May 22, 1923. 1,456,083

H. F. WEISS

INSULATING MATERIAL AND METHOD OF MAKING THE SAME

Filed Aug. 12, 1919

Fig. 1,

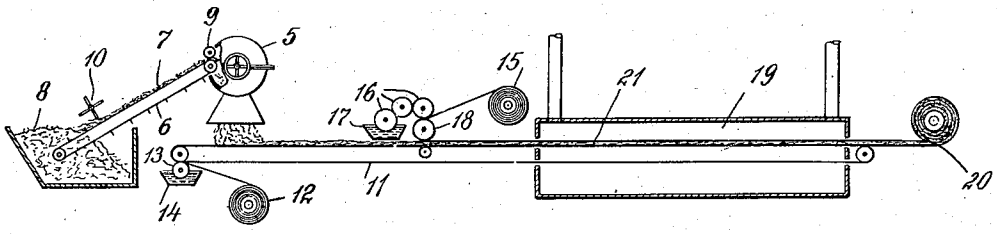
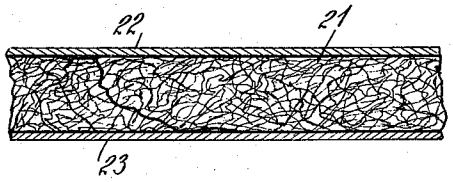


Fig. 2,



Inventor
Howard F. Weiss
By his Attorneys
Pennie, Davis, Marvin & Edmonds

Patented May 22, 1923. 1,456,083

UNITED STATES PATENT OFFICE.

HOWARD F. WEISS, OF MADISON, WISCONSIN, ASSIGNOR TO C. F. BURGESS LABORATORIES, OF MADISON, WISCONSIN, A CORPORATION OF WISCONSIN.

INSULATING MATERIAL AND METHOD OF MAKING THE SAME.

Application filed August 12, 1919. Serial No. 317,060.

To all whom it may concern:

Be it known that I, HOWARD F. WEISS, a citizen of the United States, residing at Madison, in the county of Dane, State of Wisconsin, have invented certain new and useful Improvements in Insulating Materials and Methods of Making the Same (Case C); and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to insulating materials and has for its object the provision of an improved method of making the same as well as the provision of a new article of manufacture resulting from the practice of the method of the invention.

The invention thus contemplates, as an article of manufacture, a product particularly adapted for use as an insulating material, although I do not intend to limit either the article or the method of the invention to insulating materials since both may be advantageously applied to other uses.

Fibrous material confined between sheets of paper, or the like, is extensively used as a heat insulating medium particularly in building construction. It has heretofore been customary to felt the fibrous material into a mat in which the fibres are cemented together or otherwise appropriately bound together or secured between the enclosing sheets of paper, as, for example, by sewing the fibrous material between the sheets of paper. This has generally been necessary since the fibres are usually of such relatively short length that they must be bound or fastened to one another or to the enclosing sheets of paper in order to produce a fabricated structure from which the individual fibres will not readily separate.

In accordance with the present invention, use is made of relatively long fibres, such, for example, as animal fibres, and the like. These fibres are of a greater length than the thickness of the fibrous body portion of the insulating material, and in accordance with the present invention individual fibres are cemented to each of the enclosing sheets or liners, which may be of paper or the like. In carrying out the invention I form a fibrous body portion in which the fibres are loosely bound, that is to say the fibres are not themselves cemented together but are loosely arranged so that they are held together only by their natural tendency to intertwine. This fibrous body portion is cemented between two liners, such, for example, as sheets of paper, cloth, or the like, in such a way that individual fibres are cemented to each liner. This result is possible on account of the length of the fibres which permits them to span the space between the liners and to be cemented to each liner, and in view of the fact that the fibres for the most part are cemented to both liners the fibrous body portion is securely fastened between the liners.

Reference will be made in the following discussion of the invention to the accompanying drawings for the purpose of more clearly explaining and illustrating certain aspects of the invention. In these drawings;

Fig. 1 diagrammatically illustrates in elevation one form of apparatus for carrying out the invention, but the showing is purely diagrammatic and is given merely to facilitate a complete understanding of the invention. For this reason, the precise structural details of the apparatus are omitted; and

Fig. 2 is an enlarged sectional view of the improved article of the invention showing the cementing of individual fibres to each of the enclosing liners.

When animal fibres, such as cattle hair, are passed into a shredding machine, the machine will knock the hair into a cloud of independent hairs. If this cloud of independent hairs is permitted to settle on to a fabric such as paper, one side of which is coated with an adhesive, the hairs will stick to the coated surface of the fabric. We thus secure a fabric coated with an adhesive to which there is sticking a large number of hairs. If now a second sheet of fabric coated with an adhesive is pressed against this first sheet containing the hairs there will be formed an insulating felt composed of a mass of hairs in heterogeneous arrangement and extending in all three cubical dimensions cemented between two layers of fabric. The hairs themselves are not actually cemented together but, for the most part, the hairs are individually cemented to each sheet of fabric, and it is because of the fact that the hairs are of sufficient length that they can span the space be-

tween the two sheets of fabric and thus cement the fabrics together that the fibres of the body portion need be themselves only loosely bound together.

Referring now to Fig. 1 of the accompanying drawings, there is shown a shredding engine 5 for knocking or tearing the fibrous material apart and cutting the fibres to the extent necessary to secure a fibrous deposit of the required character. The purpose of this shredding operation is to separate the fibres into individual particles of such a character that they can be deposited to form a more or less flocculent layer of heterogeneously arranged fibres in which the fibres extend in all three cubical dimensions. During this shredding operation, the fibres are only cut to the extent necessary to facilitate their deposition in a layer of the character contemplated. I have found that hair may be satisfactorily shredded for the purposes of the present invention, without balling or tangling up, in a hammer mill shredder rotating at three thousand or more R. P. M.

The fibrous material, such, for example, as hair, is fed into the shredding engine 5 from an endless belt or conveyor 6 provided with transversely arranged baffles or paddles 7 for the purpose of keeping the fibres on the belt of approximately uniform thickness. The belt 6 carries the fibres from a storage bin 8 to the mouth of the shredding engine where the fibres are fed into the shredder 5 between rolls 9. A rotating spider 10 may be provided for knocking surplus hairs from the conveyor 6 back into the bin 8.

An endless belt or conveyor 11 serves as the support for the insulating material during the process of its manufacture. A roll 12 of paper or other suitable lining material is fed over the front end of the conveyor 11 and travels along with the conveyor as will be clearly understood from the following description. A coating roll 13 dipping into a pan 14 containing adhesive material serves to coat one surface of the liner with adhesive as it passes over the front end of the conveyor 11. The shredding engine 5 is arranged to discharge the shredded fibres on the coated surface of the liner as it passes beneath the shredder. There is thus formed upon the coated surface of the liner a loosely bound layer of fibres in heterogeneous arrangement with the fibres extending in all three cubical dimensions.

A second roll 15 of paper or other suitable lining material has one surface thereof coated with adhesive by means of the coating rolls 16 and cooperating pan 17 containing the adhesive. The second liner 15 passes over a roll 18 which presses the coated surface of the liner against the layer of deposited fibres, and in this manner the layer of loosely bound fibres are securely cemented between the two liners 12 and 15.

A drier 19 may be provided through which the insulating material is passed after the fibrous body portion thereof has been cemented between the two liners. The finished product may then be wound upon a roll or winder 20 or may be prepared in any other appropriate manner for subsequent use.

The finished product produced in the manner hereinbefore described comprises a body portion of fibrous material in which the fibres are loosely bound together without the aid of any artificial or external cementing agencies. In this fibrous body portion the fibres are heterogeneously arranged with the fibres extending in all three cubical dimensions. This loosely bound body portion of fibres is confined between two liners by fibres individually cemented to each liner. In other words, a sufficient number of individual fibres of the fibrous body portion are cemented to both liners to satisfactorily secure the fibres and liners together, thus producing a fabricated structure which will not fall apart and from which the fibres will not readily separate.

In Fig. 2 of the drawings there is represented an article embodying the novel features of the invention. The fibres in the fibrous body portion 21 of this article are loosely bound together and are, for the most part, individually cemented to each of the two liners 22 and 23. In this figure I have represented an individual fibre with a heavy line so as to show the manner in which it is secured or cemented to both of the liners 22 and 23. All of the fibres of the body portion 21 need not of course be cemented to both liners, but a sufficient number of the fibres are cemented to both liners to secure the liners together and to confine all of the fibres between the liners. The liners may, of course, be of any suitable character, such as sheets of paper, cloth, or the like, and I have employed the term liner to designate any appropriate enclosing or covering agency for my improved product.

Animal fibres, such, for example, as cattle hair, are well adapted for the purposes of the invention, since they are usually of sufficient length to span the space between the two liners. The invention, however, contemplates the use of other kinds of fibres, and, in general, any fibrous material may be employed in which the individual fibres are of sufficient length to insure a satisfactory cementing of a loosely bound layer of these fibres between the two liners. Thus, for example, the bark fibres of the redwood and similar trees as well as other relatively

long vegetable fibres may be used with advantage in the manufacture of products in accordance with the principles of the invention.

The shredding operation to which the fibres are subjected prior to their deposition on the coated surface of the liner is designed to separate the fibres into individual particles, and I have herein employed the term "shredding" and its derivatives in a generic sense, to describe the operation of so treating the fibres that each fibre is substantially free from any other fibre. The shredding operation should be conducted with the view of cutting the fibres as little as possible, and only to the extent necessary to secure a satisfactory deposition thereof. In practice, the shredding of the fibres will usually be most satisfactorily effected in a shredding engine, but the desired result may be secured in other ways, as, for example, by brushing or combing. For example, a stiff wire brush revolving at a high rate of speed and coming in contact with the fibrous material will separate the fibres into individual particles of the desired character.

Numerous adhesive agents are available for cementing the liners to the body portion of loosely bound fibres. I have found sodium silicate, asphalt, coal tar pitch, and the like, suitable adhesives for this purpose. Asphalt and pitches, such, for example, as coal tar pitch, are extremely desirable adhesives for this purpose, because they render the liners moisture and waterproof in addition to cementing the same to the layer of loosely bound fibres.

I claim:

1. The method of manufacturing composite insulating material, which comprises coating the adjacent surfaces of two liners with adhesive, and cementing a body portion of loosely bound and heterogeneously arranged fibers between said coated surfaces sundry of said fibers being of sufficient length to reach from one liner to the other to secure the liners together.

2. The method of manufacturing composite insulating material, which comprises coating one surface of a liner with adhesive, depositing a layer of loose fibres in heterogeneous arrangement upon the coated surface of said liner, coating one surface of a second liner with adhesive, and cementing the coated surface of said liner to the exposed surface of said deposit of fibrous material, many of said fibres being of sufficient length to reach from one liner to the other; substantially as described.

3. The method of manufacturing composite insulating material, which comprises coating one surface of a liner with adhesive, depositing a layer of animal fibres in heterogeneous arrangement with the fibres extending in all three cubical dimensions upon the coated surface of said liner, coating one surface of a second liner with adhesive, and covering the deposit of fibres with the second liner sundry of the individual fibres being of sufficient length to reach from one liner to the other to bind the liners together with shorter fibres intervening.

4. The method of manufacturing composite insulating material, which comprises coating one surface of each of two liners with adhesive, forming a layer of loosely bound fibrous material in which the fibres are in heterogeneous arrangement and for the most part of greater length than the thickness of the layer, and cementing said layer of fibrous material between the coated surfaces of said liners so that sundry of the individual fibres are cemented to the coated surfaces of both liners; substantially as described.

5. The method of manufacturing composite insulating material, which comprises subjecting animal fibres to a shredding operation for cutting and knocking apart the fibres, coating one surface of each of two liners with adhesive, depositing the shredded fibres in heterogeneous arrangement with the fibres extending in all three cubical dimensions upon the coated surface of one of said liners, and covering said deposit of fibres with the other liner sundry of the individual fibres being of sufficient length to reach from one liner to the other and thereby bind said liners together substantially as described.

6. The method of manufacturing composite insulating material, which comprises placing a layer of loose heterogeneously arranged shredded fibers between liners of flexible material, having their adjacent faces coated with an adhesive, whereby the fibers will be free from each other between the liners, while sundry of the fibers will be cemented to the liners at both ends of said fibers to hold the material in shape and to prevent separation of the liners.

7. An article of manufacture, comprising a body portion of fibers, and liners of flexible material, the fibers of the body portion being heterogeneously arranged and with sundry of the fibers secured at both ends to the liners.

8. An article of manufacture comprising a body portion in heterogeneous arrangement confined between two liners by fibres individually cemented to each liner; substantially as described.

9. An article of manufacture comprising a body portion of loosely bound and heterogeneously arranged fibres confined between two liners with individual fibres cemented to each of the liners; substantially as described.

10. An article of manufacture comprising a body portion of fibrous material in hetero-

geneous arrangement with the fibres extending in all three cubical dimensions and confined between two liners by fibres individually cemented to each liner; substantially as described.

11. As an article of manufacture, an insulating material comprising a body portion of loosely bound animal fibres confined between two liners by fibres individually cemented to each liner; substantially as described.

12. As an article of manufacture, an insulting material comprising a body portion of loosely bound animal fibres in heterogeneous arrangement with the fibres extending in all three cubical dimensions and confined between two liners by fibres individually cemented to each liner; substantially as described.

13. An article of manufacture comprising a body portion of fibrous material cemented between two liners, the fibres being of such length as to span the space between the liners and being for the most part individually cemented to each liner; substantially as described.

14. An article of manufacture comprising a body portion of loosely bound animal fibres cemented between two liners with the fibres of such length as to span the space between the liners and having individual fibres cemented to each liner; substantially as described.

15. An article of manufacture comprising a layer of loosely bound fibres in which the fibres are for the most part of greater length than the thickness of the layer, and two liners between which said layer of fibrous material is cemented so that individual fibres are cemented to each liner; substantially as described.

In testimony whereof I affix my signature.

HOWARD F. WEISS.