

# PATENT SPECIFICATION

(11) 1 436 344

1 436 344

- (21) Application No. 21207/73 (22) Filed 4 May 1973  
 (31) Convention Application No. 255880 (32) Filed 10 May 1972 (19)  
 (31) Convention Application No. 258758  
 (32) Filed 1 June 1972 in  
 (33) United States of America (US)  
 (44) Complete Specification published 19 May 1976  
 (51) INT CL<sup>2</sup> B32B 5/18 15/08  
 (52) Index at acceptance



B2E 186 18Y 251 289 299 308 30X 327 32Y 339 360 370 378 380  
 381 382 383 384 385 386 38X 38Y 401 404 405 40X 40Y  
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## (54) FLAMEPROOF COVERING MATERIAL

- (71) We, ROHM AND HAAS COMPANY, a corporation organized under the laws of the State of Delaware, United States of America, of Independence Mall West, Philadelphia, Pennsylvania 19105, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—
- It has heretofore been the practice in making ironing board covers to apply a coating of metal particles, such as of aluminum, to the face or back of the cover to provide rapid dissipation of heat. However, ticking fabric materials are in general, relatively thin and generally have a printed decorative design on the visually exposed face. Consequently, the placing of a metal-particle-containing layer directly on the face would obscure the design and if it were placed on the back or inside surface of the ticking fabric, it would result in an undesirable appearance of the coated ticking because the metal layer would be visible to observers as they look at the outside of the covered article, such as a mattress, the effect observed being commonly referred to as "grinthrough". In addition, the metal-coated covering fabric is stiffened detrimentally.
- The invention provides a cover fabric of composite-layer type comprising a woven fabric, a soft, flexible layer adhered thereto formed of a crushed foam of a polymeric material and a metal layer or a metal-containing layer containing at least 20% by weight of the metal on the crushed foam layer, the metal content of which serves to conduct heat rapidly through the crushed foam layer.
- The cover fabrics of the invention may be provided by first coating one surface, preferably the back surface which becomes the inside surface in use, of a woven fabric material, such as a ticking fabric, with a thin opaque coating of a flexible foamed plastic material drying the foam and crushing the foam before or after applying to the foam/fabric composite, a metal or metal-containing layer so that the foam layer is between the metal and fabric layers. Preferably the foam is crushed before application of the metal or metal-containing layer.
- The opaque foam layer prevents "grinthrough" and also ensures the maintenance of flexibility in spite of the normal tendency of the metal coating to stiffen the fabric undesirably. It is essential that the foamed composition in the dry condition be soft and flexible. The thickness of the crushed foam layer may be from 5 to 20 mils, the lower limit being predicated on the need of a certain minimum thickness to counteract the stiffening effect of the metal layer applied to the foam layer. The maximum thickness of the foamed composition is influenced by the desirability to avoid too great a mass of combustible material between the cover fabric (or ticking) and the metal coating or layer which serves to protect the highly combustible filling or stuffing of the mattress, pillow, cushion or the like from the heat developed by burning of the cover fabric proper. The amount of

the crushed foam deposited may be from 1 oz. to 4 ounces per square yard. Preferably, it is from 1.5 to 2.5 oz./sq. yd.

5 The composite cover fabric of the present invention retards ignition of the fibrous filler body of, for example, pads, cushions, pillows, mattresses and sofas when a lighted cigarette or match comes into contact with the cover fabric or ticking enclosing the fibrous filling material by heat dissipation.

10 In the cover fabric of the invention the woven fabric may be provided with a decorative design on its visually exposed surface.

15 Heretofore, the general practice was to use as the ticking fabric, a rather tightly woven fabric, e.g. 80<sup>2</sup> cotton to the face of which a decorative design may be applied as by printing, or a heavy damask fabric in which a decorative effect may be provided in the weaving. The present invention is applicable to such cover fabrics. But it is also applicable to thin ticking fabrics having a weave as open as cheese cloth such as a 40<sup>2</sup> cotton.

20 The thickness of the metal coating or layer may be from about  $\frac{1}{4}$  to six mils, preferably 2 to 4 mils. The metal in the coating may be a powdered metal, the particles or flakes thereof being bonded together in a binder of a combustion-resistant material, or the metal may be applied by a chemical plating on an electroplating process wherein no organic binder is used. Again, the metal may be applied by a sputtering process or by a vacuum metallizing process wherein a small amount of metal is vaporized in a vacuum within which the crushed foam/ticking laminate is either disposed with the ticking surface as well as the crushed foam surface exposed or disposed with a removable protective film, e.g. of polyethylene, against the front face of the ticking to prevent its being coated by the metal, the protective film being removed after the metallizing operation, if desired.

25 A wide variety of metals may be used, such as aluminum, nickel, silver, bismuth, antimony, tin and zinc and alloys, such as stainless steel, brass bronze, solder, Wood's metal, etc. At present aluminum is preferred.

30 When the metal is deposited by applying a coating composition comprising the metal particles in a polymeric binder, the proportion of metal should be at least 20% by weight of the composition, and preferably is at least 40% by weight thereof. The amount of the metal-containing coating is from 0.5 to 4 oz./sq. yd. and preferably 1 to 2 oz./sq. yd.

35 The metal layer may be continuous or it may also be in the form of a foamed or a

crushed foam layer wherein it is somewhat discontinuous, but has the advantage of being more or less permeable, i.e. it has the quality of breathability, which makes it more comfortable to a person sitting or lying upon the pad, cushion or mattress especially in hot weather.

40 When the metal layer is formed from a metal powder/binder composition, the binder used should be of a flame-resistant polymer, such as a polymer of vinyl chloride, vinylidene chloride, or other halogen-containing vinyl monomer. Regardless of what type of polymer is used, it should be one that is of flexible, rather than stiff, nature.

45 Preferred compositions are those based on aqueous dispersions of emulsion copolymers of monoethylenically unsaturated monomers having a group of the formula  $H_2C=C<$  including vinyl monomers, especially of vinyl chloride, vinylidene chloride or mixtures thereof. Since these monomers produce hard and rigid homopolymers, they are copolymerized with monomers which, when homopolymerized produce polymers which are soft and flexible. Examples of the latter type of monomer are ethylene, ethyl acrylate, butyl acrylate, 2-ethylhexyl acrylate which are included in the general class of acrylic acid esters of alcohols having 1 to 18 or more carbon atoms and amyl methacrylate, 2-ethylhexyl methacrylate and octadecyl methacrylate which are included in the general class of methacrylic acid esters of alcohols having 5 to 18 carbon atoms. The copolymers may also include appreciable amounts of other hardening monomers, such as styrene, vinyl toluene, acrylonitrile, and vinyl acetate provided the particular softening monomer in the amount thereof used is able to provide the desired flexibility for the particular laminated covering material in its intended use without requiring a reduction of the halogenated monomer to such an extent as to make the binder of the metal layer too susceptible to combustion. The copolymer may also comprise small amounts (0.1 to 2% by weight) of an acid such as acrylic acid, methacrylic acid, and itaconic acid, to provide improved stability of the emulsion polymer and ease of thickening by adjustment of pH of the system. Small amounts (0.5 to 5% by weight) of other reactive monomers may be included to provide self-crosslinking properties to the copolymer and/or to favour reaction of the metal layer binder with the intermediate foam layer and thereby provide chemical bonding and the advantages of this type of adhesion between the metal layer and the intermediate foam layer.

The amount of powdered metal in such compositions should be at least 20% by weight, based on the total solids weight of the composition, and is preferably 40 by weight of the total solids.

The dry weight of the powdered metal-containing coating applied to the intermediate foam coating layer should be in the range of 0.5 to 4 ounces per square yard. The metal particles or flakes may have a wide range of sizes. Metal particles of sizes in the range of 0.02 to 0.1 mm., preferably 0.03 to 0.05, are quite practical. The selection of size is made to ensure extensive contact between the metal particles to provide for rapid conduction of heat from one area to another in the coating.

In the metal coatings obtained by chemical or electrical plating, by sputtering, or by vacuum metallization it is only necessary to provide adequate weight of metal deposit to obtain essential continuity of the metal coating film deposited, but much heavier thicknesses of the metal are permissible. Generally, a metal deposit of about 0.1 oz. or more, e.g. to 0.5 oz./sq. yd. is adequate. In this situation, the upper limit of thickness or weight of metal is determined by the amount of flexibility necessary in the particular use. While a metal foil may be used, it is preferable to avoid it because of the tendency to develop a crackling noise when the composite cover fabric is flexed.

The intermediate layer of a foamed polymeric material may for example be composed of a vinyl addition polymer to which there may be added a filler and/or pigment to provide greater opacity and, if desired, colour.

The polymer from which this intermediate layer is formed may or may not contain halogenated monomer to impart flameproof qualities thereto. It may be preferably a copolymer of ethylene or of an acrylic acid ester of an alcohol having 1 to 18 carbon atoms or of a methacrylic acid ester of an alcohol having from 5 to 18 carbon atoms. Such monomeric components provide a soft, highly flexibly foamed layer. One or more of these esters may be copolymerized with one or more hardening comonomers, such as a (C<sub>1</sub>—C<sub>4</sub>)alkyl methacrylate, e.g. methyl, ethyl, propyl, or butyl methacrylate, acrylonitrile, styrene, vinyl toluene vinyl acetate, vinyl chloride, or vinylidene chloride. Suitable copolymers are thus obtained provided the relative amounts between the soft and the hardening monomers are maintained so that the copolymers obtained are still adequately flexible for the purposes of the present invention. The copolymers may also

contain small amounts of reactive monomers, such as from 0.1 to 5% by weight of one or more of the following: acrylamide, methacrylamide, N-methylolacrylamide, N-methylol-methacrylamide, acrylic acid, methacrylic acid, and itaconic acid to act as internal crosslinking agents in the copolymer for setting it by heating in foamed condition. Preferably, these copolymers are made by emulsion polymerization processes and the aqueous dispersions obtained are mixed with fillers or pigments and foamed in known fashion to provide a foamed mass having closed, or preferably inter communicating, cells.

The composition used for making the foam layer may comprise a filler and/or pigment to ensure good opacity of the foam layer. Suitable fillers include clay and hydrated alumina, and titanium dioxide may be used as a pigment to obtain white colouration. Other pigments or dyes, such as Monastral Blue, iron oxides, carbon black, and lead chromate, may be used if black and colours other than white are desired. The total amount of filler and/or pigment, if used in the composition, may vary widely but is preferably from 25% to 75% by weight of total solids.

A suitable method of forming a foam from an aqueous dispersion of one of these polymers is to prepare the emulsion copolymer at a solids content of 40 to 55% by weight, add a predispersed filler and/or pigment if desired, a catalyst, and a foaming agent, which is preferably a type which stabilizes the foam while it is being set by heating it, and diluting the mixture, if necessary to suitable consistency. The dispersion is whipped or beaten to entrain air therein, and when the desired foamed condition is reached, the agitation is stopped while heating to set the foamed condition while drying the foamed mass. The heating to dry and set the foamed mass may be to various temperatures for various times, depending on the water content, the reactivity of the reactive groups in the polymer, and whether or not an external cross-linking or setting agent is used. Examples of the latter are water-soluble condensates of formaldehyde with urea, N,N'-ethyleneurea, or aminotriazines, such as melamine or benzoguanamine. When the copolymer contains N-methylol-acrylamide or -methacrylamide with or without an external cross-linking agent, an acidic catalyst may be used, such as ammonium chloride, oxalic acid, diammonium phosphate, or an amine salt of an acid, such as hydrochloric acid, wherein the amine may be triethylamine, triethanolamine, etc.

When the copolymer contains N-methylolacrylamide or N-methylol-

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methacrylamide, drying and setting may be accomplished by heating in the range of 100° to 200°C. for a period of about half a minute at the higher temperature to about half an hour or longer at the lower temperature. A temperature of 145 to 150°C. for a period of 3 to 5 minutes is generally quite practical.

The intermediate layer may be formed in situ on the cover fabric or ticking by spreading the freshly foamed polymer dispersion before it has been set by heating onto the fabric at suitable thickness and then subjecting the coated fabric to heat to dry it and set it. Near the end of the heating stage and before the cross-linking reaction has been completed, it is preferred that the foam/fabric laminate be passed through squeeze rolls to crush the foam without completely sealing the foamed polymer mass into an integral, fused body so that the product still has the character of permeability and porosity and is "breathable".

Instead of crushing the foam at this stage, the heating may be terminated after the foamed polymer is dry and the crushing may be effected by heating and pressing of the three-layer assemblage after decomposition and drying of the metal-containing polymer layer either in foamed or unfoamed condition. This may be done by a hot calendering operation which may or may not involve a polishing action, e.g. above 100°C., and this calendering may serve to reduce defects by causing flow of the binder in the metal-containing layer to favour an increase of the contact between metal particles therein and thereby increasing heat-conduction, electro-static conduction, and reflectivity of the layer.

The present invention is applicable to provide a wide variety of covering materials adapted to serve as pillow cases, slip covers for upholstered chairs, sofas, cushions, etc., ticking for pillows, pads, sleeping bags, mattresses, removable covers for mattresses, pillows, cushions, upholstered chairs, beds, sofas, bedspreads, coverlets, and so forth.

In the following examples, which are illustrative of the invention, parts and percentages are by weight and temperatures are °C., unless otherwise specified.

#### Example 1

a) A 60% solids filler dispersion is prepared by agitating a mixture of 42 parts of water, one part of a 25% aqueous solution of the sodium salt of a 1:1 mol ratio copolymer of maleic anhydride and diisobutylene, 15 parts of a 2% aqueous solution of hydroxyethyl cellulose of the grade QP-4400 (4400 cp. visc. of 2%

solution at 25°C) 7.5 parts of titanium dioxide, 22.5 parts clay, and 55 parts hydrated alumina. This dispersion is added to 100 parts of a 50% solids aqueous dispersion of an emulsion copolymer of about 65% ethyl acrylate, about 25.5% butyl acrylate, about 4.5% acrylonitrile, 3.5% acrylamide, and 1.5% itaconic acid while stirring and then 5.4 parts of a 33% aqueous solution of ammonium stearate, 1.8 parts of a 33% solution of sodium lauryl sulfate, and 1 part of 14% aqueous ammonium hydroxide.

b) The mixture obtained in part a) hereof is agitated to beat air into it and then is spread onto the back face of a printed 80×80 cotton ticking fabric of the type used in making mattresses to provide a 60-mil thick layer. The foam-covered ticking fabric is dried 2 minutes at 280°F., then passed through squeeze rolls of a padder to crush the foam layer, and finally cured for 5 minutes at 300°F. There is thus deposited about 4 oz./sq. yd. of the crushed foam on the ticking.

c) An aluminum powder (25 parts) containing metal particles of about 0.02 to 0.04 mm. size is mixed with 100 parts of a 46% solids aqueous dispersion of an 80/20 weight ratio mixture of (1) an emulsion copolymer of about 66 vinylidene chloride, 29% butyl acrylate, 0.5% itaconic acid, about 3% acrylamide, and about 2% methylolacrylamide, and (2) an emulsion copolymer of about 96% of butyl acrylate, 2% of methacrylamide and 2% of N-methylolacrylamide, 2 parts of methylene-bis-diamylphenoxypolyethoxyethanol containing 9 ethoxy groups, 8 parts of a 25% aqueous solution of diammonium hydrogen phosphate, 15 parts of a 50% aqueous solution of a copolymer of about 60% ethyl acrylate, 39.5% methyl methacrylate and about 0.5% of diallyl phthalate, and 42.5 parts of water. The mixture is thoroughly stirred, yielding a 40% solids coating composition.

d) The resulting 40% solids composition obtained in part c) is coated onto the exposed surface of the crushed foam of the foam/ticking laminate obtained in part b) to provide a 6-mil thick layer thereof. The coated assemblage is then dried four minutes at 280°C., yielding a deposit of about 2 oz./sq. yd.

e) A simulated mattress for testing purposes is made by placing a piece of cotton wadding (such as is used as mattress stuffing) 6 inches wide 15 inches long and 4 inches thick in the center of an 80<sup>2</sup> cotton ticking fabric 12" wide by 15" long so that the 15-inch dimensions of the wadding and the fabric extend in the same direction. Then a 12-inch by 15-inch piece of the cover fabric to be tested, such as the

laminar assemblage obtained in part d) above, is laid on top of the batting with its 12-inch and 15-inch dimensions coinciding with the corresponding dimensions of the bottom fabric layer and with its metal-coated face in contact with the wadding. The two fabrics are sewn together along the 15-inch edges of the wadding to compress the wadding along the edges. Also, the wadding is compressed along a central line parallel to the sewn edges by sewing the assemblage together along such central line. The resulting simulated pad or mattress may then, if desired, be stretched taut by fastening the extended edges of one or both cotton fabrics to opposite sides of a square frame having a square opening within the four edge members thereof. The resulting pad has a trough formed by the central sewn line between two parallel bulged ridges one on each side of the central line. For testing, a burning cigarette is placed on the pad, either on top of one of the ridges or preferably in the groove between them. The cigarette is allowed to burn itself out; if the wadding ignites, the ticking is a failure but if the wadding does not ignite before the cigarette burns out, the ticking passes the test.

f) The cover fabric obtained in part d) above, when tested in the fashion described in part e) hereof, passes the test.

#### Example 2

The procedure of Ex. 1 is repeated except that in part d) thereof, the metal-containing composition is modified by inclusion of a foam stabilizer or agent, specifically a mixture of about 4.3 parts of a 33% aqueous solution of ammonium stearate and 1.4 parts of a 33% aqueous solution of sodium lauryl sulfate. The mixture is beaten into a foam which is spread on the surface of the foam layer of the composite obtained in Ex. 1 part b) to provide a thickness of about 60 mils and after drying for 2 minutes at 280°F., the composite is passed through squeeze rolls of a textile pad to crush the foamed metal-containing layer after which curing is completed by heating four minutes at 280°F., yielding a composite material in which the metal-containing coating is present in an amount of about 3.5 oz./sq. yd. This fabric when made into a simulated mattress, passes the test described in Ex. 1e).

#### Example 3

Ex. 1 is repeated except that the emulsion polymer of part a) is replaced with a corresponding amount (solids) of the same emulsion copolymer used in part c).

#### Example 4

Ex. 3 is repeated except that the metal-

containing coating of part c) is modified by inclusion of the foam stabilizing agent of Ex. 2 and the procedure of Ex. 2 is used for depositing the metal-containing coating as a crushed foam.

The simulated mattress made using the composite material of this example passes the test.

#### Example 5

Ex. 4 is repeated except that the emulsion copolymer used in part a) is a copolymer of 96% ethyl acrylate, 3.5% acrylamide, and 0.5% acrylic acid. The cover fabric obtained also passes the test of Ex. 1e).

#### Example 6

The procedure of Ex. 1 is repeated except that the emulsion copolymer used in part a) is a copolymer of 86% ethyl acrylate, 10% acrylonitrile and about 2% each of acrylamide and N-methylolacrylamide. The cover fabric obtained passed the test of Ex. 1e).

#### Example 7

Ex. 6 is repeated except that the metal-containing coating of part c) is modified by inclusion of the foam stabilizing agent of Ex. 2 and the procedure of Ex. 2 is used for depositing the metal-containing coating as a crushed foam.

The simulated mattress made using the composite material of this example passes the test.

#### Example 8

Ex. 1 is repeated except in part c) thereof, the aqueous dispersion is an emulsion copolymer of about 80% vinyl chloride and 20% ethylene.

The simulated mattress made using the composite material of this example passes the test.

#### Example 9

Ex. 1 is repeated except in part c) thereof, the aqueous dispersion is an emulsion copolymer of about 60% vinyl chloride, 38% butyl acrylate, 1.5% acrylamide and 0.5% itaconic acid.

The simulated mattress made using the composite material of this example passes the test.

#### Example 10

Ex. 9 is repeated except that the metal-containing coating of part c) is modified by inclusion of the same amount of the foam-stabilizing agent of Ex. 2 and the procedure of Ex. 2 is used for depositing the metal-containing coating as a crushed foam. The simulated mattress passes the test.

#### Example 11

Ex. 1 is repeated except in part c) thereof

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the aqueous dispersion is a 90/10 weight ratio mixture of (1) an emulsion copolymer of about 69% vinyl chloride, 29% butyl acrylate, 1% methylolacrylamide, 1/2% acrylamide and 1/2% itaconic acid and (2) an emulsion copolymer of about 96% butyl acrylate, 2% methacrylamide and 2% methylolmethacrylamide.

#### Example 12

The process of Ex. 1 is carried out except that in part c) the aluminum powder is replaced with 23 parts of stainless steel powder, the particles of which range in size from 0.05 to 0.1 mm. The simulated mattress passes the test.

#### Example 13

The process of Ex. 1 is carried out except that in part c) the aluminum powder is replaced with 23 parts of silver powder, the particles of which range in size from 0.03 to 0.07 mm. The simulated mattress passed the test.

#### Example 14

The process of Ex. 1 is carried out except that in part c) the aluminum powder is replaced with 23 parts of nickel powder, the particles of which range in size from 0.03 to 0.06 mm. The simulated mattress passes the test.

#### Example 15

The process of Ex. 1 is carried out except that in part c) the aluminum powder is replaced with 23 parts of tin powder, the particles of which range in size from 0.02 to 0.04 mm. The simulated mattress passes the test.

#### Example 16

The process of Ex. 1 is carried out except that in part c) the aluminum powder is replaced with 23 parts of anodized aluminum powder, the particles of which range in size from 0.02 to 0.04 mm. The simulated mattress passes the test.

#### Example 17

The process of Ex. 1 is carried out except that in part c) the aluminum powder is replaced with 23 parts of bronze powder, the particles of which range in size from 0.03 to 0.7 mm. The simulated mattress passes the test.

#### WHAT WE CLAIM IS:—

1. A cover fabric of composite-layer type comprising a woven fabric, a soft, flexible layer adhered thereto formed of a crushed foam of a polymeric material and a metal layer, or metal-containing layer containing at least 20% by weight of the metal on the

crushed foam layer, the metal content of which serves to conduct heat rapidly through the crushed foam layer.

2. A cover fabric according to Claim 1 in which the woven fabric is provided with a decorative design on its visually exposed surface.

3. A cover fabric according to Claim 1 in which the metal-containing layer is also crushed foam.

4. A cover fabric according to Claim 1 in which the thickness of the crushed foam layer is from 5 to 20 mils and the weight thereof in the composite is 1 to 4 oz./sq. yd.

5. A cover fabric according to Claim 1 in which the thickness of the metal-containing layer is from 0.5 to 6 mils and the weight thereof in the composite fabric is from 0.5 to 4 oz. per sq. yd.

6. A cover fabric according to Claim 1 in which the metal in the metal or metal-containing layer is selected from the group consisting of aluminum, nickel, silver, bismuth, antimony, tin and zinc and the alloys; stainless steel, brass, bronze and Wood's metal.

7. A cover fabric according to claim 1 in which the metal in the metal-containing layer is specifically aluminum having a particle size in the range of 0.02 to 0.1 mm.

8. A cover fabric according to claim 1 in which the foam layer intermediate the fabric and the metal-containing layer contains a filler and/or pigment and the proportion of filler and/or pigment in the foam is from 25 to 75% by weight of the weight of dried foam.

9. A cover fabric according to claim 1 in which the metal in the metal-containing layer is specifically anodized aluminum having a particle size in the range of 0.02 to 0.1 mm.

10. A cover fabric according to claim 1 in which the metal in the metal-containing layer is specifically stainless steel having a particle size in the range of 0.02 to 0.1 mm.

11. A method of producing a composite flameproof cover fabric comprising preparing a foamed aqueous composition comprising a polymeric binder, depositing a layer of such foamed composition on one face of a woven fabric, drying the layer and crushing the foam on the foam/fabric composite before or after applying to the foam/fabric composite a metal or a metal-containing layer so that the foam layer is between the metal and fabric layers.

12. A method according to claim 11 wherein, after application of the metal or metal-containing layer, the composite is calendered to crush the foam and provide a



the aqueous dispersion is a 90/10 weight ratio mixture of (1) an emulsion copolymer of about 69% vinyl chloride, 29% butyl acrylate, 1% methylolacrylamide, 1/2% acrylamide and 1/2% itaconic acid and (2) an emulsion copolymer of about 96% butyl acrylate, 2% methacrylamide and 2% methylolmethacrylamide.

#### Example 12

The process of Ex. 1 is carried out except that in part c) the aluminum powder is replaced with 23 parts of stainless steel powder, the particles of which range in size from 0.05 to 0.1 mm. The simulated mattress passes the test.

#### Example 13

The process of Ex. 1 is carried out except that in part c) the aluminum powder is replaced with 23 parts of silver powder, the particles of which range in size from 0.03 to 0.07 mm. The simulated mattress passed the test.

#### Example 14

The process of Ex. 1 is carried out except that in part c) the aluminum powder is replaced with 23 parts of nickel powder, the particles of which range in size from 0.03 to 0.06 mm. The simulated mattress passes the test.

#### Example 15

The process of Ex. 1 is carried out except that in part c) the aluminum powder is replaced with 23 parts of tin powder, the particles of which range in size from 0.02 to 0.04 mm. The simulated mattress passes the test.

#### Example 16

The process of Ex. 1 is carried out except that in part c) the aluminum powder is replaced with 23 parts of anodized aluminum powder, the particles of which range in size from 0.02 to 0.04 mm. The simulated mattress passes the test.

#### Example 17

The process of Ex. 1 is carried out except that in part c) the aluminum powder is replaced with 23 parts of bronze powder, the particles of which range in size from 0.03 to 0.7 mm. The simulated mattress passes the test.

#### WHAT WE CLAIM IS:—

1. A cover fabric of composite-layer type comprising a woven fabric, a soft, flexible layer adhered thereto formed of a crushed foam of a polymeric material and a metal layer, or metal-containing layer containing at least 20% by weight of the metal on the

crushed foam layer, the metal content of which serves to conduct heat rapidly through the crushed foam layer.

2. A cover fabric according to Claim 1 in which the woven fabric is provided with a decorative design on its visually exposed surface.

3. A cover fabric according to Claim 1 in which the metal-containing layer is also crushed foam.

4. A cover fabric according to Claim 1 in which the thickness of the crushed foam layer is from 5 to 20 mils and the weight thereof in the composite is 1 to 4 oz./sq. yd.

5. A cover fabric according to Claim 1 in which the thickness of the metal-containing layer is from 0.5 to 6 mils and the weight thereof in the composite fabric is from 0.5 to 4 oz. per sq. yd.

6. A cover fabric according to Claim 1 in which the metal in the metal or metal-containing layer is selected from the group consisting of aluminum, nickel, silver, bismuth, antimony, tin and zinc and the alloys: stainless steel, brass, bronze and Wood's metal.

7. A cover fabric according to claim 1 in which the metal in the metal-containing layer is specifically aluminum having a particle size in the range of 0.02 to 0.1 mm.

8. A cover fabric according to claim 1 in which the foam layer intermediate the fabric and the metal-containing layer contains a filler and/or pigment and the proportion of filler and/or pigment in the foam is from 25 to 75% by weight of the weight of dried foam.

9. A cover fabric according to claim 1 in which the metal in the metal-containing layer is specifically anodized aluminum having a particle size in the range of 0.02 to 0.1 mm.

10. A cover fabric according to claim 1 in which the metal in the metal-containing layer is specifically stainless steel having a particle size in the range of 0.02 to 0.1 mm.

11. A method of producing a composite flameproof cover fabric comprising preparing a foamed aqueous composition comprising a polymeric binder, depositing a layer of such foamed composition on one face of a woven fabric, drying the layer and crushing the foam on the foam/fabric composite before or after applying to the foam/fabric composite a metal or a metal-containing layer so that the foam layer is between the metal and fabric layers.

12. A method according to claim 11 wherein, after application of the metal or metal-containing layer, the composite is calendered to crush the foam and provide a

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smooth surface, to improve heat  
conduction, electrical conduction, and heat  
reflectivity.

P. W. S. WOOD,  
Chartered Patent Agent,  
For the Applicants.

Printed for Her Majesty's Stationery Office, by the Courier Press, Leamington Spa, 1976.  
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from  
which copies may be obtained.