuttle backward with it, and when the lead is fully in the lead-tube *D* will by the cap be rotated axially back again to cause its rack to be engaged by the pawl of the shuttle or traveler, and after the ferrule *B* is again latched or locked with the pencil-casing *A* the pencil may be operated precisely as above described to feed the lead forward to furnish a new writing-point, or to carry or push the lead back to protect it in the casing.

In the modification shown in Fig. 9 of the drawings the shuttle or traveler *I*, which fits closely to the wall of the bore of the pencil-casing, but loosely to the outside of the lead-



tube D, with its forward end slightly bent inward toward the tube to center the latter within the casing, has fixed to it a radial fin or plate  $i$ , which moves in the slot  $d^3$  of the lead-tube. To this plate  $i$  is fixed a piece or plate J, which ranges along the interior of the lead-tube and has one elastic outbent end  $j$ , which acts as a pawl in the lead-tube notches  $d^2$ , while its other end  $j'$  serves as a plunger to feed the lead E forward in the tube and project it from the pencil-casing. The friction of the shuttle I on the pencil-casing holds the shuttle while the pawl  $j$  clicks over the lead-tube rack as the tube is drawn back by the cap, and when the cap is again pushed forward the tube-rack carries the traveler with the tube and feeds the lead forward. In this construction the lead may also be pushed back with the shuttle, lead-tube, and cap by pressure on the lead-point to protect the point in the casing, and the lead may be again projected by pressure on the cap and the shuttle may also be tilted on the lead-tube after they are withdrawn from the casing to disengage the pawl  $j$  from the tube-rack or notches, and in a manner similar to that shown in Fig. 1<sup>a</sup> of the drawings to allow the shuttle to be slid on the tube to its back end.

In Fig. 10 of the drawings the lead E is confined within a traveler K, which is provided with a spring L, one fixed end  $l$  of which enters the lead-tube slot  $d^3$ , while its other free or elastic end  $l'$  acts as a pawl in the lead-tube notches  $d^2$  from inside the tube. This construction also allows the lead E to be projected step by step to furnish new writing-points by simply reciprocating the cap to which the lead-tube will be attached, and the lead may also be pushed back by pressure on its point for protection within the pencil-casing. It is necessary in this construction that the lead E shall fit the bore at the tapered end of the pencil tightly enough to retain the traveler, while the lead-tube D is drawn back prior to again pushing it forward to advance the lead, as will readily be understood.

Having thus described my invention, I claim as new and desire to secure by Letters Patent--

1. In a lead-pencil, the combination of a casing having a practically smooth bore, a lead-containing lengthwise-slotted tube therein, a lead-actuating traveler placed upon the slotted tube and engaging the same and having a frictional bearing by the outer face of its body portion against the inner walls of the casing, whereby it is supported independently of the tube against unaided backward movement, and means for actuating said tube longitudinally from the outside of the casing, substantially as described.

2. In a lead-pencil, the combination, with a casing, of a longitudinally-movable lead-holding tube therein provided with a lengthwise slot and a rack, a shuttle or traveler engaging the slot and rack and adapted to feed the lead forward as the tube moves forward, and a de-

tent held to the lead-tube and adapted to lock with the pencil-casing or a ferrule thereon to hold the lead projected for use, substantially as described.

3. In a lead-pencil, the combination, with a casing having a practically smooth bore and a longitudinally-movable lengthwise-slotted lead-tube therein, of a shuttle or traveler placed on the tube and engaging it to move with it, and also having frictional contact by the outer face of its body portion with the walls of the pencil-casing, said shuttle provided with a radial portion entering the tube-slot and feeding the lead forward, substantially as described.

4. In a lead-pencil, the combination, with a casing having a practically smooth bore, of a longitudinally-movable lead-tube therein, a cap held to the tube and guided by the casing or a ferrule thereon, a shuttle or traveler placed on the tube and engaging it to move forward with it, and also having frictional contact by the outer face of its body portion with the walls of the casing to prevent its backward movement as the tube is drawn backward by the cap, said shuttle also having a radial portion or plunger working in the tube to feed the lead forward, and a detent at the cap adapted to lock with the casing or its ferrule to hold the lead projected for use, substantially as described.

5. In a lead-pencil, the combination, with a casing having a practically smooth bore, of a longitudinally-movable lengthwise-slotted lead-holding tube therein, a shuttle or traveler placed outside the tube and engaging it to be moved forward with it to feed the lead, and also having frictional contact by the outer face of its body portion with the walls of the pencil-casing to prevent its backward movement as the lead-tube is drawn backward, said shuttle also provided with a radial portion or plunger working in the tube to feed the lead forward, and a detent held to the lead-tube and adapted to lock with the pencil-casing or a ferrule thereon to hold the lead projected for use, substantially as described.

6. In a lead-pencil, the combination, with a casing and a longitudinally-movable lengthwise-slotted lead-tube therein, of a shuttle or traveler placed on the tube and engaging it to move with it, and also having frictional contact with opposing walls of the casing, said shuttle being split or open at the side to permit circumferential adjustment to the casing, and also having a radial portion or plunger entering the lead-tube to feed the lead forward, substantially as described.

7. In a lead-pencil, the combination, with a casing having a practically-smooth bore, and a lead-tube therein having a longitudinal slot and a rack, and a detent locking the tube against backward movement when the lead is projected, of a shuttle or traveler placed on the tube and having a pawl engaging the rack to move forward with the tube, and also having frictional contact by the outer face of its



body portion with the walls of the pencil casing, said shuttle provided with a radial portion or plunger entering the tube-slot and feeding the lead forward, substantially as described.

8. In a lead-pencil, the combination of a casing having a practically smooth longitudinal bore, a tube within the same having a longitudinal slot and rack-teeth, a lead or crayon within said tube, and a traveler surrounding the tube for more than half its circumference, and having an independent frictional bearing by the outer face of its body portion against the inner walls of the casing, said traveler having an arm or fin extending through the slot of the tube into the same, and a pawl finger or spring, which engages the rack-teeth of the tube, substantially as and for the purposes described.

9. In a lead-pencil, the combination of a casing having a longitudinal bore, a lengthwise-slotted tube in said bore having rack-teeth, a lead or crayon within said tube, and a cylindrical or partly cylindrical traveler fitted loosely on the outside of the tube and having frictional contact with the pencil-casing, and also having an arm or fin extending into the tube through its slot for actuating the lead, and a pawl finger or spring engaging the rack-teeth of the tube, substantially as described, whereby when the lead-tube is removed from the pencil-casing the traveler may be tilted to disengage the pawl from the teeth of the tube, but will be prevented from tilting while in the casing by its frictional bearing against the casing, as set forth.

10. In a lead-pencil, the combination, with a casing having a practically smooth bore, and a lead-tube therein provided with a longitudinal slot, of a shuttle or traveler placed on the tube and engaging it to move with it, and also having frictional contact by the outer face of its body portion with the walls of the casing, said shuttle having a radial portion entering the tube-slot and provided with a front prolongation adapted to push the last remnant of the lead from the pencil-casing, substantially as described.

11. In a lead-pencil, the combination, with a casing having a practically smooth bore, of a lengthwise-slotted lead-containing tube therein, a shuttle or traveler placed loosely on the tube and having frictional bearing by the outer face of its body portion against the casing, the shuttle engaging the tube to move with the same in its forward movement and having a radial portion extending into the tube through its slot for actuating the lead, said lead-tube having a lateral collar or flange at its forward end and bearing against the inner walls of the casing, substantially as described, whereby said collar or flange centers and steadies the lead-tube in the casing, as set forth.

12. In a lead-pencil, the combination, with a casing having a practically smooth bore, of a longitudinally-movable lead-containing

tube therein, having a lengthwise slot, a cylindrical or partly cylindrical shuttle or traveler fitted outside the tube and having an independent frictional bearing by the outer face of its body portion against the inner walls of the casing, and provided with a radial portion extending into the tube through its slot for actuating and being actuated by the lead, said shuttle being provided with means for engaging positively with the tube against backward movement relatively to said tube, but being movable forward and backward within the casing while interlocked with the tube, and means for actuating the tube from the outside of the casing, substantially as and for the purposes described.

13. In a lead-pencil, the combination, with a casing having a practically smooth bore, of a longitudinally-movable lead-containing tube therein, having a lengthwise slot and rack-teeth, a cylindrical or partly cylindrical shuttle or traveler fitted outside of the tube and having an independent frictional bearing by the outer face of its body portion with the inner walls of the casing, and provided with a radial portion extending into the tube through its slot for actuating and being actuated by the lead, said shuttle also having a pawl or spring finger engaging the rack-teeth of the tube and holding it against backward movement relatively to the tube, said shuttle being movable forward or backward within the casing while interlocked with the tube, and means for actuating the tube from the outside of the casing, substantially as and for the purposes described.

14. In a lead-pencil, the combination, with a casing having a practically smooth bore, and a lead-holding tube therein provided with a longitudinal slot and a rack, and a detent locking the tube against backward movement when the lead is projected, of a shuttle or traveler having a body portion loosely fitting the tube and having frictional contact with the casing, and provided with a pawl  $f^2$  and one or more opposite spring-fingers  $f'$ , and a radial fin  $f^4$ , working through the slot of the lead-tube for feeding the lead, substantially as described.

15. In a lead-pencil, the combination, with a casing having a practically smooth bore, and a lead-holding tube therein provided with a longitudinal slot and a rack, and a detent locking the tube against backward movement when the lead is projected, of a shuttle or traveler having a body portion loosely fitting the tube and having frictional contact with the casing, and provided with a pawl  $f^2$  and one or more opposite spring-fingers  $f'$ , a radial fin  $f^4$ , and a plunger  $f^5$  on the part  $f^4$  and working in the lead-tube, substantially as described.

16. In a lead-pencil, the combination, with a casing having a practically smooth bore, and a lead-tube therein provided with a longitudinal slot, of a shuttle or traveler placed on the tube and consisting of two endwise



abutting parts movable independently of each other; one part engaging the tube to move with it and adapted to be disengaged therefrom and the other part having a radial portion entering the lead-tube and feeding the lead forward, one or both parts of the shuttle having frictional contact with the walls of the pencil-casing to prevent back movement of the shuttle as the lead-tube is drawn backward, substantially as described. 10  
LEWIS H. SONDEHEIM.

Witnesses:

HENRY L. GOODWIN,  
EDGAR TATE.