

J. B. MILLET.
PHONOGRAPH.
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1,013,421.

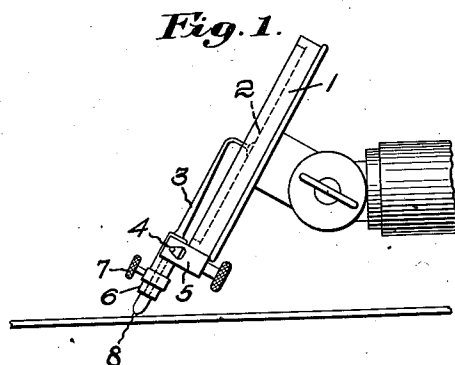


Fig. 2.



Fig. 3.



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PHONOGRAPH.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOSIAH B. MILLET, a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Phonographs, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to phonographs, being particularly concerned with the provision of means for improving the quality of the sound reproduced by such instruments.

The invention will be best understood by reference to the following description when taken in connection with the accompanying drawing of one illustrative embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings: Figure 1 is a side elevation of the reproducing mechanism of a phonograph equipped with one form of the invention; Fig. 2 is a detail in enlarged section showing the stylus support; and Fig. 3 is a modified form showing a stylus support suitable for use in connection with records provided with grooves having lateral undulations.

Referring to the drawings and the illustrative embodiment of the invention therein disclosed, I have shown, as conventionally illustrative of the reproducing mechanism of a phonograph, the sound box 1 having the diaphragm 2 (shown in dotted lines), to which is attached one end of the stylus lever 3, the latter being pivoted at 4 upon the lugs 5 secured to the sound box and having at its opposite end the socketed enlargement 6 wherein is secured, by means of the set screw 7, the carrier for the stylus or tracking point or the stylus itself.

The form of stylus and reproducing mechanism shown in Fig. 1 is specifically intended for use with records having grooves provided with vertical undulations, or in other words having an "up and down" cut. The invention, however, as will be more fully referred to, may be used in connection with records having the "zigzag" or other form of cut and may be applied to reproducing mechanisms of varying constructions and types, the one herein shown being selected merely to illustrate the principle of the invention.

In the reproduction of sound, as is well

known, the reproduction of the sound originally recorded ordinarily contains many imperfections, some of which are due to imperfections in the record itself and many of which are due to the action upon the diaphragm of mechanical effects, such, for example, as are caused by extraneous sounds, or by the scratching contact of the stylus against the record material. These imperfections, which occur irrespective of whether the record groove faithfully represents the undulations of the original sound, are converted into air vibrations by the diaphragm as well as those vibrations which are transmitted as faithful reproductions of the sound record undulations and are imposed upon the resultant sound emitted from the instrument in the form of unmusical inharmonic or discordant sounds, detracting materially from the quality and the accuracy of the reproduction.

It has heretofore been attempted to cut down the effect of the scratching and other disturbing noises by muffling more or less all the sound emitted by the instrument or by insulating the reproducing mechanism from the noises created by the motor or other extraneous sounds, but the indiscriminate muffling of all emitted sounds muffles those harmonic or musical sound vibrations which are intended to result directly from, and to reproduce exactly, the undulations of the sound groove, as well as the undesirable or inharmonic sounds, while insulation of the reproducing mechanism from the motor and other extraneous noises does not eliminate or affect the scratching, hissing and other sounds which, as imperfections in the reproduction, are transmitted to the diaphragm through the stylus and its connections thereto.

It has also been attempted to soften the reproduced sound and exclude the discordant unmusical sounds by employing a stylus of soft sound-absorbent material, such as fiber, in place of the relatively hard, non-absorbent stylus such as the common steel needle. Such absorbent stylus, however, fails to reproduce the true undulations of the record with the clearness and sharpness of a stylus of the non-absorbent type. The apparent action of such an absorbent stylus is to remain inert or non-responsive not only to inharmonic sounds, but also to undulations in the record groove representing desired faint sounds, over-tones, and notes

of high periodicity, the result being that such vibrations, as well as the inharmonic vibrations are excluded or partly excluded from the stylus, stylus lever and diaphragm and the reproduction otherwise lacks the clearness and definition of a reproduction by a non-absorbent stylus.

It has also been attempted to soften the reproduced sound by dampening or cushioning the vibrations of the stylus or of the stylus lever, as for example, by interposing a dampening or cushioning body between the stylus and the lever or between the lever and the diaphragm. Such efforts, however, have failed to accomplish the object sought by the present invention for they fail to transmit accurately the stylus movement and result in retarding the stylus and in dampening or cushioning all vibrations to a greater or less extent and in diminishing the definition or sharpness of the reproduction of musical as well as non-musical sounds.

In carrying out the present invention I utilize a non-absorbent stylus such, for example, as a sapphire ball or point or a steel needle, for traveling in contact with the record thereby to reproduce accurately in the form of stylus movements each and every undulation contained in the record. I also utilize a connector, preferably in the form of a stylus lever, intermediate the said stylus and the diaphragm, which is of such shape, mass and material as to transmit to the diaphragm faithfully and without any substantial loss by absorption, the movements communicated to it. Intermediate such non-absorbent connector, however, and the non-absorbent stylus I cause to be interposed a relatively absorbent body of such vibration absorbing material and of such shape and mass as is adapted to absorb locally within itself objectionable and inharmonic stylus vibrations but which, however, is distinguished from a mere cushioning or dampening body, and constitutes a movement-transmitting mass transmitting with substantial accuracy the desired, harmonic movements of the stylus to the stylus lever or connector. Preferably I employ a block of absorbing material at the tip of end of the stylus lever and serving preferably as a seat or holder for the stylus itself. The result is that while the stylus is free to move in response to all the undulations of the sound record, those vibrations which would otherwise become manifest through the vibrations of the diaphragm as unmusical sounds and sounds of low pitch, such as those resulting from hissing, scratching, bursts and other defects, are locally absorbed by the stylus carrier at the end of the stylus lever, while the desired vibrations of periodicity which manifest themselves as musical or harmonic notes are transmitted to

the diaphragm with definition and distinctness, resulting in greatly improved quality of reproduction without any materially lessened sharpness.

Referring to Figs. 1 and 2, the non-absorbent stylus which therein is represented as a hard sapphire point, is shown as secured in any suitable way, as for example, by a setting of shellac in the tip of a carrier 9, the shank of which is reduced so that it can be fitted into the socket 6 of the stylus lever as is usual with the ordinary sapphire carrying pin. The stylus carrier 9 is made of any suitable sound absorbent material such as ordinary commercial fiber or wood, either of which, if properly shaped and proportioned, as for example fiber of the shape and proportions shown, having a tapered lower end and a substantial body with an ample seating shoulder, will absorb very largely the non-musical movements or vibrations of the stylus 8, yet in connection with the stylus lever will produce the desired movement of said lever. It will be seen that the absorbent stylus carrier is of large mass relatively to the stylus and small mass relatively to the lever 3.

The fiber 9 shown in Figs. 1 and 2 constitutes a movement-transmitting mass between the stylus and the lever since it is of such proportions and material as to transmit accurately the harmonic movements of the stylus to the lever. The stylus lever may be of metal, but whether of metal or other material, it should be of such proportions and material as to be relatively non-absorbent of the harmonic vibrations thus received. It will thus be seen that while the sapphire point is separated from the metal of the stylus point 3 by the interposed body of absorbent fiber so that all desired movements passing from the stylus point to the diaphragm are transmitted through the body of fiber, the latter has no material effect on the rigidity of the connections between the stylus and the diaphragm, but a structurally stiff or unyielding connection is afforded so that the diaphragm vibrates in response to the vibrations of the stylus, and the latter, on the other hand, may move freely and without retardation in response to the undulations of the record groove. The same principle may be applied to a stylus in the form of the ordinary needle point used in connection with records having the zigzag cut and in Fig. 3 I have shown a similar fiber holder 10 having a socket to receive the needle point 11.

Other absorbent materials than those specified may be utilized, it being found generally that the more soft and porous the material employed, the greater the obstructive or absorbent effect, the effect of such materials being to absorb the discordant sounds to a much greater extent than the

harmonic sounds. For ordinary purposes it will be found that hard fiber properly proportioned, as for example as shown in the drawings, is satisfactory for this purpose.

It is preferable to employ the absorbent material as a holder or seat for the stylus point itself, the effect being best when the stylus carrier or preferably the stylus itself, is gripped by or seated in the fibrous or other material used and the effect being also best when the mass of the absorbent material is relatively large as regards the mass of the stylus and relatively small as regards the mass of the stylus lever.

While for illustrative purposes I have shown and described one specific form of the invention, it is to be understood that it is not limited to the particular application made herein of the same or to details, form, material or construction of the parts herein illustrated.

I claim—

1. In a phonograph reproducing mechanism, the combination with a non-absorbent stylus, of a stylus-carrying head comprising a block of sound-absorbent material and of relatively large transmitting mass as compared with said stylus, and a non-absorbent stylus bar, said head being seated against said bar to transmit thereto substantially all the unabsorbed record-producing sound-reproducing movements of said stylus.

2. In a phonograph reproducing mechanism, the combination with a non-absorbent stylus of a stylus-carrying head comprising a block of fibrous material of relatively large transmitting mass as compared with the stylus, and a metallic stylus bar, said head being seated against the stylus bar to transmit thereto the vibrations of the stylus.

3. In a phonograph reproducing mechanism, the combination with a non-absorbent stylus of a stylus-carrying head comprising a block of sound absorbent material of relatively large transmitting mass as compared with the stylus, said head having a tapered end in which the stylus is seated, and a non-absorbent stylus bar, there being provided a shouldered connection between the head and the bar whereby said head is seated against said bar to transmit thereto vibrations of the stylus.

4. In a phonograph reproducing mechanism, the combination with a non-absorbent stylus, of a stylus-carrying head comprising a block of sound-absorbent material of relatively large transmitting mass as compared with the stylus, said head having a tapered end in which the stylus is seated and a non-absorbent stylus bar, said head having a shank and said bar having a socket to receive the shank whereby the head is connected to the bar to transmit thereto the vibrations of the stylus.

5. In a phonograph reproducing mechanism the combination with a non-absorbent stylus of a stylus-carrying head comprising a block of sound absorbent material of relatively large transmitting mass as compared with said stylus, a diaphragm, and a non-absorbent connection between the block and the diaphragm to transmit thereto substantially all the unabsorbed record-produced sound-reproducing movements of said stylus.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOSIAH B. MILLET.

Witnesses:

THOMAS B. BOOTH,
ROBERT H. KAMMLER.