Patented Mar. 15, 1932 1,849,369

UNITED STATES PATENT OFFICE

MEYRL M. FROST, OF CAPAC, MICHIGAN, ASSIGNOR TO DUROWOOD INDUSTRIES INCORPORATED OF DETROIT, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN

HEAT INSULATING MATERIAL

No Drawing. Application filed March 16, 1931. Serial No. 523,198.

The present invention relates to the production of materials primarily for heat insulation but capable of other uses, and more especially to the production of such materials in the form of shaped pieces, such as slabs built up or otherwise or formed articles.

Among the objects of the invention is the production of a heat insulating element which can be formed in the shape which it is desired to use, during the process of manufacture and thereby produce a better fitting element for such devices as refrigerators and other devices, and eliminate or reduce to a great degree, final finishing.

Still other objects will readily occur to those skilled in the art upon reference to the following description:

Heretofore in making insulating layers for the walls of refrigerators and the like, many different materials have been utilized, the most common form of insulating material being cork, either in blocks in its natural condition or in the form of blocks prepared by consolidating ground work. Such materials have very good insulating effect but are quite expensive and subject to certain objections.

In the present invention a suitably sized and shaped article such as a slab, or other form of insulating piece designed to fit a particular part of the device which is to be heat insulated, is first produced by building up fibrous material such as ground wood pulp or pulp of rag fibre, hemp, jute, asbestos, or the like. This material is formed in any suitable fashion by pumping into suitable dies or molds and may have also in the pulp a suitable adhesive such as ordinary sizing or rosin size or soap.

In forming the slab or other article, a sufficient pressure is applied to remove the free moisture, the amount of pressure running from about 100 lbs. per square inch up to several hundred pounds, depending on the shape and size of the pieces and the particular kind of fibre, some kinds being more tenacious in holding the water than others.

After the forming step under pressure, the article is removed from the die or mold and dried so as to remove the greater part of the remaining moisture and if necessary is then finished to a suitable dimension. The resulting product is a slab or other shaped article of similarly coherent nature but somewhat spongy in character.

After the article has been dried it is then placed in a suitable vessel in which is contained molten sulphur or other liquid or plastic material which will solidify quickly and seal the outer pores of the material, and the vessel is then subjected to the action of a suitable vacuum pump or other low pressure producing device up to as near perfect vacuum as is practicable and then while the article is still submerged in the sealing liquid the pressure is allowed to resume normal or even a greater than atmospheric pressure may be applied.

After this step the article is removed from the sealing medium and allowed to cool or dry as the case may be. The result of this operation is to produce a more or less spongy slab or other article having in its outer portion a sealing medium forming not only a seal for the outer ends of the pores but a superficial coating and having its inner portion for the greater part of its volume evacuated. The slab is then of such nature as to correspond to the well known vacuum bottle in that when between the inner walls of a refrigerator, for example, there is an evacuated space as is used in such bottles.

The material thus produced has been found to have a very high heat insulating value and is also light weight and of considerably less cost than many of the materials now being used.

An alternative method comprises forming the article in the manner described, superficially impregnating and coating it with a suitable material, then perforating the coating and exhausting air from the inner pores and sealing the perforation.

The preferred material used for sealing the pores of the article is molten sulphur although other materials such as mineral rubber, gilsonite, "Barrett pitch", etc., may be used. When sulphur is used it can be used without additions but it is preferred to add to the sulphur a small amount of non-drying

or essential oil in order to reduce its brittleness.

There has also been found that a small amount of cyanic acid (HCNO) can be mixed with the sulphur with advantage and has a considerable effect upon the hardness and toughness. The preferred proportion of the acid is about four ounces (4 oz.) to the one hundred pounds (100 lbs.) of sulphur.

Now having described the invention and the preferred embodiment thereof, it is to be understood that the said invention is to be limited, not to the specific details herein set forth, but only by the scope of the claims which follow:

What I claim is:

1. The method of producing a heat insulating material in predetermined form which comprises molding the said form from a pulp of fibrous material, pressing out free moisture, drying, evacuating the air from said form and sealing the outer ends of the pores with a suitable sealing medium.

2. The method of producing a heat insulating material in predetermined form which comprises molding the said form from a pulp of fibrous material, compacting under comparatively light pressure, drying, evacuating the air from said form and sealing the outer ends of the pores with sulphur.

3. The method of producing a heat insulating material in predetermined form which comprises molding the said form from a pulp of fibrous material, pressing out free moisture, drying, evacuating the air from said form and sealing the outer ends of the pores with a sealing medium solid at ordinary temperatures.

4. The process which comprises producing a fluent pulp of fibrous material and water, adding thereto a small amount of adhesive, forming said pulp into a suitable shape and expressing the water therefrom under light pressure, drying the shape, evacuating the air from the pores of said shape and sealing the said pores with a suitable sealing medium.

5. The process which comprises producing a fluent pulp of fibrous material and water, adding thereto a small amount of adhesive, forming said pulp into a suitable shape and expressing the water therefrom under light pressure, drying the shape, evacuating the air from the pores of said shape and sealing the said pores with a sealing medium solid at ordinary temperatures.

6. The process which comprises producing a fluent pulp of fibrous material, adding thereto a small amount of adhesive forming said pulp into a suitable shape and expressing the water therefrom under light pressure, drying the shape, evacuating the air from the pores of said shape and sealing the said pores with sulphur to which has been added a tempering material.

7. A heat insulating material comprising a block of fibrous material in spongy or porous condition having the air exhausted from its pores and the latter sealed against inflow of air.

8. A heat insulating material comprising a block of wood fibre in spongy or porous condition having the air exhausted from its pores and the latter sealed against inflow of air.

9. The method of producing a heat insulating material in predetermined form which comprises molding the said form from a pulp of fibrous material, pressing out free moisture, drying, sealing the outer ends of the pores with a suitable sealing medium, then withdrawing air from said pores through suitable perforations in said sealing medium and subsequently sealing said perforation.

In testimony whereof, I sign this specification.

MEYRL M. FROST.