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MECHANICAL PENCIL

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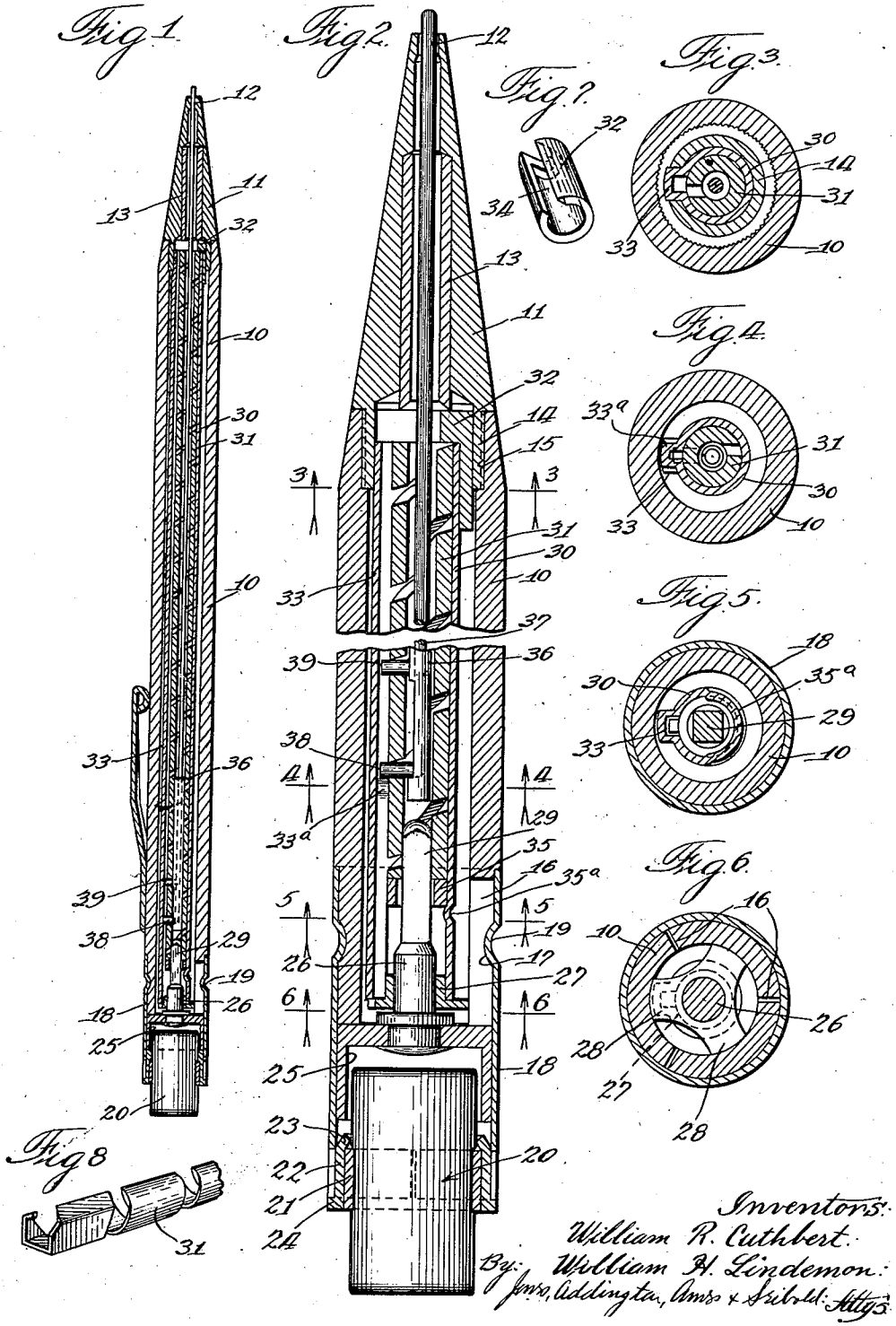

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MECHANICAL PENCIL

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5 Claims. (Cl. 120—18)

This invention relates to a writing instrument and has special reference to a device employing mechanism for feeding individual leads beyond the end of a barrel thereof for use in writing and for retracting the leads for storage within the barrel.

More particularly, this invention has reference to a writing instrument in which a spirally slotted sleeve is rotatably mounted in a guide tube for operating lead engaging means to feed the lead, there being a detachable cap carried by the casing with means extending therefrom through a support for the guide tube to impart rotation from the cap to the sleeve.

The present invention contemplates the centering of the guide tube and spirally slotted sleeve by means of a spider adjacent the end of the instrument on which the cap is detachably mounted to permit an unobstructed chamber for the storage of extra leads. The detachable cap is employed as an operating head for the spirally slotted sleeve to feed lead through the medium of a lead clutch, a pin extending from the cap through the spider for engagement with the sleeve. Further, this invention contemplates an overriding movement between the operating head or cap and the spirally slotted sleeve to prevent jamming of the mechanism at the limit of movement of the operating members in either direction.

Other objects and advantages will hereinafter be more particularly pointed out and for a more complete understanding of the characteristic features of this invention, reference may now be had to the following description when taken together with the accompanying drawing, in which latter:

Figure 1 is a vertical central sectional view of a writing instrument embodying the features of this invention;

Fig. 2 is an enlarged view similar to Fig. 1 with an intermediate portion broken away;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 2;

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 2;

Fig. 7 is a perspective view of a centering bushing; and

Fig. 8 is an enlarged fragmentary perspective view of the end portion of a spirally slotted sleeve.

Referring now more particularly to the drawing, the pencil embodying the present invention is illustrated therein and comprises an elongated casing 10 which is tubular in form and preferably formed of a plastic composition such, for example, as is known to the trade as "Radite", although, of course, any suitable rigid material may be satisfactorily employed.

The writing end portion of the barrel is provided with a conical-shaped metal tube 11 having an axial opening 12 of such size and cross section as to permit a pencil lead crayon to have a free reciprocal movement therethrough, although it is restricted enough to stabilize the lead and prevent wobbling thereof. The opening 12 communicates with an enlarged opening toward the base of the cone to receive a filler piece 13 for the purpose of preventing the breaking of the lead, the filler piece, of course, having a bore disposed substantially coaxially with the opening 12. The base of the cone-shaped metal tube has a collar 14 extending therefrom, the outer diameter of the collar being of reduced cross section from that of the base of the cone and having longitudinally extending corrugations for effecting a snug drive fit with an enlarged bore portion 15 at the end of the casing 10.

The upper end of the casing 10 is provided with a plurality of longitudinally extending slots 16 and a peripheral groove 17 approximately midway of the length of the slots. This construction permits of a detachable engagement of a cylindrical cap 18 with the end of the pencil, the cap telescoping the end of the barrel and having a peripheral restriction or indentation 19 for engaging the peripheral groove 17 of the casing. In telescoping the cylindrical cap over the end of the casing, the indentation forces a reduction in diameter of the end of the casing which is permitted by reason of the longitudinally extending grooves 16 until the groove 17 and indentation 19 register with a snap engagement. Thus the cap 18 or operating member is detachably carried by the casing.

The detachable cap 18 carries an exposed eraser 20, the eraser being formed preferably of a cylindrical piece of rubber having a band 21 fixed at an intermediate portion thereof and the band in turn frictionally fitting within a collar 22. The collar is provided with a reduced extension 23 limiting the distance to which the eraser may be urged within the collar in one direction, the other end of the collar having an outwardly formed flange 24 for limiting the inward movement of the eraser assembly into the detachable cap 18. The eraser assembly thus formed is

very simple in construction and provides a very efficient use of the rubber portion thereof, since upon using the exposed end of the rubber, the latter may be reversed in the collar 22, whereby the other end of the rubber may be exposed for use.

The cap further provides for the positioning of the operating means for the lead feeding mechanism, there being a cup-shaped member 25 fixedly secured within the cylindrical cap 18, the base of the cup-shaped member 25 having a pin 26 secured thereto in any usual manner, the pin preferably extending through an aperture in the base and being limited in its movement in one direction by a shoulder in the pin and being upset to limit movement in the other direction. The extending portion of the pin 26 is of circular cross section for a portion of its length and is journaled in a collar 27 of a spider, the latter having legs 28 for engaging the bore of the casing. A reduced extension 29 from the circular cross section of the pin 26 is of polygonal cross section and is preferably four-sided.

The mechanism for repelling and retracting the pencil lead comprises a longitudinally grooved guide tube 30 which is fixed against rotation relative to the casing and a spirally slotted sleeve 31 which is rotatably mounted within the tube 30. The diameter of the guide tube is substantially less than the internal bore of the casing and the tube is held in a centrally spaced relation with the bore of the casing at the detachable cap end by means of telescopically engaging the collar 27 of the spider and at the other end by a slotted bushing 32. The slotted bushing 32 is held in a fixed relation with the inner bore of the collar 14, the guide tube 30 having a forced engagement with the bore of the bushing 32 and being limited by a shoulder provided by a reduced opening of the bore, which latter is substantially the diameter of the bore of the filler piece 13.

The guide tube 30 is held in a fixed relation against rotary movement, the raised portion 33 forming the longitudinal groove of the guide tube fitting snugly within the slot 34 of the slotted bushing 32. The guide tube is held against longitudinal movement in one direction by the bushing 32 and in the other direction by the spider. The spider, of course, permits the entrance of extra leads into the space between the guide tube and the inner bore of the casing, an unobstructed passage being had between the legs 28 of the spider.

The spirally slotted sleeve 31 is permitted to rotate within the guide tube, although it is held in position against longitudinal movement by means of a collar 35 against which one end of the sleeve engages and the restricted end of the bushing 32 at the other end of the sleeve. The collar 35 is, in turn, held against displacement by a constriction 35a in the guide tube 30.

Within the sleeve 30 is a lead socket 36, the outer end of which clutches the inner end of the stick of lead. A plunger 37 extends through the inner bore of the lead socket 36 terminating within the socket at the lead-receiving end thereof and extending radially outwardly through an opening in the socket to form a finger 38 which extends through the spiral of the sleeve 31 and into the groove of the guide tube. A similar finger 39 fixed to the lead socket 36 extends through the slot of the sleeve 31 into engagement with the groove of the guide tube 30 for preventing rotation of the lead socket, the groove of the guide tube likewise preventing rotation of the plunger 37 through the medium of finger 38.

The screw sleeve 31 is rotatable with respect to the guide tube 30. A rotation of the screw sleeve compels the fingers 38 and 39 to ride in a longitudinal direction to propel or retract the pencil lead, the plunger operating to eject the lead after the lead socket has been urged to the limit of its forward movement. The limit of retraction of the lead socket is determined by a pinched portion 33a of the groove of the guide tube, the opening of the groove being constricted and acting as a stop against which the finger 38 abuts.

Referring now more particularly to Fig. 8, it will be noted that the spirally slotted sleeve 31 is squared at the detachable cap end of the barrel, or is of polygonal cross section, although, of course, it is to be understood that any non-circular cross section would be readily adaptable for the purpose to which it is intended. However, for purposes of illustration, the cross section is shown as being square. Further, the bore of the sleeve at the outer end thereof is of such a diameter as to snugly engage the periphery of the squared end portion 29 of the pin 26. In any event, the cross section of the end of the pin 26 should conform to the bore of the end of the sleeve 31.

It is to be noted that with the above construction, the sleeve 31 is spirally slotted to the extreme outer end thereof and that the slot extends from that end in a counter-clockwise direction. When the sleeve is rotated within the guide tube to a position such that the fingers 38 and 39 are operated to their limits, the resiliency of the metal of the sleeve will permit an overriding movement so as to prevent jamming of the mechanism. It will readily be apparent that the solid rod 29 of square cross-section may be rotated within the bore of the sleeve 31 at the squared end thereof since the sleeve is spirally slotted and will expand across the diameter thereof when manually forced after the limits of movement of the lead clutch has been obtained. It is also to be noted that the detachable member is employed as an operating member to feed lead through the medium of the lead clutch, the cap having a pin which extends through the rear end of the external mechanism. The spider is essential for providing an unobstructed chamber for the storage of extra leads.

While but a single embodiment of this invention is herein shown and described, it is to be understood that various modifications thereof may be apparent to those skilled in the art without departing from the spirit and scope of this invention and, therefore, the same is only to be limited by the scope of the prior art and the appended claims.

We claim:

1. A writing instrument of the character described comprising a casing, a longitudinally grooved guide tube fixed against rotation relative to and within said casing, a spirally slotted sleeve rotatably mounted within said tube, lead engaging means within said sleeve for engagement with both the groove and the spiral slot for feeding the lead longitudinally upon relative rotatable movement between the tube and sleeve, a rotatable cap detachably carried by said casing, and a pin of polygonal cross section carried by said detachable cap, said sleeve having a polygonal end opening for slidably receiving said pin

into an operative relation in which rotation of said cap will impart rotation to said sleeve.

2. A writing instrument of the character described comprising a casing, a longitudinally grooved guide tube fixed against rotation relative to and within said casing, a spirally slotted sleeve rotatably mounted within said tube, lead engaging means within said sleeve for engagement with both the groove and the spiral slot for feeding the lead longitudinally upon relative rotatable movement between the tube and sleeve, a rotatable cap detachably carried by said casing, and a pin of polygonal cross section carried by said detachable cap, the spiral slot of said sleeve being extended to the extreme end thereof and that end being formed into polygonal cross section for receiving said pin in an operative relation for imparting rotation from said cap to said sleeve.

3. A writing instrument of the character described comprising a casing, a longitudinally grooved guide tube fixed against rotation relative to and within said casing, a spirally slotted sleeve rotatably mounted within said tube, lead engaging means within said sleeve for engagement with both the groove and the spiral slot for feeding the lead longitudinally upon relative rotatable movement between the tube and sleeve, a cylindrical cap for telescoping one end of said casing, said cap having a peripheral indentation for engaging a peripheral groove of said casing to permit relative rotatable movement and to prevent relative longitudinal movement except detachment by force, and a pin of polygonal cross section carried by said detachable cap, said sleeve having a polygonal end opening for receiving said pin in an operative relation for imparting rotation from said cap to said sleeve.

4. A writing instrument of the character described comprising a casing, a longitudinally grooved guide tube of substantially smaller diameter than the diameter of the bore of said casing, a spider having legs thereof frictionally engaging the bore of said casing and a reduced collar for engaging and for centering one end of said tube, a spirally slotted sleeve rotatably mounted within said tube, lead engaging means within said sleeve for engagement with both the groove and the spiral slot for feeding the lead longitudinally upon relative movement between the tube and sleeve, a rotatable cap detachably carried by said casing, and means carried by said cap extending through said reduced collar for engagement with said sleeve for imparting rotation from said cap to said sleeve.

5. A writing instrument of the character described comprising a casing, a longitudinally grooved guide tube of substantially smaller diameter than the diameter of the bore of said casing, a spider having legs thereof frictionally engaging the bore of said casing and a reduced collar for engaging and for centering one end of said tube, a spirally slotted sleeve rotatably mounted within said tube, lead engaging means within said sleeve for engagement with both the groove and the spiral slot for feeding the lead longitudinally upon relative movement between the tube and sleeve, a rotatable cap detachably carried by said casing, and a pin carried by said cap having rotatable engagement with the bore of said reduced collar and extending therethrough for engagement with said sleeve for imparting rotation from said cap to said sleeve.

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