

March 30, 1943.

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2,314,876

BAG, COMPOSITE MATERIAL AND METHOD OF MAKING

Filed Feb. 9, 1939

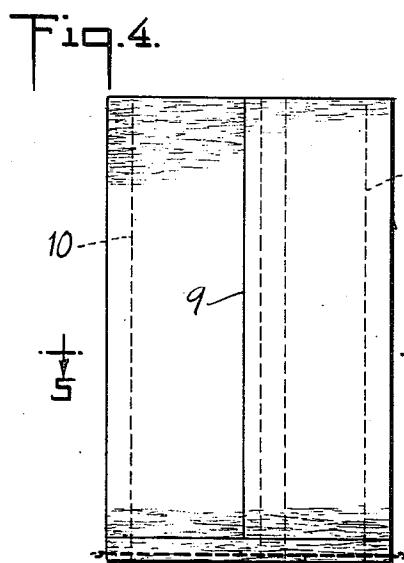
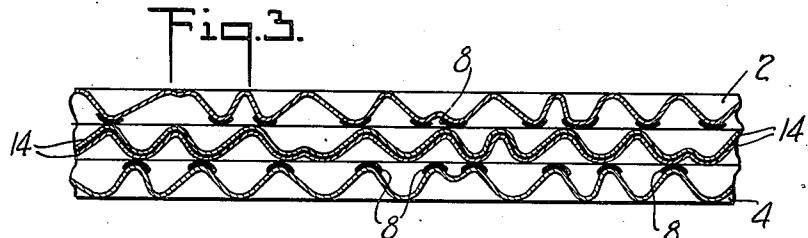
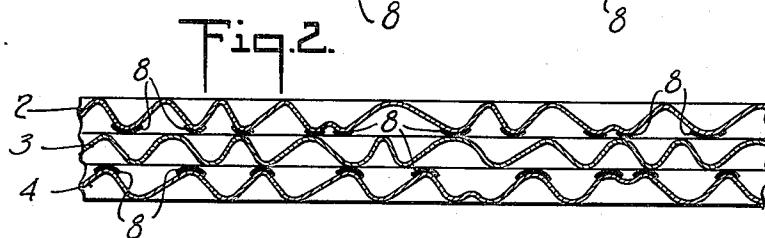
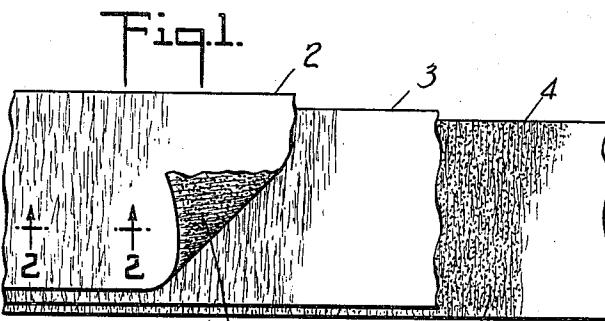


Fig. 5.

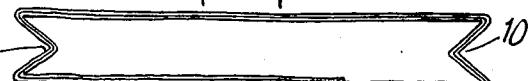
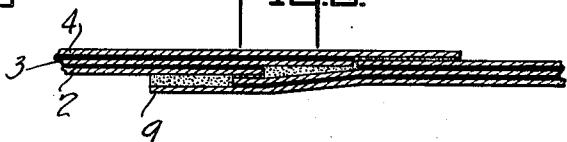


Fig. 6.



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2,314,876

BAG, COMPOSITE MATERIAL, AND METHOD
OF MAKINGEdwin D. Greene, New York, N. Y., assignor to
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Application February 9, 1939, Serial No. 255,467

8 Claims. (Cl. 154—40)

In packaging finely divided material such as sugar, cement and chemicals in approximately one hundred pound lots, cloth bags, paper-lined cloth bags or multi-wall plain paper bags have heretofore been generally employed. Such bags, however, have certain disadvantages.

Cloth bags, and paper-lined cloth bags are expensive. In the case of multi-wall plain paper bags, owing to the unstretchability of the plain paper used and the difficulty in evenly laying the plies in close contact with each other, the plies do not uniformly resist bursting strains. Moreover the stiffness of the multi-ply walls causes them to easily buckle and break when in use.

One of the objects of the present invention is to provide a bag which overcomes the disadvantages of the bags heretofore produced as above described.

Another object of the invention is to provide novel and improved composite sheet material and method of forming the same.

The several features of the invention, whereby the above-mentioned and other objects may be attained, will be readily understood from the following description and accompanying drawing, in which:

Figure 1 is a plan view of my improved composite material in its preferred form;

Fig. 2 is a longitudinal sectional view, partly diagrammatical and on an enlarged scale, of the same;

Fig. 3 is a similar view of a modified form;

Fig. 4 is a side elevation of my improved bag in its preferred form;

Fig. 5 is a transverse sectional view, partly diagrammatical, taken on the line 5—5 of Fig. 4; and

Fig. 6 is a detail transverse sectional view, on an enlarged scale of the side seam of the bag.

My improved composite material is preferably made up of three webs or sheets 2, 3 and 4 of crinkled paper arranged in superposed relation. Preferably the crinkles extend generally transversely of the sheets and the three sheets are of substantially the same stretchability. The degree of stretchability may be varied but, in making bags of the material, I have obtained the most satisfactory results with crinkled paper having approximately fifteen per centum of stretchability. Preferably the several plies are of uniform stretchability but owing to the manner in which they are secured together as hereinafter described, any slight variation in the stretchability does not materially affect the strength of the composite material, and in cases where the ma-

terial has been made into bags, I have had satisfactory results even when the intermediate sheet has had substantially more stretch than the other sheets.

5 The crinkles preferably are formed by the water-creped method which consists in passing each sheet to be crinkled through a water bath to a crinkling cylinder where it is removed by means of a doctor blade. By crinkling the sheets by this method, it has been found that they have maximum elasticity. In the case of my product, I have had very satisfactory results with relatively fine crinkles formed in the paper.

When the three sheets are thus crinkled, a thin 15 coating of suitable adhesive substance 8, such as latex or asphalt, preferably the latter, is applied to the crests of the crinkles on one side of each of the sheets 2 and 4, as illustrated in Fig. 2. Such application of asphalt may be performed in 20 any suitable manner as by running the sheets over a rotating cylinder bearing a thin coating of heated asphalt.

When the crests of the crinkles on one side of 25 each of the two sheets 2 and 4 has the asphalt thus applied, while the asphalt is in moist condition the coated sides of the two sheets are applied to the opposite sides of the intermediate sheet 3 and sufficient pressure is applied to the three sheets to cause the crests of the crinkles of 30 the outer sheets to be secured to the intermediate sheet.

With the three sheets thus secured together in accordance with my improved method, I have found that there is no substantial nesting of the crinkles and only the crests of the crinkles of the three sheets are secured together. Moreover portions of the crests of substantially all of the crinkles of the inner sides of the outer sheets are secured to portions of the crests of substantially 40 all of the crinkles of the intermediate sheet 3. The valleys between the crests remain unsecured and, consequently, closely spaced dead air spaces or pockets are provided between the sheets. Crinkled paper made by the water-crepe method have the crests of the crinkles all substantially in 45 the same plane, and the individual crinkles are made up of portions that are more or less angularly arranged in uneven lines. It is principally because of such formation of the crinkles that there is no substantial nesting of the crinkles of adjacent sheets while the sheets are being secured together as above described.

I have found that by thus securing the sheets together that the resistance to a stretching strain 50 of the composite sheet is materially increased

without materially impairing the resiliency of the sheets.

While my composite material may be used for various purposes, I find it particularly advantageous for making bags, especially large bags for holding as much as one hundred pounds or even more of finely divided material. Where the composite material is to be used for this purpose, the sheets 2, 3 and 4 of crinkled paper are preferably applied in overlapping relation as shown in Fig. 1.

To form the bag as illustrated in Fig. 4, a sheet of the composite material of the desired length may be cut from the web and the sheet made into tubular form as shown. To form the back seam 9 the overlapping edges of the composite sheet may be secured together by latex, or other suitable adhesive, as shown in Fig. 6, so that the corresponding margins of all three sheets are secured to the other corresponding margins of the sheets.

If desired bellows folds 10 may be provided in the sides of the tube, and one end of the tube closed in any suitable manner as by means of a folded and sewn seam 12. The other end of the tube may be left open, prior to filling, or if desired may be closed and a filling valve formed therein.

I have found that my improved bag when filled, is extremely strong circumferentially as well as longitudinally, and will withstand rough handling and bursting strains to a much greater degree than multi-ply plain paper bags of the same basis weight of paper. Also, even after severe tests there is very little lengthening and the bag as a whole keeps its shape remarkably well. The walls of the bag do not tend to buckle and have cloth-like flexibility. Because of the strength and pliability of the bag, it may be re-used for certain purposes and may have more resale value than plain paper bags.

Moreover, the bag effectively resists the admission of air and moisture and has high heat-insulating qualities, this probably being due to the dead air spaces or pockets between the crinkles of adjacent sheets. One reason for the extreme pliability and strength of the material, is apparently due to the manner in which the plies are yieldingly secured together at the crests of the crinkles which allows slight relative movement of the plies, and the plies are more or less cushioned by the air pockets between them.

If desired to increase the air and moisture-proofness, all three plies may be treated with waterproofing material.

To provide the most effective air and moisture-proof bag, I preferably make the intermediate ply of two layers of paper 14 which previously to crinkling are secured together in superposed relation by means of a layer of asphalt or other waterproofing substance. Also, if desired the outer plies of the composite material may be treated with a suitable waterproofing material.

I have secured the best results and maximum strength for the amount of paper used with the use of three plies of paper, the intermediate ply apparently serving most efficiently to cushion and reinforce the other plies. If desired, however, the number of plies may be increased, and in some instances only two plies may be used. In making composite material of two plies, either the ply 2 or 4 may be omitted, and in forming two-ply bags the inner ply may be omitted.

As will be evident to those skilled in the art, my invention permits various modifications with-

out departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. A bag made of composite material of the class described comprising a plurality of sheets of crinkled paper arranged in superposed relation with the crests of the crinkles of adjacent sides of adjacent sheets arranged generally in juxtaposition and adhesively secured together substantially throughout the areas of the sheets, the crinkles of adjacent sheets being generally in non-nested relation and the superposed valleys of the crinkles of said sheets opening into one another and forming air spaces between the sheets, the crinkles in all of the sheets extending transversely of the bag to provide elastic stretchability longitudinally of the bag.
2. A bag made of composite material of the class described comprising at least three sheets of crinkled paper arranged in superposed relation with the crests of the crinkles of adjacent sides of adjacent sheets arranged generally in juxtaposition and adhesively secured together substantially throughout the areas of the sheets, the crinkles of adjacent sheets being generally in non-nested relation and the superposed valleys of the crinkles of said sheets opening into one another and forming air spaces between the sheets, the crinkles in all of the sheets extending transversely of the bag to provide for elastic stretchability longitudinally of the bag, the bag being substantially non-elaastically stretchable circumferentially thereof.
3. A structure according to claim 2 in which an intermediate sheet comprises two plies that are crinkled together and are also secured together by means of a waterproof adhesive so as to form a two-ply waterproof sheet.
4. Composite material of the class described comprising a plurality of webs of crinkled paper arranged in superposed relation with the crests of the crinkles of adjacent sides of adjacent webs arranged generally in juxtaposition and secured together by means of asphaltic adhesive substantially throughout the areas of the webs, the crinkles of adjacent webs being generally in non-nested relation and the superposed valleys of the crinkles of said webs opening into one another and forming air spaces between the webs, the crinkles in all of the webs extending transversely of the composite material to provide for elastic stretchability longitudinally of the material, said superposed valleys being substantially free of the adhesive.
5. Composite material of the class described comprising at least three webs of crinkled paper arranged in superposed relation with the crests of the crinkles of adjacent sides of adjacent webs arranged generally in juxtaposition and secured together substantially throughout the areas of the webs, the crinkles of adjacent webs being generally in non-nested relation and the superposed valleys of the crinkles of said webs opening into one another and forming air spaces between the webs, the crinkles in all of the webs extending transversely of the composite material to provide for elastic stretchability longitudinally of the material.
6. A structure according to claim 5 in which an intermediate web comprises two plies that are crinkled together and are also secured together by means of a waterproof adhesive so as to form a two-ply waterproof web.
7. The method of forming composite material of at least three webs of crinkled paper having

heir crinkles extending transversely of the webs, which comprises applying adhesive material to the crests of the crinkles on one side of each of two of the webs, and superposing said webs on opposite sides of a third web so as to cause said adhesive to secure said crests of the inner sides of the first two webs to the sides of the intermediate web, whereby the crinkles of adjacent webs are arranged generally in non-nested relation and the superposed valleys of the crinkles open into one another and form air spaces between the webs, the crests of the crinkles of adjacent sides of adjacent webs being arranged generally in juxtaposition substantially throughout the areas of the webs.

8. A bag made of composite material of the

5 class described comprising at least three sheets of crinkled paper arranged in superposed relation with the crinkles arranged generally in non-nested condition, asphaltic adhesive securing the superposed crests of the crinkles of adjacent sheets together, said crests being arranged generally in juxtaposition throughout the areas of the sheets, the superposed valleys of the crinkles of said sheets opening into one another and forming air spaces between the sheets, said valleys being substantially free of said asphaltic adhesive, and the crinkles in all of the sheets extending transversely of the bag to provide elastic stretchability longitudinally of the bag.

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