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F. A. BARTLETT

MATERIAL FOR BUILDING AND OTHER PURPOSES

Filed March 18, 1921

Fig. 1.

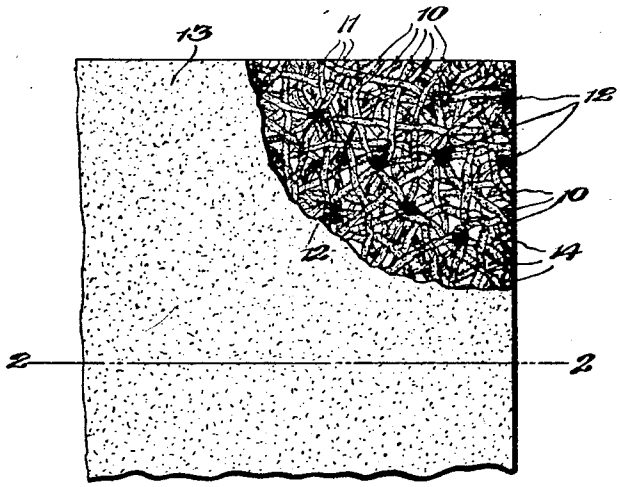


Fig. 2.

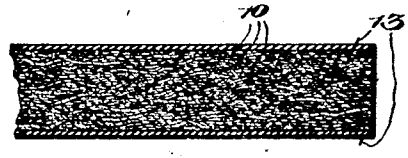


Fig. 3.



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WITNESS:-
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UNITED STATES PATENT OFFICE.

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MATERIAL FOR BUILDING AND OTHER PURPOSES.

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This invention relates to material for building and other purposes; and it has to do more particularly with novel material and articles of manufacture formed therefrom, useful especially as wall board, as filling for walls and floors, and for various other purposes.

A principal object of the invention is to provide materials and articles of the general type in question that will serve as effective heat-insulating and sound-deadening agents, and that will possess structural strength and permanence in high degree.

A further object of the invention is to enable the production of such materials and articles in a simple manner and at comparatively low cost.

A further object is to provide a novel preliminary mixture or composition which can be prepared and shipped in dry condition, and which, upon treatment with a suitable liquid agent, gives a more or less plastic mass which can be molded or otherwise brought into any desired form and which will set rapidly to produce the novel final product of the invention.

With these objects in view, as well as others which will appear more fully as the description proceeds, the invention consists in the novel materials or compositions of matter and articles which will first be described hereinafter in connection with a typical embodiment of the broad principles involved and will then be more particularly pointed out in the claims.

Described in general terms, the subject matter of the invention is a novel article of manufacture consisting of material comprising essentially as a major ingredient or base relatively coarse long fiber, in combination with a less or minor proportion of comparatively fine fiber which for the most part clings or adheres to the long fiber and equips it with filamentary or hair-like appendages which provide highly effective points of contact and anchorage for a binder or cementing agent which is included in the final product and which is of suitable character to maintain the fibrous mass in a compact but open-textured body having any desired shape and possessing considerable structural rigidity and strength. In general a woody fiber, especially excelsior or the like, is preferred as the coarse fiber constituting the basic fibrous material of the novel composition: while asbestos, more particularly in the form known as short fiber or waste asbestos, is especially well adapted to serve as the second fibrous component above mentioned. Coarse woody fibers of the character exemplified by excelsior are not well adapted alone to be held together by a binder in a strong resistant body; but the present invention overcomes this difficulty. I have found that fine fibers such as those comprised in waste asbestos cling tenaciously to the excelsior fibers or strands when brought into contact therewith, the result being that when such fiber is distributed through a mass of excelsior, the individual excelsior fibers or strands become covered to a greater or less extent with the fine fuzzy asbestos fibers which attach themselves to the coarser fibers in a surprisingly permanent manner. These attached fine fibers also interlock or felt to a certain extent; and in general, they render a matted mass of excelsior much better adapted for treatment with a binder. This fibrous mixture, in and of itself, is believed to be a novel article of manufacture and constitutes a part of the invention hereinafter claimed.

Upon adding to the fibrous mixture above described, a suitable binding or cementing material, the resultant mass may be molded or otherwise compacted into any form desired, the binding or cementing agent acting, in conjunction with the described adherent fine fibers, to bond the coarse fibers together in a strong and permanent union when the binding or cementing agent has set or solidified. The resultant consolidated mass possesses a remarkably high degree of strength and resistance to deformation; and I have found that the presence of fine fibers is essential in providing the type of strong and permanent bond between the coarse fibers necessary to produce an article

of practical value for use as a building material. I have found that where such fibers are not included in the mixture, the bonding together of the matted coarse fibers is invariably weak and easily ruptured, and a shaped mass formed therefrom is comparatively weak and fragile.

Various binding materials may be employed to bond the novel fibrous mixture above described together into a strong compact mass for the purposes in view. In practice, it is especially desirable to employ an alkali silicate such as water glass as the principal constituent of the binder; and also to include in the complete mixture an agent that will serve among other things to accelerate the setting of the silicate binder and thus decrease the time required for manufacture. For this latter purpose I prefer to employ a relatively small proportion of a hydraulic cement, such as Portland cement; and I find it advantageous to thoroughly mix the necessary proportion of Portland cement with the mixture of excelsior and asbestos fiber above described, before adding the water glass or other solution of alkali silicate. Powdered clay, umber, etc. may be used under some circumstances in place of part or all of the Portland cement but cement is most effective. The dry fibrous mixture including the added hydraulic cement is also novel in the art and constitutes a part of the invention as hereinafter claimed. The described fibrous mixture, either with or without the added hydraulic cement component, constitutes a composition or article of manufacture that can be prepared and shipped conveniently to points of use, where the liquid binding agent may then be incorporated to produce the final mixture in the particular shape or form desired.

Where the finished article in its set and hardened condition is to be employed as heat-insulating or sound-deadening material, as in building construction for example, it is desirable that it be open-textured and contain a high percentage of voids or air spaces. In preparing shaped blocks or sheets of the material for use in this way, therefore, a comparatively low degree of pressure can well be used in compacting and consolidating the mixture into the desired form. At the same time, owing to the innumerable points of attachment or bonding provided throughout the matted mass of coarse fibers by the tenaciously adherent fine fibers, the resultant article possesses both strength and rigidity in high degree notwithstanding the large percentage of voids in the mass.

In order to secure the fullest effect of the air cells or voids above described, where the article of the invention is to be used for purposes of heat insulation as in the case of wall board or wall filling, it is desirable to provide the sheet or block of material on one or both sides with a facing of fabric or the like that is comparatively impervious. Such facing may consist for example of cardboard, paper, roofing paper, felt, or the like; and in this way the passage of air currents through the open textured or reticulated mass is prevented or so diminished that the voids therein constitute substantially dead air spaces and therefore exert a maximum heat insulating effect.

In order to afford a fuller understanding of the principles underlying the invention and for the sake of a concrete example, a typical embodiment of one way in which the invention can be carried out in practice will be described in connection with the accompanying drawings in which—

Fig. 1 is a face or plan view, partly broken away, of a piece of wall board embodying the principles of the invention;

Fig. 2 is a cross sectional view of the same; and

Fig. 3 illustrates a portion of a single excelsior strand on a larger scale.

In carrying out the invention in accordance with the specific procedure here chosen for purposes of illustration, I mix ordinary excelsior with waste asbestos, or short fiber asbestos, in the proportion of 100 pounds of excelsior to from about 5 to 25 pounds of fibrous asbestos. I also prefer at this stage to incorporate Portland cement in the mixture in the proportion of from about 10 to 30 pounds. In a particularly desirable mixture, about 20 pounds each of asbestos fiber and of Portland cement are employed with each 100 pounds of excelsior, or in those relative proportions. The short asbestos fiber can be distributed quite uniformly through the mass of long coarse woody fibers by appropriately agitating the mass while sifting the asbestos thereinto. Most desirably the excelsior is fed at a regulated rate and in a comparatively thin layer upon a traveling belt or the like, while the asbestos, or the mixture of asbestos fiber and cement is sifted down upon it at the proper rate to give the necessary proportioning. The fine fluffy or downy asbestos fibers attach themselves with great tenacity to the excelsior fibers, giving them a fuzzy appearance, and the cement, if added at this stage, is also distributed through the fibrous mass with substantial uniformity and held in place to a great extent by the fuzzy fibers that partially cover the relatively rough surfaces of the excelsior fibers. Whether the hydraulic cement is added at this stage, or later, depends in part upon considerations of manufacturing convenience. In either case, the prepared mixture of excelsior and fibrous asbestos can be conveniently shipped, after being compacted in

a baling compress or the like, if desired, for subsequent treatment with the liquid binding agent to be employed.

For practical work, I find commercial water glass of about 40° Baumé a satisfactory liquid binder to employ. The fibrous mixture, containing also the specified portion of Portland cement, is thoroughly moistened with the water glass solution, the amount of water glass used for this purpose being advantageously about equal in weight to the fibrous mixture in a typical instance. The incorporation of the water glass solution with the fibrous mixture may be accomplished in any suitable manner, as by spraying the water glass upon a traveling layer thereof, or by immersing the fibrous mass in the solution and then squeezing out the excess. The moist fibrous mass is then shaped into forms of the desired nature, such as sheets, slabs, or blocks, by molding under pressure, the degree of pressure employed depending upon the characteristics desired in the finished article. A rather low molding pressure, say 50 to 100 pounds per square inch, is suitable where it is desired to have the finished article contain a larger percentage of voids or air spaces. It is not necessary to employ heat during the molding operation; and a mixture of the character described takes an initial set in a comparatively short time, say within an hour to two hours, sufficient to permanently retain the shape into which it is molded. The attainment of the final set and full strength takes longer, ordinarily several days.

If the blocks or sheets are to be faced on one or both sides, this may be effected in conjunction with the molding of the plastic mass. Thus, one practical method is to lay the proper thickness of the moist plastic mixture on cardboard, then to superimpose more cardboard, and finally to apply pressure. The water glass and cement binder unites the cardboard facing permanently to the fibrous mass.

The accompanying drawings, which are necessarily somewhat diagrammatic in character, show a specimen of wall board prepared in accordance with the procedure above described. In these drawings, 10 represents the coarse excelsior fibers; 11 the fine fuzzy fibers of waste asbestos adhering thereto; and 12 represents the water glass binding agent which bonds the fibrous mass together. The asbestos fibers and sodium silicate apparently cooperate chemically as well as physically in providing a bond. The facing 13 in this instance consists of a sheeted tarry composition cemented by means of water glass to both sides of the board. It will be noted that the body of the board is open textured and contains a multiplicity of voids or air spaces 14. It will be understood that the fibrous mass may be water-proofed by treatment with a suitable agent such as tar or asphalt, before or after molding. Other substances and materials may be incorporated in the mass as fillers or the like. The object sought in the specific example given, however, is to produce an open-textured article; and if additional fillers are used, they should be of such nature or should be employed in such proportion as not to defeat this end.

What I claim is:

1. As a new article of manufacture, a shaped body comprising a coherent mixture of excelsior, asbestos fiber, and a cementitious binder.

2. As a new article of manufacture, a shaped body comprising a coherent mixture of excelsior, asbestos fiber, and a cementitious binder, the amount of asbestos fiber in the mixture being substantially less than that of excelsior.

3. As a new article of manufacture, a shaped body comprising a coherent mixture of excelsior, asbestos fiber, and a cementitious binder, the amount of asbestos fiber in the mixture being not more than about one-fourth that of excelsior.

4. Building material in the form of block, wallboard, or the like, comprising a shaped coherent mass of a set matted fibrous mixture comprising excelsior, short fiber asbestos and an alkali silicate binder, moderately compacted but containing a large proportion of voids.

5. Building material in the form of block, wallboard, or the like, comprising a shaped coherent mass of a set matted fibrous mixture comprising excelsior, short fiber asbestos, Portland cement and water glass.

6. Building material in the form of block, wallboard, or the like, comprising a shaped coherent mass of a set matted fibrous mixture comprising excelsior 100 parts, short fiber asbestos about 5 to 25 parts, and a water glass binder.

7. Building material in the form of block, wallboard, or the like, comprising a shaped coherent mass of a set matted fibrous mixture comprising excelsior 100 parts, short fiber asbestos about 5 to 25 parts, Portland cement about 10 to 30 parts, and water glass sufficient to form a strong bond.

8. As a new article of manufacture, a material useful for building and other purposes comprising a loose dry mixture of long woody excelsior-like fibers with short fiber asbestos largely clinging thereto.

9. As a new article of manufacture, a material useful for building and other purposes comprising a loose dry mixture of long woody excelsior-like fibers with short fiber asbestos largely clinging thereto, and a pulverulent cementing agent.

10. As a new article of manufacture, a material useful for building and other pur-

poses comprising a loose dry mixture of long woody excelsior-like fibers with not substantially more than one-fourth as great a quantity of short fiber asbestos largely clinging thereto.

11. As a new article of manufacture, a material useful for building and other purposes comprising a loose dry mixture of 100 parts of long woody excelsior-like fibers, from about 5 to 25 parts of short fiber asbestos, and from about 10 to 30 parts of Portland cement.

In testimony whereof I hereunto affix my signature.

FRANCIS A. BARTLETT.