W. R. WHITNEY.

STYLUS FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED MAR. 19, 1915.

1,237,230. Patented Aug. 14, 1917.

Fig. 1.

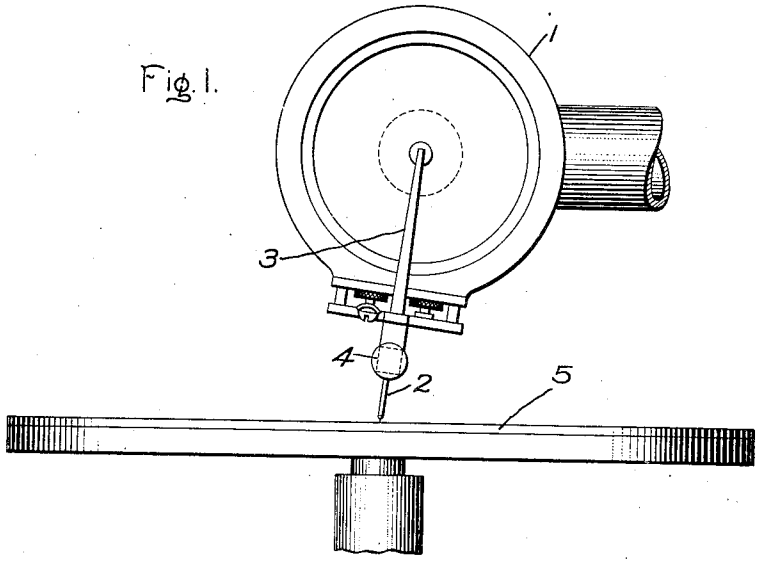


Fig. 2.

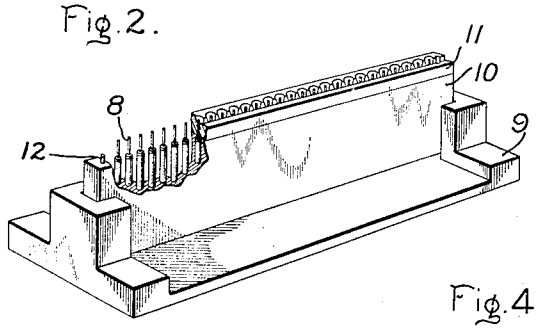


Fig. 3.

Fig. 5.

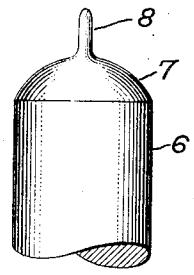
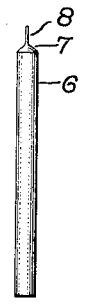


Fig. 4.



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UNITED STATES PATENT OFFICE.

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STYLUS FOR SOUND-REPRODUCING MACHINES.

1,237,230. Specification of Letters Patent. Patented Aug. 14, 1917.

Application filed March 19, 1915. Serial No. 15,541.

To all whom it may concern:

Be it known that I, WILLIS R. WHITNEY, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Styli for Sound-Reproducing Machines, of which the following is a specification.

My present invention relates to styli for sound reproducing machines, and more particularly to styli or needles having a tip of tungsten or tungstenic material, such as are described in U. S. Letters Patent No. 1,080,924.

The object of my invention is to provide an improved method of and means for securing the tip to the body portion of such needles whereby they may be produced economically and will be efficient in their operation as well as durable.

The point of such a needle should preferably have a diameter approximately equal to the width of the groove in the sound record with which it is to be used or about .006 of an inch.

I have found that such needles may be made to advantage by securing the tungsten point directly to the end of the body portion by means of a body of metal having a lower melting point than either the point or the body portion.

In carrying my invention into effect I have found that copper or an alloy thereof is most suitable for joining the tungsten point to the body portion. This is because of the fact that under non-oxidizing conditions molten copper readily wets tungsten and also wets the steel which preferably forms the body portion of the needle. The copper used is preferably first treated with a small quantity of an oxidizable boron material as described in Weintraub Patent #1,023,604. In joining the point to the body portion I have found that there is a tendency for the copper to run down over the sides of the body portion. In order to secure a uniform product it is necessary to use for each needle a predetermined amount of the metal which forms the union between the point and the body portion which amount should be just sufficient to properly join the two parts. If in some cases a part of this metal runs over the side of the pody portion the junction between the point and the body portion will be defective. I have found that this difficulty may be overcome by treating the sides of the body portion in such a way that they will not be wet by the molten copper. This has the additional advantage of causing the copper when molten to form a rounded globule on the end of the body portion and if the point is placed in the center of this globule the desired form of needle may be obtained by the joining operation without any further mechanical treatment.

My invention with further objects and advantages will best be understood by reference to the following description taken in connection with the accompanying drawing in which Figure 1 represents the sound box of a sound reproducing machine provided with a stylus, constructed according to my invention, in engagement with a sound record tablet; Fig. 2 shows a convenient form of support for holding the needles while the points are being attached to the body portions; Fig. 3 shows the parts of a needle before they are joined together; Fig. 4 shows the needle after the parts have been joined together; and Fig. 5 is a greatly enlarged view of the point end of a completed needle.

The sound box 1 of the sound reproducing machine shown in Fig. 1 is provided with one of my improved styli 2 secured to the transmission arm 3 by means of a suitable holding device 4 and the point of which rests on a sound record tablet 5. The sound box transmission arm and holder however form no part of my present invention but are shown merely to illustrate one way in which my improved stylus may be used.

The body portion 6 of the stylus illustrated in Figs. 3, 4 and 5 is preferably of steel. The metal for joining the point to the body portion may be prepared in the form of a small disk 7 of the same diameter as the body portion. These disks may be easily made by punching them out of a sheet of the required thickness. The point 8 preferably consists of a short section of tungsten wire of the desired size or about .006 of an inch in diameter. The parts of the

needles as shown in Fig. 3 may be assembled for the joining operation in a support of the type illustrated in Fig. 2. This consists of a base portion 9 having slotted ends adapted to receive an upright perforated body portion 10. The perforations in this body portion of the holder are made of slightly larger diameter than the body portions of the needles. When the portions 6 and 7 of the needles are assembled in the body portion 10 of the holder they may conveniently be substantially flush with the top thereof. A perforated cover 11 which may be held in its proper position by pins 12 at each end is then placed over the body portion 10. The points 8 are then inserted in the perforations in the cover which register with the perforations in the body portion 10. When the parts have been thus assembled the support is placed in a hydrogen furnace heated to a temperature at which the copper disks 7 will melt. As soon as these disks melt the points 8 drop down into the molten metal and may touch the ends of the body portions 6. The supporting member with the needles therein is then withdrawn from the heated section of the furnace and allowed to cool while still in the hydrogen atmosphere and when cool it will be found that the points are securely attached to the body portions. The needles may then be removed from the support. If the operation has been properly carried out the needles should have the appearance indicated in Fig. 4; that is, the joining metal should have substantially the form of a hemisphere with the point protruding from the center thereof. Since the tungsten is wet by the copper the surface of the copper around the point will be slightly raised as indicated more clearly in Fig. 5.

In order that the needles shall have this form I have found it necessary to treat the cylindrical surface of the body portion 6 in such a way that it will not be wet by the molten copper, otherwise the copper will run down over the body portion, and cause the needles to stick to the supporting member. When this happens too there may not be enough metal left to properly join the point to the body and the metal that is left instead of having a rounded surface as desired, will have a flat surface. I have found that the desired effect may be secured by forming on the surface of the body portion 6 a coating of an inoxidizable alloy of aluminum and iron. This may be done by heating the body portion in contact with powdered aluminum under non-oxidizing conditions as described in an application filed by Tycho Van Aler October 4, 1911, Serial No. 652,756. A comparatively thin coating is sufficient for my purpose and the necessary thickness may be secured by heating about half an hour in the manner described in the above-mentioned application. It is of course necessary that the coating of alloy should not cover the end of the body portion 6 to which the point is attached. I find it convenient to form the coating on long rods of the proper diameter and from these rods cut the body portions to the desired length. This will give a clean end surface to which the point may easily be secured.

The points 8 may be cut from tungsten wire of the desired size which has first been carefully straightened and cleaned so that the copper will adhere to it readily. They may be cut to such a length that when the joining operation is completed they will protrude the desired amount from the joining metal. Since this distance is very small and any variation therein is not desirable considerable accuracy in the construction of the supporting member and in the assembly of the needles therein may be required to secure the proper length of points in this way. On this account it may be desirable to cut them at first longer than necessary and trim them all to a uniform length after the joining operation has been completed. As a final step in preparing the needles for use on a sound reproducing machine it is desirable to subject them to a buffing process to remove any sharp corners and give the points the smooth rounded appearance shown in Fig. 5.

While I have described but a single embodiment of my invention it will be apparent that many modifications may be made in the form of the parts used and in the final form of the completed needles without departing from the scope of the appended claims. It will also be apparent that the method which I employ for joining the tungsten points to the body portions may also be useful for other purposes than the manufacture of needles for sound reproducing machines.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. The method of joining a tungsten point for a stylus for sound reproducing machines to a steel body portion which consists in first forming on the side of the steel body a thin film of an alloy which is not wet by molten copper and then melting a disk of copper on the end of said body portion under non-oxidizing conditions with the tungsten point in contact with the copper disk.

2. The method of joining a body of tungsten to the end of an elongated steel body which consists in first forming on the side of the steel body a thin film of an alloy which is not wet by molten copper and then melting a body of copper on the end of said steel body under non-oxidizing conditions with the tungsten body in contact with the copper.

3. The method of joining a tungsten point for a stylus for sound reproducing machines

to a body portion of a different metal by means of a joining metal having a lower melting point than the tungsten point or the body portion, which consists in first forming on the side of the body portion a coating of a material which is not wet by the joining metal when the latter is molten, and then melting a body of the joining metal on the end of the body portion with the tungsten point in contact with the joining metal.

In witness whereof, I have hereunto set my hand this 18th day of March, 1915.

WILLIS R. WHITNEY.