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831,321 Examiner.

Mineral fibers mica Sulphur

UNITED STATES PATENT OFFICE.

JOHANN BILLWILLER, OF GOLDACH, SWITZERLAND.

INSULATING MATERIAL AND PROCESS OF MANUFACTURING SAME.

No. 831,321. Specification of Letters Patent. Patented Sept. 18, 1906.

Application filed April 19, 1904. Serial No. 203,933.

To all whom it may concern:

Be it known that I, JOHANN BILLWILLER, chemist, a citizen of Switzerland, residing at Goldach, Switzerland, have invented certain new and useful Improvements in Insulating Material and Process of Manufacturing Same, of which the following is a specification.

My invention relates to a new and improved insulating material in the form of hard blocks or plates and to a process for manufacturing same. The new insulating material comprises finely-distributed vegetable fibers in a raw or cured condition in mixture with other substances of good insulating quality—such as mica, magnesia, sulfur, and other materials, the particles of said mixture being cemented together by magnesia in unclinkered condition, said magnesia forming the sole hydrating cement present in the insulating-blocks. This may exist in the form of oxid and hydroxid of magnesium without using precious cements, such as resins, or hygroscopic cements, such as chlorid of magnesium. I make an aqueous paste of the mixed substances and then press it in molds, taking care that the pressure is continued till the mass is hardened. If pressure is only employed for a moment or a short time sufficient to bring the paste into shape, the hardness of the produced blocks is not sufficient for actual use of the blocks without adding cements of high cementing quality, such as chlorid of magnesium. However, the known cements of this kind are hygroscopic, so that the insulating quality of the blocks containing such cements is highly reduced in moist atmosphere.

If I wish to further raise the insulating quality of the material obtained from compounds of insulating substances cemented together by means of magnesia, using a continued pressure, I impregnate the blocks with suitable liquids adapted to deposit insulating material in the pores of the insulating-blocks. Suitable liquids for the purpose are vegetable, and, still better, mineral oils. If I employ oils as impregnating liquid, I may add substances, such as soaps of aluminium, which reduce the combustibility of the oils. However, care must be taken that the tenacity of the liquid is not too much raised by the solution of such substances in the oil, because the oil in a thick condition does not penetrate into the pores. So I in most cases can only add up to five to ten per cent. of soap of aluminium to the oil. Although this addition has only a small influence on the combustibility of the oil, it has proved valuable still in so far that it reduces the water-absorbing quality, which is already considerably diminished by the impregnation with oils, and that it raises the insulating property of the blocks. Instead of liquids intended to be deposited themselves within the pores of the insulating-blocks produced in the described manner I can use solutions of insulating substances, such as sulfur, which deposit the dissolved insulating substances when the solvent is evaporated. It is advisable to use solutions of high liquid property, such as solutions of sulfur in sulfuret of carbon, in order to facilitate the penetrating of the solution into the pores of the insulating-blocks.

If I impregnate the blocks with solutions of insulating substances adapted to deposit insulating material in the pores of the insulating-blocks, I may use in the compounds forming the paste from which the blocks are molded an admixture of such insulating substances, which are adapted to be dissolved in the impregnating liquid. When doing so, a finer distribution of such insulating material within the blocks is effected by the impregnation. So I may add to the said compound from which the insulating-blocks are molded sulfur if I use a solution of sulfur as impregnating liquid.

If it is desired to obtain insulating-blocks having a prescribed color, I may add coloring substances to the paste from which the blocks are molded, or I may dissolve suitable dyestuffs in the liquid which I use for the impregnation of the blocks after pressing.

In a preferred form of performing my new process I proceed as follows: I make a dry mixture of five parts, in weight, of sawdust, five parts of pulverized mica, and thirteen parts of oxid of magnesium. After thoroughly mixing these components the compound is moistened with water to a pasty mass and molded to blocks or plates with a pressure of about four hundred kilograms per square centimeter. This pressure is exerted on the mass till it is hardened—that is to say, for some twelve to sixteen hours. After pressing, the plates and blocks are dried and then impregnated with mineral oil containing five to ten per cent. of soap of aluminium dissolved in it. However, the impregnating process may be dispensed with if it is not re-

quired to obtain a material having a higher insulating power than five thousand to ten thousand volts for plates of about ten millimeters of thickness. The insulating power of the material thoroughly impregnated with oil having soap of aluminium dissolved in it is about fifty thousand to sixty thousand volts for plates of ten millimeters of thickness.

By the term "block" as used in the specification and claims I of course include a mass of insulating material of any desired shape and size.

What I claim is—

1. An insulating-block of pulverulent material cemented together by a hydrating magnesia cement, and impregnated with oil.

2. An insulating-block of pulverulent material cemented together by a hydrating magnesia cement, and impregnated with a mineral oil.

3. An insulating-block of pulverulent material cemented together by a hydrating magnesia cement, and impregnated with oil and soap of aluminium.

4. A solid block of insulating material containing finely-divided vegetable fiber, mica and magnesia, said magnesia forming the sole hydrating cement present in the mass.

5. The process of making insulating-blocks, which comprises forming a moistened mixture of magnesia and other pulverulent insulating material, molding the mass into blocks, and subjecting the blocks to pressure during hardening.

6. The process of making insulating-blocks, which comprises forming a moistened mixture of magnesia and vegetable fiber, molding the mass into blocks, and subjecting the blocks to pressure during hardening.

7. The process of making insulating-blocks, which comprises forming a moistened mixture of magnesia, vegetable fiber and pulverized mica, molding the mass into blocks, and subjecting the blocks to pressure during hardening.

8. The process of making solid insulating-blocks, which comprises forming a moistened mixture of finely-divided vegetable fiber and oxid of magnesium, and continuously pressing the blocks until they are hardened.

9. The process of making solid insulating-blocks, which comprises forming a moistened mixture of finely-divided vegetable fiber, mica and oxid of magnesium, and continuously pressing the blocks until they are hardened.

10. The process of making solid insulating-blocks, which comprises forming a moistened mixture of finely-divided vegetable fiber and oxid of magnesium, continuously pressing the blocks until they are hardened, and thereafter impregnating the blocks with liquids adapted to deposit insulating substances in the pores of said blocks.

11. The process of making solid insulating-blocks, which comprises forming a moistened mixture of finely-divided vegetable fiber, mica and oxid of magnesium, continuously pressing the blocks until they are hardened, and thereafter impregnating the blocks with liquids adapted to deposit insulating substances in the pores of said blocks.

12. The process of making solid insulating-blocks, which comprises forming a moistened mixture of finely-divided vegetable fiber and oxid of magnesium, continuously pressing the blocks until they are hardened, drying the blocks, and impregnating them with liquids adapted to deposit insulating substances in the pores of said blocks.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHANN BILLWILLER.

Witnesses:

JOSEPH SIMON,

HERNANDO DE SOTO.

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