

UNITED STATES PATENT OFFICE

CAMILLE DREYFUS, OF NEW YORK, N. Y., ASSIGNOR TO CELANESE CORPORATION OF AMERICA, A CORPORATION OF DELAWARE

SOUND RECORD

No Drawing.

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My improved invention relates to duplicating sound records, tablets, discs or other bodies upon which sound waves are impressed, and/or from whose surface sound waves are reproduced. It relates especially to sound records made of a water-insoluble, non-hygroscopic, tough, flexible and relatively permanent material, such records or record masses being capable of receiving thereon impressions due to sound waves and retaining the same for a comparatively indefinite period of time.

Ordinarily, the sound records of commerce of the present time possess the disadvantage that the hardness of the material generally used in their manufacture causes blurred, indistinct and scratching tonal qualities upon reproduction, and thereby seriously interferes with the distinctness and fidelity of reproduction. The present invention overcomes these and other drawbacks, and permits of the production of sound records in an economical manner whereby the sound waves are faithfully reproduced. This invention yields an impressionable material of great tensile strength and wearing qualities, as will be more specifically set forth herein.

In the present invention I advantageously utilize cellulose ethers such as methyl cellulose, ethyl cellulose or I can use organic esters of cellulose such as cellulose acetate etc. (as distinguished from the inorganic esters of cellulose such as cellulose nitrate). Of the cellulose ethers I prefer to use ethyl cellulose, either alone with solvents, solvent combinations, diluents, high boiling solvents, plastifiers and flexilizers, or I may add filling materials or coloring matters to the mass either homogeneously or superficially, depending upon the particular effects desired, as is well understood by those conversant with the art to which this invention appertains.

I incorporate such organic cellulose ethers as ethyl cellulose, in relatively small amounts of solvents and solvent combinations to form a mass of the desired fluidity, viscosity and flowing power, and incorporate therein or therewith the usual filling materials used in phonograph record manufacture, adding thereto, if desired, lamp black, iron oxide, pigments, lakes, dyes or other coloring matter to impart a distinctive color. The mass is rendered homogeneous throughout by mixing or malaxating in any appropriate manner, after which it is sheeted or cast or rolled into forms of the desired shape and size for individual phonograph record manufacture. The phonograph record blank made according to my invention may consist entirely of the cellulose ether-containing composition, or there may be an inner layer or plurality of layers of base or core free from cellulose ether, the cellulose ether layer being in such instance, superposed by pressure upon the matrix, core or base free from cellulose ether, preferably by means of heat or pressure, or both.

The sound waves or undulations are impressed upon and in the phonograph record mass containing the cellulose derivative where a plurality of layers are employed for the record mass. Sound records made by my improved process are superior in that the impression obtained is provided with a true cast surface; the material has no tendency to harden, soften, moisten or otherwise alter under normal atmospheric conditions. The composition, form and appearance of the sound record is not subject to visible or analytically distinguishable change and for this reason the sound record impression remains practically unaltered for an indefinite period of time.

The record on account of the high tensile strength due primarily to the incorporation therein of cellulose derivatives, may be made of less thickness and hence of lighter weight, this being exceedingly valuable from the viewpoint of transportation costs, especially in parcel post forwarding. Inasmuch as the walls are uniformly hard and homogeneous in my improved record, the tendency to peel, crack, flake or warp is reduced to a minimum.

The employment of cellulose derivatives which are relatively non-inflammable and are non-explosive, such as cellulose ethers and the organic cellulose esters, yields a record mass which conserves to a very high degree the desirable properties of flexibility, toughness, elasticity, resiliency, flexibility and thermo-plasticity, and admits of the un-

interrupted commercial manufacture of a sound record of satisfactory reproduction and wearing qualities combined with desirable acoustics and sound reproduction properties.

In the formation of my preferred record substance or base upon which sound waves may be impressed, I may use, for example, 70 parts by weight of ethyl cellulose, 22 parts by weight of triacetin, and 8 parts of triphenyl phosphate, together with sufficient solvents, solvent combination, non-solvent or diluent or diluents to make a mass of the proper consistency and working qualities. To this mass various proportions of filling materials and coloring matter may be added in order to give the consistency and weight per given volume desired. The material is rendered homogeneous in any approved manner as by repeatedly passing through malaxating rolls which are preferably arranged for steam and cold water entrance to the hollow rolls, and the thoroughly incorporated components are then pressed into sheet form and cut into strips and blocks, in any manner now known.

While I have given above a specific example as representative of one method of carrying my invention into effect, it must be understood that this formula is merely illustrative and may be varied within comparatively wide limits without departing from the spirit and scope of my invention. The proportions of the various ingredients will vary greatly not only with the precise composition and viscosity of the particular cellulose ether or other cellulose derivative employed but also with the particular ratio of solvents to non-solvents utilized and the peculiar characteristics of such solvents and non-solvents. In addition the amount, nature, boiling points and melting points of the flexilizers, plastifiers and high boilers employed as adjuncts to the cellulose derivatives are factors which must be taken into consideration in preparing a formula to obtain desired specific results in phonograph record formation, as is well known to those conversant with this art. For these reasons it is obvious that the above illustrative formula may be modified and manipulated within wide limits and still embody my invention.

Instead of ethyl cellulose I can use other cellulose ethers or cellulose esters. Instead of manufacturing this flexible, high tensile strength material for phonograph records out of blocks and cutting sheets or discs therefrom, I may prepare the cellulose ethers, or cellulose esters in a film form. If this latter procedure is followed said films or relatively thin sheets can thereafter be attached to a core or base as a backing, which base is free from cellulose derivatives such as are employed in the exterior layer or layers. As a result of this modification the cost of pro-

duction may be lowered by employing a relatively cheaper inner portion or core.

This application is a continuation in part of my prior application, Serial Number 491,317, filed August 10th, 1921. The parent application is specific to the use of cellulose esters, particularly cellulose acetate, for the manufacture of sound records whereas the present application is limited to the employment of cellulose ethers such as ethyl cellulose for the manufacture of sound records.

Having described my invention what I claim and desire to secure by Letters Patent is:

1. A phonograph record having an impressed record track in which at least that portion thereof which contains the sound record track comprises 70 parts of ethyl cellulose, 22 parts of triacetin and 8 parts of triphenyl phosphate.

2. A composition of matter comprising 70 parts of ethyl cellulose, 22 parts of triacetin and 8 parts of triphenyl phosphate.

In testimony whereof, I have hereunto subscribed my name.

CAMILLE DREYFUS.