

Nov. 11, 1969

G. D. THOMAS

3,477,084

OIL IMPREGNATED CREPED WADDING-SYNTHETIC FIBER WIPE

Filed Sept. 11, 1967

2 Sheets-Sheet 1

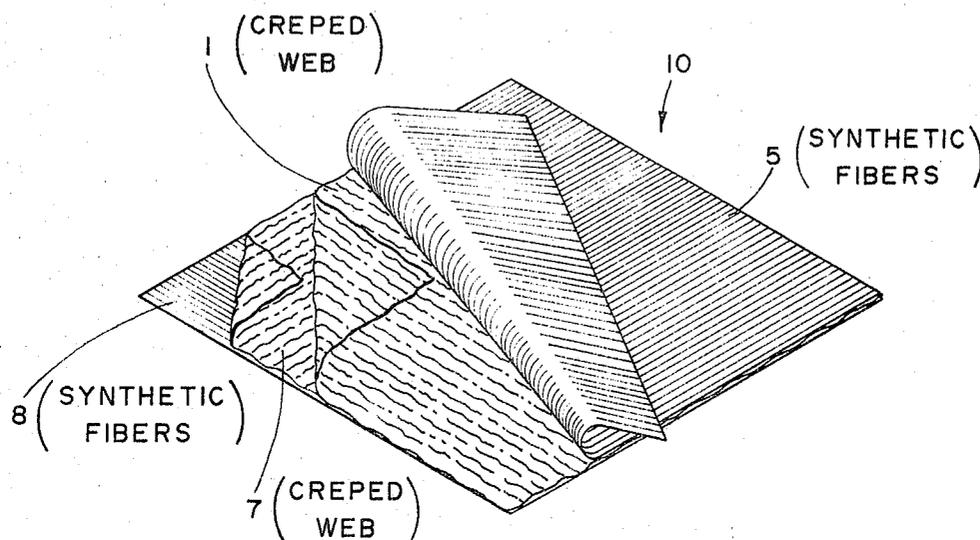


FIG. 1

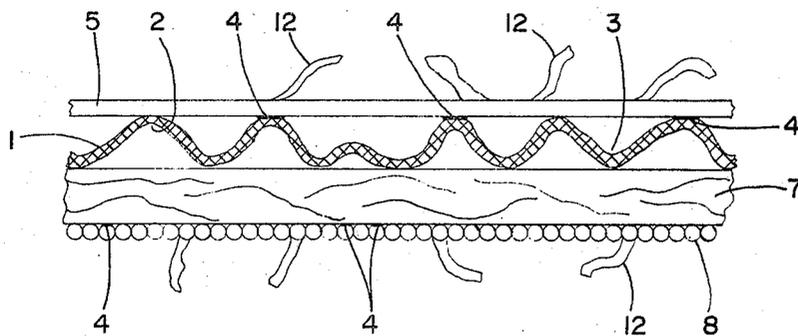


FIG. 2

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2 Sheets-Sheet 2

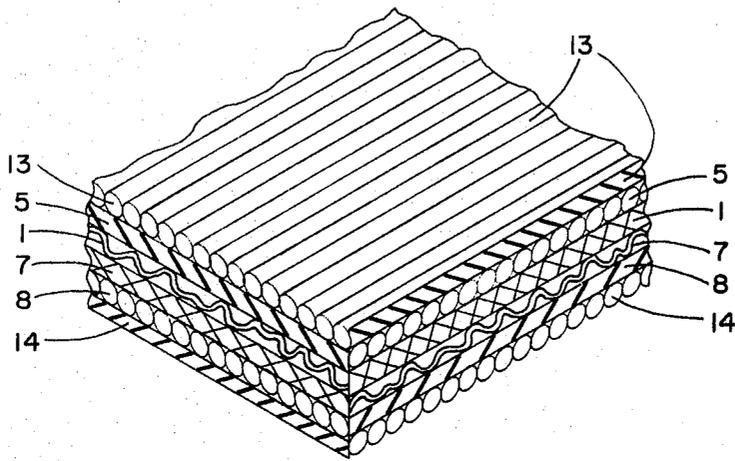


FIG. 3

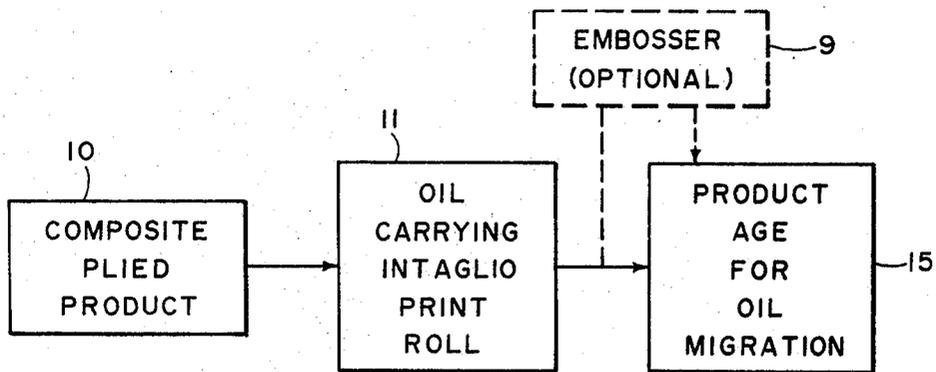


FIG. 4

1

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**OIL IMPREGNATED CREPED WADDING-
SYNTHETIC FIBER WIPE**

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3 Claims

ABSTRACT OF THE DISCLOSURE

A dust cloth having a cloth-like appearance and formed basically by a sheet of creped cellulosic wadding and a web of relatively long synthetic fibers extending generally in one direction bridging peaks of the crepe; the fibers are retained on the crepe wadding by adhesive and in use serve to attract and encompass dust, retaining it between fibers and in the valleys of the crepe sheet. The cloth is oil impregnated to lubricate the fibers, to aid in abrasion resistance between fibers and to serve to provide a mild adhesive action to retain the fibers together and on the sheet. For general service the cloth is formed with two inner layers of cross-laid creped wadding and each outer surface carries a synthetic fiber web.

BACKGROUND OF THE INVENTION

Field of the invention

(1) The invention relates to dusters and to methods of obtaining dust cloths which are useful in household and commercial applications.

(2) The invention with relation to the prior art.

Dust cloths of fabric construction, as well as dusters of a paper tissue, are well known in both household and commercial wiping applications. Such cloths are employed on furniture, flooring, tiles and the like. For such purposes the wipes should be conformable to equipment to be cleaned as well as to mop heads and manual distorting forces. Such factors as strength, softness, non-linting, good hand and feel, toughness, a resistance to abrasion and tearing, and, in many instances, water resistance are characteristics necessary to appropriate wipe functioning. To attain these features in a wiping cloth in an inexpensive manner is an object of this invention. Textile cloths, while achieving some or many of the desired characteristics mentioned, are commonly quite expensive and require laundering and reuse in order to minimize the cost factor.

The preferred cloth of the present invention is a combination of oil-impregnated creped tissue and oil-coated synthetic fibers of relatively long length retained together by an oil-resistant adhesive, the fibers extending generally in one direction and bridging valleys of the crepe. The synthetic fibers provide strength and abrasion resistance and are so retained by adhesive on the oil-impregnated soft tissue as to flex uniformly with the tissue, thereby providing a product which in use may be crumpled and distorted without significant damage to the wipe. The oil impregnant provides a lubricant between fibers to prevent their breakage by rubbing and, additionally, the oil coating the fibers tends to hold the fibers together on the tissue base sheet. Some fibers may be so loosened as to provide a kind of nap on the wipe surface, a factor which enhances the utility as a wipe by providing for greater entrapment of dust; but, because of spaced bonding of the relatively long fibers at zones over their length and because of the tendency of the oil of adjacent fibers to inhibit separation, the fibers do not lint off from the wipe to any significant degree.

2

The oil incorporated in the product may vary widely in its nature and is dependent largely upon the product specific end use. A product intended for household dust retention and pickup may satisfactorily employ only a light viscosity oil and be present to the extent of only 10-20% by weight of the impregnated cloth. This is for the reason that commonly such a duster is directed to the pickup and removal of relatively light weight dust in the form of fluff or the polishing of furniture having only superficial dirt, finger markings and the like. In contrast, a cloth designed for commercial building floor application requires larger quantities of an oil which is itself relatively viscous at ambient temperature, and such oil is generally very satisfactory as the impregnant and coating for the fibers, when present in the product to the extent of 20 to 30% by weight. I have found that the more viscous oils, that is, oils which are so viscous at ambient temperature as to require viscosity reduction for application to the cloth, are also significantly tacky at normal temperatures, although the tackiness to the touch evident in a body of oil is not discernible to human touch in the oil saturated product. Such tackiness, however, serves to aid dust retention by the impregnated cloth as well as to increase the capacity of the wipe for pickup, and retention from floors and the like, of gritty substances.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more fully understood by reference to the following detailed description and accompanying drawings wherein:

FIG. 1 is an idealized and fragmentary view in perspective, enlarged for the sake of clarity, illustrating the nature and relationship of components in a preferred embodiment of the invention, successive layers being turned back to expose underlying components;

FIG. 2 is a much enlarged cross-section view of a product as in FIG. 1 but particularly illustrating the nap-like effect attained by a working of the impregnated cloth;

FIG. 3 is a cross-sectional view of a further embodiment of the invention illustrating a dust cloth having cross-laid outer plies of synthetic fibers; and

FIG. 4 is a flow sheet illustrating steps in the production of a dust cloth having an impregnant of a high viscosity oil.

DETAILED DESCRIPTION

The following description specifically illustrates a product and method for producing the same, which product is useful under most severe service conditions as in the cleaning of floors, for example, in public buildings. The structure described and illustrated in FIGS. 1 to 3 particularly has demonstrated its utility in such applications. For such purpose the wiper or cloth is secured to a suitable mop holder.

Referring now to FIG. 1 the numeral 1 designates a base sheet of creped cellulosic wadding. As shown more clearly and in exaggerated form, in FIG. 2 the crepe wadding sheet 1 has peaks and valleys designated respectively at 2 and 3. At least some of the peaks 2 carry an adhesive 4; such adhesive is applied in known manner as by directing the sheet under very light or insignificant tension over an adhesive applicator roll whereby adhesive is applied to the more pronounced of the peaks; less pronounced peaks may have little or no adhesive and generally the valleys and slopes to the peaks are largely free of adhesive. As shown in the drawing, the peak and valley construction is somewhat idealized as the crepe is crushed to some slight extent in the process of production as noted hereinafter. Nevertheless, the peak

and valley type structure is evident in the product and functions in dust and grime pickup.

The crepe wadding sheet 1 carries a web of synthetic fibers designated at 5. Such fiber web may be formed in a plurality of different ways while serving satisfactorily in the practice of the present invention. The fibers should be relatively long and generally aligned in one direction such that each fiber bridges a multiplicity of valleys of the sheet 1 and is bonded to the sheet at a number of peaks over the fiber length. This insures good fiber retention and is readily accomplished for the purpose of this invention by a plurality of means of fiber lay such as carded webs although webs formed by a draw frame operation as described in U.S. Patent 2,407,548 issued Sept. 10, 1946 are found to be most useful. The output of such a draw frame is unbonded, striated fibers which may be fed to the adhesive carrying crepe wadding tissue sheet described above. When adhesively united to the wadding sheet, the individual strands of the striated fibers are found to bond to closely spaced peaks though not necessarily successive or adjacent peaks of the sheet.

In practice and in a specific application, a wadding sheet 1 having a basis weight per 3000 sq. ft. of about 10 pounds before creping is creped to a ratio of about 2:1 so that the sheet has a relatively high extensibility or stretch; the adhesive 4 applied to such sheet is a plastisol comprising 100 parts of vinyl chloride dispersed in about 60 parts by weight of diisodecyl phthalate and having a viscosity of about 3000 centipoises Brookfield as measured with a No. 4 spindle at 20 r.p.m. Such adhesive is applied to the peaks of the crepes at about 3 to 7 grams per square yard of crepe sheet and is adapted for receipt of the fibers.

The web fibers in the specific embodiment are of rayon, the individual fibers being sufficiently long to bridge a plurality of valleys of the sheet even when not fully extended, and the fibers generally being in the specific application of a denier of 1½ to 3, of a length of 2½" and the fiber web being of a weight of about 3-10 grams per square yard; a preferred weight is about 4 to 5 grams per square yard.

To embed the fibers or monofilaments in the adhesive and to cure the adhesive where a heat curable adhesive is employed, the composite of fibers and sheet is directed through a heated calender at low pressure to bond the fibers to the sheet. The pressure and heat aid adhesive distribution.

As illustrated in FIG. 1 the product includes two composites formed as described above; that is, the sheet 1 and fiber web 5 have a second similarly formed composite, embodying sheet 7 and fiber web 8, plied in cross-laid relation with it so that peaks of one base sheet lie across peaks of the contacting base sheet (FIG. 2) and each outer base sheet has on its exposed surface a web of the synthetic fibers bridging the valleys of the contiguous sheet. In such structure the adhesive applied to the tissue sheet is distributed through the plies upon hot calendering, and no additional adhesive for retaining layers of the composite together is commonly necessary though such may be employed if desired.

As illustrated in FIG. 4, the 4 ply adhesively united calendered composite conveniently generally designated by the numeral 10 in FIGS. 1 and 4 is passed over a conventional intaglio printing roll in a step indicated at 11 and in which the cells of the roll are provided with heated oil. Printing of the oil as closely spaced oil dots provides for close control of the amount applied. Following oil impregnation, the sheet is optionally subjected to an embossing operation indicated at 9; such improves the bulk of the product as well as the handle.

The printing application of the oil in dots provides that, upon slight time passage, all of the product will be substantially uniformly impregnated as the oil migrates readily in the sheet upon aging (FIG. 4 at 15) due to surface tension effects and covers the fibers of the web.

As shown in FIG. 2, some of the fibers or filaments, which are hair-like as seen by the eye, may be raised by a manual working of the cloth. This working may be effected prior to use or during use. In any event, fibers as at 12 tend to be raised and to form a nap. Such nap contributes to dust pickup and retention. The oil on the fibers lubricates the fibers against breakage and abrasion during working as well as providing a degree of adherence between contacting oil coated fibers.

As shown in FIG. 3 the product may be improved by including as the outer plies on each working surface cross-laid synthetic fibers. The additional fiber webs are designated by the numerals 13, 14. Such cross-laid outer plies provide for improved abrasion resistance and dust holding power as well as providing greater and more intimate contact of the oil coated fibers. As with the single ply of fibers, the fibers of the cross-laid plies of the outer covering need not all lie in one direction in a ply but should generally be aligned in order to obtain the desired strength benefit from the synthetic fiber material.

The wadding or crepe tissue may be provided in different forms for different end uses. In many instances the wadding will include a wet strength agent to provide improved resistance to aqueous fluids although the oil itself will usually impart this characteristic in desired measure; the crepe ratio should be high—about 1:2 to 2:1 as some stretch will be lost in calendering; for good conformability, the wadding basis is suitably between 5-13 pounds per 3000 sq. ft., a range in which crepe ratio is well retained.

The adhesive should be water insoluble and oil resistant so that adhesive bonding is not impaired; the extent of adhesive penetration of the sheet depends upon the desired result and this governs the adhesive selection. Generally, polyvinyl resins (plasticized or unplasticized) such as polyvinyl acetate serve the purpose of binding fibers to wadding and wadding to wadding as well as fibers to fibers. However, the acrylics such as the alkyl acrylates, the butadienes such butadiene styrene and butadiene acrylonitrile, and other known resins are useful.

Useful staple length fibers or monofilaments include nylon, acrylonitriles, polyamides, polypropylene and other synthetics.

The oil incorporated in the product, which lubricates the fibers and aids the preservation of bonding strength in the cellulosic wadding sheet particularly in the presence of aqueous fluids, is selected to accomplish the intended function of the wipe with a minimum of oil present so that significant traces of oil are not left on the structures being cleaned. A light mineral oil (about 25 to 100 centipoises) is useful for relatively easy cleaning operations. Kerosene is useful. Preferably, the oil is a low cost crude which does not swell rubber floor tiles when applied in a wiping action. One oil found most suitable for heavy duty and employed in the specific structure of FIG. 1 had a viscosity of 1610 centipoises at 81° F. and a viscosity of 35-45 centipoises at 160-175° F. so that it was readily applicable by a heated print roll at about 160° F. Other oils having a viscosity at ambient temperatures (about 70° F.) of about 800 to 1600 centipoises serve the purpose well as they commonly demonstrate a degree of tackiness at room temperature without becoming paste-like or semi-solid.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that I do not limit myself to the specific embodiments thereof except as defined in the appended claims.

I claim:

1. A dust cloth comprising base sheets of creped cellulose wadding having peaks and valleys, said base sheets being plied in contact and in cross-laid relation so that peaks of one base sheet lie across peaks of the adjacent base sheet, a web of synthetic fibers on the exposed surface of each outer base sheet and said synthetic fibers of a web being generally aligned in one direction such that

5

the fibers contact peaks of the crepe and bridge valleys of the crepe sheets, and oil incorporated in said dust cloth impregnating said base sheets and coating the synthetic fibers.

2. A dust cloth according to claim 1 in which at least some of the synthetic fibers protrude from the surface of the cloth providing a nap-like surface.

3. A dust cloth according to claim 1 in which the dust cloth has on each working surface a cross-laid web of synthetic fibers.

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DANIEL BLUM, Primary Examiner

U.S. Cl. X.R.

161—59, 62, 129