Dec. 12, 1939. H. S. HASSELQUIST 2,182,846

MECHANICAL PENCIL

Filed April 20, 1938 2 Sheets-Sheet 1

Fig. 1

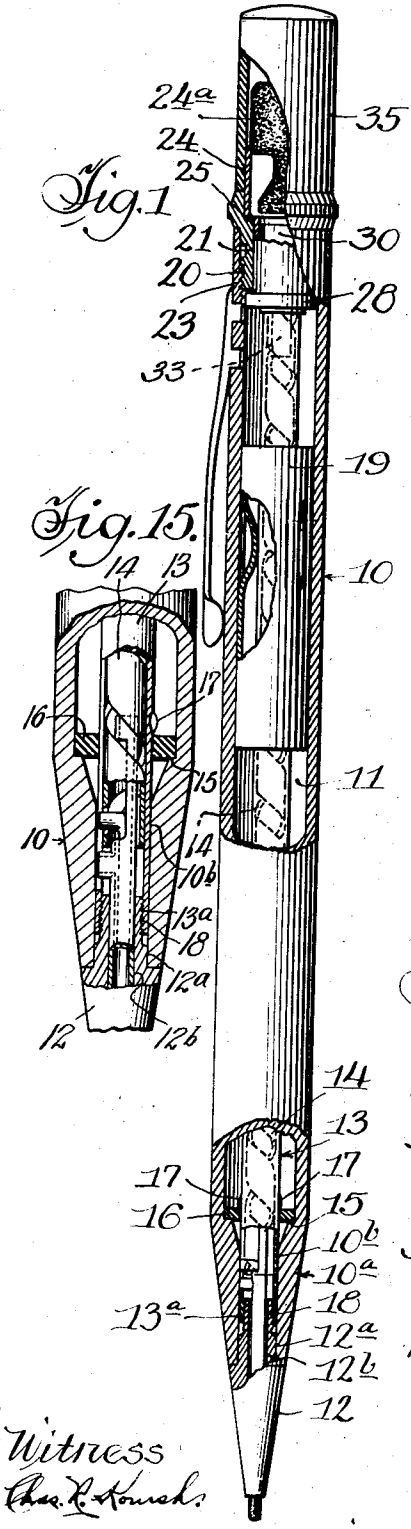


Fig. 15.

Fig. 3

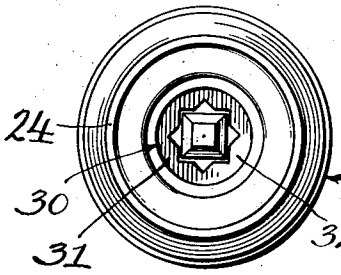


Fig. 2

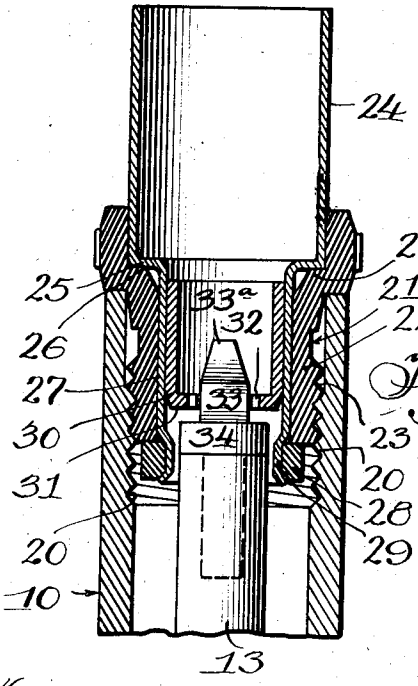


Fig. 4

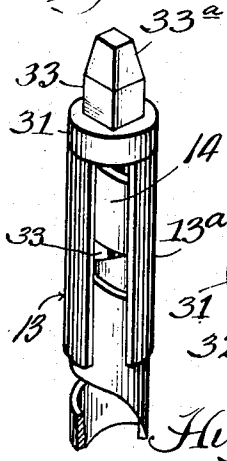
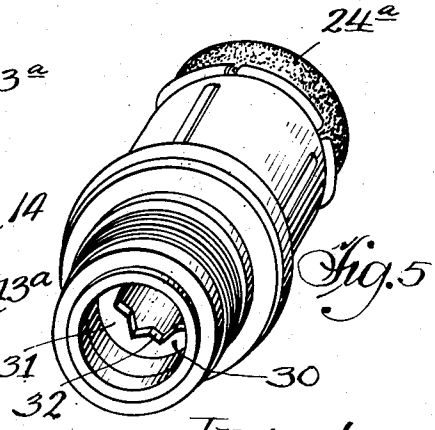


Fig. 5



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Dec. 12, 1939. H. S. HASSELQUIST 2,182,846

MECHANICAL PENCIL

Filed April 20, 1938 2 Sheets-Sheet 2

Fig. 7

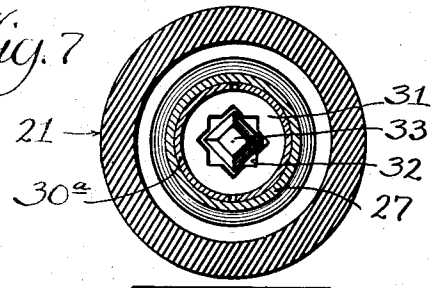


Fig. 10

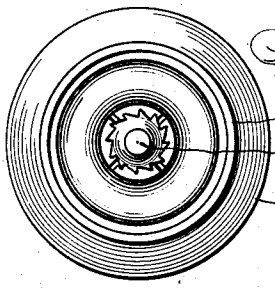


Fig. 6

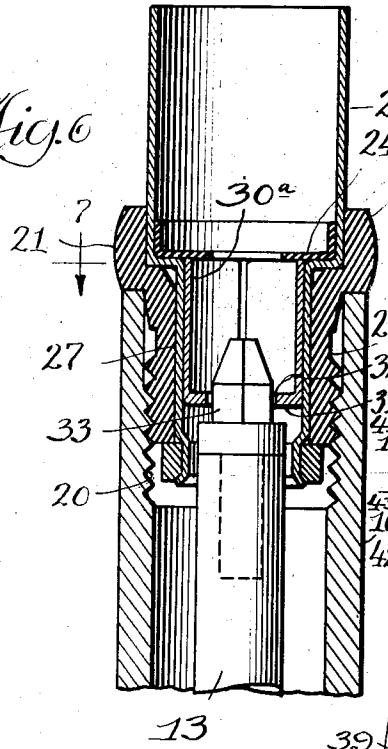


Fig. 13

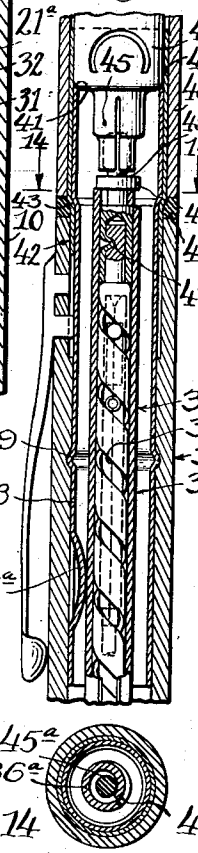


Fig. 9

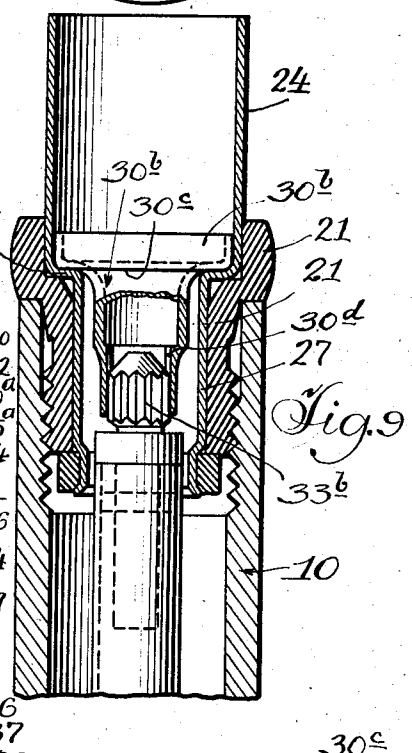


Fig. c

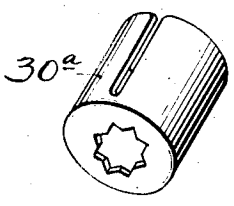


Fig. 11

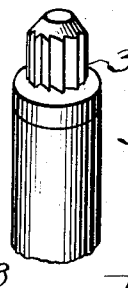
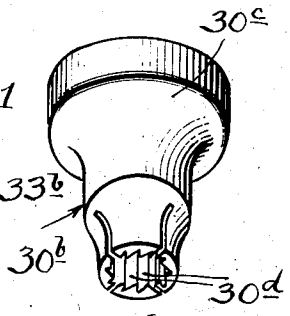


Fig. 12



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UNITED STATES PATENT OFFICE

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MECHANICAL PENCIL

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Application April 20, 1938, Serial No. 203,005

12 Claims. (Cl. 120—18)

This invention relates to an improvement in mechanical pencils, and consists of the matters hereinafter described and more particularly pointed out in the appended claims.

The improved pencil is of the advance-retract class, in which the leads approximate the length of the pencil, and in which magazines are provided to contain extra leads. A pencil of the kind is shown in Patent No. 1,966,207 granted July 10, 1934, to Herbert H. Lang.

In pencils of the kind heretofore, the magazines are closed by a cap which is rotatable on the head of the barrel to bring an opening in said cap into registry with one or the other of the magazines, which otherwise are normally closed. But difficulty has been found in pencils of the kind because when rotating the cap the user is apt to up-end the barrel to permit a lead to slide out of the barrel before he has rotated the cap, with the result that the end of the lead is apt to be broken off.

One object of the present invention is to provide a mechanical pencil of the kind, with said objection eliminated, and which is of simple and economical construction and is capable of ready manufacture.

Other objects and advantages of the invention will appear more fully as I proceed with my specification.

In the drawings:

Fig. 1 is an enlarged sectional side elevation of the improved pencil, with parts broken away to more clearly disclose the interior structure.

Fig. 2 is a vertical central section in the plane of the longitudinal axis of the pencil shown in Fig. 1, but on a larger scale, showing the head end of the pencil.

Fig. 3 is a top plan view of Fig. 2.

Fig. 4 is a perspective view of a stem to be referred to more particularly later.

Fig. 5 is a perspective view of the removable cap of the pencil.

Fig. 6 is a section similar to Fig. 2 showing a modified form of one feature of the invention.

Fig. 7 is a view showing a transverse section through Fig. 6 in a plane indicated by the line 7—7 of Fig. 6.

Fig. 8 is a perspective view of an element included in Fig. 6 to be more particularly referred to later.

Fig. 9 is another sectional view similar to that shown in Fig. 2 showing a still further modified form of the invention.

Fig. 10 is a top plan view of Fig. 8.

Fig. 11 is a perspective view of a ratchet stud included in the construction shown in Fig. 9.

Fig. 12 is a perspective view of a ratchet wheel member included in Fig. 9 which coacts with the stud shown in Fig. 11.

Fig. 13 is a sectional view similar to Fig. 2 showing a modified form of one feature of the construction shown in Figs. 2, 6 and 9.

Fig. 14 is a view representing a cross section through Fig. 13 indicated by the line 14—14 in Fig. 13.

Fig. 15 is an enlarged view of the tip end of the pencil shown partially in section.

Referring now to the drawings and particularly to that form of the invention illustrated in Figs. 1 to 5, inclusive, 10 indicates the barrel of the improved pencil. This may be made of any suitable material or composition now in use for such pencils. The barrel is a hollow tube open at both ends. One end of the barrel is tapered as shown at 10a where its bore is reduced in diameter as indicated at 10b to receive the stem 12a of a metal tip 12 tapered in continuation of the barrel part 10a. The metal tip 12 has a central recess 12b for the lead in axial alignment with the central axis of the barrel.

Within the barrel is the familiar operating assembly 13 including a longitudinally slotted tube 13a and a spiral 14 running the length of the tube and containing the lead clutch and ejecting rod. These parts are all of well known construction and need no further description. Inside the barrel just above the tapered part 10a it is provided with an annular shoulder 15 which presents a seat for an apertured centering washer 16 through which the assembly 13 extends into the recess 10b of the barrel. The tube 13a of the assembly is provided with upset shoulders 17 for engagement with the top of said washer 16 when the assembly is in final position in the barrel, being held in that position by means of a thread 18 on the stem of the tip which is screwed into the threaded bottom end of the tube 13a.

In the head end of the barrel, intermediate centering bearing support for the assembly 13 is provided by a sleeve 19 engaged snugly in the barrel 10 and having arcuately spaced upset inwardly extending lugs engaged with the tube 13a of the assembly. These lugs also divide the annular longitudinal space between the assembly 13 and the barrel wall into a plurality of compartments for leads. From the foregoing it is obvious that when the tip is unscrewed from the bottom of the assembly 13 said assembly may be

withdrawn through the open head end of the barrel.

The head end of the barrel 10 is provided with an internal thread 20 (see Fig. 2). 21 indicates an apertured head which abuts the head end of the barrel and which has a reduced part 22 below said head provided with a thread 23 screwed into the thread 20 of the barrel. Within the head 21 is rotatively mounted the usual tubular holder 24 for the eraser. Said holder has a narrow marginal bottom 25 seated upon a radial shoulder 26 formed within the head 21. A sleeve 27 rigid with and depending from the tubular holder 24 engages within the part 22 of the head 21 and is retained therein by a split ring 28 which abuts the bottom end of said part 22 and is locked in a groove 29 in the sleeve 27. 30 indicates a drive cup with a drive fit within the depending sleeve 27 of the tubular holder 24. Said drive cup has a bottom flange 31 with internal teeth 32.

It is obvious from the foregoing description that the head 21, together with the tubular holder 24 and the drive cup 30, may be removed as a unit from the barrel 10 by unscrewing the head 21 from the barrel 10.

33 indicates a drive stud for the operating assembly 13. Said stud is fixed in any convenient manner to the upper end of the spiral 14 (see Figs. 2 and 4), and has a radial flange 34 which abuts against the upper end of the slotted tube 13^a,—the construction being such that the spiral 14 may be rotated within the tube 13^a by means of the stud 33. As shown, the stud 33 is square in cross section and has a reduced end 33^a. When the head and barrel are in assembled relation as shown in Fig. 2, the stud 33 engages at its four corners with the teeth 32 of the drive cup 30,—the reduced end 33^a extending above the level of said teeth. It is obvious that by reason of the engagement of the teeth of the drive cup 30 with the stud 33 attached to the spiral 13^a, said spiral may be rotated to advance or retract a lead by rotating the tubular holder 24,—thus operating the lead from the head end of the pencil instead of operating it by rotating the tip at the other end of the pencil.

The tubular holder 24 and the eraser 24^a held therein are enclosed by the familiar tubular cap 25. Said cap abuts at its bottom end against the top of the head 21 and is frictionally engaged in any convenient manner with said tubular holder 24. Thus the spiral may be operated by rotating the cap 35.

When it is desired to remove a lead from one of the magazine compartments, the head 21 is removed from the barrel by unscrewing it therefrom. The entire assembly, including the head 21, the tubular holder 24 and its enclosing cap 35, is thus disengaged and removed from the barrel to open the head end thereof. The barrel may then be up-ended to permit a lead to drop out of one of the magazine compartments. Thereupon the operation is reversed and the head 21 is screwed into the barrel, thus restoring the drive cup to engagement with the drive stud for again operating the pencil. The drive cup is provided with eight teeth instead of four, to facilitate its re-engagement with the drive stud. Obviously there is nothing in the parts referred to and their operation as described which tends to break or shear off the ends of the leads in their respective magazine compartments.

Another advantage of the improved pencil results from the fact that, after removal of the head 21, the entire assembly 13 may be withdrawn longitudinally through the open head end of the barrel for repair or renewal after the metal tip 12 has been unscrewed and withdrawn from the tip end of said assembly, and said assembly may be manufactured in quantities in advance, ready for insertion in previously made barrels of any material, as and when required, with resulting economy of labor in the final assembly of the pencils.

In the embodiment of the invention thus described, when a lead has been exhausted and discharged, the user will rotate the cap 35 and with it the tubular holder 24 in reverse to retract the lead clutch towards the head end of the barrel for insertion of a new lead through the tip 12. The user, knowing that he must unscrew the head in order to remove it and get at the leads in the magazine compartments in the barrel, may continue the reverse rotation of the cap without gripping the head 21 and rotating it in reverse, notwithstanding obvious resistance after the lead clutch has reached its upper limit of movement. As a result, there is damage or breaking of the parts at the upper end of the assembly 13. The embodiment of the invention shown in Figs. 6 to 8, inclusive, is designed to eliminate this trouble.

In this case the parts are all as in the first case described, including the threaded barrel 10, the threaded head 21, the tubular holder 24 and the drive stud 33. The drive cup 30^a, however, instead of being fixed in the depending sleeve 27 of the holder 24 as before, is split and is only frictionally engaged within said sleeve. The frictional engagement is provided by a lock washer 24^a seated in the bottom of the tubular holder 24 and engaged with the top of the drive cup 30^a.

Now when the tubular holder 24, by the cap 35, is rotated to retract the lead clutch, and said movement is continued with the intent of unscrewing the head 21, with the objectionable result heretofore described in the first case of bringing the clutch into engagement with the top of the assembly 13, the tubular holder 24 will rotate idly without operating the drive clutch, which will slip due to its frictional engagement therewith. The user then noticing that the head is not being unscrewed, pays more attention and unscrews the head 21 by directly grasping it.

In the modification shown in Figs. 9 to 12, inclusive, a still further feature is added to the construction which includes ratchet elements to provide the driving engagement of the drive cup with the drive stud which will produce a perceptible metallic click when the tubular holder 24 has been rotated sufficiently to bring the lead clutch to the danger point. In this case we have the same assembly of barrel 10, head 21 threaded thereinto and tubular holder 24 with its depending sleeve 27 rotatively mounted in the head 21. 30^b indicates the drive cup. Said cup depends freely within the sleeve 27 from a base 30^c fixed within the tubular holder 24 on its marginal bottom 25. The cup is split towards its bottom end where it is provided with internal ratchet teeth 30^d. The drive stud 33^b is likewise provided with ratchet teeth which are yieldingly engaged by the teeth of the cup 30^b.

In this case when the tubular holder 24 is rotated in reverse to retract the lead clutch, a further rotation tending to retract said lead clutch still further will be ineffective, since the teeth of the cup will back-ratchet without rotating the stud 33^b, and this back ratcheting will produce a click which will notify the user that further rotation of the cup will be of no avail to remove

the head 21 and he will move his thumb and finger down to grasp the head 21 for that purpose.

In Figs. 13 and 14 is shown a modified form and arrangement of the cap and tubular holder for the eraser and their connection with the barrel.

In this case, 35 indicates the barrel; 36 indicates the operating assembly including the slotted sleeve 36a and the spiral 37; and 38 indicates the sleeve with the indents 38a for centering the assembly within the barrel as heretofore. Said sleeve in this case, however, is locked against longitudinal movement in the barrel by means of an annular rib engaged in an annular groove indicated at 39 formed respectively in the sleeve and in the barrel. The sleeve 38 extends beyond the head end of the barrel to engage and provide a stop for the marginal bottom of the tubular holder 40 as indicated at 41. 42 indicates a sleeve which embraces the tubular holder 40, the projecting end of the sleeve 38, and projects into the barrel for a short distance below its top end. Both sleeves, namely, 38 and 42, are enlarged beyond the barrel to provide an inclined shoulder 43. A ring 44 interposed between said shoulder 43 and the end of the barrel is locked in position to provide a seat for the bottom of the cap 40a which embraces the projecting end of the sleeve 42.

The sleeve 42 is rotative upon the projecting end of the sleeve 38 which is non-rotatively fixed in the barrel. Said sleeve 42 has frictional engagement with the cap 40a on the one hand, and with the tubular holder 40 on the other hand, so that said tubular holder may be rotated by rotating the cap to operate the spiral, as in the other cases.

45 indicates the drive cup which, as shown, is similar to the modification shown in Fig. 8, and 45a indicates the drive stud with the annular flange 46 which engages the top end of the slotted sleeve 36a. Below the flange 46 of the stud the sleeve 36a is cut longitudinally a short distance and depressed inwardly to form a part 48 which presents a lug interposed between the flange 46 of the stud and the upper end of the spiral 37 to lock the spiral against longitudinal movement of the sleeve 36a. This construction provides a thrust bearing for the spiral to prevent damage when the lead clutch is retracted too far.

In this case the spiral is operated as before, by rotating the cap and with it the sleeve 42 and the tubular holder 40. The cap may be withdrawn to give access to the leads in the magazine compartments by pulling it longitudinally from its frictional engagement with the sleeve 42. The tubular holder 40 with the drive cup may then be withdrawn separately.

I claim as my invention:

1. In a mechanical pencil, in combination with a tubular barrel open at both ends and provided at one end with a tapered part, a longitudinally slotted tube centrally disposed in said barrel and extending into the tapered part of said barrel, positive stop means limiting the movement of said tube into said tapered part of the barrel, a tip at the end of the barrel having a stem threaded into the proximate end of said slotted tube, a spiral, clutch and plunger enclosed in said tube, an apertured head provided with a depending sleeve threaded into said barrel, a tubular eraser holder rotatably seated in said aperture and having a depending sleeve locked against withdrawal from said head, a drive stud having an end depending into said slotted tube and fixed to the top end of said spiral, and a drive cup operatively engaged with said drive stud rotatable with said tubular holder and capable of disengagement from said stud when withdrawn longitudinally therefrom.

2. In a mechanical pencil, in combination with a tubular barrel open at both ends and provided at one end with a tapered part, a longitudinally slotted tube centrally disposed in said barrel and extending into the tapered part of said barrel, positive stop means limiting the movement of said tube into said tapered part of the barrel, a tip at the end of the barrel having a stem threaded into the proximate end of said slotted tube, a spiral, clutch and plunger enclosed in said tube, an apertured head provided with a depending sleeve threaded into said barrel, a tubular eraser holder rotatably seated in said aperture and having a depending sleeve locked against withdrawal from said head, a drive stud having an end depending into said slotted tube and fixed to the top end of said spiral, and a drive cup operatively engaged with said drive stud fixed within the depending sleeve of said eraser holder and capable of disengagement from said stud when withdrawn longitudinally therefrom.

3. In a mechanical pencil, in combination with a tubular barrel open at both ends and provided at one end with a tapered part, a longitudinally slotted tube centrally disposed in said barrel and extending into the tapered part of said barrel, positive stop means limiting the movement of said tube into said tapered part of the barrel, a tip at the end of the barrel having a stem threaded into the proximate end of said slotted tube, a spiral, clutch and plunger enclosed in said tube, an apertured head provided with a depending sleeve threaded into said barrel, a tubular eraser holder rotatably seated in said aperture and having a depending sleeve locked against withdrawal from said head, a drive stud having an end depending into said slotted tube and fixed to the top end of said spiral, and a drive cup operatively engaged with said drive stud, said cup being slotted and being frictionally engaged with the depending sleeve of said tubular eraser holder, said cup being capable of disengagement from said stud when withdrawn longitudinally therefrom.

4. In a mechanical pencil, in combination with a tubular barrel open at both ends and provided at one end with a tapered part, a longitudinally slotted tube centrally disposed in said barrel and extending into the tapered part of said barrel, positive stop means limiting the movement of said tube into said tapered part of the barrel, a tip at the end of the barrel having a stem threaded into the proximate end of said slotted tube, a spiral, clutch and plunger enclosed in said tube, an apertured head provided with a depending sleeve threaded into said barrel, a tubular eraser holder rotatably seated in said aperture and having a depending sleeve locked against withdrawal from said head, a drive stud having an end depending into said slotted tube and fixed to the top of said spiral, said stud being provided with ratchet teeth, a drive cup rotatable with said tubular holder and capable of disengagement from said stud when withdrawn longitudinally therefrom, said drive cup being provided with yielding back ratchet mechanism adapted for engagement with the ratchet teeth on said stud.

5. In a mechanical pencil, in combination with a tubular barrel open at both ends and provided at one end with a tapered part, a longitudinally

slotted tube centrally disposed in said barrel and extending into the tapered part of said barrel, positive stop means limiting the movement of said tube into said tapered part of the barrel, a tip at the end of the barrel having a stem threaded into the proximate end of said slotted tube, a spiral, clutch and plunger enclosed in said tube, an apertured head provided with a depending sleeve threaded into said barrel, a tubular eraser holder rotatably seated in said aperture and having a depending sleeve locked against withdrawal from said head, a drive stud having an end depending into said slotted tube and fixed to the top of said spiral, said stud being provided with ratchet teeth, a drive cup rotatable with said tubular holder and capable of disengagement from said stud when withdrawn longitudinally therefrom, said drive cup being provided with back ratchet teeth adapted for engagement with the ratchet teeth on said stud and being split to provide yielding engagement of its teeth with the teeth of said stud.

6. In a mechanical pencil, in combination with a tubular barrel open at both ends, lead operating means including a longitudinally slotted tube and a spiral, one rotative with respect to the other, centrally disposed in said barrel, means providing a thrust shoulder near one end of said barrel, and a tip abutting that end of the barrel and having a stem threaded into the proximate end of said slotted tube to draw it against said thrust shoulder and hold said operating means against longitudinal withdrawal through the other end of said barrel.

7. In a mechanical pencil, in combination with a tubular barrel open at both ends, lead operating means including a longitudinally slotted tube and a spiral, one rotative with respect to the other, centrally disposed in said barrel, means providing a thrust shoulder near one end of said barrel, a tip abutting that end of the barrel and having a stem threaded into the proximate end of said slotted tube to draw it against said thrust shoulder, a removable tubular member connected to the other end of said barrel, a drive stud having an end depending into said slotted tube and fixed to the top of said spiral, and a drive cup operatively engaged with said drive stud rotatable with said tubular removable member and capable of disengagement from said stud when withdrawn longitudinally therefrom.

8. In a mechanical pencil, in combination with a tubular barrel open at both ends, a tip at one end of said barrel, a lead operating assembly centrally located in said barrel, means for securing said assembly in said barrel permitting a longitudinal withdrawal of said assembly through the head end of said barrel, a removable tubular member connected to said head end of said barrel, a drive stud for operating said lead assembly, and a drive cup operatively engaged with said drive stud rotatable with said tubular removable member and capable of disengagement from said stud when withdrawn longitudinally.

9. In a mechanical pencil, in combination with a tubular barrel open at both ends, a tip at one end of said barrel, a lead operating assembly centrally located in said barrel, means for securing said assembly within said barrel permitting a longitudinal withdrawal of said assembly through the head end of said barrel, an apertured head provided with a depending sleeve threaded into said barrel, a tubular member rotatably seated in said aperture and locked against withdrawal therefrom, a drive stud for operating said assembly, said stud being provided with ratchet teeth, a drive cup rotatable with said tubular member and capable of disengagement from said stud when withdrawn longitudinally therefrom, said drive cup being provided with back ratchet mechanism adapted for engagement with the ratchet teeth on said stud.

10. In a mechanical pencil, in combination with a tubular barrel open at both ends, a tip at one end of said barrel having a threaded stem extending into the barrel, a lead operating assembly centrally located in said barrel, means including said tip for securing said assembly to said threaded stem permitting a longitudinal withdrawal of said assembly when said tip is unscrewed therefrom, an apertured head provided with a depending sleeve threaded into said barrel, a tubular member rotatably seated in said aperture and locked against withdrawal therefrom, a drive stud for operating said assembly, said stud being provided with ratchet teeth, a drive cup rotatable with said tubular member and capable of disengagement from said stud when withdrawn longitudinally therefrom, said drive cup being provided with back ratchet mechanism adapted for engagement with the ratchet teeth on said stud.

11. In a mechanical pencil, in combination with a tubular barrel open at both ends, a tip at one end of said barrel having a threaded stem extending into the barrel, a lead operating assembly centrally located in said barrel, means including said tip for securing said assembly to said threaded stem permitting a longitudinal withdrawal of said assembly when said tip is unscrewed therefrom, an apertured head provided with a depending sleeve threaded into said barrel, a tubular member rotatably seated in said aperture and locked against withdrawal therefrom, a drive stud for operating said assembly, said stud being provided with ratchet teeth, a drive cup rotatable with said tubular member and capable of disengagement from said stud when withdrawn longitudinally therefrom, said drive cup being provided with back ratchet teeth adapted for engagement with the ratchet teeth on said stud and being split to provide yielding engagement of its teeth with the teeth of said stud.

12. In a mechanical pencil, in combination with a tubular barrel, a lead operating assembly removably secured in said barrel at the tip end thereof, said assembly being capable of withdrawal through the head end of said barrel and including a longitudinally slotted tube and a spiral within said tube, an operating stud depending into said tube and secured to said spiral, said stud being provided with a radial flange abutting the top end of said slotted tube and said slotted tube having a part below said flange indented toward said stud to present a thrust bearing between said flange and the end of said spiral.

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