T. A. EDISON.

PROCESS OF DUPLICATING TALKING MACHINE RECORDS.

APPLICATION FILED MAR. 4, 1907.

975,339. Patented Nov. 8, 1910.

Fig. 1

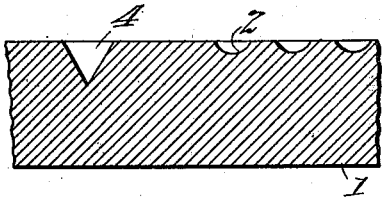


Fig. 2

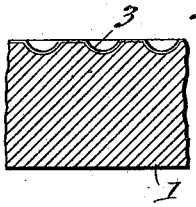


Fig. 3

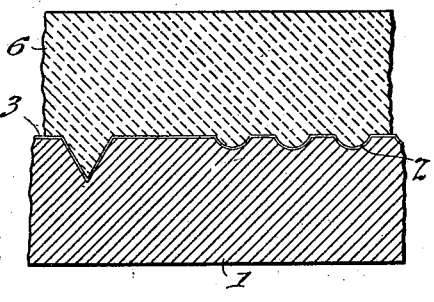


Fig. 4

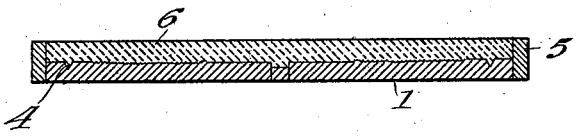


Fig. 5

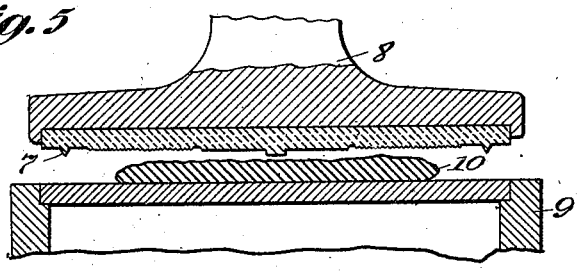
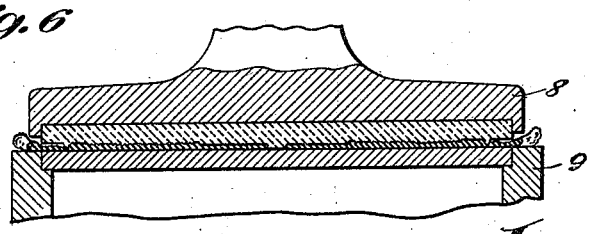


Fig. 6



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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, ORANGE, NEW JERSEY.

PROCESS OF DUPLICATING TALKING-MACHINE RECORDS.

975,339. Specification of Letters Patent. Patented Nov. 8, 1910.

Application filed March 4, 1907. Serial No. 360,313.

To all whom it may concern:

Be it known that I, THOMAS ALVA EDISON, a citizen of the United States, and a resident of Llewellyn Park, Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Processes of Duplicating Talking-Machine Records, of which the following is a description.

My invention relates to an improved process for duplicating talking machine records of the disk type and preferably in which the record itself exists as a sinuous groove cut or otherwise formed in a wax-like material by the action of a suitable stylus actuated by sound waves and vibrating in a plane parallel with the recording surface. At present such records are duplicated by first coating the original master with extremely finely divided graphite and electroplating the same to form a matrix, which is then separated from the master and employed to impress a suitable hot plastic material which, during the pressing operation, takes the proper disk-like form. Such a process is objectionable on account of the expense of making the matrices by electroplating and the uncertainty of that operation. Furthermore, in separating the matrix from the master the latter is generally broken or its record surface injured, and since the life of the matrix is not long, the surface being in a short time affected by the hot plastic material, it becomes necessary, before a fresh matrix can be secured, to make a new master, which is expensive and tedious.

The objects of my invention are to provide a very cheap and effective process for the purpose, in which electro-plating is dispensed with, and a very superior and durable matrix is secured so that the resulting duplicates are of a high order. Furthermore, in the separation of the matrix, the surface of the master will not be injured in the slightest degree, so that the master may be preserved indefinitely and any desired number of matrices made therefrom.

Broadly stated the improved process consists in first coating a suitable master (obtained by recording upon a wax-like blank in any suitable and ordinary way) with an excessively thin layer of extremely finely divided material that is not greatly water repellent, if at all, then in flowing over the record surface an emulsion of an extremely finely divided cement, preferably Portland cement, then in allowing the cement to set so as to form a perfect matrix of the record surface, then in separating the matrix from the master, and in finally obtaining duplicate copies from the matrix, preferably by impressing the same upon and into a suitable hot plastic material, as with the art as now practiced with electro-plated matrices.

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

Figure 1 represents a section of a part of the master on a greatly enlarged scale; Fig. 2, a similar view on the same scale, of the same, showing the preliminary coating; Fig. 3, a similar view on the same scale, illustrating the cement material in position before separating the matrix from the master; Fig. 4, a similar view, on a much smaller scale, illustrating more clearly the casting of the matrix; Fig. 5, a similar view showing the matrix in position to impress the hot plastic material, and Fig. 6, a similar view after the impression has been effected.

In the above views corresponding parts are represented by the same numbers.

The master 1 is of the usual type, being formed of a suitable wax-like composition, preferably one employing stearate of soda, and it carries the helical record groove 2 formed by means of any suitable stylus actuated by sound vibrations. The record 2 exists preferably as a sinuous groove as in the ordinary disk records of the present day, but it may be of any other suitable form. Having obtained a suitable master, I proceed to coat the same with a material that is not greatly water repellent, so as to permit the cement emulsion to flow regularly over the same and take a perfect impression. Obviously this layer 3 should be excessively thin so as not to appreciably fill up the record groove, and its particles should be excessively fine so as not to make the matrix rough. A material adequately meeting these conditions is extremely finely divided graphite such as now used for coating the master to form a conducting film, and which may be applied to the surface and thoroughly and carefully rubbed therein. Instead of graphite the master may be coated with gold, or other suitable metal, by a process of vacuous deposit, as in connection with the manufacture of molds from phonograph records. See

my Patent No. 713,863, granted November 18, 1902. Preferably the master 1 is formed with a concentric V shaped groove 4, surrounding the record and defining the periphery of the completed article as will be explained hereafter, said groove being of enormous depth compared with the record groove. The master as so coated and formed is now surrounded by a ring or flange 5 and over the record surface I flow a thick emulsion of a suitable hard and smooth cement 6, the uniform and perfect distribution of the cement being possible by reason of the coating 2. I prefer for this purpose, Portland cement reduced to an impalpable powder since the resulting matrix will be extremely hard—harder in fact than an electro-plated matrix; it will be practically unaffected by the hot plastic material, and its surface will be excessively smooth and glazed, so as to permit very perfect records to be impressed therefrom. Other cements may however be used which will not be affected by the hot material, such as oxychlorid of zinc and magnesia; or if rapid manufacture is important, a quick setting cement may be made, such as is used in dental work, consisting of oxid of zinc and glacial phosphoric acid, which hardens in a few minutes. But all things considered, except for the time required to set, I consider Portland cement, in exceedingly finely divided condition, to be preferable, both because it results in a harder and superior matrix and because more perfect records can be made therefrom. After the matrix is set, the ring or flange 5 is removed, and the matrix is separated from the master, which can be done without injuring the surface of the latter in any way, so that the master may be preserved and any desired number of matrices made therefrom. The matrix, which will be formed with a cutting flange 7 (corresponding to the groove 4) as will be understood, is now mounted in a suitable press plunger 8, movable over a bed 9 which may be heated if desired. On the bed and beneath the matrix, is placed a mass 10 of the desired hot plastic material—one employing shellac or so-called "button-stock," or other material—and the press plunger is forced downward with great pressure, so as to displace the material and squeeze it into a disk of the desired thickness, with the record impressed in its surface, as in the usual way. The cutting flange 7 will also partially sever the material, so that when the impressed mass is removed the superfluous material may be trimmed off and the record finished in any suitable way.

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

1. The process of making a matrix from a disk-master formed in a wax-like material, which consists in coating the record surface with an excessively thin layer of a material not greatly water-repellent, in flowing thereover an emulsion of an excessively finely divided cement, in allowing the cement to set and harden, and in separating the resulting matrix from the master, substantially as and for the purposes set forth.

2. The process of making a matrix from a disk-master formed in a wax-like material, which consists in coating the record surface with an excessively thin layer of a material not greatly water-repellent, in flowing thereover a water emulsion of an excessively finely divided cement, in allowing the cement to set and harden, and in separating the resulting matrix from the master, substantially as and for the purposes set forth.

3. The process of making a matrix from a disk-master formed in a wax-like material, which consists in coating the record surface with an excessively thin layer of a material not greatly water-repellent, in flowing thereover a water emulsion of excessively finely divided Portland cement, in allowing the cement to set and harden, and in separating the resulting matrix from the master, substantially as set forth.

4. The process of duplicating talking machine records, which consists in forming a record groove in a wax-like material, then in coating the record surface with an excessively thin layer of a material not greatly water-repellent, then in flowing thereover an emulsion of an excessively finely divided cement, then in allowing the cement to set and harden, then in separating the resulting matrix from the master, and in finally forcibly impressing the matrix upon a mass of hot plastic material, substantially as set forth.

This specification signed and witnessed this 23rd day of February 1907.

THOS. A. EDISON.

Witnesses:
FRANK L. DYER,
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