

[54] **DISPOSABLE ARTICLE WITH
MOISTURE-ACTUATED INDICATING
AGENT**

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[22] Filed: **April 1, 1970**

[21] Appl. No.: **24,573**

[52] U.S. Cl. **128/287**

[51] Int. Cl. **A61F 13/16**

[58] Field of Search **128/284, 286, 287, 290, 296, 128/156**

[56] **References Cited**

UNITED STATES PATENTS

3,520,303	7/1970	Endres	128/287
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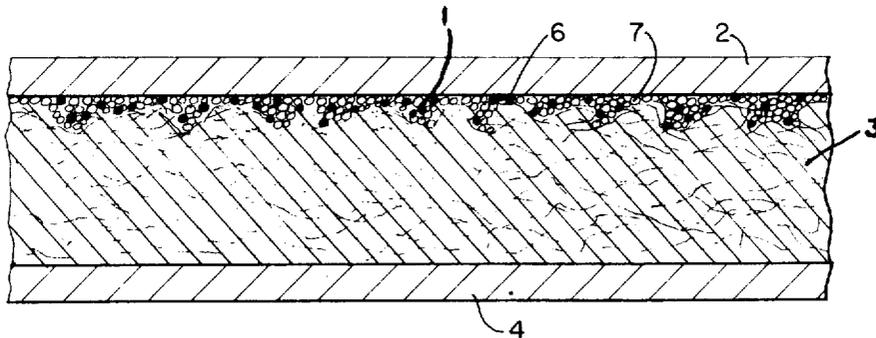
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[57] **ABSTRACT**

Disposable diapers, sanitary napkins, bandages and the like articles, comprising an absorbent pad disposed on a translucent back sheet of water impervious material are provided with a moisture-actuated indicating agent therebetween. The indicating agent comprises either a small amount of finely divided water-soluble dye having a high dye strength or such a dye admixed with a finely divided diluent masking agent, such as talcum powder. The indicating agent is dry and adheres to the pad surface facing the back sheet and the back sheet surface facing the pad by mechanical and electrostatic action. When the absorbent pad of the disposable article and the indicating agent become wet in use the resulting dye solution between the pad and sheet is visible through the translucent back sheet to provide indication of wetness.

7 Claims, 5 Drawing Figures



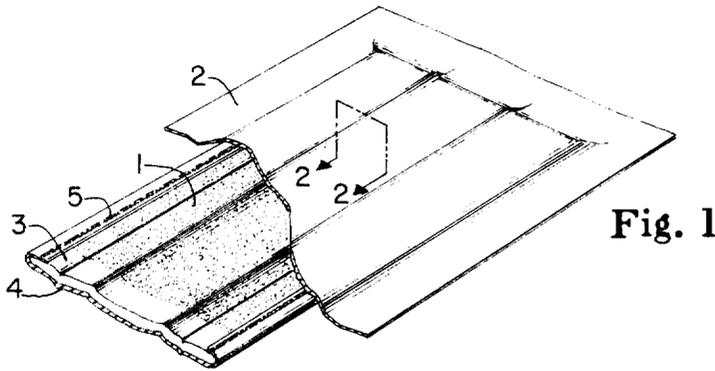


Fig. 1

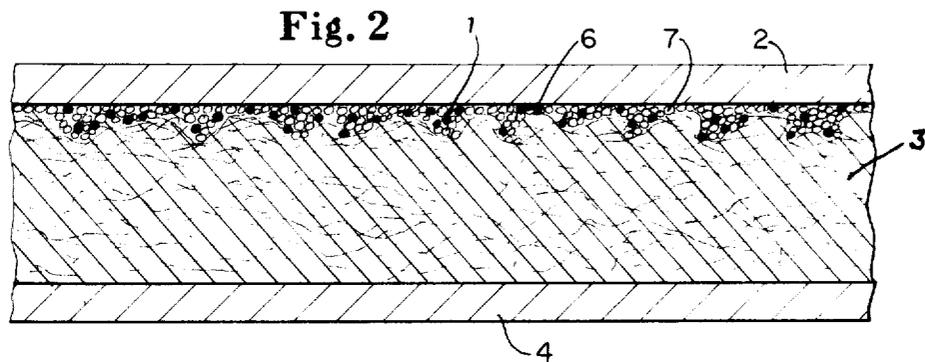


Fig. 2

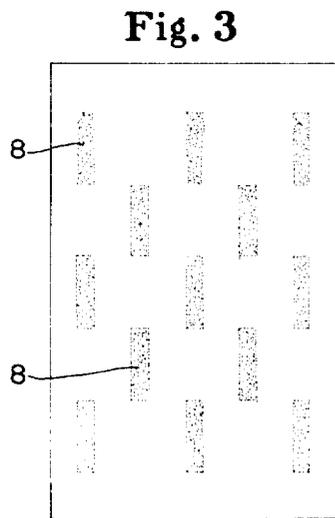


Fig. 3

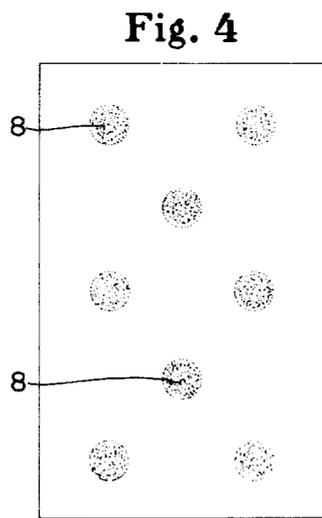


Fig. 4

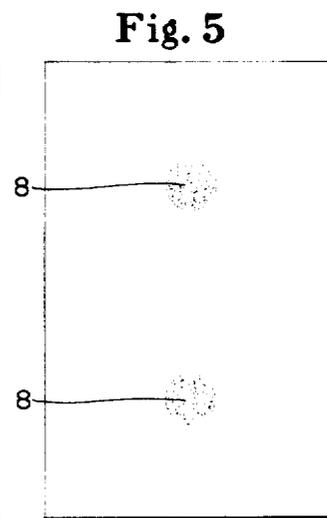


Fig. 5

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DISPOSABLE ARTICLE WITH MOISTURE-ACTUATED INDICATING AGENT

BACKGROUND OF THE INVENTION

The present invention relates to disposable diapers, sanitary napkins, bandages and like articles which are adapted to be used once and then discarded. More particularly, the invention is directed to such articles, which are adapted to give a convenient visible indication of their soiled, used condition and readiness for discard. Specifically, the invention provides for disposable articles comprising an absorbent pad disposed on a translucent back sheet of water impervious material with a water-soluble dye therebetween as a moisture-actuated indicating agent.

In general, wetness indicators are available in the art, for example, J. D. Shaw in U.S. Pat. No. 2,681,032 discloses a diaper wetness indicator, which actuates on a mechanical principle. When the diaper becomes wet, a low wet strength element breaks, moving a colored indicator into registry with an aperture through which it is visible.

I. I. Solomon in U.S. Patent 2,156,880 discloses an indicator sensitive to perspiration or body heat for use in combination with wearing apparel to indicate clothing which has been worn for more than a trial period before being returned to the retail merchant by the purchaser. In this function, the indicator is impregnated with a dye which changes color upon contact with the acid or alkaline constituents of perspiration.

M. G. Snelling in U.S. Pat. No. 2,214,354 and U.S. Pat. No. 2,249,867 discloses a detector to be packed with goods to indicate whether the goods are exposed to conditions of extreme moisture or dampness. The detector comprises an intimate admixture of a deliquescent material with a water-soluble dye of high color strength. This admixture is in association with a dry porous material. Upon exposure to dampness, water is absorbed by the deliquescent material, and the resulting dye solution is transported by capillary action through the porous material.

W. W. Kinzer in U.S. Pat. No. 2,254,609 discloses a leak indicator for liquid handling equipment. The indicator comprises a water-soluble dye, titanium dioxide and whiting (CaCO_3) applied with varnish or other vehicle. When a water leak occurs the water dissolves the dye in the varnish away from the titanium dioxide and the whiting, giving a color indication.

The present invention contributes to the art illustrated above with a disposable article comprising a translucent back sheet of water impervious material, an absorbent pad, and a moisture-actuated indicating agent dusted between the back sheet and the pad in small amounts. The indicating agent is finely divided and retained in place by mechanical and electrostatic action, so no dye vehicle or movement is required to develop a wetness indication in a nonstaining article. The herein disclosed disposable article with operably disposed moisture-actuated indicating agent was developed to provide a reliable visual indication of in use wetting with body fluids in diapers. This effect is rendered possible in accordance with the present invention by very simple and inexpensive means.

OBJECTS OF THE INVENTION

It is an object of the present invention to provide disposable diapers, sanitary napkins, bandages and like articles, which articles visibly and conveniently indicate their soiled condition and readiness for change.

Another object of the present invention is to provide a disposable article, which article exhibits a readily discernible visual change in a pattern on its outer surface, when it is wet and ready for change.

Another object of the present invention is to provide a disposable diaper, which diaper exhibits a readily discernible color change in selected indicating areas of its outer surface, when it is wet and ready for change.

SUMMARY OF THE INVENTION

Briefly stated, in accordance with the present invention, disposable diapers, sanitary napkins, bandages and like articles, comprising a translucent back sheet of water impervious material, an absorbent, skin contacting pad, which is superimposed on the back sheet, and a small amount of moisture-actuated indicating agent between the back sheet and the absorbent pad are provided. The indicating agent is a dry, finely divided solid and adheres to the pad and the back sheet by mechanical and electrostatic action. The indicating agent comprises either a water-soluble dye or an admixture of said dye with a diluent masking agent. The amount of indicating agent per square inch of indicating area on the absorbent pad is about 1×10^{-8} gm. to about 1×10^{-2} gm. The percentage of dye in the indicating agent is about 0.1 percent to about 100 percent, by weight.

For clarity of description, the invention is hereinafter described primarily in terms of its adaptation to disposable diapers, although the principles involved will be readily understood in terms of other disposable articles.

BRIEF DESCRIPTION OF THE DRAWING

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter, which is regarded as forming the present invention, it is believed that the invention will be better understood from the following description taken in connection with the accompanying drawing, in which:

FIG. 1 is a perspective view illustrating a disposable diaper of the present invention with the outer translucent back sheet side thereof uppermost and the translucent back sheet broken away;

FIG. 2 is an enlarged fragmentary sectional view, taken along line 2—2 of FIG. 1; and

FIGS. 3—5 are plan views illustrating alternative patterns for application of the moisture-actuated indicating agent on the absorbent pad.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1 of the drawing, here is illustrated a preferred embodiment of a disposable diaper with moisture-actuated indicating agent 1 incorporated therein, in accordance with the following description. Absorbent pad 3 consists of a multiplicity of plies of wadding, creped wadding or air-laid felt, prepared from wood pulp fibers, and similar absorbent materials. Absorbent pad 3 is illustrated as enveloped on its moisture receiving surface by inner sheet 4 which is a porous, non-woven fabric. The inner sheet 4 is attached to absorbent pad 3 by adhesive edge fastening 5. Adhesive edge fastening 5 also serves to attach absorbent pad 3 and inner sheet 4 to translucent, water impervious back sheet 2. Moisture-actuated indicating agent 1 is present on the surface of the absorbent pad 3 which contacts translucent, water impervious back sheet 2 in a uniform pattern of substantially overall surface distribution.

Referring to FIG. 2 of the drawing, there is illustrated how the dye particles 6 and the diluent masking agent particles 7, if present, of the moisture-actuated indicating agent 1 are situated and affixed between the surfaces of absorbent pad 3 and translucent back sheet 2. Dye particles 6 and diluent masking agent particles 7 are retained in place by mechanical and electrostatic entrapment between and on the surface fibers of absorbent pad 3 and between absorbent pad 3 and translucent back sheet 2.

Although the application of moisture-actuated indicating agent 1 in a particular disposable article can be extended over the entire expanse of the outer face of absorbent pad 3, FIG. 1 illustrates a narrow margin, covered by inner sheet 4, along the edges of absorbent pad 3, where no indicating agent is applied. Preferably, however, to reduce the required amount of moisture-actuated indicating agent 1 and to eliminate the pos-

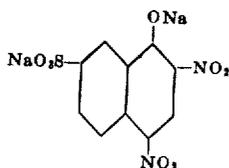
sibility of skin contact and staining, the moisture-actuated indicating agent 1 is placed in smaller visually convenient indicating areas 8. Thus, referring to FIGS. 3 and 4, there is illustrated how the pattern of application of the moisture-actuated indicating agent 1 can be limited to a plurality of small rectangular or circular indicating areas 8. Finally, referring to FIG. 5, there is illustrated how said pattern of application can be limited to two circular indicating areas 8, centrally located approximately in the middle of the two equal areas of absorbent pad 3, which areas are obtained when a dividing line is drawn parallel with the shorter edges of absorbent pad 3.

The moisture-actuated indicating agent 1 of the present invention can be either an admixture of a substantially non-toxic, water-soluble dye having high dye strength with a substantially non-toxic, water-insoluble or water-soluble diluent masking agent, or a substantially non-toxic, water-soluble dye having high dye strength without a diluent masking agent. The moisture-actuated indicating agent 1 is applied in a dry, finely divided particulate state. When moisture-actuated indicating agent 1 is exposed to liquids penetrating absorbent pad 3, the dye, or the dye and the diluent masking agent, is dissolved. The color of the resulting dye solution is readily perceptible to the eye through translucent back sheet 2.

The dye in the moisture-actuated indicating agent of the present invention can be a water-soluble dye in finely divided solid or crystalline state selected from the group consisting of (1) nitro, (2) monoazo, (3) diazo, (4) phthalocyanine, (5) quinoline, (6) xanthene, (7) triaryl methane, (8) indigoid and (9) vegetable dyes. Other dyes meeting the requirements of solidity, non-toxicity and water-solubility can also be used to effect embodiments of the invention.

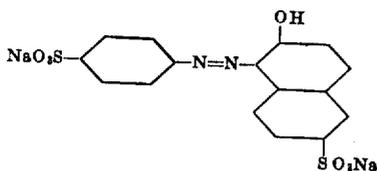
Powdered dyes used in beverages, confections and pharmaceuticals are suitable and are readily available from food dye manufacturers. Examples of food dyes belonging to the classes of dyes enumerated above are sold under the following trade names and code designations.

1. Naphthol Yellow SSX Spec. Pure, a nitro-dye having the formula

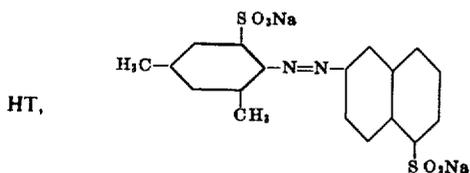


sold by Badische Anilin & Soda Fabrik, A.G., Ludwigshafen a. Rhein, Germany;

2. Orange GGN Conc. Spec. Pure, a monoazo-dye having the formula

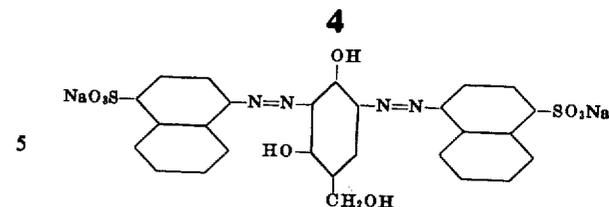


sold by Farbenfabriken Bayer A.G., Leverkusen, Germany, and Salmon Red. G.A.F. a dye having the formula



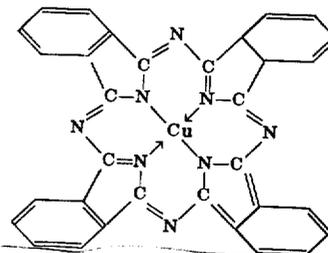
sold by CIBA Ltd., Basel, Switzerland;

3. Hexacol Chocolate Brown Ht, a diazo-dye having the formula



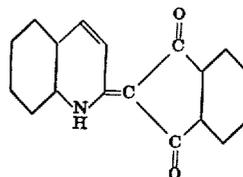
sold by L. J. Pointing & Son Ltd., Hexhem, England;

4. Heliogen Blue BWS Extra, a phthalocyanine-dye having the formula



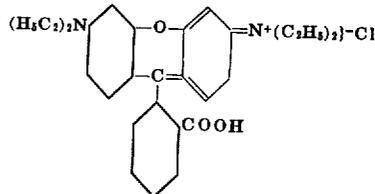
sold by General Aniline & Film Corporation, New York, N.Y.;

5. Canary Yellow Geigy, a quinoline-dye having the formula



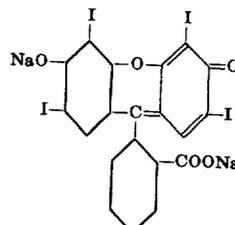
sold by J. R. Geigy S. A., Basel, Switzerland;

6. Edicol Supra Rose B, a rhodamine dye having the formula



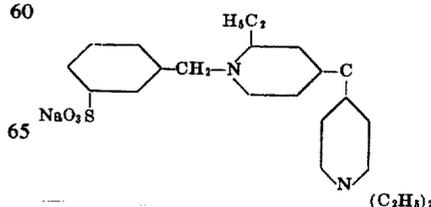
sold by Imperial Chemical Industries, Ltd., Manchester, England; and

45 Erythrosine TB Extra, having the formula



sold by Durand & Huguenin S. A., Basel, Switzerland;

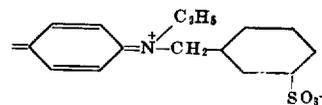
7. Acid Violet 5 BN, a triaryl methane dye having the formula



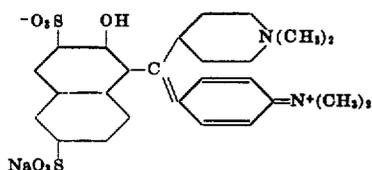
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and

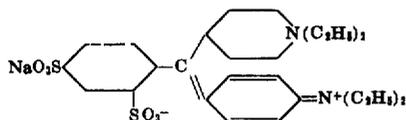
75 Acid Green S, having the formula



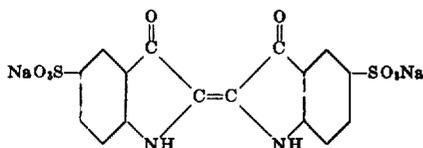
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sold by Williams Ltd., Hounslow, England;
Kiton Pure Blue V. FQ, having the formula



sold by Clayton Aniline Co. Ltd., Manchester, England; and
8. Edicol Supra Blue X, an indigoid dye having the formula



sold by Imperial Chemical Industries, Manchester, England.

Vegetable dyes, such as carotene, chlorophyll, and also tea and coffee extracts in powder state are suitable as the dye component in the moisture-actuated indicating agent of the present invention. Further, any dye compound which is characterized by water-solubility, solidity, non-toxicity, dye strength, reasonable color fastness, and heat stability can be used as the dye component in the moisture-actuated indicating agent. Green and blue dyes are preferred as being generally more attractive for the designed purposes.

The finely divided diluent masking agent, which is preferably white and can be used in admixture with the finely divided dye in the moisture-actuated indicating agent, can be any neutral color, substantially non-toxic material which is compatible with the dye to form a free-flowing powder. A suitable diluent masking agent can be a neutral color substance selected from the group consisting of talcum, whiting, silica, sugar, salt and starch.

The diluent masking agent is used to mask or partly mask the color of the dry indicating agent, so that the dye is not perceived as a color until wetted. The diluent masking agent can also be used to disperse or dilute the dye particles to facilitate uniform application of the dye on an absorbent pad. A diluent masking agent is optional, however, when very fine dye particles and small amounts of dye are used. In this instance the dye color is imperceptible through the translucent back sheet prior to wetting.

Preferred diluent masking agents are chemically inert mineral products exhibiting a neutral color, for example talcum, whiting and silica. Crystalline sugars, such as lactose, sucrose and mannose, and crystalline salts, such as table salt, can also be used.

Flour and starch products can also be used as diluent masking agents. They are slightly water-soluble and swellable. Such starch diluent masking agents may delay the appearance of color. The moisture-actuated indicating agents comprising starch diluent masking agents will, in general, be less sensitive to the presence of water in the absorbent pad; they will tend to develop the moisture indicating color signal more slowly. The amount of moisture-actuated indicating agent used in the present invention can be about 1×10^{-3} gms. to about 1×10^{-2} gms. per square inch of applied pattern on the absorbent pad of disposable article. An amount of from about 1×10^{-4} gms. to about 1×10^{-3} gms. per square inch is preferred. The percentage of dye in the indicating agent is about 0.1 percent to about 100 percent, preferably about 1.0 percent, by weight of the indicating agent.

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A suitable size range for the dye particles in the moisture-actuated indicating agent of the present invention is about 0.20 to about 20 microns, preferably about 2 microns. The particles are of a small size so that they will adhere to the absorbent pad surface and the back sheet surface by electrostatic action and to the absorbent pad surface by mechanical locking or entanglement between the pad surface fibers, fibrillae, and in fiber interstices. Where the absorbent pad is fabricated of spongy material, such as an open cell polyurethane form, the indicating agent is retained in foam openings and also between the pad surface and the back sheet. Since the pad material is fibrous or porous, the actual surface area, where the moisture-actuated indicating agent can adhere, is large. Concavities and crevices of different size and shape lock and entangle the particles as illustrated in FIG. 2. The skin contacting surface of the absorbent pad, on the absorbent pad surface opposite to that of moisture-actuated indicating agent placement, can be provided with a porous, non-woven fabric overwrap.

Mechanical and electrostatic action has been found sufficient to retain the moisture-actuated indicating agent in position during normal handling of the disposable articles, i.e., in fabrication, marketing and use, until the moment the absorbent pad is wetted by body fluids. Thus, it is possible to operably affix the particulate dye material without resort to binders or adhesives with their attendant production expenses in time and cost.

The dye and diluent masking agent materials, constituting the present indicating agents, can be finely divided and uniformly mixed by grinding a mixture of them in the proportions stated above with a mortar and pestle. In a dry state the indicating agents exhibit in bulk quantities the same neutral color as the masking agent, preferably white, provided the percentage of the dye is sufficiently low, e.g., less than 1 percent.

Dye powders sometimes exist in agglomerated or caked form, even though the individual dye particles are small. Simple mixing is often all that is required to obtain a satisfactory admixture with a diluent masking agent. To achieve this result, a crystalline diluent masking agent is preferred. Attritive forces are created, and the agglomerates are broken down. With other diluent masking agents such as flours and starches, simple mixing followed by milling, e.g., by a hammer mill or roller mill, will produce good results. Where milling is required, it is often advantageous to blend and mill a mixture containing a comparatively large amount of dye and then dilute this mixture to desired concentrations by mixing in additional amounts of the selected diluent masking agent.

Application of the moisture-actuated indicating agent of the present invention to the translucent back sheet contacting face of the absorbent pad can be accomplished by a number of convenient means, such as:

I. Method of Application by Pneumatic Means

The moisture-actuated indicating agent is enclosed in a powder bin having a lid, which is provided with a venturi tube and nozzle for spraying of dry powder. The powder bin is vibrated to promote a uniform mixture of indicating agent therein. An air pressure of 5-20 psi is applied to the venturi tube. The air transported indicating agent is directed through the nozzle onto the surface of the absorbent pad. A powder application with a duration of a few seconds will be sufficient to apply the required amount of indicating agent to the absorbent pad. The amount of indicating agent applied per unit area can be controlled by the size of the nozzle opening, the angle of the conically shaped powder stream, the distance between the nozzle opening and the pad surface, and the applied air pressure. Metal or plastic stencils and templates can be used to obtain desired patterns of the indicating agent on the pad surface.

II. Method of Application by Vibrating Sieve

An ultrasonic power source is connected with a sieve. The sieve has a screen with a mesh size, which barely permits the particles of a prepared mixture of indicating agent to fall

through the screen. The screen is loaded with the indicating agent and the sieve is placed above the absorbent pad surface at a distance of about 0.5 inch and caused to vibrate for a few seconds or only fractions of a second. The indicating agent is sifted onto the pad surface. The amount of deposition can be controlled by the mesh size of the screen, the duration of vibration, and the selection of dye and diluent masking agent materials. It is important that the particle sizes in the indicating agent and the density of the dye and the diluent masking agent be fairly uniform to avoid separation of dye and diluent masking agent particles during sieve application.

The disadvantage of dusting in vibrating sieve application can be minimized by careful weighing, transferring and sifting of the indicating agent. In commercial operations the inconvenience of indicating agent dust settling onto nearby products and the dangers of dust inhalation can be eliminated by confining indicating agent handling operations to a separate enclosure provided with vents for dust removal.

Excessive perspiration and/or air humidity must not cause a false color indication in a disposable article. Equilibrium conditions between moisture and the absorbent pad material will allow the capture of such humidity and perspiration without causing color indication. Experimental diaper testing with the moisture-actuated indicating agents of this invention at 90° F. and a relative humidity of 90 percent for 3 hrs., did not yield false color indications due to moisture absorbed by the pad under such conditions. The dye particles were not dissolved to such an extent that a noticeable coloring of the indicating agent was obtained.

The sensitivity of the indicating agent to the presence of water is influenced by such parameters as the dye strength, dye and diluent masking agent particle size, amount of dye, dye/diluent masking agent particle size ratio and diluent masking agent type. The appearance of color indication upon wetting a diaper or other disposable article can be delayed or hastened by adjustments of these parameters. Also, it is necessary to take the translucency of the back sheet into consideration when adjusting said parameters. A suitable translucent back sheet can be polyethylene containing from about 3 percent to about 8 percent titanium dioxide pigments. The thickness of the translucent back sheet can vary from about 0.5 mil. to about 2.0 mil.

The likelihood that dissolved dye and body fluids colored by dye may escape the area where indicating agent has been applied and color an infant's skin or stain the bedclothes, is very small. First, there are very small amounts of dye on the absorbent pad. Second, the body fluids travel from the skin of the infant, to which the article is applied, through the capillary channels of the fibrous or porous absorbent pad material towards the absorbent pad and water impervious back sheet interface where the moisture-actuated indicating agent is located. Experiments with such disposable article structures have shown that quite strong pressures, more than 5-8 psi, are necessary to cause even small amounts of fluid to travel from the interface to the skin side of the absorbent pad. Thus, the pressures exerted on a diaper by an infant's movements and weight will not, in practice, cause fluids to travel from the back sheet and pad interface towards the skin of the infant.

The following examples are intended to be illustrative and not limiting, and the scope of the invention is only to be construed by the scope of the appended claims.

EXAMPLE I

A disposable diaper having a moisture-actuated indicating agent consisting of a finely divided dye and talcum mixture was prepared. 3.0 percent of the phthalocyanine-dye, Heliogen Blue BWS Extra, sold by General Aniline & Film Corporation, New York, N.Y., and 97.0 percent talcum powder were admixed by grinding the materials together with a mortar and pestle to an average particle size of about 2.0 microns. The resulting indicating agent had a white appearance.

The disposable diaper has an absorbent pad measuring 11.5 inches by 15.0 inches, and the absorbent pad was enveloped with nonwoven fabric in the manner of FIG. 1 of the accompanying drawing. 0.20 gm. of said indicating agent was blown onto the non-enveloped absorbent pad surface in two centrally located indicating areas totaling 20 square inches. The indicating areas were positioned on the absorbent pad surface as indicated in FIG. 5 of the accompanying drawing. The absorbent pad with moisture-actuated indicating agent on its surface was then superimposed on a titanium dioxide pigmented translucent polyethylene sheet having a thickness of 1.1 mil.; the side of the absorbent pad with moisture-actuated indicating agent thereon faced the translucent back sheet. The absorbent pad was attached to the back sheet by adhesive edge fastening.

The resulting disposable diaper was placed in position on an infant. When the absorbent pad was exposed to body waste fluids from the infant and wet through, a clear blue color was observed through the back sheet in the area where moisture-actuated indicating agent was applied to the absorbent pad. The color appearance was uniform over the areas where waste fluid had spread in the absorbent pad, which illustrated that little migration of the dry indicating agent particles had occurred, before the discharge of waste fluid. Thus, the disposable diaper of this example yielded a readily visible indication that it had become soiled and moist in use and was ready to be discarded. There was no leakage of colored waste fluid and no staining of bedclothes associated with the infant.

When a moisture-actuated indicating agent containing 0.1 percent of Heliogen Blue BWS Extra dye and 99.9 percent talcum powder by weight is prepared, and 0.2 mg. of this moisture-actuated indicating agent is blown on a 20 square inch indicating area of a disposable diaper in the manner of this Example I, the resulting diaper will exhibit a similar visual indication of its wetness in use. A visual indication of wetness in the disposable diapers of this Example I will also occur when the moisture-actuated indicating agent consists entirely of the dye, Heliogen Blue BWS Extra.

EXAMPLE II

A disposable diaper having a moisture-actuated indicating agent consisting of a finely divided dye and whitening mixture is prepared in the following manner. 1.0 percent of the Rhodamine dye, Edicol Supra Rose B, sold by Imperial Chemical Industries, Ltd., Manchester, England, and 99 percent starch powder are admixed by grinding the material together in a roller mill to an average particle size of about 5 microns. The resulting indicating agent has a white appearance.

The disposable diaper has an absorbent pad measuring 12 inches x 15 inches, and the absorbent pad is enveloped with non-woven fabric in the manner of FIG. 1 of the accompanying drawing. 0.02 gm. of said indicating agent is blown onto the non-enveloped absorbent pad surface in a multiplicity of small rectangular indicating areas as illustrated in FIG. 3 of the accompanying drawing. The indicating areas total 20 square inches. The absorbent pad with moisture-actuated indicating agent on its surface is then superimposed on a titanium dioxide pigmented translucent polyethylene sheet having a thickness of 1.1 mil.; the side of the absorbent pad with moisture-actuated indicating agent thereon is placed to face the translucent back sheet. The absorbent pad is attached to the back sheet by adhesive edge fastening.

When the absorbent pad is exposed to body waste fluid by placement on an infant as a diaper, a clear red color is observed through the translucent back sheet in the areas where moisture-actuated indicating agent is applied to the absorbent pad. The disposable diaper of this example will yield a readily visible color indication in the areas of moisture-actuated indicating agent placement and body waste fluid wetness indicating that it has become soiled and moist in use and is ready to be discarded. Leakage of colored waste fluid and staining of bed clothing associated with the infant will not be a problem.

A moisture-actuated indicating agent containing 0.5 percent of the Aryl dye, Acid Green S, sold by Williams Ltd., Hounslow, England, and 99.5 percent whiting by weight is prepared, and 0.002 gm. of this moisture-actuated indicating agent is blown on a 20 square inch indicating area of a disposable diaper in an overall pattern in the manner of this Example II. The resulting diaper will exhibit a visual indication of its wetness in use similar to that of Example II, and the moisture-actuated indicating agent pattern will be found satisfactory from the standpoint of avoiding staining of the skin and clothing associated with the infant.

Disposable diapers prepared in the manner of this Example II with other moisture-actuating indicating agent particles sizes within the range of about 0.2 micron to about 20 microns (e.g. 0.2 micron, 20 microns and particularly 2 microns) will be found to provide a readily discernible color indication.

In addition to the preferred embodiments described herein, other arrangements and variations within the spirit of the invention and the scope of the appended claims will occur to those skilled in the art.

Having thus described the invention, what is claimed is:

1. A disposable article comprising a translucent back sheet of substantially water impervious material having an absorbent pad superimposed thereon with a moisture-actuated indicating agent in finely divided particulate form disposed therebetween in at least one indicating area, wherein the moisture-actuated indicating agent comprises an admixture of about 0.01 percent to about 100 percent, by weight, of a water-soluble, substantially non-toxic dye together with a non-toxic diluent masking agent, has particle sizes of about 0.2 to about 20 microns and is present in amounts of about 1×10^{-5} gms. to about 1×10^{-2} gms. per square inch of indicating area.

2. The disposable article comprising a translucent back sheet of substantially water impervious material having an absorbent pad superimposed thereon with a moisture-actuated indicating agent in finely divided particulate form disposed therebetween of claim 1, wherein the disposable article is a disposable diaper and two centrally located indicating areas are provided.

3. The disposable article comprising a translucent back sheet of substantially water impervious material having an absorbent pad superimposed thereon with a moisture-actuated

indicating agent in finely divided particulate form disposed therebetween of claim 1, wherein the water-soluble, substantially non-toxic dye is selected from the group consisting of nitro, monoazo, diazo, phthalocyanine, quinoline, xanthene, triaryl methane, indigoid and vegetable dyes.

4. The disposable article comprising a translucent back sheet of substantially water impervious material having an absorbent pad superimposed thereon with a moisture-actuated indicating agent in finely divided particulate form disposed therebetween of claim 1, wherein the non-toxic diluent masking agent is a neutral color substance selected from the group consisting of talcum, whiting, silica, sugar, salt and starch.

5. The disposable article comprising a translucent back sheet of substantially water impervious material having an absorbent pad superimposed thereon with a moisture-actuated indicating agent in finely divided particulate form disposed therebetween of claim 1, wherein the moisture-actuated indicating agent is a water-soluble, substantially non-toxic dye.

6. A disposable article comprising a translucent back sheet of substantially water impervious material having an absorbent pad superimposed thereon with a moisture-actuated indicating agent in finely divided particulate form disposed therebetween in a plurality of indicating areas, wherein the moisture-actuated indicating agent comprises an admixture of about 1 percent, by weight, of a water-soluble, substantially non-toxic dye together with a non-toxic diluent masking agent, has particle sizes of about 2 microns and is present in amounts of about 1×10^{-4} gms. to about 1×10^{-3} gms. per square inch of indicating area.

7. The disposable article comprising a translucent back sheet of substantially water impervious material having an absorbent pad superimposed thereon with a moisture-actuated indicating agent in finely divided particulate form disposed therebetween in a plurality of indicating areas of claim 6 wherein the disposable article is a disposable diaper, and wherein the moisture-actuated indicating agent comprises an admixture of about 1 percent, by weight, of a blue phthalocyanine dye together with about 99 percent of talcum powder as the non-toxic diluent masking agent, has particle sizes of about 2 microns and is present in amounts of about 1×10^{-4} gms. to about 1×10^{-3} gms. per square inch of indicating area.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,675,654 Dated July 11, 1972

Inventor(s) Joseph S. Baker; Mario S. Marsan; Robert C. Duncan

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Abstract, line 1, "bandages and the like" should read --bandages and like--.

In the Abstract, line 7, "due admixed with a finely divided diluent masking agent," should read --dye admixed with a finely divided diluent masking agent,--.

In the Abstract, line 12, "the resulting due solution" should read --the resulting dye solution--.

Column 2, line 15, "1 X 10⁻² gm." should read --1 X 10⁻² gm.--.

Column 2, line 43, "here is illustrated" should read --there is illustrated--.

Column 3, line 68, delete "HT,".

Column 3, line 70, "SO₂Na" should read --SO₃Na--.

Column 9, line 13, "indicating agent particles" should read --indicating agent particle--.

Signed and sealed this 6th day of March 1973.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents