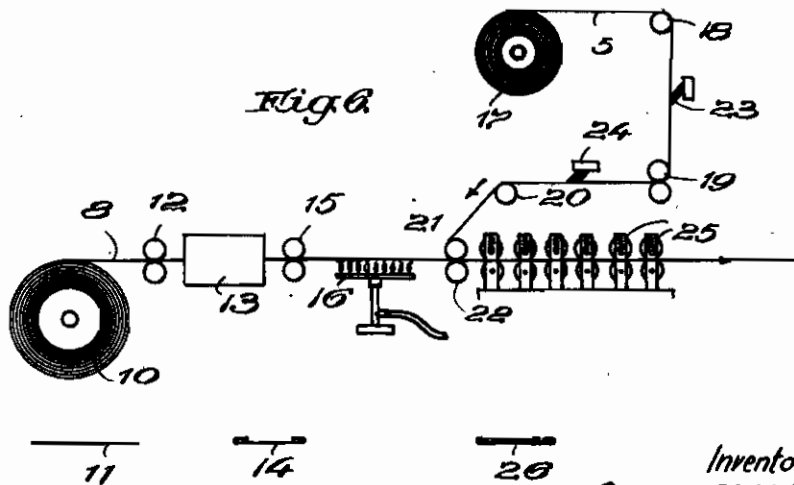
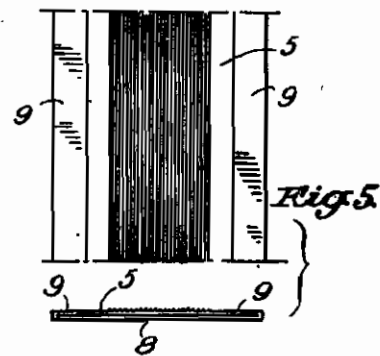
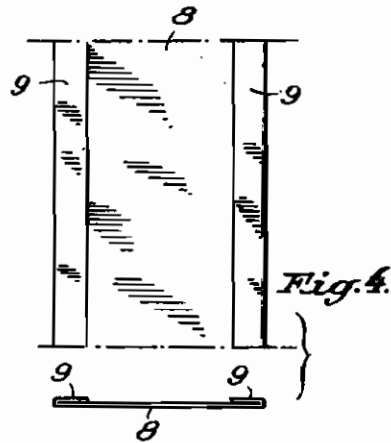
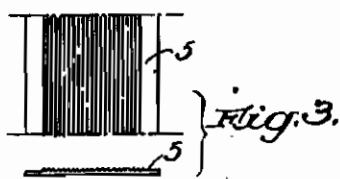
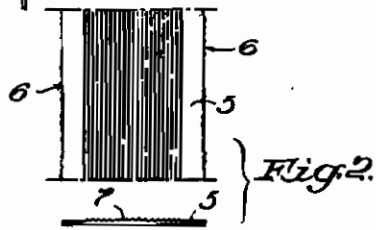
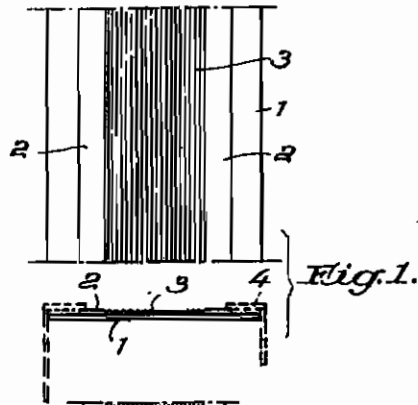


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METHOD OF AND DEVICE FOR PRODUCING
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METHOD OF AND DEVICE FOR PRODUCING SOUND BAND MATRICES

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It is known to produce sound band matrices galvanoplastically. For this purpose, it has been proposed to provide an original sound band bearing the sound record, for example a wax band, with an electrically conductive surface and then to place it in a galvanic bath, in which a copper deposit is produced on the recorded side of the band, which copper deposit, after having been separated from the original sound band, represents the matrix.

This manner of producing pressing or stamping matrices has the disadvantage of taking up much time and being rather expensive, particularly when it is the question of producing broad sound band matrices with a number of sound tracks running at the sides of each other. It requires comparatively much time until the matrix has acquired the necessary thickness in the galvanic bath.

Further disadvantages of the method described are that, owing to the absolutely necessary current connection at the conductive surface of the original sound band, the galvanically produced matrix will always be narrower than the original sound band, and that the edges of the matrix are not smooth so that both edges of the matrix have to be cut straight. This still more reduces the already smaller width of the matrix and, therefore, it is necessary from the beginning to make the matrix in the galvanic bath considerably wider. Moreover, galvanically produced sound band matrices of copper are too soft for the production of large series of sound bands in a pressing or stamping operation, and it is not at all desirable to use the original matrix for pressing or stamping operations, because, if this matrix is damaged or spoiled, the original record is not available any more. Therefore, it is necessary to use the original matrix for first making a patrix from which one or several pressure-resisting matrices are produced for the pressing or stamping operation. The patrix is produced in a galvanic bath, the original matrix serving as a cathode. The result of this is that, for the reasons given above, the width of the patrix will be still smaller than the already considerably reduced width of the original matrix. The same disadvantage occurs when the matrix intended to serve for the pressing or stamping operation is produced from the patrix. In order to obtain a pressing matrix corresponding to the normal width of the sound band suitable for reproduction, it is, therefore, necessary to produce an original matrix the width of which is equal to about $1\frac{1}{2}$ of the width of the pressing matrix.

The object of the invention is to obviate these as well as other disadvantages of the known method. This is achieved, in the first place, by producing the matrix or patrix band in the galvanic bath so as to have a width only slightly exceeding the width of the sound track bundle and a thickness amounting to merely a fraction of the required thickness, the band obtained in this manner—if necessary, after having its edges worked—being inserted in an unrecorded wider metal band the edge portions of which have the desired thickness of the matrix or patrix, and the central portion of which is provided with an opening corresponding to the cross section of the galvanoplastically produced band.

In this case, there is adopted a measure known in the manufacture of gramophone records consisting in soldering a very thin disc-shaped pressing or stamping matrix, with a thickness of only a few tenths of a millimeter, on to a thick metal plate, in order to protect the matrix against certain influences of the plate material employed, as well as against careless handling by the operator.

The method is advantageously carried out in a manner in which the matrix or patrix band is produced in the galvanic bath so as to have a thickness equal to one half of that required, in a width but slightly exceeding the width of the sound track bundle, the band obtained in this way being fixed to the central portion of a wider, unrecorded metal band of equal thickness, the free edge portions of this metal band being folded round until their edges touch those of the recorded band.

For making pressing or stamping matrices for the production of very large series of sound bands, the invention provides that an original matrix is inserted in a widening band of the type described, the recorded side of the composed band obtained in this manner being coated with an oxide layer, whereupon a patrix having a width equal to that of the total band is produced in a galvanic bath, said patrix—if necessary, after its edges have been worked—being inserted in another widening band, the composed band obtained in this manner being coated with an oxide layer, and, finally, a thick nickelled and chromed pressing or stamping matrix being produced from the composed patrix band in a galvanic bath.

Advantageously, the narrow recorded matrix or patrix band is continuously fed to a uniformly moved, heated widening band, at the same time applying to its recorded side a protective coating

preventing it from tarnishing, and its back being coated with a soldering fat, both bands being pressed together from the place where they come into contact with each other. This part of the method is preferably carried out by means of an arrangement which is provided with a device for continuously folding the edge portions of a uniformly moved, unrecorded band, a device for uniformly feeding and inserting the narrow recorded matrix or patrix band in the channel formed by the folded edge portions of the unrecorded band, a heating device for the unrecorded band disposed between the folding device and the place where the recorded band is fed in, and a device for pressing together the two combined bands behind the feeding-in place. The device for feeding the recorded band may be provided with elements serving to apply a protective paste to the recorded side of the band, and with elements for applying soldering fat to the back of the band. The device for pressing the bands together behind the feeding-in place of the recorded band advantageously consists of individual spring-controlled rollers.

The method forming the subject of the invention is diagrammatically illustrated in the accompanying drawing which also contains a diagrammatical illustration of a device of the type described.

Fig. 1 shows a plan view and a section of a piece of a recorded original sound band;

Fig. 2 is a plan view and a section of the original matrix produced from the sound band according to Fig. 1 after the original sound band has been separated; and

Fig. 3 also shows a plan view and a section of the cut original matrix.

Fig. 4 is a plan view and a section of a piece of a widening band; and

Fig. 5 is a plan view and a section of the widening band according to Fig. 4 with the inserted original matrix according to Fig. 3;

Fig. 6 illustrates the device for inserting the original matrix in the widening band and for producing the latter.

The original sound band, for example, consists of a nitrocellulose band 1 coated with a wax layer 2 into which are cut the sound grooves 3. After having been recorded, the band is coated with graphite, or its recorded side is provided with some other conductive coating. Thereupon the band is placed in a galvanic bath, the conductive coating of its recorded side being connected to the source of current of the bath. For this purpose, there are provided the indicated clamping devices 4 which pass beyond the edge of the conductive surface layer.

The copper deposit, which is now produced in the galvanic bath, forms a matrix between the clamping devices 4 on the graphite-coated surface of the original sound band, the deposit-forming operation being continued until the thickness of the matrix has reached one half of the thickness required. Then, the matrix is drawn off the original sound band; now it has the shape illustrated in Fig. 2 and is marked 5. Its edges 6 are irregular; the sound tracks, which in the original sound band had the shape of grooves 3, are formed by ribs 7.

Now the matrix 5 which, as mentioned, is only half as thick as necessary or as desired, is cut at its edges. A matrix with smooth edges is illustrated in Fig. 3.

As will be seen from Figs. 1 to 3, the matrix has already considerably lost in width as com-

pared with the width of the wax layer of the original sound band. Its width has been reduced by the galvanizing operation as well as by the working of its edges as compared with the wax layer 2 of the carrier layer 1 of the original sound band. If the matrix according to Fig. 3 would be used to galvanically produce a patrix, and if a matrix would be made of this patrix, the width of the last mentioned matrix would be considerably smaller than that of the original matrix.

In order to compensate the loss of width, the invention provides the use of a widening band. A piece of such a band is illustrated in Fig. 4. It consists of a smooth copper band 8, whose edge portions 9 are folded round. The band 8 has the same thickness as the matrix 5 according to Fig. 3 and, therefore, in its central portion has half the thickness, and in its edge portions the full thickness of the matrix band to be produced.

Now, the matrix 5 is inserted, with the sound record side out, in the opening formed by the folded edges 9 of the widening band 8, whereas the back of the matrix is soldered on to the bottom of the opening. This is illustrated in Fig. 5. By the one-piece connection a matrix band is produced which has the desired thickness and a considerably greater width than the galvanically produced matrix band 5. Nevertheless, only a part of the entire matrix requires to be produced galvanically.

The composed matrix according to Fig. 5 is now provided on its recorded side with an oxide layer, for example by silvering the recorded side and subsequently oxidizing the silver layer in a bath consisting of a solution of iodine and bromine in alcohol. Thereupon the matrix is again brought into the galvanic bath and a patrix is produced therefrom, which, after having been cut at its edges, is also narrower than the matrix. In order to compensate this loss in width, the patrix is inserted in the manner described above in a widening band according to Fig. 4 and is soldered on to this band. The total patrix widened in this way is again coated on its recorded side with an oxide layer and is brought into the galvanic bath, in which a matrix is produced therefrom. This matrix is then wide enough to be used for pressing or stamping sound bands. The pressing or stamping matrix is produced in the galvanic bath either in full thickness or in a fraction of this thickness, in which case it is attached to a band having the missing thickness of the matrix. Finally, the pressing matrix is nickelled and chromed and is then ready for use.

The inserting of the original matrix or of the patrix in the widening band and the soldering together of these two bands is advantageously effected in a device illustrated diagrammatically in Fig. 6. This device comprises a drum 10 upon which is wound the folded widening band 8; the cross section of this band is illustrated at 11. A pair of rollers 12 conducts the band to a folding device 13, in which the edge portions 9 of the band are folded round. After leaving the folding device, the band has the cross section illustrated at 14 corresponding to that of Fig. 4. Thereupon the widening band passes through another pair of rollers 15 behind which it is heated by any desired type of device 16.

The matrix band 5 is wound at 17 upon a drum and runs over the rollers 18, 19, and 20 to the entrance place of the pair of rollers 21, 22, between which also passes the widening band 8.

At 23 a device is indicated which provides the recorded side of the matrix band with a coating serving to prevent the sound tracks from tarnishing under the influence of the heat required for soldering together the bands 5 and 8. The coating is water-soluble and is washed off after the two bands have been soldered together. At 24 is indicated a device for coating the back of the matrix band with soldering fat. The matrix band is inserted through the rollers 21, 22 in the opening of the widening band, and behind the rollers 21, 22 there are arranged spring-controlled individual rollers 25 above and below the two bands 5 and 8, serving to press the matrix band, the back of which is coated with soldering fat, against the heated widening band. After having passed through the system of rollers 25, the bands 5 and 8 are rigidly connected with each other. The cross section of the combined band system is illustrated at 26.

The device illustrated in Fig. 6 is used in a similar manner for inserting and connecting the patrix band in a widening band.

The invention is not limited to inserting a galvanically produced matrix or patrix band, having half the thickness of the matrix or patrix to be produced, in a widening band the central portion of which has the same thickness as the galvanically produced matrix or patrix band; but it is also possible to galvanically produce a matrix or patrix band whose thickness represents a different fraction of the total thickness required, and this band may be inserted in a widening band whose edge portions have the required total thickness of the matrix or patrix, and whose central portion has an opening, the depth of which is equal to the thickness of the galvanically produced matrix or patrix band.