

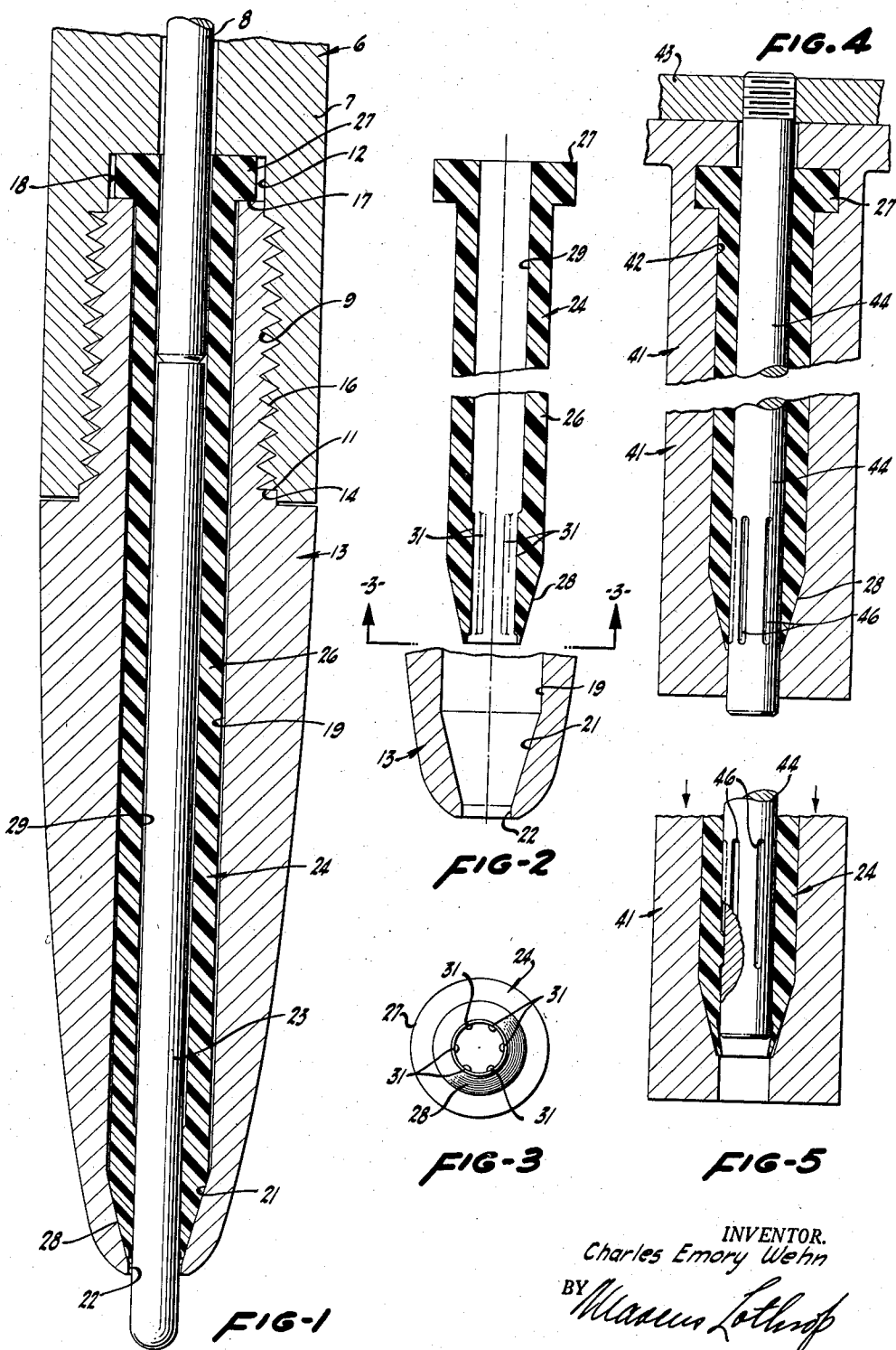
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PENCIL TIP

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My invention relates primarily to pencils of the mechanical sort in which the lead is movable with respect to the body of the pencil and is, during use, propelled from time to time and is replaced when worn out.

In pencils of this kind, the lead and its mounting must be fitted with a certain amount of clearance or looseness since the lead must be moved relative to the mounting from time to time. Yet, for appropriate writing, it is highly desirable that the lead be fixed firmly or gripped solidly so that the motion of the pencil body during writing is firmly transferred to the lead itself without substantial loss. Troubles occur in this portion of mechanical pencils because replacement leads vary in size and the parts associated with the lead wear as the pencil is used. The shape of successive leads sometimes varies substantially and often the clearance permits the writing lead to revolve or twist in use which is undesirable.

It is therefore an object of my invention to provide a pencil tip which incorporates improved properties in that it permits the in and out motion of the lead as desired but grips or holds the lead firmly in writing use.

Another object of the invention is to prevent rotation of the lead in the lead holder during writing.

Another object of the invention is to provide a mechanism which will accommodate leads of varying shape in cross section, such as imperfectly round and substantially square.

A further object of the invention is to provide a pencil tip which can be changed from time to time, if desired.

Another object of the invention is to provide a pencil tip which firmly grips the lead yet which does not substantially score or erode the lead.

Another object of the invention is to provide an improved pencil tip.

A still further object of the invention is to provide a method of making a pencil tip having the attributes above indicated.

A still further object of the invention is to provide an improved method of making a pencil tip.

Other objects, together with the foregoing are attained in the embodiment of the invention described in the accompanying description and illustrated in the accompanying drawing, in which

Figure 1 is a cross section to a greatly enlarged scale of a typical mechanical pencil showing a tip construction in accordance with my invention and with a writing lead in writing position.

Figure 2 is an exploded view in cross section, with portions being broken away, of part of the mechanism of Figure 1 in partly disassembled condition.

Figure 3 is an end view, the viewing plane of which is indicated by the line 3—3 of Figure 2.

Figure 4 is a diagrammatic showing of mechanism utilized in carrying out the method of the invention, parts being broken away to reduce the size of the figure.

Figure 5 is a view similar to the lower part of Figure 4 but with the parts in partially disassembled position.

While the pencil tip of the invention can be embodied in a number of different ways and can be made by various methods, it has quite successfully been fabricated and constituted precisely as illustrated in the drawings. In this instance, there is provided a mechanical pencil, generally designated 6, having a body 7 with appropriate rod mechanism 8 for propelling a pencil lead. The particular detailed construction of the pencil body 6 is not of moment and the nature of the mechanism which

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actuates the rod 8 is not of consequence to the present invention. It is of interest that the body 7 at its lower end terminates in a threaded portion 9 extending from a recessed shoulder 11 to a cavity 12.

5 Designed to fit into the body 7 is a hollow sheath 13, preferably of a rounded and tapered configuration, which is formed with a ridge 14 designed to abut the shoulder 11, and is formed with appropriate threads 16 to engage the threads in the portion 9. The sheath 13 is terminated at a shoulder 17 short enough to extend only partially into the cavity 12 so as to leave a substantial chamber 18 intervening between the sheath 13 and the body 7. The sheath 13 is hollow to define a circular cylindrical through passage 19 extending uniformly from the upper end of the sheath almost to the lower end thereof. The internal boundary of the lower end of the sheath is of a frusto-conical configuration 21 terminating in a circular cylinder 22 of slightly larger diameter than the lead to be received. This lead usually takes the form of a uniform cylindrical body 23 of circular cross sectional contour, although it may be substantially square or of an irregular shape, and of approximately the diameter of the rod 8 being smaller than the interior diameter of the passage 19 in the sheath 13.

25 In accordance with the invention, I provide a pencil tip having various novel and improved attributes to co-operate with the pencil body 7 and including the sheath 13 to hold the lead 23. In the tip is incorporated a pencil sleeve 24 preferably fabricated not of metal, in the usual fashion, but rather of a polyethylene material which has especial properties in connection with this use. The sleeve 24, for the most part of its length as shown typically at 26, has an annular cross section, that is circular inside and circular outside. The diameter of the interior circle is slightly greater than that of the lead 23 while the diameter of the exterior circle is slightly less than that of the passage 19. In the drawing, for clarity, the clearances or spaces between the parts are exaggerated for the most part. At its upper end, the sleeve 24 is provided with an enlarged circular cylindrical flange 27 of a free diameter slightly less than that of the chamber 18 and of a free length slightly greater than that of the chamber. When the body 7 and the sheath 13 are screwed together the flange 27 is slightly deformed and firmly clamped or gripped in axial position against dislodgement. The slight deformation of the clamped flange 27 tends to extrude the flange radially outward into some of the remaining volume of the chamber 18. The entire sleeve 24 is well anchored against substantial axial or rotary displacement, although it can readily be removed and replaced by disassembly of the body and sheath.

40 Adjacent its end opposite the flange 27, the sleeve 24 is externally formed with a frusto-conical configuration 28 of the appropriate size and shape to abut and nest within the similar configuration 21 at the bottom of the sheath 13. The sleeve 24 is made slightly longer than the corresponding dimension of the sheath so that when the sheath is screwed home in the body 7 to grip and position the flange 27, the frusto-conical portion 28 of the sleeve 24 is compressed against the convergence 21 of the sheath 13.

45 The interior of the sleeve 24 is made, for the most part, of a uniformly sized, circular cylindrical cross section to afford a cylindrical surface 29 slightly larger than the external diameter of the lead 23. Adjacent the end opposite the flange 27 and near the frusto-conical portion 28, the interior of the sleeve is provided with integral, inwardly extending axial splines 31. These are of any convenient number, for example six, and are evenly spaced around the interior periphery of the sleeve 24. They preferably extend from a point a short distance within the

terminus of the sleeve 24 along a fraction of the sleeve length. The splines in cross section are preferably somewhat less in circumferential extent than the spaces or grooves between them and are preferably slightly rounded so that they are arcuate when free. The smallest diameter between the free splines themselves is slightly less than the external diameter of the lead 23 whereas the maximum diameter of the spaces or grooves between the splines is somewhat greater than the normal diameter of the lead 23. Since the splines are disposed in part in the region of the conical portion 21, they are slightly pinched together or contracted at the lower end when axially forced into the conical portion 28.

When the sleeve 24 is in position and a lead 23 is propelled by the mechanism 8 downwardly with respect to the sheath 13 so that the end of the lead engages the splines 31, these splines are then expanded or outwardly deformed. They are flattened and extruded, so to speak, into the spaces therebetween. They thus serve as grips to position the lead 23 although the engagement affords small enough obstruction and friction to permit the lead to pass freely through the sheath 13 when strongly propelled. Preferably, the dimensions and proportions are such that when the sleeve 24 is positioned and the splines 31 are slightly deformed inwardly, particularly in the frusto-conical portion 28, the lead 23 although easily engaging the first encountered, upper portion of the splines 31, finds increasing difficulty in passing through the somewhat compacted or compressed splines adjacent the circular cylindrical recess 22, but is able to emerge for use.

The nature of the polyethylene material is such that it works with very little friction on the normal materials utilized for the lead 23, yet is quite effective to grip or hold the lead against rotation or turning and against unintended displacement within the sheath 13. Irregularities in cross sectional contour of the lead, either in diameter or in shape, do not cause difficulties since the polyethylene simply displaces. The polyethylene material is relatively flexible although it is firmly backed up by the stiff material of the sheath 13.

From one aspect, the pencil tip pursuant to the invention acts somewhat in the fashion of a collet, yet the polyethylene is sufficiently deformable or displaceable so that it does not cut into or groove the lead 23 and hence leaves no material to fall undesirably upon the sheet being written upon. The polyethylene is likewise sufficiently deformable or displaceable so that the lead 23 can be withdrawn and another lead can be inserted through the aperture 22 without the necessity of disassembling the mechanical pencil for refilling. In the filling or inward direction of movement of the lead, the sleeve 24 is displaced inwardly or upwardly slightly so that the frusto-conical portions 21 and 28 are slightly parted and the splines 31 are then easily spread. When the lead 23 is then projected slightly by the rod 8, the friction between the lead and the polyethylene sleeve 24 forces the sleeve more firmly into the frusto-conical portion and provides a firmer grip on the lead.

In the preferred manner of making the pencil tip in accordance with my invention, I provide a metallic mold 41 having an appropriate interior contour 42 to form the outside of the sleeve 24. Disposed removably within the mold 41, preferably on a plate 43, is a metallic pin 44 of an appropriate diameter to form the interior of the sleeve 24 and extending preferably through the bottom of the mold 41 for a short distance. Cut into the material of the pin 44 is a plurality of grooves 46 heaving appropriate contours to form the desired splines 31. The grooves extend axially along the pin 44 for the requisite distance. The grooves 46 are conveniently formed by a rounded milling cutter so that they have the desired arcuate contour in cross section.

When the pin 44 is in position within the mold 41, the resulting cavity is filled with polyethylene molding ma-

terial and is heated in the customary fashion. The material then molds and forms to the shape of the boundaries of the cavity including the inwardly extending splines 31. While the polyethylene material is still warm, though substantially cooled from its forming temperature, the plate 43 is lifted and the pin 44 is withdrawn from the mold 41. That is accomplished readily since the polyethylene material while warm readily deforms sufficiently so that the inwardly extending splines 31 deform out of the grooves 46 and thus the parts can be separated, substantially as shown in Figure 5. Since the polyethylene material does so deform and can so be stripped from the pin 44, either as the pin is withdrawn from the mold or thereafter, it is not necessary to utilize a mold having a number of separate parts with partings between the individual splines. This makes the manufacture of a pencil tip of this sort cheap enough to be commercially feasible. After the withdrawn polyethylene sleeve has cooled, it is effectively used as described, still being somewhat deformable but being effectively stiff and rigid to serve in the pencil grip.

What is claimed is:

1. A pencil tip comprising a hollow sheath having a frusto-conical portion, a polyethylene sleeve of continuous annular cross section disposed within said sheath and partially occupying said frusto-conical portion, and integral inwardly projecting splines on the part of said sleeve within said conical portion.

2. A pencil tip comprising a hollow sheath, a pencil body engaging said sheath and leaving an intervening chamber, a polyethylene sleeve of continuous annular cross section disposed within said sheath, an external flange on said sleeve substantially occupying said chamber, and inwardly projecting splines integral with said sleeve.

3. A pencil tip comprising a hollow rigid sheath having a frusto-conical portion, a sleeve of deformable material within said sheath, said sleeve having a continuous wall annular in cross section to define a central passage through said sleeve, splines of deformable material projecting inwardly from said wall adjacent one end of said sleeve, and means for holding said sleeve in said sheath with said one end in said frusto-conical portion.

4. A pencil tip comprising a hollow rigid sheath having an interior frusto-conical portion, a sleeve within said sheath, said sleeve having a continuous wall annular in cross section to define a central passage for a lead extending through said sleeve, means for positioning said sleeve within said sheath with the outside of said wall adjacent one end of said sleeve resting against said frusto-conical portion, and splines of deformable material on said sleeve adjacent said one end thereof projecting into said passage into the path of said lead.

5. An article of manufacture comprising a polyethylene tube open through both ends, said tube having an external flange at one end and an external frusto-conical portion at the other end diminishing in diameter toward said other end, and said tube having integral inwardly directed deformable splines separated to leave intervening spaces and located within said other end of said tube.

References Cited in the file of this patent

UNITED STATES PATENTS

549,137	Kiretchjian	Nov. 5, 1895
775,423	Jacob	Nov. 22, 1904
1,494,999	Crouse et al.	May 20, 1924
2,130,254	Visman	Sept. 13, 1938
2,262,649	Ponath	Nov. 11, 1941
2,287,384	Martinas	June 23, 1942
2,335,400	Ehrenhaft	Nov. 30, 1943
2,618,986	Hungerford	Nov. 25, 1952
2,657,431	Slaughter	Nov. 3, 1953

FOREIGN PATENTS

962,651	France	Dec. 12, 1949
852,052	Germany	Oct. 9, 1952