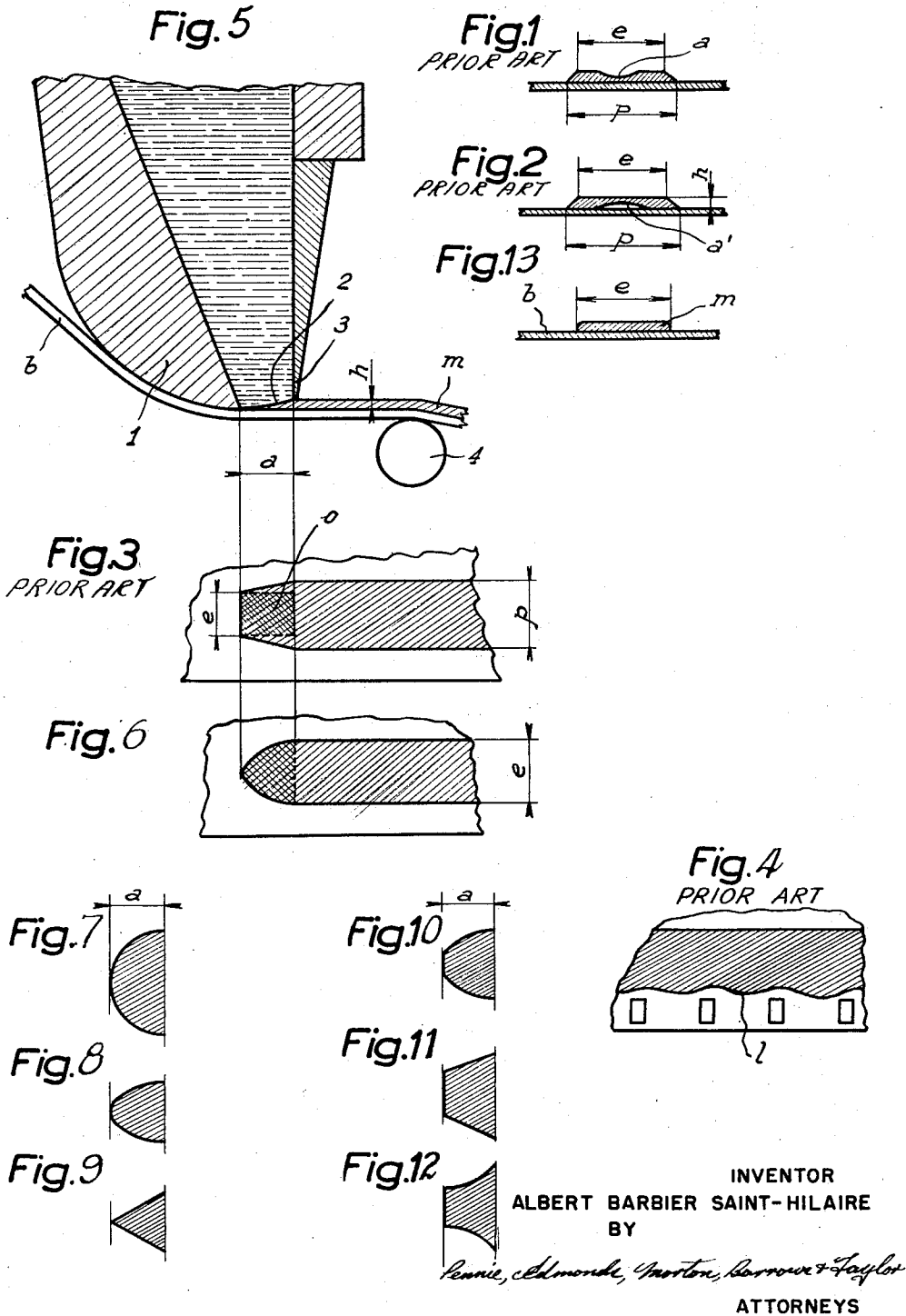


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A. BARBIER SAINT-HILAIRE 2,891,506
 APPARATUS FOR THE DEPOSIT OF A COATING ON A FLEXIBLE
 BAND AND IN PARTICULAR FOR THE DEPOSIT OF MAGNETIC
 SOUND TRACKS ON CINEMATOGRAPHIC FILMS
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APPARATUS FOR THE DEPOSIT OF A COATING ON A FLEXIBLE BAND AND IN PARTICULAR FOR THE DEPOSIT OF MAGNETIC SOUND TRACKS ON CINEMATOGRAPHIC FILMS

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The terminal portion of the term of the patent subsequent to December 18, 1973, has been disclaimed

3 Claims. (Cl. 118—415)

In my copending application Serial No. 296,111, filed on June 28, 1952, now Patent No. 2,774,327, I have in particular described a method of depositing a coating on a flexible band, which consists in passing one side of the band over a cylindrical surface element and having said band leave the cylindrical surface in a given direction tangential to said surface at a point near a constant-width aperture provided in said surface for the coating composition to pass the upstream part and finally of limits of said aperture by an edge disposed along a generatrix of the cylindrical surface at a predetermined distance from the afore-mentioned tangent.

I have also described in the said patent application a device for performing the method just described, this device comprising a coating nozzle including a cylindrical surface under and in contact with which the band to be coated passes, and which is provided at its lower end with one or more apertures of appropriate width, limited downstream by a scraper the lower edge of which extends along a generatrix of the theoretical extension of the said cylindrical surface.

Now, I have found that the constant width of the coating apertures, leads to certain drawbacks that it is the object of the present invention to eliminate.

The invention will be further and more fully described in connection with the accompanying drawings, in which:

Figs. 1 and 2 are transverse sectional views showing a deposited record track embodying defects such as occur with present known methods of making magnetic sound tracks,

Fig. 3 diagrammatically represents a projection upon a flexible strip of the coating aperture of the coating apparatus of the prior art.

Fig. 4 is a plan view of a section of a magnetic sound track record showing a more or less undulating shape which may result from the heretofore known methods of depositing the magnetic material upon the flexible strips,

Figs. 5 is a more or less diagrammatic sectional view of a coating nozzle forming a part of the apparatus of the invention,

Fig. 6 diagrammatically represents a projection upon a flexible strip of the constant-width coating aperture of the coating apparatus of the present invention.

Figs. 7 to 12 inclusive are projections of various shapes of openings which the aperture in the coating nozzle in Fig. 5 may take, and

Fig. 13 is a transverse sectional view of a strip of flexible material showing thereon the magnetic sound track deposited by the apparatus of Fig. 7.

If one examines the record track deposited by means of such an apparatus, one sees first of all that after drying it presents a central depression as shown at *a* in Fig. 1 of the accompanying drawings. This depression is due to the fact that during the passing of the strip, prior to its being coated, into contact with the cylindrical surface

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mentioned above, a film of air enters between the surface and band, which during the coating step, becomes concentrated into a narrow vein or filament situated in the middle of the track, between the strip and the coating composition, as shown at *a'* in Figure 2 of the accompanying drawings. During the drying process the entrapped air diffuses through the coating and causes the depression *a* illustrated in Figure 1.

Moreover, the resulting track is substantially wider than the uniform width of the aperture provided in the above-mentioned cylindrical surface.

In Figure 3 there is diagrammatically represented a projection, upon the flexible strip *b*, of the constant-width coating aperture, the projection being represented by the rectangle *o* having the width *e*. It is seen that the width of the deposited track *p* is greater than the width *e* of the coating aperture. This difference between *e* and *p* is caused by the fact that the coating composition discharged in line with the parallel side walls of the aperture is entrained and throttled under the effect of the static pressure prevailing at the level of the aperture. Such lateral overflow of the coating moreover is not uniform in thickness, and gradually diminishes along the edges, so that the cross section of the coating is substantially trapezoidal, as may be seen from the transverse cross section shown in Figs. 1 and 2.

Furthermore, in cases where distortions are present near the track, such as occur in any cinematographic film owing to the provision of the perforations serving to drive the film, the edge of the track may present a more or less undulating shape as shown at 1 in Fig. 4.

The present invention has as objects the elimination of the various drawbacks mentioned.

In order to overcome the first mentioned drawback, namely the central depression or collapse of the track, it is only necessary to impart to the rear portion of the coating aperture a more or less tapered form so that the coating which then enters into contact with the strip along a median line of the track to be coated, will separate the air layer into two sheets, whereby said air will be able to escape laterally, as soon as the strip starts departing tangentially from the cylindrical surface of the coating nozzle.

In order to remedy the second above mentioned drawback (excessive width of the track, trapezoidal cross section, undulations along any perforations that may be present), it is simply necessary to provide for a gradual variation of the width of the coating aperture before the scraper ridge. In such case, it will be the final length of the aperture, in line with the scraper ridge, which will determine the desired width of the track.

The invention therefore, relates to an apparatus for the deposit of narrow coated zones such as magnetic sound tracks on cinematographic films or strips, comprising a feed nozzle the tip of which has externally a cylindrical surface under and in contact with which the film or strip to be coated is caused to pass, the lower portion of which cylindrical surface is provided with at least a slot, and the downstream edge of which is constituted by the straight edge of a scraper disposed along or parallel to the generatrix of the said cylindrical surface, said apparatus being characterized by the fact that said slot has a transverse dimension (as measured transverse to the direction of travel) which increases along at least a part of its dimension in the direction of travel.

Further features and advantages of this invention will appear from the ensuing description and the accompanying drawings which illustrate schematically some forms of embodiment of the invention.

As shown in Fig. 5, the strip *b* to be coated, as in my foresaid copending application, passes under a coating nozzle which essentially includes a cylindrical por-

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tion 1, under and in contact with which the strip to be coated passes prior to the coating step, the said nozzle is provided at its lower end with one or more coating apertures 2 defined at the forward or downstream edges thereof by a scraper 3, the bottom edge of which extends along a generatrix of the theoretical surface extending the said cylindrical surface 1.

As in the afore-mentioned patent the strip *b* departs tangentially from the cylindrical surface 1, being supported on a backing roller 4 which is so vertically adjusted with respect to the elevation of the lower edge of scraper 3 as to deposit over the surface of the strip a layer *h* of coating material *m* of the desired thickness.

The strip *b*, may be caused to pass under the nozzle 1, and over the backing roller in any manner known in the art.

According to the invention the width of said coating aperture 2, instead of being constant as was provided for in the previously mentioned application, has a width that increases, over the full length *a* of the aperture, or only over a part of said length, from the rear edge of the aperture, that is, from the point at which the strip *b* departs tangentially from the cylindrical surface 1 towards the scraper 3.

Apparently the best shape for the nozzle opening is the one shown in Fig. 6, viz., an ogival configuration having its apex located approximately at the point of tangency of the strip with the cylindrical surface and with its base coinciding with the scraper ridge. Such a shape will make it possible to overcome both of the above mentioned drawbacks, that is, the central collapse illustrated in Fig. 1, and the excessive width of the track coating as shown in Fig. 3.

Instead of the ogival form shown in Fig. 6 a semi-circular configuration may be provided, as shown in Fig. 7, or a semi-elliptical one, as illustrated in Fig. 8, or even a triangular configuration as illustrated in Fig. 9, the particular shape to be used being selected in accordance with the rate desired for the coating operation, and the viscosity and the thixotropic characteristics of the composition.

If on the other hand there is no special reason to anticipate or to fear the median collapse illustrated in Fig. 1, coating apertures might also be used in which the nozzle openings are of the shapes illustrated in Figs. 10 to 12 wherein the width progressively increases from the rear to the forward end of the aperture.

Fig. 10 relates to the instance where the side edges of the aperture are convex, Fig. 11 to the case where such edges are straight, and Fig. 12 illustrates the instance where said edges are concave; in all case however, the width progressively increases throughout the full length of the aperture.

It will be understood that in such cases, as also in all the cases shown in Figs. 6 to 9 where the width of the aperture continually increases from the rear to the forward edge of the orifice, that if there was a tendency for the coating composition to spread or squirt out laterally due to the static pressure existing at the level of

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the aperture, the composition which would thus tend to overflow would be "swallowed up" progressively during the passing of the strip beneath the nozzle opening, thereby contributing to feed the track within the limits of the desired width *e*, and impart to the track a cross sectional configuration of the type shown in Fig. 13.

It will be seen from this figure that the track *m* laid down on the strip *b* has exactly the desired width *e* without any spread-out nor sloping sides, nor is there a central depression as was the case in Fig. 1 which illustrates the result obtained with the use of the applicant's earlier devices described in the application mentioned above.

Moreover, it must be specified that the lateral guiding means for the film are to be provided only in the zone where said film is in contact with the external cylindrical part 1 of the coating nozzle.

I claim:

1. In an apparatus for depositing a sound track on a flexible film comprising a nozzle having a part which is shaped externally according to a cylindrical surface and at least one aperture along that part of the cylindrical surface, the upstream edge of said aperture being substantially coincident with the generatrix of said cylindrical surface and situated at a location approximately where said film leaves said cylindrical surface tangentially thereto, while the downstream edge of said aperture is constituted by the lower edge of a scraper situated substantially on the extension of said cylindrical surface at a pre-determined distance from the line from which said film leaves said cylindrical part, so that said lower edge of the scraper is situated at a level above the path of travel followed by said film from the line at which said film leaves said cylindrical part, and in which the film is advanced past the nozzle and is caused to pass over and in contact with a substantial portion of the cylindrical surface immediately upstream of the aperture; the improvement in which the distance between the lateral side edges defining the nozzle aperture normal to the direction of movement of the film under the nozzle, progressively increases from the upstream edge of said aperture to the downstream edge thereof.

2. In an apparatus as claimed in claim 1, the further improvement in which said lateral side edges of said nozzle aperture are curved from their upstream edge to their downstream edge.

3. In an apparatus as claimed in claim 1, the further improvement in which said lateral side edges of the nozzle aperture are straight.

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