

No. 742,454.

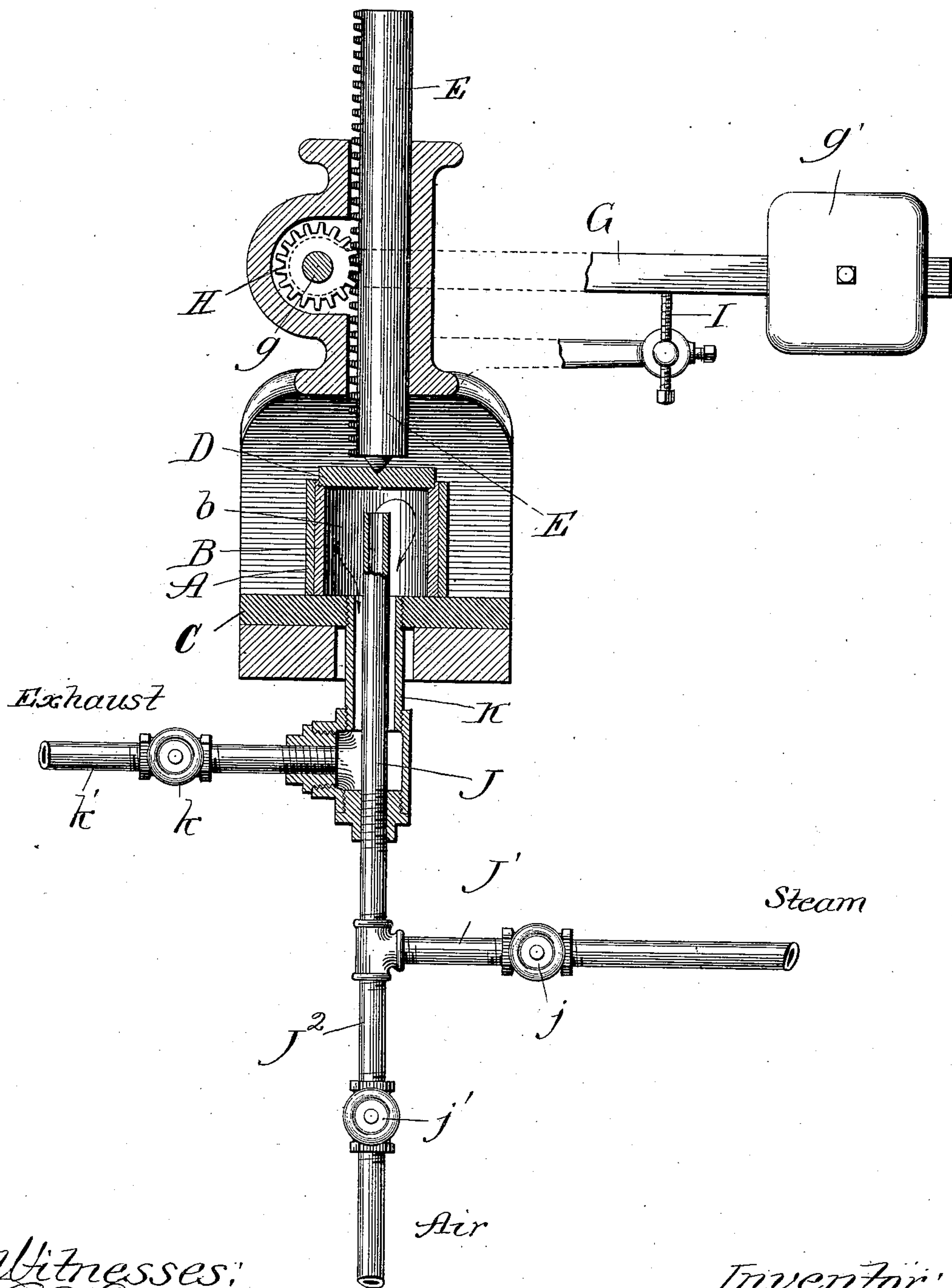
PATENTED OCT. 27, 1903.

T. B. LAMBERT.

PROCESS OF REPRODUCING PHONOGRAPHIC RECORDS.

APPLICATION FILED JUNE 14, 1900.

NO MODEL.



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UNITED STATES PATENT OFFICE.

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PROCESS OF REPRODUCING PHONOGRAPHIC RECORDS.

SPECIFICATION forming part of Letters Patent No. 742,454, dated October 27, 1903.

Application filed June 14, 1900. Serial No. 20,249. (No specimens.)

To all whom it may concern:

Be it known that I, THOMAS B. LAMBERT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Processes of Producing Duplicate Phonographic Records, of which the following is a specification.

This invention relates particularly to processes by which the ordinary record now used in connection with phonographs may be copied or duplicated any number of times, and especially to the production of indestructible duplicate-records, all of which will more fully hereinafter appear.

The principal object of the invention is to provide a simple, economical, and efficient process of reproducing phonographic records; and the invention consists in the process hereinafter described and claimed.

The accompanying drawing represents a vertical sectional elevation of one style of apparatus in which my improved process may be carried out.

In carrying out my process I provide a matrix A of the desired size, shape, and strength and which is preferably cylindrical in contour and formed of copper which has been electrochemically deposited upon a wax cylinder in the manner shown and described in Patent No. 645,920, issued to me on the 20th day of March, 1900, and which it is therefore unnecessary to show and describe in detail here. The inner side of this copper matrix is provided, as is shown in the above-named patent, with a negative of a record-cylinder provided with a surface having indentations which correspond with the projecting portions of the record and projections which correspond with the indentations on the record-cylinder, and in order to make duplicate records I place within such matrix a blank record-cylinder B, formed of celluloid or similar substance—in fact, it can be formed of any substance which is susceptible of being softened by heat and rehardened by cooling. This blank record-cylinder, which may be made of celluloid or other desirable material, is, as above stated, placed within the matrix, so that the record and matrix both rest upon

a base C, which acts as a closure for one end of the chamber inside the record and which I will hereinafter term the "record-chamber" b. A head portion D is next placed upon the record-cylinder to complete the closing of the record-chamber. An air-tight chamber, which I will designate as the "record-chamber," is thus formed within the blank record-cylinder and between the movable head D and the base C. This movable head should be of such diameter as to leave an opening between it and the matrix when the head is in contact with the record-cylinder at a point within or near the matrix, and the opening should be narrower than the thickness of the record-cylinder. The opening will then be closed and sealed by the record-cylinder when pressure sufficient to expand it is applied within, and, as will be readily seen, this opening affords an outlet for the air to escape between the head and matrix and from between the record-cylinder and matrix. This arrangement of the head and matrix leaves the matrix to rest loosely upon the base without anything to hold it unyieldingly against the base. The natural irregularities of the adjacent surfaces of the matrix and base thus afford a sufficient opening between the lower end of the matrix and base to permit air to escape from between the record-cylinder and matrix. In fact, in the absence of anything to hold the matrix rigidly and unyieldingly against the base—such, for instance, as a head in unyielding contact with the opposite end of the matrix—the application of the pressure within the record will force the air from between the record-cylinder and base however regular their adjacent surfaces may be. The natural irregularities of the adjacent surfaces, however, insure a sufficient vent when the relation of the head and matrix is as described, and a gear-spindle E is allowed to drop down thereon. A weighted lever G is provided and mounted upon the shaft g, which carries a pinion H, meshing with the rack e, which in turn operates the spindle above named, and in connection with a stop-screw I determines the position and the amount of pressure with which this spindle may rest on the head.

It is now desirable to soften the record-cylinder so that it may be expanded out against the indented record-surface of the matrix and expand the record-cylinder. In order to accomplish this, steam under about thirty pounds pressure to the square inch is forced into the record-chamber through a supply-pipe J, which is connected, by means of a branch pipe J', with a suitable source of steam-supply. The steam is permitted to escape again out through an exhaust-pipe K, connected with the outer air by means of the branch K'. The steam is kept at a substantially uniform pressure within the record-cylinder chamber, so as to by means of its heat and other actions soften the record and force it out against the inner indented surface of the matrix. After this has been accomplished—and experience teaches the operator just how long under certain pressure it takes the steam to accomplish this result—the steam-supply is shut off by means of the valve *j* and a supply of cool air under pressure is permitted to enter through the supply-pipe J by opening the valve *j'* on a second branch pipe J², which connects with a source of air under pressure and keeps up practically the same pressure as heretofore, but leaves the valve *k* on the exhaust-pipe open, so that all moisture and steam is blown out of the record-chamber, as above described. When the steam has been blown out, the next step is to shut the valve *k* and permit air under the desired pressure to stay in the record-chamber until such blank record is substantially forced into all the indentations made by the record on the inner surface of the copper matrix. As soon as this has been accomplished the air-supply is shut off, leaving just enough air inside the record-chamber to cool the same, and the exhaust-valve *k* is opened sufficiently to permit the air to blow through under certain pressure, and thus assist materially in cooling the record-cylinder.

When the duplication of the record-cylinder has been completed, the spindle E is raised, the head D removed, and the matrix, with its duplicated record, removed from contact with the apparatus. The cooling of the record-cylinder also shrinks it, so that it can be easily removed from engagement with the matrix.

Whenever desirable or necessary, the outer periphery of the matrix may be backed by plaster-of-paris, having a lead or other metallic confining-ring to give it sufficient rigidity to secure the duplication or reproduction of the records, and this is very clearly shown and described in the patent above referred to.

I claim—

1. The process of producing records of the class described, which consists in placing a blank record-cylinder adjacent to the record-surface of an indented matrix, then forcing a supply of heated fluid under pressure

against the exposed surface of the record-blank until such record has been softened and forced into the indentations of the matrix, and then furnishing a supply of cool fluid under pressure to complete the production of the record, and finally removing the record-cylinder, substantially as described.

2. The process of producing duplicate phonographic records, which consists in placing a blank record-cylinder adjacent to the inner indented surface of a cylindrical matrix, then passing into the chamber formed inside the record-cylinder a supply of steam under pressure, furnishing a supply of cool fluid under pressure to blow the steam out of the said record-chamber, complete the production of the phonographic record, and finally removing the record-cylinder, substantially as described.

3. The process of producing phonographic records, which consists in placing a blank record-cylinder within and adjacent to the indented record-surface of a cylindrical matrix and closing the ends of the record-cylinder so as to provide an interior chamber, next furnishing a supply of steam under pressure to such chamber and permitting it to blow through so as to prevent or minimize the condensation of the steam, furnishing a supply of air under pressure to complete the production of the record, and finally removing the record-cylinder, substantially as described.

4. The process of producing records of the class described, which consists in placing a blank record-cylinder adjacent to the mold-surface of a matrix in position to provide an outlet-opening communicating with the space between the record-cylinder and the matrix, then closing the ends of the record-cylinder without closing the opening communicating with the space between the record-cylinder and matrix, then applying fluid under pressure within and heat to the record-cylinder, and then applying a cool fluid to the record-cylinder, and then removing the record-cylinder, substantially as described.

5. The process of producing records of the class described, which consists in placing a blank record-cylinder adjacent to the mold-surface of a matrix in position to provide an outlet-opening communicating with the space between the record-cylinder and the matrix, then closing the ends of the record-cylinder without closing the opening communicating with the space between the record-cylinder and matrix, then applying steam under pressure within the record-cylinder, and then applying a cool fluid to the record-cylinder, and then removing the record-cylinder, substantially as described.

6. The process of producing records of the class described, which consists in placing a blank record-cylinder adjacent to the mold-surface of a matrix in position to provide an outlet-opening communicating with the space between the record-cylinder and matrix, then closing the ends of the record-cylinder with-

out closing the opening communicating with the space between the record-cylinder and matrix, then applying fluid under pressure to the record-cylinder and then removing the record-cylinder, substantially as described.

5 7. The process of producing phonographic records, which consists in placing a record-blank adjacent to the mold-surface of the matrix in position to provide an outlet-opening communicating with the space between the record-blank and the matrix, then arranging a movable head adjacent to the record-blank so as to form in combination with such blank a chamber without closing the
10 opening communicating with the space between the record-blank and matrix, then applying fluid under pressure within the chamber to complete the production of the record,

and then removing the record, substantially as described.

20 8. The process of duplicating records of the class described that consists in placing a blank record-cylinder adjacent to the record-surface of a matrix, supplying heated fluid against the exposed surface of the blank record-cylinder until such cylinder has been softened, then furnishing a supply of cool fluid under
25 pressure to said cylinder to complete the duplication of the record and finally removing the record-cylinder, substantially as described.

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