

June 4, 1940.

D. KAHN

2,203,093

MECHANICAL PENCIL

Filed Nov. 1, 1937

2 Sheets-Sheet 1

Fig. 1.

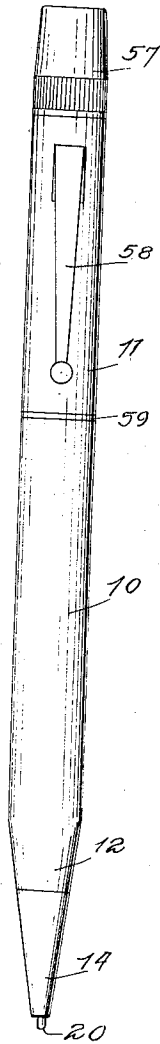


Fig. 2.

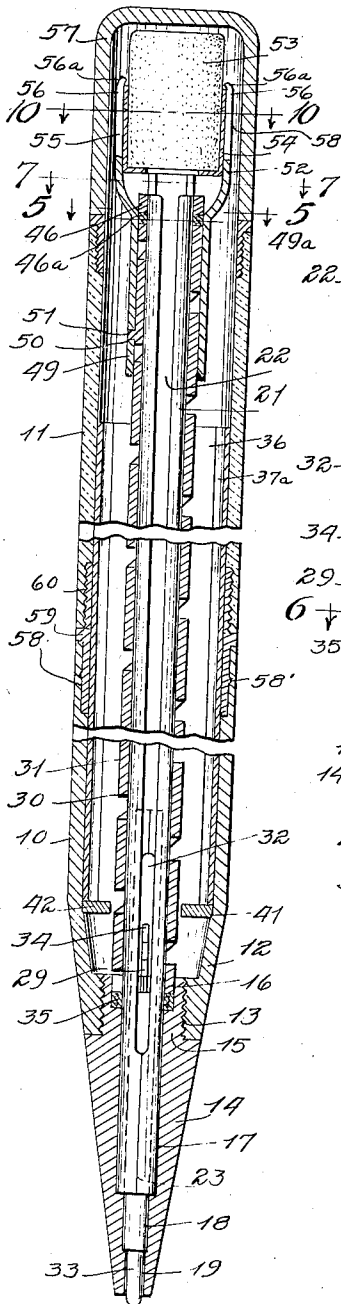
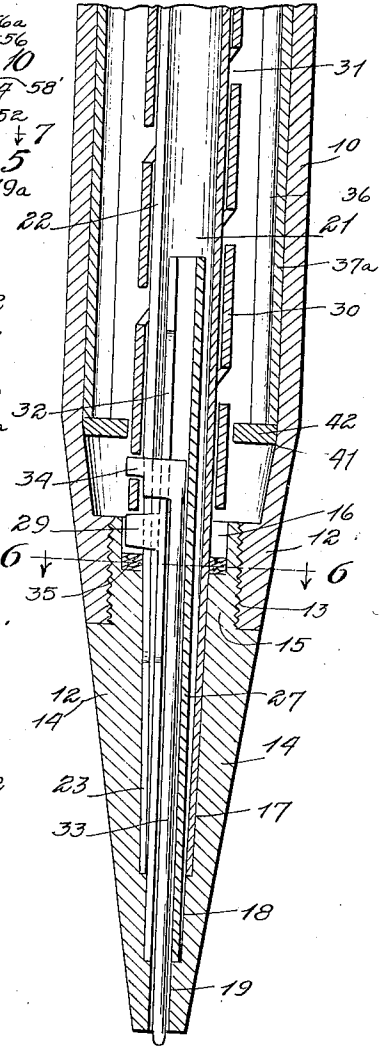


Fig. 3.



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Fig. 4.

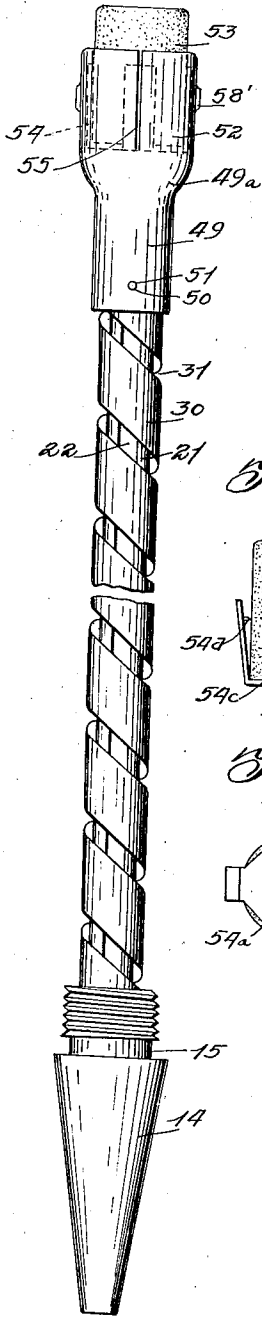


Fig. 5.

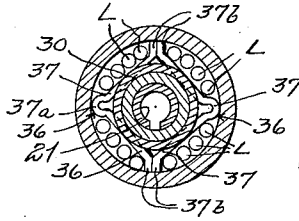


Fig. 10.

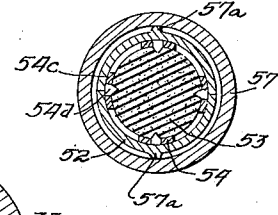


Fig. 6.

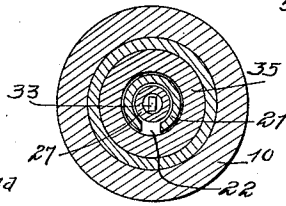


Fig. 8.

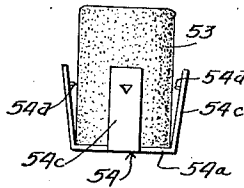


Fig. 9.

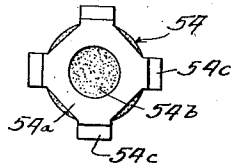
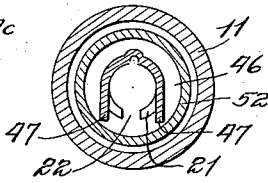


Fig. 7.



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UNITED STATES PATENT OFFICE

2,203,093

MECHANICAL PENCIL

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Application November 1, 1937, Serial No. 172,245

7 Claims. (Cl. 120—18)

This invention relates to mechanical pencils of the type wherein a movable lead is employed, the lead being actuated by a spiral member for projection, retraction and expulsion.

5 More particularly, the present invention relates to a pencil of the type disclosed in my prior application for patent on a Mechanical pencil, filed July 2, 1934, and bearing Serial No. 733,524. This application is a continuation in part of said prior
10 application.

It is essential in devices of this character that, for quiet and efficient operation, the spiral actuating tube be freely revoluble with respect to the runner tube. In order that this may take place
15 the actuating tube must be supported at its ends in such manner as to have a minimum of friction against the supporting surfaces.

To this end one important object of the invention is to provide, at the ends of the actuating tube, anti-friction washers against which
20 such ends bear.

A second important object of the invention is to provide an anti-friction washer for the before-mentioned purpose so seated in the tip as to be
25 securely held in position.

With the above and other objects in view, the invention consists in general of certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawings and particularly pointed
30 out in the appended claims.

In the accompanying drawings like characters of reference indicate like parts in the several views, and:

35 Fig. 1 is a side view of the improved pencil, partly in section.

Fig. 2 is an enlarged vertical section on the longitudinal median line of Fig. 1.

40 Fig. 3 is a still further enlarged longitudinal section at right angles to Fig. 2.

Fig. 4 is an elevation of the operating parts with the barrel and lead holder removed.

Fig. 5 is a section on the line 5—5 of Fig. 2.

Fig. 6 is a section on the line 6—6 of Fig. 3.

45 Fig. 7 is a section on the line 7—7 of Fig. 2.

Fig. 8 is a side elevation of the eraser and its retaining means.

Fig. 9 is a bottom plan view of the parts shown in Fig. 8.

50 Fig. 10 is a section on the line 10—10 of Fig. 2.

In the present embodiment of the invention there is disclosed a pencil having a barrel preferably consisting of a lower, preferably opaque part 10 and an upper preferably transparent part
55 11. On the lower part there is provided a tapered

extension or lower end 12, internally threaded preferably with a lefthanded thread as at 13. The lower end of the pencil in this, and the other forms hereinafter mentioned, constitutes a tip having a lower portion 14, of substantially conical
5 form and a collar or neck 15. In the form illustrated in Figure 1 and Figure 2 this collar or neck is externally threaded to engage the lefthanded threads of the tapered lower portion 12 of the
10 barrel.

In this form of the invention the tip 14 is provided with a bore extending from top to bottom thereof and the upper part of this bore is such as to provide a cylindrical recess 16 below which the bore tapers to form a frusto-conical portion
15 17. The frusto-conical portion of the bore extends downwardly and ends at a shoulder below which there is a cylindrical portion having a bore 18 of small diameter, another shoulder, and a final portion having a still smaller bore 19, slightly larger than the diameter of the lead 20. In this form of the invention there is also provided
20 a runner tube, well shown in Figures 2 and 3. It will be observed that this runner tube is made from a thin sheet of metal, shaped or cut so that, 25 when it is rounded up into tubular form there is provided a body 21 of cylindrical form having a slot 22 extending through the upper portion and a lower portion provided with a slit 23, the tube being compacted at its lower end to engage in the
30 frusto-conical bore 17 and thus not only compress the tube but also to insure its frictional engagement with the tip 14.

Within the tube body 21, there is provided, as shown in Figure 3, a lead carrier 27 of tubular
35 form adapted to frictionally engage the lead 20, and having between its ends a lug 29, formed from a pair of projecting parts of the lead carrier. These parts project through the slot 22, and extend outwardly thereof. Surrounding, and closely
40 engaged with the tube 21, is an actuating tube 30 having a spiral slot 31 formed therein and extending through the wall thereof. The lug 29 projects through the slot 22 and engages in the slot 31 of the spiral actuating tube.
45

Above the lug 29 the lead carrier is provided with a slot 32 extending longitudinally thereof for purposes presently to be described. Within the lead carrier 27 there is provided a lead ejector in the form of a rod 33 having at its upper end
50 a stepped lug 34 projecting laterally from the lead ejector and passing through the slot 32 and into the slot 31.

The portion 34 is shouldered so that one part engages in the slot 32, while the remaining part
55

projects therethrough and into the slot 31. From an inspection of Figures 2 and 3 it will be seen that just above the tapered portion of the bore 17, the tip is provided, as previously stated, with a cylindrical bore 16, in which is seated a washer 35, against which the lower end of the spiral actuating tube 30 abuts. In other words, the lower end of the spiral actuating tube is socketed in a recess in the top of the tip 14 and bears against an anti-friction washer 35 so provided as to eliminate the major part of the friction of the bearing of tube 30 against the tip 14. The anti-friction washer preferably is a fiber washer lubricated with petroleum jelly, the latter being distributed throughout the pores or interstices of the washer body. This is entirely different from mere surface lubrication.

It will be observed that under this construction a quite considerable space exists between the actuating tube 30 and the lower part 10, and the upper part 11 of the barrel. This space is utilized, in the present invention, as a storage space for spare leads and to that end there is provided a spacing member such as is best shown in Fig. 5. As there shown the member is formed of a pair of complementary halves 36 each of which consists of a pair of flat or plane portions 37 arranged at right angles. At the angle between the two portions 37 is a connecting rib 37a of substantially semi-cylindrical form and projecting outwardly from the angle at the remaining edges are flanges 37b which extend outwardly at 135° from the portions 37. When assembled the flanges 37b of one-half engage against the flanges 37b of the other half so as to form a square tube having ribs at its corners which engage against the inner surface of the barrel. This tube extends from a point adjacent the lower end of the barrel portion 10 to a point about half-way of the length of the upper portion 11 and just below the lower or socket end of the eraser holder for a purpose presently described. Thus when the magazines formed between the members 36 and the barrel are loaded the leads project well above the upper end of the square tube. Furthermore, for purposes which will be presently explained, the flat portions 37 lie against or very close to the spiral tube 30. This lead holder, when inserted in the barrel performs two functions. It holds the spiral tube and the parts therein concentrically of the barrel and provides storage space for the spare leads L.

In constructions of this character, there must be provided means for supporting the lower ends of the spare or magazine-carried leads and for this purpose the barrel 10 has wedged therein, at the point 41, a washer 42, which supports the lower ends of the leads L. In the form of the invention here shown the washer 42 is a simple annular washer forced down slightly into the tapered portion of the barrel and the lead holder members 36 rest on this washer at their lower ends.

In order to hold the tube 30 from movement upwardly on the tube 21, the latter extends somewhat above the upper end of the tube 30 and a washer 46 is mounted on the tube 21 to rest against the upper end of the tube 30. Beneath the washer 46 is preferably provided an anti-friction washer 46a which is a fiber washer impregnated with a lubricant. Furthermore, as can be seen in Figure 7, the portions of the tube 21 adjacent its slot 22 are bent outwardly as at 47 to overlie the washer 46. In order to rotate the spiral tube 30, there is provided at the upper

end of the tube a driver tube 49 which fits tightly around the upper end of the tube 30 and not only engages the tube frictionally but also is provided with a hole 50, into which projects a lug 51 extending from the spiral tube. By this means a positive drive is given to the spiral tube. The driver tube 49 may also be frictionally fitted on the spiral tube 30 and in the manner drive the spiral. The frictional fitting, while not a rigid connection, permits quick detachment of the driver tube from the spiral tube. The upper end of the driver tube 49 is formed as an expanded part 52 adapted to receive the eraser 53 and its holding cup 54. The expanded portion 52 is provided with slits 55 extending downwardly from its upper edge to form a circumferential series of spring fingers 56 having in-turned lips 56a at their upper edges. The eraser holding cup 54 (Figs. 8 and 9) consists of a thin metal stamping having a polygonal bottom 54a provided with a central opening 54b. Spring arms 54c extend upwardly from alternate sides of the polygonal bottom and are each provided on its inner face with a spur 54d. This cup is of such dimensions that, upon the eraser 53 being placed therein as shown in Fig. 8 and the cup and eraser being inserted in the expanded portion of the driver tube, the arms will be forced in to cause the spurs 54d to engage in the eraser 53 and, when fully inserted, the upper ends of these arms 54c will catch beneath the lips 56 without releasing the engagement of the spurs in the eraser. Thus the cup and eraser are securely held in the expanded portion of the driver tube. When an eraser is worn out the cup and remnant of the eraser may be removed and separated. A new eraser may then be placed in the cup and the cup replaced as before.

It will now be noted that, as the driver tube extends well down the spiral tube, the lower end of the driver tube lies closely above the upper ends of the members 36 so that these members cannot accidentally fall out of the barrel. Moreover the stored leads L lie closely around this lower end of the driver tube and the shoulder 49a forms a stop for preventing leads from accidentally falling from the magazine in case the pencil should be turned upside down while removing a lead from the magazine.

Slidably fitted over the upper part of the driver tube is a cap 57, which frictionally engages the part 52 and is thereby held in position. This cap is preferably of the same external diameter as the barrel 11 and, as can be seen from Figure 1, engages on top of a transparent section of the barrel 11, or, it may engage on an opaque portion on the barrel and the latter be provided middle-way of its length with a transparent section. The usual clip 58 is applied to the pencil.

In order to connect the barrel sections a sleeve 58 is fitted in the upper end of the section 10, the sleeve being provided with lugs 58' which engage in the material of the barrel. A flange 59 extends around the sleeve and above the flange the sleeve and lower end of the barrel section 11 are provided with complementary screw threads 60 by which the section 11 may be screwed on the sleeve and thus be removably attached to the section 10. Obviously, when it is desired to remove a lead from the magazine the cap 57 will be removed and the section 11 unscrewed and removed thereby exposing the leads L for withdrawal.

In assembling the pencil, the following procedure is followed:

Before the runner tubing containing the assembled lead carrier and ejector is inserted into the tip 14, the lubricating washer 35 is placed on the inside shoulder of the tip.

5 The next step is assembling of the lead carrier 27 and the ejector 33. Thereafter, the assembled lead cutter and ejector are introduced into the slot 22 of the runner tube 21 and the latter is formed into the tapered hole of the tip
10 17.

Thereafter, the spiral 30 is placed on the runner tube 21. The lubricating washer 46a is now placed on top of the spiral 30. Then the metal washer 46 is placed on top of the lubricating
15 washer. The ends of the runner tube are then spread open to provide ears to engage the washer 46, as shown in Fig. 8. The mechanism thus assembled is inserted into the barrel 10, the tip
20 17 being screwed into the barrel.

20 The lead holder washer 42 is then placed over the spiral and forced down until it becomes wedged into the lower part of the barrel as at the point 41, Figure 2. Thereafter, the segmental portions 36 of the lead holder are inserted into
25 the barrel so that the ribs fit tightly in the inner wall of the barrel, and thus also to act to centrally locate the spiral.

30 The lead holder segments 36 are forced downwardly until they touch the washer 42, the latter being the enclosure for the lead holder. The driver tube 49 is then frictionally forced over the spiral. If desired, the slot 50 and projecting boss
35 51 on the spiral may be omitted and the driver tube simply held on the spiral by friction. The eraser cup and eraser is then inserted into the driver shell cap thus completing the assembly.

What is claimed is:

40 1. In a mechanical pencil, a barrel, a tip on the lower end of said barrel, an anti-friction fiber washer at the upper end of said tip, a runner tube having its lower end fixed in said tip and extending through said washer, actuating means rotatably fitted on said runner tube and having
45 its lower end resting on said washer, and means to rotate the actuating means.

2. In a mechanical pencil, a barrel, a tip on the lower end of said barrel, a runner tube having its lower end fixed in said tip and extending through said washer, actuating means rotatably fitted on
50 said runner tube and having its lower end resting on said washer, a second anti-friction fiber washer at the upper end of said actuating means, and means to rotate the actuating means.

3. In a mechanical pencil, a barrel, a tip on the lower end of said barrel, an anti-friction grease impregnated fiber washer at the upper end
55 of said tip, a runner tube having its lower end

fixed in said tip and extending through said washer, actuating means rotatably fitted on said runner tube and having its lower end resting on said washer, a second anti-friction grease impregnated fiber washer fitted on said runner tube
5 at the upper end of said actuating means, means on the runner tube to retain said second grease impregnated fiber washer on the runner tube and means to rotate the actuating means.

4. In a mechanical pencil, a barrel, a tip fixed
10 on the lower end of said barrel having a recess in the upper portion thereof, an anti-friction grease impregnated fiber washer in said recess, a runner tube having its lower end fixed in said tip and extending through said washer, an actuating
15 spiral rotatably fitted on said runner tube and having its lower end within said recess and resting on said washer, a second anti-friction grease impregnated fiber washer fitted on said runner tube at the upper end of said actuating
20 spiral, a metal washer fitted on said runner tube above the second fiber washer, means on said runner tube to retain said metal washer and the second fiber washer, and means operatively coupled with said actuating spiral to rotate the same.
25

5. In a mechanical pencil, a barrel, a tip on the lower end of said barrel, a runner tube having its lower end fixed in said tip, actuating means rotatably fitted on said runner tube, an anti-friction fiber washer about said runner tube
30 and resting on the upper end of said actuating means, and means to rotate the actuating means.

6. In a mechanical pencil, a barrel, a tip on the lower end of said barrel, a runner tube having its lower end fixed in said tip, an actuating
35 means rotatably fitted on said runner tube and having at least one of its ends bearing on a washer of a non-metallic material having anti-friction properties, and means to rotate the actuating means.
40

7. In a mechanical pencil, a barrel, a tip on the lower end of said barrel having a recess in the upper portion thereof, a washer of a non-metallic material having anti-friction properties in said recess, a runner tube having its lower end
45 fixed in said tip and extending through said washer, actuating means rotatably fitted on said runner tube, and having its lower end within said recess and resting on said washer, a second washer of non-metallic material having anti-friction
50 properties fitted on said runner tube at the upper end of said actuating means, a metal washer fitted on said runner tube above said second anti-friction washer, and means on said runner tube to retain said metal washer and said
55 anti-friction washer in assembled relation.

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