April 23, 1929. R. P. PERRY 1,710,320

CONSTRUCTION MATERIAL

Filed Jan. 19, 1921

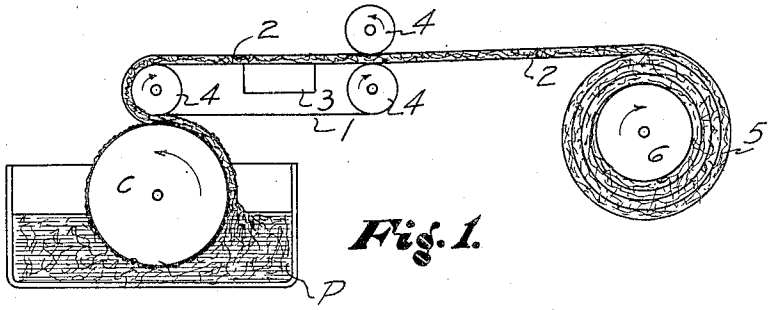


Fig. 1.

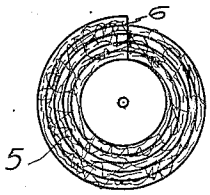


Fig. 2.

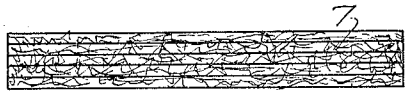


Fig. 3.

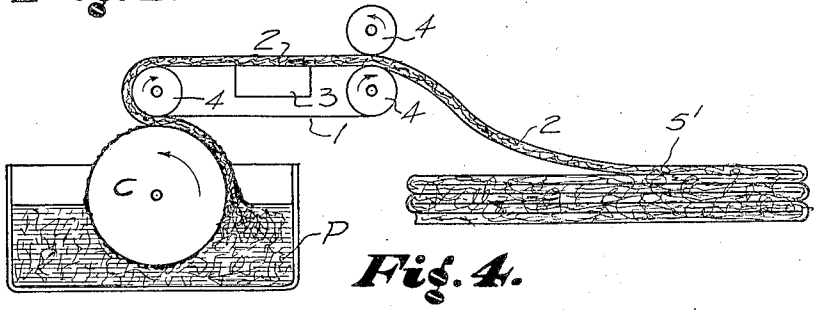


Fig. 4.

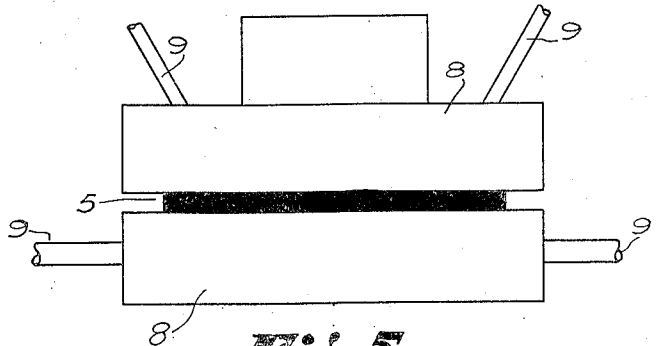


Fig. 5.

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Patented Apr. 23, 1929.

1,710,320

UNITED STATES PATENT OFFICE.

RAY P. PERRY, OF UPPER MONTCLAIR, NEW JERSEY, ASSIGNOR TO THE BARRETT COMPANY, A CORPORATION OF NEW JERSEY.

CONSTRUCTION MATERIAL.

Application filed January 19, 1921. Serial No. 438,267.

This invention relates to a construction material and the process of producing the same. It relates more particularly to a construction material containing asbestos fibers and water-proofing material, such for example as pitch, asphalt, and the like.

Heretofore it has been well known that sheets of material suitable for roofing, wall boards, etc., can be formed on an ordinary paper-making machine. It is also well known that during the paper-making process comminuted water-proofing material may be introduced into the pulp in the paper-making machine and becomes incorporated in the sheet as the sheet is formed. In such sheets the water-proofing material may be subsequently fused and caused to spread uniformly by heating or by heating and pressing the same. It has been found that when sheets of material have been made from rag or paper-stock or other fibers that are water-absorbent, the water will penetrate the sheets upon long exposure to the elements even after the sheets have been densified by heat and pressure and the bituminous material has been caused to spread throughout the sheet. This is especially true where the edges of the sheets have been cut, as the water penetrates therein and causes deterioration thereof.

One of the objects of the present invention is to obviate the objection above referred to and to produce a sheet which will not deteriorate rapidly.

Another object of the invention is to produce a construction material which shall possess good wearing qualities, and which may be manufactured in large quantities in a rapid and convenient manner, and which shall be easy to handle.

Another object of the invention is to produce a construction material which may have a smooth external surface, be impervious to water, possess considerable mechanical strength, and resist splitting or fracture.

Another object of this invention is to produce a material which is suitable for a variety of uses, such as boarding, roofing, etc., where such characteristics as stiffness, economy, and attractiveness of appearance are desirable.

In the production of this product, a quantity of comminuted waterproofing material such as pitch, asphalt and the like, may be mixed with a watery pulp of asbestos fibers, and this mixture then formed into a sheet upon an ordinary felt or paper-making machine. After the sheet has been partially freed from entrained water, it may be wound upon a mandrel or otherwise in order to form a hollow cylinder having a wall of the proper thickness which will be determined by the thickness of the sheet and the number of convolutions of the same. The sheet will preferably be wound up while it is still very wet and may be folded instead of rolled up, or may be cut into single sheets of any desired size and laid on top of one another.

If the sheet is wound on a mandrel it will be severed at the proper time and the cylinder will be slit longitudinally along one side thereof and opened out into a flat sheet. This sheet is dried and then by means of heat and pressure it is solidified until the successive layers become intimately joined together. This intimate union of the sheets is greatly promoted by the particles of bituminous material which become fused by the heat and effectively cause the sheets to become united. At the same time the fibers of asbestos distributed throughout the mass serve to give strength and rigidity to the same, which would not be obtained by a sheet of fibers or a sheet of water-proofing material alone. Also rolling up the sheet into a roll or folding it back and forth on itself while quite wet will cause matting or felting of the asbestos fibers together so that the roll or mass is thus initially joined as a unitary body, thus producing a product that has the fibers felted throughout after the hot pressing operation instead of having separate laminations which are merely cemented together and subject to a tendency to come apart when made by first drying the individual laminations and then hot pressing the same. Sufficient pressure is applied to reduce the volume to a considerable extent and leave a very hard, rigid product that is very resistant to the penetration of moisture.

The invention will be readily understood from the accompanying drawings in which,

Fig. 1 is a view showing the sheet coming from a paper-making machine and being wound up.

Fig. 2 is an end view of the slit cylinder.

Fig. 3 shows the unfolded laminated sheet of material.

Fig. 4 is a view similar to Fig. 1 showing the laminated sheet being formed by folding instead of rolling it up.

Fig. 5 represents diagrammatically a press for the sheet.

In the drawings, reference character 1 designates the usual "wet blanket" of an ordinary paper-making machine P. Carried along this blanket 1 is the sheet 2 of material which has preferably been formed on the cylinder C of the paper-making machine P. This sheet 2 is produced by mixing the desired proportions of asbestos fibers and comminuted water-proofing materials in a suitable beater, introducing a water pulp of the same into the paper-making machine where it is formed into a sheet on the cylinder C and passes out along the blanket 1 as indicated. Any other suitable means may be used for forming the thin sheet of the mixture, the paper-making machine being indicated merely for illustrative purposes. The amount of waterproofing material may vary from 50% to 90% or more of the water-free content of finished material, and may be introduced into the beater in the form of filaments or slender cylinder-like bodies when an ordinary paper-making machine is used, although other comminuted forms are suitable.

The sheet 2 may be passed over the suction box 3 where a portion of the water will be extracted, and may then be passed between the rollers 4 if it is desired that more of the water be squeezed out. From the rollers 4 the wet sheet 2 may be wound up into a cylinder 5 upon a mandrel 6, or formed into a cylinder in any other convenient manner so that the successive convolutions are in contact with each other. Instead of the sheet being rolled up as indicated in Fig. 1 to form the cylinder 5, it may be folded back and forth upon itself to form the laminated sheet 5′ as indicated in Fig. 4. When a sufficient number of turns have been taken in Fig. 1 to produce the desired thickness of the cylinder wall 5, or a sufficient number of laps have been made in Fig. 4 to produce the desired thickness of the laminated sheet 5′, the sheet 2 is severed and a new cylinder or laminated sheet is begun. The sheet 2 should preferably be made somewhat thin and a large number of convolutions or laps be used to produce the proper thickness of the finished article.

An excellent finished product may be obtained by removing sufficient water by means of the suction box 3 and rolls 4 so that the sheet 2, when rolled or folded up, contains less than 60% by weight of water, but it is usually desirable to have the sheet 2 sufficiently wet to cause felting of fibers in adjacent laminations to take place. The successive layers of this damp sheet stick together to some extent due to the felting or matting of the fibers, thus facilitating the subsequent operations of the process for the production of the finished article. It is to be understood, however, that the sheet 2 may contain more or less water than indicated above as long as the felting of the fibers can be made to take place to an appreciable extent. The rolling or folding up while the sheet is still moist or damp appears to give a better initial clinging of the layers together than is obtained by first drying it entirely and then forming the laminated article, the felting or matting of the fibers being better with increased amount of the water content of the sheet.

When the walls of the cylinder 5 have reached the proper thickness, the sheet 2 is cut off, the cylinder 5 is slit longitudinally from end to end, as indicated by the line 6 in Fig. 2, and spread out into the laminated sheet 7. A very convenient and suitable waterproofing material to be used in this invention is pitch, having a melting point of about 250° F. to 300° F.

The laminated sheet 7, Fig. 3, or the laminated sheet 5′, Fig. 4, is then dried. While the sheet is hot, it is pressed under high pressure, say 150 to 300 pounds more or less per square inch, in order to reduce the volume and to more thoroughly unite the layers and form a more rigid, hard and more nearly homogeneous product. The temperature during the pressing operation should be above the melting point or the softening point of the comminuted bituminous material, so that this material will spread through the sheet as it is pressed. The drying may be done in a drying room or in any convenient and well known manner. The pressure should be applied so that the sheets would not become torn during the pressing operation. That is, the pressure should be applied perpendicular to the sheets over a considerable area of the same and not by means of pressure rolls. Fig. 5 shows means by which the laminated sheet 5 may be heated and pressed. The sheet 5 is placed between the two pressure members 8 of a hydraulic or other press, which may be heated, if desired, by means of suitable heating means such as is represented by reference characters 9. Irrespective of whether the sheet 5 is dried before or after being admitted to the press, the waterproofing material, being hot, fuses and intimately unites the several layers into an integral mass of great solidity. The fibers on the adjacent surfaces of the laminations seemingly mat or intermingle even more during the pressing operation, or at least are firmly attached to each other so that there is very little, if any, plane of demarcation between any two adjacent layers after the hot pressing operation is completed. The product is in effect one integral, homogeneous mass that has been intimately united and densified by the heat and pressure.

The final product obtained by this invention possesses characteristics different from those possessed by hitherto known products

obtained from fibrous and waterproofing materials. Its surfaces may be smooth, and polished; its specific gravity is greater than unity, depending upon the materials and pressure used, and with the use of pressures above mentioned may be made to be about 1.50 to 1.60 when using approximately 70% of pitch and 30% of asbestos to form the sheet; a board made from asbestos and high melting point bituminous material will not soften and sag appreciably in the sunshine; it resists penetration by moisture or hard substances such as nails; it will not deteriorate rapidly upon exposure to the weather; it will not split or come apart even after long use; but it can be nailed or screwed without splitting or fracture.

It is practicable in the use of this invention to employ sufficient pressure upon the sheets while the bituminous material is in a hot, fused state to reduce the thickness of the sheets approximately 30% or 40% even when the proportion of asbestos fibers to bituminous material is only one to three by weight, or even less. The article formed by hot pressing a plurality of layers will not expand appreciably when the pressure is removed. Whenever there is a tendency for the article to expand to an objectionable extent upon the removal of the pressure, this can be remedied by retaining it under pressure until the bituminous material has been cooled and "set" in its normal solid state which it assumes at ordinary atmospheric temperatures.

Although the invention has been described by rolling or folding the convolutions or laminations together while the sheet is still wet, it is to be understood that the sheets may be thoroughly dried and a plurality of the same may be superposed upon each other and then firmly united by the application of heat and pressure, thereby obtaining a substantially uniform and homogeneous product provided the proper amount of heat and pressure is used, which can be easily ascertained in accordance with the proportion and nature of the bituminous material employed.

It has been found, upon making tests with sheets of this material to determine its susceptibility to moisture penetration and its expansion due to moisture absorption, that when samples were immersed in water for 160 hours they absorbed about 1% by weight of water compared to about 5% absorption by similar sheets containing other fibrous material instead of asbestos, and that the expansion due to the water absorption was about 1% as compared to an expansion of about 5% to 10% with samples containing the other fibrous material.

I claim:

1. As an article of manufacture, a construction material composed of a plurality of sheets which have been intimately united by heat and pressure to produce a substantially homogeneous material, said sheets containing by weight approximately 30% asbestos fibers felted together and 70% bituminous material.

2. As an article of manufacture, a construction material composed of a plurality of sheets which have been intimately united by heat and pressure to produce a substantially homogeneous material, said sheets containing asbestos fibers felted together and bituminous material in excess of the asbestos, said article having a specific gravity of between 1.5 and 1.6.

3. As an article of manufacture, a construction material containing approximately 30% asbestos fibers felted together and approximately 70% bituminous material intimately mixed therewith and fused so as to form a substantially homogeneous mass.

4. As an article of manufacture, a construction material having a specific gravity of between 1.5 and 1.6 and containing approximately 30% asbestos fibers felted together and approximately 70% bituminous material intimately mixed therewith and fused so as to form a substantially homogeneous mass.

5. As an article of manufacture, a construction material consisting essentially of asbestos fibers felted together and bituminous material, said bituminous material being present in amounts of from 50% to 90%.

In testimony whereof I affix my signature.

RAY P. PERRY.