

March 17, 1942.

F. L. CAPPS

2,276,562

SOUND RECORDING STYLUS

Filed July 9, 1940

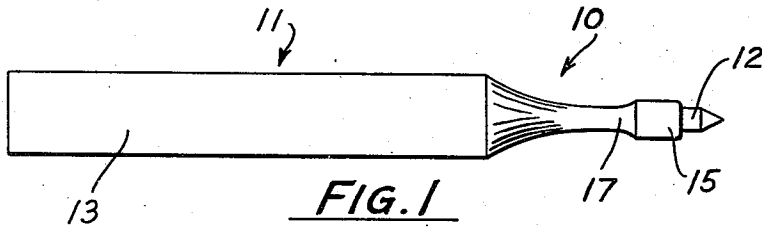


FIG. 1

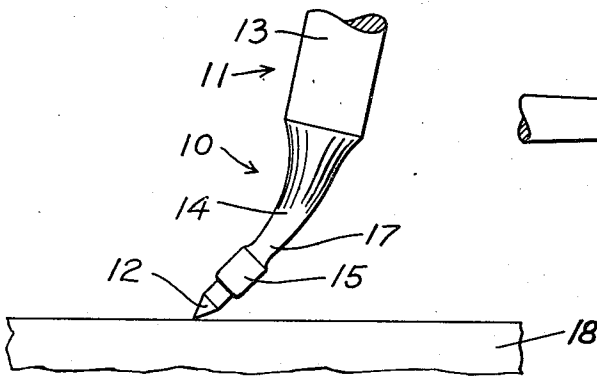


FIG. 2

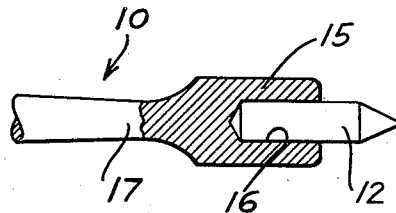


FIG. 3

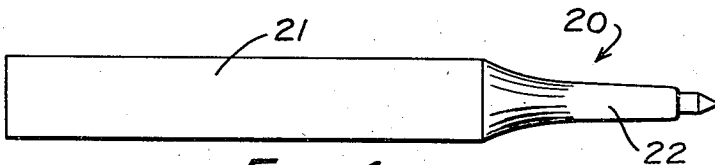


FIG. 4

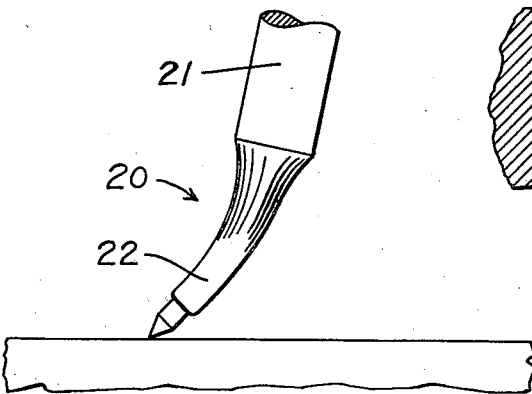


FIG. 5

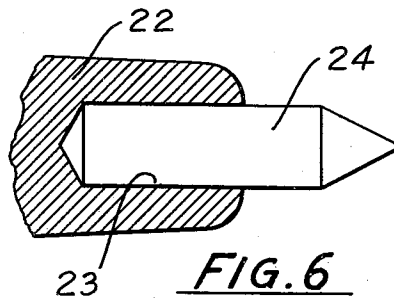


FIG. 6

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2,276,562

SOUND RECORDING STYLUS

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Application July 9, 1940, Serial No. 344,471

5 Claims. (Cl. 274—38)

This invention relates to new and useful improvements in sound reproducing apparatus and has particular relation to a more or less permanent type of sound reproducing stylus such as is used for the reproducing of sound from phonograph records and the like.

The objects and advantages of the invention will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawing wherein satisfactory embodiments of the invention are shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawing—

Fig. 1 is an enlarged side elevational view of a stylus made in accordance with the invention;

Fig. 2 is a view showing the stylus associated with a record, a portion only of the latter being shown and the stylus being bent as will be set forth in detail;

Fig. 3 is a detailed sectional view of the point carrying end of the stylus, the view showing the parts at about twenty times actual size;

Fig. 4 is a view similar to Fig. 1 but showing a modification;

Fig. 5 is a view showing the modified construction of stylus associated with a record; and

Fig. 6 is a detailed section view at approximately forty times actual size and showing the point portion of the improved stylus.

In the reproduction of sound records, by the means of needles, it has been found that when stiff needles (those with comparatively blunt points) are used, the sounds produced are harsh. On the other hand, when needles with slender points are used, the tones are thin and lacking in quality.

Obviously, in the reproduction of sound vibrations of high frequency, where these sound waves are recorded in a hard material, the needle must yield to some extent between the time it receives the impact, and the time the impulse is transmitted to the moving part or parts of the sound box or pick-up as the case may be.

It has been found by many tests that the most satisfactory result is secured when the needle is so formed that the point, or reduced portion is made with a graduated curve, instead of being tapered. The needle point should be as small as practicable and nearly straight at the extreme end, and the radius of the curvature becoming

constantly less until the body of the needle is reached.

Needles so made give a reproduction of smooth and agreeable quality with a minimum of surface noises or scratching sounds which are so objectionable in sound reproduction.

In my improved construction I have accomplished the above as well as other advantages. By making my stylus in the form of the flaring end of a trumpet (on an exponential curve) the larger diameter part of which is integral with or rigidly connected with the stylus bar whereas the thinner portion carries the sound track engaging point I have obtained results not heretofore obtained. The sound track engaging point of my stylus is of some hard substance as diamond, sapphire, corundum, "Carbaloy," "Norbide," "Stellite" or any other substance hard enough to withstand the impacts involved in the use of the stylus. According to the invention the sound track engaging point is usually applied to the body or shank of the stylus by inserting the point into a socket provided for that purpose in the smaller diameter end of the said shank.

Referring in detail to the drawing and at first more particularly to Figs. 1, 2 and 3 the reproducing stylus of the invention is generally designated 10 and the same comprises an elongated metal body or shank 11 in one end of which is carried a jewel or other point 12. The main portion 13 of the shank is preferably of uniform diameter while one end portion thereof is of gradually reduced diameter.

End portion 14 gradually decreases in diameter toward its free end and the reduction in diameter takes place along the lines of a gradually decreasing curve or of an exponential curve as shown. On the free end of the portion 14 is a head or head-like portion 15 through the free end of which opens a socket 16. In making the stylus the straight bar of stock has its end portion reduced as described. Thereafter the free end of the head 15 is drilled to provide the socket 16 in which a portion of the sapphire or other point 12 is received and secured.

With this construction, including the enlargement or head for the reception of the socket 16, it is possible to reduce portion 14 to a very small diameter immediately in the rear of the head as at 17. This very small diameter portion provides for a very flexible stylus having its reduced portion reduced along the lines of an exponential curve for the purpose to be set forth more fully.

It will be understood that the portion of the

stylus about the point 12, is quite thin and that in fact in all the views of the drawing the stylus is shown greatly enlarged. The sapphire or other point may be secured in the socket 16 in any desired manner as by having a tight fit therein or by being cemented therein or the like. In fact the portion of the holder or shank containing the socket may be rolled down about the received portion of the point to tightly embrace the latter.

After the socket is provided in the end of the shank (and this may be done either before or after the end portion 14 is reduced in diameter) the holder may be bent in its reduced portion 14 whereby to dispose the center line of the socket 16 at an angle to the remaining portion of the shank. Thus the shank may be bent to the shape shown in Fig. 2 and it will be noted there that the longitudinal axis of the point 12 is at an angle of approximately forty-five degrees to the surface of a record a portion of which is shown and designated 18. The mentioned angle is desirable and it will be understood that the stylus of the invention is used in a straight condition when the reproducer or pick-up with which it is used is of a construction to present the stylus at the proper angle to the record. Where such is not the case the stylus is bent in its reduced diameter portion to provide the desired angle.

After the drilling of the socket 16 the metal shank is hardened and tempered. Where a bent stylus is desired the bending operation is completed prior to the hardening and tempering of the shank. Following the tempering operation the sapphire or other point 12 is inserted into and secured in the socket thus completing the stylus ready for use.

The present stylus is based on the principle that it is impossible to strike a blow on the end of an unyielding member and have the blow faithfully transmitted in the short space of time allowed in the reproducing of high frequency music. I have proven by experiment that a stylus designed to yield, and so designed that the loss due to such yielding is distributed, gives highly satisfactory results. The present stylus, due to the employment of the gradually decreasing curvature of the portion 14 is especially designed to distribute the loss mentioned. Obviously the reduced diameter portion provided for the mentioned yielding.

Figs. 4, 5 and 6 show a slight modification wherein the stylus generally designated 20 includes a shank 21 having a reduced end portion 22 through the free end of which opens a socket 23 receiving a portion of a point 24. Obviously point 24 corresponds with point 12 above described. In addition the reduced diameter portion 22 is reduced on a gradually decreasing or exponential curve in the same manner as the portion 14 of stylus 10. The reduced portion 22 of 60

stylus 20 may be bent (see Fig. 5) as in the case of the portion 14 of stylus 10 and for the same reasons as above mentioned when considering stylus 10.

From the above it will be seen that the stylus of the invention comprises a hardened and tempered steel shank having a point of a suitable hard material adapted for the reproduction of numerous records without appreciable wear. The point is secured in a socket in the end of the shank or body of the stylus and the point receiving end portion of said body or shank is tapered along the lines of an exponential curve as set forth. My stylus is used in straight condition as shown in Figs. 1 and 4 or bent as shown in Figs. 2 and 5 depending on the apparatus with which it is associated. The best results are obtained when the relation of the stylus to the record surface is that above described. Points 12 and 24 may be any of the materials above mentioned or of any other material sufficiently hard for the purposes of a permanent stylus.

Having thus set forth the nature of my invention, what I claim is:

1. In a sound reproducing stylus, a metal shank including an elongated body having one end portion reduced in diameter along the lines of a logarithmic curve toward its free end, a socket in said free end, and a permanent point having a portion rigidly secured in said socket.

2. A sound reproducing stylus comprising a hardened elongated shank having an end portion reduced along the lines of a logarithmic curve, said end portion having a socket opening through its smaller diameter free end, a permanent point having a portion rigidly secured in said socket, and said shank bent in said reduced portion to dispose said point at an angle to the main portion of the shank.

3. A sound reproducing stylus comprising a hardened elongated metal shank having a portion reduced on the lines of a logarithmic curve, a head on the smaller end of said reduced portion and of a larger diameter than the smallest diameter portion of said reduced portion, a socket opening through the free end of said head, and a permanent point having an end rigidly secured in said socket.

4. In a sound reproducing stylus, a metal shank including an elongated body having an end portion reduced in diameter along the lines of a logarithmic curve toward its free end, and a permanent point rigidly secured to the free end of said portion and projecting beyond the same.

5. In a sound reproducing stylus, a metal shank including an elongated body portion of substantially uniform diameter and an end portion reduced in diameter along the lines of a logarithmic curve toward its free end.

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CERTIFICATE OF CORRECTION.

Patent No. 2,276,562.

March 17, 1942.

FRANK L. CAPPS.

It is hereby certified that error appears in the above numbered patent requiring correction as follows: In the grant, line 6, and in the heading to the printed specification and drawing, title of invention, for "SOUND RECORDING STYLUS" read --SOUND REPRODUCING STYLUS--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of May, A. D. 1942.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.