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INSULATING MATERIALS AND PROCESS OF MANUFACTURE OF SAME

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My invention relates to insulating materials and process of manufacture of same, and more especially to insulating materials adapted to be used on surfaces having temperatures ranging from 500 to 600° F. and upward. I have found that by combining carbonate of magnesia, asbestos or similar fibre and silicate of soda as hereinafter described that I can form a highly efficient insulating material capable of withstanding temperatures upward from 500 to 600° F., without danger of the material breaking down or decomposing, when subjected to those temperatures, so as to make it unsatisfactory for insulating material as has heretofore occurred when what is commonly known as 85% magnesia covering has been used. My improved insulating material has a low rate of heat transmission, has high insulating value, is mechanically strong, is light in weight, and when manufactured has a non-powdering refractory surface and can be manufactured at a comparatively low cost.

In the preferred process of manufacture of my insulating material I first mould a block composed of a major proportion of carbonate of magnesia, preferably about 85% and a minor proportion of asbestos. This block is dried. After drying it is heat treated to shrink same and is then milled to form and size. For some purposes when the material is to be used on surfaces where it will be subjected to a comparatively high temperature i. e., 750 to 800 degrees F., I have found it desirable to subject it to heat treatment at a temperature approximately the temperature to which it is to be subjected in use. When this block has been formed to desired size and form I preferably treat it to a solution of sodium silicate by dipping it in a bath so as to impregnate it with the sodium silicate. The preferred impregnating solution to obtain the result desired is a solution consisting of six (6) parts of water to one (1) part 40° B. sodium silicate. Such a solution enables me to by treating the carbonate magnesia asbestos block for a period of about one and one half minutes to impregnate a block of about 1 to 2 inches thick with the requisite amount of sodium silicate so as to form an insulating material of desired strength and other qualities set forth above. A solution containing appreciably more sodium silicate and less water or more water and less sodium silicate would not give the proper impregnation. By this I do not mean that the solution could not be varied slightly as to the relative quantities but no great latitude can be allowed beyond the limits of the formula stated. Insulating material differs in thickness due to the purpose for which it is to be used and I have found that to get a satisfactory impregnation it is preferable to treat the material if 1 inch thick to the impregnation treatment for about 1 minute, if 1½ inches or 2 inches thick I treat it for a minute and a half and greater thicknesses in like proportions. After the sodium silicate treatment the blocks are air dried at normal room temperature and then they are subjected to further drying in a heated room. I have found that this method of drying after impregnation enables me to make the material without danger of warping as generally occurs where it is immediately submitted to the action of heat before the excess moisture has dried out. In the process of manufacture of my insulation material the order of treatment after moulding and drying the block may be varied by either heat treating, milling and then impregnating, or by heat treating, impregnating and then milling, or by any variation in the order of the three steps of heat treating, milling and impregnating, without departing from my invention. Wherever in the specification or claims I have used the expression "block" I would have it understood as meaning a piece of insulating material, whether in the form of a cylindrical pipe covering, a fitting for a valve, what is known as lagging or whatever other form of moulded insulating material.

Claims—

1. In the manufacture of insulating material, the process which comprises forming a block composed of a major proportion of magnesia and a minor proportion of a suitable fibrous binder, and subjecting said block to the action of an aqueous solution of sodi-

um silicate, the fluidity and strength of the solution and the duration of the treatment being such that the block is completely impregnated with said solution and thereafter hardened substantially throughout.

2. In the manufacture of insulating material, the process which comprises forming a block composed of a major proportion of magnesia and a minor proportion of a suitable fibrous binder, and subjecting the block to the action of an aqueous solution of sodium silicate containing six (6) parts of water and one (1) part of sodium silicate, the duration of the treatment being such that said block is completely impregnated with said solution and thereafter hardened substantially throughout.

3. In the manufacture of insulating material, the process which comprises forming a block composed of a major proportion of magnesia and a minor proportion of a suitable fibrous binder, soaking the block with an aqueous solution of sodium silicate for at least one minute in the case of a block one inch thick and prolonging the soaking in the case of blocks of greater thickness for at least one-half minute for each inch of thickness or fraction thereof in excess of one inch, the fluidity and strength of said solution being such that said block is completely impregnated with said solution and thereafter hardened substantially throughout.

4. In the manufacture of insulating material, the process which comprises forming a block composed of a major proportion of magnesia and a minor proportion of a suitable fibrous binder, drying said block, milling said block, soaking said block with an aqueous solution of sodium silicate, air drying said block, and then heat treating the same, the fluidity and strength of said solution and the duration of the soaking being such that said block is completely impregnated, and the temperature of said heat treatment being at least as great as that to which said block will be subjected in actual use.

5. In the manufacture of insulating material, the process which comprises forming a block composed of approximately eighty-five per cent (85%) of magnesia and approximately fifteen per cent (15%) of asbestos, drying said block, milling said block, soaking said block with an aqueous solution of sodium silicate containing six (6) parts of water and one (1) part of sodium silicate, such soaking being continued for at least one minute in the case of a block one inch thick and being prolonged, in the case of blocks of greater thickness, for at least one-half minute for each inch of thickness or fraction thereof in excess of one inch, then air drying said block and heat treating the same at a temperature between 500° and 800° F., the fluidity and strength of said solution and the duration of the treatment with said solution being such that the block is completely impregnated and hardened substantially throughout and the temperature of heat treatment being at least as great as that to which the block will be subjected in actual use.

In testimony whereof, I have signed my name to this specification.

WALTER L. STEFFENS.