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METHOD OF COATING WAX BANDS, BEARING A MECHANICAL SOUND RECORD, WITH GRAPHITE, AND A DEVICE FOR CARRYING OUT THIS METHOD

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Fig. 1.

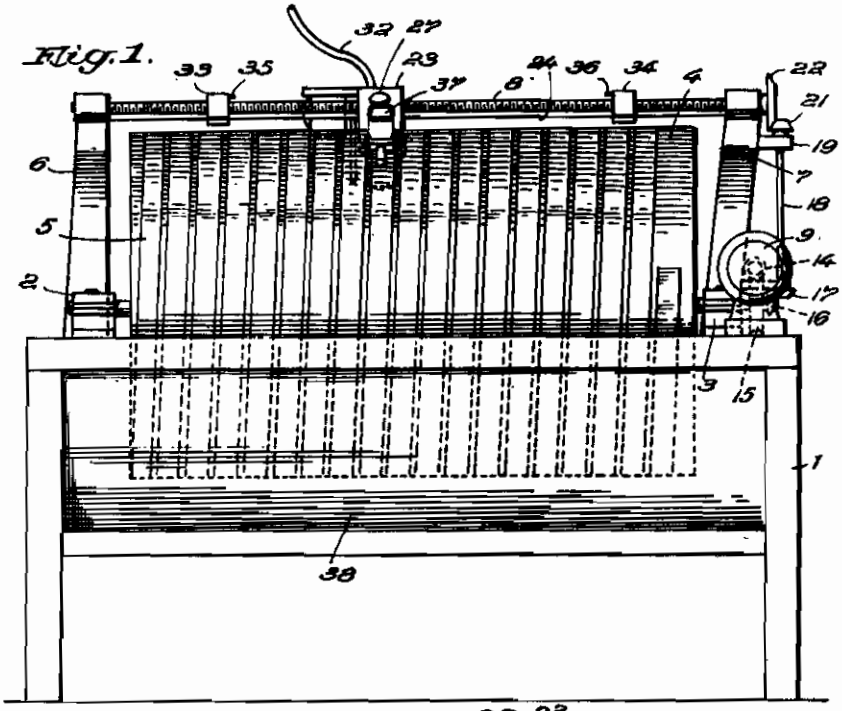
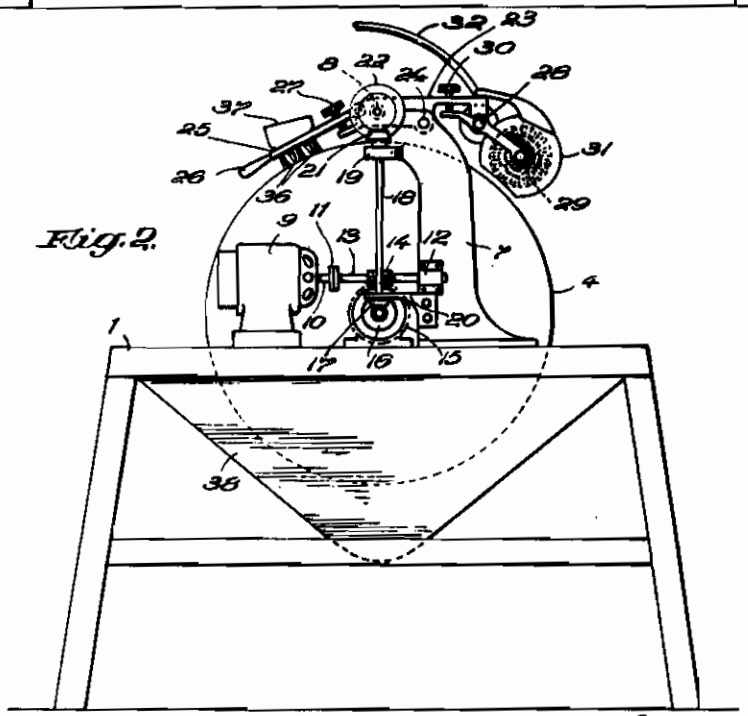


Fig. 2.



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ALIEN PROPERTY CUSTODIAN

METHOD OF COATING WAX BANDS, BEARING A MECHANICAL SOUND RECORD, WITH GRAPHITE, AND A DEVICE FOR CARRYING OUT THIS METHOD

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The invention relates to a method of coating wax bands, bearing a mechanical sound record, with graphite, and to a device for carrying out this method, it relates particularly to a method and a device for coating bands consisting of a flexible carrier lever with a thin wax layer deposited thereon and bearing the sound record, a number of coadjacent sound grooves being cut into the surface of said wax layer by means of a stylus parallel or nearly parallel to the edge of the band. In the present case, the coating with graphite serves the purpose, known per se, to make the recorded surface of the original sound carrier electrically conductive so that it is possible to produce a matrix thereof in a galvanic bath.

Since long, the general proposal is known to coat the surface of original sound bands, whose sound record layer consists of wax, with graphite; but a suitable method of carrying out such coating with graphite is lacking. Hitherto, coating short pieces of sound bands with graphite could be carried out manually so as to make it possible to produce a matrix in a galvanic bath; but in coating long sound bands with graphite, it was found that certain portions of the surface would not readily take the graphite coating although the graphite coating of these portions of the wax band showed a glossy, metallic black surface.

Investigations have proved that this difficulty is due to the fact that said portions of the surface of the wax band have been overpolished, that is, the graphite has been pressed so much into the wax and has been smeared over with fine wax to such an extent that the individual graphite particles have become highly isolated. Since the adhesion and stickiness of wax is very considerable, it is impossible, even by repeatedly brushing over, to remove a graphite particle, surrounded by wax, out of its position.

According to the present invention, this difficulty is obviated in coating the sound band with graphite by continually and uniformly polishing the graphite powder applied to the recorded surface of the sound band by uniform strokes extending over the entire length of the band until the latter has acquired a glossy, metallic black appearance. By the polishing strokes extending over the whole length of the band it is attained that all parts of the surface of the sound band are treated for a certain uniform period by the graphite coating tool, which advantageously consists of a camel hair brush, and when the surface of the wax band has acquired a glossy, metallic black appearance, the polishing with graphite powder is finished and the wax band is ready for the galvanic treatment. To continue the polishing with the graphite coating tool after this state has been reached is not only useless but detrimental because it leads to said over-polishing of the band.

In order to save room, the invention provides to wind the recorded original sound band helically upon a drum in a manner known per se, and to move a polishing brush, which is continuously supplied with graphite powder, along the drum in accordance with the rotation of the drum and with the pitch of the helical line formed by the sound band. The excess of graphite particles between the contours of the sound grooves are removed according to the invention by means of a rotating brush and are carried off from the surface of the sound band by means of a suction device.

For carrying out said method, the invention provides a device having parallel to the axis of a drum, serving to helically wind upon it the original sound band, a guide upon which there is arranged, shiftable in longitudinal direction, a polishing brush serving to spread the graphite powder applied to the surface of the wax band. The device for supplying the graphite is preferably built into the polishing brush.

Advantageously, the polishing brush is movable and adjustable in radial direction to the drum. In addition, the invention provides that the guide running parallel to the axis of the drum carries, besides the polishing brush, also the rotating brush for removing the excess of graphite particles and the suction device required therefor. The polishing brush, the rotating brush, and the suction device are advantageously fixed to a common slide.

In order to simplify the driving of the graphite coating device, the guide lying parallel to the axis of the drum may consist of a screw spindle having a common drive with the drum. It is advisable to effect the driving by a direct current motor provided with a pole reversing device controlled by the slide of the graphite coating device and serving to change the direction of rotation of the motor, said pole reversing device comprising two contacts adjustable along the spindle, so that it is possible to bring the reversing points of the graphite coating brush in the simplest manner to correspond to the length of the band to be coated with graphite.

A constructional example of a graphite coating device according to the invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a front view of the device, and Fig. 2 is a view as seen from the right in Fig. 1.

On a frame 1 there is supported in two bearings 2, 3 a drum 4 upon which the wax band 5 with the sound grooves is wound in a helical line. The frame 1 also carries two bearing brackets 6, 7 holding a screw spindle 8 parallel to the axis of the drum 4. This spindle and the drum are driven by a common motor 9, advantageously a direct current motor, whose shaft 10 is connected via a coupling 11 with a shaft 13 supported at 12 in the bearing bracket 7. On the shaft 13 there is a worm 14 engaging a worm wheel 15 carried by the shaft 2 of the drum. The shaft of the drum carries a bevel wheel 16 engaging a bevel wheel 17 attached to the lower end of a vertical shaft 18, which is supported in lateral projections of the bearing bracket 7. At the upper end of shaft 18 there is a bevel wheel 21 engaging a bevel wheel 22, which is attached to the spindle 8.

The spindle 8 also carries a slide 23 with a corresponding inside thread, said slide being prevented from turning with the spindle by a rod 24, around which it extends, the rod 24 running parallel to the spindle 8 between the bearing brackets 6, 7. The slide carries a brush 25 with camel hair bristles, the brush being linked to the slide and folding upwards by means of a handle 26 or downwards in an end position, in which it is suspended over the drum 4 and may be accurately adjusted with respect to the drum by means of an adjusting screw 27.

The slide also carries a disc-shaped brush 28 having bristles at its circumference and being rotatably supported at 26. The brush 28 may be driven in any suitable manner, for example via a flexible shaft or by means of an auxiliary motor, and is also adjustable by means of an adjusting screw 30 with respect to the drum 4. The brush 28 is disposed in a housing 31 which is open towards the drum 8 in order to give the brush access to the drum. A suction piping 32 is attached to the housing 31.

On the screw spindle 8, at both sides of the slide 23, there are arranged runners 33, 34 shiftable along the spindle and adjustable, each runner being provided with a contact 35 and 36 respectively. These contact runners form a part of a pole reversing device of the direct current motor 9 and are inserted in the circuit of the motor in such a manner that, when the brush slide, in its movement along the spindle 8, knocks against one of the contacts, the direction of rotation of the armature of the motor is reversed. Since pole reversing devices of this kind are known per se, the arrangement of the connections is not illustrated in the drawing.

When starting the graphite coating device, all brushes are at first screwed up. Then the wax band is wound upon the graphite coating drum, during which operation it should be absolutely avoided to touch the wax surface with the hand. At certain distances the wax band is fixed at its not waxed edge to the drum by means of not illustrated clips. When the wax band is completely wound upon the drum, the motor 9 is switched on and the wax band is slightly polished with some wadding. Thereupon some graphite is strewn on wadding, and the band is once more polished slightly. After this preliminary treatment, the contact runners 33, 34 are adjusted to the length of the band, and the brush 25 is carefully screwed down so far that the points of the bristles are only slightly bent. Into the brush 25 there is built a funnel 37 having a number of outlets 36 between the bundles of bristles. The funnel 37 is continually fed with graphite powder, which the brush spreads uniformly over the wax surface. Since the drum 4 rotates without interruption and the brush slide is moved along the drum according to the pitch of the helical line formed by the wax band, the brush performs a polishing stroke extending from the beginning to the end of the wax band. When the brush arrives at the end of the band, the brush slide knocks against the contact 36 and causes the direction of rotation of the motor 9 to be reversed, which also reverses the direction of rotation of the drum 4 and of the screw spindle 8. Then the brush 25 performs the next polishing stroke from the end towards the beginning of the wax band. When the brush arrives at the beginning of the band, the slide knocks against the contact 35, which again causes the direction of rotation of the motor 8 to be reversed, etc.

The time required for the graphite coating operation depends upon the length of the band and the circumferential velocity of the graphite coating drum. The band is properly coated with graphite when its surface has a glossy, metallic black appearance. When this state is reached, it is absolutely necessary to stop the coating with graphite, as otherwise the band will be overpolished.

When the wax band is perfectly coated with graphite, the brush 25 is screwed up, the rotating disc-shaped brush 28 is screwed down, and the suction device is put into operation. The brush 28 exclusively serves to brush out the graphite particles between the contours of the recorded wax band, these particles being drawn out by the air current of the suction device so as to prevent them from settling again on the surface of the wax band. After the entire surface of the wax band has been brushed out and the excess of graphite particles has been sucked off, the whole graphite coating device is put out of operation.

The graphite coating drum is enclosed at the bottom by a box 38, in which the excess of the graphite powder, that has fallen off from the wax band, is collected. This waste of graphite powder is suitable to a limited extent to be used again in the coating process. However, repeatedly used graphite has a considerably reduced conductivity, for which reason it is necessary to continuously add new graphite. The bad state of the graphite is caused by the burning of the pure graphite and the remaining of impurities, such as soot, etc. Therefore, the graphite collected in the box 38 is passed through a very fine strainer and is then mixed with new graphite in the proportion of 1 to 3. The graphite employed must have a fineness of grain amounting to 0.6 to 0.8 of a thousandth part of a millimeter.

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