

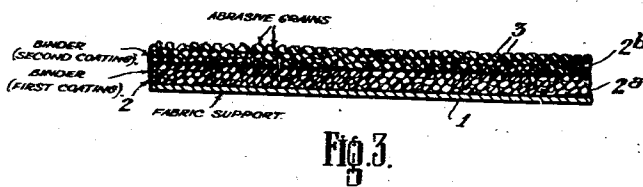
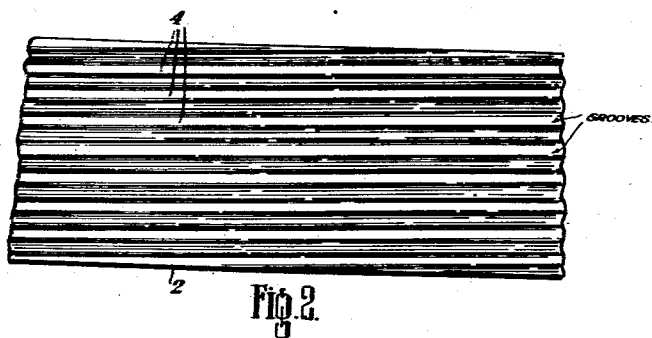
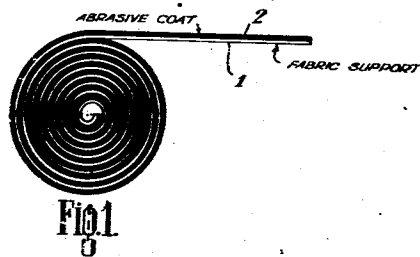
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MANUFACTURE OF ABRASIVE MATERIALS

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MANUFACTURE OF ABRASIVE MATERIALS

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1 Claim. (Cl. 51—185)

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This invention relates to improvements in the manufacture of emery fillet, especially grooved emery fillet.

Emery fillet, consisting of narrow fabric coated on one side with an abrasive such as emery, garnet or corundum, is employed for winding on cylinders or rollers to serve for the grinding of card clothing on cylinders and doffers, carding machines or the like.

Card clothing which is used on cylinders, doffers, carding machines and the like in the textile industry is customarily subjected to what is termed "grinding" after manufacture and at intervals during its use. In such grinding the tips of the wires are brought into light contact with an abrasive material, such as emery, secured to the face of a roller or cylinder which is rotated and may be traversed over the work.

One method of making such a card grinding cylinder or roller consists in winding the material known as emery fillet around the roller and securing it in position so as to provide a substantially unbroken area of abrasive material on the surface of the roller.

One method of manufacturing emery fillet is to take a narrow woven fabric of cotton, linen, or cotton and linen, apply to one face a preparation of animal glue and cause emery powder to be adhered to the glue and then allow it to dry. This gives a fillet having a thin coating of abrasive which can be wound on cylinders and rollers and gives useful results in many cases. It is better, however, before allowing the coating to dry, to provide the material with longitudinal grooves, for example by passing it into contact with the face of a grooved roller. Such longitudinal grooving is known to be valuable in emery fillet but its best effect is exhibited on double coated fillet. In the case of such double coated fillet, a further layer of animal glue is applied to the first layer before grooving and a further coating of emery powder caused to adhere thereto whereafter the double coating is grooved and allowed to dry.

Although preparations of animal glue are satisfactory as adhesives when the material is in use, there is a risk of double coated grooved emery fillet becoming too hard or too soft during storage owing to changes in atmospheric conditions. Frequently it is necessary to store such emery fillet under conditions of high temperature and humidity, as for example in India, or to store it under conditions of low temperature and/or low humidity. If the material becomes unduly softened it may be spoiled and if it be-

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comes unduly hard it may crack or break when an attempt is made to wind it on the card grinding rollers or cylinders.

I have found that these difficulties can be overcome by employing as the adhesive for the abrasive powder, a plastic or plasticised synthetic resin. I have further found that plasticised urea-formaldehyde resins, especially combinations of urea-formaldehyde resins, and alkyd resins are particularly useful for this purpose.

Certain precautions have to be observed, however, when using plasticised synthetic resins as adhesives for the abrasive powder in making grooved emery fillet, especially double coated, grooved emery fillet.

1. The synthetic resin composition chosen must be such that it does not undergo any undesirable alteration in hardness or adhesive properties under any atmospheric conditions likely to be encountered during storage. Synthetic resins are in general unaffected by moisture and in order to avoid embrittlement at low temperatures it is necessary either to employ a thermoplastic resin which has a high degree of flexibility at low temperatures or to employ a plasticised resin which may be of the thermoplastic or thermosetting type.

2. It is important to avoid stiffening of the fabric. This involves the use of a resin composition which, if it penetrates the fabric, is highly flexible.

3. Whether the synthetic resin composition penetrates the composition or not, it must be sufficiently flexible to enable the coating to bend without detachment from the support and without breaking away of the adhesive when the fillet is wound on a cylinder or roller and to enable it to stand the grooving operation.

In the practice of the present invention it is preferred to employ a plasticised thermo-hardening resin since thermo-hardening resins tend to suffer less change in plasticity under changes of atmospheric temperature. It is preferred, however, to use a preparation which can be cured at a fairly low temperature, i. e. below 212° F. and preferably at or only a little above atmospheric temperature. When using thermo-hardening resin it is essential to avoid the use of such long times and/or high temperatures of heating that brittleness develops. If this occurs, the emery fillet may crack when wound on the cylinders and/or the abrasive may easily rub off. The time, and temperature of heating must be such that the synthetic resin is no longer sticky but is quite firm, flexible and water-resistant.

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As already stated, I have found urea-formaldehyde resins suitable for use in practicing the present invention especially when plasticised with alkyd resins. The invention, however, is not limited to these since other resins may be used, for example, melamine formaldehyde products. I use the expression "synthetic" resin, however, in a broad sense as including artificial condensation products such as phenol formaldehyde products, urea and thiourea formaldehyde products, polybasic-acid-polyhydric-alcohol condensation products, amine formaldehyde condensation products and the like, polymerisation products such as polyvinyl halides, polyvinyl esters, polystyrene derivatives, polymerised acrylic acid esters, and the like, as well as plastic materials of the type of cellulose esters such as cellulose acetate and cellulose nitrate. It has been found, however, that most of the thermoplastic material, especially cellulose acetate and polyvinyl esters, do not readily wet the particles of emery and satisfactory adhesion of the emery can be secured only by mixing it with the thermoplastic material before coating. This involves difficulties in spreading the material on the narrow fabric base, which are particularly noticeable with the extremely coarse abrasives used in emery fillet, and accordingly mixing of the abrasive with the adhesive before coating is less preferable.

One suitable composition which can be used consists of a mixture of urea-formaldehyde resin such as that sold under the trade name of "Resin U. G.," and of alkyd resin such as that sold under the trade name of "Resin R. P. 8" in the proportion of one part of the former to two of the latter. By the incorporation of a known acidic hardening agent into this mixture hardening can be effected at temperatures below 212° F. and even below 100° F., e. g. at room temperatures. The alkyd resin serves as a plasticiser for the urea-formaldehyde resin and gives a bonding agent which is sufficiently flexible to furnish an emery fillet of the same degree of flexibility as that obtained with the customary animal glue preparations.

Other suitable resin compositions are (a) that sold by British Resin Products under the trade name "Epok" which is an oil-modified phenolic resin dissolved in xylol (70% resin), (b) a mixture of equal proportions of the resins sold by I. C. I. under the trade names "Paralac 100," and "Paralac 285X." These are Glyptal resins. (c) That sold by British Resin Products under the trade name "Distrene." This is a polystyrene resin.

The general procedure in making emery fillet according to the present invention is as follows:

The narrow fabric is wound spirally on to a cylinder so as to cover the surface thereof. It is then painted by brushing or spraying with a solution of resinous material in a solvent. Then a coating of emery particles of any suitable fineness is dusted on. While the coating is still plastic the cylinder is revolved in contact with a ribbed roller having, for example, twelve ribs to the inch, each rib about one-sixteenth of an inch deep. This produces grooves in the coating along the length of the fabric. The coating is then allowed to dry with heating if necessary (e. g. to about 100° F.) preferably with warm air, in order to dry off the solvent and harden the resin if this is of the thermo-hardening or polymerisable type. Finally, the emery fillet is unwound from the cylinder and made up into rolls.

If desired, a further coating of the resinous

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material is applied over the emery treated covering before grooving and a further quantity of emery particles applied.

In the accompanying drawings:

Fig. 1 shows an elevation of a roll of emery fillet made in accordance with this invention,

Fig. 2 shows on a larger scale a plan view of the coated side of a part of the emery fillet shown in Fig. 1,

Fig. 3 is a side sectional elevation on a still larger scale of the emery fillet shown in Fig. 1.

As shown in the drawings, the narrow textile fabric support 1 carries a flexible coating 2 composed of an alkyd resin plasticised ureaformaldehyde resin adhered to which are coarse emery particles 3.

As shown in Fig. 3, the coating 2 is formed of two separately applied layers 2a and 2b identical in composition. They are shown, for convenience, as separated by a line but they form together a unitary coating which is longitudinally grooved as shown at 4 in Fig. 2.

Examples of resinous compositions which may be used will now be given.

Example 1

An etherified urea-formaldehyde resin plasticised with an alkyd resin dissolved in butyl alcohol.

The urea-formaldehyde resin is one made by condensing one molecular proportion of urea with three molecular proportions of formaldehyde in the presence of butyl alcohol, the mixture being on the alkaline side of neutrality and heated under reflux at 100° C. for one hour. At the end of this time the mixture is acidified and the water boiled off as an azeotropic mixture with butyl alcohol, leaving the etherified resin in butyl alcohol solution.

The alkyd resin is made by heating a mixture of 148 parts by weight of phthalic anhydride, 47 parts by weight of glycerol, 15 parts by weight of glycol and 152 parts by weight of castor oil, under reflux allowing escape of water in an inert atmosphere at 420° F. for 6 to 8 hours until a suitable acid value and viscosity are obtained.

7 parts by weight of each of the above resins is dissolved in 5 parts by weight of xylene and 1 part by weight of an acid organic ester of phosphoric acid is added to accelerate the hardening.

Example 2

An ammonia catalysed cresol-formaldehyde resin made by condensing 1 molecular proportion of 60% metacresol with 1.4 molecular proportions of formaldehyde using 0.05% by weight of 0.880 ammonia (calculated on the cresol) as catalyst.

Example 3

Castor oil modified alkyd resin. A mixture of two resins is used. The first one can be made by heating together 130 parts by weight of castor oil, 148 parts by weight of phthalic anhydride and 75 parts by weight of glycerol to 220° C. for half an hour and then at 200° C. for a further hour. The batch is then cooled to 160° C. and held at this temperature until the resin has the desired consistency. It is then chilled by running into cold xylol.

The second one is made by heating together

	Parts by weight
Phthalic anhydride	150
Glycerol	75
Castor oil	145

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The temperature is raised to 170° C. in 40 minutes after which it is held at 170-175° C. for approximately one hour. It is then raised to 240-245° C. in about 45 minutes after which it is held at this temperature until a test portion withdrawn from the mixture gives a product of the desired consistency. It is thinned hot by running xylol into the resinous mass.

The two xylol solutions of resin are mixed together in equal proportions.

Example 4. Polystyrene

Purified monomeric styrene is polymerised alone or in aqueous emulsion by heating at 100-160° C. in the presence of 0.1 to 1% of an oxidation catalyst such as benzoyl peroxide. The molecular weight of the product obtained is higher or lower according to whether the concentration of catalyst and/or the temperature is higher or lower.

I declare that what I claim is:

The method of making a flexible, substantially longitudinally grooved emery fillet capable of being wound around a cylindrical roller to provide a substantially unbroken circumferentially grooved area of abrasive material on the surface thereof which will serve for the grinding of card clothing, which consists in wrapping a narrow textile fabric around a cylinder to cover the surface thereof, applying to the exposed face of said fabric a first solution in volatile solvent of an alkyd resin plasticised urea formaldehyde resin capable of being cured at a temperature below 212° F., dusting coarse emery particles on the coating formed by said first solution, applying to said coating a second solution in volatile solvent of an alkyd resin plasticised urea formaldehyde resin capable of being cured at a temperature below 212° F. dusting further coarse emery particles on the combined coating of said first and second solutions, revolving the cylinder carrying said

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fabric with the coated surface of said fabric in contact with a ribbed roller to produce complementary grooving in the combined coating on said fabric, bringing the coated fabric into contact with warm air to remove all solvent and cure the resin and finally removing the coated fabric from said cylinder.

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