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B. AVAKIAN

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MECHANICAL PENCIL

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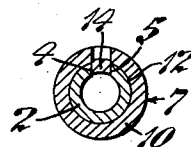
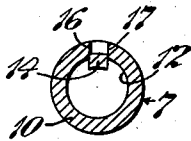
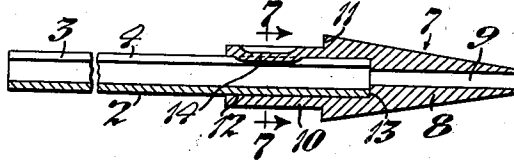
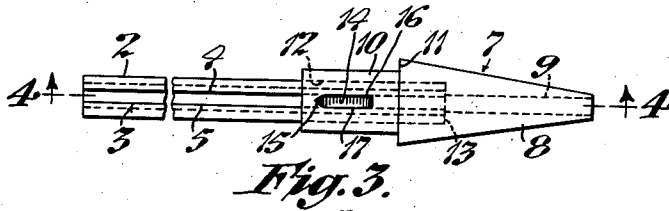
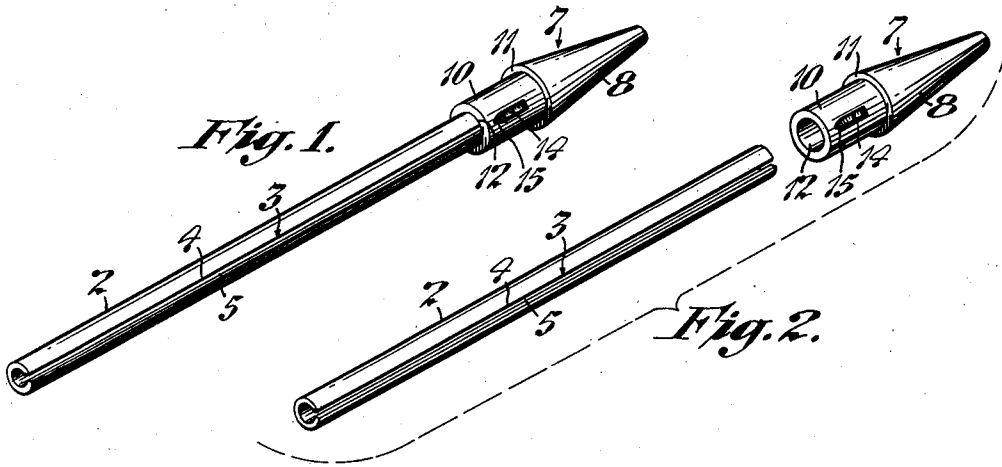


Fig. 5.

Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE

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MECHANICAL PENCIL

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6 Claims. (Cl. 120—18)

The present invention relates to automatic pencils and more particularly to a method of and means for permanently attaching the hollow split runner-tube to the tip-member of such pencils.

One of the objects of the invention is to provide a method of the character indicated which comprises maintaining the edges of the split end of the runner-tube in spaced relationship while forcing it into the bore of the tip-member to cause the tube to bind tightly against the wall of the bore.

Another object of the invention is to provide a projecting lug in the bore of the tip-member for cooperation with the opening in the split end of the runner-tube to prevent the latter from contracting as it is forced into the bore of the tip-member.

Another object of the invention is to provide an inwardly projecting lug in the bore of the tip-member by piercing parallel slits in the wall thereof and depressing the material between the slits.

Still another object of the invention is to provide a method and means of the type indicated which accomplishes a secure attachment of the runner-tube to the tip-member of an automatic pencil.

Further objects of the invention are set forth in the following specification which describes the improved method and a preferred form of construction of the parts, by way of example, as illustrated by the accompanying drawing. In the drawing:

Fig. 1 is an enlarged perspective view showing the runner-tube attached to the tip-member by the method and means of the present invention;

Fig. 2 is a view similar to Fig. 1 showing the runner-tube and tip-member in extended relationship with the slit in the runner-tube in alignment with the inwardly projecting lug on the tip-member;

Fig. 3 is a plan view of the assembled runner-tube and tip-member showing the relationship of the projecting lug on the tip-member with respect to the slit in the runner-tube;

Fig. 4 is a longitudinal sectional view taken on line 4—4 of Fig. 3 showing the lug in the bore of the tip-member projecting into the slit in the runner-tube;

Fig. 5 is a transverse sectional view of the runner-tube showing the parallel relationship of the opposed edges of the tube at the sides of the slit;

Fig. 6 is a transverse sectional view through the tip-member showing the lug as of substan-

tially rectangular cross-section projecting into the bore of the member; and

Fig. 7 is a transverse sectional view taken on line 7—7 of Fig. 4 showing the inwardly projecting lug on the tip-member engaged in the slit in the runner-tube to wedge the latter into binding engagement with the wall of the bore in the tip-member.

Referring now to Figs. 1 and 2 of the drawing, a split runner-tube 2 of usual construction is herein illustrated. The runner-tube 2 is in the form of an extended cylinder having a slit 3 in its wall extending throughout its entire length. Preferably, the tube 2 is made from sheet-stock rolled or otherwise mechanically shaped to its cylindrical form. As will be noted by reference to Fig. 5 the edges of the runner-tube 2 at the sides of the slit 3 are preferably arranged to provide opposed parallel faces 4 and 5.

The tip-member 7 as herein illustrated is also of usual construction, having a conical end portion 8 with a central bore 9 for the lead and a cylindrical shank-portion 10 projecting rearwardly from the conical portion with a shoulder 11 therebetween. The shank-portion 10 is provided with an enlarged counterbore 12 concentric with the bore 9 and forming an annular shoulder 13 therebetween. The diameter of the counterbore 12 is substantially equal to the diameter of the tube 2 to adapt it to receive the end of the latter. As thus far described the runner-tube 2 and tip-member 7 are of a form substantially the same as commonly used, as will be understood by those skilled in the art.

Heretofore in the art the end of the runner-tube 2 has been seated in the counterbore 12 in the tip-member 7 and permanently attached thereto by soldering, brazing or the like. It has also been proposed to deform the end of the runner-tube by forcing or flowing the material at its edges across the slit 3 to cause the edges to engage in abutting relationship and then to force the end of the tube into the counterbore 12 in the tip-member 7 to cause it to bind against the wall of the bore. Such previously used methods and means for permanently attaching the runner-tube 2 to the tip-member 7 require time-consuming operations and great accuracy in the dimensions of the parts and therefore have not been entirely satisfactory in the results produced.

In accordance with the present invention a lug 14 is provided on the cylindrical shank-portion 10 of the tip-member 7 projecting radially into the counterbore 12. Preferably, the lug 14 is of a width slightly greater than that of the slit 3 in

the runner-tube 2 and is pointed or tapered at its end adjacent the outer end of the shank 10 as indicated at 15 in Fig. 3. The lug 14 is preferably formed in the bore 12 of the shank 10 of the tip-member 7 by lancing or piercing the wall of the shank with two parallel slits 16 and 17 and depressing the material between the slits to cause it to project into the bore. It will be understood that a special tool may be used for lancing and depressing the metal of the shank 10 to form the lug 14 with a tapering or pointed end at 15.

The present method comprises the step of forcing one end of the runner-tube 2 into the counterbore 12 in the tip-member 7 with the slit 3 aligned with the lug 14 to seat the end of the tube against the shoulder 13 between the bore 9 and the counterbore 12. During the relative sliding movement between the tube 2 and the tip-member 7 the pointed end 15 of the lug 14 first acts to guide the latter into the end of the slit 3 in the tube. When the lug 14 has entered the slit 3 in the runner-tube 2 its sides engage the edges 4 and 5 of the tube at the sides of the slit. Due to the width of the lug 14, which is slightly greater than the width of the slit 3, the inserted end of the tube 2 is caused to bind evenly against the wall of the counterbore 12 in the tip-member 7 throughout its entire periphery. In other words, the lug 14 acts as a wedge to slightly expand the end of the tube into gripping engagement with the wall of the counterbore 12 in the tip-member 7. When the runner-tube 2 is forced into the counterbore 12 of the tip-member 7 in the manner described above the binding engagement of the parts positively prevents separation to provide a secure permanent connection therebetween.

It will be observed from the foregoing description that the present invention provides an improved method and means for effecting the permanent attachment of the split runner-tube to the tip-member of an automatic pencil. It will also be observed that the present method of attachment is adapted for use with runner-tubes and tip-members of standard construction requiring only the formation of the lug in the bore of the tip-member.

While the present invention is herein described and illustrated as applied to a preferred form of device, it will be understood that various modifications may be made in the construction and arrangement of the parts without departing from the spirit or scope of the invention. For example, the present method may be used to connect parts other than the runner-tube and tip-member of an automatic pencil and the lug may be formed in different ways from that herein illustrated and described. Therefore without limiting myself in this respect, I claim:

1. The method of permanently attaching a tube having a split end to a tip-member having a central bore with a projection on the inner wall thereof, said projection having a slightly greater width than the split in the end of the tube and so shaped as to adapt it to enter the

split, which comprises forcing the end of the tube into the bore in the tip-member with its split in alinement with the projection to cause the latter to wedge against the edges of the split to expand the end of the tube into binding engagement with the wall of the bore.

2. The method of permanently attaching a tube having a slit extending longitudinally thereof to a tip-member having a bore which comprises forming a lug projecting into the bore of the tip-member and of a width slightly greater than the width of the slit in the tube and so shaped as to adapt it to enter the slit, and forcing the end of the tube into the bore in the tip-member with its slit in alinement with the projecting lug to cause the latter to wedge between the sides of the slit to expand the end of the tube into binding engagement with the wall of the bore.

3. The method of permanently attaching a tube having a slit at its end to a tip-member having an axial bore which comprises forming a pair of spaced parallel slits in the side of the tip-member and depressing the material between the slits to provide a rectangular lug of slightly greater width than the slit in the tube projecting into the bore and so shaped as to adapt it to enter the slit, and forcing the end of the tube into the bore in the tip-member with its slit in alinement with the lug to cause the latter to wedge between the sides of the slit to expand the end of the tube into binding engagement with the wall of the bore.

4. The method of permanently attaching the slit runner-tube to the bored tip-member of an automatic pencil which comprises cutting parallel slits in the tip-member and depressing and forming the material between the slits to provide a rectangular lug with a tapered end projecting into the bore and of a width slightly greater than the width of the slit in the tube, and forcing the end of the runner-tube into the bore of the tip-member with the slit in alinement with the projecting lug to cause the latter to wedge in the slit to expand the end of the runner-tube into binding engagement with the wall of the bore.

5. In a device of the type indicated a tube having a longitudinal slit extending from the end thereof, and a tip-member having a bore in which the slitted end of the tube is seated and a lug of slightly greater width than the slit in the tube and projecting into the slit to expand the end of the tube into binding engagement with the wall of the bore.

6. In a device of the type indicated a runner-tube having a slit extending longitudinally thereof, and a tip-member having a bore in which the slitted end of the runner-tube is seated, said tip-member having the material at one side of the bore projecting thereinto and forming a lug of slightly greater width than the slit in the runner-tube and cooperating with the sides of the slit to spread the end of the runner-tube into binding engagement with the wall of the bore to permanently attach it thereto.

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