May 10, 1932. W. D. LA RUE 1,858,016

PLURAL MEMBER STYLUS OR THE LIKE

Filed Feb. 21, 1929

Fig. 2.

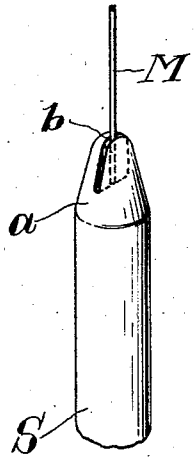



Fig. 1.

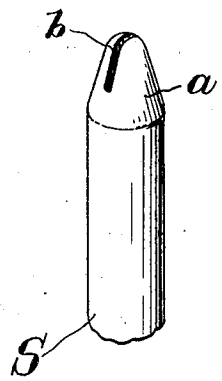



Fig. 3.

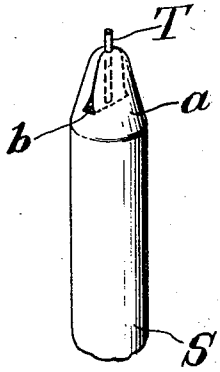



Fig. 4.

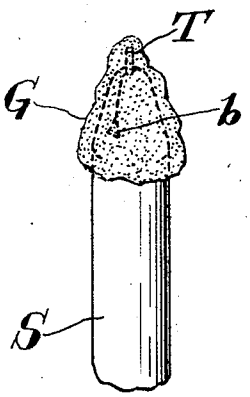



Fig. 5.

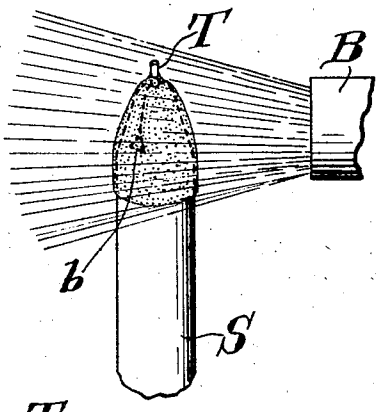



Fig. 6.

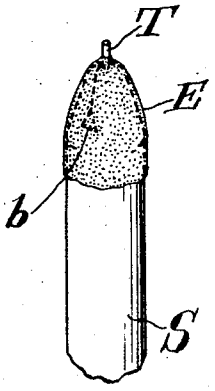
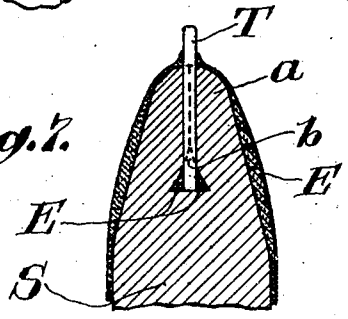



Fig. 7.




Inventor

William D. LaRue,

By Lyman D. Oberlin

his Attorney

Patented May 10, 1932 1,858,016

# UNITED STATES PATENT OFFICE

WILLIAM D. LA RUE, OF MAPLE SHADE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO RADIO CORPORATION OF AMERICA, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

## PLURAL-MEMBER STYLUS OR THE LIKE

Application filed February 21, 1929. Serial No. 341,575.

My invention relates to a method of securing, uniting or holding a plurality of members together; my invention also relates to a novel structure, article or device produced, prepared, or constructed in accordance with my method.

In accordance with my invention, adjacent surfaces of a plurality of members are held in contiguous or abutting relation and a suitable medium or coating is applied to neighboring surfaces of said members to thereby enhance or increase the degree or tenacity of the union between said members.

Further in acordance with my invention, a plurality of elongated members usually having different diameters or cross-sectional configurations are disposed in partial telescoping relation and, to neighboring surfaces of said members, there is applied a suitable coating which thereafter is elevated in temperature, or otherwise suitably treated, to form on said neighboring surfaces, or a major portion thereof, a locking or securing film or surface usually enamel-like in character.

My invention relates to a structure or article wherein one of the aforesaid members is the metallic shank of a talking machine or phonograph stylus or needle and another of said members is the tip or point which directly coacts with a talking machine or phonograph record.

My invention relates to a structure or article wherein the aforesaid metallic shank has, at one end thereof, a recess for the reception of one end of the aforesaid tip or point, the latter having a much smaller diameter or cross-sectional configuration than that of said shank.

My invention relates to a structure or article wherein the aforesaid shank is formed of iron or steel while the said tip or point is formed from material having greater hardness and ability to withstand wear than iron or steel such, for example, as refractory material, as chromium, cobalt, molybdenum, or, and preferably, tungsten or any alloy or combination of such metals one with the other or with other metals as may be suitable or desirable.

Further in accordance with my invention, to adjacent or neighboring surfaces of a shank and the associated tip which it holds there is suitably applied a coating of material to be subjected to relatively high temperature for a brief interval whereby a film or layer of enamel-like coating is produced to securely fasten said tip to said shank to lessen or decrease the tendency of tip vibration independently of the shank.

My invention relates particularly to a talking machine or phonograph stylus or needle of the general character disclosed in the U. S. patent to Owen, No. 1,080,924, December 9, 1913, and constitutes an improvement on the therein disclosed stylus or needle in that the record-engaging tip or point is more efficiently and better secured to its supporting or carrying shank.

My invention resides in the method and in the article or device of the character hereinafter described and claimed.

For an understanding of my method and for an illustration of one of the forms my article or device may take, reference is to be had to the accompanying drawings in which:

Figure 1 is a perspective view of a stylus or needle shank slotted or recessed for the reception of the tip or point to be carried thereby.

Fig. 2 is a perspective view showing the shank of Fig. 1 having associated therewith uncut stock material from which the tip or point is to be formed.

Fig. 3 is a perspective view of a complete two-part stylus or needle as now known to the art.

Fig. 4 is a perspective view of the needle or stylus of Fig. 3 with a coating on one end thereof.

Fig. 5 is a perspective view illustrating one step of my method.

Fig 6 is a perspective view illustrating a needle or stylus as constructed in accordance with my method.

Fig. 7 is an enlarged, longitudinal sectional view of the needle or stylus shown in Fig. 6.

Referring to the drawings, there is illustrated a shank or supporting member S formed usually of iron or steel, one end thereof preferably having a cone-shaped or ta-

pered end *a*. As is well understood in the art, the tapered end *a* of a shank S may be traversely slotted or recessed as indicated at *b* for the reception of one end of a tip or point T, Fig. 3, which coacts, for the reproduction of sound, directly with the spiral sound reproducing groove of a talking machine or phonograph record. In accordance with usual practice, the tip T may constitute the severed end of a suitable length of stock material M, Fig. 2, the end of which, before severance, is disposed in the slot or recess *b*. Thereafter, by a suitable mechanical operation on the tapered portion *a*, the slot or recess *b* is nearly or substantially entirely closed around the end of the stock material M which may now be severed to leave a suitable length or section extending beyond the end of shank S, the latter constituting the tip T.

Devices of the character illustrated in Fig. 3 are generally satisfactory for the reproduction of sound from talking machine or phonograph records. However, such devices are sometimes unsatisfactory due to the fact that the tip T, by the aforesaid mechanical operation, is not prevented from vibrating locally and independently of the shank S. In other words, it may happen that said tip T, to more or less extent, is loosely mounted in the shank S and, when this happens, to some extent at least, the quality of sound reproduction is impaired.

In accordance with my invention, the above described defect in the prior art construction is overcome by providing an arrangement wherein the tip or point T, in addition to the gripping action of the walls of recess *b*, is so clamped, cemented, or otherwise suitably secured to the shank S that the formation of the aforesaid local vibrations is substantially impeded or prevented; by my invention, in effect, the tip or point T becomes an integral part of the shank S.

Accordingly, in one form of my invention, to the tip T and to adjacent surfaces of the tapered end *a* of shank S there is applied a gob or mass G of coating material. In the example illustrated, this coating material is paste-like lead borate which may be readily prepared or derived from a mixture of two solutions, to wit, lead acetate and borax, each dissolved in water. These solutions, when mixed yield a precipitate of lead borate which may be washed, partially dried, and then thinned to the proper consistency with alcohol or glycerine. In equation form, the reaction is as follows:

$$Na_2B_4O_7 \cdot 10H_2O + Pb(C_2H_3O_2)_2 \cdot 3H_2O = PbB_4O_7 + 2NaC_2H_3O_2 \cdot 3H_2O + 10H_2O$$

According to conditions of precipitation, lead metaborate or lead polyborates may be formed. Due to conditions of manipulation the products obtained may not always be as above shown. However, during the heat treating operation, the proper product is obtained. In a more commercial sense, the lead borate precipitate, after the sodium acetate is washed therefrom, may be kept in a moist condition and mixed with water as desired to form the paste-like coating material.

In Fig. 4, the gob G of coating material is illustrated as applied to substantially the entire cone-shaped end *a* of shank S and entirely to and over the tip or point T. When the slot or recess *b* is not entirely closed by the aforesaid mechanical operation, as is usually the case, some of the coating material, to some extent at least, passes or comes within the part of the slot *b* thus not entirely closed.

After the gob or mass G has been applied, as aforesaid, it is suitably treated as by elevation of temperature, to produce a relatively hard enamel-like coating E on the tapered end of shank S and around a part of the exposed end of the tip T. As illustrated, the two-part stylus, coated as indicated in Fig. 4, may be exposed to the action of a flame produced, for example, by a Bunsen torch B or the like, Fig. 5. When thus elevated in temperature, fusible decomposition occurs and the gob G changes from a paste-like form to a condition akin to a liquid state and, shortly after discontinuance of the heat treatment, an enamel-like condition results. Ordinarily, when the coated two-part stylus is subjected to a temperature of the order of that encountered in the blue flame of a Bunsen torch, the application of heat should be continued for a period of fifteen seconds, more or less, or until the coating becomes substantially black. During such an interval, the gob G liquefies to some extent, at least, as described above, and permeates or fills, either partially or entirely, any open spaces between the tip T and the walls of the slot or passage *b* which have been previously closed therearound, as described above.

Accordingly, when the coating material assumes its enamel-like condition, the tip T, in effect, is locked or secured thereby to the supporting shank S independently and in addition to the clamping engagement of the walls of recess *b*. Ordinarily, and as illustrated in Fig. 7, the enamel-like coating E extends from the shank S part way along the exposed end of the tip T. However, it usually occurs, that only a small portion of said tip T is covered with enamel for, during the heat treating operation, the shank S and tip T should be maintained in a substantially vertical position with the tip T uppermost. Accordingly, when the coating material liquefies, the latter passes downwardly and leaves the upper end of tip T substantially or entirely free from said coating material.

Thus, in the specific form of my invention herein illustrated and described, the record-engaging tip of a two-part needle or

stylus is secured or locked to its supporting member or shank by a layer of enamel produced by the action of heat on a suitable substance, as one comprising lead acetate and borax. Accordingly, the tenacity or degree of union between the two members forming the stylus or needle is greatly increased over the prior art constructions to thereby impede and usually to entirely prevent vibration of the record-engaging tip independently of its supporting member or shank.

Moreover, with a needle or stylus constructed in accordance with my invention, the record-engaging tip is socketed in or securely and firmly fastened to its supporting shank and may be removed therefrom only with great difficulty, if at all. Still further, it often happens that the tungsten rod or member from which the record-engaging tips are to be formed exhibits, under the microscope, small channels or fissures extending longitudinally thereof. Under the influence of the flame, the coating, at the time it partially liquefies, entirely or partially fills such channels or fissures. As a result of all the foregoing, a decided improvement in the quality of sound reproductions results when there are utilized needles or styli constructed in accordance with my invention.

It shall be distinctly understood that my invention is not to be limited to the utilization of a paste, powder, or the like of lead borate. The latter constitutes a preferred material but, in lieu thereof, many other fusible substances may be utilized, such, for example, as manganese borate and other metallic borates. In addition, there may be utilized fusible metallic resinates, fusible alloys, solders, etc., It shall also be understood that my invention is not to be limited to the utilization of fusible substances since, for example, non-fusible alloys, solders, etc., may be utilized. Ordinary borax is sometimes suitable of itself but may be objectionable because affected by moisture. Still further, my invention, when fusible substances are utilized, is not to be limited to those which harden only after discontinuance of the heat treating operation since some desirable fusible substances coming within the purview of my invention harden during continued application of heat.

What I claim is:

1. A stylus comprising a record engaging member, a shank having a slotted end closed on the major portion of said member, and a fused coating of metallic borate on adjacent surfaces of said member and shank.

2. A stylus for sound reproducing machines having a record engaging tip composed of tungsten wire and a supporting shank of steel, said shanks being swaged around the major portion of said tip and positively joined thereto by a fused metal borate.

3. A stylus including a record engaging tip composed of tungsten and a bifurcated supporting shank of steel, said tip being clamped between the bifurcated portions of said shank and positively anchored thereto by a fused metallic solder.

4. A stylus for sound reproducing instrumentalities having a record engaging point composed of tungsten wire and a steel shank having a recess formed in one end thereof, said recessed end being swaged over a major portion of said wire point and positively joined thereto by a fused metal borate.

In testimony whereof I have signed this specification this 15th day of February, 1929.

WILLIAM D. LA RUE.