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PROCESS FOR TREATING FIBROUS MATERIAL

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This invention relates to a process for treating fibrous material and more particularly to a process for incorporating treating materials for water-repelling, softening, strengthening, sizing, lustre-finishing, or other finishing purposes in textile fabrics or other fibrous materials.

Various methods for incorporating treating substances in fibrous materials from colloidal aqueous dispersions of such treating substances are known. The prior patented art describes the treatment of fibrous material with a bath of colloidal material, the dispersed particles of which have an electrical charge opposite to the charge on the fibers, whereby the colloidal material in the disperse phase is deposited on the fibrous material from the bath by reason of the oppositely charged colloidal particles of treating material contacting the fibrous surface. The ratio of treating bath to fibrous material in these processes, however, is extremely high, ranging from 10:1 to 50:1 and over, commonly called in textile practice a "long" bath, while the concentration of colloidal treating material in such treating baths is extremely low, ranging from a few hundredths of one percent to less than two percent. In other processes of treating fibrous materials with a "long" bath, as with dilute latex, the rubber particles are coagulated on the fibers by means of heat or by the gradual addition of a coagulant to the bath. There are many disadvantages in using such large volumes of dilute bath. A large volume of dilute bath necessitates the use of a much higher amount of protective agent for the equivalent degree of stability of a given amount of dispersed colloidal material than in a more concentrated dispersion, since the large amount of water present in the bath tends to hydrate the dispersing agents usually employed in making the dispersion and causes destabilization of the bath. In using such large volumes of treating bath for a given amount of fibrous material, there is usually required a continuous circulation of the fibrous material, or the bath, or both in relation to each other, as the dispersed material and the fibrous material can become associated only by random contact over a specific period of time, with a consequent tendency of the colloidal material to deposit upon the surface of the fibrous material and subsequently be rubbed off by mechanical friction, and, in the case of fabrics, to show streaks, chafe marks, and so-called "running" marks and "crow's feet" on the finished material. Further, such processes are not continuous and this is of

a decided disadvantage in treating long lengths of fabric.

In other processes, the fibrous material may be treated with an amount of an aqueous dispersion of colloidal material that is less than that which will cause "wet saturation" of the fibrous material, that is, an amount which can be held by the fibrous material without permitting liquid to drain from the material when it is hung up or draped, or an amount less than that which would cause the material to be dripping wet. The amount of aqueous dispersion which usually remains held in the fibrous material in such treatments, as where the fibrous material is passed through a bath of the treating material and wrung or squeezed, as through rollers, or where the treating material is sprayed onto the fibrous material, is from 40% to 250% of the weight of the fibrous material. In such processes, however, the dispersed particles remain in dispersed condition in the aqueous medium which is held by the fibrous material until they are coagulated by some external influence, as by the drying of the dispersion held in the fibrous material, or by a chemical coagulation of the dispersion, as by pre-treating the fibrous material with a coagulant for the dispersion or by passing the fabric with the absorbed dispersion of colloidal material through a separate coagulating bath, or by heating the fibrous material containing the aqueous dispersion in cases where the dispersion is coagulable by heat. In these processes where the colloidal material is coagulated from the dispersion that is held in the fibrous material as by drying, or by treatment with a free coagulant, or by heating a dispersion that is sensitive to heat, the colloidal material that is deposited on the fibrous material becomes concentrated during the coagulating operation on the outer surfaces of the fibrous material, and the finished material may become stiff and boardy, and, in the case of fabrics, lose the "fabric feel" and appearance of the untreated material, or the surfaces of the fibrous material may become oily or dusty depending upon the characteristics of the treating material.

According to the present invention, fibrous material is treated with an amount of an aqueous dispersion of colloidal treating material which is less than that required for "wet saturation" of the fibrous material, and the colloidal particles are deposited onto the fibrous material without the aid of any external coagulating influences, thereby permitting the colloidal particles to gradually deposit on the fibers evenly throughout

the body of the fibrous material from the inside of the material so that the finished product while obtaining the advantages of the treatment maintains the appearance and "feel" of untreated material.

In carrying out the process of the present invention, the fibrous material is treated with an amount less than that required for "wet saturation" of an aqueous dispersion of colloidal treating material which will deposit substantially all its colloiddally dispersed particles on the fibrous material under normally non-coagulative conditions for the dispersion and thereafter allowing the fibrous material with its contained dispersion to rest until the dispersed particles have deposited on the fibrous material. The amount of entrained or absorbed dispersion which will cause "wet saturation" of the fibrous material differs with different kinds of fibers and with various types of fibrous material, but the ratio of the absorbed treating bath to fibrous material according to the present invention will range with various fibrous materials and dependent on the amount of treating substance desired to be deposited on the fibrous material, from 4:1 to 2.5:1, that is, the weight of the dispersion of colloidal treating material held in the fibrous material will be 40% to 250% of the weight of the fibrous material. The aqueous dispersion of colloidal treating material should have a 3 to 30% concentration of colloidal material depending on the amount of liquid treating material caused to be absorbed by the fibrous material and on the amount of treating substance desired to be finally deposited on the fibrous material. The dispersion which is absorbed in the fibrous material is made sensitive to the fibrous material, that is, will deposit its colloiddally dispersed particles on the fibrous material under otherwise non-coagulative conditions for the dispersion itself, by compounding the dispersion so that it contains a coagulant for the dispersed particles and sufficient protective so that it is itself stable under the conditions of treatment of the fibrous material, but will deposit its colloidal particles on the fibrous material when associated with the fibrous material. The amount of protective introduced into the dispersion need be but slightly more than that necessary to stabilize the dispersion in the absence of the fibrous material under the conditions of treatment of the fibrous material. The greater the amount of protective used over that necessary to merely protect the dispersion against coagulation in the absence of the fibrous material by the added coagulating agent, the slower will be the deposition of the dispersed particles from the dispersion onto the fibrous material when in contact therewith. If the fibrous material is treated with the aqueous dispersion of colloidal treating material at room temperature and the fibrous material with the dispersion held therein is permitted to rest at room temperature until the dispersed particles have deposited on the fibers, the amount of protective agent in the dispersion need be only that amount or slightly more than that which is necessary to protect the dispersion itself at room temperature. If the fibrous material is treated with the dispersion at elevated temperature, then the amount of protective must be such that it will stabilize the dispersion in the presence of the added coagulant at such elevated temperature, otherwise the treating bath will coagulate before being absorbed into the fibrous material. Likewise if the fibrous material is treated with the aqueous dis-

persion of colloidal treating material at room temperature and allowed to rest at elevated temperature, in order to speed up the deposition of the colloidal particles onto the fibrous material, the amount of protective must again be such that the dispersion itself is stable at such elevated temperature, otherwise the colloiddally dispersed particles will not deposit gradually on the fibers of the fibrous material but will coagulate at the elevated temperature of the rest period and produce an uneven surface coagulation. Of course the treatment of the fibrous material with the dispersion should be carried out under all other normally non-coagulative conditions for the dispersion, that is, without coagulation by outside influence, as for example, drying, or the presence of free coagulant on the fibers, or passing of the fibrous material impregnated with the dispersion through a coagulant medium.

I have developed a theory for my invention which explains the sensitivity to a fibrous material of an otherwise non-coagulating dispersion, and this I am setting forth with the idea of clarifying the process, but without the intention of making the invention in the case dependent upon the correctness of this theory. I believe that when a fibrous material holds its entire treating bath, that is, an amount less than its "wet saturation" of an aqueous dispersion of colloidal treating material of a concentration of dispersed particles as high as 3 to 30% and contains a coagulant and protective in accordance with the present invention, the fibrous material gradually absorbs the protective from the dispersion and causes a deposition of the colloidal particles which are then in the presence of a coagulant but are no longer protected from the coagulant by the protective which has been absorbed by the fibrous material, so that there is gradually built up with the absorption by the fibers of the protective agent a deposition of the no longer protected colloidal particles. It has been found that the coagulant that is introduced into the dispersion and against which the colloiddally dispersed particles are protected in the absence of the fibrous material may be an alkaline or acid coagulant so that the deposition of the dispersed particles on the fibrous material is not necessarily dependent on any type of charge on the colloidal particles or on the fibrous material.

Various types of fibrous materials, such as woven, knitted, punched or felted fabrics, yarns, rovings, cords, skeins, and webs such as water-laid felts from a paper making machine or bats of fibers from a garnet or carding machine, may be treated according to the present invention. Various fibers, as of wool, silk, cotton, viscose or acetate rayon, linen, cellulose and the like, may be used, and these may be undyed, mordanted, dyed, or otherwise treated so long as they are not in association with free coagulant which in the absence of the fiber would itself produce coagulation of the aqueous dispersion of colloidal material. Asbestos fibers can also be treated according to the present invention if the coagulants that are naturally associated with the fibers have been removed, or inactivated as by insolubilization. Various materials which can be dispersed in aqueous medium, with or without the addition of dispersing agents, may be used for the treatment of fibrous material according to the present invention. Such treating materials which can be colloiddally dispersed in an aqueous media include proteins, such as casein, gelatin, glue, albumen, serecin, and lecithin; carbohydrate gums, such as

gum tragacanth, gum acacia, locust bean gum, karaya gum, and gum arabic; waxes, such as montan, carnauba and beeswax; oils such as olive oil, castor oil, mineral oil, and neat's-foot oil; dialkyl phthalates; fatty acids, such as stearic, oleic and palmitic acids; soaps; petrolatum; paraffin; asphalt; certain hydrogenated bituminous substances; certain halogenated aromatic compounds; certain halogen derivatives of hydrocarbons; water insoluble salts; natural resins, such as rosin, gum dammar, and gum copal, and artificial resins such as phenol-formaldehyde resins, acrylic acid resins, glyptal resins, vinyl resins, and urea-formaldehyde resins. As specifically claimed in a copending application filed concurrently with this application, aqueous dispersions of rubber and rubber-like materials may also be used to treat fibrous materials according to the present invention.

The treating materials can be dispersed in water generally with the aid of dispersing agents by methods well known in the art, and the preparation of these dispersions, generally in concentrated form to be diluted in preparing the treating baths, but, if desired, originally in a concentration suitable for a treating bath, forms no part of the present invention. Those of the above listed treating materials which are also protectives may act as their own protectives against the coagulant added in preparing the treating baths, or they may be used to protect treating baths prepared from others of the above listed treating materials against coagulation on addition of the coagulant. A list of materials commonly used as dispersing agents is set forth below. Liquid water-insoluble treating materials may be dispersed or emulsified in water with the aid of a dispersing agent by mixing in a high speed stirrer or by homogenizing in a so-called colloid mill as well known in the art. Finely divided solid treating materials may readily be ball milled with water in the presence of a dispersing agent until the particles will remain in colloidal suspension. Treating materials that are plastic or which can be made plastic as by "breaking down" on a mill or "kneading" in a mixing device such as a Werner and Pfleiderer mixer, may have the dispersing agent mixed into the plasticized material and water added until an inversion of phase takes place and the treating material becomes dispersed in the aqueous medium. In preparing treating baths of aqueous dispersions of colloidal treating material for use in accordance with the present invention, there is included in the dispersion a coagulant for the dispersion and sufficient protective so that the dispersion itself will not coagulate under the conditions of treatment of the fibrous material, that is, under the conditions of time and temperature of treatment, but will deposit its colloidal particles on the fibrous material under these otherwise non-coagulative conditions. The original dispersion is diluted if necessary in preparing the bath. The amount of protective necessary for protecting the treating bath against coagulation by the coagulant may be incorporated directly in the dispersion of the treating material as it is made, but in general, as the treating material comes in the form of a commercial product which contains little more than sufficient protective to stabilize the coagulant-free dispersion as made, additional protective to that employed in making such dispersion will generally be needed when the original dispersion compound is diluted and the coagulant added.

Various examples of the treatment of different fibrous materials with aqueous dispersions of various colloidal materials, protected with different known stabilizers and containing a coagulant according to the present invention, are set forth below, but these are merely exemplary of the invention and are not intended to be limitations thereon. Various protectives that may be used both for dispersing the treating material and for protecting the dispersion against coagulation by the coagulant contained therein when not in contact with the fibrous material, are proteins, gums, soaps, vegetable mucilages, saponin, starch, and certain salts of carboxyl ($R-COOM$), sulphonic ($R-SO_3M$), sulfinic ($R-SO_2M$), or phenolic ($R-OM$) groups or of ethereal sulphuric ($RO.SO_3M$) radicals, where the R may have a straight chain or ring structure and may contain substituent halogen, amino, nitro or hydroxyl groups. Other organic chemicals are well known protectives as certain benzene-sulphonic acids, their homologues and substitution products, naphtholic acids, aliphatic-aromatic acids, derivatives of hydro-aromatic series of acids, phenylglycine and derivatives. Some of these protectives are listed above as treating substances for the fibrous material and hence in some cases the treating material may act as its own protective or be protected by another treating material.

In order to better understand the invention, the following illustrative examples are included. In these examples the selected fabric was passed through the treating bath so that it became thoroughly wetted, and the desired amount of dispersion was removed by passing in the flat through squeeze rolls. The amount of dispersion remaining absorbed in the fabric and the concentration of colloiddally dispersed particles in the dispersion was such as to deposit in the various examples from 4.2 to 13.6% solids. It is a relatively simple matter to regulate the amount of dispersion remaining in the fabric accurately and uniformly from 40% to 250% of the weight of the fabric. The fabric was then allowed to rest at room temperature on a continuous belt for the desired period of time, which in practice can conveniently be anything up to 60 minutes, during which time the dispersed particles of colloidal material deposited upon the fibers. The duration of this rest treatment for depositing a desired proportion, or all, of the dispersed material can be governed by the composition of the bath, commonly by the concentration of the dispersion and the amount of protective used over that necessary to prevent coagulation of the dispersion in the presence of the coagulant contained therein but in the absence of the fibrous material. In practice, however, it is a simple matter to determine the amount of material not deposited from the dispersion by squeezing a part of the fabric at time intervals by hand and noting the characteristics of the expressed liquid, such as turbidity, or by rinsing samples of the fabric and noting the degree of turbidity of the rinse water. Elevated temperatures, which in the absence of the fibrous material, would not cause coagulation of the dispersion, may be used and thus speed up the deposition of solids from the dispersion onto the fibrous material. After the desired amount of treating material is deposited from the dispersion onto the fibrous material, the thus treated material may be washed, dried and finished. There is an additional distinct advantage here over methods of treatment where the entrained dispersion must be dried to form the deposit on the fibrous

material and where the thus dried material is subsequently washed and redried. In such practice two dryings are necessary, whereas according to the present invention only one drying operation need be performed due to the deposition of the treating material onto the fibers in the wet condition and the consequent possibility of washing the treated material without a preliminary drying for setting the same. Also, by the present invention, the colloid is deposited in a form which permits rinsing, whereas in some of the other methods the deposit will not resist rinsing or washing. Formic acid is the coagulant used in compounding the dispersions in the following examples, because it is a volatile acid, but other acids, namely, acetic, tartaric, phosphoric, hydrochloric, and sulphuric acid, have successfully been used, as well as various acidic and basic coagulating salts.

Example 1

In this case an acrylic acid resin was deposited on a silk fabric from a treating bath made from a commercial aqueous dispersed acrylic acid resin compound sold by Rohm & Haas Co. under the name of "Hydrhoplex C-5". A treating bath of the following composition was made up from the "Hydrhoplex" compound by diluting with water and adding a coagulant after the addition of an amount of protective or stabilizer sufficient to prevent coagulation of the treating bath by the added coagulant.

Parts by weight	
Solids of above "Hydrhoplex" compound	10
"Aquarex D"	1
Formic acid	5
Water	84

The silk fabric was run through the above treating bath and squeezed through rollers so that it contained about 140% of its weight of the treating bath, that is, the so-called bath-to-goods ratio was approximately 1.4:1. The fabric with the thus absorbed dispersion was allowed to stand at room temperature for 20 minutes, in which time substantially all the dispersed material deposited on the fabric, as shown by a clear rinse. The fabric after rinsing and drying showed a gain in weight of 13.6%. "Aquarex D" is the trade name of a protective or stabilizer which is the mono sodium sulphate ester of one-half lauryl and one-half myristal alcohol. The "Hydrhoplex" compound as obtained, and also as diluted to 10% solids but without the addition of the "Aquarex D" and formic acid, deposited no solids on the silk fabric under the same conditions of treatment as above with the dispersion of the above formula, the entire solids of the treating baths in these cases being removed in the rinse water, and the dried fabric showing no weight gain.

Example 2

In this case, a commercial wax known as "Sunproof" wax was deposited onto wool fabric. A concentrated dispersion of the "Sunproof" wax was made by emulsifying 88 parts of the "Sunproof" wax in 300 parts of water by means of 9 parts of oleic acid and 3 parts of triethanolamine, as follows: The "Sunproof" wax was melted and the oleic acid added to it and the whole heated to 75° C. This was added to the triethanolamine dissolved in 100 parts of water at 75° C. in a thin stream under a high speed stirrer and the stirring continued for ten minutes after the wax and oleic acid had all been added. The stirring was continued while 200 parts of cold water was added to

this mixture in a thin stream and this was stirred for 30 minutes after all the water had been added.

The treating bath was prepared from the concentrated wax dispersion by diluting with water and adding a coagulant after the addition of sufficient protective or stabilizer to prevent coagulation of the treating composition by the added coagulant:

Parts by weight	
Solids of the above "Sunproof Wax" dispersion	10
"Aquarex D"	.5
Formic acid	10
Water	79.5

The wool fabric was run through the above treating bath and squeezed through rollers so that it contained about 120% of its weight of the treating bath, that is, the bath-to-goods ratio was approximately 1.2:1. The fabric with the thus absorbed treating bath was allowed to stand at room temperature for 20 minutes, in which time substantially all the dispersed material deposited on the fabric as shown by a clear rinse. The fabric after rinsing and drying showed a gain in weight of 12.2%.

Example 3

In this case, paraffin wax was deposited on a tanned cotton fabric from a treating bath prepared from a commercial paraffin emulsion sold by Paper Makers Chemical Company under the trade name "Paracol No. 500". The cotton was tanned by soaking the fabric for two hours in a 1% tannic acid solution at 140° F., wringing, and drying, then soaking for one-half hour in 5% tartar emetic solution, rinsing, wringing and drying. The composition of the treating bath prepared from the "Paracol No. 500" emulsion was as follows:

Parts by weight	
Solids of above "Paracol No. 500" emulsion	10
"Arctic Syntex AX"	1
Formic acid	7.5
Water	81.5

The tanned cotton fabric was passed through the above treating bath and squeezed through rollers so that it contained about 120% of its weight of the treating bath, that is, the bath-to-goods ratio was approximately 1.2:1. The fabric with the thus absorbed treating bath was allowed to stand at room temperature for 20 minutes, in which time substantially all the dispersed material deposited on the fabric as shown by a clear rinse. The fabric after rinsing and drying showed a gain in weight of 11.5%. "Arctic Syntex AX" is the name of a protective or stabilizer which is an oleic acid ester of a sulphated aliphatic compound of the formula $R-COOX-SO_3Na$. The same tanned cotton fabric treated under the same conditions as above with the same "Paracol No. 500" emulsion diluted to 10% solids but without the addition of the coagulant and protective, showed a gain in weight of only 0.6%, the remaining solids being unattached to the fibrous material and removed in the rinse water.

Example 4

In this case dibutyl phthalate was deposited on a viscose rayon fabric. A concentrated dibutyl phthalate emulsion was first made which contained sufficient protective so that no additional stabilizer was necessary to protect the treating bath from coagulation on the addition of the

coagulant. A dibutyl phthalate emulsion was made by dispersing 100 parts of dibutyl phthalate in 100 parts of water in the presence of 2 parts "Avitex W", 5 parts oleic acid, and 2 parts triethanolamine. "Avitex W" is the trade name of a protective which is a mixture of sulphated oleyl alcohol and free stearyl alcohol. The emulsion was made at 60° C. by adding to 100 parts of dibutyl phthalate, 1 part of triethanolamine and 3 parts of oleic acid. This was poured slowly, under a high speed stirrer, into 100 parts of water at 60° C. to which previously had been added 1 part triethanolamine, 2 parts oleic acid and 2 parts of "Avitex W". Stirring was continued until the emulsion cooled to 50° C., making a very stable, white emulsion.

The composition of the treating bath made up from the above emulsion was as follows:

Parts by weight

20 Solids of above dibutyl phthalate emulsion--	10
Formic acid-----	.4
Water -----	89.6

The rayon fabric was passed through the above composition and squeezed through rollers so that it contained about 40% of its weight of the treating bath; that is, the bath-to-goods ratio was approximately 4:1. The fabric with the absorbed treating bath was allowed to stand at room temperature for 20 minutes, in which time exhaustion of substantially all the dispersed material deposited on the fabric as shown by a clear rinse. The fabric after rinsing and drying showed a gain in weight of 4.2%.

The above examples clearly illustrate the present invention as applied to various treating materials for fabrics and it will be obvious to those skilled in the art that various other treating baths than those illustrated in the above examples and stabilized against coagulation in the absence of fibrous materials, may be developed using the principles of the present invention. In view of the many changes and modifications that may be made without departing from the principles underlying the invention, reference should be made to the appended claims for an understanding of the scope of the invention.

The application is a continuation-in-part of application Serial No. 149,267, filed June 19, 1937.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. The process which comprises associating fibrous material with an aqueous dispersion containing 3% to 30% colloidal treating material, causing the fibrous material to entrain therein an amount of said aqueous dispersion which ranges from 40% to 250% of the weight of the fibrous material and which is less than that required for "wet saturation" of the fibrous material so that the fibrous material holds its entire treating bath, the treating bath being capable of depositing on the fibrous material in which it is held substantially all its colloiddally dispersed particles under normally non-coagulative conditions for the dispersion, and maintaining the treating bath in the fibrous material under normally non-coagulative conditions for the dispersion until the desired amount of the dispersed material has deposited on the fibrous material.

2. The process which comprises associating fibrous material with an aqueous dispersion containing 3% to 30% colloidal treating material, causing the fibrous material to entrain therein an amount of said aqueous dispersion which

ranges from 40% to 250% of the weight of the fibrous material and which is less than that required for "wet saturation" of the fibrous material so that the fibrous material holds its entire treating bath, the treating bath being capable of depositing on the fibrous material in which it is held substantially all its colloiddally dispersed particles under normally non-coagulative conditions for the dispersion, and maintaining the treating bath in the fibrous material under normally non-coagulative conditions for the dispersion until substantially all the dispersed material has deposited on the fibrous material.

3. The process which comprises associating fibrous material with an aqueous dispersion containing 3% to 30% colloidal treating material, causing the fibrous material to entrain therein an amount of said aqueous dispersion which ranges from 40% to 250% of the weight of the fibrous material and which is less than that required for "wet saturation" of the fibrous material so that the fibrous material holds its entire treating bath, said dispersion containing a coagulant and an amount of protective that stabilizes the dispersion in the absence of the fibrous material but not in the presence of the fibrous material, the treating bath being capable of depositing on the fibrous material in which it is held substantially all its colloiddally dispersed particles under non-coagulative conditions for the dispersion itself, and maintaining the treating bath in the fibrous material under non-coagulative conditions for the dispersion itself until the desired amount of the dispersed material has deposited on the fibrous material.

4. The process which comprises associating fibrous material with an aqueous dispersion containing 3% to 30% colloidal treating material, causing the fibrous material to entrain therein an amount of said aqueous dispersion which ranges from 40% to 250% of the weight of the fibrous material and which is less than that required for "wet saturation" of the fibrous material so that the fibrous material holds its entire treating bath, said dispersion containing a coagulant and an amount of protective that stabilizes the dispersion in the absence of the fibrous material but not in the presence of the fibrous material, the treating bath being capable of depositing on the fibrous material in which it is held substantially all its colloiddally dispersed particles under non-coagulative conditions for the dispersion itself, and maintaining the treating bath in the fibrous material under non-coagulative conditions for the dispersion itself until substantially all the dispersed material has deposited on the fibrous material.

5. The process which comprises associating fibrous material with an aqueous dispersion containing 3% to 30% colloidal treating material, causing the fibrous material to entrain therein an amount of said aqueous dispersion which ranges from 40% to 250% of the weight of the fibrous material and which is less than that required for "wet saturation" of the fibrous material so that the fibrous material holds its entire treating bath, said dispersion containing a coagulant and an amount of protective that stabilizes the dispersion at room temperature in the absence of the fibrous material but not in the presence of the fibrous material, the treating bath being capable of depositing on the fibrous material in which it is held substantially all its colloiddally dispersed particles at room tempera-

ture and in the absence of free coagulant on the fibrous material, and maintaining the treating bath in the fibrous material at room temperature in the absence of free coagulant on the fibrous material until the desired amount of the dispersed material has deposited on the fibrous material.

6. The process which comprises associating fibrous material with an aqueous dispersion containing 3% to 30% colloidal treating material, causing the fibrous material to entrain therein an amount of said aqueous dispersion which ranges from 40% to 250% of the weight of the fibrous material and which is less than that required for "wet saturation" of the fibrous material so that the fibrous material holds its entire treating bath, said dispersion containing a coagulant and an amount of protective that stabilizes the dispersion at room temperature in the absence of the fibrous material but not in the presence of the fibrous material, the treating bath being capable of depositing on the fibrous material in which it is held substantially all its colloiddally dispersed particles at room temperature and in the absence of free coagulant on the fibrous material, and maintaining the treating bath in the fibrous material at room temperature in the absence of free coagulant on the fibrous material until substantially all the dispersed material has deposited on the fibrous material.

7. The process which comprises associating fibrous material with an aqueous dispersion containing 3% to 30% colloidal treating material, causing the fibrous material to entrain therein an amount of said aqueous dispersion which ranges from 40% to 250% of the weight of the fibrous material and which is less than that required for "wet saturation" of the fibrous material so that the fibrous material holds its entire treating bath, said dispersion containing a coagu-

lant and an amount of protective that stabilizes the dispersion at elevated temperature in the absence of the fibrous material but not in the presence of the fibrous material, the treating bath being capable of depositing on the fibrous material in which it is held substantially all its colloiddally dispersed particles at elevated temperature and in the absence of free coagulant on the fibrous material, and maintaining the treating bath in the fibrous material at elevated temperature without drying and in the absence of free coagulant on the fibrous material until the desired amount of the dispersed material has deposited on the fibrous material.

8. The process which comprises associating fibrous material with an aqueous dispersion containing 3% to 30% colloidal treating material, causing the fibrous material to entrain therein an amount of said aqueous dispersion which ranges from 40% to 250% of the weight of the fibrous material and which is less than that required for "wet saturation" of the fibrous material so that the fibrous material holds its entire treating bath, said dispersion containing a coagulant and an amount of protective that stabilizes the dispersion at elevated temperature in the absence of the fibrous material but not in the presence of the fibrous material, the treating bath being capable of depositing on the fibrous material in which it is held substantially all its colloiddally dispersed particles at elevated temperature and in the absence of free coagulant on the fibrous material, and maintaining the treating bath in the fibrous material at elevated temperature without drying and in the absence of free coagulant on the fibrous material until substantially all the dispersed material has deposited on the fibrous material.

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