

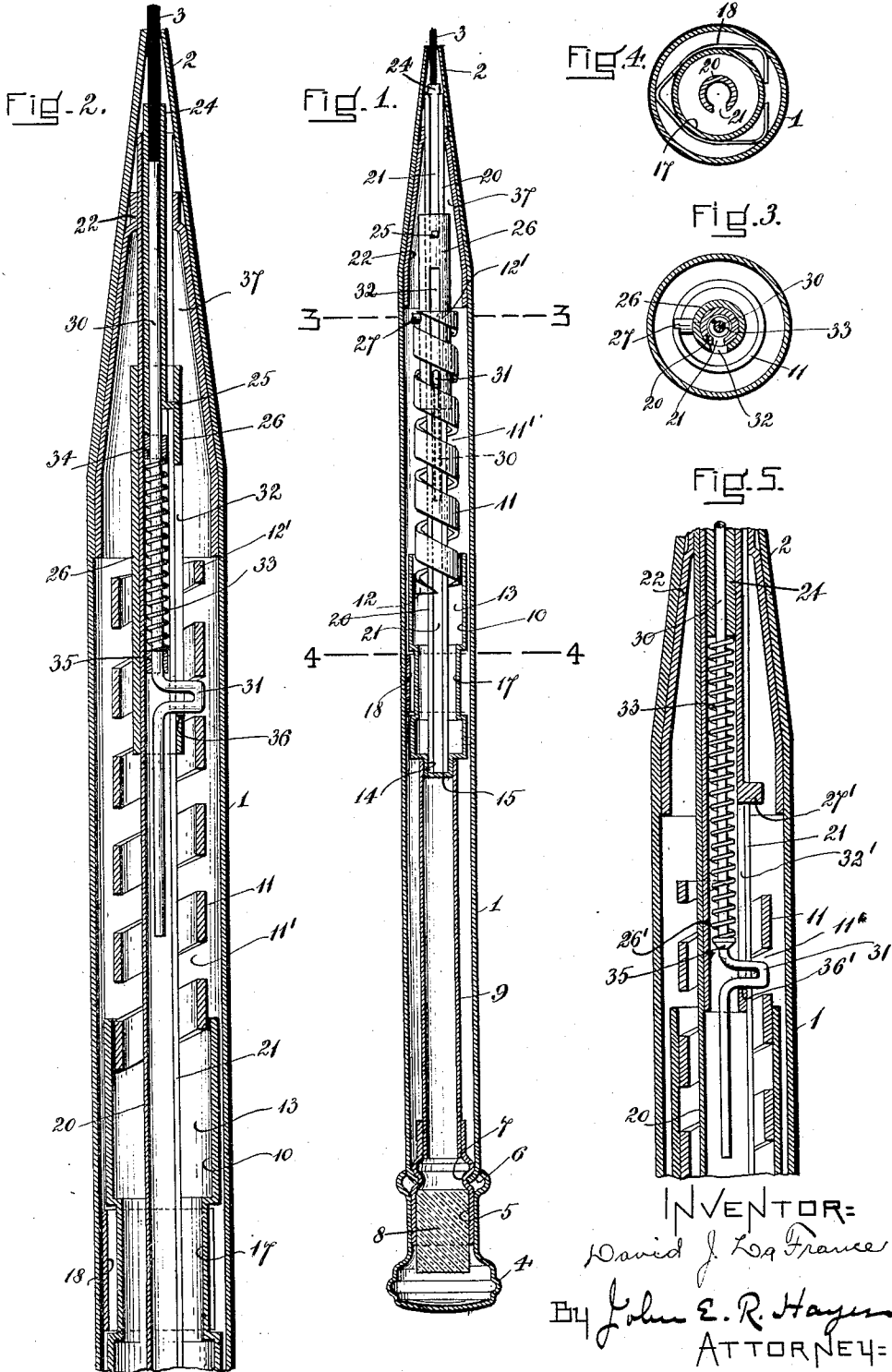
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PENCIL

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PENCIL

Continuation of applications Serial Nos. 258,174, filed March 1, 1928, and 272,640, filed April 25, 1928. This application filed December 20, 1929. Serial No. 415,427.

The invention relates to an improvement in pencils of the mechanical type in which the lead is propelled and retracted by operating mechanism inside the pencil. The invention especially relates to that type of mechanical pencil shown in Letters Patent No. 1,472,962 of November 6, 1923 in which continued movement of the operating parts is permitted without injury to the pencil after the lead has been moved to either extreme of full retracted or extended position or expelled from the pencil, the present invention essentially constituting an improvement over what is shown in said patent.

The present application is a continuation of my prior copending applications, Serial Nos. 258,174, filed March 1, 1928, and 272,640, filed April 25, 1928.

The primary object of the invention is to provide a foolproof mechanical pencil having its parts so constructed as to eliminate strain on the working mechanism at all times; also, to provide a construction not easily disarranged. A further object of the invention is to provide a mechanical pencil simple in construction, economical in point of manufacture and light in weight.

The pencil embodying the invention can best be seen and understood by reference to the drawings, in which—

Figure 1 is a sectional elevation of the pencil.

Fig. 2 is a cross section in enlarged detail of a portion of the pencil.

Fig. 3 is a section on the line 3—3 of Fig. 1.

Fig. 4 is a section on the line 4—4 of Fig. 1, and

Fig. 5 is a section of a modified structure in enlarged detail.

1 is the barrel of the pencil terminating at its front end in a conical end portion 2 through which the lead 3 is fed.

At the rear end of its barrel the pencil is provided with a rotary head 4 which fits onto the rear end portion of a tube 5. This tube

is contracted to project inside the rear end of the barrel and is secured thereto to rotate as the head is rotated, but fixed against endwise displacement relatively to the barrel by means of an annular flange 6 on the rear end of the barrel which fits within an annular groove 7 in the tube. It is on the rear projecting end of the tube outside the barrel that the head fits and it has a sliding frictional engagement therewith permitting of a removal of the head, but such engagement as will effect a positive turning of the tube 5 with relation to the barrel as the head is turned. The rear projecting end portion of the tube may also contain an eraser 8 to which access may be had on removal of the head.

That portion of the tube extending inside the barrel is a contracted portion and into it fits a propeller tube 9, the tube 5 being contracted onto the rear end of the propeller tube. Secured to the front end of the propeller tube in extension thereof is a screw-carrying tube 10 into the forward end of which is fixed the rear end of a screw 11 having a helical groove 11' in it, 12 representing the extreme rear end of this screw and 12' its front end. The tube 10 is of sufficient size diametrically to permit of the end of the screw fitting within it and leave back of the rear end 12 of the screw a clear smooth bore 13 of substantially the same diameter as the screw. The tube 10 is provided with a reduced rear end portion 14 which fits within the front end of the propeller tube and onto which the propeller tube is contracted. This reduced portion 14 has a closed top end 15 and this end forms a bottom to the chamber of the propeller tube.

The tube 10 is provided about midway its length with an annular channel or groove 17. Wrapped around the tube and lying within this channel is a spring 18 which has bearing both against the tube and against the inside wall of the barrel of the pencil. This

spring assists in centering the propeller tube and its extension with attached screw within the barrel and it performs also the more important function of acting as a brake or drag for preventing a too free rotation of the propeller tube in the operation of the pencil. When functioning as a brake the frictional retarding influence of the spring may be between the spring and interior wall of the barrel or between the spring and the exterior wall of the tube, frictional impedance being obtained in either case.

Centrally disposed within the barrel of the pencil with longitudinal extension therein through the interior of the screw 11 is a guide tube 20 having a slot 21 throughout its length. The rear end of this guide tube fits within the socket provided by the reduced end portion 14 of the propeller tube extension 10. The fit is a loose one in order that the propeller tube may turn relatively to the guide tube while the latter remains fixed. The rear end of the guide tube also has bearing against the end 15 of the tube extension 10. At its front end the guide tube has end bearing against the interior of the conical front end portion 2 of the barrel. The guide tube is otherwise retained in place by extension through a holder 22 fixedly arranged in the front end portion of the barrel and within the conical portion thereof. This holder tightly grips the guide tube centering it and holding it fixedly in place.

Slidable within the guide tube is a lead carrier 24 into the front end of which the lead fits, the lead carrier being provided with any suitable means for holding the lead when thus fitting within it. At a point adjacent its rear end the lead carrier is provided with a pin connection 25 extending laterally from the side thereof through the slot 21 in the guide tube and fastening into the front end of a slide 26 arranged on the exterior of the guide tube in the manner of a sleeve and slidable thereon. The pin 25 on the lead carrier, by reason of its extension through the slot 21 in the guide tube, prevents the slide 26 from turning on the guide tube. Extending from the side of the slide 26 is a traveler 27 which enters the groove 11' of the screw 11.

Slidable within the lead carrier is a push rod 30. This rod extends back from the rear end of the lead carrier with extension through the hollow of the guide tube in the part thereof enveloped by the slide 26 and preferably to a point in the guide tube beyond the rear end of the slide 26. Extending laterally from the side of the push rod is a traveler 31 preferably formed by a bend in the push rod. This traveler projects laterally through the slot 21 in the guide tube and also through a slot 32 cut longitudinally in the slide 26, the traveler thence projecting outwardly beyond the side of the slide 26 and into the groove 11' of the screw 11.

Located within the guide tube encircling the push rod and interposed between the rear end of the lead carrier and the traveler offset 31 from the push rod is a coil spring 33. Washers 34 and 35, respectively, are interposed between the ends of this spring and the rear end of the lead carrier at one end of the spring and between it and the traveler offset 31 from the push rod at the other end of the spring, these washers providing bearings for the respective ends of the spring. The tensioning of the spring 33 is such that it will retain the push rod in a normally retracted position with its traveler 31 bearing against the edge 36 on the slide 26 and which forms the rear end of the slot 32 therein.

The screw 11 is a relatively short screw and the pitch of the screw is preferably such as to impart a relatively quick action to the operating parts of the pencil. It will also be observed that the front end 12' of the screw terminates at a point short of the front end of the barrel and substantially flush with the extreme rear end of the holder 22. The adjacent rear end portion of the holder at this point is formed to provide a smooth bore 37 forward of the front end of the screw substantially of the same diameter as the screw. In other words, a smooth bore of substantially the same diameter as the screw is formed in front of the forward end of the screw just as a smooth bore 13 is formed just back of the rear end thereof as previously explained.

The operation of the parts is as follows: On turning the head 4 of the pencil in a clockwise direction the rotary motion of the head will be transmitted through the propeller tube 9 and its extension 10 to the screw 11 for turning this screw in a clockwise direction. As the screw is thus turned both the travelers 27 and 31 will be advanced by the screw. The traveler 27 will operate through the slide 26 and pin 25 to impel the lead carrier for advancing the lead. At this same time the traveler 31 which operates the push rod will move along with the traveler 27, but no action will be exerted upon the push rod for expelling the lead. The advancement of the lead continues until the front end of the lead carrier has been moved to a position where it will contact with the internal wall of the conical portion 2 of the pencil just short of its forward end or point. This acts to stop further advancement of the lead carrier.

The disposition and arrangement of the parts is such that when the lead carrier is thus stopped the traveler 27 will have moved out of the groove in the screw into the smooth bore 37 just forward of the front end 12' of the screw. This can be better understood by reference to Fig. 1 of the drawings where it will be seen that the front end of the lead carrier is just about to engage the conical end of the pencil and the traveler 27 is just about

ready to move out of the coils of the screw into the bore 37. With the lead carrier thus stopped and the traveler 27 moved out of the coils of the screw the continued turning of the head of the pencil will further advance the traveler 31 by turning of the screw, thereby advancing the push rod 30 and compressing the spring 33. The push rod will be advanced to a point where it will expel all lead from the end of the lead carrier. At this time the traveler 31 will have advanced to a position beyond the forward end 12' of the screw into the bore 37, the spring 33 then being highly compressed and exerting tension at all times to throw the traveler 31 back into the groove of the screw, but as long as the head of the pencil is continued to be rotated in a clockwise direction no return of the traveler 31 into the groove of the screw will take place except that the traveler 31 will simply snap back and forth by the forward end of the screw as the head of the pencil is continued to be rotated and it may be rotated indefinitely and no harm result.

Upon turning the head of the screw in a reverse or anticlockwise direction the traveler 31 controlling the push rod will immediately be returned into the groove of the screw by the tension of the spring 33 and thereupon will move along the slot 32 in the slide 26 until it engages the edge 36 at the rear end of the slot. Thereupon as the reverse turning of the head is continued the traveler 27 on the slide will be drawn out of the bore 37 and back into the groove of the screw carrying with it the slide 26 which in turn through the connecting pin 25 will draw back the lead carrier.

The retraction of the respective travelers controlling the lead carrier and push rod respectively will be continued as the reverse turning of the pencil head is continued until the traveler 31 controlling the push rod will have been moved back to a position beyond the rear end 12 of the screw and into the smooth bore portion 13 of the pencil. At about this time the rear end of the push rod will have contact with the rear closed end 15 of the propeller tube extension 10. Thereupon as the reverse turning of the head of the pencil is continued the traveler 27 will continue to be retracted by the operation of the screw and the lead carrier will likewise be retracted. This retraction is accompanied by a compression of the spring 33 and continues until the traveler 27 has been retracted to a position beyond the rear end 12 of the screw into the bore 13, the spring 33 then being highly compressed and exerting tension at all times to throw the traveler 27 back into the groove of the screw, but as long as the head of the pencil is rotated in an anti-clockwise direction no return of the traveler 27 into the groove of the screw will take place, the traveler 27 simply snap-

ping back and forth by the rear end of the screw as the head of the pencil is continued to be rotated, and it may be rotated indefinitely and no harm result. When the head is again reversely turned or in a clockwise direction the tension of the spring 33 will operate to immediately throw the traveler 27 into the groove of the screw and this traveler will be advanced carrying with it the slide 26 and lead carrier. When the slide 26 has been moved downward to a position where the traveler 31 has permitted engagement with the end 36 of the slot in the slide, being forced against it by the tension of the spring, thereupon the traveler 31 will be drawn by the slide into the groove of the screw carrying with it the push rod which becomes advanced with the lead carrier with the resulting operation as first described as the rotation of the head of the pencil is continued.

In Fig. 5 a slightly modified construction is shown. Here the screw 11 fits directly over the guide tube 20 embracing it in the manner of a sleeve. Slidable with easy fit inside the guide tube is a slotted slide 26' as contrasted with the construction previously described in which the slotted slide was located outside the guide tube. 32' is the slot in the slide 26', 36' representing the rear end of the slot. Carried by the slide 26' is the lead carrier 24. This lead carrier fits within the front end of the slide forward of the front end of the slot therein and the lead carrier projects beyond the front end of the slide. The lead carrier is fixed to the slide in any suitable manner but preferably by brazing. Projecting laterally from the slide and located preferably just in front of the slot 32' in it, is a traveler 27' which extends outward through the slot 21 in the guide tube and into the groove 11' of the screw. Located within the slide 26' and slidable within and through the lead carrier 24 is the push rod 30. This rod extends back from the rear end of the lead carrier through the interior of the slide with extension beyond the rear end of the slide when the push rod is in its normal retracted position. Extending laterally from the push rod is the traveler 31 which projects laterally through the slot 32' in the slide and through the slot 21 in the guide tube and thence into the groove 11' of the screw. Located within the slide encircling the push rod and interposed between the rear end of the lead carrier and the traveler 31 on the push rod is the coiled spring 33. A washer 35 is preferably interposed between the rear end of this spring and the traveler, the washer providing a bearing for the rear end of the spring. The normal tension of the spring is such that it will operate to retain the push rod in a normal retracted position with its traveler bearing against the edge 36' at the rear end of the slot 32' in

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the slide. In this modified structure the general operation is the same as before.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States:—

5 1. In a pencil, the combination comprising a barrel, a slotted stationary guide tube inside the barrel, a screw inside the barrel outside the guide tube, means whereby the screw may be rotated from outside the barrel, a lead carrier inside the guide tube, means for operating the lead carrier including a slotted slide connected to the lead carrier and a traveler on the slide working in the slot of the screw, a push rod within the guide tube movable within and through the lead carrier, said push rod having extension beyond the rear end of the slide when the push rod is occupying a normally retracted position, a traveler extending laterally from the push rod with extension through both the slot in the slide and the slot in the guide tube and workable in the groove of the screw, a spring inside the guide tube arranged upon the push rod and tensioned between the lead carrier and the traveler on the push rod, a part forming a smooth bore beyond the rear end of the screw and into which both travelers may be retracted in the operation of the pencil, and a stop at the end of the smooth bore forming part with which the rear-extended end of the push rod will have engagement after the traveler on the push rod has been retracted into said smooth bore part and before the traveler on the slide has been retracted into said smooth bore part.

2. In a pencil, the combination comprising a barrel, a slotted stationary guide tube inside the barrel, a screw inside the barrel outside the guide tube, means whereby the screw may be rotated from outside the barrel, a lead carrier inside the guide tube, means for operating the lead carrier including a slotted slide connected to the lead carrier and a traveler on the slide working in the slot of the screw, a push rod within the guide tube movable within and through the lead carrier, said push rod having extension beyond the rear end of the slide when the push rod is occupying a normally retracted position, a traveler extending laterally from the push rod with extension through both the slot in the slide and the slot in the guide tube and workable in the groove of the screw, a spring inside the guide tube arranged upon the push rod and tensioned between the lead carrier and the traveler on the push rod, parts forming respectively a smooth bore beyond the forward and rear ends of the screw and into which respectively both travelers may be advanced or retracted in the operation of the pencil, and stops at the ends of the smooth bore forming parts, one stop limiting the forward movement of the combined slide and lead carrier after the traveler on the slide

has been advanced into the smooth bore part beyond the forward end of the screw and before the traveler on the push rod has been advanced into the smooth bore part beyond the forward end of the screw, the other of said stops limiting the backward movement of the push rod after the traveler thereon has been retracted into the smooth bore part beyond the rear end of the screw and before the traveler on the slide has become retracted into the smooth bore part beyond the rear end of the screw.

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