Jan. 26, 1954 R. L. McMULLEN 2,667,098

HEAD FOR MUSICAL INSTRUMENTS

Filed June 12, 1951 2 Sheets-Sheet 1

Fig 1

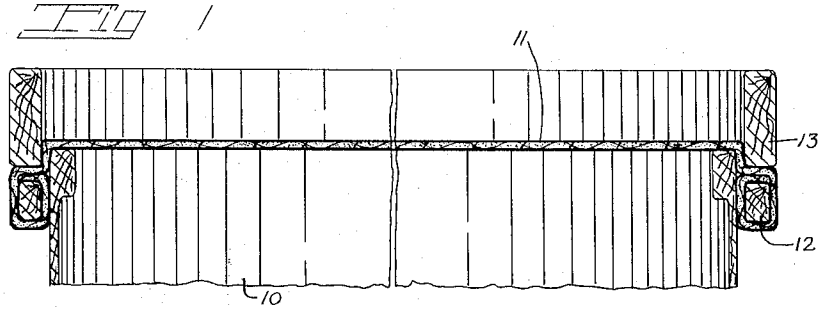


Fig 2



Fig 3

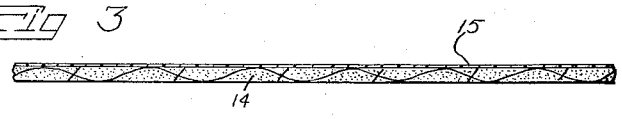


Fig 4

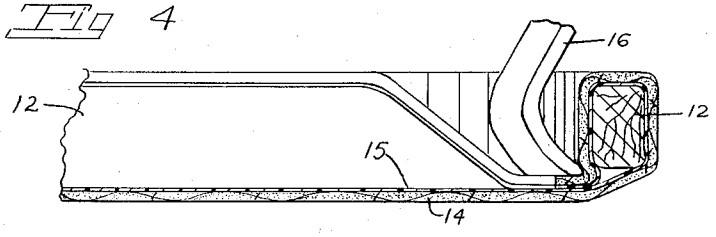


Fig 5

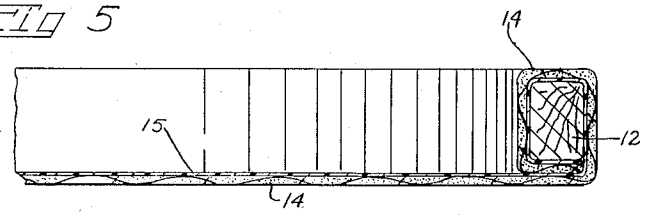
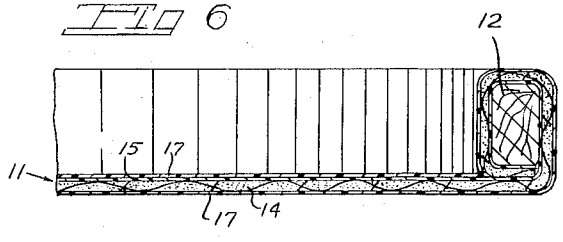


Fig 6



INVENTOR.
Rafry L. McMullen
BY Grudt Wells.
Atty.

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Fig 7

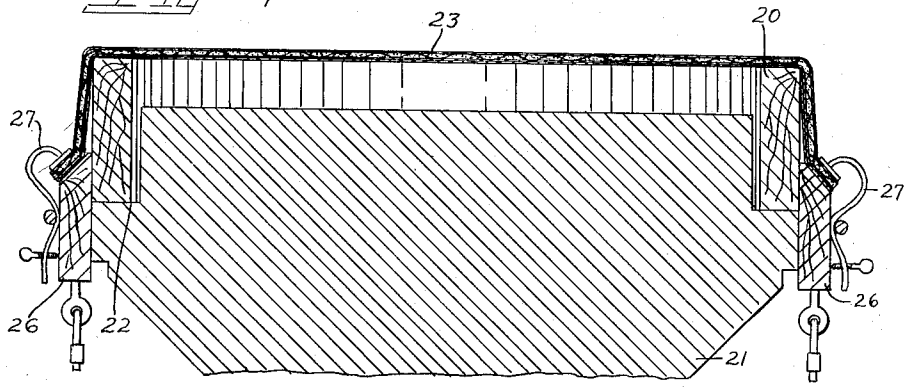


Fig 8

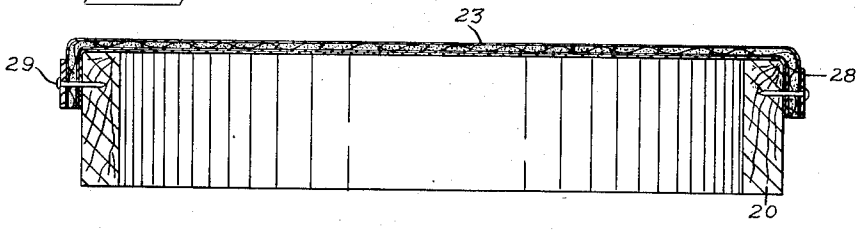
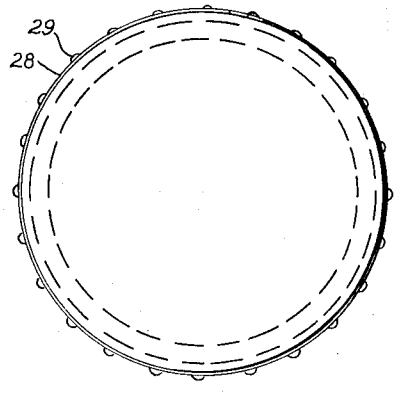


Fig 9



INVENTOR.
Rafry L. McMullen
BY Gruck Wells
Atty.

Patented Jan. 26, 1954

2,667,098

UNITED STATES PATENT OFFICE

2,667,098

HEAD FOR MUSICAL INSTRUMENTS

Rafry L. McMullen, Spokane, Wash.

Application June 12, 1951, Serial No. 231,233

5 Claims. (Cl. 84—414)

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My invention relates to heads for musical instruments, such as tambourines, tom-toms, banjos and the like.

In musical instruments having heads or covers made of layers of skin which resound when struck a blow, the problem of avoiding difficulty due to the moisture content of the skin is very great. It has been suggested in the past that these heads be made of fabric layers of different types but up to date there appears to have been no successful substitute for the animal skins. Such skins are costly and stretch unevenly under varying conditions of moisture so as to lose considerable quality in the emission of sound. Although the problem of providing a suitable head for musical instruments of the character above referred to has received considerable attention from prior inventors as witnessed by the number of patents heretofore granted, the almost universal use of skins for the heads indicates that the previously proposed solutions have not been successful. Having this in mind I have prepared and tested and had others test heads of various characteristics wherein other materials are substituted for the animal skin.

My present invention is embodied in a head for musical instruments such as drums, banjos, tambourines, etc. It is the purpose of my invention to provide a novel head or cover for musical instruments embodying a base fabric woven of acrylic fiber that in turn is manufactured from polyacrylonitrile. The fabric is impregnated and coated in a novel manner with certain resins. The acrylic fiber is manufactured and sold by the E. I. du Pont de Nemours and Company Inc. of Wilmington, Delaware, under the trade-mark Orlon. This base fabric is treated in such a manner as ultimately to provide a coated sheet of material that is practically impervious to moisture and that has the necessary characteristics to equal the tonal qualities of fine calf skin heads.

More particularly my invention contemplates a method of preparing a head for drums, etc. which comprises the steps of first impregnating a fabric sheet woven from acrylic fiber yarn with a solution of a medium oil length drying alkyd resin which has the characteristic of drying substantially non-tacky, then, after drying, coating the under side only of the sheet with a solution of a second medium oil length drying alkyd resin, which has the characteristic of becoming quite tacky as it dries, coating the flesh hoop of the drum also with the second resin then while the sheet and flesh hoop are both partially dried so that the surfaces thereof contacting each other

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are tacky, stretching the sheet on the flesh hoop with the tacky side toward the hoop and tucking the sheet on the hoop, thereafter coating the upper surface of the drum with a second coating of the first mentioned resin and curing the resins either at room temperature of about 70 degrees F. or in mild heat up to about 150 degrees F.

The nature and advantages of my invention will appear more clearly from the following description and the accompanying drawings illustrating the various steps of making a head in accordance with my invention.

In the drawings:

Figure 1 is a fragmentary sectional view of an instrument such as a drum showing the application of a finished head thereto;

Figure 2 is a diagrammatic representation of a sheet of woven fabric of acrylic fiber impregnated with the first coating;

Figure 3 is a diagrammatic illustration of the sheet as it is coated on one side only with a second layer of the coating material;

Figure 4 illustrates diagrammatically the step of stretching and tucking the sheet on the flesh hoop of the drum;

Figure 5 is a diagrammatic sectional view illustrating the tucked head wherein the sheet is stretched on the flesh hoop before being given the final coating;

Figure 6 is a view like Figure 5 illustrating the finished drum head constructed according to my invention;

Figure 7 is a sectional view illustrating the means for stretching a prepared sheet over the hoop of a tambourine;

Figure 8 illustrates in section the final head construction for a tambourine; and

Figure 9 is a plan view on a smaller scale of a finished tambourine.

In making up a head for a drum or other instrument of this character, I first select a woven fabric of the acrylic fiber of the proper thread size. For example, for a snare drum I use a one hundred denier fabric and for a base drum I may use as much as two hundred denier fabric.

The material has a tensile strength dry of approximately seventy thousand pounds per square inch of cross section. In stretching it to the breaking point it will stretch about fifteen per cent. For minor stretches of up to two per cent, it has an instantaneous recovery of ninety-seven per cent. By preparing and coating the material in accordance with my invention, I find that the finished head has improved stretch recovery and is capable of withstanding the repeated vibrations

and blows over a longer life period as compared to a natural skin head, with no permanent distortion noticeable even after many months of continuous service.

In Figure 1 of the drawings the drum is shown at 10, the head is indicated at 11, the flesh hoop is shown at 12 and the clamping ring is shown at 13. The clamping bolts and lugs are not shown. In forming the head 11, I initially prepare a sheet 14 of acrylic fiber fabric by first applying to the unstretched sheet either by brush or spray, a solution of a specially modified alkyd resin in xylol that dries substantially non-tacky. The details of this solution will be set forth more fully hereinafter. The initial application of the solution is primarily an impregnation of the fabric. When dried for a short while, about an hour, the sheet is not sticky and can be handled.

The next step, after allowing the initial solution to dry for about an hour, is to coat one side only of the impregnated sheet 14 with a second coating 15 which is a specially modified alkyd resin dissolved in xylol that dries tacky. When the sheet 14 is impregnated initially the wooden flesh hoop 12 is also given an impregnation with the solution of the second resin. Another coating of the second resin solution is also applied to the flesh hoop at about the same time it is applied to one side of the sheet.

When the sheet and hoop have partially dried for forty-five minutes to one hour after the coating 15, the sheet is cut and placed on a support with the surface bearing the coating 15 upward. The flesh hoop 12 is laid on the sheet and the edges of the sheet are stretched around the hoop and tucked between the hoop and the stretched sheet with a tucking blade 16. Being only partially dry and tacky, the coating 15 actually aids in the tucking operation. It adheres the sheet to the hoop while the edge is being tucked. As soon as the tucking and stretching operation is finished as shown in Figure 5, the entire head is coated, preferably by spraying, with a final layer 17 of the impregnating solution. This construction gives all of the outer, wear receiving surface of the head a finish coat of the non-tacky material. The tuck joint is sealed too. The head is then cured by air drying for several days or by mild heat 130 degrees F. to 150 degrees F. for several hours.

Referring now to Figures 6 to 9 inclusive, these figures illustrate the steps of assembling a tambourine head with a tambourine hoop. The tambourine hoop 20 is mounted on a suitable base 21 which has a shoulder at 22 that holds the upper edge of the band 20 above the top of the base 21. A sheet 23 is prepared with an initial impregnation, a separate coat 24 on one side and a final coat 25 on both sides. The impregnating, coating and curing of the sheet 23 is carried out in the same manner as the drum head impregnating and coating. The impregnation solution and the final coat 25 are the same as the impregnating solution for the drum head. The coat 24 is the same material as the coat 15. After the sheet 23 is cured it is stretched on the hoop 20 by clamping the sheet to a sleeve 26 with clamps 27 and pulling the sleeve 26 downwardly to provide the proper tension in the sheet 23. A finishing strip 28 of metal or other suitable material is next wrapped around the exterior of the sheet 23 at the position shown in Figure 8 where it is fastened by nails 29 as indicated.

The fabric which provides the base of the drum and tambourine heads of my invention is woven from the acrylic fiber yarn manufactured from polyacrylonitrile by the Dupont Company under the trade-mark "Orlon." It is a continuous filament yarn. This fabric alone is unsatisfactory as a head for musical instruments of the drum type. It has air spaces between threads. It absorbs some moisture and its instantaneous stretch recovery is not adequate to give a reliable tonal response. I have discovered that by treating the fabric in the manner hereinbefore outlined, these faults are practically overcome resulting in a head that is fully satisfactory. The coating material is critical. For the impregnation and final coating I use a medium oil length, drying alkyd resin modified with nitrocellulose and vinyl chloride-acetate copolymer in a solvent base of xylol, butyl acetate, ketones and alcohol. The solids content of this solution is about 20%. This resin has the characteristic of remaining wet and non-sticky for most of the drying period and then quickly changing to a tough non-tacky film. It is therefore well distributed in the fabric before setting up. Also it makes a smooth outer surface quite free of pin holes when applied as the finish coat 17.

The coating 15 is a medium oil length, drying alkyd resin modified with styrene chlorinated rubber and pentaerythritol ester of abietic acid in a solvent base of xylol. It is used with a solids content of about 30%. This solution begins to become sticky soon after it is spread on the fabric and is quite tacky in 45 minutes after applying.

The drying time between the impregnation of the sheet 14 and application of the coating 15 is just sufficient to permit the impregnating solution to harden enough for easy handling. It seals the fabric so that the application of the second solution forms a distinct layer or coating. The impregnating resin fills the interstices of the fabric, and when it sets up, acts as a buffer between threads of the fabric. The outer or last coating forms a yielding protective surface over the fabric to take the wear of the repeated blows in the playing of the instrument. It also seals the protected side of the head, and, with the coating 15 reinforces the protected side, which is stretched the most by the blows.

The impregnation, or first coating, is applied and dried before the tucking and stretching of the head takes place. The final coating is applied after tucking and stretching of the head. This method of application provides an outer protective coating that is unstretched while the impregnation coating is stretched. This method of applying the coatings also helps to bond the coating materials and fabric together in such a way that peeling or cracking of the surface is substantially prevented.

When the cured drum head is first applied to a drum, it should be drawn down and adjusted over a period of a few days to the desired tautness. Thereafter it does not appear to require further tightening. It does not respond to changes in humidity like a calf skin head. It is not necessary to change the adjustment for damp and dry conditions.

It is believed that the nature and advantages of my invention will be apparent from the foregoing description.

Having thus described my invention, I claim:

1. A head for musical instruments such as drums and tambourines comprising a sheet of fabric woven from yarn composed of an acrylonitrile polymer which sheet is impregnated with a

medium oil length, drying alkyd resin and stretched on a hoop, the stretched impregnated sheet having an unstretched surface layer of said alkyd resin on both sides thereof.

2. A head for musical instruments such as drums and tambourines comprising a sheet of fabric woven from yarn composed of an acrylonitrile polymer which sheet is impregnated with a medium oil length, non-tacky drying alkyd resin, and coated with a second tacky drying alkyd resin on one side and stretched on a hoop, the stretched impregnated sheet having an unstretched surface layer of said first named resin on both sides thereof.

3. The method of making a head for drums which comprises first impregnating an unstretched sheet of fabric woven from a yarn composed of an acrylonitrile polymer with a medium oil length, non-tacky drying alkyd resin, coating a wood flesh hoop with a medium oil length, tacky drying alkyd resin, drying the sheet and hoop, applying a coating of the tacky drying resin to one side only of the sheet and applying a second coating of the resin to the hoop, then, while the coatings are drying, tucking and stretching the sheet on the hoop with the coated side of the sheet against the hoop, then covering the stretched sheet on both sides with a layer of the first named resin.

4. A head for drums, tambourines, banjos and tympans comprising a sheet of fabric woven from a yarn composed of an acrylonitrile polymer, and impregnated with a medium oil length, drying alkyd resin modified with nitrocellulose and vinyl chloride acetate copolymer, said sheet having a coating on one side of a medium oil length, drying alkyd resin modified with styrene chlorinated rubber and pentaerythritol ester of abietic acid, both sides of said sheet having an outer layer of the first named resin thereon.

5. The method of making a head for musical instruments such as drums, banjos and tambourines which method comprises, first impregnating a sheet of fabric woven from a yarn composed of continuous filaments of an acrylonitrile polymer, while it is substantially free of tension, with a medium oil length non-tacky drying alkyd resin modified with nitrocellulose and vinyl chloride acetate polymer, then drying the impregnated sheet, next coating one side only of the impregnated sheet with a medium oil length tacky drying alkyd resin modified with styrene chlorinated rubber and pentaerythritol ester of abietic acid, then while the coating on the one side is tacky, stretching the sheet, thereafter drying the sheet while it is stretched and then applying a coating of the first named resin to both sides of the stretched sheet and drying the coatings.

RAFRY L. McMULLEN.

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