

(No Model.)

E. BERLINER.

SOUND RECORD AND METHOD OF MAKING SAME.

No. 548,623.

Patented Oct. 29, 1895.

Fig. 1.

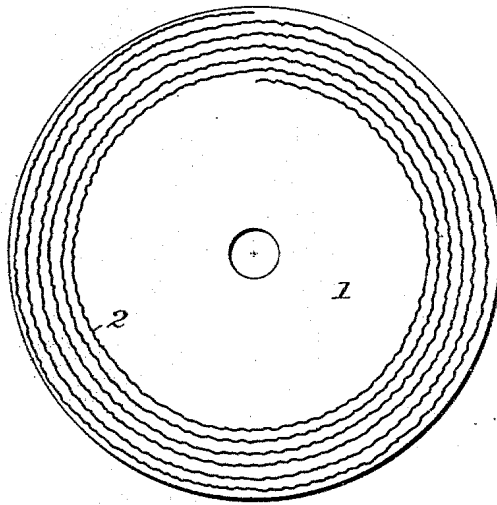
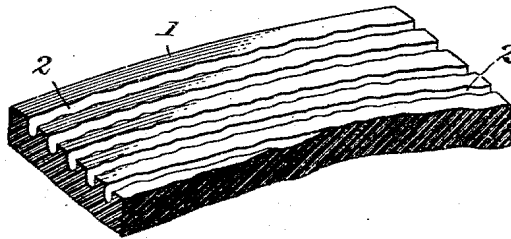


Fig. 2.



Witnesses
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UNITED STATES PATENT OFFICE.

EMILE BERLINER, OF WASHINGTON, DISTRICT OF COLUMBIA.

SOUND-RECORD AND METHOD OF MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 548,623, dated October 29, 1895.

Application filed March 18, 1893. Serial No. 466,708. (No model.)

To all whom it may concern:

Be it known that I, EMILE BERLINER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Processes of Making Copies 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.

This invention relates to improvements in sound-records and in the method of making the same.

The present invention relates more particularly to the production of copies or duplicates of the flat sound-records as made by gramophone in the manner set forth in Letters Patent granted to me on November 8, 1887, No. 372,786, and on May 15, 1888, No. 382,790.

The sound-records, as is well-known, consists of undulatory grooves of even depth, as distinguished from non-undulatory grooves of varying depth produced by other methods of recording sounds.

The sound-records of the gramophone are generally zinc disks into which a spiral record of sound-waves is etched. Other substances than zinc capable of being etched into may of course be used.

The simplest way for making a duplicate copy of such a record is to impress it in wax, deposit copper thereon, and detach the copper shell. This is the well-known method used by electrotypers. There is, however, a loss in the perfection of the surface, resulting from the fact that electrotypers' wax is porous and uneven of surface, and the resultant copper copy containing the sound-record is not as good in tone quality as the original. It is therefore necessary to deposit a copper or other metallic matrix directly on the original zinc record. This I do by first thinly covering the zinc with a material capable of resisting the action of the sulphate of copper solution usually employed for electro plating or typing, and then deposit copper over that, and when thick enough detach the copper deposit.

My method is to cast the previously-cleaned zinc-record disk in a cyanide-of-copper or cyanide-of-brass solution, electrolytically, by

which a very thin film of copper or brass adheres to the zinc. After being thus prepared, the coated zinc disk is placed into a sulphate-of-copper bath and copper deposited on it electrolytically. The deposit when thick enough is then detached and forms an accurate matrix, showing the sound-record of the zinc disk in reverse. This matrix can then be impressed into suitable material and thereby produce exact duplicates of the original record-sheet.

I have found hard rubber and celluloid to be excellent materials from which to make such duplicates. These substances when heated become very soft, and when in this soft state they are impressed with a matrix, such as above described, and are cooled while still under pressure, and the resultant rubber or celluloid sheet retains all the characters of the matrix, and thus forms a copy record of the original zinc disk. In impressing a copper matrix on softened rubber, however, the sulphur fumes which are generated when heating the rubber attack the copper and destroy the smoothness of its surface. I have therefore found it necessary to coat the copper matrix with a substance capable of withstanding the sulphur fumes, and I find electrolytically-deposited iron or nickel a proper substance to accomplish the desired effect. The copper matrix is therefore cleaned and placed in a nickel or iron bath, and a thin coating of iron or nickel is deposited on it by an electric current. The matrix thereby becomes protected against sulphur fumes, and iron and nickel being harder than copper the matrix, by being thus coated, becomes more durable, and withstands pressure for a longer period. It is also possible with such a matrix to press unvulcanized rubber into it, vulcanize the rubber while attached to the matrix, and then detach it, when a true copy of the original sound-disk will be the result.

In the annexed drawings, forming part of this specification, there is shown in Figure 1 a plan view of a sound-record made in accordance with the present invention, with the lines representing the record greatly exaggerated; and Fig. 2 is a perspective view of a small portion of a sound-record copy on an enlarged scale.

Referring to the drawings, there is shown a

disk 1, of hard rubber or like material, having in its face an undulatory spiral groove 2 of even depth representing sound-waves.

What I claim is—

- 5 1. The process of duplicating flat sound records, which consists in depositing copper or other like metal on an original record, then detaching the copper reverse thus produced and facing the same with a layer of hard
10 metal which is not attacked by sulphur, and then pressing the reverse into temporarily softened hard rubber, substantially as described.
- 15 2. The process of duplicating flat sound records, which consists in facing an electro-deposited reverse of a record, with nickel or iron, and then pressing this reverse into hard rubber, substantially as described.

3. As an article of manufacture, a sheet of hard rubber having upon its face an undulatory groove of even depth representing sound waves, substantially as described. 20

4. As an article of manufacture, a sheet of hard rubber having pressed into its face an undulatory line of even depth representing
25 sound waves, substantially as described.

5. A copy of a flat sound record, which consists of a disk of hard rubber having impressed upon its face the lines representing the
30 record, substantially as described.

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

EMILE BERLINER.

Witnesses:

S. E. YOUNG,

GEORGE SEIDENSPIMER.

It is hereby certified that in Letters Patent No. 548,623, granted October 29, 1895, upon the application of Emile Berliner, of Washington, District of Columbia, for an improvement in "Sound-Records and Methods of Making Same," an error appears in the printed specification requiring correction, viz: In line 50, page 1, the word "cast" should read *coat*; 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, countersigned, and sealed this 26th day of November, A. D. 1895.

[SEAL.]

JNO. M. REYNOLDS,
Assistant Secretary of the Interior.

Countersigned:

JOHN S. SEYMOUR,
Commissioner of Patents.