106. COMPOSITIONS, COATING OR PLASTIC

Cross Reference

Examiner

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F. J. MAYWALD.

PROCESS OF MAKING HEAT INSULATING MATERIAL.

APPLICATION FILED JULY 30, 1910.

1,142,829.

Patented June 15, 1915.

2 SHEETS—SHEET 1.

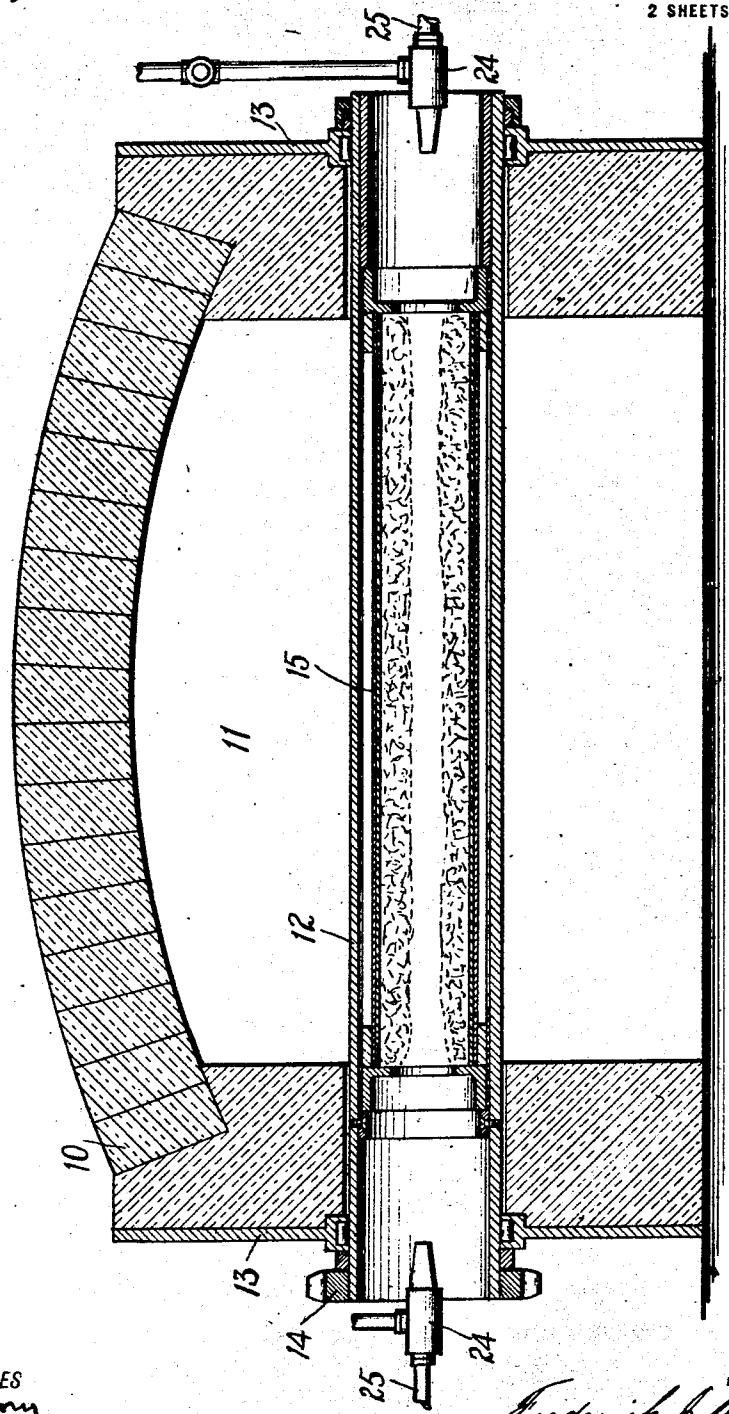


Fig. 1.

WITNESSES

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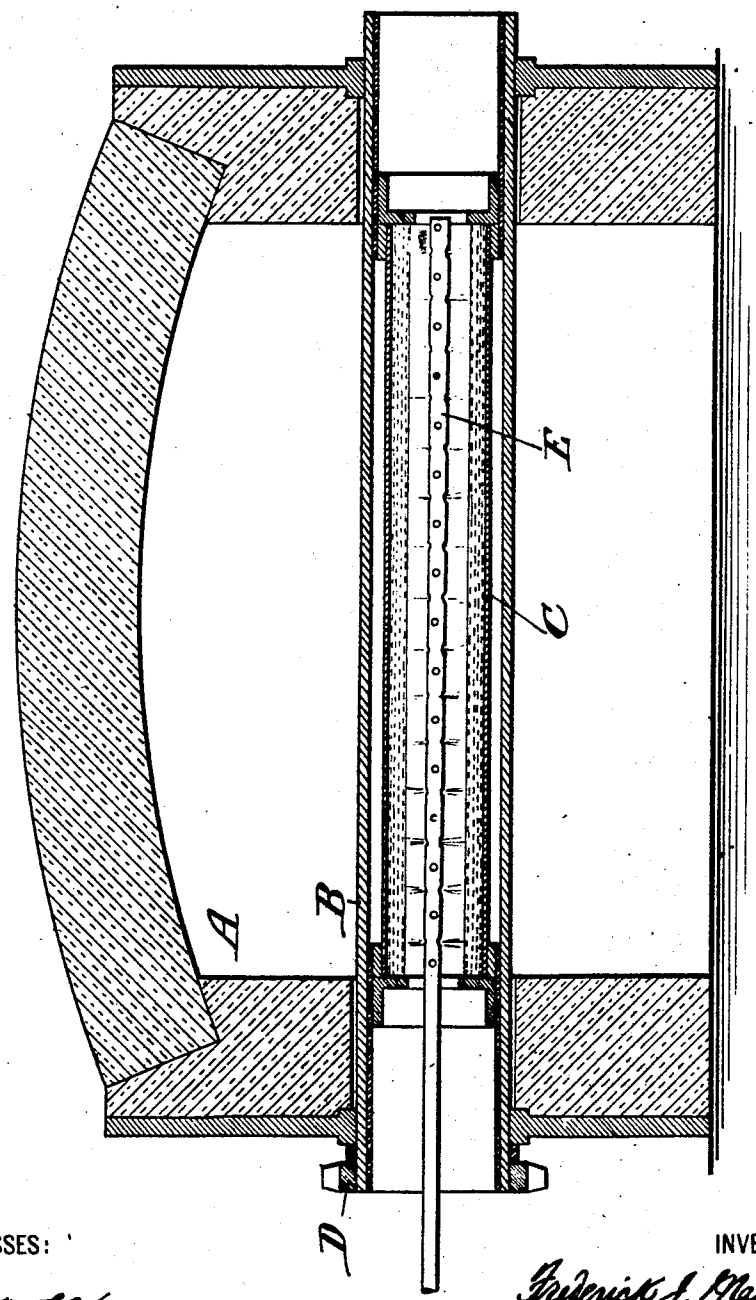
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

FREDERICK J. MAYWALD, OF BROOKLYN, NEW YORK.

PROCESS OF MAKING HEAT-INSULATING MATERIAL.

1,142,829. Specification of Letters Patent. Patented June 15, 1915.

Application filed July 30, 1910. Serial No. 574,592.

To all whom it may concern:

Be it known that I, FREDERICK J. MAYWALD, a citizen of the United States of America, and a resident of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Processes of Making Heat-Insulating Material, of which the following is a specification.

My invention relates to a process of making heat insulating material, and particularly to a novel method of producing an interstitial solid composed in whole or in part of one or more of the alkaline silicates such as silicate of soda or the like. Such a material when heated to the required degree loses its moisture and is converted into a hard, substantially insoluble cellular structure, which is very effective as a heat insulator, being well adapted to prevent either egress or ingress of heat from or to the body protected thereby.

I have found in actual practice a tendency, during the conversion of the raw material into a hard cellular structure by such application of heat, toward the formation of large bubbles which seriously interfere with the production of a structure of the desired character, namely, one in which the cells are small and substantially uniform in size throughout. Furthermore, crust formations are apt to result such as interfere with the required throwing off of the moisture.

It is the main object of my present invention to avoid the formation of these large bubbles and as far as possible to prevent the production of these crust formations, and I attain this object by constantly moving the mold in which the material is contained while being treated.

A further object of my present invention is to produce heat insulating structures of tubular form such as may be conveniently employed as pipe coverings for steam or hot water pipes or the like, or for pipes for conveying cooling fluids as in refrigerating systems, and to this end I conveniently employ a tubular mold and impart rapid movements of rotation thereto, so that the centrifugal force thus generated will cause the material in the mold to be thrown toward the walls thereof and thus to assume and maintain a tubular shape during the baking and hardening operation.

The raw material is desirably in liquid or semi-liquid form, as would be the case where the material employed is in the main silicate of soda or potash or the like, for such a condition lends itself well to the ready introduction thereof into the mold,—and in any event such is as a rule the natural condition of the material I employ. This material as before stated preferably consists either wholly or in the main of one or more of the alkaline silicates, such as any of the grades of silicate of soda or potash, either as single or double silicates. In combination therewith, I may employ a minor proportion of other materials such as carbonate, oxid hydrate or chlorid of magnesium, or calcium, and so forth, according to the results I desire to attain.

It will, of course, be understood that my invention is in no way dependent upon any particular form of apparatus but I have illustrated diagrammatically, two slightly different forms of such apparatus in the accompanying drawings in which each of the figures shows a view in central longitudinal section through a furnace and mold in which my invention may be carried out.

In the drawing herewith, A designates a furnace, and B a rotatable mold carrier containing a mold C therein. The mold carrier is provided with a sprocket wheel D by which rotary movements may be imparted thereto. A nozzle or perforated pipe E is also provided by which the material to be treated may be introduced into the mold.

With special reference to Figure 1, I have shown a furnace 10 of conventional form inclosing a furnace chamber 11 which is heated by any desired means. Rotatably mounted in the furnace and passing longitudinally through the furnace chamber is a tubular mold carrier 12. This mold carrier is mounted to rotate in suitable bearing plates 13 in the end walls of the furnace, any suitable or desired form of bearing elements or surfaces being employed, as will be well understood. Mounted upon one of the ends of the mold carrier 12 at a point outside of the furnace 10, is a sprocket wheel 14 by which movements of rotation may be given to the said carrier. The interior of the carrier is substantially cylindrical throughout and the same forms a receiving element for a tubular mold 15. Any suitable means may be employed to retain the mold in position longitudinally of the carrier after it has been mounted therein. According to this means for carrying out my invention the material

is introduced into the mold through atomizing heads 24, one of which is arranged at each end of the mold carrier 12. The material will be supplied to the heads under a suitable pressure and atomized by air, or steam introduced through pipes 25 or in any desired manner.

In Fig. 2 I have shown a modified apparatus for carrying out my invention which comprises a pipe 26 which enters the mold and is provided with orifices 27 through which the material may be forced. In operation a mold is first fitted to the carrier and heat is then applied to it and the mold rotated at a somewhat high rate of speed. The material is then introduced into the mold either by means of the atomizing heads 24, or pipe 26, or otherwise, and after a while the moisture in the material thus introduced is driven off and it commences to be converted into a cellular structure. If the material is fed slowly this structure is built up gradually until a structure of the desired thickness is attained, while on the other hand, if it is introduced substantially in bulk, then a tubular structure is formed by the centrifugal force consequent upon the rapid revolution of the mold carrier, the cellular structure being then formed in mass. In any event the rapid rotation of the mold tends to enforce an equal distribution of the heat, to prevent large bubbles being formed and thus to insure a uniformity of structure, and to a large degree to prevent the development of crust formations. After all the material has been converted into a cellular structure of the desired size, heat is preferably applied for some time longer, to the end that the final structure may be substantially insoluble, for I have found that the additional application of heat tends to reduce the solubility of the material.

What I claim is:

1. The herein described process of making a heat insulating structure which consists in introducing a material comprising in the main a liquid silicate into a forming mold, rotating the mold at a relatively high speed to uniformly distribute the liquid therein by centrifugal action, and in applying heat thereto to bake, expand and harden the material and to prevent the formation of large bubbles, whereby a fine grained uniform cellular structure is produced.

2. The herein described process of making a heat insulating structure which consists in introducing a material comprising in the main a liquid silicate into a mold a little at a time, and in applying heat thereto to bake, expand and harden the same while it is being so applied, whereby a homogeneous cellular structure of the desired size and thickness is built up gradually.

3. The herein described process of making a heat insulating structure which consists in atomizing a material comprising in the main a soluble silicate in liquid form, and in introducing the material in atomized form into a mold while heat is being applied thereto, whereby a homogeneous cellular structure of the desired size and thickness is built up gradually.

4. The herein described process of making a heat insulating structure which consists in gradually introducing a material comprising in the main a liquid silicate, into a mold while heat is being applied thereto, and in rotating the mold at the same time whereby a homogeneous cellular structure of the desired size and thickness is built up gradually.

5. The herein described process of making a heat insulating structure which consists in atomizing a material comprising in the main a liquid silicate and in introducing the material in atomized form into a mold while heat is being applied thereto and in rotating the mold at the same time, whereby a homogeneous cellular structure of the desired size and thickness is built up gradually.

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Witnesses:
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