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(54) **SELF-CONTAINED FIBROUS BUFFING ARTICLE**

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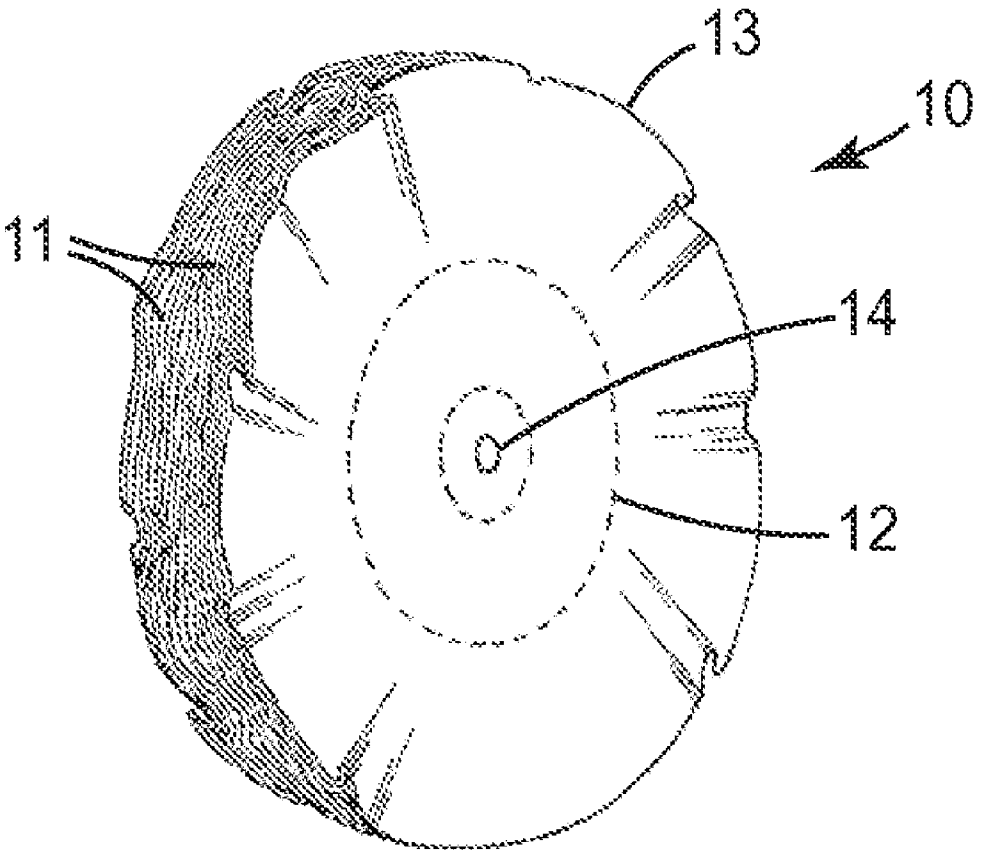
(57) **ABSTRACT**

A self-contained fibrous buffing article. The self-contained fibrous buffing article includes at least one layer of a spun-laced nonwoven fabric having a hardened adherent coating comprising a thermosetting binder, abrasive particles, and a lubricant.



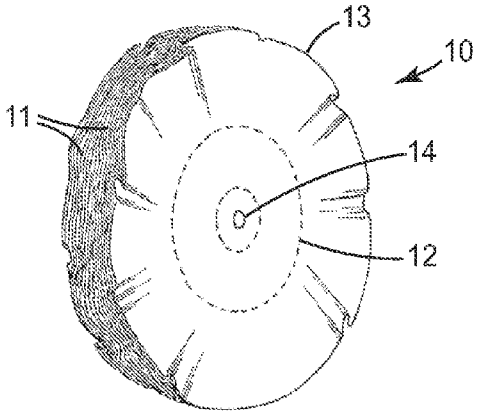


FIG. 1

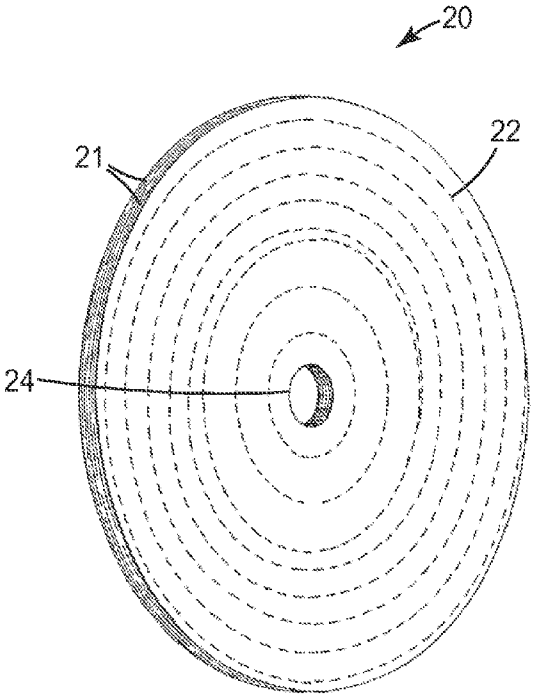


FIG. 2

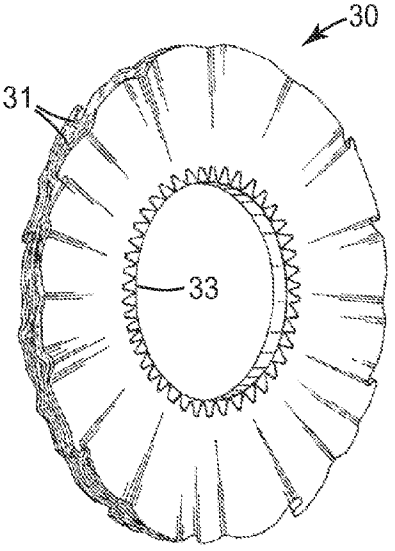


FIG. 3

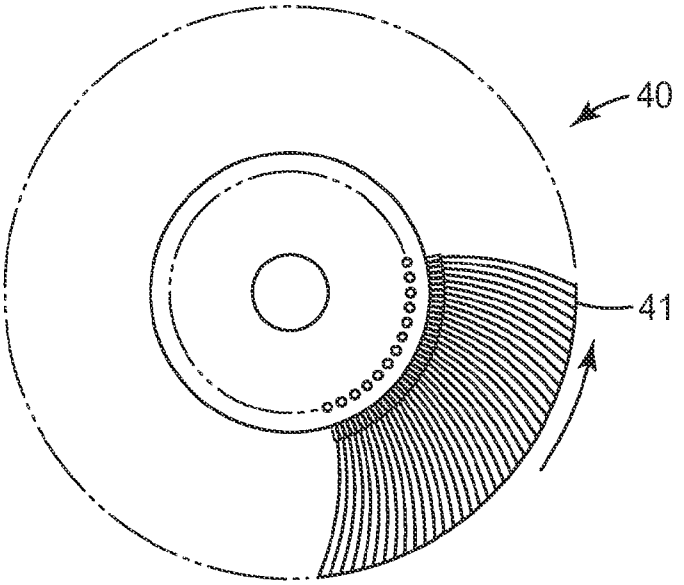


FIG. 4

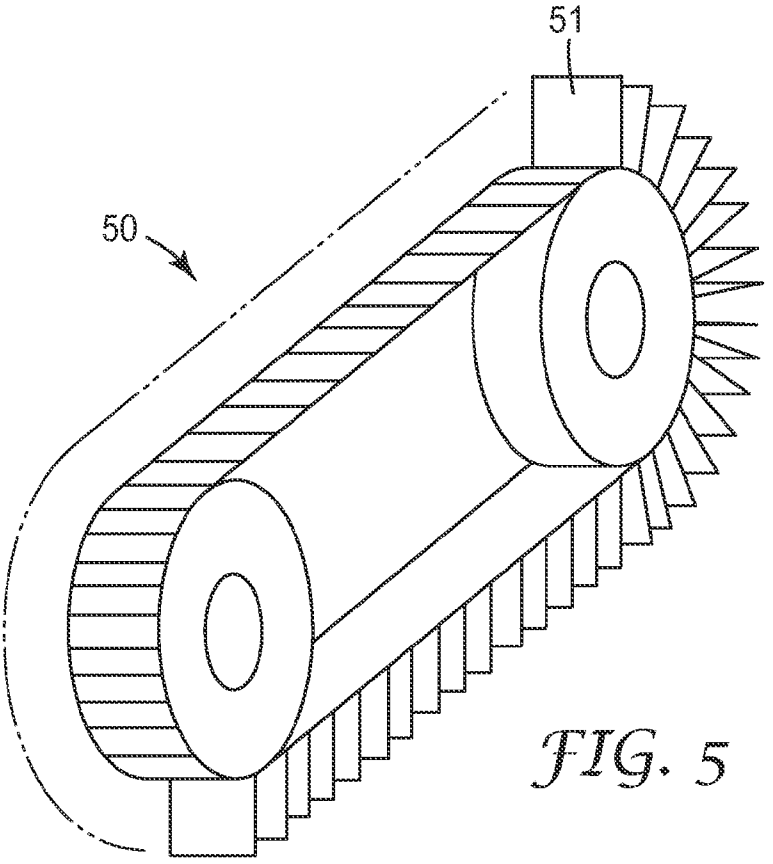


FIG. 5

SELF-CONTAINED FIBROUS BUFFING ARTICLE

BACKGROUND

[0001] Buffing wheels or buffs are generally formed from layers of a fibrous material which are stacked or fastened together. Fastening methods include, for example, compression, sewing, stapling, adhesive bonding, plastic or metal clinch rings, and combinations thereof. The buffing wheel is typically attached to a shaft and supported for rotation. Buffs have long been used to finish items such as machined parts, stamped parts, and cast articles which often have surfaces which must be modified, generally for aesthetic purposes. Buffing is a finishing process which is typically accomplished after more rigorous stock removal treatment of the surface.

[0002] Buffs are frequently categorized as either "cut" buffs or "color" buffs. A cut buff is more aggressive and is typically employed with a coarser buffing compound, a medium to high pressure between the buff and the workpiece, and the workpiece is advanced against the direction of rotation of the buff. This results in the refinement of scratches on the workpiece and yields a uniform matte finish. A color buff is typically employed with a finer buffing compound, a medium to low pressure between the buff and the workpiece, and the workpiece is advanced in the direction of rotation of the buff. The color buff application results in a further refinement of scratches in the surface of the workpiece and yields a reflective, mirror-like finish.

SUMMARY OF THE INVENTION

[0003] Buffs are most often employed to refine surfaces by a three-body abrasion mechanism. Driven buffs transmit energy to a workpiece, but the abrading action is provided by an abrasive composition 'buffing compound" that is peripherally applied, but not bound, to the buff's surface. Unbonded buffing compounds situated between the workpiece and the buff's surface refines the workpiece surface resulting in fewer and smaller scratches being imparted to the workpiece surface as the buffing continues. While such three-body systems produce the required finishes, the buffing compound must be frequently applied to achieve a consistent finish, can be undesirably transferred onto adjacent surfaces, and leaves a residue on the workpiece surface which then must be removed. Attempts to resolve these deficiencies by employing a two-body abrading system, wherein the abrasive composition is hardened to the working surfaces of the buff or pre-impregnated instead of peripherally applied, have been unsuccessful for cut and color buffs. Hence there is a need for cut and/or color buffs having a pre-impregnated abrasive composition for buffing such that the need to apply buffing compound to the buffing wheel is substantially eliminated.

[0004] The present invention relates to self-contained fibrous buffing articles that are functional without the application of external buffing compounds to the periphery or surfaces of the buffing wheel. Hence, in one embodiment, the invention resides in a self-contained fibrous buffing article including at least one layer of a spunlaced nonwoven fabric having a hardened adherent coating comprising a thermosetting binder, abrasive particles, and a lubricant. The self-contained buff of the present invention is capable of imparting bright finishes onto metal surfaces, has a long service life, and is resistant to fraying, dusting, smearing, and unraveling.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] It is to be understood by one of ordinary skill in the art that the present discussion is a description of exemplary embodiments only, and is not intended as limiting the broader aspects of the present disclosure, which broader aspects are embodied in the exemplary construction.

[0006] FIG. **1** illustrates one embodiment of a self-contained fibrous buffing article

[0007] FIG. **2** illustrates a second embodiment of a self-contained fibrous buffing article

[0008] FIG. **3** illustrates a third embodiment of a self-contained fibrous buffing article

[0009] FIG. **4** illustrates a fourth embodiment of a self-contained fibrous buffing article

[0010] FIG. **5** illustrates a fifth embodiment of a self-contained fibrous buffing article. Repeated use of reference characters in the specification and drawings is intended to represent the same or analogous features or elements of the disclosure.

DEFINITIONS

[0011] As used herein "self-contained fibrous buffing article" means a buffing article containing a pre-applied or pre-impregnated abrasive buffing composition to the fibrous material forming the buffing article. The abrasive buffing composition is suitable for cut or color buffing, and is applied to the buffing article by the manufacturer during the initial manufacturing of the buffing article. As such, the application of a buffing compound to the buffing article by an operator before first using or while using the buffing article to buff a work surface is not required.

[0012] As used herein, "hardening", when used to describe the solidification of a precursor, refers to curing (e.g., polymerization and/or cross-linking, thermally or otherwise), drying (e.g., driving off a volatile solvent) and/or simply by cooling.

[0013] As used herein, forms of the words "comprise", "have", and "include" are legally equivalent and open-ended. Therefore, additional non-recited elements, functions, steps or limitations may be present in addition to the recited elements, functions, steps, or limitations.

DETAILED DESCRIPTION

[0014] The self-contained fibrous buffing article of the present invention comprises at least one layer of a spunlaced fabric impregnated with an adherent slurry comprising a thermosetting binder precursor, abrasive particles, and a lubricant.

Fibrous Buffing Material

[0015] Fibrous buffing material useful in the practice of this invention may be made by any known web formation system. In some embodiments, the fibrous buffing material may be spunbonded, hydroentangled, or melt blown. In some embodiments, the fibrous buffing material is a dry laid nonwoven fabric. In some embodiments, the fibrous buffing material is an air-laid nonwoven fabric. In some embodiments, the fibrous buffing material is formed by carding and cross-lapping. While web formation methods using staple fibers are typical, continuous filament systems such as spunbond or meltblown may be used. Useful staple fibers lengths include those between 0.75 inch (19 mm) and 4 inches (102

mm), inclusive. In some embodiments, a prebond coating may be applied to enhance the integrity of the nonwoven fabric.

[0016] The fiber component of the fibrous buffing material may be synthetic, man-made, or natural in origin. Exemplary synthetic fibers are polyester (such as poly(ethylene terephthalate) or poly(butylene terephthalate)), polyamide (such as poly(hexamethylene adipate) or polycaprolactam), and polyolefins (such as polyethylene or polypropylene). Exemplary man-made fibers include cellulose acetate, rayon, and lyocell. In some embodiments, natural fibers such as cotton, jute, ramie, flax, and wool are useful alone or in combination. In some embodiments, blends of two, three, or even more fiber constituents may be used.

[0017] In some embodiments, fiber denier may be greater than 0.1 denier (0.11 dtex). In some embodiments, fiber size may be less than 20 denier (22.5 dtex). In some embodiments, mixtures of two or more fiber deniers may be useful.

[0018] In some embodiments, the fibrous buffing material of the self-contained fibrous buffing article is a spunlaced fabric. Spunlaced fabrics are produced by a hydroentanglement process whereby an array of high-pressure water streams impinge a web formed from fibrous material. Typically, the fibrous material is supported on a perforated surface whereby the hydroentanglement process results in an entangled, apertured fabric that can resemble a woven fabric. Spunlaced fabrics typically exhibit high tensile strength and a low shear modulus, resulting in a robust fabric with good drape and soft hand. Spunlaced fabrics are often resistant to unraveling.

[0019] Fibers useful for preparing the spunlaced fabric backing are typically staple fibers, but webs of continuous filaments may also be used. Useful staple fibers are typically synthetic or man-made, but natural fibers such as cotton or jute may be useful. Useful synthetic or man-made fiber materials comprise polyamide, polyester, polyolefin, polyacrylic, polyimide, lyocell, and rayon. Blends of two or more fiber materials are also useful. For example, 75% nylon and 25% cotton or 50% polyester and 50% rayon blends are useful. While fabric weights are not limiting, a range of from 30 to 130 grams per square meter is typical. Suitable spunlaced fabrics are available, for example, as "SPLENDEX"/"SPLENDOTEX" from Uniminas Industries, Vila Maria, SP, Brazil.

[0020] In some embodiments, suitable spunlaced fabrics exhibit tensile strengths 500 N/50 mm or less in the machine direction, 400 N/50 mm or less in the machine direction, or 300 N/50 mm or less in the machine direction; and 300 N/50 mm or less in the cross machine direction, 200 N/50 mm or less in the cross machine direction, or 150 N/50 mm or less in the cross direction. In some embodiments, suitable spunlaced fabrics exhibit tensile strengths of at least 50 N/50 mm in the machine direction, or at least 100 N/50 mm in the machine direction; and at least 30 N/50 mm in the cross machine direction or at least 50 N/50 mm in the cross machine direction. The tensile strength numbers are for a 50 mm wide test strip. In addition, tensile ranges for the machine direction and cross machine direction using any of the above upper and lower limits are suitable.

Adherent Slurry

[0021] The adherent slurry comprises an aqueous dispersion of abrasive particles, a lubricant, and a thermosetting binder precursor. Useful adherent slurries are formulated to maximize the desired abrasive effects (cut or color buffing), maximize the buff's flexibility, and minimize both smearing (unwanted transfer of buffing components onto the workpiece) and dusting during use. Useful ranges of the hardened adherent coating are 11-40 wt. % thermosetting binder, 20-50 wt % mineral, and 20-45 wt % lubricant.

Thermosetting Binder

[0022] Suitable thermosetting resins and their precursors include epoxy resins, phenolic resins, urea-aldehyde resins, aminoplast resins having pendant unsaturated carbonyl groups, and the like, (including those having at least 1.1 pendant alpha, beta unsaturated carbonyl group per molecule or oligomer as described in U.S. Pat. No. 4,903,440), acrylated resins such as isocyanurate resins having at least one pendant acrylate group (such as the triacrylate of tris(hydroxyethyl) isocyanurate), acrylated urethane resins, acrylated epoxy resins, and isocyanate derivatives having at least one pendant acrylate group. It is understood that mixtures of the above resins could also be employed. The term "acrylated" is meant to include monoacrylated, monomethacrylated, multi-acrylated, and multimethacrylated monomers, oligomers and polymers.

[0023] Preferred epoxy resins are aqueous emulsions and organic solvent dispersions. Suitable aqueous epoxy emulsions for use in the adherent slurry include 2,2-bis[4(2,3-epoxypropoxy)phenyl]propane (diglycidyl ether of bisphenol A) and commercially available materials under the trade designation "Epon 828", "Epon 1004" and "Epon 1001F" available from Shell Chemical Co., and "DER-331", "DER-332" and "DER-334" available from the Dow Chemical Co. Other suitable epoxy resins include glycidyl ethers of phenol formaldehyde novolak resins (e.g., "DEN-431" and "DEN438" available from the Dow Chemical Co.), and resorcinol diglycidyl ether.

[0024] Organic solvent dispersions of epoxy resins useful in the adherent slurry may also comprise diglycidyl ethers of bisphenol A epoxy resin and an organic solvent such as that known under the trade designation "Aromatic 100", commercially available from Worum Chemical Co., St. Paul, Minn., which includes a mixture of aromatic hydrocarbons. Epoxy equivalent weights for resins meeting this description typically and preferably have an epoxy equivalent weight ranging from about 100 to about 500. One particularly preferred epoxy resin, which may be combined with an organic solvent to form a coatable adherent slurry, is that known under the trade designation "EPON 828" previously mentioned having an epoxy equivalent weight ranging from about 185 to about 195.

[0025] As noted, epoxy resins of the type useful in the adherent slurry require curing (hardening) agents which react with the oxirane groups of the epoxy resin to form crosslinked binders. Useful curing agents are typically and preferably selected from amides and imidazoles. One useful amide is the polyamide known under the trade designation "VERSAMID 125", commercially available from Henkel Corporation. A useful imidazole is that known under the trade designation "EMI-24", commercially available from Air Products, Allentown, Pa., which is a 100 percent solids version of 2-ethyl-4-methyl imidazole. This imidazole is typically and preferably diluted with water when used with aqueous epoxy resins. A preferred imidazole has from about 10 to 40 percent solids, more preferably about 25 percent solids. When used with

organic solvent dispersions of epoxy resins, the imidazole is typically and preferably used as 100 percent solids.

[0026] Phenolic resins and urea-aldehyde resins useful in the adherent slurry as thermosetting resins include those disclosed U.S. Pat. No. 5,178,646 in columns 15-17. These resins comprise the reaction product of an aldehyde and a non-aldehyde. Phenolic resins are preferred because of their thermal properties, availability, low cost, and ease of handling. The general term "phenolic" includes phenol-formaldehyde resins as well as resins comprising other phenol-derived compounds and aldehydes. The phenolic and urea-aldehyde resins preferably are 30-95% solids, more preferably 60-80% solids, with a viscosity (Brookfield viscometer, number **2** spindle, 60 rpm, 25° C.) ranging from about 750 to about 1500 cps before addition of any diluent, and have molecular weight (number average) of at least about 200, preferably varying from about 200 to 700.

[0027] Resole phenolic resins can be catalyzed by alkaline catalysts, and the molar ratio of formaldehyde to phenol is greater than or equal to one, typically between 1.0 to 3.0, thus presenting pendant methylol groups. Alkaline catalysts suitable for catalyzing the reaction between aldehyde and phenolic components of resole phenolic resins include sodium hydroxide, barium hydroxide, potassium hydroxide, calcium hydroxide, organic amines, and sodium carbonate, all as solutions of the catalyst dissolved in water. As disclosed in U.S. Pat. No. 5,178,646, the unhardened resole phenolic resin may be combined with a reactive diluent having the properties and structure described therein.

[0028] Aldehydes which are useful as components of thermosetting resins, include cyclic, straight and branched chain alkyl aldehydes, which can be saturated or unsaturated, and aromatic aldehydes. Preferably, the aldehydes have molecular weight below about 300 to afford a less viscous binder precursor solution. Examples of suitable aldehydes include formaldehyde, benzaldehyde, propanol, hexanal, cyclohexane carboxaldehyde, acetaldehyde, butyraldehyde, valeraldehyde, and other low molecular weight aldehydes. Preferred is formaldehyde, for its availability, low cost, hardened resin properties, and because it affords low viscosity grinding aid precursor compositions.

[0029] Examples of commercially available phenolic resins useful in the adherent slurry include those known by the trade names "Varcum" (from Durez Division of Occidental Chemical Corp.), "Aerofene" (from Ashland Chemical Co.), "Bakelite" (from Union Carbide), Resafen (from Reichhold do Brasil SA) and Prefere (From Dynea Brasil SCP). A standard, 70% solids (1.96:1.0 molar ratio of formaldehyde to phenol) phenolic resin having 2 weight percent KOH per weight of phenol is available from Neste Resins Canada, Mississauga, Ontario, Canada.

[0030] Other binder compositions including polyacrylonitrile, styrene-acrylonitrile copolymers, styrene-butadiene copolymers, and combinations of these may also be used. However, use of these binders results in less efficacious buffing articles than the above disclosed thermosetting binders.

Lubricant

[0031] Examples of lubricants for use in the self-contained fibrous buffing article include fatty acids (e.g., stearic acid), metallic salts of fatty acids (e.g., lithium stearate, zinc stearate), solid lubricants (e.g., poly(tetrafluoroethylene) (PTFE), graphite, and molybdenum disulfide), mineral oils and waxes (including micronized waxes), carboxylic acid esters (e.g., butyl stearate), poly(dimethylsiloxane) fluids, gum, and combinations thereof. Such lubricants and commercial sources are known to those of skill in the art. Other suitable lubricants may be apparent to those skilled in the art after reviewing the present disclosure.

[0032] Useful lubricants include, for example, "ZINCUM SW", "ZINCUM AV", "CEASIT SW" and "CEASIT AV" (from Baerlocher Do Brasil S.A, Americana, SP, Brazil), "COMAX A", "COMAX T", "QUIMIPEL COAT 9327" and "QUIMIPEL COAT 9330" (from Quimipel Industria Quimica LTDA, Piracaia, SP, Brazil), "Natural Graphite" (from Nacional de Grafite LTDA, Itapecerica, MG, Brazil), "Mineral Oil USP Grade Agecom and Drakeol" (from Agecom Produtos de Petroleo, Maud, SP, Brazil).

Abrasive Particles

[0033] Suitable abrasive particles are those useful for buffing operations. The abrasive particles may be of any suitable composition, but those comprising chromium oxide, aluminum oxide, calcined micronized aluminum oxide, iron oxide, titanium oxide, or silicon carbide are typical. Appropriate abrasive particle size distributions include those with median particle diameters of no greater than 50 micrometers, no greater than 30 micrometers, or no greater than 15 micrometers.

Other Optional Additives

[0034] Other optional additives that may be beneficial in the adherent slurry are surfactants, wetting agents, antifoaming agents, colorants and coupling agents.

[0035] An anionic surfactant is beneficial to incorporate the lubricant into the adherent slurry. An example of an effective anionic surfactant is sodium dioctyl sulfosuccinate, available as "Aerosol OT-75" from Cytec Do Brasil Ltda., Sao Paulo, SP, Brazil.

[0036] A wetting agent is useful to promote impregnation of the spunlaced fibrous buffing material with the adherent slurry. Useful wetting agents include surfactants that are at least partially non-ionic, such as "NopcoWet BR", available from Gap Quimica Ltda., Guarulhos, SP, Brazil.

[0037] A coupling agent is useful to improve adhesion between the fibrous buffing material, the binder, and the abrasive mineral. Useful coupling agents include "Z-6020 Silane" and "Z-6040 Silane", both available from Dow Corning.

[0038] Colorants or pigments such as iron oxide, titanium oxide, or carbon black may be added to visually identify different buffing articles and/or type of buffing article. In some embodiments, pigments such as chromium oxide may also serve as an abrasive particle.

Adherent Slurry Impregnation Process

[0039] The self-contained fibrous buffing articles are made by impregnating a length of suitable fibrous material with the adherent slurry comprising abrasive particles, thermosetting binder, a lubricant, and optionally a wetting agent and/or a surfactant, followed by a thermal treatment step forming a hardened adherent coating on the fibers and surfaces of the fibrous material. The adherent slurry may be incorporated into the fibrous material in one or more steps with either one or more hardening (thermal or otherwise) steps. In some embodiments, an adherent slurry is incorporated and hardened, followed a subsequent coating comprising additional lubricant, followed by an additional hardening step. Adherent

slurries and additional coatings may be applied by conventional application means, such as roll coating, curtain coating, die coating, or spraying. In some embodiments, the total dry add-on weight of the coating(s) is from 25 gsm to 500 gsm, or from 50 gsm to 300 gsm, or from 100 gsm to 200 gsm.

[0040] During the hardening step(s), as water is removed, it has been discovered that more desirable adherent slurries separate into a hydrophilic phase and a lipophilic phase. While not wishing to be bound by theory, the inventors believe that the partitioning of the various coating constituents into these discrete phases contributes to superior buffing performance when using the self-contained fibrous buffing article.

Self-Contained Fibrous Buffing Articles

[0041] The buff must not only be capable of withstanding the strenuous use conditions typically encountered in buffing operations, but it must also be capable of holding the pre-impregnated adherent buffing composition on the buffing surface(s). Self-contained fibrous buffing articles may be any design or styles presently known or contemplated in the future. The most popular forms of buffs are depicted by FIGS. **1-3**.

[0042] FIG. **1** shows a buff **10** composed of layers **11** of fibrous buffing material, optionally sewn with one or more circles of stitching **12** with suitable thread which is known for this purpose between the outer edge **13** and central opening **14** for attachment to a rotating spindle or mandrel. Layers of fibrous buffing material have a generally circular shape and they are stacked (or the entire assembly is cut) so that the edges of each of the layers define a cylindrical surface which is the peripheral edge of the buff.

[0043] FIG. **2** shows a buff **20** composed of layers **21** of fibrous buffing material sewn together with several circular patterns **22** of stitching with suitable thread. The sewing pattern may be concentric (as shown), spiral, square, radial, radial arc, or combinations thereof. Buff **20** has a central opening **24** for attachment to a rotating spindle or mandrel.

[0044] FIG. **3** depicts what is known as a "puckered" buff **30** which is produced by cutting a continuous strip of fibrous buffing material and convolutely wrapping this strip around the separated ends of axially aligned cylindrical mandrels, radially constricting the wrapped strip at its middle to form a flattened "puckered" annulus, and installing a rigid clinch ring **33** of either plastic or metal within the opening of the annulus. A "puckered" fibrous buffing material annulus may also be fastened by stapling, sewing or adhesive bonding to a suitable rigid annulus such as an annulus formed of cardboard.

[0045] The particular construction of a sewn buff will depend upon its ultimate use. Buffs formed of layers of fabric, which are sewn together, as shown in FIG. **2** are typically used for cut buffing. Very close rows of stitching increase the stiffness of the sewn buff to increase cut. The sewing patterns for such buffs may vary, depending upon the needs of the user, from concentric sewn, radial sewn, square sewn, spiral sewn, to radial arc sewn and radial arc with spiral center. Concentric sewing results in non-uniform density when the buff wears as it is used. As the buff wears closer to the stitches, the buff will become harder and just past a row of stitches it becomes softer. Spiral sewing results in a more uniform density, although the buff surface will still have a density variation. Square and non-concentric sewing patterns produce pockets that may aid in buffing.

[0046] The puckered or pleated buff is popular for its cool running capability, provided by pleats or puckers in its fabric. The type of the construction of a puckered buff depends upon its ultimate use also. Different hardnesses may be required for various cutting and/or color buffing applications. Hardness may be controlled somewhat by the spacing of buffs on the mandrel, but more commonly is regulated by the degree of puckering, the diameter of the buff relative to the clinch ring diameter, or the stiffness of the buff fabric.

[0047] Other self-contained fibrous buffing articles may also find utility, including "flap wheel" constructions **40** as illustrated in FIG. **4** having individual buffing flaps **41** or "flap belt" constructions **50** as illustrated in FIG. **5** having individual buffing flaps **51**.

EXAMPLES

[0048] Objects and advantages of this invention are further illustrated by the following non-limiting examples; however, the particular materials and amounts thereof recited in these examples, as well as other conditions and details, should not be construed to unduly limit this invention. Unless otherwise noted, all parts, percentages, ratios, etc. in the Examples and the rest of the specification are by weight. The following abbreviations are used throughout the Examples.

Material	Description & Source
Phenolic resin	Phenolic Resin, known as "RESAFEN 13-376", from Reichhold Do Brasil Ltda, Mogi das Cruzes, S.P., Brazil
PEG 400	Polyoxyethylene Glycol, available as "ATPEG 400", from Oxiteno S/A Industria E Comercio, São Paulo, S.P., Brazil
Emulan A	Oleic Acid based surfactant, available as "EMULAN A", from BASF Aktiengesellschaft, Ludwigshafen, Germany
Stearic Acid emulsion	40% weight Stearic Acid Emulsion, available as "QUIMIPEL COAT 9330", from Quimipel Industria Quimica LTDA, Piracaia, SP, Brazil
Q2	Silicone based superwetting agent, available as "Q2-5211", from Dow Corning Do Brasil Ltda, Hortolandia, SP, Brazil
Z-6040	Alkoxysilane based silane, known as "Z-6040 Silane", from Dow Corning Do Brasil Ltda, Hortolandia, SP, Brazil
Green Pigment	Green pigment, known as "HOSTATINT GG-BR", from Clariant S/A, São Paulo, S.P., Brazil
Micronized Calcined Aluminum Oxide	Alumina abrasive particles, D_{90} = 12.0 micrometers, available as "TAP 10" from Treibacher Schleifmittel Brasil, Salto, S.P., Brazil
SiC F500	Silicon carbide particles, available as "BSICSK F500" from Treibacher Schleifmittel Brasil, Salto, S.P., Brazil
Aerosol OT	Sodium dioctyl sulfosuccinate, available as "AEROSOL OT-75" from Cytec Do Brasil Ltda., Sao Paulo, S.P., Brazil
Mineral oil	85 USP Grade mineral Oil, available as "AGECOM 85 USP Grade", from Agecom Produtos de Petróleo Ltda, Mauá, SP, Brazil
Antifoam BC-1137	Silicone based antifoam, available as "1520 Silicone Antifoam", from Dow Corning Do Brasil Ltda, Hortolandia, SP, Brazil

Example 1

Color Buff

[0049] 100 g/sq. meter polyester spunlaced fabric ("SPLENDEX" from Unimas Industries, Vila Maria, SP, Bra-

zil) fibrous buffing material was roll coated with an adherent slurry of 27 parts phenolic resin, 4.7 parts PEG-400, 0.4 parts Emulan A, 31.8 parts stearic acid emulsion, 0.4 parts Q2, 0.3 parts Z-6040 silane, 1.3 parts green pigment and 34 parts micronized calcined aluminum oxide. The coated fabric was heated in an oven for 54 seconds at 193 degrees C. followed by 54 seconds at 185 degrees C. The dry add-on was 146 gsm. A second coating of 53 parts water, 0.7 parts Emulan A, 0.1 parts Aeorsol OT, 6 parts mineral oil, 40 parts stearic acid emulsion, and 0.1 part antifoam BC-1137 was applied via a roll coater and heated in an oven for 54 seconds at 193 degrees C. followed by 54 seconds at 185 degrees C. The total dry add-on for both coatings was 196 gsm.

[0050] A self-contained buffing article was constructed of the resulting impregnated fibrous buffing material by stacking 50 layers of 25 cm diameter discs onto a flanged mandrel via an arbor hole. The assembled discs were compressed on the machine up to the point to keep the layers together. The self-contained buffing article was used to treat brass and aluminum workpieces. The test was made by rotating the self-contained buffing article at 1500 rpm. Surface finish was determined both before and after buffing using a micrometer ("Perthometer M2", Mahr Federal, Inc, Providence, R.I.). Three measurements were taken at each condition on each workpiece with the result being the average of those three readings. On brass, the Rz was reduced from 0.46 micrometers to 0.22 micrometers and the Rmax from 0.86 micrometers to 0.24 micrometers. On aluminum, the Rz was reduced from 0.83 micrometers to 0.4 micrometers and the Rmax from 0.99 micrometers to 0.44 micrometers.

Example 2

Cut Buff

[0051] The buffing article of Example 2 was prepared identically to that of Example 1 except that 35.3 parts of micronized calcined aluminum oxide were replaced by Silicon Carbide "BSICSK F500".

[0052] A buffing wheel of Example 2 was evaluated on both brass and aluminum. The surface finish was evaluated both before and after the buffing operation buffing using a micrometer ("Perthometer M2", Mahr Federal, Inc, Providence, R.I.). Three measurements were taken at each condition on each workpiece with the result being the average of those three readings. On brass, the Rz was reduced from 3.17 micrometers to 0.53 micrometers and the Rmax from 3.62 micrometers to 0.68 micrometers. On aluminum, the Rz was reduced from 6.81 micrometers to 0.84 micrometers and the Rmax from 7.36 micrometers to 1.41 micrometers.

[0053] Other modifications and variations to the present disclosure may be practiced by those of ordinary skill in the art, without departing from the spirit and scope of the present disclosure, which is more particularly set forth in the appended claims. It is understood that aspects of the various embodiments may be interchanged in whole or part or combined with other aspects of the various embodiments. All cited references, patents, or patent applications in the above application for letters patent are herein incorporated by reference in their entirety in a consistent manner. In the event of inconsistencies or contradictions between portions of the incorporated references and this application, the information in the preceding description shall control. The preceding description, given in order to enable one of ordinary skill in the art to practice the claimed disclosure, is not to be construed as limiting the scope of the disclosure, which is defined by the claims and all equivalents thereto.

1. A self-contained fibrous buffing article comprising at least one layer of a spunlaced nonwoven fabric having a hardened adherent coating comprising a thermosetting binder, abrasive particles, and a lubricant.

2. The self-contained fibrous buffing article of claim **1** wherein an adherent slurry applied to the spunlaced nonwoven fabric which forms the hardened adherent coating comprises a surfactant.

3. The self-contained fibrous buffing article of claim **1** wherein an adherent slurry applied to the spunlaced nonwoven fabric which forms the hardened adherent coating further comprises a wetting agent.

4. The self-contained fibrous buffing article of claim **1** wherein the spunlaced nonwoven fabric has a basis weight from 30 grams per square meter to 130 grams per square meter.

5. The self-contained fibrous buffing article of claim **1** wherein the abrasive particles have a mean particle size of no more than 50 micrometers.

6. The self-contained fibrous buffing article of claim **1** wherein the lubricant comprises stearic acid.

7. The self-contained fibrous buffing article of claim **1** wherein the lubricant comprises mineral oil.

8. The self-contained fibrous buffing article of claim **1** wherein the lubricant comprises stearic acid and mineral oil.

9. The self-contained fibrous buffing article of claim **1** wherein the abrasive particles comprise at least one of chromium oxide, aluminum oxide, or silicon carbide.

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