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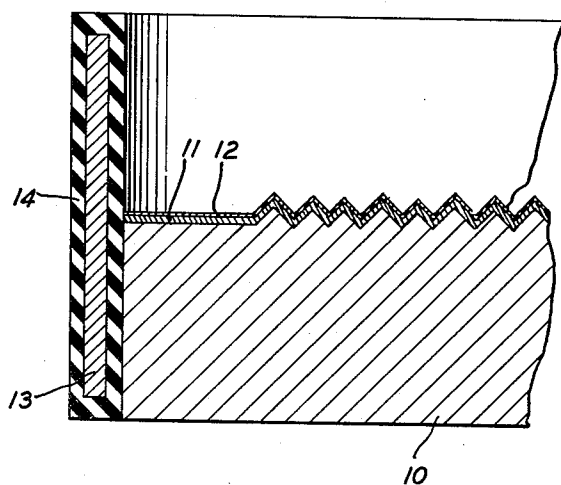
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ART OF DUPLICATING PHONOGRAPH RECORDS

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FIG. 1



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ART OF DUPLICATING PHONOGRAPH RECORDS

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1 Claim. (Cl. 204—8)

This invention relates to the art of duplicating fine contours in surfaces, and particularly to the art of duplicating phonograph records.

The method generally used in making a large number of identical phonograph records is substantially as follows: An original record is cut into a soft wax disc, the surface of which is subsequently coated with an electroconductive material and electroplated to a thickness sufficient to form a separable negative called a metal "master." The master is cleaned, coated with a separating material and electroplated to form a metal "mother" which when completed is stripped from the master, cleaned, coated with a separating material and electroplated to form a metal stamper. Several stampers are made from one mother and each stamper can be used as a metal master to form additional mothers. Thus, between the first metal master and the first stamper at least two coatings of separating material are applied to the grooves and two stripping operations are performed, each application or separation being capable of altering the contour of the groove and thereby introducing undesirable sounds, commonly known as "surface noise", into the record. To avoid the introduction of this noise, the separating material, and all other coatings placed into the grooves, must be of the finest texture so that the resulting surface is as smooth as the surface coated, and of exactly the same configuration. The matrices must also be readily separable to insure an undamaged original as well as duplicate.

It is the object of this invention to provide a separating coating for a phonograph record matrix, and a method for forming the coating which adds no surface noise to the original recorded sounds and which permits a matrix and its electroplate to be readily separated.

According to this invention a perfectly smooth separating coating is formed upon the surface of a metal matrix by plating the matrix with a thin layer of fine-grained metal, such, for example, as chromium, which does not tarnish and which possesses the property of forming upon itself a thin protective film. Since the protective film is formed naturally, it is much more uniform than an applied coating. The film has been found to be a poor conductor of electricity, which is a desirable characteristic in a separating material, and hence it is necessary to coat the film with an electroconductive material, such as sputtered metal, which is

known to produce no additional surface noise in a matrix.

The invention may best be illustrated by reference to the drawing which accompanies this specification and forms a part thereof, wherein 10 represents a metal master record, made preferably in accordance with the procedure outlined in part in U. S. Patent No. 1,954,950 to A. G. Russell whereby a metal-backed wax record is coated with gold by sputtering and then copper-plated to a thickness of about one-eighth inch, the copper plate being subsequently stripped from the wax to form the metal master. The metal master is thoroughly cleaned before plating by placing it in a hot electrolytic caustic cleaner, rinsing in hot water, brushing with a soft camel's hair brush, returning to the electrolytic cleaner and again rinsing, after which it is dipped into dilute hydrochloric acid, rinsed and finally placed into a sodium cyanide solution for half a minute. When it is perfectly clean, the master is electroplated with chromium in a thoroughly agitated bath. The plating solution may be any of the well known chromium plating solutions such, for example, as the Sargeant solution. The chromium plate is shown greatly exaggerated at 11 and is actually approximately one-eighteenth of a mil in thickness. The protective film forms upon the chromium almost immediately and remains indefinitely.

The chromium-plated master is coated with non-adherent sputtered metal 12 by again following the procedure outlined in the above mentioned Russell patent. The sputtered metal provides an electroconductive surface upon which the subsequent electroplate can form, but since there is no firm bond between the sputtered metal and the separating film, the former can be readily separated from the latter. The thickness of sputtered metal 12, though shown as appreciable for the purpose of illustration, is only about a millionth of an inch and hence would be practically invisible in cross-section.

Before placing the sputtered master into the electroplating bath to form the mother, it is advisable to clamp a steel ring 13 covered with rubber 14 around the edge of the master to prevent the electroplate from forming around the edge, thus limiting the electrodeposition to the surface of the master. This facilitates the separation of the master from the mother and also avoids the necessity of trimming the edge of the mother and the consequent undesirable reduction in its diameter.

When ring 13 is securely clamped to the master, the latter is placed into a copper-plating tank and a mother is electrodeposited upon sputtered metal 12 to a thickness preferably equal to that of the master. When this is done, the two are taken from the tank, ring 13 is removed from the edge of master 10 and the mother and master are separated. It is preferred that the separation be effected immediately upon the completion of the electroplating to avoid the possibility of the plating solution making its way between the master and mother and staining the surfaces of both. When the separation is completed it will be found that the surfaces of both matrices are perfectly smooth and bright. The mother can now be subjected to the same process that was used with reference to the master to obtain a stamper.

One of the advantages of this process is that a number of mothers can be made from one master without material harm to the latter, and likewise a number of stampers can be made from each mother without damaging the mother, and this irrespective of the perfection

of the electrodeposited matrix. With other processes, a damaged or imperfect electroplate ordinarily means a damaged master or mother due to the imperfection of the separating material used. Another advantage is its simplicity and the uniformly good results that can be obtained.

It is understood that the foregoing description is merely illustrative of the invention and that the scope of the invention therefore is not to be limited thereby, but is to be determined by the appended claim.

What is claimed is:

The method of duplicating a metal negative of a wax phonograph record which consists in electrodepositing a thin layer of chromium on the negative, allowing the chromium to form a protective film upon itself, coating the film with an even layer of sputtered metal, electrodepositing a substantial layer of metal on the sputtered metal and separating the substantial layer from the metal negative.

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