Aug. 29, 1933. H. I. RICHARDS 1,924,256

SELF FEEDING PENCIL

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Fig. 1.

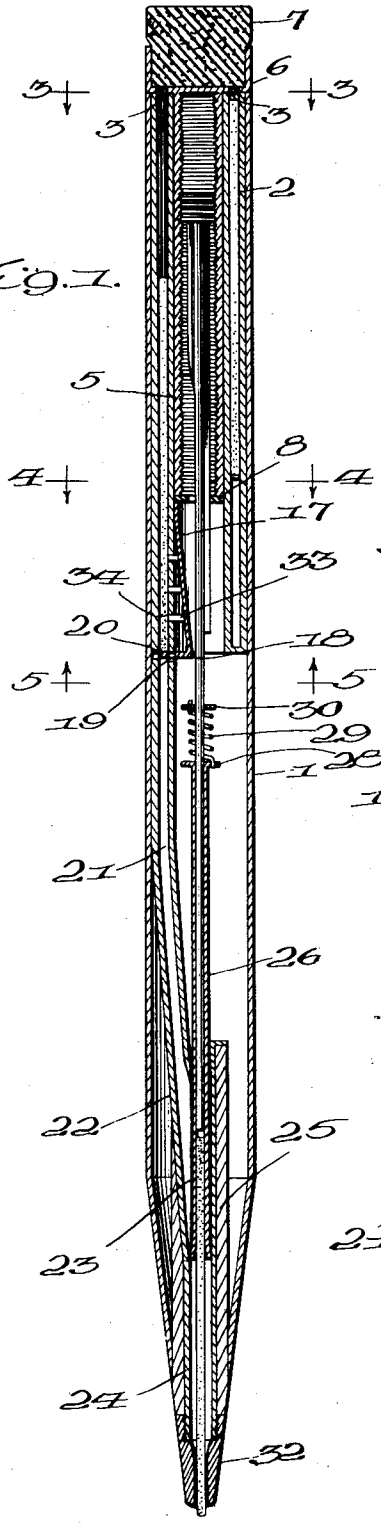


Fig. 3.

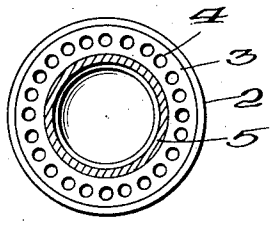


Fig. 4.

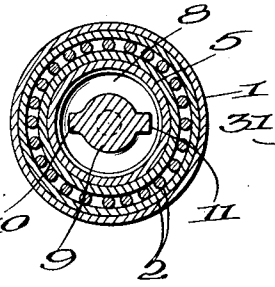


Fig. 5.

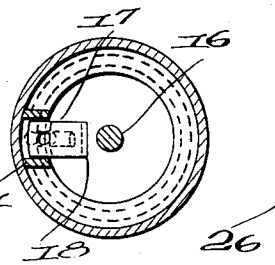
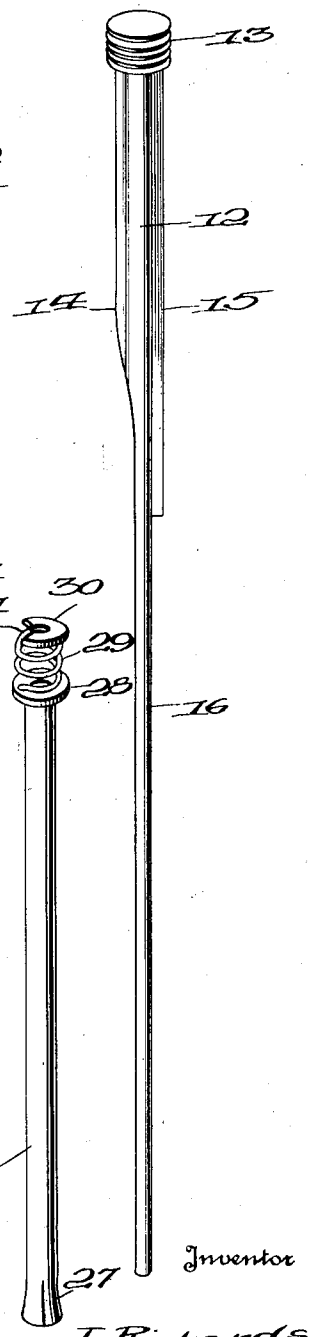


Fig. 2.



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Fig. 7.

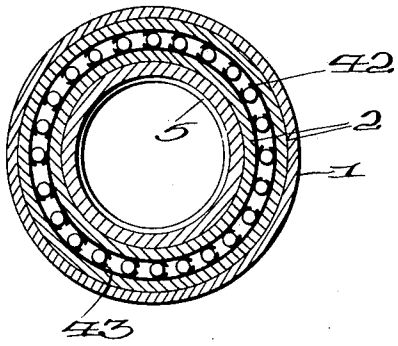
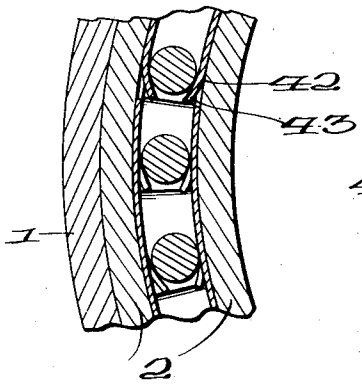
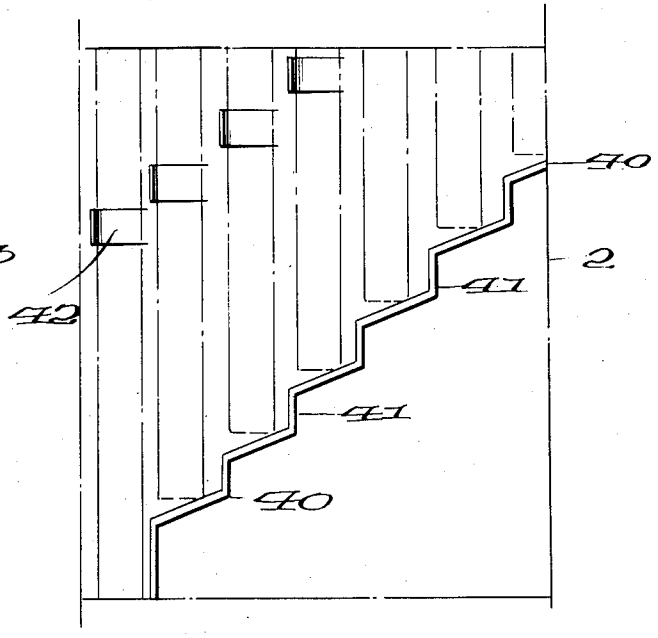


Fig. 6.

Fig. 8.





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UNITED STATES PATENT OFFICE

1,924,256

SELF-FEEDING PENCIL

Henry I. Richards, Cambridge, Mass.

Application August 27, 1931. Serial No. 559,767

10 Claims. (Cl. 120—18)

This invention relates to mechanical pencils wherein the writing lead is positively expelled and retracted.

More particularly, the present invention relates to mechanical pencils provided with a lead magazine in which the leads are automatically fed as needed.

An object of the invention is to construct a mechanical pencil containing simple, unexpensive and rugged mechanism and one which is operated by the mere turning of the pencil cap.

In the drawings, Fig. 1 is a longitudinal sectional view disclosing the preferred construction of the pencil.

Fig. 2 is a perspective view of the lead feed plunger and associated mechanism.

Fig. 3 is an enlarged sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is an enlarged sectional view taken on line 4—4 of Fig. 1.

Fig. 5 is an enlarged sectional view taken on line 5—5 of Fig. 1.

Fig. 6 is a plan view of the lead magazine.

Fig. 7 is a detail view of a portion of the lead magazine.

Fig. 8 is a further detail view of a portion of the lead magazine.

More particularly in the drawings, numeral 1 denotes the conventional outer barrel of the mechanical pencil. Positioned interiorly of the barrel 1 and adjacent the upper end thereof and affixed thereto is a tubular lead magazine 2 consisting of spaced apart concentric tubes joined at their lower ends and fitted with the cover plate 3 at their upper ends. The cover plate 3 is provided with a plurality of lead receiving apertures 4 which register with mechanism formed in the lead magazine 2 and which will be described in detail hereafter.

Rotatably mounted interiorly of the tubular lead magazine is an internally threaded sleeve 5 which extends from the upper end of the pencil and downwardly approximately three-fourths of the length of the tubular magazine. Attached to the upper end of screw threaded sleeve 5 is a cup or cap 6 containing an eraser 7. The eraser cup 6 is also the operating handle for expelling and retracting the writing lead and is the means for feeding fresh leads from the magazine to the writing tip of the pencil.

Abutting the lower end of the screw threaded sleeve 5 and affixed in the tubular lead magazine is a circular plate 8 in which is provided an opening 9 having diametrically opposite radial guide openings 10 and 11 (see Fig. 4).

A vertically movable feed plunger 12 is adapted to be moved up and down in sleeve 5 by means of screw head 13 being in engagement with the screw threads of the sleeve. On opposite sides of the upper portion of feed plunger 12 are formed radial projections 14 and 15. These radial projections engage the guide slots 10 and 11, respectively, formed in plate 8 and prevent rotary movement of the feed plunger in its travel up or down in screw threaded sleeve 5. As will be obvious from Fig. 1, turning of cap 6 rotates screw threaded sleeve 5 which is in engagement with screw head 13 and, consequently, the feed plunger 12 is fed up or down at the will of the operator and, as before stated, the projections 14 and 15, being in engagement with guide openings 10 and 11 of plate 8 during the movement of the feed plunger, prevent its rotation.

The feed plunger terminates in an elongated round feed rod 16 which, as will be explained later, carries the lead expelling and retracting means. Attached to the inner periphery of the tubular lead magazine 2 is a leaf spring 17 having its lower end 18 bent at right angles so that it snugly underlies the closed lower end of the lead magazine. Due to the resiliency of the spring 17, it normally lies in the position indicated in Fig. 1 but upon continued downward movement of the feed plunger 12 the spring member 17 is contacted by the sloping lower end of projection 14 formed on the feed plunger and is, consequently, pushed outwardly. The lateral deviation of the portion 18 of the spring 17 continues until just before the screw head 13 contacts with plate 8, at which time, the right angle portion 18 of the spring 17 is forced to its furthest lateral position and the opening 19 formed in the transverse portion 18 registers with an opening 20 in the lead magazine and permits a section of lead from the lead magazine to drop by gravity through the opening or valve 19 into a vertical tube 21 fastened to the pencil barrel 1.

The vertical length of the spring 17 is divided into four equal parts by means of pins 33 which register with openings 34 in the wall of the lead magazine so that when the valve 18 is in its lateral deviated position the pins 33 hold the additional leads during the time the bottom-most lead is being fed downwardly. Of course, when the tension is relieved from the valve and the projection 14 is out of contact therewith, the pins 33 also release the additional leads and

permit the series to feed axially to position another lead adjacent the valve.

The lower portion of the tube 21 bends inwardly at its lower end 22 so that the elongated opening 23 coincides with tubular member 24 mounted axially within cylinder 25 which forms the reduced point of the pencil. Rifled writing tip 32 is screw threaded onto tubular member 24 and abuts cylinder 25.

Mounted concentrically upon portion 16 of the feed plunger is a sleeve 26 having a flared split end portion 27. The upper end of the sleeve terminates in a flange 28 to which is affixed a coil spring 29 and a washer 30. The washer 30 is cut away at 31 to permit its passage past spring 17 and is permanently attached by any suitable means to the feed rod 16. As indicated in Fig. 1, when in position the sleeve 26 extends somewhat beyond the feed rod 16. Split flared portion 27 is of a diameter sufficient to snugly hold a writing lead and upon movement of the feed plunger 12 either expells or retracts the lead through the opening formed in writing tip 32.

In operation, the cap 6 is rotated with relation to the pencil barrel 1 until the feed plunger 12 is forced to its lowermost position at which time the projection 14 has laterally displaced the spring valve 18. The openings 19 and 20 being registered, a piece of writing lead drops into tube or temporary lead magazine 21 and continues down until it lodges in the throat of opening 23 thereof. The lead cannot continue because its progress is blocked by the sleeve 26 which being in its downward position covers opening 23 of the tube. However, by rotating the cup 6 to withdraw the feed plunger, the sleeve 26 moves upwardly and uncovers the opening and the lead in the temporary magazine drops down into vertical cylinder 25, whereupon, reversal of the feeding means forces sleeve 26 downwardly and, inasmuch as the split lower portion thereof 27 is flared slightly so as to completely fill the interior of the vertical cylinder 24, the flared portion 27 engages the upper end of the lead and continued downward movement forces the lower portion of the lead through the writing tip 32. If the cap 6 is rotated in the opposite direction, it will retract the lead and draw the same upwardly until it is completely enclosed in the pencil.

When the flange 28 strikes the top of cylinder 25, the coil spring 20 will be compressed, allowing the feed rod 16 to continue downwardly to feed the remainder of the lead, which has been held by the sleeve, out through the rifled tip. After expelling the last of the lead and the cap 6 is rotated, the coil spring will be relieved of its compression and the sleeve 26 will again extend beyond the end of the rod 16 and will be in position to receive a further writing lead.

The novel means for storing and feeding successive leads to the pencil is one of the most important features of this invention. When the eraser 7 is removed, it exposes to view the apertured plate 3 positioned in the upper end of the magazine and it is through these apertures that fresh leads are dropped. By referring to Figs. 6, 7 and 8, it will be seen that a spiral plate 40 is fastened between the concentric walls of the lead magazine and that this spiral plate comprises slanting steps for the individual leads and that the slanting steps are spaced one from the other by vertical sections 41. In a vertical line to each of the slanting steps 40 is provided a plurality of spring fingers 42 which are made by merely punching inwardly the opposite sides of the metal of the lead magazine 2. These spring fingers are preferably curved as at 43 to lightly bear against the leads to retain them in vertical position on their respective steps 41 and to prevent the last lead in the magazine from falling backwards.

By this construction, the series of leads retained in the spiral stepped annular lead magazine are always held in upright position and the spring fingers 43 are, in practice, very slightly pushed into the annular space. These spring fingers permit leads to move forward to be fed but prevent retrograde or backward movement inasmuch as each lead is caught by the front edges of the spring fingers and thus is prevented from falling backwards.

Fig. 6 shows the lead magazine in a diagrammatic manner and drawn in a flat plane. This view is somewhat exaggerated, for in actual practice the ascending leads are so close to one another that the lowermost lead, which is in engagement with the right angle portion 18 of the spring valve 17, abuts throughout its length the enclosed ascending lead and so on throughout the entire magazine. This tends to hold each lead in vertical position and this is further assisted by the spring fingers 42. Thus it will be seen that as the lowermost lead is fed through the valve, the succeeding leads all slip forward one step and are retained in that position until the enclosed lead is fed through the valve.

I claim:

1. A mechanical pencil including a pencil barrel, a spiral lead magazine therein, a plunger, means for reciprocating the plunger in the said barrel and valve means operable by said plunger for gravitationally releasing lead from said magazine.

2. In a mechanical pencil, the combination of a pencil barrel, a lead magazine contained therein, a sliding valve associated with said magazine, a plunger adapted to reciprocate in the barrel, the said plunger carrying means for operating said valve.

3. A mechanical pencil including a pencil barrel, a spaced walled cylindrical lead magazine therein, a plunger, screw means for reciprocating said plunger in said barrel, a valve controlling the flow of lead from said magazine and a cam on said plunger for operating said valve.

4. A mechanical pencil including a pencil barrel, a tubular lead magazine therein, a plunger adapted to be reciprocated in said barrel, the lead magazine having an opening therein for the exit of leads normally closed by a valve and means on said plunger for opening said valve.

5. A mechanical pencil including a pencil barrel, a lead magazine therein, a plunger, means for reciprocating said plunger in said barrel, intermittently operated means controlled by the reciprocation of said plunger for retaining and releasing leads from the lead magazine and positioning said leads by gravity in line with said plunger subsequent to being released from the lead magazine.

6. In a self-filling mechanical pencil, a pencil barrel, a spiral lead storage magazine, a valve controlling the passage of leads from said magazine, a reciprocating plunger actuating said valve and a plurality of pins carried by said valve and operable simultaneously with the opening there-

of to positively block the passage of more than one lead through said valve.

7. In a magazine for self-filling mechanical pencils, two concentric tubes joined at one end and adapted to hold a series of leads therebetween and a spirally ascending stepped strip positioned between said tubes on which said series of leads are supported.

8. A self-feeding mechanical pencil including a barrel, a feed plunger and a lead storage magazine adapted to contain a plurality of reserve leads, the magazine consisting of spaced apart cylinders, a single apertured disc closing one end of the magazine and a plural apertured disc closing the opposite end thereof, and an ascending sloped stepped strip held between said cylinders on which the reserve leads rest.

9. In a mechanical pencil including a barrel, lead feeding mechanism and a reserve lead storage magazine, the said magazine comprising spaced apart cylinders to confine reserve leads therebetween, a spiral stepped strip on which said reserve leads are supported in a vertical position and spring fingers pressed inwardly from the cylinders engaging the reserve leads adjacent their upper ends.

10. In a mechanical pencil including a barrel, lead feeding mechanism and a reserve lead storage magazine, the said magazine comprising spaced apart cylinders to confine reserve leads therebetween, a spiral sloping strip on which said reserve leads are supported in a vertical position and a spiral series of fingers pressed inwardly from the cylinders preventing retrograde movement of said reserve leads while permitting forward movement thereof.

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