

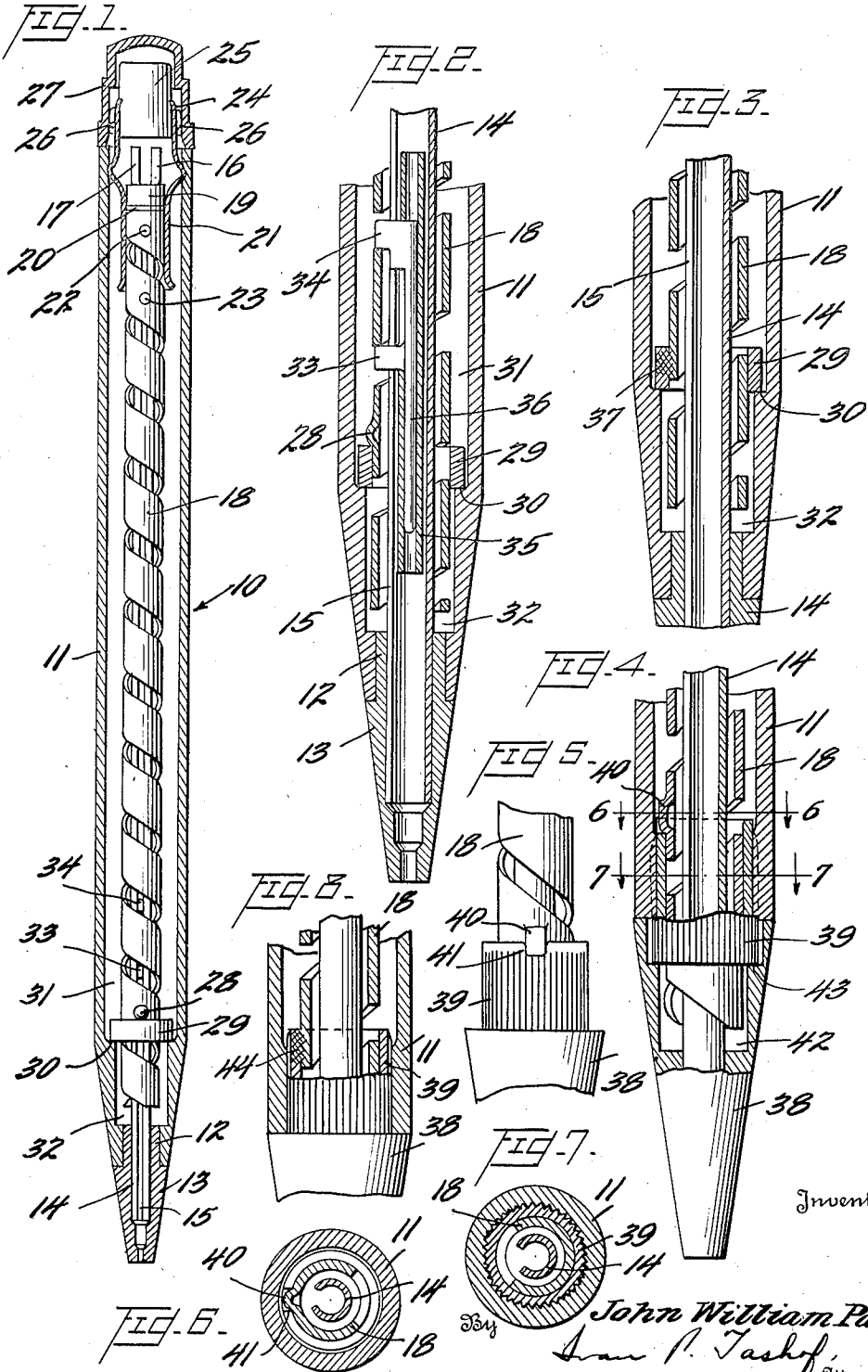
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MECHANICAL PENCIL

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## MECHANICAL PENCIL

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The present invention relates to a mechanical pencil.

More particularly, the present invention relates to a mechanical pencil of the type provided with a rotating screw or spiral and to novel means for supporting the same.

Pencils of this character consist, in general, of an actuating spiral or screw and a longitudinally slotted runner tube generally positioned within the spiral. This type of pencil is also generally provided with a lead carrier comprising a tubular member of a size to carry a single lead and a lead ejector which is telescopically mounted with respect to the lead carrier. The lead carrier and the lead ejector are usually provided with lugs which extend through the longitudinal slot of the runner tube and also between the convolutions of the actuating spiral. During normal operation, the respective lugs of the lead carrier and the lead ejector are spaced apart a definite distance by the convolutions of the spiral, with which they cooperate. When the lead carrier and ejector are so spaced, lead may be carried within the carrier and upon a reduction of the spacing of the lugs a telescopic action of the ejector in the carrier is produced to eject the lead from the lead carrier. The motion of the lead within the pencil and out of the tip thereof is generally produced by the relative motion of the spiral and runner tube.

Pencils of the character just described are more completely shown in the copending application of Julius M. Kahn and John William Para, Serial No. 329,958, filed April 16, 1940, and the copending application of John William Para, Serial No. 356,235, filed September 10, 1940, of which this application is a continuation in part.

In pencils of the general character described, it is necessary to provide some means for permitting a relative motion of the ejector and lead carrier lugs to eject the lead. This has been provided in the past by cutting away a portion of the lower edge of the spiral to provide a space within which the lead carrier lug may rotate without forward motion. This permits the forward movement of the ejector lug while preventing forward movement of the lead carrier lug.

The same general effect is also produced by supporting the entire spiral above the bottom of the main bore of the pencil, which permits a disengagement of the lead carrier lug from between the convolutions of the spiral and therefore, also prevents its forward motion while the motion of the ejector lug and ejector continues.

It is to this latter type of pencil that the present invention particularly relates.

It is one of the objects of the present invention to provide a novel means for supporting the lower end of the actuating spiral.

Another object of the present invention is to provide a supporting bushing for the lower end of the spiral and novel means for supporting this bushing.

A third object of the present invention is to provide a pencil of the character described with a supporting bushing for the lower end of the actuating spiral which is adapted to rest on a shoulder at the lower end of the main pencil bore.

A fourth object of the present invention is to provide a supporting shoulder for the lower end of an actuating spiral which is formed integrally within a plastic barrel.

A fifth object of the present invention is to provide a novel interconnecting means between a supporting bushing for an actuating spiral and the actuating spiral.

A sixth object of the present invention is to provide an actuating spiral with a supporting bushing which is connected to the spiral by a spot weld.

Other objects and advantages of the present invention will become apparent from the specification, and drawing, wherein;

Fig. 1 is an assembled view of a mechanical pencil according to the present invention, partly in section.

Fig. 2 is an enlarged vertical section of the lower end of the pencil mechanism illustrated in Fig. 1 but taken at right angles thereto.

Fig. 3 is a sectional detail of a pencil according to the present invention illustrating the spot welding of the supporting bushing.

Fig. 4 is a vertical section of a pencil according to the invention illustrating a modified supporting structure.

Fig. 5 is a detail of the supporting structure of Fig. 4.

Fig. 6 is a horizontal section taken on a line 6—6 of Fig. 4.

Fig. 7 is a horizontal section taken on the line 7—7 of Fig. 4.

Fig. 8 is a sectional detail illustrating a spot welded support for the pencil of Figs. 4—7.

Referring to Fig. 1, a mechanical pencil of the type hereinbefore described is indicated in general at 10. The pencil is provided with a barrel 11 of plastic material, as for example, hard rubber, Celluloid etc. Fixed immovably within the

lower end of the barrel, as by a projection 12, is a metal tip 13. Fixed immovably within the tip 13 is a runner tube 14 provided with a longitudinal slot 15 and a pair of offset ears at its upper end, designated by the reference numerals 16 and 17.

Mounted rotatably about the runner tube 14 is an actuating member, or spiral 18 which is limited in its upward movement by the ears 16 and 17, although, as may be understood, the upper end of the spiral 18 does not directly contact the ears 16 and 17, but is spaced therefrom by the bushing member 19, which may be of metal, and the anti-friction washer 20, which may be of a suitable material.

An eraser holder 21 is also provided which is adapted to rotate the spiral 18, being linked to the spiral, as by the projections 22 and 23. The upper portion 24 of the eraser holder is adapted to carry an eraser 25 and the outer surfaces of the upper portion 24 are provided with bowed members 26 adapted to frictionally contact a cap 27 so that rotation of the cap 27 will rotate the eraser holder, and through the eraser holder the spiral 18.

A projection 28 is provided spaced from the lower end of the spiral 18. Movably mounted about the spiral 18, just below the projection 28, is a bushing 29 which rests or rotatably bears on an annular shoulder 30 in the barrel, the shoulder 30 constituting the bottom of the longitudinal main bore 31 of the barrel.

The bushing 29, as may be seen, serves to support the lower end of the spiral 18 through the cooperation of the bushing and the projection 28. Thus, a space 32 is provided below the spiral in which the lead carrier lug 33 may rotate after its disengagement from between the convolutions of the spiral permitting the ejector lug 34 to move forwardly to produce telescoping action of the lead carrier 35 and the ejector 36. This action may be understood by reference to Fig. 2.

This support of the lower end of the spiral by the bushing 29, which in turn cooperates or bears on the integral shoulder 30 in the barrel, possesses a number of advantages. Thus, it enables a small tip member, as the tip member 13, to be utilized. It considerably simplifies the tip structure and it prevents noise which may normally occur between the lower end of the rotating spiral and the tip. This last phenomena occurs because the barrel which is moulded from a plastic material possesses anti-friction and noise-reducing properties relative to the bushing 29 which rotates thereon.

It is desired to point out that the barrel may be formed from any suitable material so long as it is capable of being softened, as by heat, and molded, and that the shoulder 30 may either be molded directly in the barrel, or may be produced after the barrel has been molded by an additional operation. In other words, the barrel may be molded or formed with an internal diameter equal to the inner periphery of the shoulder 30 and subsequently reamed out to the diameter shown leaving the shoulder 30.

Although the washer 20 has been shown as smaller than, and spaced from the bore 31, it is desired to point out that it may be fit snugly within the bore 31. Thus, the bore may be made slightly smaller than the washer 20, and the washer forced into the bore while in a heated condition. If the washer 20 is assembled in the bore in this manner, it is evident that the washer will be held immovably within the bore

and the relative motion will take place between the projection 28 and the washer 20.

Referring to Fig. 3, it will be noted that a detail is shown of a lower portion of a pencil mechanism which is entirely similar in general to that shown in Fig. 2, except that the lead carrier and ejector have been omitted for the sake of clarity. It is to be noted further, that no projection 28 is provided, and that the bushing 29 is spot welded to the spiral 18, as indicated at 37.

The advantage of this type of construction is that it makes unnecessary the raising of the projection 28 on the spiral which, in some instances, causes the spiral to be bent and/or deformed. Further, the spiral is ordinarily supported, in the modification of Fig. 1 tangentially to the projection 28, or at a single point on the bushing 29. In some instances, when pressure is applied, i. e., when the spiral is tensioned, as described in the aforementioned copending applications, the bushing 29 will twist out of true alinement, and prevents smooth operation of the spiral. By omitting the projection on the spiral, therefore, a very considerable economy in the cost of manufacture is achieved.

Referring to Fig. 4, a modified form of pencil in which the barrel 11 is movable relative to a modified form of tip 38 is here shown. A bushing member 39 is provided which is adapted to support the actuating spiral 18 through the cooperation of a projection 40 and a notch 41 in the upper portion of the bushing 39. The bushing 39 is also provided with a longitudinally ribbed outer surface which is adapted to bite into the plastic barrel 11 to produce the rotation of the actuating tube 18 and the barrel as a unit. In other words, in this type of pencil, the bushing 39, the projection 40, the actuating tube and the barrel constitute a movable element relative to the tip and the runner tube, and no driving cap such as the cap 27 of Fig. 1 need be provided. Similarly, in this modification, the end of the bore 42 in the tip so as to permit the rotation of the lead carrier lug 33, which has been omitted from this showing for the sake of clarity.

The supporting shoulder 43 for the bushing 39 is formed in this modification within the tip 38. However, it is to be noted that this shoulder similarly occurs at the lower end of the main bore, and through the medium of the bushing 39, performs a similar function to the annular shoulder 30 of Fig. 1.

It is to be noted, further, that the runner tube 14, in this modification, is also immovably fixed within the tip 38 in any suitable manner.

Fig. 8 illustrates a modification of the construction shown in Figs. 4 to 7 inclusive, wherein the projection 40 and the notch 41 are omitted, and a spot weld 44 substituted therefor, the spot weld in this instance immovably joining the bushing 39 and the spiral 18.

The use of a spot weld in this modification possesses a further advantage that it is unnecessary to match the projection 40 with the notch 41 during assembly. It also possesses substantially the same advantages mentioned in conjunction with the spot weld assembly of Fig. 3.

It is desired to point out that although the runner tube 12 is simply shown in position within the tip 13, it may be suitably wedged in the tip. For example, the runner tube may be provided with a tapered end, or with various serrations or projections in order to fix the same immovably within the tip upon assembly therewith.

What is claimed is:

1. In a mechanical pencil including a barrel, an actuating spiral in said barrel, a lead carrier, and an ejector in said barrel, means on each of said lead carrier and ejector movably engaging spaced portions of said spiral and spaced thereby, supporting means integral with the lower portion of said barrel and a second means on said actuating spiral, said two means cooperating to support said actuating spiral with its lower end in spaced relation to a portion of said barrel so that movement of said means on said ejector and lead carrier to the lower end of said spiral will enable one of said means to move beyond the lower end of said spiral to disengage therefrom and produce relative movement of the lead carrier and ejector.
2. In a mechanical pencil, a barrel, a tip fixed at the lower end of said barrel, a runner tube immovably extending inwardly from said tip, an actuating spiral rotatably mounted on said runner tube and supporting means for said spiral including a shoulder integral with the lower portion of said barrel.
3. In a mechanical pencil, a barrel, a tip fixed at the lower end of said barrel, a runner tube immovably extending inwardly from said tip, an actuating spiral rotatably mounted on said runner tube, a collar about said actuating spiral and adapted to support the same and supporting means for said collar including a shoulder integral with the lower portion of said barrel cooperating with said collar.
4. In a mechanical pencil, a barrel, a tip fixed at the lower end of said barrel, a runner tube immovably extending inwardly from said tip, an actuating spiral rotatably mounted on said runner tube, supporting means projecting from said spiral, a collar mounted about said spiral below said supporting means and cooperating therewith to support said spiral, and an integral shoulder on the lower portion of said barrel adapted to support said collar.
5. In a mechanical pencil, a barrel, a tip fixed at the lower end of said barrel, a runner tube immovably extending inwardly from said tip, an actuating spiral rotatably mounted on said runner tube, a collar about said spiral, a spot weld immovably connecting said collar and spiral and supporting means for said collar including an integral shoulder on said barrel.
6. In a mechanical pencil, a barrel, a tip on the lower end of said barrel, said barrel being provided with a relatively large longitudinal bore and a relatively smaller bore extending from the lower end of said first bore, an integral annular shoulder at the juncture of said bores, an actuating spiral in said bore, a collar member about first spiral and bearing on said annular shoulder and means interconnecting said collar and spiral for supporting the lower end thereof.
7. In a mechanical pencil, a barrel, a tip on the lower end of said barrel, said barrel being provided with a relatively large longitudinal bore and a relatively smaller bore extending from the lower end of said first bore, an integral annular shoulder at the juncture of said bores, an actuating spiral in first bore, a collar member about said spiral and bearing on said annular shoulder and a spot weld uniting said collar and spiral for supporting the lower end thereof.
8. In a mechanical pencil, a barrel, a tip on the lower end of said barrel, said barrel being provided with a relatively large longitudinal bore and said tip with a relatively smaller bore extending from the lower end of said first bore, an annular shoulder integral with said tip at the juncture of said bores, an actuating spiral in first bore, a collar member about said spiral bearing on said annular shoulder, said collar being provided with outer ribbed surfaces in contact with said barrel, and a spot weld connecting said collar and spiral for driving and supporting the same.
9. In a mechanical pencil, a barrel, a tip on the lower end of said barrel, said barrel being provided with a relatively large longitudinal bore and said tip with a relatively smaller bore extending from the lower end of said first bore, an annular shoulder integral with said tip at the juncture of said bores, an actuating spiral in first bore, a collar member about said spiral bearing on said annular shoulder, said collar being provided with outer ribbed surfaces in contact with said barrel, and a spot weld connecting said collar and spiral for driving and supporting the same.
10. A mechanical pencil including a tip member at the lower end thereof, a longitudinally slotted runner tube and an actuating spiral movable relative to one another, relatively telescoping lead carrying and ejecting members cooperating with the slotted runner tube and the actuating spiral to advance the lead, said telescoping members being substantially fixedly spaced by portions of said actuating spiral, and means on said spiral adapted to be rotatably supported by a portion integral with the lower part of the barrel of said pencil to space the lower end of said spiral from said tip to permit disengagement of one of said telescoping members from said spiral to vary the distance between the telescoping members to eject lead.
11. In a mechanical pencil including a runner tube and an actuating spiral movable relative to one another, a collar closely fitted about the lower portion of said spiral, a spot weld immovably connecting said collar and spiral, and means to support said collar and spiral, said last mentioned means and said collar forming a thrust bearing for said spiral.
12. In a mechanical pencil, a barrel having a main bore and a relatively smaller bore extending from the lower end of said main bore, an integral annular shoulder formed at the juncture of the two bores, a tip at the lower end of said barrel, said tip having a central aperture extending from said smaller bore, a longitudinally slotted runner tube extending through said bores and fixed in said central aperture, a tubular member having a spiral groove open at its lower end mounted in said main bore to rotate relative to said runner tube, a lead carrying and a lead ejecting member each having laterally projecting means cooperating with the slot in said tube and the spiral groove in said tubular member to advance a lead, said means being spaced apart by at least one turn of said spiral groove, a second annular shoulder at the juncture of said smaller bore and central aperture, a collar fitted about said tubular member to bear on said first annular shoulder, means preventing downward movement of said tubular member with respect to said collar to hold the end thereof spaced from said second shoulder to permit disengagement of one of said projecting means from said tubular member to vary the relative position of said lead carrying and ejecting means to eject the lead.
13. In a mechanical pencil, a barrel having a main bore and a relatively smaller bore extending from the lower end of said main bore, an integral annular shoulder formed at the juncture

of the two bores, a tip at the lower end of said barrel, said tip having a central aperture extending from said smaller bore, a longitudinally slotted runner tube extending through said bores and fixed in said central aperture, a tubular member having a spiral groove open at its lower end mounted in said main bore to rotate relative to said runner tube, a lead carrying and a lead ejecting member each having laterally projecting means cooperating with the slot in said tube and the spiral groove in said tubular member to advance a lead, said means being spaced apart by at least one turn of said spiral groove, a sec-

ond annular shoulder at the juncture of said smaller bore and central aperture, a collar fitted about said tubular member to bear on said first annular shoulder, a spot weld immovably connecting said collar and tubular member to prevent downward movement of said tubular member with respect to said collar to hold the end thereof spaced from said second shoulder to permit disengagement of one of said projecting means from said tubular member to vary the relative position of said lead carrying and ejecting means to eject the lead.

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