Aug. 1, 1933. W. H. LINDEMON ET AL 1,920,409

SWAGED TIP FOR MECHANICAL PENCILS

Filed Feb. 24, 1931

Fig. 1



Fig. 2



Fig. 3

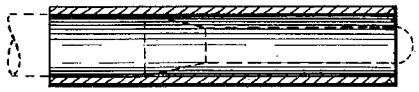


Fig. 4

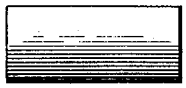


Fig. 5

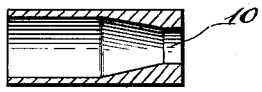


Fig. 6

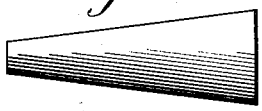


Fig. 7

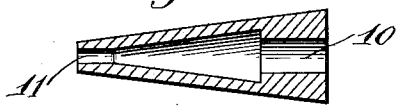
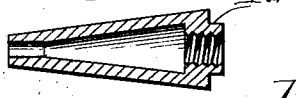


Fig. 8



Fig. 9



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UNITED STATES PATENT OFFICE

1,920,409

SWAGED TIP FOR MECHANICAL PENCILS

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Application February 24, 1931. Serial No. 517,899

1 Claim. (Cl. 29—148.2)

This invention relates to a metallic tip for mechanical pencils and to a method for forming the same and has special reference to a one-piece tip connected preferably to the internal mechanism at the writing point end of the pencil to permit the passage of the lead therethrough.

More particularly, this invention has reference to a tip for a mechanical pencil comprising a one-piece construction of conical shape having an axial bore at the small end thereof of sufficient diameter to guide and to steady the pencil lead extending therethrough and a thickened internally threaded end portion at the base of the cone for threadedly engaging preferably the guide tube of the pencil mechanism.

In prior commercial constructions it has been usual to form the tips of two pieces, one being a conical shell into which is soldered an internally threaded bushing. Inasmuch as solder deteriorates with age, the bushing often becomes loosened and the tip falls off requiring subsequent repair at the place of manufacture. The dropping of the pencil will often cause the soldered joint to break and the tip thereafter to become displaced necessitating servicing. It is also pointed out that the cost of assembly of the tip to the shell and the cost of the individual parts is substantially great compared to the one-piece construction herein contemplated. The manner of assembly of a two-piece construction is inconvenient owing to the small parts of which the construction is formed and to the fact that an application of heat is necessary to join the parts thus prohibiting the handling thereof with one hand.

The present invention contemplates the elimination of the soldered joint by means of forming the entire construction of a single piece of tubular stock, the cylinder being upset to cause the wall at one end thereof to become sufficiently thickened to take a thread and the whole being swaged thereafter to take a conical shape. The device made in accordance with this teaching practically eliminates subsequent servicing of the tip because there is but a single piece of material which is not subject to deterioration with respect to the assembly of parts as in the prior constructions. Inspection will reveal practically no "production rejects" due to inferior assembly or other causes because that hazard has been eliminated, the quoted term relating to those devices rejected after production as being not suitable for use on a pencil of high grade.

One of the objects of this invention is to provide a tip for a mechanical pencil of the character noted above wherein the manner of production substantially eliminates production rejects and service repairs after sale.

Another object of this invention is to provide a tip for a mechanical pencil of the type hereinbefore mentioned wherein the construction is comparatively inexpensive to manufacture and is durable.

A further object of this invention is to provide a new and novel method of forming a one-piece tip for a mechanical pencil of the above description.

Other objects and advantages will hereinafter be more particularly pointed out and for a more complete understanding of the characteristic features of this invention reference may now be had to the following description when read together with the accompanying drawing, in which latter:

Figure 1 is a side elevational view of a pencil embodying the tip of this invention with a portion of the pencil broken away to show the tip in central cross section and a portion of the operating mechanism in elevation.

Fig. 2 is an elevational view of the metallic tube employed in forming the tip of this invention;

Fig. 3 is a central longitudinal sectional view of the tube of Fig. 2;

Fig. 4 is an elevational view of the tube of Fig. 2 after the first operation thereon;

Fig. 5 is a central longitudinal sectional view of Fig. 4;

Fig. 6 is an elevational view of the device of Fig. 4 after completion of the second operation;

Fig. 7 is a longitudinal sectional view of Fig. 6;

Fig. 8 is a view of the device of Fig. 6 after the trimming and threading operation; and

Fig. 9 is a central longitudinal sectional view of Fig. 8.

Referring now to the drawing, the invention relates to a metallic tip for mechanical pencils and to a method of forming the same, the tip in its initial state being a metallic tube of substantially uniform external and internal diameters. The length of the tube is predetermined and contains sufficient stock to produce the resultant tip with preferably an allowance for trimming.

The tube is first upset at one end thereof in any of the usual manners, it being noted particularly that the external diameter is retained uniformly throughout its length. However, the wall at the upset end is thickened and tapers from a predetermined point thereon to a fixed internal diameter 10, the taper of the wall preferably being substantially uniform. The par-

ticular dimensions and configuration of the construction after the first operation are obtained by employing an internal tool and a die of such a configuration. For example, the internal tool may be of a shape to have a cylindrical end portion tapering from an arbitrary point uniformly and gradually to a reduced diameter. The external die may have a diameter to snugly engage the outside of the tube. By upsetting the end of the metallic tube it is, of course, meant that pressure is exerted against that end while the other end is held fixed so that a flow of the material of the wall is had in the direction of least resistance which, of course, would be toward the taper of the internal tool since the outer diameter is held fixed by means of the external die. Such an internal tool has been shown in dotted lines in Fig. 3 in its relation to the metallic tube prior to operating thereon.

After the end of the tube has been upset to provide the thickened wall tapering inwardly to a fixed internal diameter 10 and retaining a uniform external diameter, it is swaged as by means of inserting the same between preferably a plurality of rotary rollers, the engaging surfaces thereof being disposed angularly with respect to each other. The end of the structure shown in Fig. 5 having the walls of lesser thickness is inserted between the engaging surfaces so as to form that end into the smallest diameter of a cone. The internal diameter at the apex of the cone is held to a fixed size as by means of the internal tool being of that diameter and the internal diameter 10 at the base of the cone is likewise retained by means of a continuation of the same internal tool. In disposing the member to be urged into the cone shape between the rotary rollers, there is sufficient material to flow toward the base to lengthen the upset portion bounding the internal diameter 10 and to add to the external diameter at the base of the cone so that the diameter thereof is preferably greater than the original diameter of the tube of which it is formed. This latter flow of material to increase the amount at the base is provided in this operation merely to relieve the necessity of upsetting to a greater extent the material at the end of the tube, or, in other words, of providing a greater amount of material in the first operation.

After reaching the state shown in Fig. 7 it has been found desirable to trim the end to organize a reduced portion 12 for insertion into the end of the mechanical pencil. The aperture at 10 is threaded to engage an externally threaded guide tube 13, which latter is a part of the internal mechanism of the mechanical pencil. However, it may be desirable to provide threads on the external diameter of the reduced portion for other engagement with the pencil.

In the production of the above described tip but two operations are required in the formation thereof aside from the trimming and tapping operation and it is, therefore, comparatively inexpensive to manufacture. We have hereinbefore pointed out that by means of eliminating the assembly of several parts and by making a one-piece construction production rejects and service repairs are substantially eliminated and, therefore, the resultant structure is durable.

While but a single embodiment of this invention is herein shown and described, it is to be understood that various modifications thereof may be apparent to those skilled in the art without departing from the spirit and scope of this invention and, therefore, the same is only to be limited by the scope of the prior art and the appended claim.

We claim:

The method of forming a tip for mechanical pencils consisting in upsetting one end of a metallic tube to form a thickened wall tapering inwardly to a fixed internal diameter extending over a substantial area at the other end thereof while retaining a uniform external diameter over the full length, in swaging said tube to provide a conical-shaped exterior and a uniform internal diameter at said thickened wall, and in internally threading said thickened wall at said uniform diameter.

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