Sept. 11, 1962 G. J. ADOMSHICK ET AL 3,053,727

MOUNTING FOR ELECTRICAL RESISTANCE ELEMENTS
AND METHOD FOR PREPARING THE SAME
Filed Oct. 12, 1960

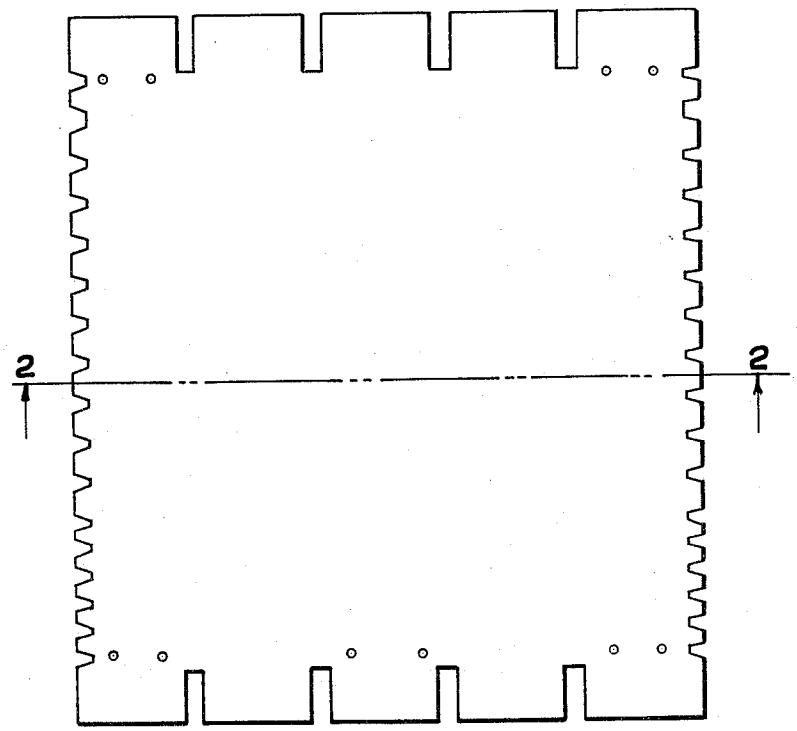

Fig. 1.

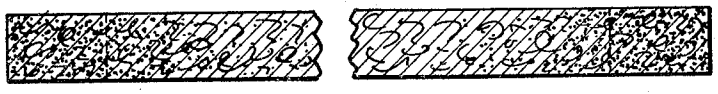

Fig. 2

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United States Patent Office

3,053,727
Patented Sept. 11, 1962

3,053,727

MOUNTING FOR ELECTRICAL RESISTANCE ELEMENTS AND METHOD FOR PREPARING THE SAME

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Filed Oct. 12, 1960, Ser. No. 62,140
15 Claims. (Cl. 162—136)

This invention relates to a substitute material or product for mica or ceramic components which is useful in and about electrical devices. More particularly the invention comprises a novel and improved product for the fabrication of mountings, supports or the like for electrical resistance heating elements, and the method of producing the same.

Most electrical devices or appliances embodying heating means such as toasters, irons, heaters, etc., have for some years typically utilized mica or ceramic materials for the construction or fabrication of mountings or supports for the resistance wires or elements which comprise a common electrical heating means. Although such conventional mica or ceramic mountings or supports exhibit excellent electrical insulating properties, their high cost of manufacture and their frangible nature results in a need for suitable compositions of greater strength and/or which are less expensive to produce and fabricate.

Asbestos millboard, and various compositions or products based upon or comprising asbestos millboard have heretofore been proposed and utilized in the manufacture of mountings or supports for electrical resistance elements, and some have been so employed with varying degrees of success. One type of improved asbestos millboard support for high resistance electrical conductors, for example, is illustrated by United States Letters Patent No. 2,541,273. The asbestos millboard mounting or support products now available for electrical appliances and the like, nevertheless, have not been extensively adapted or utilized by manufacturers of electrical devices or appliances because of their generally poor electrical properties and/or lack of strength, among other disadvantages.

It is a primary object of this invention, therefore, to provide a relatively inexpensive asbestos millboard product which comprises an effective and efficient replacement for mica or ceramic mountings or supports for electrical resistance heating elements or wires in appliances and the like electrical devices or mechanisms.

It is also a primary object of this invention to provide an improved and novel asbestos millboard composition or product for mounting or supporting electrical resistance heating elements or wires having the strength, resistance to deformation, rigidity and electrical properties or characteristics which render the same uniquely suitable for the intended application.

Another object of this invention is to provide an asbestos millboard product or composition which exhibits improved and adequate electrical insulating properties throughout all humidity conditions over extended periods of time and which is completely resistant to the temperature conditions encountered in electrical heating devices or mechanisms such as irons, toasters, heaters, etc.

An additional object of this invention is to provide mounting or support means for electrical resistance heating elements or wires and a method of producing the same, which will resist warping or deformation and will maintain their rigidity, coherency, dimensional stability, and configuration, and which are effectively reinforced or possess greater strength, hardness and resistance to high temperatures, abrasion or breakage, etc., in or about their marginal or peripheral edge portions which portions generally comprise the means for supporting, securing and retaining the wires comprising the heating elements and accordingly consist of a critical portion or area which is subjected to the greatest stress and severest temperature conditions.

A still further object of this invention is to provide a method or means for producing an inexpensive asbestos millboard product or composition which has greater strength and electrical insulating properties than have heretofore been available in such products for use as a mounting or support for electrical resistance heating elements.

Other objects and advantages of the instant invention will become apparent from the hereinafter detailed description and annexed drawing showing a millboard mounting or support for electrical resistance elements wherein:

FIG. 1 is a plane view illustrating a typical millboard mounting for toaster heating elements showing the serrated edge portions comprising a series of cut-outs forming projections or "nibs"; and

FIG. 2 is a cross-sectional view taken on line 2—2 of FIG. 1.

It has been found that the foregoing objects, particularly superior physical and electrical properties among others, for electrical resistance mountings or supports can be achieved through the cooperative or synergistic effect of a particular type of porous asbestos millboard composition and an indurating procedure which imparts or enhances both physical and electrical properties within the product. The porous asbestos millboard which has been determined to be effectively receptive to the indurating procedure or treatment briefly comprises a medium density board composed of asbestos fiber, a relatively high proportion of diatomaceous earth, and, as a binder, a dry, activated in situ, alkali metal silicate consisting of sodium and/or potassium silicate. The indurating procedure which has been found to effectively complement the asbestos millboard of this invention comprises the application of an aluminum acid phosphate impregnant coupled with a unique means of curing the same.

In accordance with the procedure of this invention, porous millboard comprising the foregoing components, upon substantially complete solubilization or activation of the dry alkali metal silicate binder may be cut, punched or otherwise reduced to its ultimate size and/or configuration for an electrical resistance mounting or support prior to the indurating treatment comprising the aqueous aluminum acid phosphate solution impregnation or in accordance with the more preferred procedure, the board is initially impregnated with the indurating aluminum acid phosphate solution and subsequently cut, punched or the like to obtain a mounting or support of the ultimate con-

figuration and/or size desired while still wet or containing the absorbed aluminum acid phosphate solution. Thus, the sequence or order of rendering the board to the ultimate size and configuration of the intended product and of applying the indurating impregnation is not critical provided that the cutting or shaping of the millboard mount or support to its ultimate physical form or configuration is completed before removal or loss of a substantial amount of the absorbed aqueous aluminum acid phosphate impregnating solution. Upon completion of the shaping and impregnating procedure, the two major surfaces, i.e., the front and back sides, of the board or mounting formed therefrom are blanketed or covered with a substantially water-impervious material such as a plastic sheet to bar or impede egress or escape of the water content of the impregnating solution from either of said major surfaces and to direct and confine migration of the aqueous solution to the marginal or peripheral edge portion(s) of the shaped mounting or support whereby the escape of the water content therefrom results in an accumulation or higher concentration of the solution solute in and about said marginal or peripheral edge portion(s) of the mounting and in turn further increases the beneficial effects of the impregnant in the critical portions of the object.

Asbestos millboard electrical resistance element or wire mountings or supports, such as contemplated by this invention, typically consist of sheets of more or less conventional types of inorganic millboard products which are cut or otherwise shaped to a general configuration suitably adaptable for installation in the particular electrical device or appliance contemplated. The peripheral edge portion(s), or segments thereof, of the shaped mount or support of the usual sheet construction is provided with some means of supporting and retaining or securing the electrical resistance heating elements or wires, or coils composed of the same, which generally consist simply of a multiplicity of marginal perforations or a series of edge cuts or notches forming a serrated or scalloped border area of alternating slots and projections or "nibs" through or in which the wire or like component may be threaded and securely retained. FIG. 1 of the drawing comprises a typical design or configuration of an asbestos millboard sheet mounting or support for an electric toaster resistance wire heating element illustrating a conventional serrated border or peripheral edge portion(s) configuration which provides effective retaining and spacing means for resistance wires or elements and conveniently ready access in stringing or winding the same.

The marginal or peripheral edge and corners or ends of a product of an object composed of a frangible material such as a sheet of asbestos millboard, naturally comprise an area(s) of maximum stress and in turn breakage, and such a precarious condition or susceptibility is obviously further aggravated or intensified by the cutting of perforations, slots or the like and removal of a portion of the material from this area, and subsequent installation of wires, etc., handling, and repeated exposure to the high temperatures of the wires comprising the heating elements.

In addition to providing an asbestos millboard composition or product of sufficient strength and electrical properties to replace and surpass previous conventional materials, this invention also embodies or provides for the reinforcement of the critical marginal edge or corner portions of the millboard article by concentrating the effects thereof or characteristics imparted thereby, such as structural strength, resistance to heat, breakage and deformation, and dielectric properties, within and about said portions or areas. The reinforcing effect of this invention is produced by a concentration or accumulation of the aluminum acid phosphate indurating solution solute in the portions or areas most suspectible to damage, breakage and deterioration or the like. This effect is achieved and regulated by blanketing portions of the millboard object such as the two major surfaces of the sheet while the millboard is wet or still retains the absorbed aqueous indurating solution whereby egress of the aqueous solution from such surfaces is curtailed and migration thereof directed to exposed surfaces such as its marginal or peripheral edge portions where free escape of the water content of the solution deposits the solution solute. FIG. 2 cross-sectional view of the object of FIG. 1 visually illustrates the concentration of the aluminum acid phosphate indurating solution solute or reaction product(s) thereof in and about the edge(s) portions of the millboard mount.

The asbestos millboard component of this invention should comprise approximately 40–60% by weight of asbestos fiber, approximately 35–45% by weight of diatomaceous earth, and approximately 7.5–12.5% by weight of dry sodium and/or potassium silicate, preferably consisting of about 50% by weight of asbestos fiber, about 40% by weight of diatomaceous earth, and about 10% by weight of dry sodium silicate, and may be prepared or formed from any typical source or grade of the specified components commonly utilized in the manufacture of millboard. It has been determined, however, that the use of a relatively short grade asbestos fiber in the board will further enhance both the strength and electrical properties of the final product. A suitable and preferred grade of asbestos fiber comprises one having approximately the following McNett analysis stated as the weight percent passing through a standard mesh screen:

	Percent
On 14 mesh	7.5
On 28 mesh	8.7
On 100 mesh	13.2
On 200 mesh	6.6
Through 200 mesh	64.0

Formation of the millboard can be effected on a wet machine or in any conventional manner, but activation or solubilization of the relatively insoluble dry alkali metal silicate binder requires substantial periods of exposure to elevated temperature and moisture conditions, such, for example, as temperature in the vicinity of approximately 200 to 400° F., preferably about 300° F., and high moisture conditions ranging from about 80 to 100% relative humidity for periods of approximately 4 to 8 hours.

The indurating impregnant, an aqueous solution of aluminum acid phosphate, is prepared by combining hydrated alumina ($Al_2O_3.H_2O$) with 85% phosphoric acid (H_3PO_4) in a mol ratio of, for example, about 1.4/3.0 of hydrated alumina to phosphoric acid. Upon completion of the reaction, the products thereof should be diluted to produce a readily handleable solution for the subsequent impregnation, typically about a 25% solution concentration. Induration of the millboard may be carried out by any convenient or suitable impregnating procedure, viz., dipping or submerging, spraying, brushing, coating, etc., but should be carried to the point wherein the millboard retains 15 to 50% by weight of the aluminum acid phosphate solute, preferably approximately 30% of solute by weight of the board. Without restricting this invention to any theory or mechanism, but merely for illustration, it is apparent and believed that the aluminum acid phosphate indurant, or a component or components thereof, reacts with the millboard or the asbestos constituent thereof to result in a hard, integrated product(s) of outstanding strength and electrical properties.

Although cutting or completing the shaping of the asbestos millboard into mounting or supporting elements of a particular ultimate shape or configuration may be effected either before or after the indurating impregnating treatment, provided shaping is completed prior to the drying or removal of a substantial amount of the ab-

sorbed solution, millboard wet with the impregnating solution cuts or punches cleaner than when dry and the sequence or order of procedure comprising wet cutting or forming is therefore preferred. Nevertheless, to obtain maximum strength in and about the critical areas of the greatest physical and electrical stress and shaping, cutting or forming of the mounting or support must be completed prior to the loss or removal of a substantial or preponderant amount of the aqueous solution of the aluminum acid phosphate whereby migration of the same can be directed to the critical peripheral edge portion to accumulate a higher concentration.

It is to be understood that the following examples of millboard mounting or support products for electrical resistance elements, and the method of producing the same, are given for the purpose of illustration and are simply exemplary and not to be construed as limiting the novel products and method of this invention.

EXAMPLE I

A porous, medium density (about 44 lbs./cu. ft.) millboard was produced on a wet machine from a water suspension of the following batch formulation:

Ingredient	Batch, Pounds	Percent by Wt.
Asbestos fiber (Grade 5K)	1,000	50
Diatomaceous earth	800	40
Dry silicate of soda	200	10
	2,000	100

The asbestos fiber, group 5K—Quebec standard grading test, was prepared by beating in a Hydrobeater for 35 minutes at 110 amp. loading prior to the addition of the diatomaceous earth and dry sodium silicate, and the wet machine was adjusted to produce a sheet with a wet thickness of 62–65 mil. To activate the dry sodium silicate binder component of the formed but "green" millboard, the sheets thereof were exposed to a temperature of about 300° F. at 90–100% relative humidity for 6 hours. The average physical properties of the resulting untreated millboard were as follows:

Table I

PHYSICAL PROPERTIES OF UNTREATED MILLBOARD

[Avg. of 12 samples—cross section of entire run]

Basis wt., lb./sq. ft	0.242.
Caliper, mils	65.0.
Density, lb./cu. ft	44.6.
MD tensile, lb./in	10.6=163 lb./sq. in.
CD tensile, lb./in	6.6=102 lb./sq. in.
MD stretch, percent	2.4.
CD stretch, percent	0.75.

An indurating impregnant for the millboard was prepared by combining 55.3 lbs. of 85% phosphoric acid (H_3PO_4), with 17.3 lbs. of hydrated alumina (Alcoa C–31) and upon allowing the reaction to go to substantial completion, adding sufficient water, in this case 134 lbs., to produce a 25% solids solution. The millboard, cut into strips 5 3/16" x 48" for convenience in handling and subsequent processing and saturated with a 25% solids aluminum acid phosphate solution by pouring this solution on a strip ahead of a small hand operated wringer and duplicating the procedure for the other side whereby a solution pick-up was obtained of approximately 17–18% solution solids based upon the weight of the millboard and the solids of the solution. The treated millboard strips were divided into two equal groups and half were first dried at 170–180° F. for approximately 20 hours and then toaster mounts were die punched from the dry millboard strips in the configuration illustrated in FIG. 1. From the other half of the impregnated millboard strips, toaster elements of an identical configuration were die punched while the millboard was still wet with and containing the absorbed aluminum acid phosphate solution. The wet punched mounts were stacked or superimposed upon each other 20-high, separated by plastic sheets, to prevent their adhering to each other and to blanket both major surfaces, and the last mount was covered and weighted to inhibit warping. The stacked wet punched mounts were then dried for approximately 24 hours at 170–180° F.

The average physical properties of the aluminum acid phosphate impregnated millboard while wet were as follows:

Table II

PHYSICAL PROPERTIES OF TREATED MILLBOARD

[Avg. of 10 samples (18% phosphate solids[1] pick-up—based on normal wt. of board). Weighed immediately after saturation]

Weight (lb./sq. ft.)	0.300.
Caliper (mils)	67.0.
Density (lb./cu. ft.)	53.6.
MD tensile (lb./in.)	72.0=1073 lb./sq. in.
CD tensile (lb./in.)	47.4= 706 lb./sq. in.
MR with grain	1595.
MR across grain	2165.
Brinell hardness	1247.

[1] Calculated from weight before and after saturation and dried phosphate pick-up=24.0%.

To evaluate the effect or merit of cutting the millboard prior to drying or removal of the indurating solution and inducing the edge migration phenomenon of the indurating solution, a test was devised to determine the comparative structural strength of the narrow (about 1/8") projections or "nibs." A small light tool was made which fitted snugly over the 1/8" wide projections or "nibs" with a weighing pan hung from the tool 1 7/8" from the nose of the tool and sand was gradually added to the pan until the nib fractured. This test demonstrated that the strength of the projections or "nibs" on the wet punched toaster mounts wherein the indurated solution was induced to migrate and hence concentrate in the peripheral edge portion comprising the projections or "nibs" are approximately 70% stronger than the dry punched samples. The results of this test are as follows:

Table III

Nib Tests (As Described in Discussion ABOVE)

[Tested 5 mounts of each set—20 tests with felt side of millboard up and 20 with smooth side up]

	Weight Added to Fracture 1/8" Nibs	
	Range, grams	Average, grams
Dry Punched	12.5–43.5	23.5
Wet Punched	28.0–51.5	39.0

The electrical properties of both the above prepared wet and dry punched toaster mounts and a commercial millboard toaster mount taken from a standard product on the market are as follows:

Table IV

ELECTRICAL PROPERTIES OF TREATED TOASTER MOUNTS

	Wet Punched		Dry Punched		Commercial Product, Avg.
	Avg.	Range	Avg.	Range	
Insulation Resistance (Megohms) 1" Spacing 500 volts D.-C.:					
(a) Std.—75° F./50% RH/72 hr.	21.7	15.5–36.5	28.6	19.1–45.5	1.3
(b) Humidity—75° F./91% RH/16 hr.	2.2	1.4–2.8	2.2	1.4–3.7	0.13
Leakage Current at above Humidity Conditions—Milliamps.	0.23	----------	0.23	----------	3.8
Dielectric Stress, 1,000 volts A.-C., 1 min. at humidity (Milliamps)	<1	----------	<1	----------	63

EXAMPLE II

Medium weight, porous asbestos millboard of the same composition as Example I and having the following physical properties:

Table V

AVERAGE PROPERTIES OF UNTREATED MILLBOARD

Weight (lb./sq. ft.)	0.24
Thickness (in.)	0.070
Density (lb./cu. ft.)	41
MD tensile (p.s.i.)	457
CD tensile (p.s.i.)	276

was saturated by submersion in an aluminum phosphate indurating impregnant comprising phosphoric acid and hydrated alumina (Alcoa C–31) in a mol ratio of 3:1.4, prepared by combining 52 lbs. of hydrated alumina with 166 lbs. of phosphoric acid (85%) and upon completion of the reaction diluted with sufficient water to produce a 25% solution. The average pick-up was 21% by weight. The saturated boards were dried at approximately 200° F. and portions thereof were cut for testing.

The physical and electrical properties of the samples are given and compared with those of a commercial millboard toaster mount in Tables VI and VII:

Table VI

PHYSICAL PROPERTIES OF TREATED TOASTER MOUNTS

	Example II	Commercial Product
Density (lb./cu. ft.)	49	74
Modulus of Rupture—Cross grain (p.s.i.)	2,000–3,110	[1] 2,835
Modulus of Rupture—With grain (p.s.i.)	1,650–2,140	[1] 1,930

[1] Average of three tests.

Table VII

ELECTRICAL PROPERTIES OF TREATED TOASTER MOUNTS

	Example II	Commercial Product
Insulation Resistance:		
Standard Conditions—50% RH (megohms)	88	1.3
Humidity—16 hr.—91%RH (megohms)	5.3	.13
Current at 1,000 v.—Humidity (milliamps)	<1	63

The materials of the foregoing examples decidedly surpass Underwriters' requirement for "Electrical Heat Appliances" at 91% relative humidity when tested according to the prescribed procedure of A.S.T.M. test D709 at 75° F. at 91% R.H. This standard specifies a minimum insulating resistance of 0.5 megohm at 75° F. at 91 R.H.

It is to be understood that the above disclosure is for the purpose of illustration only and not restriction and that variations within the scope of this invention are to be included within the spirit of the appended claims.

What we claim is:

1. The method of manufacturing mountings for electrical resistance elements which comprises treating millboard consisting essentially of approximately 40 to 60% by weight of asbestos fiber, approximately 35 to 45% by weight of diatomaceous earth and approximately 7.5 to 12.5% by weight of alkali metal silicate selected from the group consisting of sodium silicate and potassium silicate and mixtures thereof, by accumulating a higher concentration of indurating impregnant in the peripheral edge portion of the cut millboard mounting impregnated with an aqueous solution of aluminum acid phosphate indurant and containing at least about 15% by weight of aluminum acid phosphate solute, comprising the step of blanketing the millboard mounting while wet on its two major surfaces to impede egress of the absorbed aqueous impregnating solution from these surfaces and to direct migration of the aqueous impregnating solution to the peripheral edge portion and permit escape of the water content therefrom.

2. The method of manufacturing mountings for electrical resistance elements which comprises treating millboard consisting essentially of approximately 40 to 60% by weight of asbestos fiber, approximately 35 to 45% by weight of diatomaceous earth and approximately 7.5 to 12.5% by weight of alkali metal silicate selected from the group consisting of sodium silicate and potassium silicate and mixtures thereof by impregnating the same with an indurating aqueous solution of aluminum acid phosphate until the millboard retains at least about 15% by weight of solute, accumulating a higher concentration of the indurating impregnant in the peripheral edge portion of the millboard mounting to reinforce the same by cutting the millboard to its ultimate configuration while wet with the absorbed aqueous impregnating solution, then blanketing the wet millboard mounting on its two major surfaces to impede egress of the absorbed aqueous impregnating solution from these surfaces and to direct migration of the aqueous impregnating solution to the peripheral edge portion of the mounting and permit escape of the water content therefrom.

3. The method of manufacturing mountings for electrical resistance elements which comprises treating millboard consisting essentially of approximately 40 to 60% by weight of asbestos fiber, approximately 35 to 45% by weight of diatomaceous earth and approximately 7.5 to 12.5% by weight of alkali metal silicate selected from the group consisting of sodium silicate and potassium silicate and mixtures thereof, by cutting the millboard to its ultimate configuration and impregnating the same with an indurating aqueous solution of aluminum acid phosphate until the millboard retains at least about 15% by weight of solute, accumulating a higher concentration of the indurating impregnant in the peripheral edge portion of the millboard mounting to reinforce the same by blanketing the wet millboard mounting on its two major surfaces to impede egress of the absorbed aqueous impregnating solution from the surfaces and to direct migration of the aqueous impregnating solution to the peripheral edge portion of the mounting and permit escape of the water content therefrom.

4. The method of manufacturing mountings for electrical resistance elements which comprises treating millboard consisting essentially of approximately 40 to 60% by weight of asbestos fiber, approximately 35 to 45% by weight of diatomaceous earth and approximately 7.5 to 12.5% by weight of alkali metal silicate selected from the group consisting of sodium silicate and potassium silicate and mixtures thereof, by impregnating the same with an indurating aqueous solution of aluminum acid phosphate until the millboard retains about 15 to 40% by weight of solute, accumulating a higher concentration of the indurating impregnant in the peripheral edge portion of the millboard mounting to reinforce the same by completing the cutting of the millboard to its ultimate configuration while wet with the absorbed aqueous impregnating solution, then blanketing the wet millboard mounting on its two major surfaces to impede egress of the absorbed aqueous impregnating solution from these surfaces and to direct migration of the aqueous impregnating solution to the peripheral edge portions of the mounting and permit escape of the water content therefrom.

5. The method of manufacturing mountings for electrical resistance elements which comprises treating millboard consisting essentially of approximately 50% by weight of asbestos fiber, approximately 40% by weight of diatomaceous earth and approximately 10% by weight of alkali metal silicate selected from the group consisting of sodium silicate and potassium silicate and mixtures thereof, by impregnating the same with an indurating aqueous solution of aluminum acid phosphate until the millboard retains at least about 20 to 30% by weight of the solute, accumulating a higher concentration of the

indurating impregnant in the peripheral edge portion of the millboard mounting to reinforce the same by cutting the millboard to its ultimate configuration while wet with the absorbed aqueous impregnating solution, then blanketing the wet millboard mounting on its two major surfaces to impede egress of the absorbed aqueous impregnating solution from these surfaces and to direct migration of the aqueous impregnating solution to the peripheral edge portion of the mounting and permit escape of the water content therefrom.

6. The method of manufacturing mountings for electrical resistance elements which comprises forming a millboard from a furnish consisting essentially of approximately 40 to 60% by weight of asbestos fiber, approximately 35 to 45% by weight of diatomaceous earth and approximately 7.5 to 12.5% by weight of dry alkali metal silicate selected from the group consisting of sodium silicate and potassium silicate and mixtures thereof, activating the dry alkali metal silicate binder by exposing the formed millboard to high temperature and moisture conditions to solubilize the same, indurating the millboard by impregnating the same with an aqueous solution of aluminum acid phosphate until it retains at least about 15% by weight of solute and accumulating a higher concentration of the indurating impregnant in the peripheral edge portion of the millboard mounting to reinforce the same by cutting the millboard to its ultimate configuration either before or upon completion of the impregnating treatment but prior to drying of the absorbed aqueous impregnating solution from the millboard, then blanketing the wet millboard mounting on its two major surfaces to impede egress of the absorbed aqueous solution from these surfaces and to direct migration of the aqueous impregnating solution to the peripheral edge portion of the mounting and permit escape of the water content therefrom.

7. The method of manufacturing mountings for electrical resistance elements which comprises forming a millboard from a furnish consisting essentially of approximately 40 to 60% by weight of asbestos fiber, approximately 35 to 45% by weight of diatomaceous earth and approximately 7.5 to 12.5% by weight of dry alkali metal silicate selected from the group consisting of sodium silicate and potassium silicate and mixtures thereof, activating the dry alkali metal silicate binder by exposing the formed millboard to high temperature and moisture conditions to solubilize the same, indurating the millboard by impregnating the same with an aqueous solution of aluminum acid phosphate until it retains at least about 15% by weight of the solute and accumulating a higher concentration of the indurating impregnant in the peripheral edge portion of the millboard mounting to reinforce the same by cutting the millboard to its ultimate configuration prior to drying of the absorbed aqueous impregnating solution, then blanketing the wet millboard mounting on its two major surfaces to impede egress of the absorbed aqueous impregnating solution from these surfaces and to direct migration of the aqueous impregnating solution to the peripheral edge portion of the mounting and permit escape of the water content therefrom.

8. The method of manufacturing mountings for electrical resistance elements which comprises forming a millboard from a furnish consisting essentially of approximately 40 to 60% by weight of asbestos fiber, approximately 35 to 45% by weight of diatomaceous earth and approximately 7.5 to 12.5% by weight of dry alkali metal silicate selected from the group consisting of sodium silicate and potassium silicate and mixtures thereof, activating the dry alkali metal silicate binder by exposing the formed billboard to high temperature and moisture conditions to solubilize the same, cutting the millboard to its ultimate configuration and indurating the same by impregnating it with an aqueous solution of aluminum acid phosphate until the millboard retains at least about 15% by weight of solute and accumulating a higher concentration of indurating impregnant in the peripheral edge portion of the millboard mounting to reinforce the same by blanketing the wet millboard mounting on its two major surfaces to impede egress of the absorbed aqueous solution from these surfaces and to direct migration of the aqueous impregnating solution to the peripheral edge portion of the mounting and permit escape of the water content therefrom.

9. The method of manufacturing mountings for electrical resistance elements which comprises forming a millboard from a furnish consisting essentially of approximately 40 to 60% by weight of asbestos fiber, approximately 35 to 45% by weight of diatomaceous earth, and approximately 7.5 to 12.5% by weight of dry alkali metal silicate selected from the group consisting of sodium silicate and potassium silicate and mixtures thereof, activating the dry alkali metal silicate binder by exposing the formed millboard to temperatures of at least about 200° F. and relative humidities of at least about 80% for a period in excess of about 4 hours to solubilize the same, indurating the millboard by impregnating the same with an aqueous solution of aluminum acid phosphate until it retains about 15 to 40% by weight of solute and accumulating a higher concentration of indurating impregnant in the peripheral edge portion of the millboard mounting to reinforce the same by completing the cutting of the millboard to its ultimate configuration while wet with the absorbed aqueous impregnating solution, then blanketing the wet millboard mounting on its two major surfaces to impede egress of the absorbed aqueous impregnating solution from these surfaces and to direct migration of the aqueous impregnating solution to the peripheral edge portion of the mounting and permit escape of the water content therefrom.

10. The method of manufacturing mountings for electrical resistance elements which comprises forming a millboard from a furnish consisting essentially of approximately 50% by weight of asbestos fiber, approximately 40% by weight of diatomaceous earth and approximately 10% by weight of dry sodium silicate, activating the dry sodium silicate binder by exposing the formed millboard to temperatures of about 200–400° F. and relative humidities of about 80–100% for a period of about 4–8 hours to solubilize the same, indurating the millboard by impregnating the same with an aqueous solution of aluminum acid phosphate until it retains about 20 to 30% by weight of the solute and accumulating a higher concentration of indurating impregnant in the peripheral edge portion of the millboard mounting to reinforce the same by completing the cutting of the millboard to its ultimate configuration while wet with the absorbed aqueous impregnating solution from the millboard, then blanketing the wet millboard mounting on its two major surfaces to impede egress of the absorbed aqueous impregnating solution from these surfaces and to direct migration of the aqueous impregnating solution to the peripheral edge portion of the mounting and permit escape of the water content therefrom.

11. A mounting for electrical resistance elements which consists essentially of a millboard composed of approximately 40 to 60% by weight of asbestos fiber, approximately 35 to 45% by weight of diatomaceous earth and approximately 7.5 to 12.5% by weight of solubilized in situ alkali metal silicate selected from the group consisting of sodium silicate and potassium silicate and mixtures thereof, containing at least about 15% by weight of aluminum acid phosphate and the reaction products of the millboard and aluminum acid phosphate, said aluminum acid phosphate and the reaction products of the same with the millboard being present in a higher concentration in the peripheral edge portion of the millboard mounting than in the intermediate portion thereof.

12. A mounting for electrical resistance elements which consists essentially of a millboard composed of

approximately 40 to 60% by weight of asbestos fiber, approximately 35 to 45% by weight of diatomaceous earth and approximately 7.5 to 12.5% by weight of solubilized in situ alkali metal silicate selected from the group consisting of sodium silicate and potassium silicate and mixtures thereof, containing about 15 to 40% by weight of aluminum acid phosphate and the reaction product of the millboard and the aluminum acid phosphate, said aluminum acid phosphate and the reaction products of the same with the millboard being present in a higher concentration in the peripheral edge portion of the millboard mounting than in the intermediate portion thereof.

13. A mounting for electrical resistance elements which consists essentially of a millboard prepared from a furnish consisting essentially of approximately 40 to 60% by weight of asbestos fiber, approximately 35 to 45% by weight of diatomaceous earth and approximately 7.5 to 12.5% by weight of solubilized in situ alkali metal silicate selected from the group consisting of sodium silicate and potassium silicate and mixtures thereof, containing about 15 to 40% by weight of aluminum acid phosphate and the reaction products of the millboard and the aluminum acid phosphate, said aluminum acid phosphate and the reaction products of the same with the millboard being present in a higher concentration in the peripheral edge portion of the millboard mounting than in the intermediate portion thereof.

14. A mounting for electrical resistance elements which consists essentially of a millboard prepared from a furnish consisting essentially of approximately 50% by weight of asbestos fiber, approximately 40% by weight of diatomaceous earth and approximately 10% by weight of solubilized in situ alkali metal silicate selected from the group consisting of sodium silicate and potassium silicate and mixtures thereof, containing about 20 to 30% by weight of aluminum acid phosphate and the reaction products of the millboard and aluminum acid phosphate, said aluminum acid phosphate and the reaction products of the same with the millboard being present in a higher concentration in the peripheral edge portion of the millboard mounting than in the intermediate portion thereof.

15. A mounting for electrical resistance elements which consists essentially of a millboard prepared from a furnish consisting essentially of approximately 50% by weight of asbestos fiber, approximately 40% by weight of diatomaceous earth and approximately 10% by weight of solubilized in situ sodium silicate, containing about 20 to 30% by weight of aluminum acid phosphate and the reaction products of the millboard and aluminum acid phosphate, said aluminum acid phosphate and the reaction products of the same with the millboard being present in a higher concentration in the peripheral edge portion of the millboard mounting than in the intermediate portion thereof.

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