

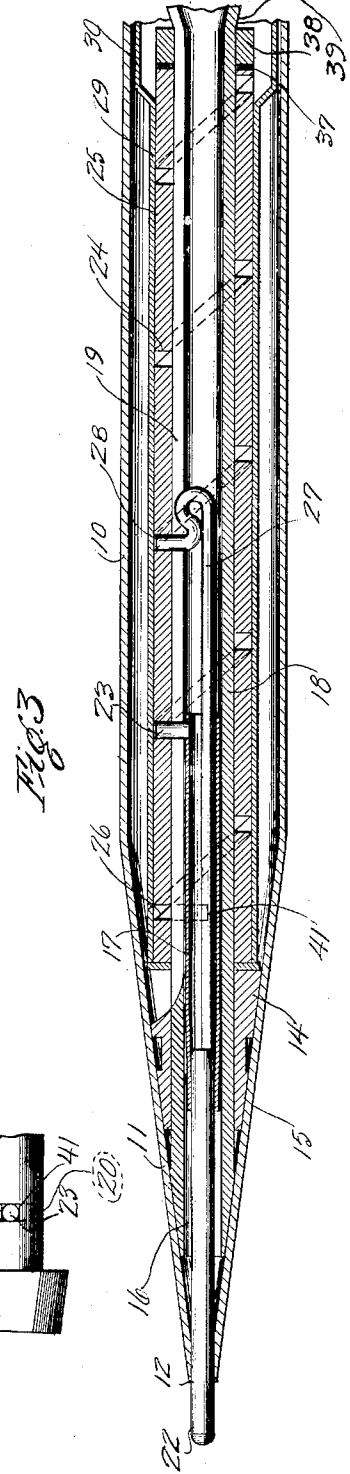
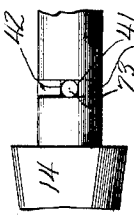
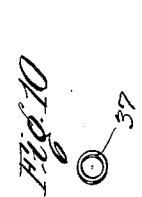
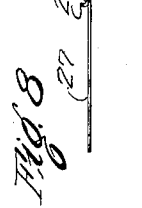
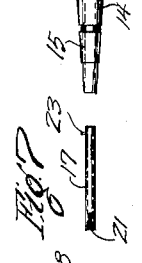
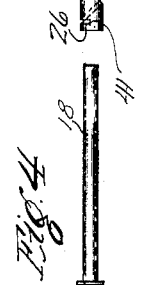
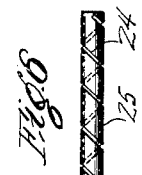
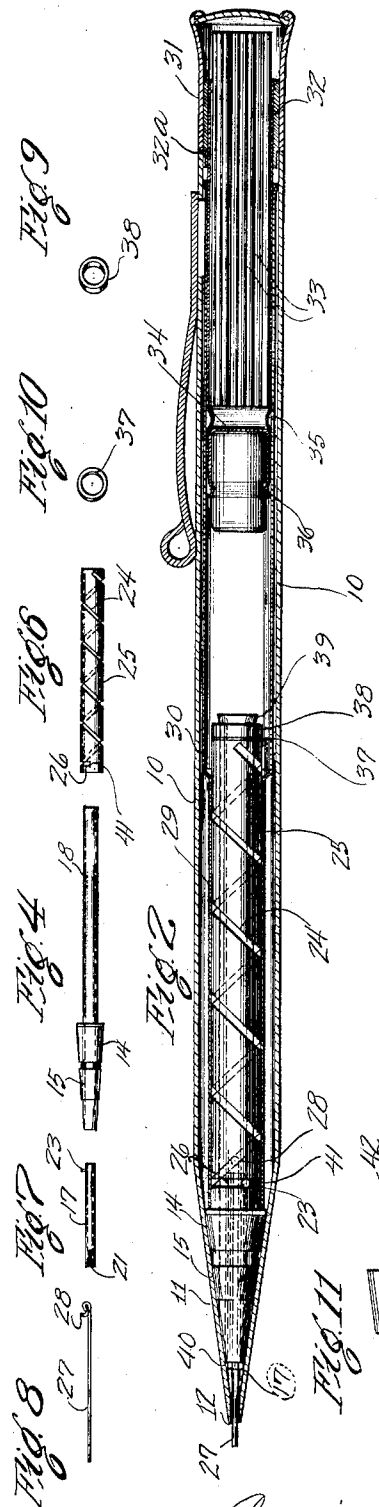
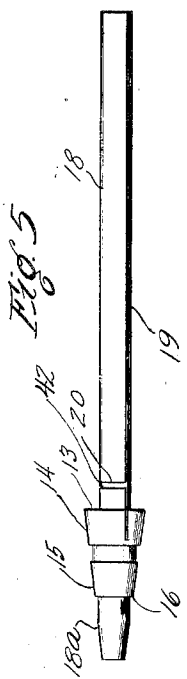
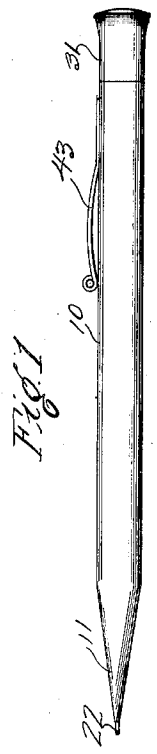
May 14, 1929.

C. R. SHEAFFER

1,712,850

PENCIL

Filed Nov. 23, 1921



Witness  
J. L. Brown.

Inventor  
Craig R. Sheaffer,  
By Sprinkastopkins & McNeil,  
Attys.

## UNITED STATES PATENT OFFICE.

CRAIG B. SHEAFFER, OF FORT MADISON, IOWA, ASSIGNOR TO W. A. SHEAFFER PEN COMPANY, A CORPORATION OF IOWA.

## PENCIL.

Application filed November 23, 1921. Serial No. 517,173.

My invention relates to that form of pencils employing mechanism for propelling and repelling individual leads beyond the end of the pencil barrel and for completely expelling the individual leads therefrom.

The primary object of my invention is to improve devices of this character generally.

One of the unique features of my invention is the means for arresting the pencil lead socket or clutch in its outward movement and then expelling the pencil lead from the clutch by a continuous rotation of the cap of the pencil barrel.

Other objects of the invention will appear from the following description, which is directed to the preferred embodiment of the invention, reference being had to the accompanying drawings forming a part of the specification.

Fig. 1 is an elevational view of a pencil embodying my invention.

Fig. 2 is an enlarged longitudinal sectional view thereof.

Fig. 3 is an enlarged detail sectional view of the lower portion of the barrel of a pencil embodying my invention.

Fig. 4 is an elevational view of the slotted guide tube.

Fig. 5 is an enlarged detail view of the slotted guide tube.

Fig. 6 is an elevation view of the spirally slotted screw sleeve.

Fig. 7 is an elevation view of the pencil lead socket or clutch.

Fig. 8 is an elevational view of the follower.

Fig. 9 is a perspective view of the retaining collar for the screw sleeve.

Fig. 10 is a perspective view of the washer which surrounds the guide tube between the end of the screw sleeve and the retaining collar.

Fig. 11 is an enlarged detail view showing the stud of the pencil lead socket or clutch engaged by the right angle slots in the guide tube and the screw sleeve.

Referring now to the drawings the pencil embodying my invention as illustrated therein comprises an outer casing or barrel 10, which terminates at one of its ends in the conically shaped or tapered portion 11, which is provided with an axial opening 12 therein of such contour and size in cross section as will permit the pencil lead or crayon that it is proposed to use in the pencil to have free reciprocal movement therethrough. This outer casing or barrel may be made of any suitable material and of such thickness or weight as may be deemed desirable. The barrel or outer casing forms a housing for the reception therein of the pencil lead propelling, retracting and expelling mechanism. I shall now proceed to describe my improved pencil lead propelling, retracting and expelling mechanism which may be made of any suitable material, preferably brass and which comprises a collar 13 which in its general outline is conical or tapering in shape and is provided with two enlarged portions 14 and 15, which conform on their peripheral surfaces to the surface of the periphery of the inner face of the wall of the conical or tapered portion 11 of the pencil barrel or casing 10 in order that they may establish a friction grip with the barrel or outer casing 10 when forced into contact with the inner walls of the conical portion 11 thereof, as shown in Figs. 2 and 3. Collar 13 has central bore 16 passing longitudinally therethrough of such diameter as to snugly receive the guide tube 18 in a tight push fit and rigidly hold the tube in frictional engagement with the collar. The outer wall of tube 18 is beveled or tapered at its lower end as at 18<sup>a</sup> to conform to and frictionally engage with the surface of the inner wall of tapered portion 11 of the outer casing or barrel 10 and is provided with a longitudinal slot 19 which intersects a slot 20 lying at right angles thereto and extending around the tube 18 approximately 180 degrees at a point adjacent the upper or inner end of collar 13 for a purpose which will presently be described.

I prefer to unite the collar 13 with guide tube 18 previous to cutting slot 19 therein, which slot has a tendency to weaken the tube, in order to prevent distortion thereof when the tube is forced into engagement with the collar, which operation will result in considerable strain on the tube in order to firmly engage the tube with the collar as the parts are made to have an exceedingly snug or tight fit in order to form an efficient union therebetween. After uniting the collar and the tube I use a cutter for forming a slot 19 in the tube, thus preserving the perfect alignment of the guide tube. The collar and guide tube may of course be made of one piece of any suitable material, although in the interest of

economy of manufacture I prefer to make them separately and assemble them as described. The tubular pencil lead socket or clutch 17 which is carried within guide tube 18 and adapted to have free reciprocal movement therein is kerfed at its lower end as at 21 in order to give it a resilient grip on the inner end of the pencil lead 22 when the lead is introduced therinto, and is provided with stud 23 adjacent its upper end which stud is adapted to extend through slot 19 of guide tube 18 and slidably engage the spiral slot 24 of screw sleeve 25, as shown in Figs. 2 and 3.

It will be noted by reference to Figs. 2, 3 and 6 that spiral slot 24 of screw sleeve 25 intersects slot 26 which latter slot is cut in the lower portion of the sleeve and at right angles to the axis thereof and extends around the sleeve approximately 180 degrees in the same direction as the convolutions of the spiral slot 24, which is in the opposite direction to the course of slot 20 in guide tube 18, and slot 26 lies in the same plane with slot 20 of guide tube 18 and therefore registers therewith when the parts are assembled as shown in Fig. 11. The tubular socket 17 has mounted therein follower 27 which is adapted to have free reciprocal movement with relation to socket 17. The follower 27 is formed from a piece of relatively stiff wire which is bent upon itself and then at right angles to the axis of the wire at one of its ends, thus forming an enlarged elongated portion adapted to engage the slot 19 of the guide tube 18 and a short finger 28 adjacent the end thereof, which finger slidably engages slot 19 of guide tube 18 and slot 24 of screw sleeve 25. This form of follower characterizing applicant's invention is a most desirable and ingenious construction, and is a decided improvement over structures heretofore used in the art which have only a projecting end or tip of small diameter co-operating with the slot in the guide tube and which have substantially only a line contact with the walls of the slot, while in applicant's structure it will be observed that the folded or sinuous shape of the material of the follower at the upper end thereof provides an enlarged elongated bearing in the slot of the guide tube and contributes to the strength and durability of the follower and to the efficiency of the structure as a whole. Finger 28 of follower 27 engages slot 24 of screw sleeve 25 at a point above stud 23 of socket 17 in guide tube 18 in order to completely expel the pencil lead from the outer end of the tubular socket 17 and the tapered end of the pencil barrel after the socket has been moved to the limit of its outward movement within guide tube 18 in the manner presently to be explained.

Guide tube 18 is rotatably carried within screw sleeve 25 which sleeve is held in frictional engagement by the reduced portion 29 of a connection sleeve 30. The sleeve 30 at

its upper end forms an enlarged socket adapted for the reception of a tubular magazine 31<sup>a</sup> which contains a quantity of reserve pencil leads 33. The upper end of the magazine is provided with an enlarged cap portion 31, 70 which is adapted to have rotatable movement with relation to the barrel or outer casing 10. It will be noted by reference to Fig. 2 that cap 31 is formed with its inner wall thickened as at 32 at a point adjacent its juncture with the 75 outer casing or barrel 10, thus forming a bearing 32<sup>a</sup> for the cap on the barrel. The wall of the tubular extension of cap 31 is provided with an inwardly struck bead 35 adjacent its inner end to form a seat for the pencil eraser 80 socket 34 and thereby limit the inner movement of the socket, while socket 34 has an inwardly struck bead 36 adjacent its open end to form a detent for securely holding the pencil eraser 34<sup>a</sup> therein. By the arrangement just 85 described, it will be seen that I have provided a construction in which a propelling, expelling and repelling mechanism for individual pencil leads together with a magazine for a quantity of reserve pencil leads is compactly ar- 90 ranged in such a manner as to occupy a minimum amount of space. This arrangement is permitted by reason of the construction of the connection sleeve 30 which is securely fixed to screw sleeve 25 by frictional engagement 95 therewith and connected to the operating cap 31 by being detachably and frictionally secured to the magazine barrel 31<sup>a</sup> of the cap 31. As the cap 31 is rotated with respect to the barrel or casing 10, this motion is transmitted 100 by the connection sleeve 30 to the screw sleeve 25, which, in turn, actuates the lead propelling and repelling mechanism.

I will now describe the manner of assembling my improved pencil. After the guide tube 18 has been secured to collar 13 as described, I insert the upper end of follower 27 in screw sleeve 25 engaging slot 24 thereof with stud 28 of the follower, the lower end of the follower 27 protruding from the bottom 110 of screw sleeve 25, and then insert the lower end of the follower in the upper end of socket 17, and then push the upper end of the socket into the lower end of the sleeve and engage the slot of the sleeve with stud 23 of socket 17 115 leaving the lower end of the socket protruding from the lower end of the sleeve 25 and around the follower 27, when I place the lower end of the socket with the lower end of the follower therein in the upper end of guide tube 18, 120 rotating the guide tube until slot 19 thereof engages first finger 28 of the follower and then stud 23 of the socket. I then place the washer 37 around the upper end of guide tube 18 and superimpose collar 38 thereon, when the upper end of the guide tube 18 may be flared 125 as at 39, Figs. 2 and 3, in any suitable manner, thus securely holding the parts in assembled relation. Then the reduced portion 29 of the connection sleeve 30 is frictionally se- 130

cured to the screw sleeve 25 by being telescopically connected therewith, after which the magazine barrel 31<sup>a</sup> of the cap 31 is detachably inserted in the enlarged portion of the connection sleeve 30. The parts thus far assembled form a very efficient and compact mechanism in the shape of a "core" which is next inserted into the outer casing 10 to a position in which the tapered portions 14 and 15 of the collar 13 engage the inner conical wall 11 of the outer casing. In this position the collar 13 is frictionally secured in the casing and forms a bearing for the actuating mechanism and also serves to centrally position the guide tube 18 in socket 17 as well as the follower 27 in registering position with the axial opening 12 in the casing 10. The upper end of the "core", as previously described, is rotatably supported in the upper end of the casing 10 by means of the cap 31 having a bearing seat 32<sup>a</sup> thereon and engaging the casing at this point. It will of course be understood from the above description that after the collar 13 with its co-operating parts has been securely fixed in the casing 10 that the magazine 31<sup>a</sup> containing the reserve pencil leads together with the cap 31 may be removed without disturbing or disconnecting the other parts.

In using my improved pencil the barrel 10 is held against rotation and the cap 31 is turned in the right hand direction, thereby forcing the pencil lead socket or clutch downwardly within guide tube 18, and through collar 13 until its forward end reaches the position shown in dotted lines in Fig. 2, when stud 23 and finger 28 will assume the position shown in Fig. 2, at which time there will be a very short butt of the pencil lead held by the socket or clutch 17 when the cap 31 may be further rotated in the right hand direction which will result in the rotation of the spirally slotted screw sleeve 25, which rotation of the sleeve will force the follower downwardly through the pencil lead socket or clutch until finger 28 assumes the position shown in Fig. 2, at which time the outer end of follower 27 will have protruded through the opening 12 of the conically or tapered portion 11 of barrel or casing 10 and completely expelled all of the piece of the pencil lead from the clutch and pencil barrel, Fig. 2. As before stated, the right angular slot 20 of guide tube 18 and the slot 26 of screw sleeve 25 which extends around the sleeve at right angles to the axis thereof both lie in the same plane with relation to collar 13 and therefore register one with the other. In this construction when finger 23 reaches the limit of its outward movement in slot 19 the pencil lead socket or clutch will be arrested in its outward movement by the contacting with the bottom of slot 19 of finger 23 at which time finger 23 will be in registering position with the slot 20 of guide tube 18 also

in registering position with slot 26 of screw sleeve 25 while finger 28 of the follower 27 will engage slot 24 of screw sleeve 25 above stud 23 the distance between the convolutions of slot 24 in the plane of slot 19 of guide tube 18. The stud 23 being in registering position with slot 26 will permit of the rotation of screw sleeve 25 approximately 180 degrees about its axis when stud 23 will contact with the end wall 41 of slot 26 when it will be carried through slot 20 of guide tube 18 approximately 180 degrees until stud 23 contacts with the end wall 42 of slot 20, thus allowing finger 28 of follower 27 to move the follower downwardly to the position shown in Fig. 2, which is a trifle beyond the point of the conical or tapered portion 11 of the barrel or casing 10, thereby completely expelling the lead 22.

On applying the reverse or left hand rotation to screw sleeve 25 the stud 23 of socket or clutch 17 will ride through slot 26 of the screw sleeve 25 to the end thereof when the end wall of slot 26 will draw stud 23 through slot 20 of guide tube 18 to the end of slot 20 opposite to that which it occupied when follower 27 was at its limit of outward movement, thereby placing the stud 23 in alignment with slot 19 of guide tube 18 at which time stud 23 and finger 28 will be in position to ascend spiral slot 24 of screw sleeve 25 in their normally spaced relation. This operation will have required approximately one revolution of cap 31 about its axis and will have drawn finger 28 of follower 27 upwardly in slot 19 of guide tube 18 into normal relation and longitudinal alignment with stud 23 in slot 19 of barrel 18 when further rotation of cap 31 in the left hand direction will completely withdraw pencil lead socket or clutch in the pencil barrel to the full limit of its movement.

I provide my pencil with the usual clip 43 for retaining the same in the pocket.

Having thus described my invention, what I claim is:

1. A lead pencil of the character described comprising, in combination, a casing, a rotatable cap carried thereby, a sleeve having a spiral slot formed therein rotatably mounted in said casing and operatively connected to said cap, a guide tube having a longitudinal slot therein, a lead engaging socket within said tube, and a follower positioned in said socket and formed of a piece of wire bent upon itself and then at right angles to the axis thereof in a manner to form an elongated bearing in the slot of said tube and a short finger adapted to engage the spiral slot in said sleeve.

2. A lead pencil of the character described comprising, in combination, a casing, a longitudinally slotted guide tube positioned in said casing and connected therewith, a spirally slotted sleeve journaled on said casing, a lead engaging socket mounted within said

guide tube, a stud carried by the socket and adapted to engage the longitudinal slot in said tube and the spiral slot in said sleeve, a follower positioned in said socket and formed  
 5 of a spring wire bent upon itself to form an enlarged elongated portion adapted to engage the longitudinal slot in said guide tube and then bent laterally to the axis of the follower in a manner to form a finger adapted to extend  
 10 into the spiral slot of said sleeve, and a rotatable cap carried by said casing and operatively related to said spirally slotted sleeve.

3. A follower for a lead pencil of the character described; comprising a piece of spring wire having a portion thereof bent upon itself to form an enlarged elongated portion at one end of the follower and then bent at right angles to the axis of the body portion in  
 20 a manner to form a relatively short finger adjacent the inner end of said enlarged portion and extending transversely to the body portion of the follower.

4. A lead pencil comprising an outer casing having one end conically shaped with an axial lead opening therein, a solid conical collar conforming on its outer peripheral surface to the inner surface of the conically shaped end of the casing, a tubular guide extending axially through said conical collar

and on both sides thereof and closely fitting an axial bore therein, the said tubular member being provided with a longitudinal slot on the side of its said supporting collar remote from the conically shaped end of the  
 35 casing; pencil lead propelling, retracting and expelling mechanism associated with said slotted guide tube and comprising a spirally slotted sleeve mounted on said collar and on that side thereof remote from the lead opening and concentrically with said guide tube,  
 40 means for preventing longitudinal movement of said sleeve relative to said conically shaped collar and said casing, an operating cap at the end of the casing opposite the lead opening, means connecting between said operating cap and said spirally slotted sleeve for rotating the latter, a tubular pencil lead socket carried within said guide tube and having a part thereof operatively associated  
 50 with the groove in said spirally slotted sleeve and with said slotted guide tube, and a follower telescopically engaging said pencil lead socket and being also operatively associated with and controlled by said spirally slotted sleeve and said slotted guide tube.  
 55

In testimony whereof I have signed my name to this specification, on this 19th day of November, A. D. 1921.

CRAIG R. SHEAFFER.