No. 688,739. Patented Dec. 10, 1901.

J. W. JONES.

PRODUCTION OF SOUND RECORDS.

(Application filed Nov. 19, 1897.)

(No Model.)

Fig. 1.

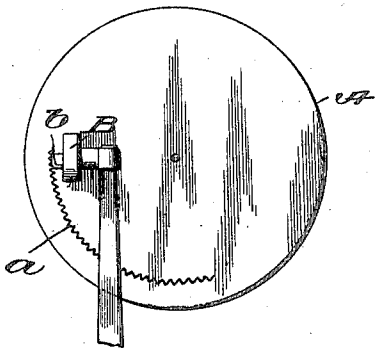


Fig. 2.

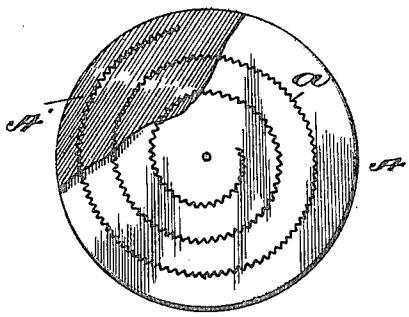


Fig. 3.

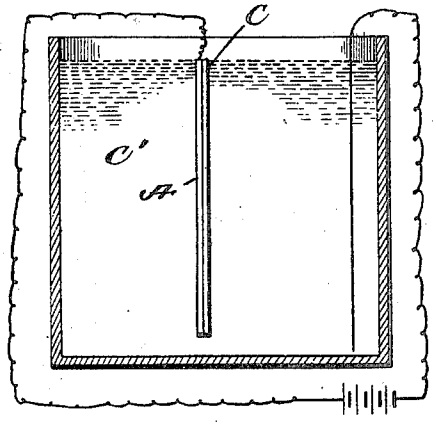
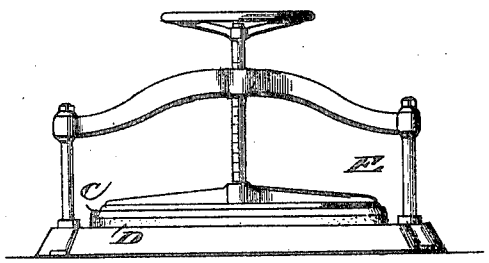


Fig. 4.



Witnesses

Inventor

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By

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UNITED STATES PATENT OFFICE.

JOSEPH W. JONES, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF, AND JOSEPH A. VINCENT, OF PHILADELPHIA, PENNSYLVANIA.

PRODUCTION OF SOUND-RECORDS.

SPECIFICATION forming part of Letters Patent No. 688,739, dated December 10, 1901.

Application filed November 19, 1897. Serial No. 659,170. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. JONES, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improved Production of Sound-Records; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the commercial production of sound-records, and has for its object the production of a number of copies of an original record characterized by lateral undulations of substantially uniform depth. Heretofore records of this character, generally known as "gramophone-records," have been produced by first tracing the lateral undulations or zigzags in a fatty (inky) film that protects an etching-surface, then etching this tracing into the material to form a groove, then running a blunt stylus through this groove to smooth the ragged etched surface, and finally electroplating this touched-up surface and pressing the matrix so formed into a suitable material to form the commercial record. The etching process, for reasons unnecessary to state, causes considerable departure or deviations, so that the etched groove is far from being a correct representation of the path of the recording-stylus. The deformations from this cause are still further exaggerated by the use of the smoothing-stylus. I avoid these objections by producing in the first instance a fully-finished original record whose grooves are of the final depth required, slight but appreciable, thus doing away with the necessity for etching and the subsequent smoothing made necessary thereby. The original records made by this process are electroplated and the electroplate matrix used as a die in the ordinary manner.

In carrying out my invention I employ a disk or tablet, of suitable recording material, (as wax or a wax-like composition, preferably rendered sufficiently hard, as by an admixture of rosin, to withstand the treatment employed in giving it an electrical conducting-surface.) Upon the surface of this tablet I then form by the use of a sound-recording machine in a well-known manner a spiral groove of practically uniform depth that contains lateral sinuosities or irregularities corresponding to or representing the sound-waves recorded. This cutting or engraving of a record-groove by the lateral movement of the stylus differs from the operation of the well-known graphophone system in that the resistance offered the stylus of a graphophone in cutting downward to produce the vertical irregularities characteristic of that system varies practically as the cube of the length of the vibrations of the diaphragm and stylus, whereas in producing my original records the resistance encountered by my recording-stylus is exactly equal to the length of the vibrations. On account of this difference in principle I am enabled to obtain more accurate, and therefore better, records of the original sounds. The original record so formed is an exact copy of the record to be used for reproducing. It is a complete and finished record, its grooves being of a slight yet appreciable depth, and no deepening or retouching by an etching fluid or in any other manner is required. This original record is then prepared for receiving the electroplate deposit by coating its surface with an electric conducting medium—such, for instance, as carbon, (graphite,) as commonly employed in the process of electroplating, or, as a substitute, nitrate of silver. This coated plate is then placed in an electroplating-bath, and a layer of metal (nickel, steel, &c.) is deposited upon it. The thin shell or matrix thus formed is then separated from the original record, which may be used repeatedly in the same manner to form other matrices. Owing to the flat shape of the original and of the matrix and to the fact that the sound-groove of the former and the corresponding ridge of the latter do not lock the two are separated readily without the employment of heat or of shrinkage, it being obvious that the repeated heating and resultant cooling are very injurious to the accuracy of the record. The matrix itself may be backed up with a supporting-plate, such as brass or bronze cast upon (or sweated to) the reverse of the matrix. This complete matrix constitutes a stamp or die, the record appearing on its face in the form of a raised ridge

having lateral sinuosities or irregularities that correspond to the sound-waves being the exact counterpart of the original sound-groove. This die is then pressed or stamped into a disk or tablet of suitable composition, such as electrose or other fibrous material that can be readily handled in a soft state and that will receive truly and retain faithfully an accurate impression of the record on the face of the die. The stamped record thus produced is the finished commercial article ready for use, being a faithful and indestructible copy of the original path traced by the recording-stylus.

In the drawings annexed hereto to illustrate this invention, Figure 1 shows a recorder in the act of producing the original record. Fig. 2 shows the original record partially covered with graphite. Fig. 3 shows diagrammatically the electroplating apparatus for forming the metallic matrix on the original record, and Fig. 4 shows a press for forming stamped records from the matrix.

A is a tablet of wax-like composition; B, a recording device whose stylus *b* cuts or engraves into the surface of tablet A a line or groove or channel *a* of uniform depth and undulating laterally. The shaded portion A', Fig. 2, represents the graphite coating applied over surface of A. Tablet A having its electroconductive coating A' is immersed in a plating-bath C', Fig. 3, by which a (copper) matrix or reverse C is formed. Matrix C is laid on a tablet D of suitable material in a press E and the finished product produced.

I am aware that it has been proposed to make duplicates of sound-records of the vertically-undulated character, the type generally known as "graphophone-records," by first coating the surface of such sound-record with a conducting material, next depositing an electroplate thereon to form a die, and then pressing this die into some suitable material. This process is impracticable and unsuccessful for two reasons. First, when the conducting material (as plumbago) is deposited upon the vertical irregularities that are the very essence of this kind of record it forms a covering that resembles on a minute scale a light fall of snow over a landscape. The sharp contours of the vertical irregularities are rounded, (the more delicate and minute irregularities being filled in and completely obliterated,) with a resulting mutilation of the record. Again, when the electroplate die is pressed into the surface to be stamped any inequality in the material being stamped would cause unequal impressions to be made, some deeper than others, which is fatal to the accuracy of a record, whose very existence lies in the comparative depths and heights (vertical) of its irregularities. Furthermore, the presence (between the die and the material being stamped) of minute particles of dust or other foreign matter, or even of particles of air, (air-bubbles,) would to that extent still further distort and disfigure the impressions stamped by an already inaccurate die, whereas in the laterally-undulated records any vertical deformation (whether due to the causes just pointed out or to any other cause) does not in the slightest degree affect the accuracy of the record, the essence of which lies in its lateral undulations, for the deposit of a film of conducting material does not modify the lateral outline, but only the vertical irregularities, and the deformations caused by the presence of foreign particles in the stamping or pressing process are vertical, and consequently do not affect a record that depends upon its lateral and not its vertical outline.

For the foregoing reasons I do not claim my new process in connection with sound-records characterized by vertical irregularities, but limit it to records characterized by lateral undulations of practically uniform depth.

I claim—

1. The herein-described method of producing sound-records, which consists in cutting or engraving upon a tablet of suitable material, by means of the lateral vibrations of a suitable stylus, a record-groove of appreciable and practically uniform depth and having lateral undulations corresponding to the sound-waves, next coating the same with a conducting material, then forming a matrix thereon by electrolysis, and finally separating this matrix and pressing the same into a tablet of suitable material, substantially as described.

2. The process of producing commercial sound-records of the type indicated, which consists of first preparing a flat tablet or disk of soft wax-like material, then engraving thereon by means of the lateral vibrations of a suitable stylus a record-groove of appreciable and uniform depth and having lateral undulations corresponding to sound-waves, next rendering the surface thereof electrically conductive, then forming a matrix thereon by electrolysis, next separating the matrix from the original record-disk without the use of heat, and finally impressing said matrix into a disk of suitable material to form the ultimate record, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH W. JONES.

Witnesses:
HARRY A. DINMORE,
WALTER C. PUSEY.