Sept. 29, 1942. H. WESTERKAMP 2,297,517

ART OF PRODUCING SOUND FILMS

Filed Aug. 6, 1940

Fig.1

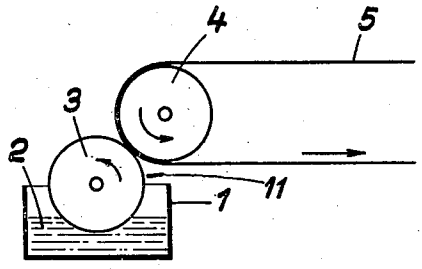


Fig.3.

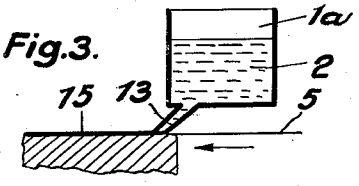
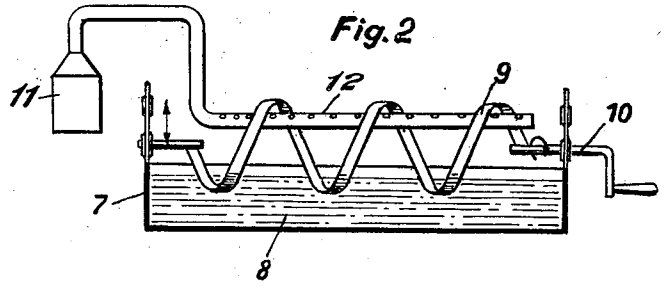


Fig.2



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ART OF PRODUCING SOUND FILMS

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8 Claims. (Cl. 18—48.5)

The invention primarily relates to a particularly simple and cheap method of making matrices from wax ribbons having mechanical sound records on their surfaces. According to the invention, a liquid gelatinous substance or gelatinating albumin is applied in thin layers to the recorded surface of the wax ribbon until the layers formed in this way, when hardened, have the thickness of the desired matrix, whereupon the ribbon-shaped layer is withdrawn from the wax ribbon. In doing this, it must be observed that each thin layer of the substance forming the matrix is dry before the next layer is applied.

It is advisable to add to the matrix substance tanning materials of known composition (metal chrome compounds, such as for example sodium bichromate). It is also possible to spray hardening materials of known types (formaldehyde or the like) on the surface of the matrix while the matrix substance is drying.

In practice, this method may be performed in various ways, for example by first helically winding up the original wax ribbon, then dipping the wound up wax ribbon into a bath of the matrix substance while simultaneously rotating about the axis of the helix, drying the layer, repeating this dipping operation after each layer formed on the wax ribbon has dried, until the film of the matrix substance has acquired the thickness of the matrix ribbon, and finally withdrawing the film of the matrix substance from its base.

Another way of proceeding consists in continuously applying the matrix substance in a thin layer to the surface of the original wax ribbon by means of a roller partly dipping into the bath and arranged opposite the original wax ribbon, whereupon the hardened film of the matrix substance formed on the wax ribbon, after having acquired the desired thickness, is withdrawn from the wax ribbon.

A third way of proceeding is to apply the matrix substance by means of a slotted nozzle onto the recorded surface of the original recording ribbon moved past the opening in the nozzle, and then withdrawing the layer of the matrix substance thus formed on the wax ribbon, after it has hardened, from the wax ribbon.

With the two last mentioned methods the devices known to experts will serve the purpose; however, in practising the first mentioned procedure it is advisable to use a special kind of device in which there is arranged, above a container for the liquid or liquefied matrix substance, a helical ribbon carrier mounted to rotate about a horizontal axis and adjustable in vertical direction so that by lowering it, the helical surface partly dips into the bath of the matrix substance.

With the procedure described a novel type of matrix is formed for producing a series of duplicate sound films having mechanical sound records, which differs from known types of similar matrices inasmuch as it consists of a plurality of layers of a gelatinous substance, such as gelatine or gelatinated albumin, hereinafter generically termed a gelatin material.

Three constructional forms of devices for performing the method described above are diagrammatically illustrated on the accompanying drawing, in which:

Figure 1 is a diagrammatic showing of apparatus by which the invention may be practiced.

Figure 2 is a view of another form of apparatus for practicing the invention.

Figure 3 is a cross-sectional view indicating a third form of apparatus.

In the constructional form shown in Fig. 1, a container 1 receives the liquid or liquefied matrix substance, for example liquefied gelatine 2. Above the container with the matrix substance, a roller 3 for applying the substance is rotatably mounted so as to partly dip into the bath of the substance 2; of course, it is necessary to maintain the level of the liquid in the container 1 at such a height that the depth of immersion of the roller 3 remains approximately constant. Above the roller 3 there is a counter roller 4 mounted to rotate at a distance sufficient to let the original wax ribbon, from which the matrix is to be made, pass between the rollers. The original wax ribbon 5 is drawn, as shown, over the roller 4 and between the rollers 3 and 4. The rollers rotate in the same angular direction and preferably at different speeds with respect to each other, the dipping roller 3 having a stripper 11 which serves to regulate the quantity of substance carried to the surface of the running wax ribbon. The dipping roller 3 transfers the layer of substance carried by it to the surface of the wax ribbon, the liquid substance entering the sound tracks on the wax ribbon. The thin layer of substance thus produced on the wax ribbon is then left to dry, whereupon another thin layer of substance is applied to the first layer covering the surface of the wax ribbon, in the manner described. This procedure is repeated until the film of substance has acquired the desired thickness for the matrix. By a suitable regulation of the distances traversed by the

moving wax ribbon 5, it may be assured that the portions of the wax ribbon, to which a thin layer of the matrix substance has been applied, are dry when they return to the place where the substance is applied. Finally, the ribbon-like film of material applied to the wax ribbon is withdrawn from the latter; it forms the matrix which is excellently suitable for the production of a series of duplicate sound film copies. The sound film copies may, for example, be produced by pressing the matrix on blank sound film strips, but preferably the copies are produced by a casting process corresponding to that in Fig. 3 and utilizing an appropriate material for the duplicate record.

In the constructional form shown in Fig. 2, a helically coiled ribbon consisting of any resisting material of approximately the same width as the original wax ribbon is disposed so as to have a uniform distance from the axis of the turning shaft 10 and to be rotated with the turning shaft. As shown in the illustration, a kind of interrupted cylindrical carrier is formed with spaced convolutions, on whose helical path the original wax ribbon is p'aced with the recorded side towards the axis of the helix and is thus also wound up helically. The carrier 9 is arranged so that it can be raised and lowered, dipping to a certain amount into the liquid bath 8 when in the lowered position, but being completely above the liquid bath in the raised position. When the carrier with the wax ribbon lying thereon is lowered and the shaft 10 is rotated, a thin layer of matrix substance is applied to the recorded surface of the wax ribbon. Thereupon the carrier is raised for a time sufficient to let the matrix substance dry, and a known kind of hardening material, such as formaldehyde or the like, from the pressure vessel 11 may be blown from the apertured tube 12 on to the surface of the layer formed. Then, the carrying body is lowered again and rotated, the procedure described being repeated until the substance applied to the wax ribbon has acquired the desired thickness. Finally, the film of applied substance is withdrawn from the wax ribbon and constitutes the finished matrix.

In Fig. 3, the container 1a holds a bath of gelatinous substance in liquid condition. An opening is provided at the lower side of the container leading to a slotted nozzle 13. The wax ribbon 5, having the mechanical sound record on its upper surface, is led over a guide 14, so that the thin layer of liquid gelatine formed by the nozzle 13 is deposited from the container 1a upon the recorded surface of the wax ribbon to provide a layer 15. This layer 15 is then dried, and the depositing of a thin layer can then be repeated a desired number of times, alternating with drying, until the film has been built up to the desired thickness for the matrix.

What is claimed is:

1. A method for producing a duplicating matrix from a wax ribbon having a mechanical sound record upon the surface thereof, which comprises repeatedly applying thin layers of a liquid gelatine material to the surface of the wax ribbon and effecting a hardening of each individual layer by the action of the hardening agent and the substantially complete drying thereof prior to the application of the succeeding layer, said repeated application and drying being continued until the desired thickness has been established, and withdrawing the ribbon-like film from the wax ribbon as a matrix for producing duplicate copies.

2. A method for producing a duplicating matrix from a wax ribbon having a mechanical sound record upon the surface thereof, which comprises repeatedly applying thin layers of a mixture of a liquid gelatine material and a gelatine hardening agent to the surface of the wax ribbon and hardening and drying each individual layer prior to the application of the succeeding layer, said repeated application and drying being continued until the desired thickness has been established, and withdrawing the ribbon-like film from the wax ribbon as a matrix for producing duplicate copies.

3. A method for producing a duplicate matrix from a wax ribbon having a mechanical sound record upon the surface thereof, which comprises repeatedly applying thin layers of a liquid gelatine material to the surface of the wax ribbon, applying a hardening agent to each layer of the gelatine material and drying the same prior to the application of the succeeding layer, said applications of gelatine material and hardening agent and said drying being continued until the desired thickness has been established, and withdrawing the ribbon-like film from the wax ribbon as a matrix for producing duplicate copies.

4. A method for producing a duplicating matrix from a wax ribbon having a mechanical sound record upon the surface thereof, which comprises supporting the wax ribbon as a helical coil, dipping a portion of each convolution of the coil into a bath of liquid gelatine material and rotating the coil about its axis to effect successive deposit of a thin layer of the material for the length of the wax ribbon, effecting hardening of the material after the deposit by the action of the hardening agent and drying the same, repeating the successive deposition and drying until a film of the desired thickness has been established, and withdrawing the ribbon-like film from the wax ribbon as a matrix for producing duplicate copies.

5. A method for producing a duplicating matrix from a wax ribbon having a mechanical sound record upon the surface thereof, which comprises supporting the wax ribbon as a helical coil with the recorded surface directed toward the axis, dipping a portion of each convolution of the coil into a bath of liquid gelatine material and rotating the coil about its axis to effect successive deposit of a thin layer of the material for the length of the wax ribbon, applying a hardening agent and drying the material after the deposit, repeating the successive deposition and application of hardening agent and drying until a film of the desired thickness has been established, and withdrawing the ribbon-like film from the wax ribbon as a matrix for producing duplicate copies.

6. A method for producing a duplicating matrix from a wax ribbon having a mechanical sound record upon the surface thereof, which comprises supporting the wax ribbon as a helical coil, dipping a portion of each convolution of the coil into a bath of liquid gelatine material and rotating the coil about its axis to effect successive deposit of a thin layer of the material upon a length of the wax ribbon, blowing a gelatine-hardening material upon portions of said convolutions which are out of the bath and drying the material, repeating the successive deposition, hardening and drying operations until a film of the desired thickness has been established, and with-

drawing the ribbon-like film from the wax ribbon as a matrix for producing duplicate copies.

7. A method for producing a duplicating matrix from a wax ribbon having a mechanical sound record upon the surface thereof, which comprises preparing a thin layer of gelatine material, bringing the recorded surface of the wax ribbon into contact with said thin layer and thereby depositing the layer upon the wax ribbon, hardening the layer of material by the action of the hardening agent and drying the same, repeating the successive deposition and hardening until a film of the desired thickness has been established, and withdrawing the ribbon-like film from the wax ribbon as a matrix for producing duplicate copies.

8. An apparatus for producing a duplicating matrix from a wax ribbon having a mechanical sound record upon the surface thereof, comprising a container for a bath of liquid gelatine material, a support for said wax ribbon comprising a carrier of helical form, means for presenting a portion of each convolution of the wax ribbon on said carrier in the bath and for rotating the wax ribbon about the helical axis to effect successive deposit of a thin layer of the material upon the length of the wax ribbon, and means for blowing a hardening agent upon a portion of the layer which is out of the bath.

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