March 19, 1929. J. E. MACKAY 1,705,935

PENCIL

Filed March 19, 1928

Fig. 1

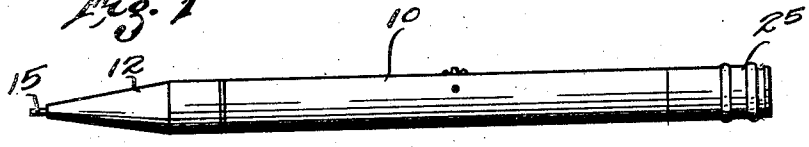


Fig. 2

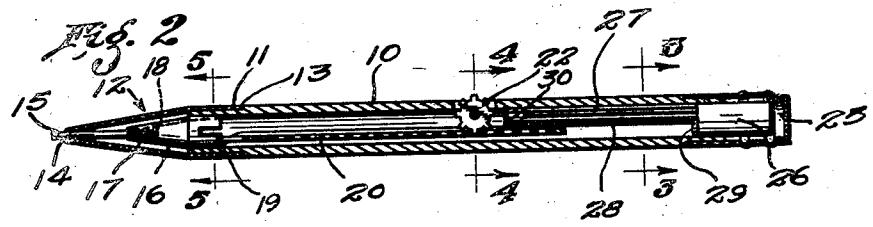


Fig. 3

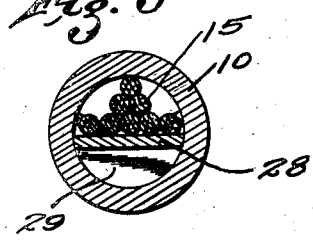


Fig. 4

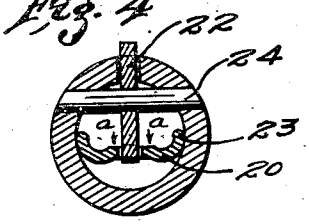


Fig. 5

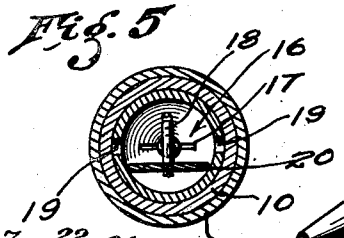


Fig. 6

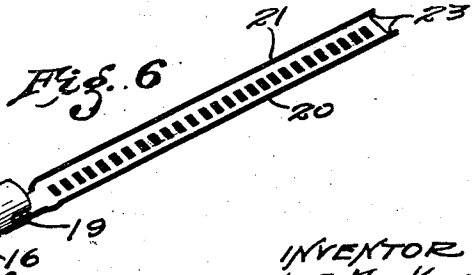


Fig. 7

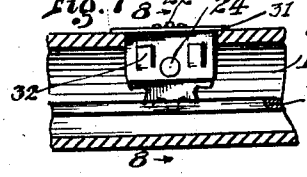


Fig. 8



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UNITED STATES PATENT OFFICE.

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PENCIL.

Application filed March 19, 1928. Serial No. 262,663.

This invention relates to a pencil structure, and particularly pertains to a refillable pencil.

It is the principal object of the present invention to provide a pencil adapted to receive separate leads which may be propelled within the pencil and may be progressively projected from the point thereof as the lead is abraded. The structure is so designed as to make it possible for the leads to be easily installed in operative relation to the pencil mechanism, and to be propelled by the operator by manipulation as it is held in one hand and operated by the same hand,—the structure being decidedly inexpensive as to material and manufacturing cost and possessing two parts not liable to get out of order.

The invention is illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a view in side elevation showing the complete pencil as assembled.

Fig. 2 is a view in central longitudinal section through the pencil showing the operating mechanisms thereof.

Fig. 3 is a view in transverse section through the barrel of the pencil as seen on the line 3—3 of Fig. 2 and disclosing the lead mechanism.

Fig. 4 is a view in transverse section through the pencil as seen on the line 4—4 of Fig. 2, showing the propelling bar and the gear for operating the same.

Fig. 5 is a view in transverse section through the pencil on the line 5—5 of Fig. 2, showing the clutch mechanism in detail.

Fig. 6 is a view in perspective showing the lead clutch and propelling mechanism.

Fig. 7 is a fragmentary view in longitudinal section and elevation showing a modified form of the invention.

Fig. 8 is a view in transverse section on the line 8—8 of Fig. 7.

Referring more particularly to the drawing 10 indicates the barrel of a pencil. This pencil is formed from tubular material and is circular in cross-section. The outer diameter at one end of the barrel is reduced as indicated at 11, to provide a bearing surface for a tubular pencil point 12, which point abuts against a shoulder 13 formed on the barrel. The point 12 has a cylindrical portion fitting snugly around the reduced portion 11 of the barrel and continues in a hollow tubular member of conical shape, the apex of which is formed with a lead opening 14 through which a pencil lead 15 may be projected.

The lead 15 is mounted within a friction clutch 16. This clutch has a conical section agreeing in angularity with that of the point 12, and terminates in a cylindrical portion intended to fit snugly within the bore of the barrel 10. The conical portion of the clutch 16 is formed with an opening in its end to receive the lead 15, and the clutch cone is split along opposite sides as indicated at 17, so that it will yieldably engage the lead and frictionally hold it in position.

A stop pin 18 extends transversely of the clutch cone at a point intermediate the ends thereof and against which pin the lead abuts so that it will not be forced into the pencil by the action or pressure required in writing.

In order to insure that the cylindrical base portion of the clutch 16 will fit snugly within the bore of the barrel 10, it is split along diametrically opposite sides as indicated at 19, thus the clutch will be firmly held and guided through the bore of the barrel and the lead will always be held in an aligned position with the opening 14 of the point through which it is propelled.

Securely fastened to the clutch 16, or formed integral therewith, is a propelling rack 20. This rack, as seen in Fig. 6 of the drawing, is formed with a plurality of peripheries 21, which are engaged by teeth of the propelling gear 22. The opposite sides of the rack are curved as indicated at 23 in Fig. 4 of the drawing, and the intermediate portion of the rack is longitudinally convexed. This makes it possible for the propelling gear 22 to create a downward pressure upon the center of the rack, as indicated at "*a*" in Fig. 4, thus tending to straighten the center of the rack and to force its outer curved edges against the wall of the barrel and in frictional contact therewith. This insures that the parts at all times will be firmly held with relation to each other, and that there will be no possibility for rattle or slippage. The gear is mounted upon a pin 24 extending through the barrel, as indicated in Fig. 4.

The opposite end of the barrel from that upon which the point is mounted is formed with a reduced section to receive a cap 25. This cap is frictionally held in place and normally covers an eraser 26 mounted within the end of the barrel. By removing the eraser it is possible to gain access to a lead compart-

ment 27, within which extra leads are placed. This compartment is formed by a metal partition member 28, which extends substantially along the longitudinal center of the barrel, and has an end portion 29 turned down at one end and an end portion 30 turned in the opposite direction at the other end, to form end walls therefor.

It will be evident that by this arrangement the leads may be conveniently stored without interfering with the movement of the rack bar 20 within the barrel.

Referring particularly to Figs. 7 and 8, it will be seen that another form of mounting is provided for the gear 22. This comprises a frame member 31, which extends through an opening in the side wall of the pencil barrel 10 and carries the pin 24 of the gear 22. This frame member has a flange 33 resting against the outer face of the barrel and is formed along opposite sides with outwardly flaring tangs 32, which are struck from the sides of the metal and will yield as the device is forced through the opening in the barrel of the pencil, but will extend outwardly along opposite sides of the member 31, after it has been positioned through the barrel, as particularly shown in Fig. 8. It will thus be evident that the tangs 32 will rigidly hold the gear in position and will thus make it possible for the pencil to be readily assembled without boring holes through the barrel wall to receive the pin 24 of the gear 22, as was shown in Fig. 4 of the drawing.

In operation of the present invention, the pencil is assembled as shown, and by removing the cap 12, a lead may be inserted in the end of the clutch 16, and between the jaws thereof. The cap is then placed upon the barrel of the pencil and the propelling gear 22 is rotated. This can easily be accomplished by the thumb of the hand within which the pencil is grasped, since the gear will provide a friction surface over which the thumb of the operator may move and by which the gear will be rotated.

It will be evident that this entire operation may be performed in one hand without the assistance of the other hand, thus making this a desirably convenient pencil to manipulate and adjust.

When the propelling gear 22 has been rotated to project the lead 15 a desired distance beyond the end of the point 12, this operation may be discontinued, and the parts will remain in their adjusted position without danger that sufficient traction will be exerted upon the lead to force it into the pencil.

It will thus be seen that the structure here disclosed, while decidedly simple in its construction and operation, makes a highly desirable and efficient pencil, involving a minimum amount of material and labor.

While I have shown the preferred form of my invention, as now known to me, it will be understood that various changes may be made in the combination, construction and arrangement of parts by those skilled in the art without departing from the spirit of the invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A pencil structure comprising a tubular barrel, a point in the end thereof through which a lead may pass, a clutch within the barrel to receive the lead, a gear rack secured to the clutch and extending longitudinally within the barrel and a gear projecting through the wall and adapted to rotate to manipulate the rack and propel the lead.

2. A pencil structure comprising a tubular barrel, a hollow conical point on one end thereof having an opening through the apex thereof, through which a lead may pass, a clutch adapted to move longitudinally within the barrel and to frictionally engage a pencil lead, a bar secured at one end to the clutch and extending longitudinally within the barrel, a gear rack formed by said bar, a gear pinion engaging the rack and with its peripheries extending through a slotted opening in the side wall of the barrel, whereby rotation of the gear will reciprocate the rack and propel the lead.

3. A lead pencil comprising a tubular barrel, a hollow conical point mounted upon one end of said barrel, and having an opening in its apex through which a lead may project, a conical clutch within the barrel and projecting within said point, said clutch being adapted to frictionally engage a pencil lead, a cylindrical end section formed as a part of said clutch and yieldably engaging the walls of the barrel, a gear rack secured to the clutch and extending longitudinally within the barrel, a gear in mesh therewith and projecting through a slot in the side wall of the barrel and by rotation of which the clutch and its lead may be propelled.

4. A lead pencil comprising a tubular barrel, a hollow conical point mounted upon one end of said barrel, and having an opening in its apex through which a lead may project, a conical clutch within the barrel and projecting within said point, said clutch being adapted to frictionally engage a pencil lead, a cylindrical end section formed as a part of said clutch and yieldably engaging the walls of the barrel, a gear rack secured to the clutch and extending longitudinally within the barrel, said rack being of a width to engage opposite sides of the barrel, a gear in mesh therewith adapted to hold said rack in frictional engagement with the barrel and by rotation of which said clutch will be propelled.

5. A pencil structure comprising a tubular barrel, a hollow conical point on one end thereof, having an opening through which a

pencil lead may be passed, a conical clutch for receiving the end of said lead, said clutch having a yieldable portion engaging the wall of the bore of the barrel to center the clutch within the barrel, a rack secured to said clutch and extending longitudinally, the longitudinal marginal edges of said rack being curved to engage and conform to the contour of the bore of the barrel upon opposite sides of the center thereof, the intermediate portion of the rack being concaved longitudinally thereof, a gear mounted within the barrel and with its periphery extending through the side wall of the barrel, said gear engaging the rack in a manner to tend to flex the concave portion thereof and engage frictional engagement of the edges of the rack with the barrel, and whereby rotation of the gear will move the rack longitudinally of the barrel.

6. A lead pencil comprising a tubular barrel, a hollow conical point mounted upon one end of said barrel, and having an opening in its apex through which a lead may project, a conical clutch within the barrel and projecting within said point, said clutch being adapted to frictionally engage a pencil lead, a cylindrical end section formed as a part of said clutch and yieldably engaging the walls of the barrel, a gear rack secured to the clutch and extending longitudinally within the barrel, said rack being of a width to engage opposite sides of the barrel, a gear in mesh therewith adapted to hold said rack in frictional engagement with the barrel and by rotation of which said clutch will be propelled, and a frame member carrying said gear and adapted to be inserted through an opening in the barrel wall and automatically interlocked therewith.

JOSEPH E. MacKAY.