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DIAPHRAGM AND COMPOSITION OF MATTER FOR FORMING THE SAME

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My invention relates to acoustic diaphragms and particularly to a composition of matter adapted for use in building or forming the same.

It is a known practice to construct such diaphragms by suitably shaping a section of open mesh fabric, then filling the fabric to provide a degree of rigidity, then treating the surfaces with a pyroxylin lacquer containing metal salts or metallic solid matter in finely divided form, the composition being thinned with a volatile substance such as amyl acetate. The metal powder performs a very useful function in serving to prevent the formation of a multitude of microscopic openings through the diaphragm. Such openings interfere seriously with efficiency and tone quality in that they permit the passage of air through the vibratory element. This expedient, that is, the use of a finely divided metal such as powdered aluminum, is an essential where a coating material is used that hardens by evaporation. As the volatile matter is dissipated the solids become hard and this results in a surface containing a large number of voids; when the metal powder is used in sufficient quantity and is thoroughly disseminated, the metal particles fill all such holes and render the diaphragm air impervious.

However, a diaphragm containing a sufficient quantity of metallic solids to fill the voids and prevent the formation of pin holes results in sound reproduction with a metal ring; in other words, a brassy tone is distinguished from the true tone, and this is to be avoided.

An object of my invention is to provide a diaphragm in which the coating material is hardened by polymerization and oxidation in order to avoid the formation of pin holes in a metal-free film. This result is secured by the utilization of gums or resins and drying oils and without any metallic solids. The solvent which I prefer to use as a thinner may be volatile and be dispersed by evaporation, but the remaining film is still in a semi-fluid condition after the solvent has disappeared. This film will tend to spread rather than contract and will fill up the spaces left by the disappearance of the solvent. The setting of the described film is accomplished by baking, in which polymerization and oxidation takes place.

A diaphragm can be constructed solely of the described materials but for greater resistance to breakage I prefer to incorporate in the body of material a reinforcement of fibrous material such as fabric or an open fibre paper.

In the process of forming such a diaphragm, I provide a section of fabric or paper, first filling it with a starch or sizing solution, then shaping and drying it and then spraying or dipping the so formed element with the composition of matter of my invention. This may preferably consist of a compound of approximately 50% non-volatile ingredients and 50% of a volatile solvent. The solvent may consist of approximately equal parts of light and heavy naphtha. The non-volatile matter may properly consist of equal parts of Ester gum and resin, and drying oils, consisting of a mixture of linseed oil and china wood oil in a proportion of 1 to 4. Care should be taken to avoid the inclusion of any metallic dryer or any metallic solids.

After the diaphragm base has been fully covered with the composition, it is allowed to dry to dissipate the volatile matter, and is then baked to set the drying oil. The resulting diaphragm is free from microscopic holes, is water repellant and very light in weight and sensitive to vibrations. Tests of such diaphragms have indicated remarkably high efficiency and tone quality.

The gummy solid matter may consist of any of the gums commonly used in the varnish industry such as gum Damar, Ester gum, resin, bakelite, etc. The drying oil may consist of linseed oil, china wood oil or a mixture of these or similar drying oils. While we have found that satisfactory results are secured by using four parts of china wood oil to one part of linseed oil, this proportion may be varied somewhat. Also that the proportion of volatile matter may be varied in order to adapt the compound to different forms of application; at any

rate, it should be understood that my invention contemplates the elimination of all metallic matter and of the use of a surface coating that hardens other than by evaporation.

I again emphasize the point that a coating material should be used that tends to spread in drying in order to insure an air empervious film without the use of metal powder or other solids that tend to impair the tone reproducing quality of the vibratory element.

Obviously the composition is capable of variation in several particulars, and I do not wish to be limited except as indicated in the appended claims.

I claim:

1. An acoustic diaphragm comprising a fibrous reinforcement and a body of air-impervious water repellant material consisting of gums, resins and drying oils, in which the proportion of the gums and resins to the oils is about equal.

2. An acoustic diaphragm comprising a fibrous reinforcement and a body of air-impervious, water repellant material consisting of gums and resins, and drying oils in the proportion of four parts of china wood oil to one part of linseed oil.

3. A composition of matter for use in making acoustic diaphragms consisting of a non-metallic gummy solid, a non-volatile drying oil and a volatile thinner, the proportion of volatile matter to the whole compound being not greater than 50%, the composition being free from metal salts or metallic dryers.

4. A composition of matter for use in making acoustic diaphragms consisting of a non-metallic gummy solid and a non-volatile drying oil in substantially equal parts.

5. A composition of matter for use in making acoustic diaphragms consisting of Ester gum and resin, a non-volatile drying oil and a volatile thinner.

In testimony whereof I have affixed my signature.

GLEN HARVEY BURGMAN.