

F. L. DYER.
PROCESS OF MAKING METALLIC DUPLICATE SOUND RECORDS.
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1,002,659.

Patented Sept. 5, 1911.

Fig. 1

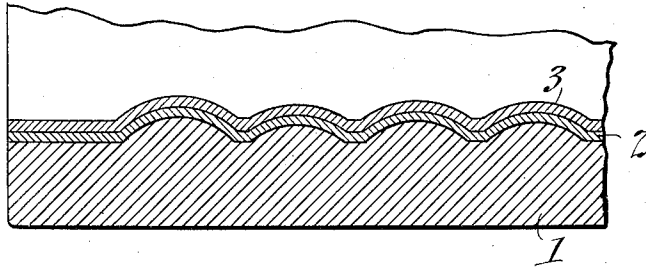


Fig. 2

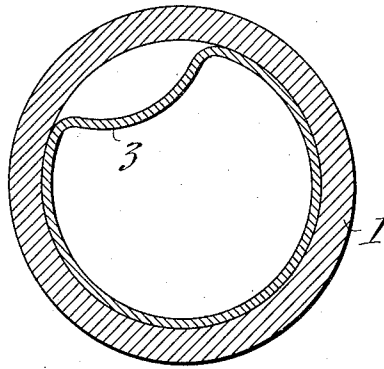
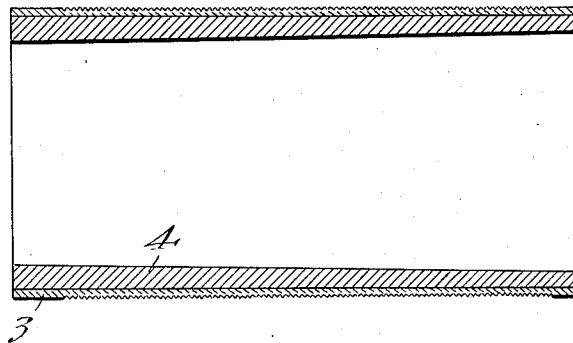


Fig. 3



Witnesses:

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UNITED STATES PATENT OFFICE.

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PROCESS OF MAKING METALLIC DUPLICATE SOUND-RECORDS.

1,002,659.

Specification of Letters Patent.

Patented Sept. 5, 1911.

Application filed January 27, 1908. Serial No. 412,741.

To all whom it may concern:

Be it known that I, FRANK L. DYER, a citizen of the United States, residing at Montclair, county of Essex, and State of New Jersey, have invented a certain new and useful Process of Making Metallic Duplicate Sound-Records, of which the following is a description.

My invention relates to an improved process for making metallic duplicate sound records, whether of cylindrical or disk type, and my object is to provide a very simple process which can be carried out on a commercial scale for the production of an unlimited number of accurate metallic duplicates from a single mold or matrix. Metallic duplicates thus made will permit the effective production and reproduction of a record of very great fineness, say, of three-thousandths of an inch, or less in width.

The invention resides in the fact that by producing on the record surface of the matrix or mold an excessively thin coherent layer of so-called "cement copper," and by electroplating the metal thereon, the adhesion between the particles of cement copper and between the latter and the matrix or mold, on the one hand and the electrodeposited metal on the other, is so slight as to permit the ready separation of the electrodeposited metal, after which any of the cement copper adhering thereto, or to the mold, can be easily rubbed off. When the mold or matrix is of a tubular form, the electrodeposited metal will exist as a shell and can be removed by collapsing the shell inwardly, but when the matrix or mold is in the form of a flat disk, the electrodeposited metal can be freely stripped off of the same. The shell or disk obtained in this way, carrying the representation of the record to be duplicated, is supported on a suitable foundation.

In order that the invention may be better understood, attention is directed to the accompanying drawing, forming part of this specification, and in which—

Figure 1 is a sectional view on an enlarged scale, of a portion of the matrix or mold with its film of cement copper deposited on the record surface thereof, and with the electrodeposited layer constituting the record surface of the duplicate; Fig. 2 a cross-sectional view illustrating the manner

of removing the electrodeposited shell from the tubular mold; Fig. 3 a longitudinal sectional view of the composite cylindrical record with a metallic surface.

In the above views, corresponding parts are represented by the same numerals of reference.

The mold 1, is of any suitable character, being either tubular or of disk form, and is provided with the usual negative record surface, as shown. I place the mold in a suitable cobalt plating bath, preferably a concentrated solution of cobalt chlorid with cobalt anodes, and plate on the record surface an exceedingly thin film or blush of cobalt 2, which may be less than .0001 of an inch in thickness. During this plating, the mold is preferably rotated so as to make the plating uniform. The mold is now washed and is then immersed in a solution of copper sulfate, the reaction causing the cobalt to go into the solution and the copper to be deposited as "cement copper" in a minutely granular but slightly adhesive form. Preferably, the immersion is continued only long enough to result in the covering of the cobalt film with a perfect layer of cement copper, so as to leave a part of the cobalt film still intact. If all the cobalt were dissolved in the copper sulfate bath, there might be danger of the electrodeposited film being plated imperfectly at first, since it is deposited under a condition of tension, but it will be understood of course, that if desired, the entire film of cobalt may be reduced to cement copper. Instead of first depositing on the mold a thin blush of cobalt, as explained, any other metal might be used in connection with which substantially the same reactions take place, for instance, iron. Having coated the record surface of the matrix or mold with an excessively thin film of cement copper, as explained, I now electroplate upon such film, a heavier deposit 3, of a suitable metal, upon which the record is to be made. This is preferably nickel, owing to its non-oxidizing properties. Preferably, during the operations which have been described, the matrix or mold, except for its record surface is protected by a coating of varnish or paraffin, or some similar material, so that the plating operations will be confined to the record surface. The shell or disk of nickel or other

metal, which has thus been formed (depending, of course, whether the mold is tubular or disk-like) is removed, which can be readily effected, owing to the slightly adhesive character of the film of cement copper. When the mold is tubular, the shell is preferably collapsed, as shown in Fig. 2. Having obtained a shell or disk of electroplated metal, carrying an accurate copy of the record to be duplicated, it is now supported on a suitable foundation 4, of plaster-of-Paris, or papier mâché. It will be understood that in order to facilitate the stripping of the electrodeposited duplicate from the matrix, the matrix with the electroplated deposit in position, may be subjected to a thirty to forty per cent. solution of cyanid of potash, by which the cement copper will be dissolved, so as to entirely free the electrodeposited layer, but ordinarily this is not necessary, since the adhesion of the particles of cement copper is so slight as to permit the electrodeposited layer to be readily stripped from the matrix or mold.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:—

1. A process for making metallic duplicate copies of sound records, which consists in applying to the record surface of a matrix or mold, a very thin film of granular slightly adhesive cement copper, in electroplating a thin and relatively non-oxidizable metal thereon, and in finally separating the electrodeposited metal from the matrix or mold, substantially as and for the purposes set forth.

2. A process for making metallic duplicate copies of sound records, which consists in applying to the record surface of the matrix or mold, an excessively thin film of cobalt, in then subjecting the deposited film to a copper solution to thereby result in the formation of granular slightly adhesive cement copper, in electrodepositing on the cement copper a heavier layer of metal, and in finally removing the latter deposit, substantially as and for the purposes set forth.

3. A process for making metallic duplicate copies of sound records, which consists in rotating a matrix or mold in a cobalt plating bath, and in depositing on the record surface of the matrix or mold an excessively thin film of cobalt, in then subjecting the cobalt film to a copper solution, resulting in the formation of granular slightly adhesive cement copper film, in then electrodepositing a metal thereon, and in finally removing the electrodeposited metal, substantially as and for the purposes set forth.

4. A process for making metallic duplicate copies of sound records, which consists in electroplating on the record surface of a matrix or mold an excessively thin film of cobalt, in subjecting said film to the effect of

a copper solution so as to convert a part only of the film to granular slightly adhesive cement copper, in then electroplating a metal thereon, and in finally removing the electrodeposit, substantially as and for the purposes set forth.

5. A process for making metallic duplicate copies of sound records, which consists in applying to the record surface of the matrix or mold, an excessively thin film of a metal having the power to replace copper in a copper solution, in then subjecting the deposited film to a copper solution to thereby result in the formation of granular slightly adhesive cement copper, in electrodepositing on the cement copper a heavier layer of metal, and in finally removing the latter deposit, substantially as and for the purposes set forth.

6. A process for making metallic duplicate copies of sound records, which consists in rotating a matrix or mold in a plating bath and in depositing on the record surface of the matrix or mold an excessively thin film of the metal the salt of which is in solution in the bath, the metal being one having the power to replace copper in a copper solution, in then subjecting the film so deposited to a copper solution resulting in the formation of a granular slightly adhesive cement copper film, in then electrodepositing a metal thereon, and in finally removing the electro-deposited metal, substantially as and for the purposes set forth.

7. A process for making metallic duplicate copies of sound records, which consists in electroplating on the record surface of a matrix or mold an excessively thin film of a metal having the power to replace copper in a copper solution, in subjecting said film to the effect of a copper solution so as to convert a part only of the film to granular slightly adhesive cement copper, in then electroplating a metal thereon, and in finally removing the electro-deposit, substantially as and for the purposes set forth.

8. A process for making metallic duplicate copies of sound records, which consists in applying to the record surface of the tubular matrix or mold an excessively thin film of a metal having the power to replace copper in a copper solution, in then subjecting the deposited film to a copper solution to thereby result in the formation of granular slightly adhesive cement copper, in electrodepositing on the cement copper a heavier layer of metal to form a positive record, and in finally removing the latter from the mold and the cement copper by collapsing the same, substantially as and for the purposes set forth.

9. A process for making metallic duplicate copies of sound records which consists in applying to the record surface of a matrix or mold, a very thin film of granular

slightly adhesive cement copper, and electro-
plating a thin deposit of metal thereon, in
dissolving out the cement copper by a solu-
tion of cyanid of potash, and finally sep-
5 arating the electro-deposited material from
the matrix or mold, substantially as and for
the purpose set forth.

This specification signed and witnessed
this 25 day of Jan. 1908.

FRANK L. DYER.

Witnesses:

ANNA R. KLEHM,
FRANK D. LEWIS.
