G. H. HILES.

STYLUS OR NEEDLE FOR SOUND REPRODUCING MACHINES.

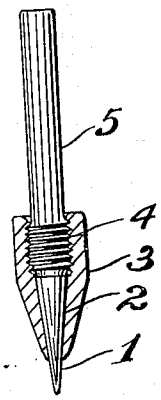
APPLICATION FILED MAR. 30, 1911.

Patented Aug. 10, 1915.

1,149,514.

Fig. 1

Fig. 6



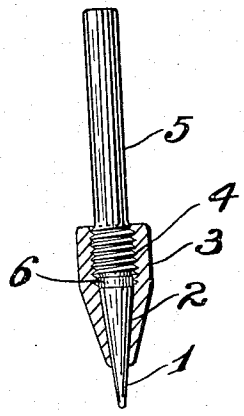




Fig. 2

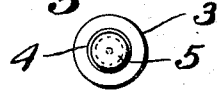



Fig. 3

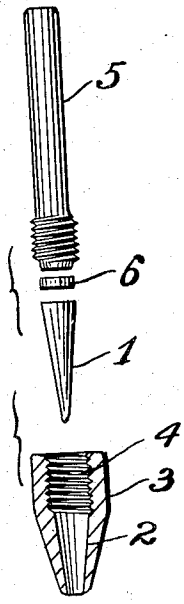



Fig. 4

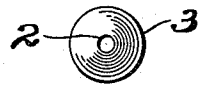
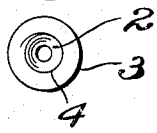



Fig. 5




Witnesses:

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# UNITED STATES PATENT OFFICE.

GEORGE H. HILES, OF LOS ANGELES, CALIFORNIA.

## STYLUS OR NEEDLE FOR SOUND-REPRODUCING MACHINES.

1,149,514. Specification of Letters Patent. Patented Aug. 10, 1915.

Application filed March 30, 1911. Serial No. 618,010.

*To all whom it may concern:*

Be it known that I, GEORGE H. HILES, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Stylus or Needle for Sound-Reproducing Machines, of which the following is a specification.

An object of this invention is to minimize the wear on the record while reproducing therefrom and at the same time produce a clear, mellow tone from the record.

Another object is to minimize the scraping sound vibrations that the needle ordinarily transmits to the sound box due to the friction between the needle and the record.

A further object is to provide practically a permanent needle point of agate or other hard stone, so mounted as to minimize the liability of breakage and to be easily removable from its mounting in case it becomes desirable to replace the point.

In music, vibrations range from forty per second to a little over 4,000 per second, which is a fair example of the number of vibrations undergone by the stylus of a sound-reproducing machine. It is therefore evident that to properly transmit musical vibrations the stylus point and its mounting will have to be joined together in such manner that the stylus will withstand as many as 40,000 vibrations per second and will also withstand a jump within a thousandth part of a second from 4,000 to 40,000 vibrations per second.

An object of this invention is to provide in an efficient manner for the transmission to the diaphragm of sound waves registered on a record plate and for this purpose I provide a needle point fitting along the greater part of its length a taper seat in a socket of hard rubber and projecting but slightly below the socket and I also provide a stem of bone.

Other objects and advantages may appear from the subjoined detail description.

The accompanying drawings illustrate the invention.

Figure 1 is an enlarged side elevation of a stylus made in accordance with this invention. The socket is shown in vertical mid-section. Fig. 2 is a plan view of Fig. 1. Fig. 3 is a view of the parts shown in Fig. 1 disassembled. Figs. 4 and 5 are bottom and top end views respectively of the socket shown in the preceding figures. Fig. 6 is a view analogous to Fig. 1 of the invention embodied in a different form.

The needle point 1 of some hard, smooth and durable material as agate, sapphire or the like and preferably taper or conical in shape tightly fits along the greater part of its length a taper seat 2 in the lower portion of a socket 3 below which the point slightly projects and which seat and socket are preferably of circular cross section and of smaller diameter at their lower than at their upper ends; said upper end of the socket being provided internally with a threaded portion of larger diameter than and in communication with the seat 2 and adapted to hold the threaded end of a cylindrical stem 5 which is adapted for connection to the usual sound-box, not shown, and the stem is screwed tightly against a non-metallic washer 6 that rests against the inner end of the needle point 1 as in Fig. 1, or may be screwed directly against the needle point and the washer omitted as in Fig. 6.

The socket and stem thus provide a suitable mounting for securely holding the needle point which may consequently be made to project but slightly below the socket in order to minimize the liability of breakage and the needle point can be readily removed through the threaded portion 4 and replaced by a new one when desired.

The socket 3 and stem 5, constituting the mounting, may both be of non-metallic substance such as hard rubber, fiber, bamboo, ivory or the like, alone or in combination, when a soft tone is desired; or may be, the one of metallic and the other of non-metallic substance when a louder tone is desired. The washer need only be employed when a non-metallic socket is used in combination with a metallic stem.

The seat 2 is sufficiently long to extend from the butt end of the needle point 1 to the lower end of the socket 3 so that the needle point will be held with maximum security against vibrating relatively to the socket along that portion of the point which is contained in the socket, and so that vibrations set up in the needle point by the sound waves registered in the record plate will be transmitted without variation to the socket along substantially the entire length of the needle point and thence undiminished through the stem 5 to the usual diaphragm lever arm, not shown.

The stylus when in operating position is at an angle to the vertical of thirty degrees more or less, as is customary in devices of this character, and, in order to minimize the length of the projecting portion of the point 1, the socket is considerably diminished in diameter at its lower end and tapers from thence upward in a conical portion as clearly shown in the drawings. This is important in order that proper angularity may be given the stylus point which projects but a slight extent beyond the end of the socket.

I prefer to use fiber or hard rubber for the socket for the reason that I have discovered after considerable experimentation that the needle point may be forcibly pressed into such fiber or rubber socket so as to be substantially integral therewith, even when as is usually the case the needle point has not been ground to exactly fit the seat 2; and for the reason that the fiber or hard rubber socket has sufficient elasticity together with that degree of firmness necessary to obtain vibration of the needle point and socket in unison even when the vibrations run as high as 40,000 per second. I prefer to use bone or a kindred substance for the stem for the reason that in the course of my experiments I have discovered that sound vibrations will be transmitted through a bone stem from the socket to the lever arm, not shown, of the diaphragm without objectional diminution in volume and yet devoid of the harshness incident to the use of a metallic stem.

I do not broadly claim the use of a stone needle point nor a non-metallic mounting for said point but by the combination hereinbefore described of a stone point such as agate, a hard rubber socket and a bone stem and by the specific construction specified of the various parts I am enabled to obtain a maximum volume of clear tone devoid of harshness.

I claim:—

1. A vibration transmitting stylus comprising a fiber socket, a point seated along the greater part of its length in and projecting slightly from the socket, and a bone stem fixed in the socket and holding the point in place.

2. A vibration transmitting stylus comprising a firm elastic non-metallic socket, a point seated along the greater part of its length in and projecting slightly from the socket and a bone stem screw-threaded into the socket and holding the point in place.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 25th day of March, 1911.

GEORGE H. HILES.

In presence of—
JAMES R. TOWNSEND,
L. BELLE RICE.