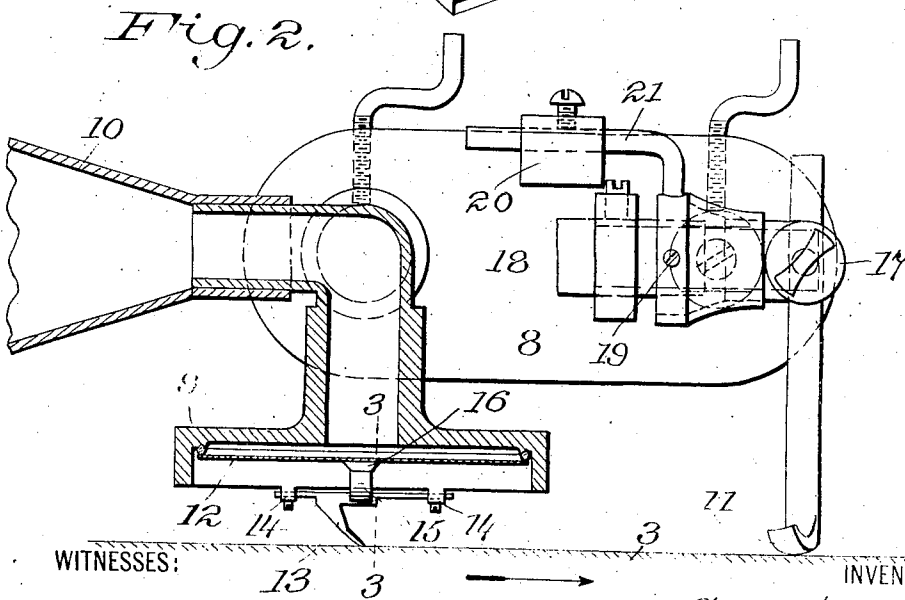
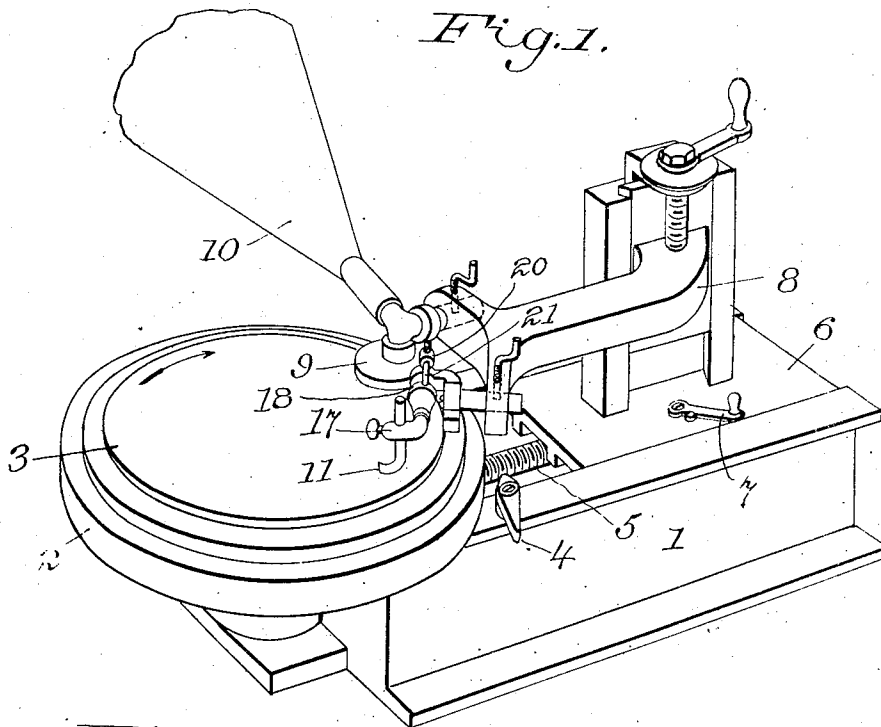


G. K. CHENEY.
 APPARATUS FOR RECORDING SOUND.
 APPLICATION FILED DEC. 12, 1902.

941,011.

Patented Nov. 23, 1909.
 2 SHEETS—SHEET 1.



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Fig. 3

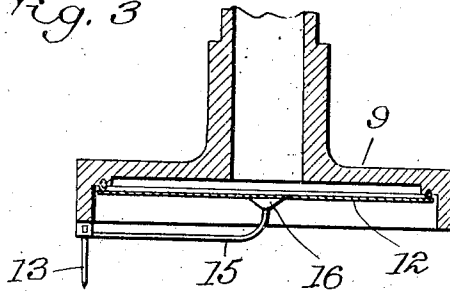


Fig. 6.

Fig. 4.

Fig. 5.

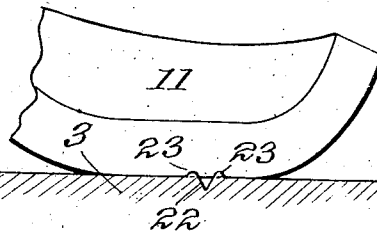
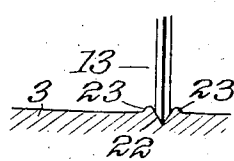
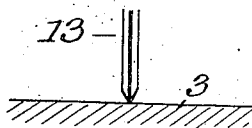
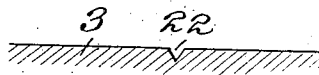


Fig. 7.



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UNITED STATES PATENT OFFICE.

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VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR RECORDING SOUND.

941,011.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed December 12, 1902. Serial No. 134,915.

To all whom it may concern:

Be it known that I, GEORGE K. CHENEY, a citizen of the United States of America, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Apparatus for Recording Sound, of which the following is a specification.

My invention relates in general to the recording of vocal and other sounds and more specifically consists of an improved apparatus for producing an exact record of sharp, clean outline, in a suitable tablet from which the sound may be reproduced, said record being in the shape of a sinuous line of even depth.

Heretofore, it has been common in the art to make a sinuous line representing sound waves on a photographic material, or in a film upon the surface of a metal plate and then by chemical action to form a corresponding line in a resisting tablet, and the method has also been practiced of cutting or engraving such a line in a tablet of suitable nature, the tool cutting out the material in the shape of chips or shavings. It has been suggested that these methods are objectionable, however, to a more or less extent in that the final record grooves may have certain roughnesses and irregularities which might result from the methods of their formation. My invention is designed to overcome these suggested difficulties by dispensing both with chemical action and any cutting action of the recording tool itself, substituting therefor a dividing and pressing or ironing action of the tool.

The preferred form of apparatus embodying my invention is illustrated in the accompanying drawings in which:

Figure 1 is a perspective view of a record making apparatus. Fig. 2 is a side elevation and partial section of the recording apparatus shown in its relation to the recording tablet. Fig. 3 is a detail sectional view on line 3-3 of Fig. 2. Fig. 4 is an enlarged detail front view of the recording tool point. Fig. 5 is a similar enlarged detail showing said tool in operation, and the shape of the furrow formed thereby in the record tablet. Fig. 6 is an enlarged detail view of the paring knife in action removing

the raised edges of the furrow, and Fig. 7 is an enlarged detail cross section showing the completed groove.

Referring to the drawings, the apparatus comprises a base 1 mounted upon a table 2, by means of a vertical shaft (not shown) permitting rotation. On this table is carried the record tablet 3, of any suitable material. A brake 4 is provided for stopping rotation of the table and tablet when desired. A screw shaft 5 feeds the bed plate 6, which supports the recorder and the paring knife, which separately and in combination constitute the main features of novelty of my invention.

A switch 7 is provided for throwing the screw 5 into and out of engagement with the slide 6 by means of mechanism not shown. An adjustable arm 8 supported from the slide 6 carries a sound box 9, a horn 10 and a paring knife 11. The sound box 9, has the usual diaphragm 12, the vibrations of which are communicated to my improved recording tool 13. This tool is formed integrally with a torsional spring mounted in sockets 14, 14, on the sound box, and has a bell crank arm 15 which is attached by wax 16 to the center of the diaphragm 12 (see Fig. 3). The tool 13 has a backward inclination of approximately 45 degrees to the surface of the record tablet 3, *i. e.* in the direction of travel of the adjacent surface of said tablet, which direction of travel is indicated by the arrow in Fig. 2. This tool has a V-shaped point and front edge. The paring knife 11, is clamped in the holder 17, which is mounted on the piece 18 by means of two trunnion screws one of which is shown at 19 in Fig. 2. The piece 18 is adjustable in all directions, being supported from the arm 8, by means of the various connections shown in Fig. 1, but which need not be here described, as they constitute no part of the invention herein claimed. The holder 17 has a counter-weight 20 adjustable on an arm 21, so that it may be nearly balanced on the trunnion screws as a center. It will be seen that the axis of the pivot or trunnion bearing of the knife holder is approximately at right angles to the line of travel of the record tablet and the knife having considerable overhang beyond said bearing, it will have suf-

sufficient drag upon the surface of the tablet as the same passes under it to pare off any portions of the material which project up beyond the normal plane of the surface of said tablet, while on the other hand said knife will not bite into the surface of the tablet itself for the reason that any such action would produce an immediate resistance sufficient to turn the holder upon its trunnion and lift the knife out of such deeper engagement with the tablet proper.

The operation of my invention is as follows: A record tablet of suitable material being provided and the mechanism set in motion, the tablet rotating in the direction of the arrow in Fig. 2, sound waves are projected into the horn by declamation, singing, playing of musical instruments, or in any other manner. The parts are so adjusted that the point of the recording tool sinks into the record tablet, as indicated in Fig. 5, and the paring knife 11 barely touches the plane surface of the record tablet, as indicated in Fig. 6. The sound vibrations cause movements of the recording tool so that it irons or scores a sinuous line of even depth in the tablet as the latter advances. On account of the backward rake or inclination of the recording tool, as shown in Fig. 2, said tool does not cut or gouge out a quantity of material in the tablet as the same passes by it, but on the contrary presses said material downward and to either side in the same manner as the advancing prow of a ship acts on the water through which it is passing. This forces the material of the tablet to either side, ironing out a groove 22 therein, with a slightly raised bur or ridges 23, 23, on either side, as shown in Fig. 5. The paring knife being adjusted as before described, cuts off these ridges leaving the surface of the tablet smooth with the sinuous record groove plowed or ironed therein, as shown in Fig. 7. The sound record so produced may be reproduced direct or copies may be made therefrom by any of the well known duplicating methods such as electrotyping and stamping.

The main advantage of my invention is the ironing action of the recording tool which forms a record groove with smooth walls, the surfaces of which have been packed and ironed down by the tool, making the material adjacent to these surfaces denser and harder than it was before being acted upon by the recording tool.

It is evident of course that various changes might be made in the details of operation above described without departing from the spirit and scope of my invention. The paring down of the bur or ridges might be done as a separate operation or dispensed with altogether. Other forms of recording

tool might be employed so long as the necessary backward inclination is retained to give the scoring and ironing action described and to avoid any cutting or paring action of the tool. These and similar modifications, however, would still leave the process within the boundaries of my invention.

Having, therefore, described my invention, what I claim as new and desire to protect by Letters Patent, is:

1. In a sound recording apparatus, the combination with a record, of a recording tool having an end provided with plane converging surfaces and adapted to displace the material of the record both laterally and upwardly in forming the record groove.

2. In a sound recording apparatus, the combination with a record, of a recording tool having an end terminating in lateral inclined surfaces, said surfaces being in the rear of the stock of the tool in relation to the movement of the record.

3. In a sound recording apparatus, the combination with a record, of a record tool having an impressing end which is V-shaped in cross section transversely to the direction of motion of the record material, said V-shaped end being adapted to gradually enter the record material in contradistinction to scraping or cutting said material.

4. In a sound recording apparatus, the combination with a record, of a recording tool having an impressing end which is V-shaped in cross section transversely to the direction of the motion of the record material, said V-shaped end portion forming an edge and laterally inclined sides adapted to impress a V-shaped groove in said material.

5. In a sound recording apparatus, the combination of a recording tool having an end terminating in lateral deflecting surfaces and a second tool for removing the material displaced by said recording tool.

6. In a sound recording apparatus, a combination of a recording tool having an end terminating in lateral inclined surfaces and a cutting tool for removing the material displaced by the recording tool.

7. In a sound recording apparatus, the combination of a recording tool having an end terminating in a transverse V-shaped impressing edge and a cutting tool adjacent said recording tool and adapted to remove the material displaced by the latter.

8. In a sound recording apparatus, the combination of a recording tool having an end adapted to drag in the rear of the stock of the tool, said end terminating in a transversely V-shaped impressing edge and a cutting tool adapted to remove the material displaced by the recording tool.

9. In a sound recording apparatus, the

- combination with a record, of a recording tool mounted in such a manner and having its rearward extremity of such a configuration that the same will extend in the same direction as that of the movement of the record and will iron or impress, in contradistinction to gouging, cutting or scraping, in the record, a sinuous groove.
10. In a sound recording apparatus, the combination with a record, of a reproducing tool mounted to rock relative to the surface of the record and having an ironing extremity disposed in such a direction that the regular movement of the record will cause the said extremity to drag on the surface thereof in such a manner as to form a sinuous groove therein.
11. In a sound recorder, the combination with a recording tool, of a cutting tool for removing the material displaced by said recording tool.
12. In a sound recorder, the combination with a record, of a recording tool, and a cutting tool for removing the material displaced by said recording tool, said cutting tool being yieldingly mounted to swing over the record, the path of the cutting edge being tangent to the face of the record.
13. In a sound recorder, the combination with a record, of a recording tool, and a second tool moving in unison with said recording tool over the face of the record to reduce the upwardly displaced edges of the groove, formed by the recording tool, to the normal plane of the record.
14. In a sound recorder, the combination with a record, of a recording tool having record engaging surfaces inclined rearwardly, downwardly and outwardly with respect to the record to the full, transverse sectional contour of the groove.
15. In a sound recorder, the combination with a record, of a recording tool, having a record engaging portion inclined from the front rearwardly, downwardly and outwardly to the full, transverse sectional contour of the groove to compress the material of the record upon the sides of the groove and to iron the same, the material at the edge of the groove being displaced upwardly above the normal face of the record, and a second tool moving in unison with said recording tool over the face of the record to reduce the upwardly displaced edges of the groove to the normal plane of the record.
16. In a sound recorder, the combination with a record, of a recording tool having a record engaging portion inclined from the front rearwardly and downwardly, the front portion of said tool engaging the record being substantially triangular in cross section, whereby the material at the sides of the groove will be compressed and ironed, none of said material being removed from the record by said tool.
17. In a sound recorder, the combination with a record of a recording tool, having a record engaging portion inclined from the front rearwardly and downwardly, the front portion of said tool engaging the record being substantially triangular in cross section, whereby the material at the sides of the groove will be compressed and ironed, none of said material being removed from the record by said tool.
18. In a sound recorder or reproducer, the combination with a sound box, of a record, and a stylus comprising a bell crank lever, one end thereof being phonetically connected to the diaphragm of the sound box and the other end thereof extending rearwardly and obliquely to the record and constituting the record engaging point, and a mounting for said stylus comprising a torsional spring forming the axis of oscillation of said stylus.
19. In a sound recorder or reproducer, the combination with a sound box, of a record, and a stylus comprising a bell crank lever, one end thereof being phonetically connected to the diaphragm of the sound box and the other end thereof extending rearwardly and obliquely to the record and constituting the record engaging point, and a mounting for said stylus comprising a torsional spring, said spring being rigidly secured to said bell crank intermediate the ends of said spring, and the ends of said spring being rigidly secured to the sound box casing.
20. In a sound recorder or reproducer, the combination with a sound box, of a record, and a stylus having front surfaces inclined rearwardly of the record forming a record engaging point which is V shaped in cross section.
21. In a sound recorder, the combination with a recording tool, of a yieldingly mounted cutting tool for removing the material displaced by said recording tool.
22. In a sound recorder, the combination with a rotary record support, of means movable laterally in respect to said support for compressing undulations corresponding to sound waves in a record tablet carried by said support.
23. In a sound recorder, the combination with a movable record, of a stylus having a record ironing point mounted adjacent the record, to oscillate laterally with respect thereto, said stylus being inclined toward

the record in the direction of motion of the adjacent surface thereof.

24. In a sound recorder, or reproducer, the combination with a record support of a
5 stylus having an ironing extremity mounted to oscillate with respect to said support for engaging a record.

25. In a sound recorder or reproducer, the combination with a record support of a

stylus having an ironing extremity mounted 10 to oscillate laterally with respect to said support.

Signed at New York, N. Y., this 25th day of November, 1902.

GEORGE K. CHENEY.

Witnesses:

W. H. PUMPHREY,
M. G. CRAWFORD.