March 30, 1937. D. KAHN 2,075,725

WRITING INSTRUMENT

Filed Oct. 18, 1935

Fig. 1.

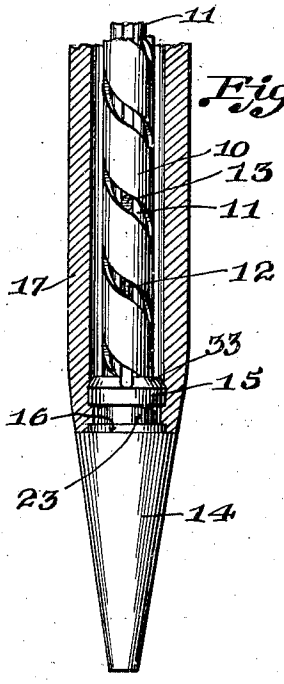


Fig. 2.

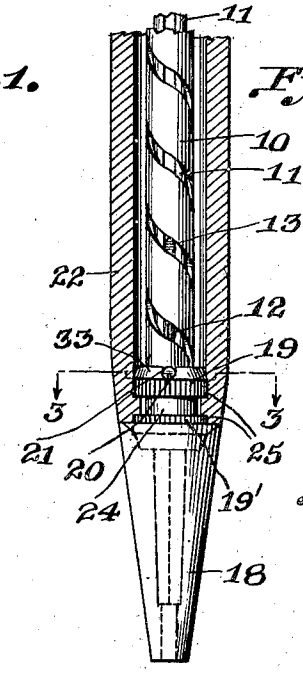


Fig. 3.

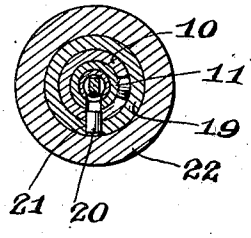


Fig. 8.

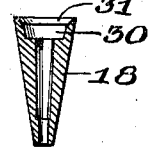


Fig. 9.

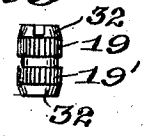


Fig. 4.

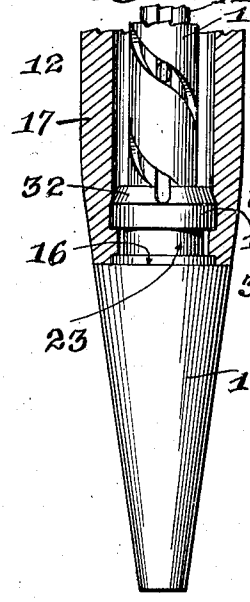


Fig. 5.

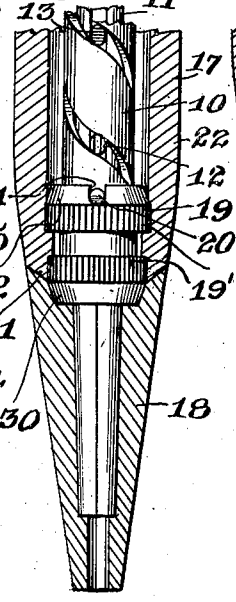


Fig. 6.

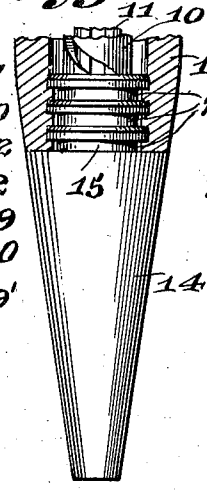
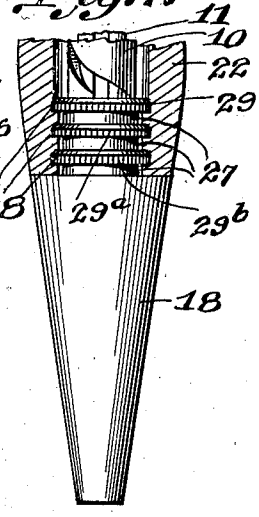


Fig. 7.



Inventor,
David Kahn

By Isaac P. Jacobs,
Attorney

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UNITED STATES PATENT OFFICE

2,075,725

WRITING INSTRUMENT

David Kahn, Woodcliff, N. J., assignor to David Kahn, Inc., North Bergen, Hudson County, N. J., a corporation of New Jersey

Application October 18, 1935, Serial No. 45,663

13 Claims. (Cl. 120—18)

This invention relates to mechanical pencils and has special reference to a novel construction of the tips and barrel portion of such pencils and to the method of connecting such a barrel and tip.

In the construction of pencils of this type, it is common to employ a metal tip and a barrel of plastic material such as celluloid, pyroxylin, cellulose acetate and the like. These barrels are usually quite thin and much difficulty has been experienced in firmly uniting the barrel and tip. Attempts have been made to overcome this difficulty in various ways. For instance, it has been proposed to provide the tip with a threaded upper end and to screw the barrel thereon. Such a construction is not only expensive but also, due to the thinness of the barrel, frequently results in breakage of the barrel at the joint. Moreover, thin barrels of the usual materials as above mentioned do not lend themselves readily to threading. Other attempts have been made by providing the tip with a reduced upper end which is provided with a circumferential groove of some character and molding the barrel in a highly plastic condition to fit in such groove. This again is an expensive method since it entails the use of special molds and coves and means for forcing the barrel forming material into such molds. In this method, it is not possible to use long thin tubes cut to proper lengths to form the barrels, but each barrel must be separately molded.

In carrying out the present invention, it is proposed to utilize the natural flow property of barrel materials of the kind mentioned when in the form of thin tubes and particularly to use this flow when the material has been softened as by a suitable solvent or by heat, the tip being provided with one or more circumferential grooves into which the barrel material will flow.

One important object of the invention is, therefore, to form an improved joint between the tip and barrel of a mechanical pencil wherein the parts are held together without the use of threads or of a molding method.

A second important object of the invention is to provide a novel tip and barrel joint for mechanical pencils, wherein the inherent tendency of the barrel material to flow is utilized to cause a portion of such material to interlock with circumferential grooves formed on the upper part of the tip.

A third important object of the invention is to provide a novel method of forming a rigid joint between the tip and barrel of such a pencil upon the barrel material having been softened by suitable treatment.

With the above and other objects in view, the invention consists in general of certain novel details of construction and combinations of parts and of a process including certain novel steps, all of which is hereinafter fully described and particularly pointed out in the claims.

In the accompanying drawing, which shows certain preferred embodiments of the invention, like characters of reference indicate like parts in the several views, and:—

Figure 1 is a section taken axially through the lower part of one form of the invention showing its use in connection with a pencil arranged to be operated by rotation of its upper end with respect to the barrel.

Figure 2 is a similar view of a pencil showing the use of the invention in connection with a pencil operated by rotation of the lower part of the tip structure with respect to the barrel.

Figure 3 is a section on the line 3—3 of Figure 2.

Figure 4 is a greatly enlarged detail section of a portion of Figure 1 to show the joint.

Figure 5 is similar greatly enlarged detail of a portion of Figure 2.

Figure 6 is a detail showing one modification of the joint.

Figure 7 is a detail showing a second modification of the joint.

Figure 8 is a detailed section through the tip in one form of the invention.

Figure 9 is a side elevation of a certain collar as used herein.

In the forms of the invention shown in Figs. 1 and 2, there is disclosed the usual spiral actuating tube 10, runner tube 11, carrier lug 12 and ejector lug 13, these parts corresponding in construction and function to the similar parts shown in the Patent No. 2,009,182, granted July 23, 1935. In pencils of this type the runner tube is fixed in the tip and the actuating tube is revoluble with respect to the runner tube for protracting and retracting the lead. Since these elements do not form part of the present invention, no further description of them is deemed necessary.

The form of the invention shown in Figure 1 illustrates that type of pencil wherein the operation is effected from the upper end and the actuating tube rotates in the barrel. In this type of pencil, there is provided a tip having a conical body 14 and a reduced upper part or neck 15, which is immovable with respect to the lower part

of the tip, being preferably integral therewith. A shoulder **16** is formed at the junction of the tip parts **14** and **15** and a barrel **17** of the plastic material mentioned is fitted on this neck.

In a tip operated pencil such as shown in Fig. 2, the actuating tube **10** is fixed in respect to the barrel, and in this form of the pencil there is provided a tip having a conical lower end **18** and a reduced upper portion or neck **19** which is revolubly connected to the lower part **18** in the manner common to tip-operated mechanical pencils. Also in this form the actuating tube is fixed to the neck **19** as by a lug **20** struck out from the actuating tube and engaging in a notch **21** formed in the upper end of the neck. On the neck is fitted the barrel **22**.

Considering the manner in which the barrel is secured to the neck in accordance with this invention, it will be seen that in Figure 1 the neck **15** is provided with a circumferential groove **23**, the exterior being otherwise smooth, while in Figure 2 the neck is similarly provided with a circumferential groove **24**, but the neck is roughened in any suitable manner, such as by knurling **25**.

In the form shown in Figure 6, the neck **15** is provided with a series of circumferential grooves **26** and in Figure 7 the neck is not only provided with a series of grooves **27** but the ribs **29**, **29***a* and **29***b* defined by these grooves are roughened in any suitable manner as by knurling **28**.

In all of these forms, it will be seen that the barrel material projects slightly into the grooves and this is accomplished in the following manner. The tubular formed barrel is suitably treated to soften its lower end. This softening may be effected in any desired manner, such as by heat, which will not only soften the material, but tend to expand it slightly. Alternately, the lower end of the barrel may have a suitable solvent, such as a ketone exemplified by acetone, applied thereto, preferably interiorly of the barrel. This softened end is slipped on the neck to butt against the neck shoulder and is allowed to harden in this position. As the softened end is forced on the neck, some of the softened material will flow into the groove or grooves to interlock therewith.

Some of the softened material interiorly of the tube end will also interlock with the knurled portions **25**, as shown in Figures 2 and 5, or **28**, as shown in Figure 7. In that form of the invention in which knurling is employed, the grooves **24** and **27** provide a primary tip means assisting in locking the barrel to the tip member and the knurling **25** or **28**, a secondary tip means for locking the barrel to the tip member. The knurling in effect forms a series of fine grooves into which flows material interiorly of the barrel which has been softened by the application of a suitable solvent, this material forming ribs extending into fine grooves formed by the knurling. In this connection, it is desired to point out that any suitable chemical or composition may be used which accomplishes the softening of the barrel. More specifically, any of the prior art solvents which are used for softening pyroxylin, celluloid cellulose nitrates or cellulose acetates, are suitable. The prior art solvents are, therefore, by the above statement incorporated as part of the present disclosure.

The tube may also be prepared by coating its end interiorly with a cement suitable for the material from which the tube is made, the materials above named being such that cements suitable for them have a solvent action on the material. The coated tube is then fitted on the neck as before and the cement allowed to set. This will effect the formation of a rib or ribs extending transversely of the pencil barrel and interlocking with the transverse grooves of the tip member, and other ribs extending interiorly and longitudinally of the barrel tube when the tip neck is knurled, as shown at **25** and **28**, the longitudinal ribs interlocking with the fine grooves extending longitudinally of the tip neck and formed by the knurling. It is, of course, within the province of the present invention to provide the neck member portions **19'** with coarse knurling, or stated differently, with a series of somewhat deeper grooves extending longitudinally of the tip neck, the softened interior portion of the barrel flowing into said grooves to form longitudinal ribs extending interiorly and longitudinally of the barrel.

In the form of the invention shown in Figure 7, all of the ribs **29**, **29***a* and **29***b* may be knurled and therefore provided with longitudinally extending grooves, or only some of the ribs may be knurled and others left unknurled. For example, the rib **29***a* may be unknurled and ribs **29** and **29***b* knurled, or both **29***a* and **29***b* may be knurled and **29** remain unknurled, or **29** and **29***a* may be knurled and **29***b* left unknurled. This provides either a three-point longitudinal attachment, or a two-point or one-point longitudinal attachment of the barrel to the pencil tip.

Instead of interiorly coating the lower end of the celluloid or pyroxylin tube, celluloid cement or the like containing a solvent capable of softening the interior of the tube may be applied to the neck members **15**, **19** and allowed to flow into the grooves **23** or **24** or into grooves **26** or **27**. The cement will, of course, flow into the fine grooves formed by the knurling **25** or **28**. When the tube is fitted over the neck, the solvent present in the cement will act on the interior of the tube and the softened interior tube material will flow into the transversely extending grooves formed on the neck member and the longitudinally extending grooves formed on the tip rib members where knurling is employed. The cement itself exerts a certain action in fixing the interior barrel to the tip member, and this is supplemented by the interlocking of the transversely and longitudinally extending barrel rib members with the transversely and longitudinally extending tip-neck rib members. Any cement may be used which will perform the function set forth, that is, will act to soften the interior of the pencil barrel and allow the material to flow into the grooves.

The tube forming the barrel may be forced on the tip neck without softening when the material is of such a character that it will expand over the ribs of the neck and flow to some extent into the groove or grooves. In other words, advantage can be taken of the natural flow tendencies of some of these materials. However, since the materials are made of different ingredients, by different chemical processes, under different pressures, and therefore vary in stability; the best method is to soften the interior of the tube in accordance with the present invention. However, as indicated in some cases if the tube is not softened when it is forced over the neck the material will expand over the ribs and engage in the transverse grooves of the tip member and to some extent into the fine longitudinal grooves formed by the knurling.

It is to be noted that in accordance with the

present invention, a preformed tube is used for the barrel and that the barrel is not molded onto the neck.

As clearly shown in Figure 8, the tip 18 has a recess 30 wherein the lower part 19' of the member 19 extends. Furthermore, this recess 30 is chamfered as at 31 to receive the lower end of the plastic tube 17, as shown in Figure 5.

Also, it will be noted that the member 19 has both ends chamfered as at 32, the upper chamfer serving to guide the tube onto the larger portion of the member, and a similar chamfer 33 is provided on the member 15, as shown in Figures 1 and 2.

While the plastic material has been shown as extending rather far into the grooves of the various forms, it is to be understood that the illustration is exaggerated in order to bring out this feature, and that the plastic material may merely extend far enough into these grooves to form a secure lock for the tube and member 15 or 19, as the case may be.

The locking ribs are formed after the tube is forced over the neck of the tip, and, therefore, are formed in place, or may be termed "in situ" formed ribs, which broadly provide an in situ formed portion of the barrel extending into the tip-locking means.

The present invention, while particularly applicable to mechanical pencils, may be applied to any writing instrument where the same problem is involved.

Instead of using acetone as a softening medium, ethyl alcohol, methyl alcohol, ethyl acetate or amyl acetate may be used.

I claim:—

1. The method of forming a joint between a writing instrument tip and a pre-formed barrel of plastic material adapted to flow when softened, said tip being provided with means for receiving said softened material, said method comprising softening the end of the pre-formed barrel, seating the tip in the end of the barrel, allowing the softened barrel to flow into said material-receiving means, and hardening the softened tube whereby the barrel is fixedly secured to the tip.

2. The method of forming a joint between the tip of a writing instrument and a preformed barrel of plastic material adapted to flow when softened, said tip being provided with means for receiving said softened material, said method comprising applying to said material-receiving means a cement containing a constituent adapted to soften the interior of said barrel end, seating the tip carrying the cement in the end of the barrel whereupon said cement softens the barrel end and permits the softened material to flow into the material-receiving means, and hardening the softened portion of the tube whereby the barrel is fixedly secured to the tip.

3. That method of forming a joint between the tip and barrel of a mechanical pencil comprising providing the tip with a circumferentially grooved neck portion, providing a preformed barrel of plastic material and having an end proportioned to fit closely on said neck, applying a solvent cement to the interior of one end of the barrel, seating said neck in the cemented end of the barrel whereby the cement will enter the neck groove, and allowing the cement to set.

4. In a mechanical pencil, a tip member having its upper end reduced to form a neck, said neck being provided with transversely and longitudinally extending grooves and a preformed barrel of plastic material fitted over said neck and having transversely and longitudinally extending in situ formed ribs interlocking with said transversely and extending grooves.

5. In a mechanical pencil, a preformed barrel of plastic material and a tip having its upper end reduced to form a neck, said neck being provided with primary and secondary tip means for locking the preformed barrel thereto, one end of said barrel being fitted tightly over the neck with in situ formed primary and secondary tube locking means extending into said primary and secondary tip means.

6. In a mechanical pencil, a preformed barrel of plastic material, and a tip having its upper end reduced to form a neck, said neck having tip means for locking the barrel thereto, one end of said barrel fitting tightly over the neck with an in situ formed portion of the barrel extending into said tip-locking means.

7. In a mechanical pencil, a preformed barrel of plastic material, and a tip having its upper end reduced to form a neck, said neck having tip means for locking the barrel thereto and at least a portion of its surface roughened and in contact with said barrel, one end of the latter fitting tightly over the neck with an in situ formed portion of the barrel extending into said tip-locking means.

8. In a mechanical pencil, a preformed barrel of plastic material, and a tip having its upper end reduced to form a neck, said neck having tip means for locking the barrel thereto, one end of said barrel being cemented to and fitted tightly over the neck with an in situ formed portion of the barrel extending into said tip-locking means.

9. In a mechanical pencil, a preformed barrel of plastic material, and a tip having its upper end reduced to form a neck, said neck having tip means for locking the barrel thereto and at least a portion of its surface roughened and in contact with the barrel, one end of the latter being cemented to and tightly fitted over the neck with an in situ formed portion of the barrel extending into the tip-locking means.

10. In a mechanical pencil, a preformed barrel of plastic material and a tip having its upper end reduced to form a neck, said neck being provided with a series of alternate circumferential grooves and ribs and fitted in one end of the barrel, said barrel being cemented on said neck with the cement entering said grooves.

11. The steps in the process of making a writing instrument having a barrel of material capable of being softened and a metal tip having a roughened surface, comprising forming the said barrel, adding a softening material for the barrel to the interior surface thereof and seating the said metal tip in the interior of the barrel so that the inner surface of the barrel will shape itself to conform to the shape of the roughened surface of the tip in order to form a stable joint between the said barrel and tip.

12. In a writing instrument, the method of forming a joint between a plastic and metal portion thereof comprising roughing the metal portion, adding a solvent for the plastic to the surface of the plastic portion thereof in a quantity such that the section of the plastic material in close proximity to the surface will be solubilized, contacting the metal portion with the plastic portion and solvent in order to cause the surface of the plastic portion to conform to the shape of the roughened surface of the metal portion to form a joint therebetween.

13. The method of forming a joint between a writing instrument metal tip and a barrel of plastic material, said tip being provided with serrations, comprising seating the tip in the barrel in the presence of a cement which is a solvent for the plastic material of the barrel, in order that the plastic material shall become plasticized and tend to mold itself to conform to the shape of the said serrations, and allowing the cement to harden to form a joint between the tip and barrel.

DAVID KAHN.