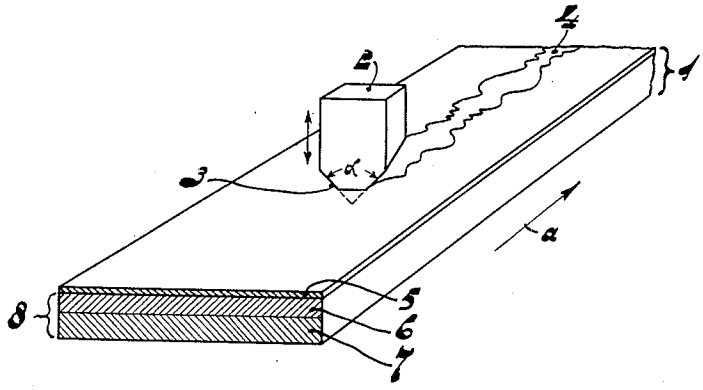
June 20, 1939. J. H. DE BOER 2,163,087

MECHANICAL RECORDING

Filed May 24, 1937



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Patented June 20, 1939

2,163,087

UNITED STATES PATENT OFFICE

2,163,087

MECHANICAL RECORDING

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Application May 24, 1937, Serial No. 144,498
In Germany February 16, 1937

9 Claims. (Cl. 274—46)

My invention relates to carriers for mechanically-recorded and optically-reproducible sound tracks, and to a method of making same.

I shall describe my invention in connection with mechanical recording of the type described in the U. S. Patent 1,919,116 to James A. Miller; however my invention is not limited thereto but is applicable to other types of mechanical recording.

In such recording it has been proposed to cut the sound track in a band-shaped carrier of regenerated cellulose, but as such a carrier was insufficiently strong for the purpose, it was necessary to use a carrier comprising a layer of regenerated cellulose secured to a supporting layer of strong transparent material, such as Celluloid, with the usual binders. Such carriers, however, were difficult and expensive to manufacture, and frequently the layers became separated, especially when subjected to the high cutting forces occurring in mechanical recording.

The object of my invention is to overcome the above difficulties, and to provide a carrier which has the required cutting properties while at the same time is mechanically strong and relatively inexpensive to manufacture.

In accordance with the invention, I start with a band of a saponifiable cellulose derivative, and saponify this band to transform into regenerated cellulose, a surface portion extending to a depth sufficient for mechanical recording. I then form, either prior or subsequently to the recording, and either on or within the regenerated cellulose, a thin layer of a material opaque to the light used in optical reproduction.

The term "reproduction" as used herein and in the claims is to be understood to include both sound reproduction and the reproduction or copying of the sound track on one or more additional carriers.

In order that my invention may be clearly understood and readily carried into effect, I shall describe same more fully with reference to the accompanying drawing, in which the single figure is a perspective view of a carrier and shows a cutting tool cutting a sound track therein.

In the drawing, a carrier 1 is moved in the direction of the arrow a at a constant speed, while a cutting tool 2 provided with a V-shaped cutting edge having an apical angle α is vibrated in the direction of the double-headed arrow in accordance with the vibrations of the sounds to be recorded to produce a sound track 4. In practice the angle α is given a value of about 174°, but is shown much smaller for purposes of illustration. Such recording has been described in detail in the above-mentioned patent.

Carrier 1, with which the present invention is concerned, comprises a cutting-supporting layer 8, and a covering layer 5 of opaque material. In accordance with the invention, layer 8 is formed from a band or strip of a saponifiable cellulose derivative, for instance an inorganic or organic ester of cellulose, such as nitrocellulose. I prefer to use acetyl cellulose, as such material is non-inflammable, which is of great advantage both during recording and the later projection.

I then saponify layer 8, whereby a portion 6 thereof having a depth substantially equal to the cutting depth is formed into regenerated cellulose, and a portion 7 remains as the cellulose derivative.

Thus it appears that portion 6 is of relatively soft material and serves as a cutting layer, whereas portion 7 is relatively hard and serves as a supporting layer. Furthermore, during the recording there is no danger of layers 6 and 7 becoming detached.

In a particular embodiment of my invention, I form layer 1 by starting with a band of acetyl cellulose having a thickness of, for instance, 130 microns. I then superficially saponify this layer, for instance by treating same with a 2 N methyl alcoholic solution of potassium hydroxide until the thickness of the saponified portion 6 is about 50 microns, after which I wash and dry the layer.

I then form the opaque layer 5, which should be very thin, and should be capable of absorbing at least 95% of the light (opacity about 1.4) required for the optical reproduction or copying.

Layer 5 may be formed in various manners, which are known per se, for example, by applying to the surface of portion 6 a layer of a metal sulphide sol, such as mercury sulphide, Berlin blue, or colloidal carbon provided with a protective colloid. Layer 5 may also be chemically formed within portion 6 by soaking layer 8 in a solution of a metal salt, such as a nickel salt, which during subsequent treatment with a sulphide solution forms an insoluble metal sulphide opaque to the light used for the reproduction.

On the other hand, layer 5 may be formed photochemically, for instance by coating the surface of portion 6 with a photosensitive diazonium compound whose light-decomposition product is capable of reducing a metal salt, such as silver salt to silver. Particularly good results are obtained when the light-decomposition product of

the diazonium compound acts upon a mercurous salt to produce, in or on portion 6, a mercury-metal layer which may be converted into a silver layer by treatment with a silver salt, such as silver nitrate. In this way it is possible to obtain a coating or layer which is highly opaque to the light required for reproduction.

While I have described my invention in connection with specific examples and applications, I do not wish to be limited thereto, but desire the appended claims to be construed as broadly as permissible in view of the prior art.

What I claim is:

1. A method of making a band-shaped carrier for a mechanically-recorded and optically-reproducible vibration record from a band of a cellulose derivative capable of being saponified, comprising the steps of saponifying a portion of said band to form a cutting layer of regenerated cellulose having a depth sufficient for mechanical recording, and providing a thin layer of opaque material at the cutting surface of said regenerated cellulose layer.

2. In the manufacture of carriers for mechanically-recorded and optically-reproducible vibration tracks from a band of a saponifiable cellulose derivative, the step of saponifying part of the band to form a cutting layer of regenerated cellulose.

3. In the manufacture of carriers for mechanically-recorded and optically-reproducible vibration records, the step of saponifying a surface portion of a band of acetyl cellulose to form a cutting layer of regenerated cellulose.

4. A method of making a carrier for mechanically-recorded and optically-reproducible vibration records from a band of a saponifiable cellulose derivative, comprising the steps of saponifying a portion of said band to form a cutting layer of regenerated cellulose having a depth sufficient for mechanical recording, providing the cutting layer with a layer of a photo-sensitive diazonium compound, exposing the carrier to decompose the diazonium compound, and treating the carrier with a metal salt to produce a metal layer opaque to the light used for reproduction.

5. A method of making an optically-reproducible vibration record from a band of a saponifiable cellulose derivative, comprising the steps of saponifying a portion of said band to form a cutting layer of regenerated cellulose having a thickness sufficient for mechanical recording, providing an opaque layer at the surface of said regenerated cellulose layer, and cutting through said opaque layer and into said regenerated cellulose layer to form a vibration track having a V-shaped section.

6. A method of making an optically-reproducible vibration record from a band of a saponifiable cellulose derivative, comprising the steps of saponifying part of the band to form a surface layer of regenerated cellulose, cutting a vibration track into said surface layer to form a sound track having a V-shaped section, and forming an opaque layer at the surface of the cutting layer surrounding the vibration track.

7. In a carrier for mechanically-recorded and optically-reproducible vibration records, a unitary supporting-recording layer having a supporting layer portion of a saponifiable cellulose derivative and a surface layer portion of regenerated cellulose of a thickness sufficient for mechanical recording.

8. In a carrier for mechanically-recorded and optically-reproducible vibration records, a unitary supporting-recording layer having a supporting layer portion of a saponifiable cellulose derivative and a surface layer portion of regenerated cellulose having a thickness of the order of 50 microns and serving as a recording layer.

9. A mechanically-recorded and optically-reproducible vibration record comprising a unitary supporting-cutting layer having a suporting layer portion of a saponifiable cellulose derivative and a surface layer portion of regenerated cellulose having a thickness of the order of 50 microns and serving as a recording layer, a thin covering layer of opaque material at the surface of the layer portion of regenerated cellulose, and a mechanically-recorded vibration track extending through said covering layer and into said surface layer portion.

JAN HENDRIK DE BOER.