

[54] FIRE RETARDING TREATMENT

[72] Inventors: **Leroy J. Goldbeck**, Neenah; **Norbert L. Van Den Elzen**, Hilbert, both of Wis.

[73] Assignee: **Kimberly-Clark Corporation, Neenah, Wis.**

[22] Filed: **Sept. 18, 1970**

[21] Appl. No.: 73,412

[52] U.S. Cl.....117/46 CA, 117/62, 117/76 T,
117/102 R, 117/135.5, 117/136, 117/137, 117/138

[51] Int. Cl. B44d 1/46, C09k 3/28

[58] **Field of Search**.....117/62, 76 T, 102 R, 135.5,
117/136, 137, 138, 46 CA

[56] **References Cited**

UNITED STATES PATENTS

3,103,254	9/1963	Stedman	117/137 X
2,421,218	5/1947	Pollak.....	117/76
2,640,000	5/1953	Seyb et al.	117/76

3,062,678	11/1962	McCluer.....	117/62 X
2,422,730	6/1947	Hoffman.....	117/136
2,911,322	11/1959	Klein et al.....	117/76
3,265,527	8/1966	Adelman.....	117/62
3,154,426	10/1964	Kohnken.....	117/46 X
2,443,617	6/1948	Homan.....	117/46 X

Primary Examiner—William D. Martin

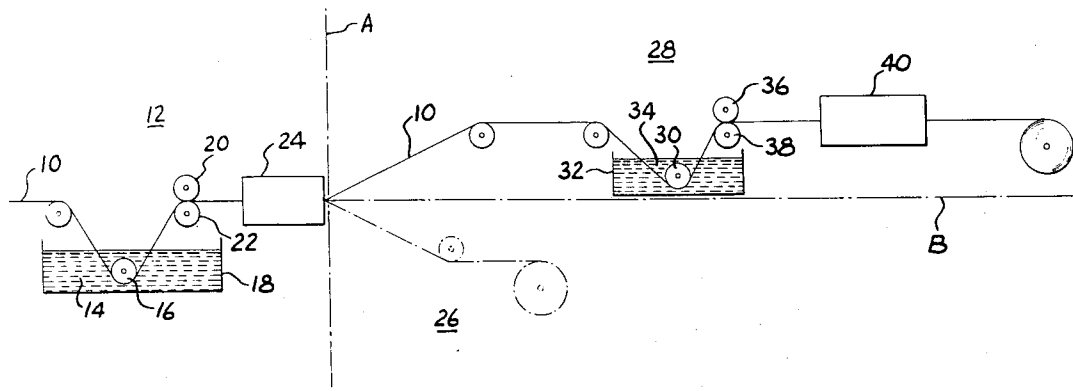
Assistant Examiner—Harry J. Gwinnell

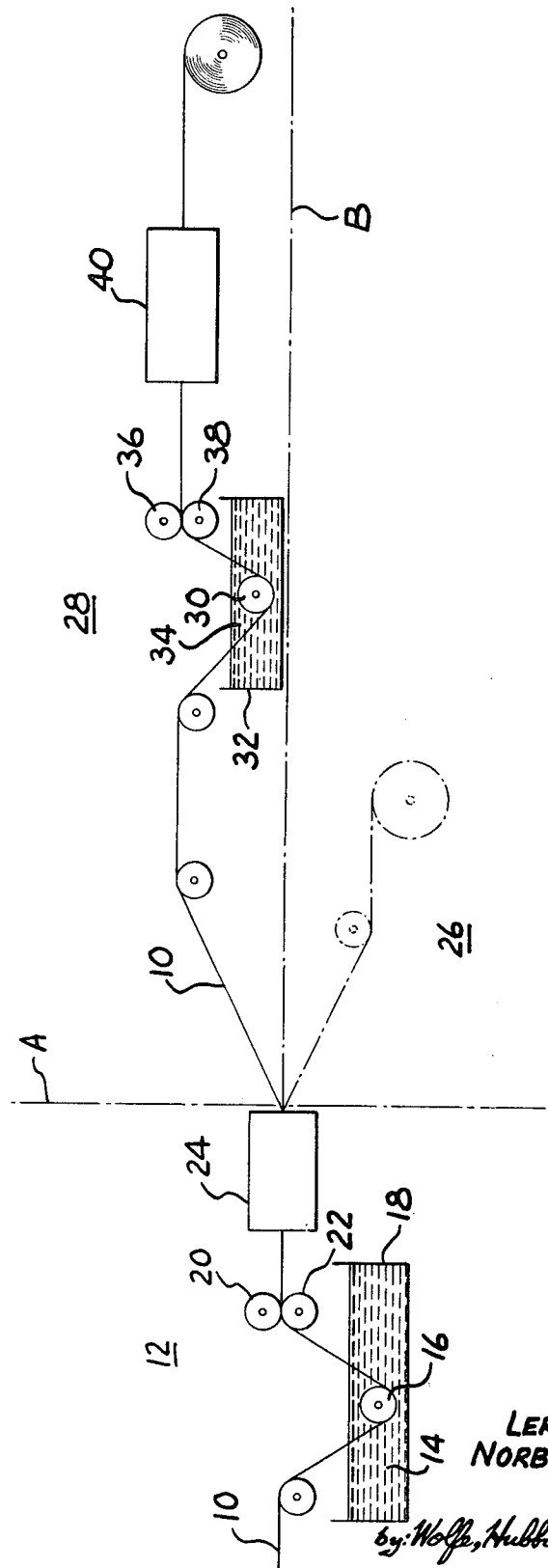
Attorney—Wolfe, Hubbard, Leydig, Voit & Osann

[57] **ABSTRACT**

A process is illustrated for rendering a water repellent fabric fire retardant without adversely affecting the fabric's water repellent characteristics. The water repellent fabric is treated with an aqueous medium containing a fire retarding agent and a thermally degradable surfactant such as the diacetyl dilauryl amide derivative of triethylenetetramine and then dried. On drying, the surfactant degrades and the water repellent characteristics of the fabric are restored.

4 Claims, 1 Drawing Figure





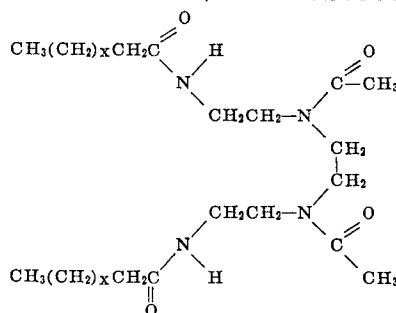
INVENTORS
 LEROY J. GOLDBECK
 NORBERT L. VANDENELZEN

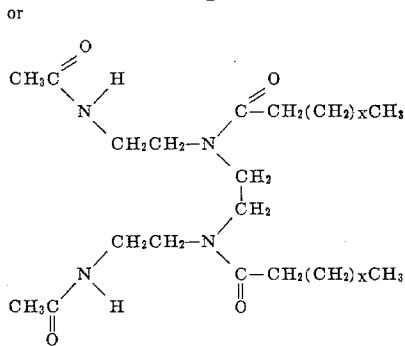
by: Wolfe, Hubbard, Laydig, Vait & Osawa
 ATTYS.

2

Turning now to the drawing, there is schematically illustrated an arrangement of apparatus which can be used in accomplishing the present process. As shown, a web of fabric 10 is initially rendered water repellent at the treatment station 12 which is illustrated as being that apparatus to the left of the verticle phantom line A. As illustrated, the fabric 10 is impregnated with an aqueous medium 14 containing a suitable water repellent by passing the fabric around the roll 16 submerged in the tank 18 containing the aqueous medium 14. After emerging from the tank 18, the fabric 10, now impregnated with the water repellent, is passed through the press rolls 20, 22 to remove excess repellent and, thereafter, dried by being passed through the oven 24.

Surfactants with the above characteristics which are particularly useful in the present invention are the diacetyl dihighalkyl amide derivatives of triethylenetetramine. Such surfactants have the following basic structural formula:





wherein X is 6-12 inclusive. A preferred surfactant of the above type which is thermally degradable at about 250°-300° F. is the diacetyl dilauryl amide derivative of triethylenetetramine (the above structure wherein X is 9). This surfactant is commercially available from Sun Chemical Co. and is sold under the tradename "Mykon NRW-3."

A variety of well known fire retardants can be used in accomplishing the method of the present invention. Useful retardants, both of the inorganic salt and organic type, are given in the journal "Textile World" 119 (10) 102-106 (1969) Oct. Particularly useful fire retardants are those containing nitrogen, phosphorus, boron, sulfur, and/or halogen substituents. Specific examples of useful compounds include water soluble salts such as ammonium chloride, ammonium sulfamate, sodium borate, and mono and di-ammonium phosphate, as well as other retardants such as barium meta borate, zinc borate complexes, urea, boric acid, antimony chloride, antimony oxychloride, antimony trioxide, titanium acetate, and titanium oxychloride.

In preparing the aqueous fire retarding medium useful herein, it is simply necessary to mix the fire retarding agent and the surfactant together in the presence of water. Ordinarily, the concentration of fire retardant is about 4-20 wt. percent based on the total weight of the aqueous medium with the surfactant being present in an amount of about 2-8 wt. percent, based on the weight of the fire retardant. The retardant pick up by the fabric must be sufficient to impart the desired degree of fire retardance and, to this end, a retardant pick up of about 4-6 percent, based on the weight of the dry fabric, is ordinarily useful. In addition to the surfactant and fire retarding agent, other ingredients can also be present in the aqueous medium. For example, anti-yellowing agents are frequently

also included.

As is apparent from the above discussion, the present invention is applicable to a wide variety of fabrics wherein it is desired to impart fire retardancy while maintaining water repellency. The invention is especially applicable to that class of fabrics generally categorized as nonwovens and, in particular, those nonwovens which are principally comprised of tissue, such as cellulose wadding, containing a suitable reinforcing means such as a scrim or a web of drafted or carded fibers.

The following description further illustrates the method of the present invention. Apparatus similar to that depicted in the drawing was employed. The water repellent fabric treated at the station 28 comprised a nylon scrim having two plies of creped cellulose wadding (each having a weight of about 8 lbs./2,880 ft.²) adhesively bonded to each side of the scrim. Water repellence was achieved by impregnating the fabric with 3M's FC-805. The aqueous fire retarding medium 34 in the tank 32 was comprised of the following ingredients:

Water	863 parts by weight
Urea anti-yellowing agent	12 parts by weight
Ammonium Sulphamate	120 parts by weight
"Mykon NRW-3" Surfactant	5 parts by weight

After saturation with the aqueous fire retarding medium, the fabric was heated at about 300° F. for about 30 seconds to dry the fabric and degrade the surfactant. Based on the dry fabric, the retardant add on was about 12 wt. percent.

The fabric prepared as described above possessed the combination of good fire retardancy and good water repellency. Thus, as has been shown, the method described herein fully satisfies the aims and objectives of the present invention.

We claim as our invention:

1. In the process for rendering a water repellent fabric fire retardant comprising treating the water repellent fabric with an aqueous medium containing a fire retarding agent and a water soluble surfactant and thereafter heating the fabric, the improvement wherein the water soluble surfactant is thermally degradable and fabric heating is accomplished for a time and at a temperature sufficient to degrade the surfactant and not adversely affect the fabric.

2. The process of claim 1 wherein the surfactant is a diacetyl dihigheralkyl amide derivative of triethylenetetramine.

3. The process of claim 1 wherein the surfactant is a diacetyl dilauryl amide derivative of triethylenetetramine.

4. The process of claim 3 wherein fabric heating is accomplished at about 250°-400° F. for about 0.3-3 minutes.

* * * * *

50

55

60

65

70

75