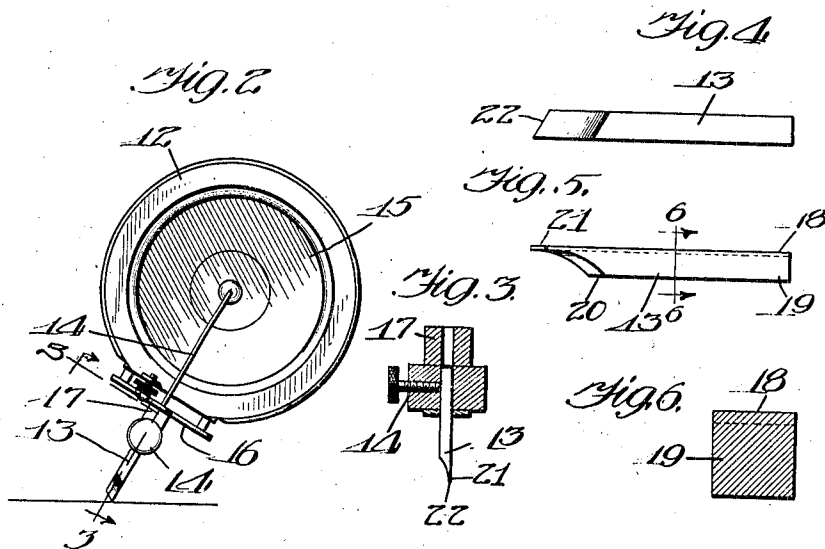
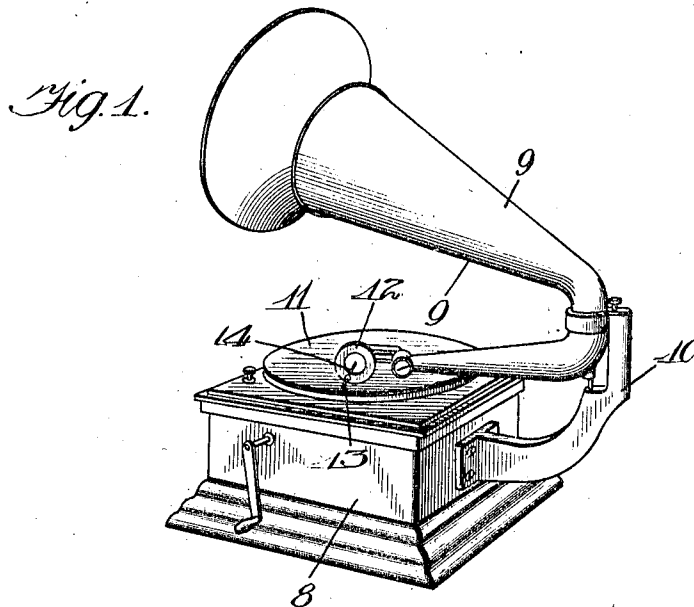


No. 870,723.

PATENTED NOV. 12, 1907.

F. D. HALL.
TALKING MACHINE NEEDLE.
APPLICATION FILED JULY 9, 1906.



Witnesses:
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UNITED STATES PATENT OFFICE.

FREDERICK D. HALL, OF CHICAGO, ILLINOIS.

TALKING-MACHINE NEEDLE.

No. 870,723.

Specification of Letters Patent.

Patented Nov. 12, 1907.

Application filed July 9, 1906. Serial No. 325,211.

To all whom it may concern:

Be it known that I, FREDERICK D. HALL, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Talking-Machine Needles, of which the following is a specification.

My invention relates to improvements in talking machines, and has for its object the production of a device by means of which the quality of the tone produced is greatly improved.

A further object is the production of a device for reproducing the sound from the record disk without materially injuring the disk itself.

A further object is the production of a practical and inexpensive device for reproducing the sound from the record disk.

These and such other objects as may hereinafter more fully appear are attained by my device, embodiments of which are illustrated in the accompanying drawings, in which,

Figure 1 represents a perspective view of a talking machine showing my device in position. Fig. 2 represents an enlarged view of the reproducer showing my reproducing needle in place. Fig. 3 is a cross-section on line 3—3 of Fig. 2, looking in the direction indicated by the arrows. Fig. 4 is a bottom view of my improved needle. Fig. 5 is a side elevation of my improved needle. Fig. 6 is a cross-section on line 6—6 of Fig. 5, looking in the direction indicated by the arrows.

Like numerals of reference indicate like parts in the various figures of the drawings.

Referring now to the figures, 8 represents the talking machine case, 9 the horn, 10 the horn support, 11 the record disk, 12 the reproducer, and 13 the reproducer needle. A metallic arm 14 is secured to the center of the diaphragm 15, and the other end secured to the frame 16, which frame is secured to the shell of the reproducer. A block 17 is secured to this frame, in an opening of which is secured the reproducing needle 13. A set-screw 14 passes through the block and into the opening, engaging the side of the reproducing needle, clamping it securely in place. This needle is composed of vegetable fiber. I have found that a fiber comprising an inner comparatively soft portion and a hard outer shell or crust is especially adapted to my purposes. The material by the use of which I have so far been able to derive the most satisfactory results is a portion of bamboo forming the needle in such a manner that the outer casing of the bamboo shall form one of the outer sides of the needle.

The needle is constructed in any form desired, such, for instance, as having a square cross-section as shown in Fig. 6. The outer hard fiber is shown in this figure as 18, and the inner softer fiber, as 19. In preparing

the needle for use, a portion of the inner fiber is cut away toward one end, at 20, the needle terminating in a thin portion 21. This makes an angular chisel-shaped end consisting entirely of the hard outer shell of the fiber. This end may be left at right angles to the needle itself, or may be cut to an acute angle, as shown at 22. I find in practice that such an angle is well adapted for the purpose of allowing the reproducer to follow the sound undulations as recorded in the record disk and thus to faithfully reproduce the sound to the horn. It is obvious that the same result might be obtained by securely fastening together layers of vegetable fiber of different density and degrees of hardness, or by using a fiber or wood in which the harder portions might be on the inside of the piece, in which case cuts would be made on the two opposite sides tapering toward the middle at the end. So, also, I have shown the cut between 20 and 21 as curved. Of course, this cut could be straight, but in practice I find that a greater resiliency is given the needle and a corresponding clearness to the tone reproduced by the curved cut shown. So, also, the cross-section of the fiber, while it is shown as square, it is evident that it might be round, in which case, if desired, a portion of the outside could be cut off toward the end, leaving a point in the center, the same, for instance, as shown in a sharpened lead pencil.

While I have shown in the drawing and in the explanation above that the harder portion or shell of the fiber is used as the point of the reproducing needle, it is evident that if desired some other portion of the fiber itself could be formed into a point for the purpose of reproducing the sound and thereby, by the use of points of varying degree of hardness and resiliency, considerably varying the quality of tone reproduced.

The main purpose of my invention is the production of a needle of a vegetable growth, regardless of the shape or cross-section of the same.

The ordinary record of talking machines of the Victor type consists in a hard rubber disk, the record of sound being made through the medium of a spiral groove extending from the outer portion of the disk toward the center, and continuing as far therein as necessary. These grooves are V-shaped, and so far as appears to the naked eye, consist in parallel grooves. When these grooves are looked at through a microscope, it appears that the adjacent coils of the spiral are in no sense uniform, but the spiral itself is really a series of sinuous curves. The grooves are of practically a uniform depth, the variation in sound, tone, timbre, pitch, etc., being caused by the variations in the contour of the side walls of the groove. This being the case, it is at once apparent that in order to accurately reproduce the sound, it is necessary to have

the stylus or reproducing needle follow the exact line of the sides of the grooves. In the use of the ordinary metallic steel needle having a sharp point, the operative point of the needle only bears against the bottom of the groove, and in the event that the record has extreme variation resulting in sharp bends or turns in the sinuous grooves, the point of the needle is quite apt, instead of accurately following the groove, to jump across the groove at these points, causing breaks in the sound. By the use of my device, not only does the point of the stylus follow the bottom of the groove, but also the edges of the stylus pass along approximately the entire surface of the sides of the grooves, thus accurately and faithfully reproducing the sound. I have found that the best results are attained by the use of needles of a square or triangular cross-section, as these needles more accurately fit the curves in the ordinary record. In any event, however, the edges of the needle always bear against the sides of the groove at two or more points, regardless of the fact whether the point itself travels in the bottom groove or not.

In the use of the talking machine, the reproducing needle exclusively used is steel, and the needles themselves are inexpensive. The needles are very much harder than the record disks, and they, of course, wear the disk to such an extent that after a record has been played for a few times, the nicer gradations of tone are lost. It is found in practice that after a record has been played fifteen or twenty times, it becomes absolutely valueless as an expression of fine music, although it may be used an indefinite number of times by persons who have not a musical ear and cannot notice the difference in tone. By the use of my improved needle, however, which is of a less degree of hardness than the record itself, it is possible to use the same record several hundred times without any appreciable difference in the tone of the production. This fact gives a great value to my device, as the records of the finest singers and musical productions are quite expensive, and if it becomes necessary to replace them after they have been used a few times, it necessitates a large outlay of money. By the use of my device, however, which is also inexpensive, the needle after being used for one record may be thrown away and a new needle put in place, and the record remain in as good condition as before being played.

I claim only the use of my device as a reproducing needle or stylus, the device being incapable for use as a cutting or recording stylus.

50 I claim:

1. A reproducing needle formed from vegetable fiber, said fiber comprising a laminated structure with layers of different degrees of hardness.

55 2. A reproducing needle formed from vegetable fiber, said fiber comprising a laminated structure with layers

of different degrees of hardness, one end of said needle terminating in an angularly disposed portion.

3. A reproducing needle formed from vegetable fiber having a thin shell on one side thereof, comprising a tough outer portion, the balance of said needle comprising a portion of a less degree of hardness. 60

4. A reproducing needle formed from vegetable fiber having a thin shell on one side thereof, comprising a tough outer portion, the balance of said needle comprising a portion of a less degree of hardness, a section of said latter portion being cut away leaving the thin shell forming an angularly disposed point adapted to follow the undulations in the disk record. 65

5. A reproducing needle formed from layers of vegetable fiber of varying degrees of hardness. 70

6. A reproducing needle formed from layers of vegetable fiber of varying degrees of hardness, one end of said needle being cut away to form an angularly disposed point adapted to follow the undulations of the record disk.

7. A reproducing needle formed from bamboo fiber, the outer shell of said bamboo forming one side of said needle. 75

8. A reproducing needle formed from bamboo fiber, the outer shell of said bamboo forming one side of said needle, a portion of said fiber being cut away longitudinally, forming an angularly disposed point adapted to follow the undulations in the record disk. 80

9. A reproducing needle formed from the outer shell of bamboo fiber, of a substantially rectangular cross-section, one end of said needle being cut away longitudinally, and the resulting end being cut transversely, forming an angularly disposed point adapted to follow the undulations of the sound record. 85

10. A reproducer for talking machines comprising a needle formed from a vegetable growth and having an angular cross-section, the operative portion of said needle consisting of the edges formed between adjacent sides and the end of the needle. 90

11. A reproducing needle comprising a strip of wood, of a triangular cross-section, the operative portion of said needle being the edges formed by the meeting of adjacent sides and the end of the needle. 95

12. A reproducing needle comprising a wooden pin, of an angular cross-section cut off at the end and adapted to enter within and bear against the sides of the grooves in a record disk. 100

13. In a talking machine, the combination with a reproducer, of a record disk, and a reproducing needle formed from a vegetable growth and having an angular cross-section, the operative portion of said needle consisting of the edges formed between adjacent sides and the end. 105

14. In a talking machine, the combination with a reproducer, of a record disk, and a reproducing needle formed from wood, of an angular cross-section cut off at the end and adapted to enter within and bear against the sides of the groove in the record disk. 110

15. In a talking machine, the combination with a reproducer, of a record disk, and a reproducing needle formed from bamboo fiber, the outer shell of said bamboo forming one side of said needle. 115

Signed by me at Chicago, Cook county, Illinois, this 2nd day of July, 1906.

FREDERICK D. HALL.

Witnesses:

F. H. DRURY,
ALBERT J. SAUSER.