July 13, 1965 J. A. SERGOVIC 3,194,724

COATED BLOCKS

Filed June 29, 1961

Fig. 1.

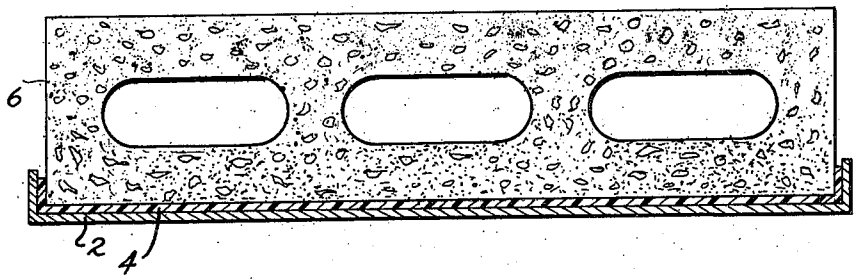
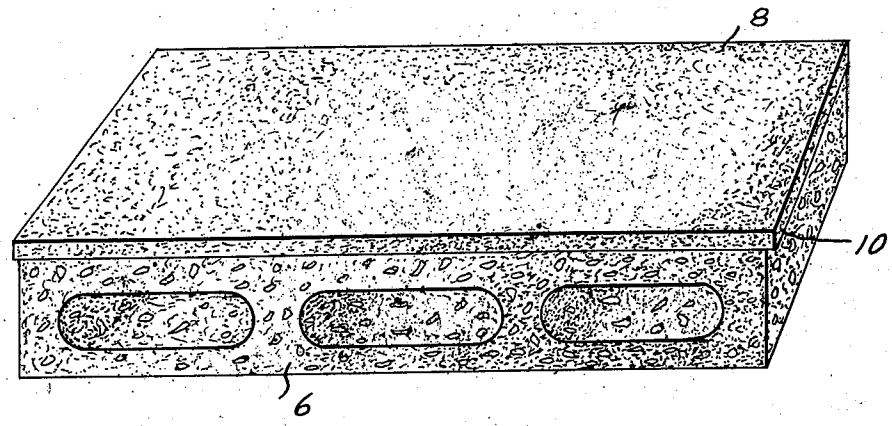


Fig. 2.



INVENTOR

JOHN A. SERGOVIC

BY Cushman, Darby & Cushman

ATTORNEYS

United States Patent Office 3,194,724 Patented July 13, 1965

3,194,724

COATED BLOCKS

John A. Sergovic, Linthicum Heights, Md., assignor to The Burns & Russell Company of Baltimore City, Baltimore, Md., a corporation of Maryland

Filed June 29, 1961, Ser. No. 120,712
13 Claims. (Cl. 161—158)

This invention relates to coated construction materials, particularly masonry units.

Numerous compositions have been proposed in the past for coating masonry units with synthetic resins. The one which has gained widespread commercial acceptance is that disclosed in Sergovic Patent 2,751,775. The use of polyesters as described therein has the disadvantage that it is not possible to obtain a glossy face on the masonry unit. Another disadvantage is that for optimum conditions 22% of polyester must be used in the sand-polyester coating composition.

The polyester resins also shrink to some extent during curing and hence cannot be used with lightweight construction materials such as foamed glass and plastics.

Accordingly, it is an object of the present invention to provide a glossy decorative surface to masonry units.

Another object is to obtain coated masonry units having good properties while utilizing more sand than has been possible heretofore.

A further object is to apply a coating of a non-shrinkable material to porous construction units.

A still further object is to reduce staining of such coated construction units.

An additional object is to reduce the cost of coated masonry units.

Yet another object is to provide a coated masonry unit in which the coating has excellent dimensional stability even at sub-zero temperatures.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter. It should be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

It has now been found that these objects can be obtained by coating a masonry or other porous construction unit with a mixture of 5 to 50%, preferably 10 to 20%, of a polymer of a 1,3 diolefin having 4 to 6 carbon atoms, such polymer containing at least 30% of its unsaturation in the form of side (or "dangling") vinyl groups, and 95 to 50% of a rock-like granular filler, preferably sand, and then curing the mixture on the construction unit.

The invention will be better understood with reference to the accompanying drawings wherein:

FIGURE 1 is a vertical section of a mold showing a masonry block in section during the coating operation; and,

FIGURE 2 is a perspective view of a coated block produced in accordance with the invention.

Referring more specifically to the drawings numeral 2 indicates a shallow mold containing a quantity of coating composition 4 comprising a mixture of 84.6% sand and 15.4% of a thermosetting copolymer of 80% butadiene-1,3 and 20% styrene made by sodium polymerization. The block 6 to be coated, e.g., a slag block, is introduced into the mold and the copolymer cured, e.g., at 430° F. (221° C.) for 25 minutes.

As shown in FIGURE 2, the coating composition has formed a smooth surface rectangular face 8 with a lip or edge portion 10 that extends over and around the side edges of the slag block 6.

The construction unit is preferably a porous masonry block of any conventional type such as those made from slag, cinders, cement, concrete, clay, Haydite or the like. Other porous construction units which can be employed include foamed glass and foamed plastics, e.g., foamed phenol-formaldehyde, foamed urea-formaldehyde, foamed melamine-formaldehyde and foamed polyurethane, e.g., from toluene diisocyanate and a polyol such as glycerine-propylene oxide adduct having a molecular weight of 3000.

The filler is preferaby sand but other granular mineral filler can be employed such as gravel, flint, granular calcium carbon, e.g., marble. Small amounts of pigments can be added to give any desired color to the final product. The granular filler can have a mesh size from 20 to 325 mesh, preferably 20 to 140 mesh. The filler should not be powdered.

The diolefin employed in preparing the polymer is preferably butadiene-1,3 although there can be used isoprene, 2,3-dimethyl butadiene-1,3, piperylene or 2-methyl pentadiene-1,3. While diolefin homopolymers can be employed preferably there are used copolymers of the diolefin with up to equal parts by weight of styrene, paramethyl styrene, meta methyl styrene, dimethyl styrene or ethyl styrene.

Generally 60 to 90 parts of butadiene-1,3 are copoymerized with 40 to 10 parts of styrene. The most preferred product is an oily copolymer of 75 to 85 parts of butadiene-1,3 with 25 to 15 parts of styrene. The polymerization is carried out in accordance with procedures known in the art to produce polymerized 1,3-butadiene containing at least 30% of its unsaturation in the form of side vinyl groups. The preferred catalyst is sodium but other alkali metals such as potassium, lithium, rubidium and cesium or sodium-potassium alloys can be used as well as organic compounds of the alkali metals, e.g., phenyl isopropyl potassium, triphenyl methyl sodium, lithium butyl, amyl sodium and the like.

The preferred butadiene-styrene copolymers as previously indicated are viscous oils. The side vinyl groups present are reactive sites and can be cross-liked with vinyl monomers to form thermoset resins. The preferred monomers are aromatic hydrocarbons such as p-vinyl toluene, o-vinyl toluene, m-vinyl toluene, styrene, ethyl styrene although other monoethylenically unsaturated compounds can be employed such as acrylonitrile, α-methacrylonitrile, α-chloracrylonitrile, alkyl acrylates and methacrylates, e.g., methyl acrylate, butyl acrylate and methyl methacrylate, butyl methacrylate, vinyl acetate, vinyl methyl ketone, cinnamaldehyde, etc. The ethylenically unsaturated monomer can be added in an amount to constitute up to 80%, e.g., 10 to 65% of the total of the polymerizable materials. (The term polymerizable materials includes the butadiene-1,3 styrene copolymer since it is still polymerizable.) Thus, employing a mixture of Buton A–500 (sodium polymerized copolymer of about 80% butadiene-1,3 and 20% styrene) and vinyl toluene the following results are noted:

Buton A–500 (Parts by wt.)	Vinyl Toluene (Parts by wt.)	Viscosity, poises at 77° F.
100	0	4,600.0
80	20	42.0
70	30	9.3
60	40	3.0
50	50	1.0

It has also been found desirable to add a small amount, e.g., 1–10% based on the total polymerizable materials, of a polyethylenically unsaturated material such as ethyl-

ene dimethacrylate, propylene dimethacrylate, N'N'-methylene bisacrylamide, poly unsaturated esters, e.g., diallyl phthalate, diallyl oxalate, diallyl maleate, diallyl itaconate, diallyl fumarate, divinyl phthalate, ethers, e.g., diallyl ether, divinyl ether, divinyl thioether, ketones, e.g., diallyl ketone, triallyl cyanurate, triallyl melamine, allyl methacrylate, poly unsaturated hydrocarbons, e.g., para-divinyl benzene, o-divinyl benzene, m-divinyl benzene, divinyl toluene, divinyl xylene, diallyl benzene and diisopropenyl benzene; divinyl chlorobenzene, triallyl phosphate, triallyl phosphite, etc.

In the present specification and claims all parts and percentages are by weight unless otherwise indicated.

In the following examples the butadiene-styrene copolymer employed was a viscous oil which had been prepared by the sodium polymerization of about 80 parts butadiene-1,3 with 20 parts of styrene. Approximately 50% of the unsaturation was in the form of side vinyl groups. The copolymer is available under the trademark Buton and can be made, for example, as described in Gleason Patent 2,762,851.

It has been found advantageous to employ a curing agent in order to cure the polymerizable material present in the coating composition. Any of the conventional free radical engendering substances can be used, such as azo compounds, e.g., azo bis isobutyronitrile, persulfates, e.g., sodium persulfate, potassium persulfate, perborates, peroxides, e.g., benzoyl peroxide, methyl ethyl ketone peroxide, cumene hydroperoxide, dicumyl peroxide, di tert. butyl peroxide, tert. butyl perbenzoate as well as other conventional curing catalysts.

It has been found desirable to enhance the bond of the sand to the cured resin by employing a bonding agent having at least two reactive groups, one of which selectively reacts with the sand particles and the other of which selectively reacts with the polymerizable diolefin polymer. This insures that the sand particles are bonded to the resin so tightly that resin at the surface cannot shrink away but retains a smooth uninterrupted surface.

One preferred type of bonding agent having the two types of reactive group is the silanes and siloxanes having at least one ethylenically unsaturated group and at least one substituent which will react with sand or hydroxyl groups present on the surface of sand . The preferred ethylenically unsaturated substituted silanes and siloxanes are those having the formula:

$$R_xSiX_{(4-x)}$$

in which at least one R is an ethylenically unsaturated group preferably an ethylenically unsaturated hydrocarbon group such as vinyl, allyl, methallyl, butadienyl, isopropenyl or an ethylenically unsaturated chlorohydrocarbon group such as chlorvinyl and chlorallyl. The remaining R groups can be as defined above or can be other hydrocarbon and halohydrocarbon groups including alkyl such as methyl, ethyl and octadecyl or aryl, e.g., phenyl, tolyl, xylenyl or haloaryl, e.g., chlorophenyl. X is a group which reacts with sand or moisture normally present in the surface of sand such as oxyaryl, e.g., phenoxy, tolyloxy and xylenyloxy, or oxyalkyl, e.g., methoxy, ethoxy and butoxy, or amino or preferably is a halogen, e.g., chlorine or bromine, x is a whole number from 1 to 3. Examples of suitable compounds are allyl triethoxy silane, diallyl diethoxy silane, triallyl ethoxy silane, methallyl trichloro silane, trichloroallyl chloro silane, allyl phenyl dichloro silane, allyl ethyl dichloro silane, allyl methyl diethoxy silane, diallyl methyl ethoxy silane, allyl trichloro silane, dimethallyl diethoxy silane, vinyl trichloro silane, divinyl dichloro silane, trivinyl monochloro silane, vinyl triethoxy silane, methyl vinyl dichloro silane and the like.

The foregoing ethylenically unsaturated silane compounds are employed to treat the sand prior to its incorporation with the viscous oily butadiene-styrene resin or other diolefin polymer, since addition of the silane directly to the resin does not provide to a sufficient degree the improvements made possible by the present invention. The silanes, however, can also be used in addition as modifiers for the butadiene in the manner previously indicated for other ethylenically unsaturated monomers.

The silane compound is used to treat the sand in amounts of from 0.1 to 2% by weight of the sand and preferably between 0.25 and 1%. Amounts in excess of 2% are uneconomical but are not otherwise disadvantageous. The silanes can be used to treat the sand by simply contacting the dry sand with the silane, either in the vapor phase or as a liquid or in the form of a solution in a non-reactive solvent, such as, for example, a hydrocarbon liquid, such as benzene and toluene, or any other diluent which does not react with the reactive groups of the silane, the solvent is then removed prior to the curing step.

It appears that the reactive group or groups of these unsaturated silanes react with the hydroxyl groups chemically absorbed or combined on the surface of the sand grains as a result of a hydrolysis reaction whereby the silicon atom of the silane is bonded through an oxygen atom to the sand grain, leaving the unreacted, ethylenically unsaturated groups such as the vinyl and allyl groups, which are highly compatible with the viscous oily butadiene or other diolefin polymer. The bonding causes the cured resin to be closely linked to the sand grains and insures against any possible shrinkage of the resin at the surface of the finished article.

Another type of bonding agent is the product sold by Union Carbide Company as "A-172" which is a vinyl triethoxy silane. This product can be applied to the sand directly in the same concentration as in the foregoing type, or it may be applied in an aqueous solution.

A third type of bonding agent is the Werner-type methacrylate-chromic chloride complex available commercially as "Volon A" in which the complex is marketed in an isopropanol solvent. These complexes can also be employed in the form of an aqueous solution and after the treatment of the sand, the aqueous treating solution is removed and the sand suitably dried, such as by air drying or by tumbling in a drum drier, until the sand is dry to the touch. The complex can also be employed in an aqueous solution at a concentration between about 0.1 and 5% strength to provide a pick-up of complex on the sand of between about 0.1 and 2% by weight of the sand.

A fourth type of bonding agent suitable for use in the present invention is the allyl silicates such as allyl silicate, beta-methallyl silicate, beta phenylallyl silicate, beta-chloroallyl silicate, and the like. These silicates are also employed in an amount of from about 0.1 to 2% by weight of the sand.

Where the bonding agent is of the silane or siloxane type, it is desirable that the sand contain sufficient moisture to comprise about 0.3% by weight of the sand. Preferably an amount of moisture of at least about one-sixth up to about 3 times the weight of the silane or siloxane employed is desirable, with a preferred amount being about one-third the weight of the silane or siloxane. Adjustment to the proper moisture content can be achieved by adding additional water to the sand and mixing the sand, or by drying the sand with heat where it contains excessive moisture. Sands are normally dried in the course of their commercial preparation so that it is usually necessary to replace some of the moisture driven off during drying. This may be accomplished by adding sufficient liquid water to replace any excessive amounts of water driven off during drying, or the moisture content can be increased by permitting the dried sand to stand exposed to the atmosphere from which the sand can sufficiently absorb moisture.

After the sand has reacted with the silane or siloxane it is desirable next to heat the silane-treated sand. Heating serves to drive the reaction of the sand with the silane or siloxane to completion and thereby finishes the hydrolysis

reaction. By heating the treated sand to from 160° F. to about 300° F., preferably 190° F. to 220° F., the reaction is driven to completion. When the bonding agent is a halogenated silane, copious amounts of hydrogen chloride and chlorine will be observed being driven off from the sand. It has been discovered that unless the hydrogen chloride and any chlorine from the reaction are driven off, the final surface of the coated masonry unit, or other construction unit may tend to develop fine hairline cracks and fissures on the subsequent curing and are, therefore, subject to staining. Consequently, the heating of the sand treated with halogenated silane is important if the full benefits of the invention are to be attained.

Antifoaming agents are also preferably incorporated into the resin-sand composition to minimize formation of air bubbles. A suitable material of this type is Dow-Corning Antifoam A, a dimethyl polysiloxane. An amount of about 0.2 to 0.5% of the resin generally gives satisfactory results.

While the sand is preferably finely divided silica it can also be small but easily distinguishable grains resulting from the disintegration of rocks. The grains are usually between one-sixteenth and two mm. in diameter. In the specific example, the sand employed was silica sand.

It is preferable to employ sand having at least 2 general particle size classifications, one of which is of relatively large size, in the order of 30–70 mesh, and the other of relatively small size, in the order of 100–325 mesh. It is desirable to employ a major proportion, and preferably 60% or more of the large size particles. One particularly successful gradation employs 65% of said of 40–70 mesh and 35% of 70–140 or 70–200 mesh. A gradation of 80% of the former mesh size and 20% of the latter is equally satisfactory.

It is also desirable to incorporate a small percentage of a cation modified clay. Such materials are disclosed in Hauser Patent 2,531,427. Bentonite and other clays normally possessing cation exchanging properties can be employed. The clay is treated with an onium base to form the onium base derivatives of the clay. Such onium base derivatives include the ammonium, phosphonium, oxonium, sulfonium, arsonium, stibonium and telluronium derivatives. The quaternary ammonium base clays are preferred. They can be incorporated in an amount of 0.1 to 2% weight of the polymerizable material. A preferred onium base is Bentone 34 which is dimethyl dioctadecyl ammonium bentonite. Another suitable onium base is Bentone 38 which is a similar quaternary ammonium derivative of magnesium bentonite. The onium base usually is employed in a particle size of 0.05 to 1.0 micron diameter.

Conventional materials can also be added to the coating composition to insure production of a surface that is non-combustible. Typical examples of such additives are antimony trioxide, chlorinated paraffin, tricresyl phosphate, etc. Where fireproofing is not required such additives can be omitted.

Conventional pigments can also be added, e.g., titanium dioxide, carbon black, colored ceramic roofing granules, etc.

Example 1

There was provided a mixture of 60% of the butadiene-styrene copolymer viscous oil described above (80:20 butadiene:styrene), 4% ethylene dimethacrylate and 36% para vinyl toluene as a thinner and reactive monomer. This mixture is hereinafter designated formulation A.

To 250 pounds of formulation A there was added 25 lbs. of antimony trioxide, 47 lbs. of titanium dioxide, 46 lbs. of chlorinated paraffin (70% chlorine), 91 lbs. of 325 mesh asbestine and 10 lbs. of para vinyl toluene. There was then added a further 491 lbs. of formulation A and 60 lbs. of para vinyltoluene. The final mixture was designated formulation B.

A slurry was prepared by mixing 25 lbs. of formulation B, 16 lbs. of para vinyltoluene, 5 oz. of Bentone 34, 13 oz. of dicumyl peroxide, 1 oz. of Anti Foam A (a dimethylpolysiloxane antifoaming agent), 145 lbs. of 40 mesh sand (Flintshot Jr.) and 48 lbs. of 80–120 mesh sand (Bonding). The slurry was placed in a mold and a slag block placed on top of the slurry. The block and mold were then placed in a hot air, infrared gas oven at 430° F. for 27 minutes to obtain a good cure.

The product had excellent dimensional stability even at sub-zero temperatures. It also exhibited substantially no shrinkage in the forming operation or subsequently. The coated block also had a very high gloss.

Example 2

Example 1 was repeated but the sand employed was first adjusted to a moisture content of 0.1% by the addition of sufficient water and mixing it with the sand. To this moistened sand mixture was added 0.25% of vinyl trichlorosilane and the mixture tumbled in a mixing drum at 190° F. for one-half hour. The thus pretreated sand was then employed as described in Example 1 to obtain a product having improved resistance to staining while retaining all of the other advantages of that product.

Example 2a

The procedure of Example 2 was repeated but the sand was treated with 1% of a mixture of vinyl silicone chlorides having one to three vinyl groups attached directly to silicon and the remaining valences of the silicon attached to chlorine atoms. The coated block obtained was similar in properties to that in Example 2.

Example 2b

The procedure of Example 2 was repeated but the sand was mixed with a 5% aqueous solution of A–172. The sand suspension was mixed for about one-half hour, after which the liquid was drained from the sand and the surface mixture removed from the sand by air drying. At the end of the treatment, the sand had picked up 0.5% by weight of silane monomer.

Example 2c

The procedure of Example 2b was repeated but in place of silane A–172 there was employed the Werner-type methacrylato-chromic chloride complex, Volan A. The treated sand picked up 1% by weight of the complex.

Example 3

To 25 lbs. of formulation B there was added 16 lbs. of para vinyltoluene, 5 ozs. of Bentone 34, 1 oz. of Anti Foam A, 13 ozs. of dicumyl peroxide, 13 ozs. of di tert. butyl peroxide, 150 lbs. of Flintshot Jr. sand and 42 lbs. of the Bonding sand. The sand had previously been treated with vinyl trichloro silane in the manner set forth in Example 1. The final mixture was placed in a mold, a concrete block placed on top and the mixture cured at 430° F. for 26 minutes in an oven to obtain a product in which the coating had properties similar to those of the product of Example 2.

Example 4

A mixture was made from 710 grams of the viscous oily butadiene-styrene copolymer, 510 grams of para vinyltoluene, 13 grams of para divinyl benzene, 22 grams of di tert. butyl peroxide, 22 grams of di cumyl peroxide, 22 grams of tert. butyl perbenzoate, 10 grams of Bentone 34, 3600 grams of the Flintshot Jr. sand and 1200 grams of the Bonding sand. This mixture was placed in a mold and a brick placed on top. The composition was cured in the oven for 30 minutes at 375° F. to give a coated brick in which the coating exhibited no shrinkage, had a good gloss and in general was an excellent decorative facing for the brick.

Example 5

Example 4 was repeated but instead of coating a brick a foamed glass block was coated. The finished lightweight product had all the good qualities previously noted.

A polyester based coating was unsuitable for this use since the foamed glass was pulled apart due to the shrinkage of the polyester during curing.

Example 6

A slag block was coated with a mixture of 1200 grams of the viscous oily butadiene-styrene copolymer, 22 grams of the di tert. butyl peroxide, 22 grams of dicumyl peroxide, 22 grams of tert. butyl perbenzoate, 10 grams of Bentone 34, 3600 grams of the Flintshot Jr. and 1200 grams of the Bonding sand. The coated brick after allowing the polymer to penetrate the surface thereof was cured in an oven at 430° F. for 30 minutes.

Example 7

Example 6 was repeated but in place of the 1200 grams of butadiene-styrene copolymer there was added 710 grams of the butadiene-styrene copolymer and 525 grams of divinyl benzene to obtain a coated block which had good properties.

I claim:

1. A porous masonry unit having an integral molded facing layer of a composition comprising 50 to 95% of a granular sand filler and 50 to 5% of a cured polymer, said cured polymer being made from a curable composition containing (1) a copolymer of 75 to 85% of butadiene-1,3 containing at least 30% of its unsaturation in the form of side vinyl groups with 25 to 15% of styrene and (2) up to 80% of the total polymerizable material present of a vinyl substituted benzene hydrocarbon, said percentages of filler and cured polymer being based on the total of said filler and said cured polymer and in which said sand and said cured polymer are bonded to one another by a bonding agent selected from the group consisting of an ethylenically unsaturated silane, a Werner-type methacrylato chromic chloride complex, allyl silicate, beta-methalyl silicate, beta-phenylallyl silicate, and beta-chloroallyl silicate.

2. A product according to claim 1 wherein said bonding agent is an ethylenically unsaturated silane.

3. A product according to claim 2 wherein said silane is vinyl trichlorosilane.

4. A product according to claim 1 wherein said bonding agent is a Werner-type methacrylato chromic chloride complex.

5. A product according to claim 1 wherein the bonding agent is vinyl trichlorosilane and the copolymerizable compound is vinyl toluene.

6. A porous masonry unit having an integral molded facing layer of a composition comprising 50 to 95% of a granular sand filler and 50 to 5% of a cured polymer containing a polymer of a 1,3-diolefin having 4 to 6 carbon atoms and selected from the group consisting of butadiene-1,3-isoprene-2,3-dimethyl butadiene-1,3-piperylene and 2-methyl pentadiene-1,3, said polymer prior to curing being in the form of a viscous oil and containing at least 30% of its unsaturation in the form of side vinyl groups, said cured polymer being selected from the group consisting of homopolymers of said diolefin and copolymers of said diolefin with up to 50% of a member of the group consisting of styrene and ring lower alkyl substituted styrenes, said percentages being based on the total of said filler and said cured polymer and in which said sand and said cured polymer are bonded to one another by a bonding agent selected from the group consisting to an ethylenically unsaturated silane, a Werner-type methacrylato chromic chloride complex, allyl silicate, beta-methallyl silicate, beta-phenylallyl silicate, and beta-chloroallyl silicate.

7. A porous construction unit having an integral molded facing layer of a composition comprising 50 to 95% of a granular sand filler and 50 to 5% of a cured polymer containing a polymer of a 1,3-diolefin having 4 to 6 carbon atoms and selected from the group consisting of butadiene - 1,3 - isoprene-2,3-dimethyl butadiene-1,3-piperylene and 2-methyl pentadiene-1,3, said polymer containing at least 30% of its unsaturation in the form of side vinyl groups, said cured polymer being selected from the group consisting of homopolymers of said diolefin and copolymers of said diolefin with up to 50% of a member of the group consisting of styrene and ring lower alkyl substituted styrenes, said percentages being based on the total of said filler and said cured polymer and in which said sand and said cured polymer are bonded to one another by a bonding agent selected from the group consisting of an ethylenically unsaturated silane, a Werner-type methacrylato chromic chloride complex, allyl silicate, beta-methyallyl silicate, beta-phenylallyl silicate, and beta-chloroallyl silicate.

8. A product according to claim 7 wherein the construction unit is a foamed glass unit.

9. A product according to claim 7 wherein the construction unit is a foamed plastic unit.

10. A product according to claim 7 wherein the construction unit is a masonry block.

11. A product according to claim 10 wherein the polymer is a copolymer of 75 to 85% butadiene with 25 to 15% styrene.

12. A product according to claim 7 wherein said bonding agent is an ethylenically unsaturated silane.

13. A product according to claim 7 wherein said bonding agent is a Werner-type methacrylato chromic chloride complex.

References Cited by the Examiner

UNITED STATES PATENTS

2,544,666	3/51	Goebel et al.	
2,662,064	12/53	Mead	117—161
2,720,470	10/55	Erickson et al.	117—72 X
2,751,775	6/56	Sergovic	50—268
2,861,968	11/58	Wolf et al.	117—161
2,951,782	9/60	Eilerman	117—72 X
2,957,786	10/60	Baumhart et al.	117—161
3,062,242	11/62	Vanderbilt	138—141

OTHER REFERENCES

Thompson, "Gum Plastics," copyright 1958, Reinhold Publishing Corp., pp. 62, 64, 67, 136 relied on.

ALEXANDER WYMAN, *Primary Examiner.*

EARL M. BERGERT, MORRIS SUSSMAN, RICHARD D. NEVIUS, *Examiners.*