

(No Model.)

T. A. EDISON.  
PROCESS OF DUPLICATING PHONOGRAMS.

No. 484,582.

Patented Oct. 18, 1892.

FIG. 1

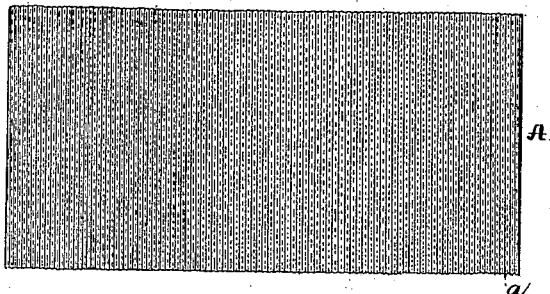


FIG. 2.

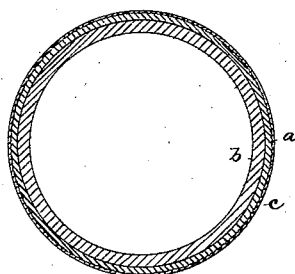


FIG. 3.

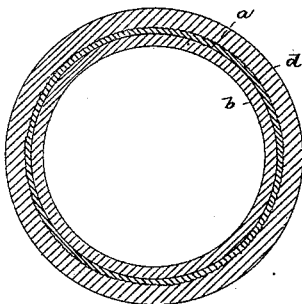


FIG. 4.

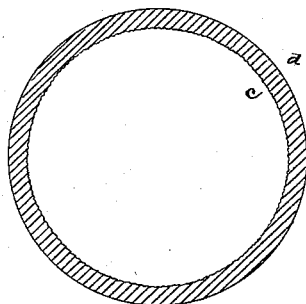


FIG. 5.

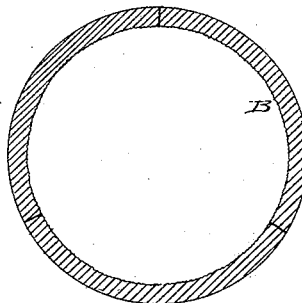


FIG. 6.

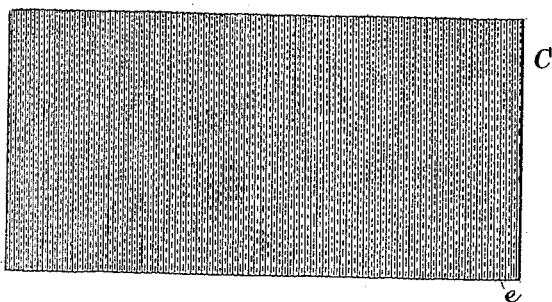
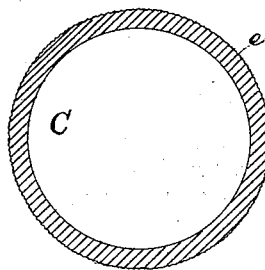


FIG. 7.



Witnesses  
E. Howard  
William Payer

Inventor  
Thomas A. Edison,  
By his Attorneys  
Dyer & Seely

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY, ASSIGNOR TO  
THE EDISON PHONOGRAPH COMPANY, OF NEW JERSEY.

## PROCESS OF DUPLICATING PHONOGRAMS.

**SPECIFICATION** forming part of Letters Patent No. 484,582, dated October 18, 1892.

Original application filed January 5, 1888, Serial No. 269,895. Divided and this application filed January 30, 1888. Renewed  
March 30, 1892. Serial No. 427,011. (No specimens.)

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, of Llewellyn Park, in the county of Essex and State of New Jersey, have invented a certain  
5 new and useful Process for Duplicating Phonograms, (Case No. 751,) of which the following is a specification.

The object I have in view is to produce a practical process for the duplication of phonographic records, so that the new art of phonographic publication can be established. Generally I propose to construct a suitable matrix, preferably in metal, and by its use  
10 mold duplicate phonograms with the phonographic records thereon, such phonograms or the surface thereof being preferably constructed of a material too hard for the satisfactory indentation thereof by the phonograph-recorder; but the duplicate phonograms may be made of a softer material. For  
15 the construction of the matrix I employ the process of vacuous deposit described in my application, Serial No. 118,942, filed January 28, 1884. The original phonogram is preferably  
20 constructed with a surface of wax or a similar material. This is placed in a suitable phonograph and the phonographic record produced thereon. The phonogram so impressed with the phonographic record is placed in a high  
25 vacuum, in which an electric arc, continuous or discontinuous, is produced between electrodes of metal or in which metal vapor is otherwise produced. The electric arc produces a vapor of the metal of which the electrodes are composed, which vapor or a metallic vapor otherwise  
30 produced within said chamber is deposited on the indented surface of the phonogram, forming a layer of metal thereon, which follows accurately all the indentations of the record, however minute, owing to the highly-comminuted condition of the metal deposited. The phonogram while the deposit is taking  
35 place in the vacuum-chamber is revolved slowly by a suitable power connection, and this is especially necessary when the form of the phonogram is cylindrical, which it preferably is. The vacuous deposit is continued until the layer of metal is sufficiently thick, when the covered phonogram is removed  
40 from the vacuum-chamber and is further

covered by a more rapid process to give strength and body to the covering. A further covering of metal may be produced by electroplating a metal upon the vacuous deposit in the usual manner of electroplating,  
55 or the vacuous deposit may be backed up by casting upon it type-metal or other metal or alloy having a lower fusing-point than the vacuous deposit, or this may be done after electroplating upon the vacuous deposit, or  
60 the vacuous deposit may be backed up by a cement or gum or by plaster-of-paris; but a metal backing is preferred. The material of the original phonogram is then dissolved off of the metal covering, leaving in the case of  
65 cylindrical phonograms a hollow metal cylinder or one internally faced with metal, carrying the phonographic record in relief upon its inner surface. This metal cylinder is then split longitudinally by a very thin saw into a number of parts—say, for illustration, three parts—  
70 which are suitably mounted upon levers, so that a mold is formed, which can be closed to receive the material to be molded and opened to permit of its being taken out. The duplicate  
75 phonograms are produced by means of this mold by pouring therein and preferably around a suitable core placed in the mold suitable substances, such as wax or wax-like material, resin, or plaster-of-paris, the material  
80 being preferably too hard to be satisfactorily indented by the phonograph, or the duplicate phonograms may be made by taking sheets of smooth material, like waxed paper or tin-foil, and pressing them upon the surface of  
85 the mold by a plunger or otherwise, the sheets being afterward backed up by a wax, resin, or cement. The latter way of making the duplicate phonograms is especially applicable to flat-surface phonograms, although it may  
90 be used for phonograms with cylindrical surfaces. The production of the first layer of metal upon the phonograph-record by means of the vacuous deposit has great advantages over doing this by electroplating. In electroplating the wax-surface must first be covered  
95 by plumbago or gold-leaf or silver salts reduced by chemical reagents in order to form a conducting basis for the plating. The plumbago and gold-leaf do not bring out the fine  
100

vibrations and produce rough reproductions while the silver salts do not run well on the wax surface. The vacuous deposit, however, adheres uniformly to the wax surface and reproduces the record with great perfection.

The invention is illustrated for convenience in connection with a cylindrical phonogram.

In the accompanying drawings, forming a part hereof, Figure 1 is an elevation of an original phonogram; Fig. 2, a cross-section of the original phonogram with a thin vacuous deposit thereon; Fig. 3, a view similar to Fig. 2, with a further backing; Fig. 4, a view the same as Fig. 3, with the original phonogram dissolved out; Fig. 5, a sectional view of the divided mold or matrix; Fig. 6, an elevation of a duplicate phonogram produced by the mold, and Fig. 7 a cross-section of such duplicate phonogram.

A is the original phonogram, having a relatively-soft wax or wax-like surface *a* and the backing of harder material *b*, or it may be entirely of wax. The phonographic record is produced upon the surface *a*. The metallic vacuous deposit is shown at *c*, and the further backing, preferably of metal, is shown at *d*.

B is the divided mold, produced as has been stated and having the phonographic record in relief.

C is the duplicate phonogram, produced by the mold and having a surface *e*, indented with the phonographic record and preferably of harder material than could be practically or satisfactorily indented directly by the phonograph.

My invention herein is limited to constructing the matrix or mold by covering the phonograph-record by a vacuous deposit.

The broad invention of duplicating phonograph-records and of producing matrices for that purpose, not limited to the use of the vacuous deposit as a step in the process of reproducing the phonographic record or constructing a matrix for that purpose, is not claimed herein, such broad subject-matter being covered by an application for patent filed

by me January 5, 1888, Serial No. 259,895, of which this specification is a division.

What I claim is—

1. The process of forming a matrix or mold for the duplication of phonographic records, consisting in covering the phonograph-record with a deposit of metal by vaporizing metal in a vacuum in which the record is placed, substantially as set forth.

2. The process of forming a matrix or mold for the duplication of phonographic records, consisting, first, in indenting the original record on a phonogram; second, covering the recording-surface of such phonogram with a deposit of metal by vaporizing metal in a vacuum in which such phonogram is placed, backing up such deposit to give it strength, and then removing the original phonogram, substantially as set forth.

3. The process of forming a matrix or mold for the duplication of phonographic records, consisting, first, in indenting the original record upon a phonogram having a wax-like surface; second, covering the recording-surface of such phonogram with a deposit of metal by vaporizing metal in a vacuum in which such phonogram is placed, backing up such deposit to give it strength, and then removing the original phonogram, substantially as set forth.

4. The process of duplicating phonograms carrying a phonographic record, consisting, first, in indenting the original record upon a phonogram; second, constructing a matrix or mold of such original record by depositing thereon a coating of metal by vaporizing metal in a vacuum in which the record is placed, and, third, producing duplicate phonograms from such matrix, substantially as set forth.

This specification signed and witnessed this 17th day of January, 1888.

THOS. A. EDISON.

Witnesses:

WILLIAM PELZER,  
E. C. ROWLAND.