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WATERPROOF AND WATER-REPELLANT INSULATION

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5 Claims. (Cl. 92—21)

This invention relates to improvements in insulating material and the object thereof is to produce a highly cellular insulating block which is uniformly nonabsorptive throughout its structure and which will substantially inhibit absorption of moisture by capillary attraction.

A further object of the invention is to provide insulating material of the character described comprising interlaced fibres of mineral wool individually thinly coated and bonded together by a water-repellent substance to form a highly cellular structure.

Another object of the invention is to provide an insulating sheet of material of the character described comprising a substantially homogeneous cellular construction capable of being cut into blocks or slabs and which will prevent absorption or capillary attraction from any exposed surface whether such surface is originally produced or produced by cutting or splitting.

More specifically, the invention comprises the production of an insulating material comprising a highly cellular sheet or block of felted mineral wool fibres individually thinly coated and bonded together by asphalt.

A further object of the invention is to provide a process for producing insulation of the character above described.

The process of producing such waterproof insulation comprises broadly mixing masses of mineral wool fibres with a relatively large quantity of an emulsion of a water-repellent substance suitable as a size and binder for the mineral wool fibres, agitating the mixture to individualize and to disperse the fibres uniformly throughout the liquid and to maintain the fibres in suspension therein, causing or permitting the binder to precipitate from the emulsion upon the individualized fibres in such a manner as to thinly coat the same, assembling the coated fibres and subjecting the assembled fibres to heat of a temperature sufficient to render said coating plastic and coherent thereby binding contiguous fibres together, permitting the fibres thus assembled and joined to cool thereby binding the fibres together in such a manner as to produce a readily handled insulation which if made in sheet or block form will be self-supporting and readily handled and capable of being bent during assembling.

The term "mineral wool" is used herein as inclusive of rock wool, slag wool or other types of mineral wool.

The binder may be of any suitable character but preferably is asphalt. In order to coat the fibres thinly and uniformly asphalt emulsions are employed. Various commercial emulsions of this asphalt may be employed such as a soap emulsion which is used most advantageously in soft water and from which the asphalt may be precipitated by the addition of a water-hardening agent.

Other types of asphalt emulsions which are capable of use with hard water will, if agitated for substantially a predetermined time interval, automatically precipitate the asphalt therefrom upon the individualized mineral wool fibres to form a thin coating thereupon.

Other emulsions of asphalt and equivalent binding materials from which the binding agent is capable of being precipitated by the addition of an acid or other chemical may be employed within the spirit and scope of the invention.

The preferred process of producing the insulating material above described comprises mixing mineral wool fibres with a soft water and a soap asphalt emulsion in approximately the proportions of 650 pounds of wool to 12,000 pounds of water (1500 gallons) and 30 pounds of soap type emulsion of asphalt (containing about 65% of asphalt) agitating the mixture to individualize and to disperse the fibres uniformly throughout the liquid and to maintain the fibres in suspension therein, then adding to the mixture a sufficient amount of a precipitating agent to liberate the asphalt from the emulsion, such for example as 4 or 5 pounds of alum, thereby causing the precipitated asphalt to coat thinly the individualized fibres of the rock wool.

The mixture may then be caused to flow into a suitable receptacle or mold for assembling the fibres into a substantially homogeneous cellular mass or the fibres may be continuously felted from the mixture to produce a continuous sheet. Such a sheet may be suitably surfaced to lay the fibres upon the faces of the sheet in such a manner as to produce a smooth and slightly-condensed surface. Such a sheet may be cut into blocks or slabs in any suitable manner but preferably by hydraulic jets.

The felted sheets, blocks or slabs thus formed of individually-coated fibres are then subjected to heat at a temperature sufficient to render the coating of the fibres plastic and coherent so that the contiguous fibres will be secured together by coherence of the binding material as well as by the interlacing of the fibres. The sheets, blocks or slabs may then be permitted to cool and when cooled are of sufficient rigidity to be self-supporting and of sufficient elasticity to bend to such form as may be required in the use of such insulation.

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Suitable apparatus which will perform the process above described is disclosed in my prior application for Felted Mineral Wool Insulation and Process and Apparatus for Producing the Same filed concurrently herewith.

Other types of emulsion such as clay emulsion may be used in substantially the proportions above specified. In such case, however, the addition of a precipitating agent ordinarily is not required as when the mixture is subjected continuously to agitation for a substantially predetermined period the asphalt will be automatically precipitated upon the fibres in the manner above described. The mixture may thereafter be treated in the manner above set forth to produce masses of insulation or sheets or blocks of insulation as may be desired.

What is claimed as new and desired to be secured by Letters Patent, is:

1. The process of producing waterproof insulation which comprises mixing masses of mineral wool fibre with a relatively large quantity of a liquid emulsion of a water-repellent substance suitable for a size and binder for the mineral wool fibres, agitating a batch of said mixture to individualize and to disperse the fibres uniformly throughout the liquid and to maintain the fibres in suspension therein, precipitating the binder from the emulsion upon the individualized fibres to thinly coat the same, assembling the coated fibres and subjecting the assembled fibres to heat of a temperature sufficient to render said coating plastic and coherent and allowing the same to cool.

2. The process of producing waterproof insulation which comprises mixing masses of mineral wool and fibres with a relatively large quantity of a liquid emulsion of asphalt, agitating a batch of said mixture to individualize and to disperse the fibres uniformly throughout the liquid and to maintain the fibres in suspension therein, precipitating, during the agitation of the mixture, the asphalt from the emulsion upon the individualized fibres to thinly coat the same, assembling the coated fibres and subjecting the assembled fibres to heat of a temperature sufficient to render said coating plastic and coherent and allowing the same to cool.

3. The process of producing waterproof insulation which comprises mixing masses of mineral wool fibres with a relatively large quantity of liquid soap emulsion of asphalt in soft water, agitating a batch of said mixture to individualize and to disperse the fibres uniformly throughout the liquid and to maintain the fibres in suspension therein, introducing into the mixture during agitation a water-hardening agent operable to precipitate the asphalt from the emulsion upon individualized fibres to thinly coat the same, assembling the coated fibres to produce a substantially homogeneous cellular mass, and subjecting the mass to heat of a temperature sufficient to render said coating plastic and coherent and allowing the same to cool.

4. The process of producing waterproof insulation which comprises mixing masses of mineral wool fibres with a relatively large quantity of liquid soap emulsion of asphalt in soft water, agitating a batch of said mixture to individualize and to disperse the fibres uniformly throughout the liquid and to maintain the fibres in suspension therein, introducing into the mixture during agitation a water-hardening agent operable to precipitate the asphalt from the emulsion upon individualized fibres to thinly coat the same, assembling the coated fibres into a substantially homogeneous cellular sheet, cutting the same into blocks or slabs and subjecting said blocks or slabs to a temperature sufficient to render said coating plastic and coherent and allowing the same to cool.

5. The process of producing waterproof insulation which comprises mixing masses of mineral wool fibres with a relatively large quantity of a liquid emulsion of asphalt in hard water, said emulsion being operable during agitation after a predetermined time to precipitate the asphalt therefrom, agitating a batch of said mixture to individualize and to disperse the fibres uniformly throughout the liquid and to maintain the fibres in suspension therein, continuing said agitation a sufficient time to cause the precipitation of the asphalt upon the individual fibres to thinly coat the same and assembling the coated fibres in substantially uniform highly cellular sheets and subjecting the sheets or blocks cut therefrom to a heat sufficient to render said coating plastic and coherent and allowing the same to cool.

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