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WATERPROOF ABRASIVE.

No Drawing.

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REISSUED

My invention relates to waterproof abrasives, and particularly to the waterproofing of abrasive paper and cloth.

Abrasive paper or cloth is ordinarily made by applying a coating of hot adhesive, such as hide glue, bone glue, or vegetable glue, to the surface of the backing, then running on a stream of abrasive grain, and allowing the product to cool. The ordinary adhesives in use for this purpose are not waterproof and do not permit of the efficient use of the abrasive paper with water which is required in the process of rubbing certain kinds of varnish finish. The water loosens the grain from the paper and materially shortens its life.

I provide an abrasive product comprising a flexible backing and abrasive grains attached thereto by a binder, the outer portion of which is a nitro-cellulose composition.

In carrying out my invention, I may apply the ordinary glue and an abrasive grain, which may be carborundum, emery, garnet, sand, or the like, in the usual manner, and allow them to set. After this operation I spray or flow the waterproofing compound on both the face and the back of the abrasive paper or cloth. The waterproofing substance is preferably pyroxylin dissolved in a proper solvent, such as an acetate like butyl acetate, with or without other acetates, an alcohol like ethyl alcohol, with or without other alcohols, ketones like acetone, methyl ketone, or acetone oils, benzol, and camphor. I find it possible to use in the solution of nitro-cellulose a gum, such as copal or damar. The solution mentioned may vary within wide limits, and should be adjusted as to its boiling point to prevent too rapid evaporation of the film and to prevent absorption of water which may weaken the film before it is set.

In order to get a form of nitro-cellulose which can be used in solution and possess properties essential for operation on a production basis, such as even flowing or spreading on the backing used, there must be a certain balance of high, medium, and low boiling solvents to obtain the proper rate of evaporation. To get the gum, like damar, into solution, and the nitro-cellulose into solution, the lower boiling solvents, such as ethyl alcohol, acetone and an acetate are used. To prevent too rapid evaporation

and thus provide for the proper flow of the material, additional solvents of relatively higher boiling points, such as butyl and amyl acetates, the higher boiling alcohols, and certain ketones are used. Low evaporation rate, produced by higher boiling solvents prevents cooling of the surrounding air and the consequent condensation of water on the lacquer surface. This in turn prevents precipitation of the nitro-cellulose. Thus the important adjustment of the solution to the proper boiling point is secured.

Benzol is used as a diluent and also as a solvent for the gums used because of its comparatively low cost. It functions to reduce the viscosity of the nitro-cellulose solution containing gums so that it is easier to manipulate in the abrasive coating process.

Camphor constitutes a plasticizer or softener. The function of such a plasticizer or softener is to make the resulting film tough, elastic, flexible, adhesive and permanent.

The function of the gum is to give adhesion, body and hardness to the coating and to render the coating more imperious to moisture. This increase in the hardness of the film is a very desirable feature in producing a good abrasive paper because the abrasive grains on the paper undergo very severe service in the art of rubbing or grinding the materials on which they are being worked, and by increasing the hardness of the film the grains are more firmly held in place and stick on to the backing longer and more securely so that the life of the abrasive article is increased. The gum also increases the body of the coating material without increasing the viscosity thereof, and this is highly desirable. Being cheaper than nitro-cellulose, many gums tend to reduce the cost. In increasing the hardness by the use of a gum there is a tendency to brittleness, and to offset this and secure plasticity is one of the functions of the plasticizer, such as camphor.

On the evaporation of the solvent from the abrasive product, a thin transparent film is left which protects the adhesive from the action of water, even under very severe conditions.

Another method of carrying out the invention is to apply the nitro-cellulose solution to the paper or cloth backing in the

same manner as the glue is commonly applied, and then flow the abrasive grain thereon. The product is then run over or under steam pipes in an enclosure until the volatile vapors evaporate and the film has set. The enclosure is arranged with proper facilities for collecting the volatile vapors which are recovered.

The film of abrasive and adhesive on the paper or cloth may then be put into use or sized with a thin pyroxylin solution to hold the grains more firmly in place. I provide an abrasive which is resistant to the action of water and which may be used under very severe conditions.

It will be noted that in either case, there is an outer coating of nitro-cellulose which not only serves to waterproof the abrasive product, but is also effective for assisting to secure the grains in place.

The word "fabric" is used in the claims to designate a flexible backing of paper or cloth, such as is employed in the manufacture of sandpaper or sandcloth.

While I have described a preferred embodiment of my invention, it will be understood that it is not limited thereto but may be otherwise embodied within the scope of the following claims.

I claim:

1. An abrasive product comprising a flexible backing having abrasive grains attached thereto by a nitro-cellulose composition containing a gum.
2. An abrasive product comprising a flexible backing having abrasive grains attached thereto by a nitro-cellulose composition containing a gum and a plasticizer.
3. An abrasive product comprising a flexible backing having abrasive grains attached thereto by a nitro-cellulose composition, including an acetate, an alcohol, a ketone, benzol, a plasticizer, and a gum.
4. An abrasive product comprising a flexible backing having abrasive grains attached thereto by a nitro-cellulose binder containing an acetate, an alcohol, a ketone, benzol, camphor, and a gum.
5. An abrasive product comprising a flexible backing having abrasive grains attached

thereto by a nitro-cellulose composition containing an acetate, an alcohol, a ketone, a benzol-type hydro-carbon, and a plasticizer.

6. An abrasive product comprising a flexible backing having abrasive grains attached thereto by a nitro-cellulose composition containing a solvent, camphor, and a gum.

7. An abrasive product comprising a flexible backing having abrasive grains attached thereto by a binding material containing nitro-cellulose, a gum, and a plasticizer.

8. An abrasive product comprising a flexible backing having abrasive grains attached thereto by a binder consisting of nitro-cellulose composition, a gum, and camphor.

9. An abrasive product comprising a flexible backing having abrasive grains secured thereto by a composition containing nitro-cellulose, a high boiling solvent, a low boiling solvent, a plasticizer, and a gum.

10. An abrasive product comprising a flexible backing having abrasive grains attached thereto by a nitro-cellulose composition containing nitro-cellulose, a gum for giving body to the nitro-cellulose and a substance for rendering the composition tough and permanent and for overcoming the brittleness of the gum.

11. An abrasive product comprising a flexible backing having abrasive grains attached thereto by a flexible film containing nitro-cellulose, a gum for giving body to the nitro-cellulose, and a plasticizer for rendering the film flexible, tough and permanent.

12. An abrasive product comprising a flexible backing having abrasive grains attached thereto by a film which is resistant to water, such film being deposited from a slow evaporating nitro-cellulose composition in solution with a low boiling solvent, a high boiling solvent for retarding the evaporation thereof and by which an even spreading of the film is secured, a gum for giving body to the composition, benzol, which forms a solvent for the gum, and a plasticizer for imparting permanent toughness and flexibility to the film.

In testimony whereof I have hereunto set my hand.

HENRY R. POWER.