

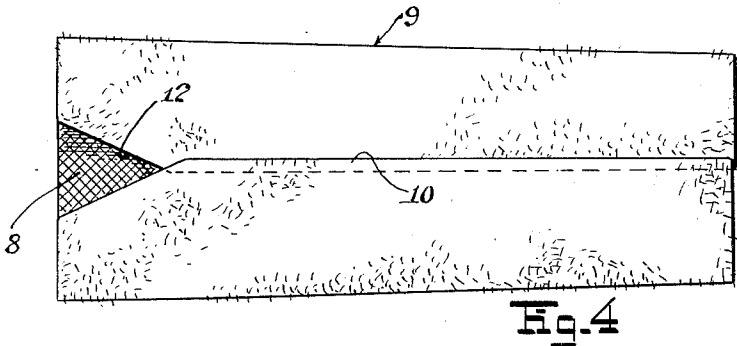
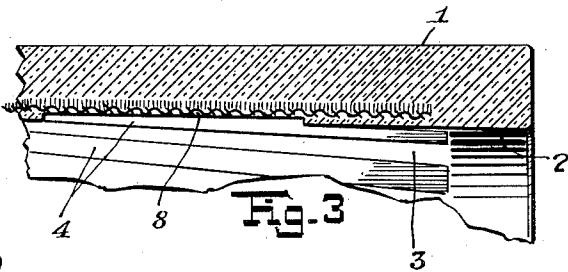
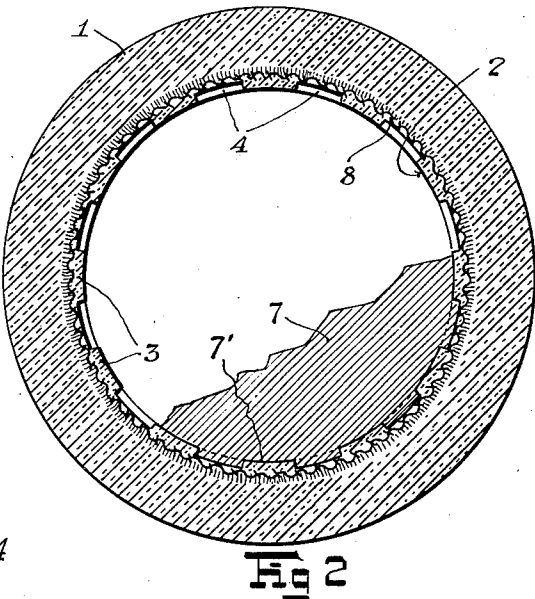
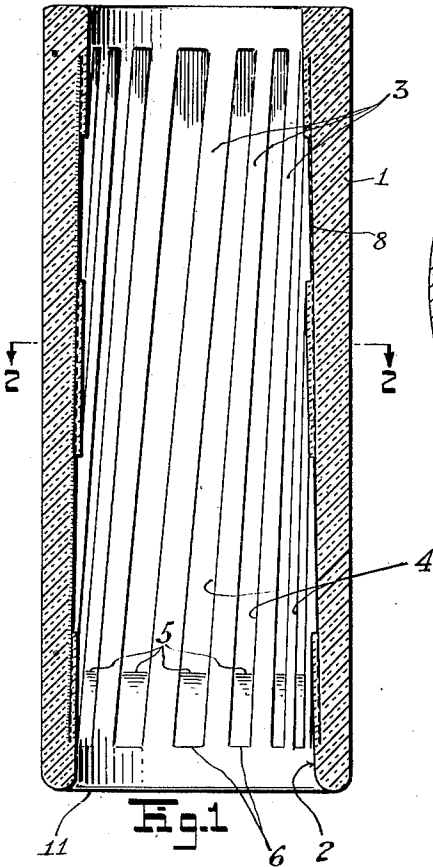
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J. W. NELL

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PHONOGRAPH RECORD

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Inventor

James W. Nell

Henry Lanahan

Attorney

UNITED STATES PATENT OFFICE

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PHONOGRAPH RECORD

James W. Nell, Nutley, N. J., assignor to Thomas A. Edison, Incorporated, West Orange, N. J., a corporation of New Jersey

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This invention relates to phonograph records and more particularly to an improved construction of such records, the term "record" being herein employed in the sense of a record body or tablet irrespective of whether the same bears a recordation or not.

My invention has especial utility and is herein illustrated and described in connection with hollow cylindrical records of the type commonly used in connection with business phonographs or dictating machines, but it will be understood that no unnecessary limitation of my invention to this type of record is intended.

The more general objects of my invention are to provide a reenforced record of great strength and to construct such record in a novel and improved manner.

It has been found desirable to employ napped materials or fabrics as the reenforcing medium in phonograph records since, when such a material is molded into the record body, the many fibers constituting the nap thereof become separately embedded into the record to form a firm tenacious adherence between the reenforcing material and the record proper. There is a tendency, however, during the molding process, as when the molten record material is poured into the record mold, for some loose particles, fibers or lint of the nap to be carried by the flow of the record material out into the record proper. Such escape of particles from the nap of the reenforcing material is to be avoided as the presence of these particles in the record proper causes an increase in the surface noise of the record.

It is an object of my invention to employ napped reenforcing materials in phonograph records in a novel and improved manner whereby to prevent an escape of loose particles of the nap of such materials into the record proper during the record molding process.

Another object is to fulfill the function just stated by suitably sizing or impregnating the reenforcing material preliminary to the use of the same in the record construction.

A further object is to provide an effective impregnating medium for the present purpose which will integrally unite with the record proper during the record molding operation and which will have substantially the same temperature expansion and contraction characteristics as the record material itself whereby to minimize internal stresses and strains within the record.

Still further objects are to provide an improved composition liner for phonograph records and a configuration of the same which will per-

mit a utilization to greater advantage of the record proper.

Other and allied objects of my invention will more fully appear from the following description and the appended claims.

In the description of my invention reference is had to the accompanying drawing, of which:

Figure 1 is a longitudinal sectional view of a hollow cylindrical phonograph record incorporating my invention;

Figure 2 is an enlarged transverse sectional view of this record, taken on the line 2—2 of Figure 1, and showing also in transverse section a portion of the mold core by which the bore of the record is formed;

Figure 3 is a view in longitudinal section and also to enlarged scale of a portion of the record here shown; and

Figure 4 is a view illustrating certain details in the construction of the record reenforcement.

In the accompanying drawing there appears a cylindrical phonograph record 1 which embodies my invention. This record has a central bore 2 extending longitudinally therethrough by way of which the record is mounted on a support or mandrel of a phonograph (not shown). The bore 2 of the record is tapered from one end to the other in order that it may fit a corresponding taper provided on the mandrel, such tapering serving to locate the record on the mandrel and to adapt it to be held frictionally thereon. To provide ample bearing engagement between the mandrel and record, the bore of the record is suitably provided with helical ribs or projections 3 and intervening grooves 4. These grooves are preferably made of even depth except at the end portion of the record where the bore is enlarged in diameter. Here, starting at 5 in Figure 1, the bottoms of the grooves 4 are inclined so as to be parallel to the longitudinal axis of the record, the same merging with the surface of the bore of the record at points 6 near the record end. In so letting the grooves run out before they reach the end of the record, the record construction is strengthened and certain advantages in constructing the record are realized, as are explained in Miller Patent No. 1,976,795, entitled "Sound record tablet."

The ribs or projections 3 are produced in the molding of the record by means of a fluted mold core 7 fractionally shown in Figure 2. The molding of the record is carried out by the use of a cylindrical mold (not shown) which has the core 7 in the center thereof. This core is first wrapped with a reenforcing liner—which is here-

inafter described—and then there is poured a molten wax-like record material into the mold. In the present instance it is preferred that this record material consist of a mixture of metallic soap and diluents composed of free fatty acid and of natural and/or petroleum waxes. These diluents are added to reduce the congealing temperature of the composite mixture, the proportion of the diluents being preferably such as to reduce the congealing temperature down to about 280° F. (It will be understood that the term "congealing temperature" is here used to mean that temperature at which a liquid begins to harden, set or congeal as the temperature of the same is reduced.) When this molten record material has sufficiently cooled and congealed, the outer shell of the mold is stripped from the record and the record is removed from the mold core, the record being turned in correspondence with the fluting on the core during such removal. The record is then cut to proper length, the bore of the record is suitably reamed and the outer surface of the record is shaved.

It is found that the strengthening capability of a reenforcing material or liner for a phonograph record depends not only on the strength of the liner itself but also in great measure upon the amount of "grip" or adherence which the liner has with the record material. Materials having napped surfaces are particularly suitable for obtaining a strong tenacious adherence with the record proper, as aforementioned. It is however important that the fibers constituting the nap of these materials be firmly attached to and that they project largely individually from the base of the material; also, it is important that the interstices between these fibers be of such size that molten mediums, such as the record material, will be capable of percolating therethrough about the individual fibers of the nap to cause these fibers to become thoroughly embedded in and firmly interlocked with the surrounding medium. Preferably I use a close-mesh napped material such as flannel made of either wool or cotton, the latter being however in many cases the more desirable because of its low cost. A flannel for this purpose is employed in the present instance and is referred to in the figures as 8. This flannel is napped at least on one side thereof and is folded, as shown in Figure 4, into a sleeve 9 which is tapered to fit the mold core 7. In the folding of the flannel the napped side thereof is placed to the outside so as to be effective in forming a firm and tenacious adherence of the flannel to the record proper.

As aforementioned, there is encountered the difficulty in using napped materials as reenforcing liners for phonograph records that during record molding some fibers, lint, dirt or other loose particles contained in the nap of the reenforcing fabric become detached therefrom and are carried out into the record proper. I have found however that this difficulty may be effectively and simply overcome by treating or sizing the reenforcing fabric, before molding, so as to set the nap of the material. Also, such pretreating has the advantage that it gives body to the reenforcing fabric and thereby facilitates the handling and reshaping of the same.

My invention may be effectively carried out by sizing the napped material or flannel 8, before molding, with the use of the record material itself, the sizing being done merely by dipping or otherwise subjecting the fabric to the record material while the same is heated to such a state of

fluidity as to render the record material capable of readily penetrating the flannel. After treating, this flannel may be cut into pieces of a generally trapezoidal shape and each of the pieces may then be folded about a suitably tapered core (not shown) to form the aforementioned tapered sleeve 9; the adjoining edges of each piece being overlapped as at 10 and secured together as by cementing. The liner so formed is inserted into the record mold on the core 7 and the molten record material is poured into the mold while the liner and mold are initially at a temperature substantially below that of the molten record material. The result of using a mold and treated liner which are initially relatively cool is that during the time of greatest agitation of the record material in the mold—which is the time just following the pouring of the record material into the mold—the liner will not yet have come up to the temperature of the record material, and that by the time the liner does reach such temperature the record material will have come to a substantially still or quiescent state. This cooler temperature of the liner causes the impregnating medium thereof to have a relatively high viscosity (i. e., a relatively low degree of fluidity) during the moment of greatest turbulence or agitation of the record material, and thus the impregnating medium tends to hold the loose particles of the nap of the liner in place and to prevent their escape into the record proper.

While the record material itself may be employed effectively as the impregnating medium of the reenforcing liner, there is preferably employed an impregnating medium which has a congealing temperature which is higher than that of the record material; this is in order that, at the temperature of record molding, the impregnating medium will have a greater viscosity than the record material will have at that same temperature. Otherwise, however, it is desired that the impregnating medium have as nearly as possible the same consistency and the same temperature expansion and contraction characteristics as the record material. This greater viscosity of the impregnating medium will serve as an additional factor in holding the nap of the liner set during record molding. In having the viscosity at a not too high value, however, the impregnating medium will be able to flow into the grooves 7' of the mold core and form the ribs 3 in the bore of the record, and to diffuse with the record material at its surface of contact therewith to form an integral union with the record material.

A particularly suitable composition as an impregnating medium for the present purpose is one composed of metallic soap and of free fatty acid as a diluent, there being however a substantially lower percentage of diluent employed than in the case of the record material in order that the impregnating medium will have a suitably higher viscosity, as aforementioned. To this impregnating medium there is also added a dye, suitably of the coal-tar variety, to produce the desired coloring. The soap itself in this impregnating medium may be any one or a mixture of several kinds. For example, it may be a sodium, potassium, aluminum and/or lead salt of fatty acids such as stearic, oleic, palmitic, etc. Also the free fatty acid may be any one or a mixture of these several kinds.

The flannel 8 may be treated or sized by dipping the same in a heated bath of the impregnating medium. However, in order that only a thin

layer of the impregnating medium will adhere to the surface of the flannel when the same is removed from the bath it is desirable to thin the impregnating medium with a suitable solvent. This solvent may be any one or a mixture of the coal tar or petroleum products which have the property of dissolving mixtures of soap and free fatty acids at temperatures of from 200° F. to 400° F. For example, of the petroleum solvents there are kerosene and naptha and of the coal tar solvents there are solvent naptha and xylene. When, for instance, xylene is employed, the impregnating medium is preferably dissolved in from 5 to 12 times its weight of such solvent and the entire mixture is then maintained at a suitable temperature below the boiling temperature of the solvent, as at about 250° F., during the time the flannel is treated therewith. After the flannel is so treated, the solvent is driven off by prolonged heating at a medium temperature and the flannel is then formed into the sleeves 9, as aforescribed. When in the sizing of the flannel there is obtained only a thin layer of the impregnating medium on the flannel, some of the longer fibers of the nap of the flannel may project beyond the surface of its coating. These longer fibers, being usually only loosely attached to the nap of the flannel and of little value in securing an adherence of the flannel to its surrounding medium, are preferably removed by singeing the treated fabric and then brushing off the burnt particles from the surface thereof.

At the overlap 10 on the sleeves, the thickness of the sleeves is about twice normal. Such increased thickness is of no disadvantage except at the end 11 of the record where the bore 2 is the larger in diameter and the wall thickness of the record is at a minimum. Here any increase in the thickness of the sleeve has the effect of reducing the number of times the record can be reused—as it will be understood that hollow cylindrical records of the type here shown are reconditioned for reuse again and again by successively shaving off the used surface layers of the record. I find however that with a reinforcing liner of the type herein described I may

remove a portion of this overlap at the larger-diameter end of the sleeve while yet maintaining a record construction of superior strength. This removal of the overlap is preferably carried out by cutting the flannel piece for each individual sleeve with opposite corners thereof removed so that when this piece of flannel is folded into a sleeve, there will be formed a notch 12 in the larger-diameter end of the sleeve at its point of overlap.

It will be understood that my invention, as is herein illustrated and described, is subject to many changes and modifications without departure from the scope thereof, which I endeavour to express according to the following claims.

I claim:

1. A record comprising a body portion composed of metallic soap and diluent of soap and having embedded therein a sized napped reinforcing material, the sizing of said reinforcing material comprising metallic soap and less diluent than that in the composition of said record body portion.
2. A molded phonograph record comprising a close-mesh fabric having a nap, said fabric being sized before molding with a material filling the interstices thereof and forming a continuous surface, and a record material covering said sized fabric and in adherence therewith, said sizing material having a higher congealing temperature than said record material.
3. A phonograph record molded of a mixture of metallic soap and a diluent and including a composition liner comprising a napped fabric the nap of which is set, before molding, with a medium of metallic soap and of less diluent than that in said record composition.
4. A phonograph record composed of a mixture of metallic soap, fatty acid and other diluent and having embedded therein a liner comprising a napped fabric the nap of which is set, before molding, with a composition consisting of metallic soap and fatty acid.

JAMES W. NELL.