Feb. 6, 1934. A. N. LUNGREN 1,946,085

MECHANICAL PENCIL

Filed Nov. 5, 1932

Fig. 1.

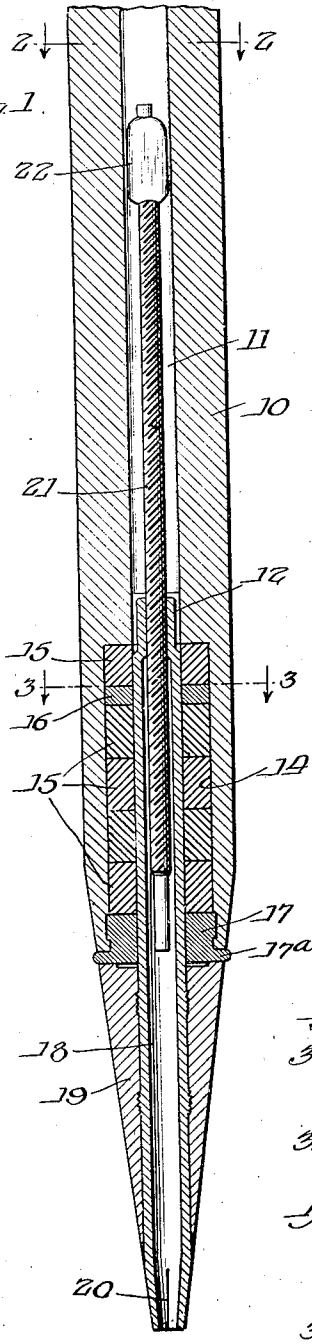


Fig. 2.

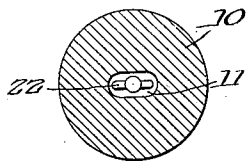


Fig. 3

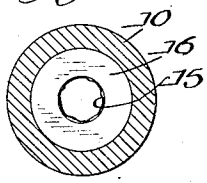


Fig. 4

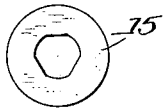


Fig 6

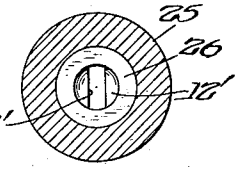


Fig. 7

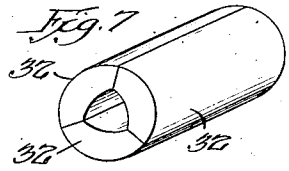


Fig. 8

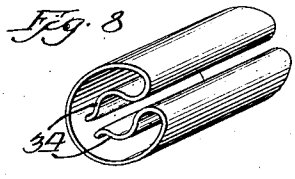
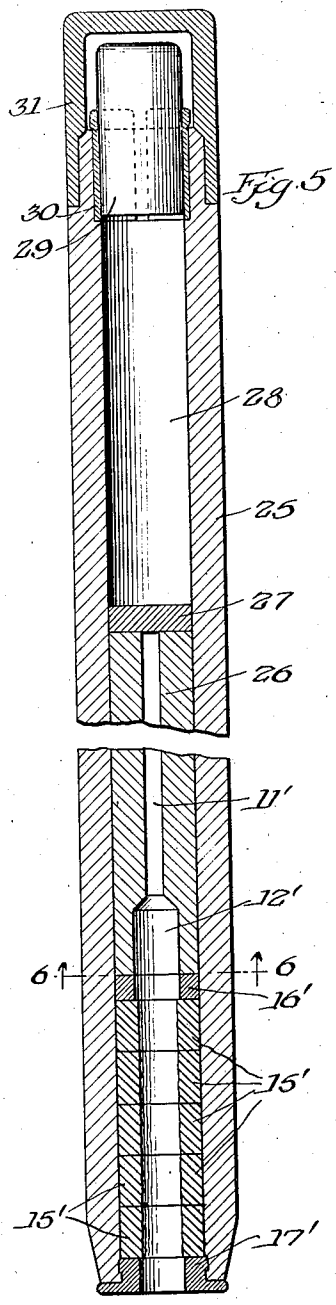


Fig. 5



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UNITED STATES PATENT OFFICE

1,946,085

MECHANICAL PENCIL

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Application November 5, 1932. Serial No. 641,418

15 Claims. (Cl. 120—18)

This invention relates to mechanical pencils, and is applicable with particular advantage in mechanical pencils of the so-called detachable tip type, wherein the lead in writing position is retained in a tip portion of the pencil which is rotatable with respect to the pencil barrel for the purpose of feeding the lead to the writing position.

One object of the invention is the provision of a construction which will be effective to hold the detachable tip portion of the pencil securely against wabbling with respect to the barrel, and at the same time permit rotary adjustment of the tip with respect to the barrel for the purpose of feeding the lead, and allow removal of the tip from the barrel, when desired, for the purpose of inserting new lead sticks.

Another object of the invention is the provision of a mechanical pencil of the detachable tip type which may be manufactured very economically and which will be very sturdy and durable.

Yet another object is the provision of a mechanical pencil construction in which the metal parts are of very simple character and susceptible of being formed very easily.

Yet another object of the invention is the provision of a construction for detachable tip pencils which will be effective to prevent the binding or sticking together of the parts which are intended to be relatively movable for the purpose of replenishing or feeding the lead.

Other and further objects of the invention will be pointed out or indicated hereinafter, or will be apparent upon an understanding of the invention or its employment in use.

For the purpose of aiding in an explanation of the invention I show in the accompanying drawing forming a part of this specification, and hereinafter described, certain embodiments of it, but it is to be understood that these examples are presented merely by way of illustration of the essential features of the invention, and hence are not to be construed in any fashion calculated to limit the appended claims short of the true and most comprehensive scope of the invention in the art.

In said drawing,

Fig. 1 is a part longitudinal sectional view of a mechanical pencil construction embodying the invention;

Fig. 2 is a cross section on substantially line 2—2 of Fig. 1;

Fig. 3 is a cross section on substantially line 3—3 of Fig. 1;

Fig. 4 is an elevational view of a holding element;

Fig. 5 is a broken or part longitudinal sectional view of a mechanical pencil barrel embodying a modified form of the invention;

Fig. 6 is a cross section on substantially line 6—6 of Fig. 5;

Fig. 7 is a perspective view of an alternative form of holding element; and

Fig. 8 is a perspective view of a third form of holding element.

In view of the comparatively simple character of the construction, it is believed that an understanding of the invention may be had most quickly by a consideration of these various illustrative embodiments in detail.

Referring first to the construction illustrated in Figs. 1, 2 and 3, it will be understood that the reference numeral 10 designates the barrel or shaft portion of the pencil, same being provided with an axially extending non-circular guideway 11 opening at its lower end into an axially aligned cavity 12 of circular contour, which cavity communicates at its lower end with a bore 14 of considerably larger diameter. The bore 14 extends to the lower end of the barrel.

Closely fitted in the bore 14 is a holding element made up of a plurality of disk-like sections 15 formed with central apertures disposed coaxially with the cavity 12. This holding element is of elastic or resilient character, and in the construction here referred to may be made of cork or other material of similar character.

Also fitted in the bore 14 are the rigid spacer or centering members 16 and 17, same being spaced from each other a substantial distance longitudinally of the barrel. As here shown, the centering element 16 is adjacent the upper end of the bore 14, and the element 17 occupies the lower end of the bore. These centering elements have central apertures aligning axially with the cavity 12. The member 17 is knurled at its periphery so that it bites into the material of the barrel in such fashion that it is held securely in place and serves to confine the portions 15 and 16 in the bore. The portions 15 and 16 preferably are arranged in close abutment with one another, and the elastic material of the members 15 may be held under some compression by the member 17.

The centering member 17 is provided at its lower end with an outwardly extending flange 17a which abuts against the lower end of the barrel, the lower surface of the member 17 extending normal to the axis of the barrel.

The detachable tip comprises a lead guide tube 18 and a tapering sheath portion 19 which encompasses the lead guide tube for a portion of its length, said sheath being permanently connected to the lead guide tube and terminating at a slight distance above the lower end thereof. At its upper end the surface of the sheath extends approximately normal to the axis of the lead guide tube and is of approximately the same diameter as the lower end of the barrel.

The lower end of the lead guide tube is cleft at 20 and swaged inwardly, so that the bore of its terminal portion is somewhat reduced in size and of somewhat smaller cross-sectional area than the cross section of the lead stick which it is contemplated to be employed in the pencil. At its upper end the lead guide tube is swaged inwardly somewhat, and the bore of the swaged portion is threaded for cooperation with the threaded lead propeller 21. The propeller has at its upper end a spline 22 of size and form adapted to travel non-rotatably in the spline guideway 11 of the barrel.

The external form and size of the portion of the lead guide tube which projects beyond the upper end of the sheath 19 are such that said portion of the tube will fit slidably and rotatably in the central apertures of the centering elements 16 and 17. The form and size of the axial aperture of the holding element, on the other hand, are such that the intrusion of the lead guide tube therein will produce some elastic compression or deformation of the material of the holding element. As a consequence, the holding element will grip the lead guide tube with an elastic pressure effective to retain the tip assembly in position, yet permit its being withdrawn from the barrel or rotated with respect thereto upon application of requisite force. The elastic nature of the washers 15 also insures a good grip on feed tube 18 even though the latter may vary in size through the range of commercial tolerances. Thus interchangeability is assured and manufacture facilitated.

In use of the pencil in writing, the tip assembly is subjected to lateral pressure tending to press it out of alignment with the barrel. Such displacement of the tip assembly is definitely prevented, however, by the centering members 16 and 17 which afford the lead guide tube fixed points of support at locations spaced longitudinally thereof. The bearing of the upper end of the sheath 19 against the lower surface of the member 17 likewise resists lateral displacement of the lead guide tube, and although the lead guide tube is itself quite stiff, the sheath 19 affords an additional stiffening reinforcement for the portion thereof below the end of the barrel. The segments formed at the lower end of the lead guide tube by the slotting thereof admit of slight outward displacement, whereby they are tensioned so as to exert a resilient gripping action upon a suitable lead stick in the bore, thereby to hold it securely against turning or dropping out.

Not only does the cooperative arrangement of the lead guide tube with the centering members prevent wobbling between the tip assembly and the barrel, but also prevents crushing or permanent distortion of the elastic holding element, as it imposes a definite limit to the pressure which may be imparted to the holding element by the lead guide tube.

In order that the elastic holding element may properly grip the lead guide tube, its axial aperture is so formed that a portion extends slightly inwardly beyond the line of the walls of the axial apertures of the centering members 16 and 17, as illustrated in Fig. 3. In Fig. 4 is illustrated one of various forms in which the holding element may be made in order to produce this effect. By forming the holding element of a plurality of the sections 15, a distributed arrangement of these inwardly projecting portions about the lead guide tube may be made. Upon the insertion of the upper end of the lead guide tube into the lower end of the barrel, its reduced upper end will enter between these inwardly projecting portions of the holding element, so that they will be wedged outwardly by the intrusion of the lead guide tube, thus permitting the latter to be moved to position smoothly without shearing off or abrading the contacting portions of the holding element. When the tip assembly is in seated position, its upper end portion occupies the cavity 12, and the spline 22 of the propeller is accommodated in the spline guideway 11 with sufficient looseness or play to accommodate any slight misalignment of said guideway and the lead guide tube, thereby avoiding any springing or cramping of the propeller and the subjecting of the lead guide tube to any eccentric pressure therefrom.

In Figs. 5 and 6 is illustrated a modified form of barrel construction which permits the use of tubing having a straight uniform bore. In this construction the barrel is formed from a section of straight tubing 25 and inserted core portion 26 which is pressed into the bore of the tube section with a tight non-rotatable fit. This core is formed with the axial spline guideway 11' and with the cavity 12' at its lower end. The centering members 16' and 17' are positioned in the lower portion of the bore with the holding element, made up of the sections 15', between them. The tip assembly may be of the construction above described, and is adapted for cooperation with this barrel construction as in the instance above described, the upper end of the lead guide tube extending into the cavity 12' when the tip assembly is in position.

The upper end of the spline guideway is closed or covered by a plug 27, and a portion of the tube bore thereabove affords a magazine 28 for lead sticks. This magazine is closed at its upper end by an eraser 29 and its holding ferrule 30, removably seated in a slightly counterbored portion of the upper end of the barrel, and a removable cap 31 is fitted to the upper end of the barrel to house the eraser.

The holding element may be made in any of various forms which vary in specific features from those above described. For example, in the form illustrated in Fig. 7, it is made up of complementary segments 32, of cork or similar elastic frictional material, which segments, when assembled in complementary relationship, fit snugly in the barrel bore and afford the axial passage for accommodation of the lead guide tube.

The holding element illustrated in Fig. 8 is formed from a sheet of resilient metal shaped to fit snugly, under compression if desired, in the barrel bore, and having the resilient portions 34 arranged to accommodate the lead guide tube between them and to clasp it with resilient pressure. Holding elements of the nature of those illustrated in Figs. 7 and 8 would be arranged in the barrel bore between the spaced centering members 16 and 17, and would function in co-

operative relationship therewith as above described.

In the operation of the pencil, for insertion of a lead stick, the tip assembly is withdrawn from the barrel, the plunger 21 unscrewed and removed from the lead guide tube, and a lead stick of suitable size inserted into the latter through the opening at its upper end. The propeller is then reinserted in the upper end of the lead guide tube and its thread turned into the thread of the latter for a short distance. The tip assembly is then remounted on the barrel, the projecting portion of the plunger being inserted into the spline guideway and the lead guide tube being inserted through the axial apertures of the centering members and the holding element until the sheath 19 abuts the member 17. Then, upon relative rotation of the barrel and tip in the proper direction, the propeller will be screwed further into the lead guide tube, and its lower end will abut the upper end of the lead stick in the latter and propel the lead stick longitudinally toward the lower end of the tip.

The member 17 with its flange 17ª forms a neat and wear-resisting finish for the lower end of the barrel, and by extending and rounding the periphery of the flange somewhat beyond the peripheral surface of the barrel, it will serve to obviate the effect of any slight inaccuracy in alignment of the adjacent peripheral portions of the barrel and tip sheath. The slightly projecting flange also serves as a low abutment or stop for the fingers when the pencil is used in writing.

What I claim is:

1. In a mechanical pencil, in combination, a barrel affording an opening at its lower end, a tip portion having a lead guide tube insertable longitudinally into the barrel, centering members carried by the barrel for cooperation with the lead guide tube to hold it in axial alignment with the barrel, and a holding element adapted to engage the lead guide tube intermediate the centering members to hold it in place by friction, yet permit its rotation and withdrawal upon application of sufficient force.

2. In a mechanical pencil, the combination as specified in claim 1 and wherein one of the centering members is at the lower end of the barrel and the other spaced apart therefrom longitudinally of the barrel and the holding element is interposed between them.

3. In a mechanical pencil, the combination as specified in claim 1 and wherein the centering members are provided with axial apertures slidably receiving the lead guide tube and the holding element has an elastic portion arranged for cooperation with the lead guide tube.

4. In a mechanical pencil, in combination, a barrel affording an opening at its lower end, a tip portion having an axial tube insertable longitudinally into the lower end of the barrel, centering means in the barrel for cooperation with the tube at points spaced apart a substantial proportion of its length to hold it in axial alignment with the barrel, and a holding element in the barrel above the lower terminals of the centering means adapted to exert yielding pressure on the tube to restrain it frictionally against movement yet permit its rotation within the barrel and its withdrawal from the barrel upon application of requisite force.

5. In a mechanical pencil, the combination as specified in claim 4 and including a sheath on the lower portion of the tube and having its upper end adapted for abutment with the lower end of the barrel.

6. In a mechanical pencil, the combination as specified in claim 1 and including a lead propeller movable longitudinally in the lead guide tube by relative rotation of the tip member and barrel.

7. In a mechanical pencil, in combination, a barrel affording an opening at its lower end, rigid centering members in the lower end portion of the barrel each provided with an axial opening and which openings are in alignment, a tip member having an upwardly extending tube adapted to fit slidably in said openings, and a holding element in the barrel adapted to exert yielding pressure on an area of the tube intermediate the centering members.

8. In a mechanical pencil, in combination, a barrel affording an axial opening at its lower end, a tip member having an upwardly extending tube movable longitudinally through said opening, rigid means in the barrel for holding the tube against movement laterally therein, and holding means in the barrel for exerting resilient pressure on peripheral portions of the tube within the barrel.

9. In a mechanical pencil, the combination as specified in claim 8 and wherein said holding means comprises an annular resilient member constrained by the barrel and encompassing the tube and frictionally engaging peripheral portions thereof.

10. In a mechanical pencil, in combination, a barrel affording an axial bore, a centering member fixed to the barrel at its lower end and having an axial aperture, a tip member having a projecting tube portion adapted to fit slidably in said aperture and extend into the bore of the barrel, a resilient holding element in the bore of the barrel and having frictional engagement with peripheral portions of said tube, said tip member including a portion extending outwardly from said tube and adapted for abutment with the lower surface of said centering member, and the centering member having an outwardly extending flange abutting the lower end of the barrel and projecting slightly beyond the periphery of the abutting portion of the tip member.

11. In a mechanical pencil, in combination, a barrel having an axial bore, a rigid centering member fixed in the bore and affording an axial aperture, an elastic ring arranged in the bore and provided with an axial aperture, and a tip member having a tube extending axially therefrom and adapted for sliding fit in the aperture of the centering member and for frictional intrusion in the aperture of the ring to induce elastic compression of portions of the ring, the tip member having a portion extending outwardly from the tube to limit the insertion of the latter into the barrel.

12. In a mechanical pencil, a tubular barrel, a rigid centering member fixed in the lower end thereof and affording an axial aperture, a tip having a stiff tube insertable into the barrel with a sliding fit in said aperture, a core member fixed in the barrel above the centering member and provided with an axial guideway approximately in alignment with said aperture, and a resilient holding element in the barrel between said centering member and core and adapted for frictional engagement with the tube of the tip such as to retain it in place yet permit its withdrawal and rotation upon application of sufficient force.

13. In a mechanical pencil having a barrel and removable tip tube, a tip-retaining device com-

prising an apertured cork member retained in the barrel and adapted to receive and exert frictional retaining pressure on the tip tube.

14. In a mechanical pencil, a tip-retaining device as specified in claim 13 and including also a rigid centering member retained in the barrel in association with said apertured cork member and adapted for guiding cooperation with the tip tube.

15. In a mechanical pencil, a barrel, a rigid centering member fixed thereto and having an axial aperture and a resiliently compressible retaining member disposed in the barrel and retained peripherally thereby and having an aperture approximately in coaxial alignment with, but affording lesser clearance than, that of the centering member.

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