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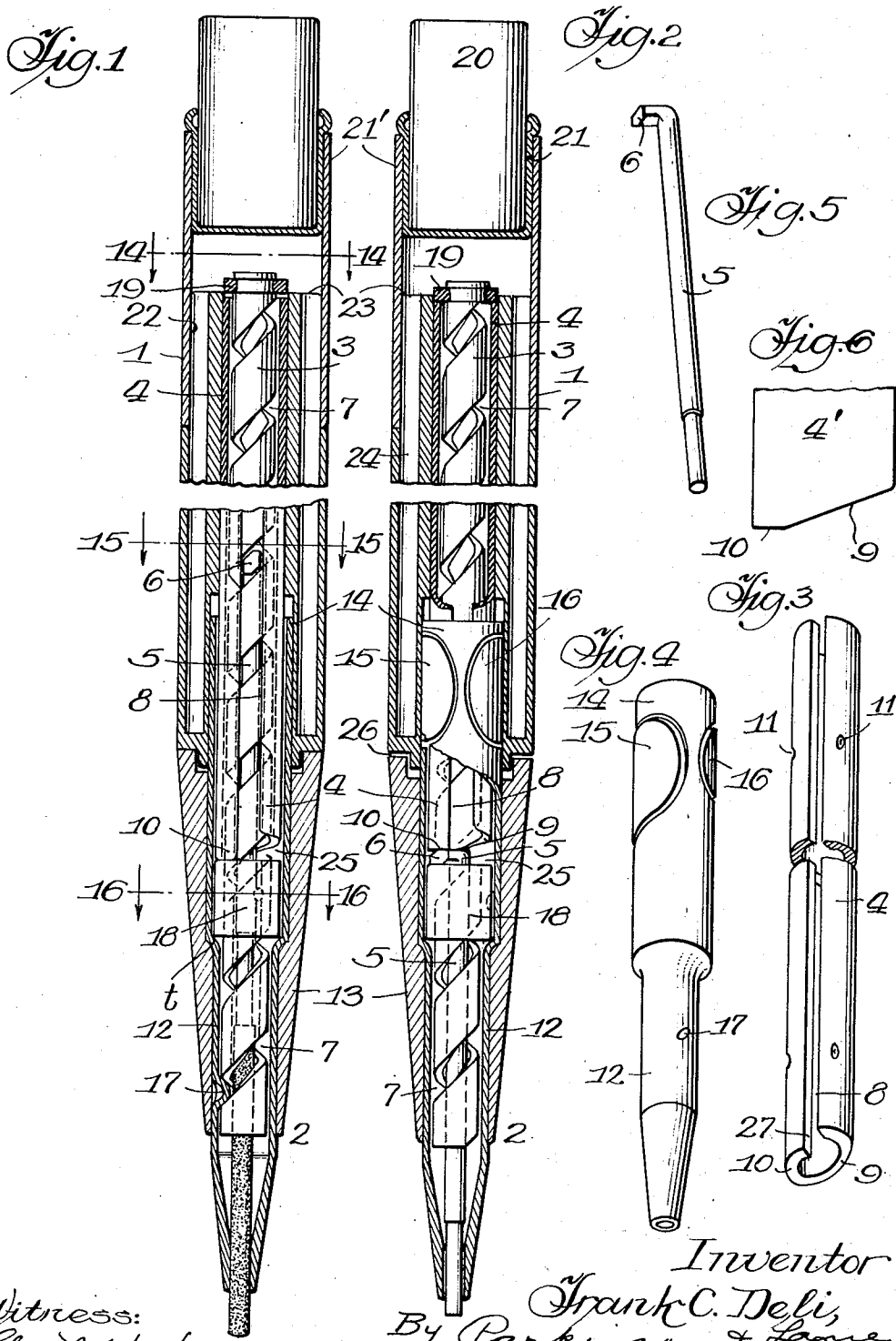
F. C. DELI

2,131,551

MECHANICAL PENCIL

Filed Aug. 10, 1936

2 Sheets-Sheet 1



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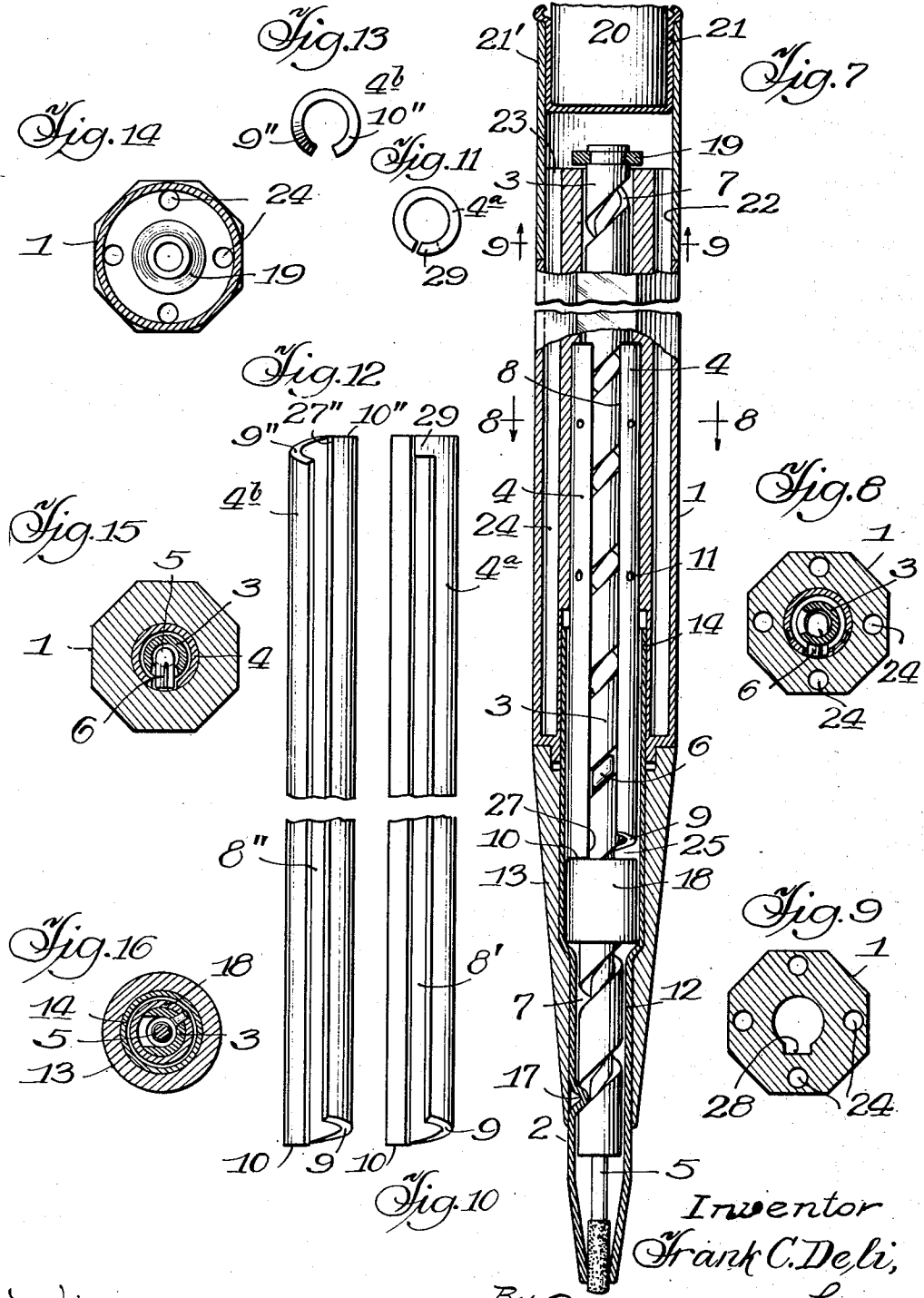
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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE

2,131,551

## MECHANICAL PENCIL

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Application August 10, 1936, Serial No. 95,073

16 Claims. (Cl. 120—18)

This invention relates to mechanical pencils and more particularly to improvements in the general structure of the pencil and the operating mechanism thereof.

5 The invention of this application constitutes improvements in the mechanical pencil of my copending application Serial No. 39,252, filed September 5, 1935, and like the pencil of said copending application is constructed to use extra  
10 long leads to save the inconvenience of too frequent reloading.

Among the objects of my invention is to provide improved means for effecting longitudinal movement of the lead with relation to the tip, and  
15 to at the same time permit the use of an extra long lead.

A further object is to provide for the stretching of the lead guide tube to permit movement of the plunger head circumferentially in the  
20 safety zone.

Another object is the stretching of the lead guide to permit rotation of the plunger head in the safety zone and also guide the plunger head into the longitudinal slot for rearward movement upon reverse rotation of the tip with relation to the barrel.

A still further object is the provision of a longitudinally slotted tube having its front end beveled to provide a safety zone and to guide the  
30 plunger head back into the longitudinal slot upon reverse rotation.

Another object is to provide a longitudinally slotted tube having both its front end and rear end beveled to provide at both ends of said tube a safety zone and to guide the plunger head back into the longitudinal slot upon reversing the direction of rotation.

A further object is to provide a longitudinally slotted tube with its front end beveled, and the  
40 slot open at the front end and closed at the rear end.

Another object is to provide an improved tip construction of desirable length without unduly increasing the length of the pencil.

5 A still further object is to generally improve the construction of a mechanical pencil especially adapted to use extra long leads.

Other objects, advantages and capabilities will later more fully appear.

50 My invention further resides in the combination, construction and arrangement of parts illustrated in the accompanying drawings, and while I have shown therein preferred embodiments I wish it understood that the same are  
55

susceptible of modification and change without departing from the spirit of my invention.

In the drawings:—

Fig. 1 is an enlarged longitudinal section on a median plane of the preferred form of my invention, a portion being broken away and certain of the parts being shown in elevation for the sake of clearness.

Fig. 2 is an enlarged sectional view similar to Fig. 1 but showing some of the parts moved to a different position, and the plunger head in the forward safety zone.

Fig. 3 is an enlarged perspective view of the longitudinally slotted tube, a portion being broken away for convenience.

Fig. 4 is an enlarged perspective view of the metal portion of the tip.

Fig. 5 is an enlarged perspective view of the plunger.

Fig. 6 is an enlarged fragmentary face elevation of a portion of the beveled end of the longitudinally slotted tube developed or laid out flat prior to being bent into tubular form.

Fig. 7 is a view similar to Fig. 1, but showing a modification.

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

Fig. 9 is a transverse section taken on the line 9—9 of Fig. 7, but with the lead guide tube omitted.

Fig. 10 is an enlarged side elevation of a modification of the longitudinally slotted tube, showing the rear end of the slot as being closed, and the front end of the tube beveled or inclined.

Fig. 11 is an end elevation of the tube of Fig. 10.

Fig. 12 is an enlarged side elevation of a further modification of the longitudinally slotted tube, showing the slot open at both ends and both ends of the tube beveled or inclined.

Fig. 13 is an end elevation of the tube shown in Fig. 12.

Fig. 14 is a transverse section taken on the line 14—14 of Fig. 1.

Fig. 15 is a transverse section taken on the line 15—15 of Fig. 1, and

Fig. 16 is a transverse section taken on the line 16—16 of Fig. 1.

Referring in detail to the drawings, the preferred form of my improved pencil is shown in Figs. 1 and 2 to comprise in general a barrel 1, a tip 2, a lead guide tube 3, a longitudinally slotted tube 4, and a plunger 5 formed with a head 6 adapted to be seated in the spiral slot or guide-way 7 of the lead guide tube 3 and also extend

into the longitudinal slot 8 of the longitudinally slotted tube 4. As the lead guide tube 3 is rotated by the tip with relation to the barrel, the plunger head is forced longitudinally along the slot 8 by the inclination of the sides of the spiral slot 7 in the lead guide 3, the direction of such movement being determined by the direction of the relative rotation between the tip and the barrel, as is generally common in mechanical pencils.

The longitudinally slotted tube 4 is formed by rolling a properly shaped flat piece of metal 4' (see Fig. 6) into tubular form with the two longitudinal edges spaced apart a sufficient distance to form the longitudinal slot 8. In making the form of tube 4 shown in Figs. 1, 2 and 3, the flat piece of metal 4' from which this tube is made has one of its ends formed with the beveled portion 9 and the straight portion 10 (see Fig. 6), so that when rolled into the said tubular form this tube has at its front end the bevel or inclined cam-like portion 9 and the straight or non-beveled portion 10, for a purpose later more fully described. This tube 4 is also provided with one or more (four being shown in Fig. 3) depressions or holes 11 into which the bakelite, celluloid, pyrolin or other material of which the barrel is made may enter when the barrel is molded around the tube. This holds the tube 4 against rotation or longitudinal movement with relation to the barrel.

The tip 2 is made up of the tubular interior metal portion 12 and the exterior conical portion 13, preferably of the same material as the barrel and preferably pressed with a tight fit onto the tubular portion 12 or, if desired, molded thereon. As seen in Figs. 1 and 2, the forward end of the tubular portion 12 of the tip is shaped frusto-conical, extends beyond the portion 13 and is formed with a proper sized opening and the usual slits to permit a lead to be moved there-through with the proper amount of friction. The rear portion of the tubular member 12 is enlarged in diameter to form the tip shank 14, in which are cut the leaf portions 15, 16 which normally tend to spring outwardly sufficiently to create enough friction between themselves and the forward portion of the bore of the barrel to permit rotation of the tip with relation to the barrel but prevent the tip from falling out of the barrel. The tubular portion 12 is also formed with the pressed in portion 17, which is appropriately shaped (approximately like plunger head 6) to fit into and be movable along the spiral slot 7 in lead guide tube 3, whereby when the inwardly extending portion or projection 17 is caused to enter into the forward open end of slot 7 of lead guide tube 3 the tip may be screwed thereonto until the rear edge of tip portion 13 contacts the forward end of the barrel as shown in Fig. 1. This holds the tip onto the barrel and the pitch of the spiral slot 7 is sufficiently steep that rotation of the tip in either direction with relation to the barrel will cause a corresponding rotation of lead guide tube 3 and a corresponding movement of the plunger 5 and lead.

Also when the tip is rotated with relation to the barrel to move the plunger rearwardly (a slight pressure being maintained on the tip toward the barrel), and the plunger head reaches its rearmost limit of travel (in the form not having a safety zone formed at the rear end of the tube 4), continued rotation of the tip in the same direction will cause the tip to unscrew itself from and move downwardly away from lead

guide tube 3, as described in my said copending application.

Pinned, brazed or otherwise suitably fixed to the lead guide tube 3 near its forward end, as shown in Figs. 1, 2 and 7, is a sleeve, collar or the like 18 which, when the lead guide tube and associated parts are assembled in operative position in the barrel, occupies a position closely adjacent the front end of the longitudinally slotted tube 4, and in contact with shoulder *t* of the metal part of the tip when the tip is in operative position on the barrel. While a slight amount of play may be permitted between said sleeve or collar 18 and the forward end of slotted tube 4, such play should be considerably less than the thickness of the plunger head 6 in a direction longitudinally of the pencil for reasons more fully pointed out hereinafter.

As pointed out earlier herein, the longitudinally slotted tube 4 is held fixedly in the bore of the barrel 1 so as to not have any movement with relation thereto. The lead guide tube 3 has swaged, spun or otherwise fixed to its rear end a collar, sleeve or the like 19, the forward face of which when the parts are in the position shown in Fig. 1, stands a slight distance away from the rear end of tube 4, and when the parts are in the position shown in Fig. 2 with the plunger head 6 riding on the straight portion 10 of tube 4, the forward face of collar 19 abuts against the rear end of tube 4, which serves as an abutment therefor. The pencil is provided at its rear end with an eraser 20 suitably gripped in the eraser carrying portion 21, which is frictionally insertable into and from the rear open end of a sleeve 21', which in turn has removable sliding engagement with the reduced portion 22 of the rear end of the barrel, so that when the sleeve is in position on the barrel the outer surface of the sleeve will be in substantial alignment with the outer face of the barrel, which latter may be round, hexagonal or other desired shape. Removal of this sleeve 21 by pulling rearwardly thereon exposes the open ends 23 of the openings 24 which receive and retain the extra leads. While I have shown these extra lead openings 24 in Figs. 8, 9 and 14 as being four in number, they may be greater or less than four if desired.

In the operation of the form of pencil shown in Figs. 1 and 2, the tip when propelling a lead forward is rotated in a clockwise direction (when looking longitudinally at the free end of the tip) with relation to the barrel, which rotation of the tip due to the engagement between the projection 17 and the spiral slot 7 of the lead guide tube, the steepness of pitch of the spiral slot, and the lead guide tube loosely rotating in tube 4, will cause a corresponding rotation of the lead guide tube and advance the plunger 5 forwardly due to the engagement of plunger head 6 in both the spiral slot 7 and the longitudinal slot 8. When the lead is exhausted the plunger head 6 will be at the forward end of slot 8. Due to the inclined or beveled face 9 on the front end of tube 4, a safety zone opening 25 is formed at the front end of travel of the plunger, this opening by reason of the face 9 on the end of tube 4 being beveled begins where it merges into slot 8, with an opening of slightly more than the thickness of the plunger head in a direction longitudinally of the pencil, and tapers down as it advances circumferentially to a thickness much less than said thickness of the plunger head. It will thus be seen that the adjacent edges of the lower end of tube 4 (and 4a) and the upper end of sleeve or

collar 18 form a tapered groove 25, which functions as a safety zone when the plunger head has reached its limit of longitudinal travel. The width of this safety zone groove increases or diminishes as the lead guide tube is stretched or returns to its normal length as explained more fully hereinafter.

Continued rotation of the tip and lead guide tube in said clockwise direction will move the plunger head 6 into the tapered safety zone 25 until it reaches a point where the width of the safety zone slot is equal to the thickness of the plunger head. Continued rotation will force the plunger head to advance further in this tapered slot, which forced rotation will through sliding pressure on the rear end of sleeve 18 stretch the lead guide tube 3 in a longitudinal direction (sleeve 18 being fixed to lead guide tube 3) sufficiently to permit plunger head 6 to pass through the opening thus formed between the straight portion 10 of tube 4 and the rear face of sleeve 18. As soon as plunger head 6 during this rotation is brought into alignment with slot 8, it will jump into the open end of slot 8 and continued rotation will again carry it around the safety zone 25 in a similar manner as many times as the tip is thus rotated. This provides a safety zone for the plunger head when the lead is exhausted, which thus obviously prevents jamming of parts, this being effected by the longitudinal stretching of the lead guide tube. This longitudinal stretching movement of the tube is also accompanied by a slight movement forward of the tip by reason of the engagement of projection 17 in spiral slot 7, this forward movement of the tip being shown at 26 in Fig. 2.

As soon, however, as the plunger head moves over the edge of the flat portion 10 in tube 4, the lead guide tube will be returned to its normal length and the tip jumped back into the position shown in Fig. 1. If now the direction of rotation of the tip with relation to the barrel is reversed, the plunger head 6 will be forced through the tendency of sleeve 18 to normally occupy the position closely adjacent the end of tube 4 as shown in Fig. 1, to follow the inclined or beveled surface 9 on the end of tube 4, which guides it back into slot 8. As soon as the plunger head strikes the exposed end 27 of the side of slot 8, continued rotation in said reverse direction will, as will be readily understood, cause the plunger head to move rearwardly in slot 8. The longitudinal stretching of lead guide tube 3 is possible because of the inherent resiliency of the metal of which this tube is made, and the presence of the spiral slot 7 extending from one end of the tube to the other.

As in my said copending application, when the plunger head reaches its rearward limit of travel it cannot in the form shown in Figs. 1 and 2 travel any farther, but due to striking the collar 19 is stopped and any continued rotation in this reverse direction will unscrew tip 2 off of the barrel because projection 17 will be unscrewed from the spiral slot 7. As in my said copending application, this unscrewing of the tip prevents breaking of parts due to jamming, and also without further disassembling movements removes the tip from the barrel so that the parts are immediately in position to have one or more new leads inserted into the lead guide tube 3.

It is thus seen that I have provided a mechanical pencil in which a slotted tube protrudes out of the front end of the barrel, which makes possible a tip longer than in the construction of my co-

pending application. This also enables the simplifying of the metal insert for the tip and makes possible to mold the composition cone 13 separately and press it on to the metal portion of the tip, or mold it thereon if desired. Also the mechanism in the barrel of the pencil will be self-contained and may be assembled in any kind of barrel whether it be molded of bakelite, machined of celluloid or otherwise formed. This construction also will simplify the forming of the hole in the molded bakelite barrel. Also after the lead is ejected from the tip the plunger head can be revolved in the safety zone without damaging the plunger head, and will readily reenter the slot by reversing the direction of rotation of the tip with relation to the barrel.

The modification shown in Fig. 7 is similar to the pencil shown in Figs. 1 and 2 in general operation, but in the form shown in Fig. 7 the longitudinally slotted tube 4 extends only partially of the length of the barrel. In this modification the tube 4 provides the longitudinal slot up to its rear end, from which point to the rear end of the barrel the slot 28 is formed in the material of the barrel, as shown in Fig. 9. In order that the slot in the tube 4 will not move out of alignment with the slot 28, one or more depressions or openings 11 are provided in the tube 4 as described earlier herein, into which depressions or openings a portion of the material of the barrel will enter when the barrel is being molded or formed around the tube 4, which holds the tube 4 in fixed position within the barrel and with its slot 8 in alignment with slot 28. Otherwise the construction of the form shown in Fig. 7 is the same as that shown in Figs. 1 and 2.

In Fig. 10 is shown a side elevation of a tube 4a extending substantially to the rear end of the bore of the barrel, and is similar to the tube 4, except that the rear end of slot 8' is closed by a lug 29, which in case the spirally slotted lead guide tube should stretch, the plunger head would not get "lost" between the end of the longitudinally slotted tube and the washer which is permanently fixed to the upper end of the spiral tube.

In Fig. 12 is shown a further modification of the longitudinally slotted tube adapted to also extend substantially to the rear of the bore of the barrel, and which comprises the tube 4b similar to the tube 4, except that both ends of this tube (instead of only one end) are beveled to provide a safety zone at both ends of the limit of travel of the propeller. The operation of the safety zone at the rearmost limit of travel is the same as the operation of the safety zone at the forward end of travel of the propeller, already described herein, except that the beveled portion is on the opposite side of the tube from that on the forward end. The reason for this is obvious since the beveled portion at the rear end of the tube 4b must guide the plunger head into the slot 8'' upon rotation of the tip in the opposite direction from that in the forward safety zone. The operation of the rear safety zone will be accompanied by a longitudinal stretching of the lead guide tube in a manner similar to that already described in connection with the forward safety zone, which stretching is effected by reason of the plunger head 6 striking the forward face of collar 19 and due to riding of the propeller head upwardly over the beveled portion 9'' and over the flat portion 10''. Rotation in this direction may be continued indefinitely without jamming of parts, but when

the direction of rotation is reversed so as to advance the propeller forward the plunger head will ride down the beveled portion 9" until it strikes the end 27" of the side of the slot and be guided thereinto in the same manner as described in connection with the forward safety zone.

If desired, when the lead is exhausted the tip may be removed and the forward end of the lead guide tube may be grasped by the operator's fingers and rotated with relation to the barrel to move the plunger to its rearmost limit of travel, and a long lead, or a plurality of shorter leads, then inserted in the lead guide tube. The tip is then replaced by screwing it onto the lead guide tube and the pencil is again ready for use.

Having now described my invention what I claim is:

1. In a mechanical pencil, a hollow barrel, a longitudinally slotted tube fixed in the bore of the barrel, said tube being formed with an inclined face at each end, said inclined face at one end of the tube being on one side of the slot and that at the other end of the tube being on the other side of the slot, a spirally slotted lead guide tube having two collars fixed thereto, one adjacent one of the inclined faces and the other adjacent the other of the inclined faces, a plunger having a head, the tapered spaces formed between the inclined faces and the edge of the adjacent collar forming safety zones whereby the plunger head will ride up on one of the inclined faces and stretch the lead guide tube longitudinally as the plunger head passes around in the safety zone.

2. In a mechanical pencil, a barrel, a spirally slotted lead guide tube having at its rear end means to prevent forward longitudinal movement of the tube in the barrel; a tip member rotatably mounted with relation to the barrel, means including a plunger for advancing a lead forward when the tip is rotated in one direction with relation to the barrel, a head on said plunger for movement in the spiral slot of the lead guide tube, said barrel having a portion formed with an inclined surface, and means fixed to the lead guide tube against which the plunger head contacts when a lead is exhausted, said last mentioned means being closely adjacent said inclined surface and defining therewith a tapering groove into which the plunger head moves and passes over said inclined surface upon continued rotation of the tip with relation to the barrel, said movement of the plunger head over said inclined surface moving said last mentioned means away from the inclined surface and stretching the lead guide tube to increase its length sufficiently to permit the plunger head to continue movement around the said groove in a circumferential direction.

3. In a mechanical pencil, a barrel, a spirally slotted lead guide tube having at its rear end means to prevent forward longitudinal movement of the tube in the barrel; a longitudinally slotted tube, a tip member rotatably mounted with relation to the barrel, said barrel having a portion formed with an inclined surface, a projection, a collar fixed to the lead guide tube adjacent said surface and defining therewith a tapered space, a plunger having a head movable into the tapered space when substantially at its limit of longitudinal travel, said head during its travel in the tapered space passing over said inclined surface and forcing said projection longitudinal-

ly of the pencil and stretching the lead guide tube.

4. In a mechanical pencil, a barrel, a spirally slotted lead guide tube rotatably mounted in the barrel, a longitudinally slotted portion in said barrel, a plunger having a head, a tip rotatably mounted on the barrel, said barrel having a portion formed with an inclined surface, means on the rear end of the lead guide tube for holding the same against forward movement in the barrel, an annular projection fixed to the lead guide tube adjacent said inclined surface, means for rotating the lead guide tube in the barrel to cause movement of the plunger longitudinally of the barrel, said lead guide tube being longitudinally stretchable, said inclined surface and the adjacent edge of said annular projection forming a tapered space into which the plunger head enters, and upon continued rotation of the lead guide tube said head will be forced through the tapered space and force the annular projection away from the inclined surface, said movement being permitted by longitudinal stretching of the lead guide tube.

5. In a mechanical pencil, a hollow barrel provided on its interior with a longitudinal groove, a spirally slotted lead guide tube rotatable in said barrel and held against removal from said barrel in a forward direction, a plunger having a head movable in the spiral slot of the tube and in the longitudinal groove, a tip, said barrel having a portion formed with an inclined surface, a projection fixed to the lead guide tube closely adjacent said inclined surface, the lead guide tube being longitudinally stretchable, the space between said projection and inclined surface being tapered so that when said head is moved thereinto and rotation continued, the lead guide tube will be stretched longitudinally and damage to parts prevented.

6. In a mechanical pencil, a hollow barrel having means in its bore providing a longitudinal groove, a spirally slotted lead guide tube rotatable in said barrel and so connected at its rear end with the barrel to prevent the tube being removed from the barrel in a longitudinal direction, a plunger having a head movable in said groove and in the slotted portion of the lead guide tube, a tip connected to said tube to rotate the latter upon rotation of the tip, said barrel having a portion formed with an inclined surface, a member fixed to the lead guide tube adjacent said inclined surface to provide therebetween a tapered space, said tube stretching and increasing its length when the plunger head moves into and around said tapered space.

7. In a mechanical pencil, a barrel, a tip, a spirally slotted lead guide tube having means at its rear end to prevent forward longitudinal movement with relation to the barrel, a plunger having a head, said barrel having a portion formed with an inclined surface and projecting means fixed to said lead guide tube adjacent said inclined surface, the plunger head being rotatively movable along said inclined surface to exert a longitudinal pressure against said means whereby to move the latter away from the inclined surface, said movement being permitted by longitudinal stretching of the tube.

8. In a mechanical pencil, a hollow barrel having means in its bore providing a longitudinal groove, a spirally slotted lead guide tube having means at its rear end for contacting the rear end of the barrel to prevent said tube being pulled forwardly out of the barrel, a plunger hav-

ing a head movable in both said groove and spiral slot of the lead guide tube, a tip rotatably mounted on the barrel and so connected with the lead guide tube that rotation of the tip when in its normal position will rotate the lead guide tube, said barrel having a portion formed with an inclined surface, a collar fixed to the lead guide tube, one edge of said collar and the inclined surface forming a tapered space into which the plunger head is circumferentially movable when at one of its limits of longitudinal travel, continued rotation of the tip when the plunger head enters said tapered space causing movement of the collar longitudinally of the pencil, such movement of the collar being permitted by longitudinal stretching of the lead guide tube, so that as the plunger head passes beyond the narrower end of the tapered space it will jump back into the wider part of the tapered space and the length of the lead guide tube be returned to normal.

9. In a mechanical pencil, a hollow barrel having means in its bore providing a longitudinal groove, a spirally slotted lead guide tube held at its rear end against forward longitudinal movement in the barrel, a plunger having a head movable in both said groove and the spiral slot of the lead guide tube, a tip rotatably mounted on the barrel and so connected with the lead guide tube that rotation of the tip when in its normal position will rotate the lead guide tube, said barrel having a portion formed with an inclined face and a straight face, a collar fixed to the lead guide tube, one edge of the collar and said inclined face forming a tapered space into which the plunger head moves circumferentially when substantially at its forward limit of longitudinal travel, continued rotation of the tip when the plunger head is in said tapered space causing said head to move up said inclined face and impart movement to the collar longitudinally of the pencil, and at the same time stretch the lead guide tube longitudinally until the plunger head passes beyond said straight face when said head will jump back into the wider part of the tapered space and the length of the lead guide tube be returned to normal, reverse rotation of the tip and lead guide tube relatively to the barrel returning said head into said groove and moving the head and plunger rearwardly in the barrel.

10. In a mechanical pencil, a hollow barrel, a longitudinally slotted tube fixed in said barrel to protrude from the forward end thereof, a counterbore in the barrel at its forward end around said tube, a tip having a tubular shank passing over said protruding end of the tube and into said counterbore, one of the two parts, the tip shank and the wall of the barrel in the counterbore, having resilient slightly protruding friction means for frictional contact with the other of said two parts to permit rotation of the tip with relation to the barrel and preventing the tip from falling out of the barrel when in assembled position.

11. In a mechanical pencil, a barrel, a spirally slotted lead guide tube, said barrel having a portion formed with a groove, a plunger having a head movable in said groove and the slot of said lead guide tube, a tip, said barrel having a portion formed with an inclined surface, a projecting member fixed to the lead guide tube adjacent the inclined surface so that said inclined surface and said projecting member will form therebetween a tapered space, the plunger head moving up the inclined surface as it is moved circumferentially in said tapered space, said

movement of the plunger head up the inclined surface forcing said projecting member to move farther away from said inclined face and stretch the lead guide tube longitudinally, the resiliency of the lead guide tube causing the plunger head to follow down the inclined face and be returned to said groove when the head is moved in the opposite direction in said space.

12. In a mechanical pencil, a hollow barrel, a longitudinally slotted tube fixed in said barrel to protrude from the forward end thereof, a counterbore in the barrel at its forward end around said tube, a tip having a tubular shank passing over said protruding end of the tube and into said counterbore, one of the two parts, the tip shank and the wall of the barrel in the counterbore, having friction means to contact the other of said two parts permitting rotation of the tip with relation to the barrel, but preventing the tip from falling out of the barrel when in assembled position, a spirally slotted lead guide tube rotatably mounted in said longitudinally slotted tube, a plunger having a head, and an inwardly extending projection in the tip adapted to extend into and follow the spiral slot of the lead guide tube whereby the tip may be threaded onto the lead guide tube when applying the tip to the barrel and be unthreaded therefrom when the plunger head reaches its rearmost limit of travel.

13. In a mechanical pencil, a hollow barrel, lead propelling mechanism in said barrel including a spirally slotted lead guide tube and a headed plunger, the rear end of said tube having means to prevent forward longitudinal movement of the tube in the barrel, said barrel having a portion formed with an inclined surface forming one side of a tapered space adapted to receive the head of the plunger when it moves out of position for longitudinal movement in the barrel, an abutment on the lead guide tube adjacent the inclined surface to prevent further longitudinal movement of the head in the spiral slot and forming the other side of said tapered space, movement of the plunger head in the tapered space causing longitudinal stretching of the lead guide tube, the resiliency of the lead guide tube returning the lead propelling mechanism to position for rearward longitudinal movement upon appropriate rotation of the parts.

14. In a mechanical pencil, a hollow barrel having a longitudinal groove, a spirally slotted lead guide tube rotatably mounted in the barrel and provided at its rear end with abutment means for preventing forward longitudinal movement of the tube in the barrel, a rotatable tip, a headed plunger having its head slidable in the groove of the barrel and movable laterally therefrom at a predetermined point upon continued rotation of the tip in one direction, said barrel having a portion formed with an inclined surface, a collar fixed to said tube adjacent said surface to form a tapered space to receive said head when it moves laterally from the groove of the barrel, whereby the head will ride over the inclined surface and push said collar forwardly stretching said tube, the stored up energy of said stretched tube returning said head to said groove in the barrel when the tip is rotated in the opposite direction.

15. In a mechanical pencil, a hollow barrel having a longitudinal groove, a tip, a spirally slotted lead guide tube having at its rear end abutment means for holding the tube against forward longitudinal movement in the barrel, a

propeller having a head, said barrel and said tube having complementary portions adjacent each other forming a tapered space into which said head is circumferentially movable, the tip being  
5 connected to the tube so that they will be rotatable together and move the said head into said tapered space, the lead guide tube being longitudinally stretched when the head is moved circumferentially in said tapered space.

10 16. In a mechanical pencil, a barrel having a longitudinal groove, a rotatable tip, a spirally slotted longitudinally stretchable lead guide tube having at its rear end abutment means for preventing forward longitudinal movement of said  
15 tube in the barrel, a plunger having a head mov-

able in the groove of the barrel and the spiral slot of the lead guide tube, said barrel and said lead guide tube having complementary means forming a tapered space into which said plunger head is circumferentially movable when the lead  
5 has been exhausted, said complementary means on the tube being fixed thereto whereby when said head moves around in said tapered space it will stretch said tube longitudinally, and when  
10 said head has completed substantially a revolution in said tapered space the stretched tube will force the head back into position to be returned to said longitudinal slot upon reversal of  
the direction of the rotation of the tip.

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