July 1, 1930. F. W. McCARTER 1,768,704

STYLUS

Filed Dec. 6, 1928

Fig. 2

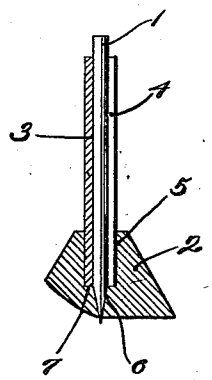


Fig. 1

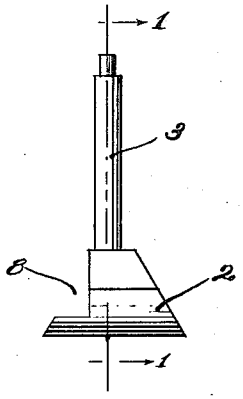


Fig. 3

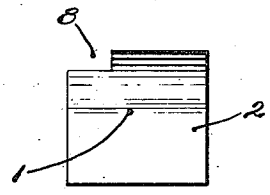
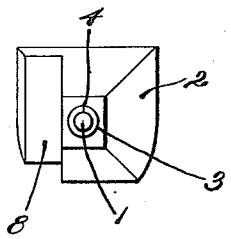


Fig. 4



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UNITED STATES PATENT OFFICE

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STYLUS

Application filed December 6, 1928. Serial No. 324,244.

Objects of the present invention are to provide a stylus for mechanical or electrical sound reproduction which affords clear and faithful reproduction throughout a wide range of tone values and intensity including full volume, which eliminates the use of noise filters in electric reproduction, which avoids the muffled effect characteristic of prior reproducers, which reproduces talking records with perfect articulation and exact inflection, which eliminates false tones, tintinnabulations and crepitations, which has its point protected from breakage, which requires less frequent change of points, and which is generally superior to prior constructions.

According to this invention a fine needle is employed to afford a sharp point and the needle is stiffened by external means tightly fitting therearound. The stiffening means preferably comprises a mass of relatively light material such as aluminium or other material comprising aluminium, as duraluminium, tightly gripping the needle in close juxtaposition to its point. Indeed it is believed to be advantageous to have the microscopic surface irregularities of the hard needle embed themselves in the relatively soft mass which thus constitutes a matrix. A preferred way of attaining this result is to form a tapered opening in the mass somewhat smaller than the tapered needle and then force the needle into the opening until a tight junction is effected, with the tip or point of the needle protruding through the mass, the opening being expanded in this process. The area of contact between the needle and mass is preferably confined to the lower end of the needle and the size of the mass depends upon the tone quality desired. By suitably adjusting the size the tone quality may be regulated to the optimum value. The quality may also be adjusted by regulating the position of the mass 2 longitudinally of the needle.

While it is not essential for all kinds of reproduction to have the upper end of the needle thin, for most purposes better quality is obtained in this way, in which case the thin needle is preferably stiffened throughout all or substantially all of its length. The best way of obtaining this result of which I am now aware involves the use of a split tube of material such as steel having an internal diameter somewhat smaller than the external diameter of the needle so that the tube grips the needle when the two are telescoped together. The lower end of the tube preferably extends into the aforesaid mass with a tight fit.

For the purpose of illustrating the genus and the preferred species of the invention a concrete embodiment is shown in the accompanying drawings, in which:

Fig. 1 is a front elevation;

Fig. 2 is a longitudinal section on the line 1—1 of Fig. 1;

Fig. 3 is a bottom plan view; and

Fig. 4 is a top plan view.

The particular embodiment of the invention chosen for the purpose of illustration comprises a needle 1, a mass 2 of soft light material, preferably metal, and a sleeve 3 in the form of a tube split at 4.

The needle 1 may be formed of any suitable material such as hard steel and is preferably formed very thin throughout its entire length to afford a fine point, it being understood that if the needle has a large diameter the point could not be formed sharply without tapering the needle throughout a large proportion of its length, which would be the equivalent of using a fine needle. By making the internal diameter of the tube 3 somewhat less than the external diameter of the needle 1 it grips the needle tightly when the latter is forced into the tube. Suitable material for the split tube is spring steel. The mass of aluminium or other light soft material 2 is preferably shaped before it is applied to the tube, including the opening 5 to receive the tube 3 and the reduced tapered opening 6 which forms a continuation of the opening 5 with a shoulder 7 between the two openings.

For most purposes the needle may be of the order of thirty-six thousandths of an inch in diameter with its point so tapered that ten to fifteen thousandths inch wear will not increase the width of the point beyond the width of the groove and therefore will not form shoulders which would overhang the

edges of the groove and tend to prevent the point from functioning properly; and the outside diameter of the tube may be of the order of sixty-eight thousandths of an inch. However it will of course be understood that the invention, in its broader aspect, is not restricted to any specific dimensions.

The preferred method of assembling the parts consists in inserting the tube 3 into the mass 2 and then forcing the needle 1 through the tube and mass into the position shown in the figures wherein only the extreme point of the needle protrudes through the mass tube. The diameter of the opening 5 in mass 2 is preferably a trifle smaller than the external diameter of the tube 3 after it has been expanded by the insertion of the needle 1 so that the mass 2 is slightly expanded by the tube 3 when the parts are assembled, tightly to hold the tube and mass together. The tapered opening 6 is also preferably a slight degree smaller than the tapered part of the needle so that when the needle is forced into the position shown in the figures the opening 6 is expanded, thereby forming a tight fit between the mass 2 and the tapered part of the needle. The external shape of the mass 2 may be varied widely but the longitudinal dimension of the mass is preferably confined to the lower end of the needle, as shown in the drawings. To accommodate certain types of reproducers the mass 2 may be recessed on one side as shown at 8 in the drawings.

By virtue of the present invention vibrations within the needle other than those representative of the sound being reproduced are suppressed. Moreover this improved stylus will reproduce a wider range of tone values (from high-pitched tones to deep heavy tones) with fidelity; and it will accurately reproduce from records in which the grooves have wider and more abrupt deflections from the center line of the groove so that the records may be driven at a lower speed and therefore more subject matter can be recorded and reproduced per unit length of groove.

I claim:

1. A reproducing stylus comprising a hard needle and a mass of light relatively soft material tightly gripping the needle in close juxtaposition to its point, the extent of said mass along the axis of the needle being confined to the lower end of the needle.

2. A reproducing stylus comprising a needle, a tube closely surrounding the needle with its lower end terminating above the needle point, and a mass of light material tightly gripping the needle between said end and point.

3. A reproducing stylus comprising a needle, a tube closely surrounding the needle with its lower end terminating above the needle point, and a mass of light material tightly gripping the needle between said end and point and overlapping said tube.

4. A reproducing stylus comprising a thin hard needle, a split tube resiliently gripping the needle with its lower end terminating above the needle point, and a mass of light material tightly gripping the lower end of the tube and the portion of the needle between said end and said point.

5. A reproducing stylus comprising a thin hard needle, a split tube resiliently gripping the needle with its lower end terminating above the needle point, and a mass of material tightly gripping the lower end of the tube and the portion of the needle between said end and said point.

Signed by me at Boston, Massachusetts, this thirtieth day of November, 1928.

FREDERICK W. McCARTER.