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T. YOSHIMATSU

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PENCIL

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Fig. 1~

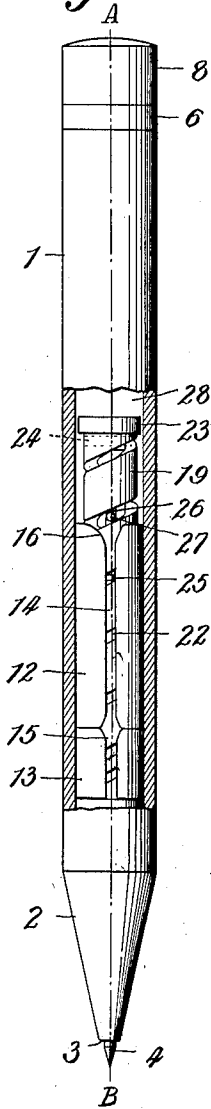


Fig. 2~

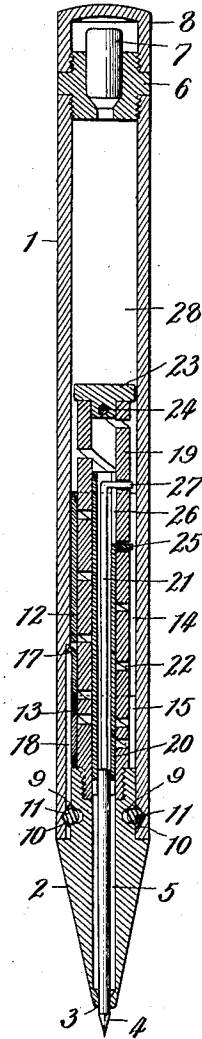


Fig. 3~

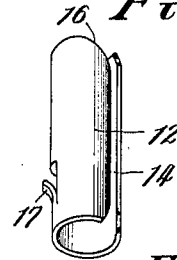
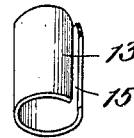


Fig. 4~



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PENCIL

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This invention relates to a pencil in which the lead is projected or retracted from or in a barrel by rotation of the operating tip relatively to the barrel, and has for its object to provide a pencil of this class which is simple and durable in construction and efficient in operation.

In pencil of this kind the excessive rotation of the operating tip relatively to the barrel beyond the extremity of the advance or the withdrawal of the lead is usually liable to cause breakage of the lead propelling mechanism or the lead. The invention is proposed to eliminate these disadvantages and consists in the novel construction, combination and arrangement of the parts.

In the accompanying drawings:

Fig. 1 is a side elevation of my pencil, partly in section.

Fig. 2 is a longitudinal cross sectional view of the same taken on line A—B of Fig. 1.

Figs. 3 and 4 are perspective views illustrating a stationary and a rotatable guide bush for the lead propelling mechanism respectively.

Referring to the drawings a barrel or casing 1 is formed of thin tubular material which is adapted to enclose a lead propelling mechanism. Connected to the fore end of the barrel 1 is a conical operating tip or writing end 2 having an end opening 3 in which a lead 4 fits snugly and a central longitudinal perforation 5 extending throughout its length. Screwed in the other end of the barrel 1 is an eraser holder 6, which carries an eraser 7, and has a screwed cap 8. The rear end of the operating tip 2 is of such a reduced diameter as to fit closely within the fore end of the barrel 1 and is formed with an annular groove 9 of a substantially U-shaped cross section. The barrel 1 is formed with an annular groove 10 of a substantially V-shaped cross section in the fore end to be in substantially opposite relation to the groove 9 of the operating tip 2 when the same is inserted in the barrel. The operating tip 2 is inserted with its rear end in the fore end of the barrel 1 and is secured in place by means of a spring ring 11 interposed in the grooves 9 and 10, but is free-

ly rotatable therein. With such connection, the operating tip 2 will be securely held in the barrel 1 although the grooves 9 and 10 are not in exactly opposite relation, and also the connection will form suitable frictional engagement between the said operating tip and barrel to prevent free or loose rotation between the same if the grooves 9 and 10 are slightly shifted from the exactly opposite relation, but the same are easily detachable from each other, so that the lead propelling mechanism may be withdrawn from the barrel.

Insertible within the barrel 1 from its fore end are a stationary tubular guide bush 12 and a rotatable tubular guide bush 13, the latter being of a length shorter than the former, each of which is provided with a longitudinal guide slot 14 and 15 extending throughout its length respectively. The guide slot 14 is slightly flared at either end and the guide slot 15 is slightly flared at the rear end to accommodate transit of the guide members which will be described hereinafter. A corner of the rear end of the slot 14 is cut round as shown in 16, while the opposite corner is made angular as clearly shown in Figs. 1 and 3, in order to permit free transit of the guide member on the rear edge of the guide bush 12 over the corner upon getting out from the slot, whereon the guide member may travel round, while the opposite angular corner prevents the guide member from getting out of the slot and directs the same toward the slot upon entering thereinto, for purposes described hereinafter. The stationary guide bush 12 is formed with a tongue 17 at its fore part and in substantially opposite position to the slot 14, which is cut therein and bent slightly outward to engage with a longitudinal groove 18 formed in the fore end of the barrel 1, whereby the said guide bush is secured in place within the said barrel as clearly shown Figs. 2 and 3.

Within the barrel 1 is a lead propelling mechanism composed of a propelling tube 19, a lead carrier 20 and a lead projector 21.

The propelling tube 19 is formed with a spiral slot 22 of course pitch and is inserted in the barrel 1 extending through the guide

bushes 12 and 13 and is screwed in the operating tip 2 at the fore end. Said propelling tube is loosely held in the guide bush 13, while the latter is tightly but rotatably held in the barrel 1, so that the propelling tube may be rotated independently in the guide bush and also may be rotated in the barrel together with the latter upon their operative engagement as hereinafter described. The pitch of the said spiral slot is considerably reduced at its fore end for the purpose as described hereinafter. A plug 23 is attached to the rear end of the propelling tube 19 through means of a pin 24.

Within the propelling tube 19 is the lead carrier 20, which is split at the fore end to grip and hold the lead 4, and is provided with a laterally projecting pin or guide member 25 adapted to extend through the spiral slot 20 of the propelling tube 19 and the guide slot 14 of the stationary guide bush 12 or the guide slot 15 of the rotatable guide bush 13, and a longitudinal slot 26 of a length greater than one pitch length of the upper portion of the spiral slot 22 for receiving a bent extremity of the lead ejector 21, particulars of which are described hereinafter. The projecting pin 25 may be formed in the lead carrier 20 in such a manner that a strip is formed by longitudinally cutting the rear end of the same up to a point where the pin is to be located to form the slot 26 and is cut to the necessary length and is bent outwardly at substantially right angles.

Within the lead carrier 20 is the lead ejector 21 having a bent extremity 27 which extends through the slot 26 of the said lead carrier, the spiral slot 22 of the propelling tube 19 and the guide slot 14 of the guide bush 12 or the guide slot 15 of the guide bush 13, and is located at a point aligned with the pin 25 of the said lead carrier and spaced one pitch distance therefrom.

It is to be noted that when the guide slots 14 and 15, are once aligned with each other they will be kept in alignment as the guide bushes 12 and 13 are normally rotated. Further rotation of the operating tip 2 after both the pin 25 of the lead carrier 20 and the bent extremity 27 of the lead ejector 21 have come into the groove 15 of the guide bush 13, will cause the guide bush 13 to be rotated to move the slot 15 from the alignment with the slots 14. But, in the reverse rotation of the operating tip 2 the guide bush 13 will be rotated after the bent extremity 27 has come into contact with the edge of the end of the guide bush 12, although it is not rotated until that time. By this rotation, as soon as the slot 15 has come to an alignment with the slot 14 the bent extremity 27 will come into the slot 14, whereby the alignment of the slots is resumed.

The space 28 in the barrel 1 between the

propelling tube 19 and the eraser holder 6 forms a magazine within which may be carried extra leads for use with the point of the operating tip.

In operation, the lead 4 is inserted through the end opening 3 in the operating tip 2 and is held in place by the split end of the lead carrier 20. To project the lead from the barrel, the operating tip 2 is rotated relatively to the barrel 1 in a direction to advance the lead carrier 20 through means of the propelling tube 19. In order to protect the tip of the lead when the pencil is not in use, the lead may be withdrawn in the barrel by rotating the operating tip relatively to the barrel in the reverse direction. The lead ejector 21 will longitudinally move with the lead carrier 20, and at the fore part of the propelling tube 19 it will advance relatively to the lead carrier to eject the lead therefrom, as the pitch of the spiral slot 22 is reduced in that part of the propelling tube as aforementioned. When the operating tip 2 is further rotated relatively to the barrel 1 after the lead carrier 20 has reached the extremity of its advance the propelling mechanism will rotate in unity with the rotatable bush 13 relatively to the barrel 1 the pin 25 of said lead carrier being now in the guide slot 15 of said rotatable bush, to prevent the same from being subjected to undue stress. It shall be noted in the above described arrangement that the bent extremity 27 of the lead ejector 21 will come in the guide slot 15 of the guide bush 13 before the guide bush is caused to rotate, in order to prevent the bent extremity from engaging with rear edge of the guide bush. On the other hand, when the operating tip 2 is further rotated relatively to the barrel 1 after the lead carrier 23 has reached the extremity of its withdrawal the pin 25 of the lead carrier 20 will get on the rear edge of the stationary guide bush 12 over the round corner 16, whereon the said pin may slide around, and then the propelling mechanism will rotate in unity relatively to the barrel 1 to prevent the same or the lead from being subjected to such undue stress as to cause breakage thereof. It is a special feature of the invention that the breakage of the propelling mechanism or the lead due to excessive rotation of the operating tip relatively to the barrel is entirely prevented as seen from the above description.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. In a pencil, the combination with a barrel and an operating tip connected thereto, of a rotatable guide bush having a longitudinal slot, a stationary guide bush having a longitudinal slot with a corner cut round at the rear end and a lead propelling mechanism composed of a propelling tube, a lead

carrier and a lead ejector, and the operating tip being arranged to further rotate in safety beyond the extremities of the advance or the withdrawal of the lead carrier.

5 2. In a pencil, the combination as set forth in claim 1, characterized by the operating tip being securely but detachably connected with the barrel through means of the provision in the tip of an U-shaped annular
10 groove and the provision in the barrel of a substantially similarly shaped annular groove and a spring ring interposed in these grooves, so that the propelling mechanism may be removed from the barrel with the
15 operating tip as a unit in order to facilitate repairs and the like.

3. In a pencil, the combination as set forth in claim 1, wherein means is provided for securing the stationary guide bush to the
20 barrel, including the provision in a barrel of a longitudinal groove and a tongue struck out from the bush and engaged in the groove of the barrel.

4. In a pencil, the combination with a barrel and an operating tip detachably and rotatably connected thereto, of a rotatable guide bush tightly arranged within the barrel and having a longitudinal slot, a stationary guide bush arranged within the barrel and also
30 provided with a longitudinal slot and with a corner at the inner end rounded, and a lead propelling mechanism constructed as a unit with a tip and comprising a propelling tube detachably connected to the inner end of the
35 tip and loosely arranged within the bushes and provided with a spiral slot, the pitch of which is considerably reduced adjacent the operating tip, a tubular lead carrier arranged within the propelling tube having a slot provided with a rib arranged at the inner end
40 of the longitudinal slot and also engaged with the spiral slot, and a lead ejector arranged within the tubular carrier and having the inner end bent angularly and arranged
45 through the slot in the tube carrier and engaged with the spiral slot in the propelling tube, substantially as and for the purposes set forth.

50 In testimony whereof I affix my signature.
TADAO YOSHIMATSU.

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