United States Patent

Grand et al.

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[54] FIBER CONDITIONING ARTICLE

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[52] **U.S. Cl.**.....**34/9**, 34/60

[51] **Int. Cl.**.....**F26b 3/00**

[58] **Field of Search**.....34/9, 12, 60, 71

[56] **References Cited**

UNITED STATES PATENTS

1,429,997	9/1922	Ayres	34/71
2,941,309	6/1960	Cobb	34/12 X

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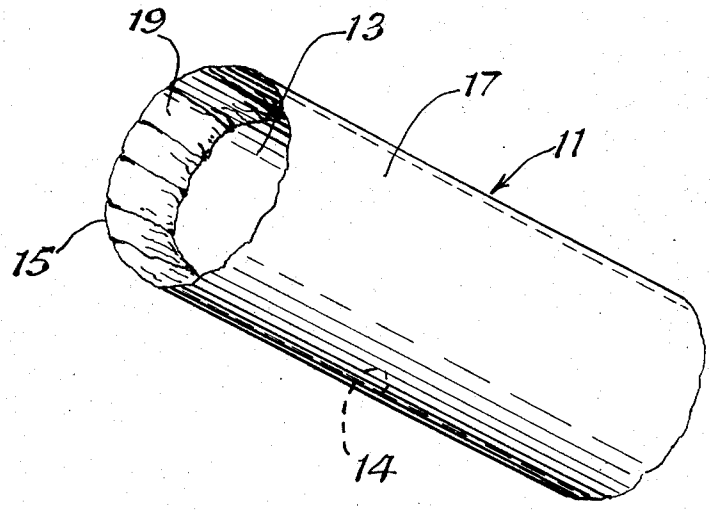
[57] **ABSTRACT**

An article for conditioning fibrous materials by contact includes a form-retaining base and, held to an outside surface of the base in form-retaining relationship with it, a flexible material which has an outer surface thereof containing a fiber conditioning agent. Conditioning effected is preferably fabric softening and may take place in an automatic laundry dryer wherein damp laundry is brought into tumbling contact with the conditioning article while being dried. Such contact causes the transfer to the laundry of softening agent and the dried laundry is satisfactorily soft, non-static and unwrinkled, upon removal from the dryer.

Also disclosed are packages for the articles wherein the form-retaining base is a paperboard cylinder and is employed as a container for the flexible material coated with softening agent.

12 Claims, 8 Drawing Figures



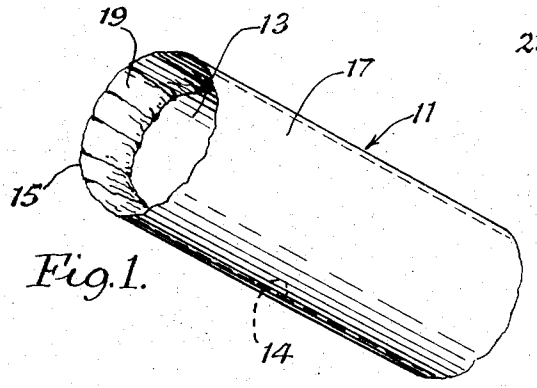


Fig. 1.

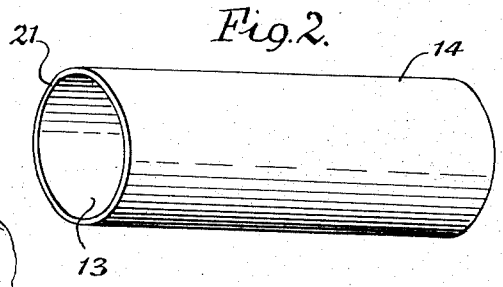


Fig. 2.

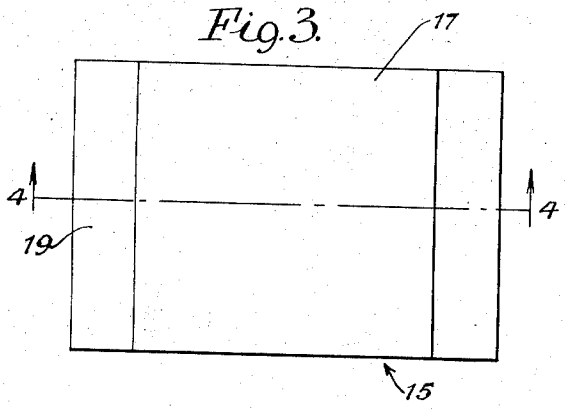


Fig. 3.

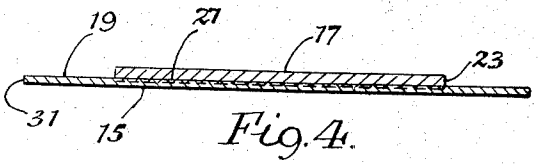


Fig. 4.

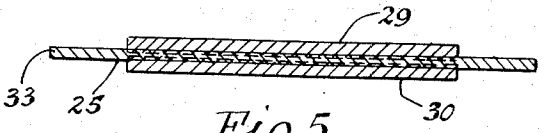


Fig. 5.

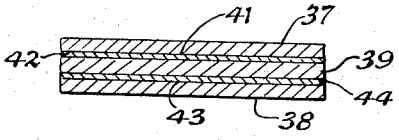


Fig. 7.

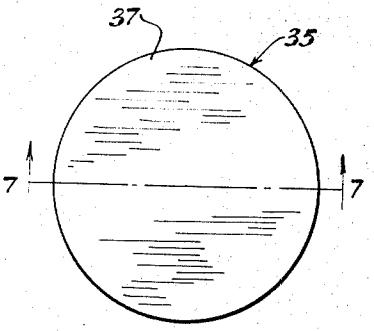


Fig. 6.

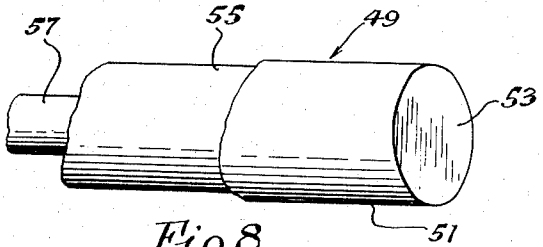


Fig. 8.

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FIBER CONDITIONING ARTICLE

SUBJECT OF THE INVENTION

This invention relates to the conditioning of fibrous materials by contact with a form-retaining base having on an outer surface thereof a conditioning agent which is transferable to the contacted fibrous materials. More particularly, the invention relates to certain structures of such form-retaining conditioning articles wherein flexible substrates are employable despite the disadvantages which it has been discovered are often associated with their use.

BACKGROUND OF THE INVENTION

It is well known that conditioning agents may be employed to improve the characteristics of fibrous materials. The most important of such conditioning operations undertaken on a large scale today during the washing of fibrous articles and materials is the softening of such materials by addition of treating chemicals in the last rinse. Substantive chemicals employed adhere to the laundry so that after drying it has the desired properties conditioned into it. Thus, cotton and synthetic organic polymeric fibrous materials are made soft to the touch, static-free and wrinkle-resistant by treatment with substantive softeners. Of course, a problem with such treatment is in the necessity for the softening agent or other conditioning compound to be highly substantive to the fibers being treated. Otherwise, the conditioning chemical is largely wasted, being discharged with the rinse water.

When attempts have been made to condition laundry by a treatment which will not require addition of a chemical to the rinse water, such as in treatments in the dryer, other problems have been encountered. For example, conditioning sprays or other applications of liquid to the laundry in the dryer require somewhat complicated and accordingly, expensive installations and even with these, staining or other detrimental effects due to local over-application of conditioning agent may be caused. Also, when a flexible paper or cloth sheet is impregnated with cationic conditioning agent and the product is tumbled with laundry in the dryer, staining is sometimes experienced, apparently due to temporary entrapments of the flexible conditioning article in the laundry being treated, causing the application of more conditioning agent than is desirable at a particular location on the treated material. Local over-application of conditioning agents may also be caused by cracking and flaking off of such compositions when the flexible substrate is folded, creased, twisted, bent or otherwise distorted, straining the conditioning material to a breaking point. In the case of cationic conditioning agents, such as quaternary ammonium salts, severe staining may result if there is also present a sufficient quantity of materials containing color bodies or heavy metal ions, such as ferric or ferrous ions. Such stains are difficult to remove from the laundered articles, often requiring dry cleaning, which sometimes is not completely successful. Thus, even the possibility of only occasional adverse effects of this type will prevent the satisfactory marketing of such a product. In attempts to counteract this objectionable characteristic, the concentration of conditioning agent may be diminished or its nature may be changed, so as to avoid the most severe staining but such action may

also have a detrimental effect on the conditioning power of the product.

Although the disadvantages of the use of flexible substrates for conditioning substances have been ascertained, it is often advantageous from a manufacturing standpoint to utilize films or sheets of flexible materials as the means of applying conditioning agent. This is largely so because they lend themselves to continuous and mass production coating operations, which may not adapt as well to the coating of solid or form-retaining articles. Furthermore, flexible substrates such as paper may be rolled and packaged automatically and large quantities of effective conditioning surfaces may be contained in packages of comparatively small volume.

DESCRIPTION OF THE INVENTION

The products, packages and methods of this invention allow the commercial production of fiber conditioning articles and the treatment of fabrics with them in efficient and commercially adaptable ways and permit advantage to be taken of the better transfer properties of conditioning materials from form-retaining substrates, while at the same time permitting use of the manufacturing and packaging techniques best applicable to flexible materials.

In accordance with the present invention, an article for conditioning fibrous materials making contact with it comprises a form-retaining base and, held to an outside surface of such base, in form-retaining relationship with it, a flexible material having an outer surface containing thereon a fabric conditioning agent which, during a tumbling operation, is transferable to the fibrous materials contacted, thereby conditioning them. In particularly preferred embodiments of the invention, the base of the conditioning article is a paperboard cylindrical tube and the flexible material is paper, wrapped around the tube and held to it, with the outer surface of the paper being coated with a conditioning agent for the fibrous materials to be contacted.

Various details, constructions, operations, uses and advantages of the invention will be apparent from the following description, taken in conjunction with the illustrative drawing of some embodiments thereof, in which drawing:

THE DRAWING

FIG. 1 is a perspective view of a cylindrical fabric conditioning article, illustrating holding of the flexible sheet portion thereof to the form-retaining base by folding in of the sheet ends;

FIG. 2 is a perspective view of the cylindrical base of the article of FIG. 1;

FIG. 3 is a developed plan view of the flexible sheet employed in making the article of FIG. 1;

FIG. 4 is a vertical section along plane 4—4 of FIG. 3;

FIG. 5 is a corresponding vertical section of a flexible sheet coated on both sides with fiber conditioning agents;

FIG. 6 is a top plan view of another form of fabric conditioning article;

FIG. 7 is a vertical sectional view along plane 7—7 of FIG. 6; and

FIG. 8 is a cutaway view of a part of a tubular package containing a roll of flexible sheet material coated with conditioning agent.

DETAILED DESCRIPTION OF THE INVENTION:

Fabric conditioning article **11** includes a base portion of form-retaining material, a cylindrical paperboard tube **14**, the interior of which is shown at **13**, plus a flexible covering sheet **15** having a coating of conditioning agent or composition **17** thereon. The ends of such sheet, one of which is illustrated at **19**, are uncoated and are folded in to hold the sheet to the form-retaining cylindrical base **13**. The base is shown in FIG. **2**. Wall **21** is of sufficient thickness to make the paperboard cylindrical tube form-retaining. The flexible sheet **15** of paper, coated with fabric conditioning composition **17** is shown in FIG'S. **3** and **4**, before being rolled around the outside of tube **13** to form the product of FIG. **1**. As will be noted from FIG. **4**, the coating **17** of conditioning agent penetrates slightly below the surface **27** of sheet **15**, but does not completely impregnate the paper. The thickness **23** of the conditioning material external to the surface of sheet **15** is generally sufficient to allow a plurality of conditioning uses in softening or otherwise treating charges of laundry or other fibrous material in an automatic dryer. In FIG. **5** there is illustrated a different form of cover for a base, flexible sheet material **25**, coated on both sides with conditioning compositions **29** and **30**, respectively. In the articles of both FIG'S. **4** and **5** the thicknesses **31** and **33** of the flexible bases and their flexibilities are such that when the ends of the flexible sheet materials are folded inwardly over a cylindrical form-retaining base **13**, they hold the coated sheet in place thereon.

In FIG'S. **6** and **7** there is shown a disc shaped fiber conditioning article **35** having coatings **37** and **38** of fabric conditioning composition on the surfaces **41** and **43** of flexible substrates **42** and **44**, respectively, with these held to form-retaining base **39**. Substrates **42** and **44** are fastened to form-retaining base **39** by suitable means, e.g., staples, cement.

In FIG. **8** a cylindrical tubular outer package **49** comprises tubular wall portion **51** and end **53**. The tube is similarly closed at the opposite end and the ends may be punched out, if so desired, when the tubular portion **51** thereof is to be employed as a form-retaining base to be covered with a strip of flexible sheet material coated with conditioning agent. Such flexible sheet material is shown at **55**, in a continuous sheet rolled about mandrel tube **57**. In the packages illustrated in the drawing the roll of flexible sheeting coated with conditioning agent is long enough to cover form-retaining cylinder **51** about 10 to 25 times.

The present articles for conditioning fibrous materials may be made of any of the wide variety of suitable components. Thus, the form-retaining base, while preferably of paperboard, cardboard or corrugated board or other cellulosic product, may also be of any of various suitable synthetic organic polymeric plastics, in foam, solid or hollow form, wood, metal, mineral, or vegetable. Thus, polyvinyl chloride, polystyrene, foamed polystyrene, either open or closed cell, rigid polyurethane foam, glass-reinforced polyester, balsawood, coconut shells, asbestos-foamed concrete, talc, pumice or other bases may be used. They may be perforated or continuous at the surfaces thereof. They may be of various forms, such as the preferred cylinders or other rounded tubular shapes. However, discs, parallelograms, such as rectangles, parallelepipeds, such as cubes, ellipsoids, spheres, and many other shapes, which may also be symbolic or decorative, e.g., figures, flowers, etc., are also useful, providing only that they may be adequately covered with a thin flexible material having conditioning agent on a surface thereof. Of course, characteristics of the base material chosen should be such that under the conditions of operation, usually in an automatic laundry dryer with from 5 to 10 pounds of laundry tumbling about it, the base will maintain its shape and thereby will prevent distortion of the coated flexible material about it.

A preferred base is a tube, most preferably a cylinder of paperboard, and the thickness thereof will usually be from 0.1 cm. to 0.4 cm. Its diameter may be variable but will usually be between 2 and 15 cm. with the length usually being from 2 to 30 cm. Generally, the important measurement with respect to the base is the total surface thereof which will be covered with the coated flexible material. This should usually be from 10 to 5,000 sq. cm. preferably from 100 to 2,000 sq. cm. and most preferably about 250 to 1,500 sq. cm. In some embodiments of the invention, the form-retaining base will also be used as an outer container for a roll of coated flexible paper. In such cases, it may be desirable for the ends of the tube to be closed in, as by paper, plastic or metal caps. Alternatively, other container structures may be used, such as telescoping tube portions, each of which has one closed end and one of which fits inside the other. Various other package designs that lend themselves to the present use are apparent and will not be discussed further here. Of course, when the form-retaining base is not to be used as a package, it may be solid or have internal reinforcing members present, because in such cases space need not be allowed for storage of the flexible sheet material.

The thin flexible substrate to be coated with conditioning agent and used to cover at least a portion of the form-retaining base may also be any of a wide variety of suitable materials, including papers, plastics, rubbers, metals, cloths, sponges, fibers, felts or non-woven fabrics. The various fibrous materials may be natural or synthetic and usually will preferably be cellulosic. However, they may also be of resilient foamed plastics, such as polyurethanes. The shape of the flexible substrate material will necessarily be such as to be conformable to the form-retaining base. Generally, it will be preferred to utilize comparatively thin sheeting, usually from 0.001 to 0.1 cm. thick but in some cases, as when flexible foams or sponges are employed, the thickness may be increased to as much as about 1 cm. without detrimental effects. The main consideration is that the material have the desired flexible properties to make it readily processable when coating agent is employed and to make it readily storable before use. In both such cases it is desired that it be capable of being formed into a roll in which the sheet material is usually comparatively thin. Of course, instead of using a rolled sheet, sections can be cut from it into various shapes and employed on flat or partially curved bases.

Among the fabric softeners and antistatic agents that are usable in accord with the present invention are the nonionic surface active materials, including higher fatty acid mono-lower alkanolamides, higher fatty acid di-lower alkanolamides, block copolymers of ethylene oxide and propylene oxide, having balanced hydrophil-

ic and lipophilic groups, alkyl (preferably middle alkyl) phenol polyclower alkylene oxide lower alkanols, polymers of lower alkylene glycols, polyalkylene glycol ethers of higher fatty alcohols and polyalkylene glycol esters of higher fatty acids. Among the anionic agents are the higher fatty acid soaps of water soluble bases, higher fatty alcohol sulfates, higher fatty acid monoglyceride sulfates, sarcosides, taurides, isethionates and linear higher alkyl aryl sulfonates. Cationic compounds include the higher alkyl di-lower alkyl amines, di-higher alkyl lower alkyl amines and quaternary compounds, especially quaternary ammonium salts, e.g., quaternary ammonium halides. In the preceding description, lower, as applied to various hydrocarbyl-containing groups, indicates a carbon content of from 1 to 6, preferably from 2 to 3. Similarly, higher includes compounds having from 10 to 20 carbon atoms, preferably from 12 to 18. Of course, since it is important to the present invention that the conditioning composition be in a solid form, so that it can have conditioning agent gradually removed from it by contact with tumbling laundry fabrics in a dryer or similar machine, the fabric softening and/or antistatic agents will be chosen to be in the solid state. Mixtures of nonionic conditioning agents with either cationics or anionics of the types mentioned above may also be used and generally, the proportions of components of such mixtures will be chosen so as to have the final product in most desired waxy condition and satisfactorily removable by a combination of moisture, heat and abrading contact with laundry that exists in an automatic dryer.

Specific examples of surface active materials of the types described above are given in the text Synthetic Detergents by Schwartz, Perry and Berch, published in 1958 by Interscience Publishers, New York. See pages 25 to 143. Among the more preferred of these are:

Nonionic — nonylphenoxy polyethoxy ethanol; stearic monoethanolamide; lauric diethanolamide; block copolymers of ethylene oxide and propylene oxide (Pluronics);

Anionic — sodium soap of mixed coconut oil and tallow fatty acids; sodium stearate; potassium stearate; sodium laurate; tallow alcohols sulfate;

Cationic — dilauryl dimethyl quaternary ammonium chloride; hydrogenated tallow alkyl trimethyl ammonium bromide and benzethionium chloride.

The above list is only illustrative of some of the compounds useful in accordance with the present invention. Conditioning agents of these types are well known in the art and others than those mentioned above may also be used satisfactorily.

In addition to the fabric softening and/or antistatic and anti-wrinkling agents which are the principal conditioning compounds, other components may also be present in these conditioning compositions for their adjuvant effects. Thus, other conditioning agents may be used, including those designed to treat the fabrics in other ways than in softening. For example, perfumes, brighteners, bactericides, solvents, thickening or hardening agents, stabilizers and other materials may be incorporated in the conditioning compositions. In some cases, small quantities of water may be present, especially when the components form hydrates. Plasticizers and release agents may be employed to assist in having the conditioning compounds satisfactorily coat the flexible substrate and to facilitate release of the conditioning agent from the treated articles upon subsequent laundering. Solvents and dispersants may be used to assist in applying the conditioning compositions to the flexible base, principally in those cases where a flexible material, such as paper, is being impregnated with the conditioning composition. The types and proportions of the various adjuvants used will be chosen so to make them readily applied with the softening agents and so as not to interfere with the operations of the conditioning compounds.

The final conditioning composition is preferably waxy in appearance and is capable of being stored at room temperature without melting, while yet being satisfactorily picked up by fabrics in the operation of an automatic laundry dryer, when the fabrics tumble into contact with the conditioning composition. The conditioning composition will be form-retaining at temperatures below 30° C. and preferably, also at all temperatures below 40° C. It may tend to fuse or melt under the higher temperatures obtaining in the dryer, such as 70° to 90° C. but usually will be only sufficiently softened, even in the presence of the plasticizers, to be abraded off a treating article onto the surface of material to be conditioned, at dryer conditions, including the presence of moisture and drying gas at an elevated temperature. The conditioning composition should be removable from a substrate rather slowly but in sufficient quantity to condition fabrics, at a temperature from 40° to 90° C., preferably from 50° to 80° C. Normally, to effect these purposes, the fabric softener and/or antistatic agent, the surface active conditioning agent mentioned previously, will be a major proportion of the conditioning composition, usually from 51 to 100 percent thereof. Preferably it will comprise from 75 to 100 percent of the composition. The various adjuvants will normally constitute any remainder of the composition.

When the conditioning composition is employed as a coating on the substrate, the thickness of the coating applied will normally be within the range of 0.0005 to 0.5 centimeter, generally from 0.001 to 0.3 cm. and preferably from 0.005 or 0.05 to 0.2 cm. The thickness given is that external to the outer surface of the thin flexible material coated. A somewhat porous or rough surfaced substrate or one having indentations will normally be preferred so that the coating composition may penetrate below the outer surface to a sufficient depth to hold the external coating firmly to the surface and prevent its cracking or flaking off from the surface during use. As an example of such a substrate may be mentioned the flexible polyurethane foams or paper toweling, having a crinkled or roughened appearance, as contrasted to a smooth sheet of paper. A minor proportion of the external thickness of coating agent may be below the surface. This will usually be held to 10 to 30 percent of that external to the base. In terms of weights applied, the conditioning composition will normally be employed in the range of 0.0005 to 0.5 g./sq. cm., preferably from 0.001 to 0.3 g./sq.cm. and most preferably from 0.005 to 0.2 g./sq. cm.

The preparation of the conditioning compositions is easy, usually requiring only the melting together of the various components or the dissolving of them in a sol-

vent such as ethanol, water, acetone, ether or other suitable medium. Such solutions are normally employed if it is desired to impregnate a porous material, such as paper, cloth or sponge. Normally however, it is most desirable to have a major proportion of the coating agent external to the flexible base so that it will all be available for transfer to the laundry to be conditioned. In such cases, although solutions can be used, it will generally be desirable to employ melts.

Methods for coating flexible articles which are especially adaptable to coating such materials as they are unwound from and wound onto rolls are described in an application for patent Ser. No. 82,238, filed Oct. 20, 1970 entitled PROCESS FOR THE MANUFACTURE OF FABRIC CONDITIONING ARTICLE, filed by P. J. Falivene, one of the present inventors. Usually, the flexible base will be drawn through a bath of conditioning composition, will be passed under rollers or a spreader which coats a surface thereof or will be sprayed with a melt or a solution of the treating composition. In such manner, a coating of the type described previously can be deposited on the flexible base and the coated sheet can be rolled up or otherwise stored, ready for subsequent use.

If it is desired to coat both sides of the flexible sheet, as will often be the case, this may be done by the application of sprays or spreading of conditioning composition on both sides simultaneously or sequentially. If only one side is to be treated, it will usually be preferred to accomplish this with a roller, doctor blade or spray application, rather than by drawing of the sheet or film substrate through a melt and removing one side coating. Of course, it is a simple matter to coat the central portion of the sheet, leaving the ends free of conditioning composition and this can be accomplished by utilizing masking means or by squeezing out or scraping off coating composition from the ends, after application. Where both sides of a substrate are covered, the conditioning materials may be the same or different on the major faces. Also, one of them may incorporate another coating thereon to aid in preventing adhesion of portions of the sheet which come into contact with each other after rolling up of the coated substrate. Thus, a thin layer of wax can be applied on top of one side of the sheet coated with conditioning agent or an interleaf of waxed paper, foil or other protective barrier can be used. Although it will be strongly preferred to employ continuous, automatic machinery, of the type used to make waxed paper, for the coating of the present flexible substrates, other means may also be used, including printing equipment. Also, the conditioning compounds can be deposited from emulsions or dispersions and their fusion can be promoted by flame, plasma arcs, lasers, or sonic means. Individual pre-cut pieces of substrate may be made. Although the material treated may be removed from a roll, it may be cut immediately after coating. Evaporation means may be employed to remove solvent after coating, or cooling means, such as an air blast, may be used to lower the temperature to solidify the coating melt.

In preferred embodiments of the invention, after coating of the sheet of substrate it will be wound on a spool or mandrel on which it is to be sold or it may be subsequently rewound from a larger spool onto the final one. If the product is to be packed on a cylindrical roll, such as a roll of the type used to support wax paper, this, in turn, may be boxed or packaged in a tube or comforming container. It is not necessary that such container be used as the form-retaining base but this is generally preferable, in the interest of utilizing each part to the fullest extent and avoiding unnecessary elements. If desired, the supporting form-retaining tube or base may be packed inside the mandrel, rather than outside it. Instructions for use may be printed on the base. The sheets of flexible substrate may be scored or marked for cutting or tearing at such lengths as to most efficiently cover the form-retaining base. Means may be supplied in the package for fastening the coated flexible substrate to the base.

To assemble the conditioning article, it is necessary only to apply the coated flexible sheet to the form-retaining base. In some cases, this may be done beforehand by the manufacturer. Most of the time, however, in the interest of making less bulky packages and producing a more economical product, the housewife will tear off a length of sheet material, apply it to or wrap it around the base and fasten it thereto. The fastening means employed, while they may include conventional adhesives, elastic bands, snaps, clips, etc., will very often most economically be merely the uncoated ends of the flexible sheet, which will be folded in at the ends of a tube and will be held in place there by the confining or bending forces created. Of course, after use, the consumed sheet may be removed, turned over, if coated on both sides, re-used and ultimately discarded, when all the conditioning composition has been consumed. Then, another sheet may be placed on the base. Such use will continue until the entire package is consumed.

The present articles are simple to employ and the treating methods are effective for conditioning fabrics without special care being necessary on the part of the user. The conditioning article is placed in the automatic dryer or other tumbling device immediately before a drying or treating operation commences. In tumbling, the laundry and the conditioning article are in relative movement and the combination of heat and moisture with the abrading action due to contact causes the deposit of conditioning agent on the fabrics. These then, by repeated contact with other fabrics, further even out the depositing of conditioning agent. Although it is preferred to employ an automatic laundry dryer, equivalent machines may be used and in some instances the heat and drying air may be omitted for part or all of the cycle. Generally, air will be employed and will be circulated frequently. Normally there will be about 5 to 50 changes of drying gas in the dryer drum per minute and the gas temperature will be from 10° to 90° C., preferably from 50° to 80° C. The dryer will usually revolve at about 20 to 100 revolutions per minute, preferably 40 to 80 r.p.m. The weight of laundry employed will usually be from 4 to 12 pounds, preferably from 5 to 10 pounds, dry weight. This will fill 10 to 70 percent of the volume of the dryer, preferably about 30 to 60 percent thereof. Drying will usually take from 5 minutes to 2 hours and generally from 20 minutes to 1 hour will be sufficient, with synthetic fabrics, such as nylon, polyesters and synthetic-natural blends requiring shorter periods of time than cotton laundry. The synthetics may often be

dried satisfactorily in from 3 to 10 minutes and resin-treated fabrics of the permanently pressed or non-wrinkling types may be dried in from 10 minutes to 1/2 hour.

After completion of the drying of the laundry or the softening operation, the conditioning article is removed and examined. If sufficient softener remains, the article may be employed again until complete removal of the coating. If the laundry is not satisfactorily conditioned, additional tumbling may be in order. To obtain different levels of conditioning activity or different effects there may be employed several treating articles or a plurality of different treating articles. Of course, after the coating s consumed the form-retaining base may be covered with a new treated flexible substrate. Other details about the use of the present compositions, articles and methods may be found in an application for patent entitled FABRIC CONDITIONING METHODS, ARTICLES AND COMPOSITIONS, Ser. No. 82,357, filed by G. T. Hewitt on the same day of the present application, as well as in my other patent application previously mentioned.

The advantages of the present invention have been mentioned previously. In summary, it is considered most important that the conditioning agent should not be employed on a flexible substrate which is free to be distorted and trapped in the tumbling laundry or fabrics being treated, thereby being apt to deposit excessive treating composition which can stain or spot the fabrics being conditioned. Yet, the advantages of a coated flexible material, in that it is readily manufactured by continuous mass production techniques, is easy to store and lends itself to efficient packaging, are retained by having the coated flexible substrate held to a form-retaining article and used to treat fibrous materials to be conditioned. By use of such an article, the tendency toward entrapment is minimized and staining, due to such entrapment or cracking off of particles of conditioning agent due to distortion of the flexible substrate, is minimized. Although the highly preferred embodiments of the invention utilize conditioning agents designed to soften textiles, such as cotton, and to make them antistatic, an effect most desirable with respect to the synthetic organic fibrous materials, such as nylons and polyesters, or to make them wrinkle resistant, other conditioning agents may also be employed and suitable bases for their application, such as waxes, hydrophilic solids, fats, carriers or other depositable media may be used.

The following examples illustrate various embodiments of the invention. Unless otherwise indicated, all parts are by weight, temperatures are in degrees Centigrade and the measurements are in the metric system. The examples are not intended to be limiting because it is evident that various modifications may be made and equivalents may be substituted without departing from the spirit or scope of the invention.

EXAMPLE 1

A melt is prepared by heating 70 parts of stearic monoethanolamide and 30 parts of stearic diethanolamide to a temperature of about 90° C., while mixing to maintain uniformity of the composition. The melt is then applied to a sheet of toweling paper, which is creped and has a thickness of approximately 0.1 cm. Application is by means of a roller, dipping into a bath of the melt and depositing a uniform layer of coating composition on a central portion of the toweling, leaving the ends free of coating composition, as illustrated in FIG. 3 of the drawing. Also, as illustrated in FIG. 4, the toweling is covered with the softening and antistatic conditioning composition on only one side thereof. The deposit of conditioning composition is to a depth of about 0.05 cm. above the surface of the paper and the penetration is about 0.015 cm. below the surface. Penetration is limited by the rapid cooling of the melt effected by air flow directed onto the coated paper immediately after withdrawal from contact with the coating roller.

After coating of the paper with conditioning composition, it is rolled onto a paperboard spool having a diameter of about 6 cm. and being 35 cm. long. The spool is of ordinary paperboard tubing material, about 0.4 cm. thick. Enough of the treated paper is rolled onto such a spool for 50 sheets, 35 × 20 cm., to be obtained therefrom. Thus, each roll is 25 cm. wide and 10 meters long.

The roll of conditioning paper wrapped around the base or mandrel spool, is approximately 15 cm. in diameter, when wrapped tightly. Another tube, this one having a closure at one end and a cover, removable from the other end, and being of internal diameter of about 17 cm., with an external diameter of about 18 cm., is employed as a packaging enclosure for the tube of conditioning paper. The roll of paper is slid into the tube and the cover is slipped on and held thereto by suitable means, such as transparent adhesive tape. The tube is covered then with an overwrap of decorative and descriptive paper, containing instructions for use of the product or such decorations and instructions are printed directly on it.

In use, a 20 cm. of length of paper coated with conditioning agent is drawn off from the roll and is cut, either with scissors or by means of pre-perforations. It is wrapped around the external surface of the paperboard cylinder which also serves as a package for the roll of conditioning material. Because the coated paper is 35 cm. wide with 5 cm. uncoated strips along the edges, the coated portion thereof just covers the entire width of the 25 cm. long cover portion. Note that the tubular package for containing the roll of coated material is about 37 cm. long, with the separable cover being approximately 17 cm. long, giving a 5 cm. overlap with the portion thereof being used as a form-retaining base for the flexible coated conditioning paper. The conditioning paper is held to the base by pressing in of the uncoated ends thereof so that they appear as shown in FIG. 1 of the drawing.

The conditioning action of the conditioning article made is tested by employing it in treating a dryer load of 8 pounds of mixed laundry in an automatic laundry dryer. The laundry treated is a mixture of wearing apparel and household articles, including cotton, synthetic fibers, especially polyesters, polyacetates and blends of these plastics with each other or with cotton, nylons, rayons and resin-treated, permanently pressed and wrinkle resistant fabrics. The wash comprises approximately 50 percent of cotton articles, 20 percent of polyester-cotton blends, 10 percent permanently pressed items, 10 percent nylon articles and the

balance of rayon, acetate, etc. The dryer employed is of the horizontal drum type, having longitudinal flights or ridges to assist in creating a tumbling action. After loading the damp laundry, just removed from a washing machine after having been spun "dry," the conditioning article is placed on top of the laundry, which occupies 40 percent of the dryer volume, and the dryer operation is commenced. Drying air is blown through the dryer at the rate of about 200 cubic feet per minute and with an initial temperature of about 70° C. The drum rotates at about a speed of 60 r.p.m. Initially the temperature of the damp laundry is low, approximately 20° C., but as drying continues, it increases to almost 70° C. The conditioning agent on the surface of the article is abraded off onto the surface of the fabric being treated, so that when, after 50 minutes of drying, the machine is turned off and the laundry is removed, it is static-free and soft to touch, compared to a similar load in which the conditioning article is not used. Of course, no softening agent is employed in the rinse water during the wash cycle. The clothing treated exhibits so spots or stains and periodic examination of the conditioning article during the operation of the dryer shows that the coating is held satisfactorily to the base. There is no flaking or cracking of the conditioning composition evident.

Upon removal of the treating cylinder and examination of it, it is found that approximately 3 grams of conditioning composition have been abraded from the surface onto the articles to be treated. Therefore, the coated paper contains at least an additional 2 grams of available conditioning material and can be used again. When it is reused with another load of laundry and all the coating is abraded from the surface, only about 1.5 grams of the original 6.5 grams of conditioning composition remains in the conditioning paper. At that time, the paper is replaced with a fresh sheet and the conditioning operation is repeated with another laundry load.

In other runs, using the same type of base and with the same coated paper, nylon articles are removed after 5 minutes and permanently pressed articles are withdrawn after 15 minutes and are found to be satisfactorily conditioned, being soft, static-free and wrinkle-free.

When, instead of employing the formula described above there is used a melt of lauric monoethanolamide and stearic diethanolamide, also in 30:70 portions, comparable results are obtained. Similarly, when a solution comprising 30 percent ethanol, 55 percent distearyl dimethyl ammonium chloride and 15 percent water is employed to impregnate the same type of paper over the same area at approximately the same weight of conditioning compound per unit area, and the article covered with treated paper is used in the described conditioning operation, good softening of cotton and antistatic action on synthetic organic polymeric textiles are obtained. In manufacturing such a product, an air blast is employed to evaporate solvent immediately upon removal of the coated paper from contact with the coating roll. When synthetic organic anionic surface active agents such as sodium lauryl sulfate and soap are also used, applied either as melts or solutions to toweling of the type described above and wrapped around the form-retaining base, they are also found to be satisfactory in conditioning of the tested laundry. It is generally observed that the additions of plasticizing agents, such as those described in a patent application filed by P. J. Falivene on the same day as this application and entitled FABRIC CONDITIONING WITH IMPROVED COMPOSITION CONTAINING A PLASTICIZER, are useful in improving even further the adaptability of the coated toweling to be rolled onto and rolled from a cylindrical mandrel, without exhibiting any cracking or flaking off of the coating.

EXAMPLE 2

The experiments reported in Example 1 are repeated, this time using various other tubular shapes, including those of elliptical, square and rectangular cross-section, but with equivalent surface areas and covered with similarly coated papers. Those tubes having sharp corners have strips of conditioning paper cut to fit each face and these are applied thereto by stapling or cementing, so as to avoid creating sharp bends which could cause the conditioning composition to flake off and spot the treated clothing. When such precautions are followed, the conditioning results are comparable to those of Example 1.

EXAMPLE 3

The procedure described in Example 1 is followed but the base material, rather than being a paper towel, is a thin layer of polyurethane foam, approximately 0.5 cm. thick. It is cemented to a form-retaining base which is a paperboard box in the shape of a cube, having a side of approximately 10 cm. when employed to treat similar laundry, satisfactory conditioning results, following the test procedures in Example 1, but the softening and antistatic effects are not as good as those observed with the product of Example 1.

EXAMPLE 4

The preparation of a coating paper follows the procedure described in Example 1 with respect to the stearic monoethanolamide-stearic diethanolamide coating on paper toweling, with the exception that entire sheet of paper is coated on both sides at approximately the same weight of conditioning agent per unit area. Clothing is softened by the same method but after consumption of the exposed conditioning agent on the paper, the tucked in paper is removed and reversed, so that a fresh surface of conditioning agent is available. It is then used over again, until the coating is consumed. The, the ends, previously tucked in to hold the sheet onto the form-retaining base, are cut off and are stapled to the base, together with other such ends, so that the coating thereon can be utilized. By following this method, it is not necessary to make any special effort to prevent the coating of the ends of the sheets, which would normally be inaccessible for application of coating composition from them to the laundry or fibrous materials being treated.

Instead of being stapled to the tubes, the coating compositions may be fastened, as by staples, cement, or other fastening means, even paper clips, to other form-retaining bases, even to discs or other flat items. Of course, articles of such shapes do not roll as satisfac-

torily in the automatic dryer as do the rounded tubular items, but, providing that an equivalent weight of conditioning composition is present on a comparable surface area, useful conditioning results.

If, instead of the nonionic conditioning agents, a cationic material, such as the distearyl dimethyl ammonium chloride conditioner of U.S. Pat. No. 3,442,692 is employed and is used to coat a flexible substrate, in the manner described in that patent, with the substrate then being made form-retaining by being affixed to a form-retaining base, useful conditioning of laundry results. However, in such cases, contact with metals, especially heavy metal ions, such as ferric or ferrous ions, and color bodies should be avoided to prevent staining. Thus, staples and paper clips will not ordinarily be used to fasten the flexible substrates to the bases when cationic materials are employed. For similar reasons, where contact with metals or rusted materials is possible, one will preferably employ the nonionic or anionic conditioning agents. If the cationics are used, some staining problems therewith are obviated by having the flexible base made form-retaining and thereby less apt to have large quantities of conditioning agent broken off and deposited on the fibrous materials being treated.

Other embodiments of the invention will be apparent to those of skill in the art from this description. For example, the form-retaining cylinder may be of a springy nature, made of plastic or metal, with a longitudinal slit running the length thereof. The springing together of the plastic at the slit may be used to hold a sheet of coated paper wrapped around the cylinder. Also, the coated sheets and base materials may be in pad form, with the pad support, being a plastic or other material which is flexible, yet form-retaining when rolled into a tubular shape. The form-retaining support which may be of polyurethane foam, paper, Mylar, nylon, etc., can be rolled into a cylindrical shape and held in this shape by rubber bands or other suitable fasteners. The coated sheets from the pad may then be wrapped around the cylinder and employed in a conventional automatic dryer for softening purposes. With respect to the form-retaining base, it may even be made from a plurality of layers of flexible material, such as paper, which are wound sufficiently to become essentially form-retaining. In such an embodiment, a coating may be applied to the outer portion of the strip of paper, with the section thereof forming the base portion being uncoated. All such embodiments are fairly within the concept of the present invention. These and other equivalents are intended to be encompassed by the claims appended hereto.

What is claimed is:

1. An article for conditioning fibrous materials making contact with it which comprises a form-retaining base and, held to an outside surface of such base, in form-retaining relationship with it, a flexible material having an outer surface containing thereon a fiber conditioning agent which, during a tumbling operation, is transferable to the fibrous materials contacted, to condition them, said flexible material being in thin sheet or strip form and conforms closely to the outer surface of at least a portion of the form-retaining base, said fiber conditioning agent being a fabric softener or antistatic agent.

2. An article according to claim 1 wherein the fabric softener is a waxy composition which extends beyond the surface of the flexible paper and which comprises, as an active fabric softening constituent, an organic nonionic, anionic, cationic or mixed anionic-nonionic or cationic-nonionic surface active softening agent.

3. An article according to claim 2 wherein the form-retaining base is tubular and the flexible material is fastened to the exterior of the tube by fastening means and is removable from the tube after use and consumption of substantially all the fabric softening agent at the outer surface thereof.

4. An article according to claim 5 wherein the form-retaining tubular base is of paperboard, cardboard or corrugated board construction and the thin sheet or strip of flexible material is of paper.

5. An article according to claim 4 wherein the paper is coated on both sides with fabric softener so as to be reversible on the tubular base after consumption of the softener from one side thereof.

6. An article according to claim 4 wherein the means for holding the flexible material to the form-retaining base comprises end sections of the paper which extend beyond the length of the tubular base and are capable of being folded into the ends of the tubular portion thereof, to hold the rest of the sheet or strip in form-retaining relationship with the outer surface of the tube.

7. An article according to claim 6 wherein the end sections of the paper are uncoated in the portions thereof which extend beyond the length of the tubular base.

8. An article according to claim 3 wherein the tubular base is a cylinder which is telescopic with a roll of paper containing the conditioning agent.

9. A package of materials of a fiber conditioning article which comprises a form-retaining tubular base and a quantity of flexible material having an outer surface containing thereon a fiber conditioning agent for the treatment of fibrous materials by contact therewith, which quantity is sufficient for making a plurality of covers for the base, with the quantity of flexible material being packed in telescopic relationship with the base, whereby the base performs the function of a packaging element for the quantity of flexible material containing fiber conditioning agent.

10. A package according to claim 9, wherein the form-retaining tubular base is an outer cylinder and the quantity of flexible material having an outer surface thereof containing a fiber conditioning agent is in roll form, packed in the base cylinder.

11. An article for conditioning fibrous materials making contact with it which comprises a form-retaining base and, held to an outside surface of such base, in form-retaining relationship with it, a flexible material having an outer surface containing thereon a fiber conditioning agent which, during a tumbling operation, is transferable to the fibrous materials contacted, to condition them, said fiber conditioning agent being a fabric softener or antistatic agent.

12. A method for conditioning fibrous materials which comprises contacting such materials with a fiber conditioning article comprising a form-retaining base, and held to an outer surface of such base in form-retaining relationship with it, a flexible material having

an outer surface containing thereon a fiber conditioning agent, and tumbling fibrous materials to be conditioned in contact with the article until a sufficient quantity of fiber conditioning agent is transferred to the fibrous materials to condition them, the fibrous materials being conditioned being items of laundry in a damp state, the fiber conditioning agent being a fabric softener and the contacting occurring in an automatic laundry dryer during tumbling contact of the damp laundry being dried with the conditioning article.

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