Aug. 14, 1923. 1,464,853

J. E. ROACH

PENCIL

Filed Oct. 6, 1917

Fig. 1

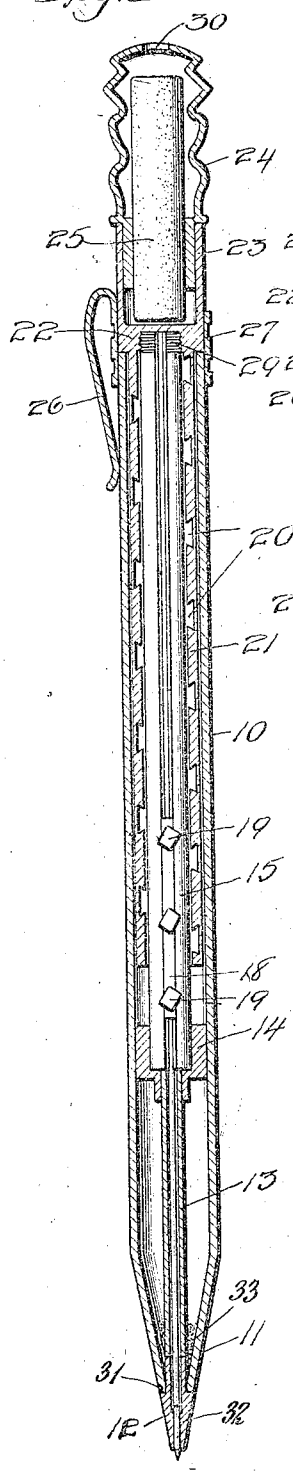


Fig. 2

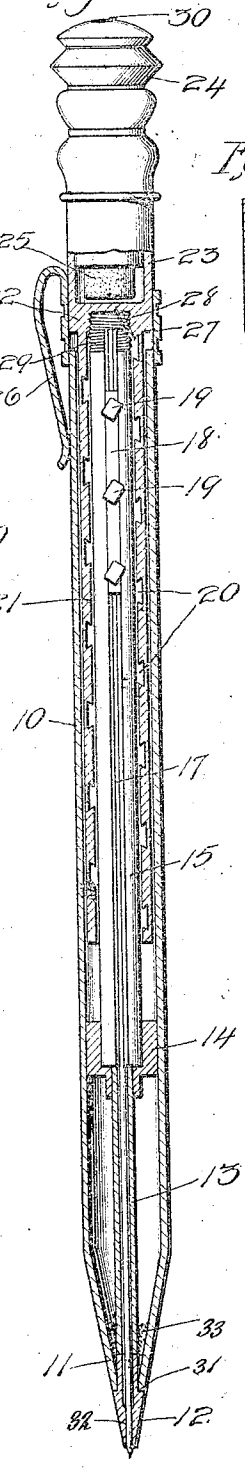


Fig. 3

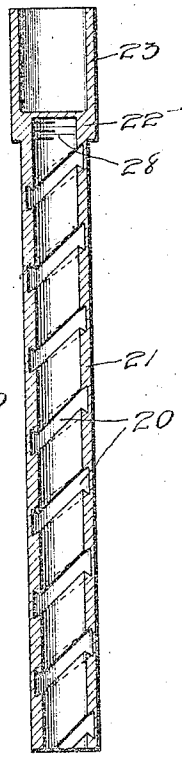


Fig. 5



Fig. 7

Fig. 4

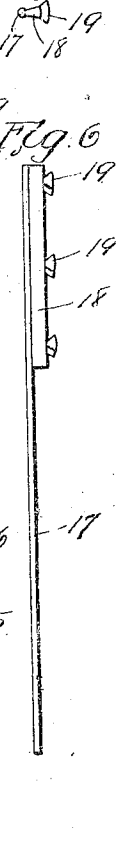


Fig. 6

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Patented Aug. 14, 1923. 1,464,853

UNITED STATES PATENT OFFICE.

JESSE E. ROACH, OF OAKLAND, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO AUTOPOINT MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

PENCIL.

Application filed October 6, 1917. Serial No. 195,206.

To all whom it may concern:

Be it known that I, JESSE E. ROACH, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, 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 a lead into operative position.

The present pencil embodies many novel features of improvement, among which are: a magazine having capacity for the storage of a large supply of reserve leads; a connection between the several working parts of the pencil that may be readily established or disestablished whenever required; and a threaded engagement between the plunger and rotatable sleeve that acts to retain the plunger in operative position therewithin whenever the sleeve is temporarily withdrawn from the body. These may be mentioned as a few of the special features of my invention, although I have aimed additionally to devise a structure that is simple, reliable, inexpensive, and otherwise desirable from manufacturing and service standpoints. Other objects as well will appear from the description to follow, wherein reference is made to a preferred embodiment of my invention as exhibited in the accompanying drawing, in which—

Figure 1 is a longitudinal section through the pencil, the parts being shown in their relation to the stub end of a piece of lead advanced to its limit;

Fig. 2 is a similar view, excepting that it shows the parts in their relation to a piece of lead that is full length;

Fig. 3 is a detail view, in longitudinal section, of the sleeve which is adapted for rotation within the pencil body;

Fig. 4 is a side elevation of the core which serves as a magazine and which is stationary within the pencil;

Fig. 5 is an end view thereof;

Fig. 6 is an elevation of the plunger; and

Fig. 7 is an end view thereof.

In constructing the present pencil, use is made of a body 10 in the form of tubing, its lower end 11 being tapered. At the extremity of this taper is a tip 12, having its lower end in the form of a truncated cone whose sides are tapered in conformity with the proximate end of the pencil. The upper end of the tip is of reduced size to enter into the interior of the pencil body for a short distance, and by this construction an annular shoulder 31 is provided which abuts the tapered end of the pencil, as clearly shown in Figs. 1 and 2. An axial bore is arranged in the tip, being slightly constricted as at 32 near its lower extremity so as to frictionally engage the lead being used in the pencil.

Centrally arranged within the body 10 and directly above the tip is a tube 13, the one part being held in fixed relation to the other by some such means as solder 33 dropped into the tapered end of the pencil. The upper end of the tube 13 is fitted to a collar 14 arranged immovably within the body, and formed on the upper side of the collar is a socket into which is fixedly secured a hollow core 15 which serves as a magazine for reserve leads. This magazine is of horseshoe shape in cross section (see Fig. 5), being open along one side from end to end to provide in effect a slot 16. Within the magazine a number of leads may be stored, both end to end and side to side. The lower end of the magazine is closed by the annular surface of the collar 14 with which it abuts; the closure for the upper end, however, is differently formed, as will presently be explained.

I have arranged within the pencil a plunger 17 (see Fig. 6) which is of a size and shape to travel freely through the core, tube, and tip as far as the constriction in the latter. This plunger is equipped with a head 18 provided with a plurality of laterally projecting teeth 19 of peculiar formation. When operatively assembled, the body of the plunger lies centrally within the core 15, the head 18 lies within its slot 16, and the teeth 19 project exteriorly of the core so as to interlock with a spiral thread 20 formed on the inner face of a sleeve 21 which is mounted to rotate within the pencil. The formation of the spiral thread is of particular interest inasmuch as it is of dove-tailed or undercut shape in cross section such that the teeth 19 (which are formed in a complementary manner) can not disengage therefrom. This is important for the reason that the operation of refilling the pencil requires

the temporary withdrawal from the body 10 of the sleeve 21, together with the plunger 17 therein, and during this interval the plunger would tend to become disengaged from the sleeve if it were not for the interlocking connection between these parts. Owing to the fact, moreover, that these teeth are several in number, and engage with several convolutions of the thread, the plunger is required to remain in operative position within the sleeve when these parts are withdrawn from the pencil. This is of advantage in the replacement of the parts; since the plunger will automatically enter the core in a proper manner as the sleeve is inserted within the pencil body.

The upper end of the sleeve 21 is formed with a head 22 which overlies and may abut the upper end of the pencil body. Extending upwardly from the head is a cylindrical wall 23 providing in effect a cup into which may be inserted a cap 24 which serves as a retainer for an eraser 25. Preferably the cap frictionally engages the cylindrical wall 23 so as to be readily disengaged therefrom whenever it is desired to use the eraser. This head, or cap, or both, may be turned freely whenever required to actuate the plunger within the pencil. A clip 26 is carried upon a band 27 which surrounds the pencil in a manner to overlap the adjoining ends of the body and sleeve head, thus serving to conceal the line of juncture therebetween.

At the upper end of the sleeve adjacent its head, interior threads 28 are provided, adapted to receive the upper end of the core, which for this purpose is similarly threaded as at 29. The threads 28 formed at the sleeve head should be substantially the same in number, but not in pitch, as the spiral threads 20 within the sleeve. If, for example, the pencil is designed to accomodate pieces of lead which are two inches in length, the plunger should be capable of traveling within the pencil for a distance fully as great. The spiral threads will accordingly be formed with a pitch that will act to propel the plunger the required distance with a predetermined number of turns within the pencil body. In order that the spiral threads may act to propel the plunger, it is necessary that the sleeve itself be prevented from any substantial longitudinal movement. For this purpose I have provided the cooperating threads 28 and 29 which act to hold the sleeve against any but a very slow and limited movement longitudinally of the pencil.

When a full length piece of lead is introduced into the pencil the parts will be related very much as is indicated in Fig. 2. It will be noted that the plunger stands near the upper end of the core, and that the threads 29 have just commenced to engage with the socket 28. With rotation of the sleeve and the consequent propulsion of the plunger, the parts will tend to assume the relation exhibited in Fig. 1. When the lead is about used up, the lower end of the plunger will abut the constriction in the tip, while the sleeve will have moved downwardly until the threaded end 29 of the core has advanced clear to the upper end of the sleeve. By a reversal of the movements described, the plunger will be retracted again to the top of the core and the sleeve as well will unscrew from the core until the sleeve with plunger therein is free to be withdrawn from the pencil body. It will be observed that during these operations both the plunger and sleeve are required to travel longitudinally within the pencil, the ratio of travel varying in accordance with the pitch of the respective actuating threads.

In refilling the pencil, the plunger as well as the sleeve is retracted by a turning movement imparted to the latter in the direction reverse to that applied for the advancement of the lead, the relation of the parts being such that when the plunger has about reached the end of its retracted movement, the sleeve is unscrewed from the body, permitting its withdrawal therefrom, together with the plunger. A lead may then be removed from the magazine, and be inserted in the upper end of the core so as to drop through the pencil until it abuts the stub section of lead remaining at the tip end. Replacement of the parts in the pencil is then followed by rotation of the sleeve therein, and this causes the threads 28 and 29 to re-engage; this action results further in an advance of the plunger so as to propel forwardly the leads which lie in advance thereof. It will thus be seen that the same movement which advances or retracts the plunger also causes the sleeve to move to a very slight extent, with the result that while the sleeve is held against any substantial longitudinal movement, it is nevertheless moved sufficiently to disengage from the pencil body when the plunger is fully retracted.

The cap which is shown in Figs. 1 and 2 is formed with an opening or slot 30 in its upper end through which any convenient instrument may be inserted to advance the eraser 25 whenever such action is desirable. It will be understood, of course, that in the use of this eraser the cap is removed from the pencil.

From the preceding description, it will be apparent that the pencil of my invention is simple and inexpensive to produce. The parts are so constructed and related as to be thoroughly protected and to require but slight manipulation for any purpose whatever. In addition, it will be noted that the threaded connections between the sleeve and

body and sleeve and plunger are concealed at all times except when the pencil is disassembled, and this is of especial advantage inasmuch as the sleeve projects from the pencil body for varying distances depending upon the extent to which the actuated parts have been operated. This connection between the sleeve and body is shown as formed with threads arranged at the upper extremity of the core, but as the core is a part having a fixed relation to the body, the connection, to all intents and purposes, is made to the body itself.

I claim:

1. A pencil having a chambered body in which is fixed a core curved in horse-shoe shape in cross section to provide a slit communicating with a central passageway therein, a lead propelling plunger adapted for travel within the central passageway of the core, the plunger having a head extending within the slit, and dovetailed teeth upon the head extending exteriorly of the core, and a sleeve mounted for rotation within the body, the sleeve having undercut threads to form an interlocking connection with the plunger teeth, and means exteriorly of the body for rotating the sleeve whereby the plunger is advanced within the pencil, substantially as described.

2. A pencil having a chambered body within which is mounted a rotatable sleeve formed interiorly with a spiral undercut thread, a plunger adapted for longitudinal travel within the pencil body and having laterally projecting teeth in interlocking engagement with the spiral threads of the sleeve, means for maintaining the plunger against rotation while traveling within the pencil, and means exteriorly of the pencil for rotating the sleeve to advance the plunger, substantially as described.

3. A pencil having a chambered body within which is arranged a sleeve formed interiorly with an undercut thread, a plunger adapted for movement within the pencil body having laterally projecting teeth in interlocking engagement with said undercut threads, and means for effecting a relative rotative movement between the sleeve and plunger whereby the one is advanced longitudinally of the other, substantially as described.

4. A pencil having a chambered body within which is arranged a lead propelling mechanism including two parts relatively rotatable to each other, one part being arranged to effect actuation of the other, and both parts being removable from the pencil, an interlocking connection between said parts including a dovetailed tooth on the one and an undercut thread on the other, whereby both parts remain in unitary relation when withdrawn from the body, and means for securing one part within the pencil body whereby the other part is also secured therewithin, substantially as described.

5. A pencil having a chambered body within which is arranged lead propelling mechanism including, in combination, an actuating and an actuated member each in operative relation to the other and interlocked by means of an undercut thread on the one and a dovetailed tooth on the other, and each being arranged for travel simultaneously in a direction longitudinally of the pencil, the actuating member having a threaded connection with the pencil body and adapted to be rotated relative thereto, the threaded connection being disestablished when the actuated member reaches the limit of its travel in one direction, whereby both members may be withdrawn as a unit from the pencil body, substantially as described.

6. A pencil having a chambered body within which is arranged a lead propelling mechanism including two parts interlocked by means of an undercut thread on the one and a dovetailed tooth on the other, and adapted for relative longitudinal movement when one such part is rotated relative to the pencil body, the part so rotatable relative to the body having a threaded connection therewith independent of its threaded connection with the other part, and being automatically disconnected from the body when the mechanism is operated in one direction for a predetermined distance, and when rotated in the opposite direction being automatically connected to the body, substantially as described.

7. A pencil having a chambered body within which is arranged lead propelling mechanism, including, in combination two relatively rotatable parts one of which is formed with an undercut thread and the other of which is provided with a tooth in interlocking engagement with said thread, said parts being removable as a unit from the pencil body, substantially as described.

8. A pencil having a chambered body within which is arranged mechanism including a lead propelling member and an actuating member therefor and attached thereto by an interlocking threaded connection, said members being removably secured within the body of the pencil and being adapted for simultaneous longitudinal movement therein during the propulsion of the active lead, substantially as described.

9. A pencil having a chambered body within which is arranged lead propelling mechanism, including, in combination, an actuating and an actuated member, one having an interlocking threaded connection with the other, and the actuating member having a threaded connection with the body, such that, when operated, both the actuating and actuated members are adapted to

move longitudinally of the pencil in the same direction, the threads forming the interlocking connection having a greater pitch whereby the speed, and consequently the distance of travel, of the actuated member, is also the greater, substantially as described.

10. A pencil comprising a hollow barrel, a lead propelling element arranged to move axially within the barrel and provided with a laterally extending projection, a tubular member surrounding the element and furnishing a guide for the active lead and provided with a longitudinal slot through which the projection on the element protrudes, a tubular screw member concentric with and outside of the slotted tubular member and operatively engaged with said projection, a rotatable head for imparting relative rotation between the propelling element and screw member for advancing the propelling element, said head being secured to and removable with the tubular screw member, the operating parts being arranged to furnish a holder for extra leads adapted to be exposed by the removal of the head and tubular screw member associated therewith, substantially as described.

11. A pencil comprising a hollow barrel within which is formed a magazine for reserve leads, a lead propelling element arranged to move axially within the barrel and provided with a laterally extending projection, a tubular member fixedly secured within the barrel in surrounding relation to the element and furnishing a guide for the active lead and provided with a longitudinal slot through which the projection on the element protrudes, a tubular screw member concentric with and outside of the slotted tubular member and operatively engaged with said projection, and a head forming a closure for the magazine fixedly connected with the tubular screw member so as to rotate the same relative to the propelling element whereby this latter part may be advanced within the pencil, there being means for removably holding the head and screw member in operative relation to the remaining parts of the pencil, substantially as described.

12. A pencil comprising a hollow barrel within which is formed a magazine for reserve leads, a longitudinally slotted tubular member arranged within the barrel and held in fixed relation thereto, a lead propelling element within the tube and having a lateral projection which extends through the slot, a rotatable head adapted to close the magazine, a tubular screw member connected with the head and adapted to rotate therewith, the tubular screw member being arranged in surrounding relation to the slotted tubular member and having internal threads with which engage the lateral projection of the lead propelling element, said head and tubular screw member being removable as a unit from the barrel, and means for maintaining the head and tubular screw member in operative relation to the remaining parts of the pencil, substantially as described.

JESSE E. ROACH.