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METHOD OF MAKING FIBER PRODUCTS

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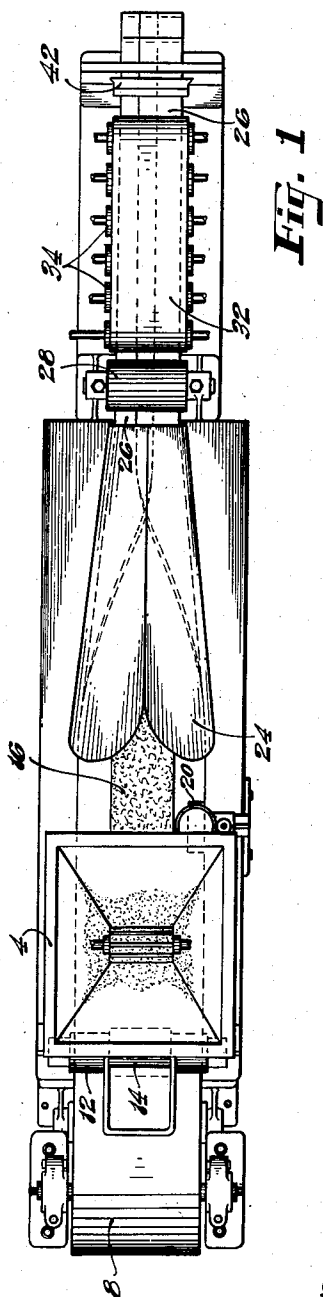


Fig. 1



Fig. 3

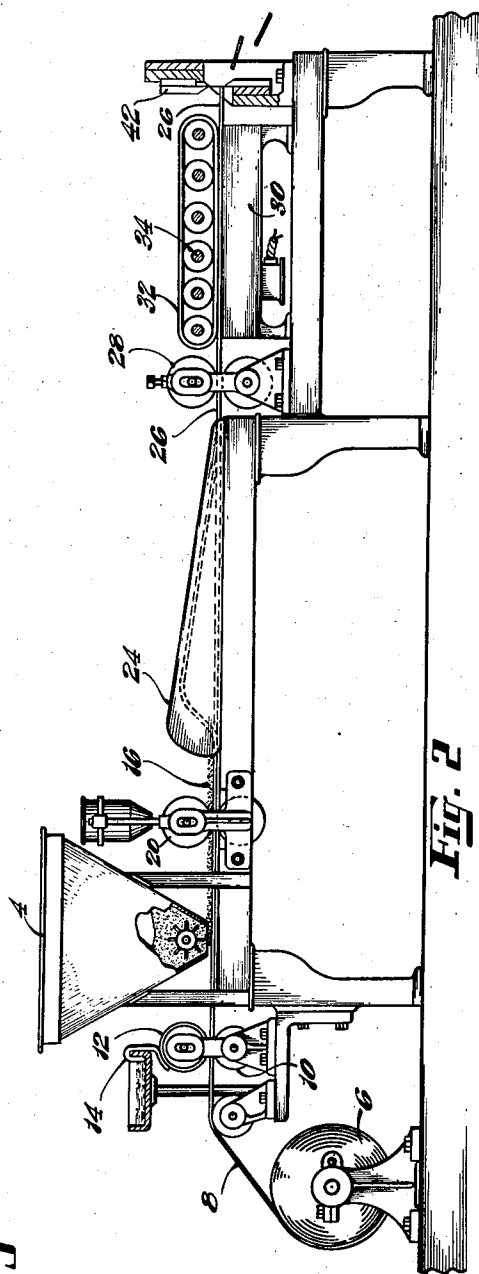


Fig. 2

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UNITED STATES PATENT OFFICE

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METHOD OF MAKING FIBER PRODUCTS

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1 Claim. (Cl. 154—29)

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This invention relates to improvements in fiber products having cushioning or insulating characteristics such as those described in the Gerard and Weisman Patent No. 1,837,261 and to methods and machines for making such improved products.

The pad shown in the patent comprises a wadding of beaten or milled waste paper enclosed between fabric sheets. The desirable insulating characteristics of the pad are due to the loose or fluffy nature of the wadding, since the wadding consists of a mixture of short fibers and intermingled flakes. As described in the patent, the method of manufacture contemplated the possibility of mixing the fibrous material with a liquid adhesive. In actual manufacture, however, the adhesive was omitted since it was discovered that the wadding, because of the interlocking relation of flakes and fibers, had sufficient stability to hold together under most conditions of use, especially when incorporated in a completely sealed pad of the type shown in Fig. 5 of the Gerard and Gerard Patent No. 2,028,388. It was also found that the use of a liquid adhesive within the wadding tended to densify the wadding, and furthermore, tended to introduce excessive moisture into the pad. On the other hand, a pad manufactured without adhesive in the wadding was not ordinarily suitable for use as an "open-ended" pad, since the wadding would then tend to fall out.

An object of this invention is to produce, preferably from waste paper, a fibrous pad material with substantial cohesive properties, while preserving the softness of packing upon which the natural cushioning and insulating properties of such materials depend.

A further object is to develop a simple method for manufacturing pads filled with fibrous material in continuous sheets which may be cut into desired lengths and shapes without the exposed fiber filling falling out during manufacture or use. The object is to avoid the added difficulty and expense of sealing each individual pad at all its edges.

Other objects and advantages of my invention will be apparent from the following description.

In the accompanying drawings, forming a part of this application, Fig. 1 is a schematic side elevation of a machine adapted for manufacturing a pad of the fibrous material embodying my invention; Fig. 2 is a plan view of the same machine, and Fig. 3 shows in a magnified cross-sectional view the loosely cohesive mass of fibrous material produced by this invention.

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By my invention dry and finely-divided cementitious material is first mixed thoroughly in predetermined proportions with the fibrous material, which may be a beaten dry waste paper of the type described in the above Gerard and Weisman patent, namely, a material in which flakes and short fibers are intermingled in interlocking relationship. In the manufacture of pads the fiber cover, which may, for example, be of kraft paper, is moistened lightly on the inside surface and the mixture of cementitious and fibrous materials is put in place upon the moistened fiber cover. Then the whole combination is heated to vaporize the moisture on the inside of the cover whereby the vapor passes up through the mass of the fiber-cementitious material mixture and causes the fibers to cement together at a number of the contact points between adjacent fibers.

The invention in one embodiment will be described with reference to Figs. 1 and 2. The fibrous material, which preferably is ground-up waste paper, particularly old newspapers, is thoroughly intermingled in a mixing chamber with a finely-powdered cementitious material, e. g. an inexpensive dry glue made of starch. The glue is somewhat hygroscopic so that it will pick up moisture readily during the later vaporizing step. I have found that for the insulating and cushioning pads desired in most applications an amount of starch glue equal to about five to twenty percent of the mixture weight provides proper cohesiveness while preserving the other desirable properties of the finished pad.

The fibrous-cementitious materials mixture is introduced into the hopper 4. At 6 is a supply roll of sheet fabric, preferably kraft paper, usable for the cover of pads. The sheet fabric 8 from the roll 6 passes through the rolls 10 and 12, the upper one 12 being a moistening roll. A wick 14 or other suitable means is used to impart steadily a small amount of moisture to the central, or larger radius part of the roll 12. The roll 12 transmits the moisture to the center portion of the fabric sheet 8. The amount of moisture used is preferably small, and only sufficient to produce, in the wadding, a vapor concentration adequate for satisfactory absorption by the glue particles.

The fabric sheet 8 moistened on the upper side passes on below the hopper 4, which feeds onto the fabric sheet a continuous layer 16 of the fiber-cementitious material mixture. A liquid adhesive material is fed in a narrow strip onto one upper edge of the sheet fabric. This may be done as shown by any suitable means, indicated by a roll

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20. The sheet fabric 8 then passes between the convoluted plates 24 which roll the outer edges of the sheet back into face-to-face contact with each other, thereby forming a closed pad 26. The roll 28 presses flat the continuous pad and cements together the opposite edges of the cover sheet fabric along the seam to which adhesive was applied earlier at point 18. The continuous pad 26 now is passed over a heating plate 30 against which the pad is pressed by a canvas belt 32 driven by rollers 34. During the passage of the pad over the heating plate the vaporized moisture rises through the mass of fiber filler. The small particles of the dry starch glue absorb the moisture and join together adjacent fibers at a few contact points. As shown in Fig. 3 the fibers 36 and intermingled flakes 38 are glued together at a few discrete points by small particles of cementitious material 40 which are indicated as small dots in the drawing.

The amount of moisture is of some importance, since adequate moisture must be provided to dissolve, or at least to soften, the individual glue particles. It will be appreciated that not all of the moisture is absorbed by the glue, and the excess is believed to condense within, or to be absorbed by, the particles of the paper wadding. The presence of this moisture in the wadding, however, is not of any consequence, especially in view of the dry nature of the beaten paper. The actual quantity of moisture is not critical, however, and it has been found possible to vary it over a fairly wide range, and to supply adequate moisture for the glue particles, while still maintaining the essentially dry nature of the pad itself.

There is thus produced a continuous pad with a cohesive fiber filling permitting the pad to be cut off into convenient lengths or shapes without loss of the filling at the edges exposed by the cut-

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ting. For example, the knife 42 controlled by any suitable timing means (not shown) may cut off pads transverse to the direction of motion of the continuous pad 26. Also, the original fabric sheet 8 as it comes from the supply roll 6 may have ventilating perforations. The fiber mass has sufficient cohesiveness to prevent the filler fibers from shaking out through the cover of the pad in its final form. Since the preferred cementitious material is a cheap dry starch glue, the pad may be economically manufactured in substantially any desired form.

Having thus described my invention, I claim:

The method of making a fiber product, which consists in mixing a dry, finely-divided hygroscopic cementitious material with inter-locked short fibers and flakes of beaten paper, moistening the center portion of a strip of backing paper, depositing the resultant mixture on the moistened sheet of backing material, applying heat to vaporize moisture from the backing material, and applying a narrow strip of adhesive to one edge of the paper strip, folding the paper strip over the short fibers and flakes of beaten paper to form an envelope enclosing them therein, said cementitious material absorbing the moisture to bind the fibers and flakes at discrete points.

GEORGE A. GERARD.

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