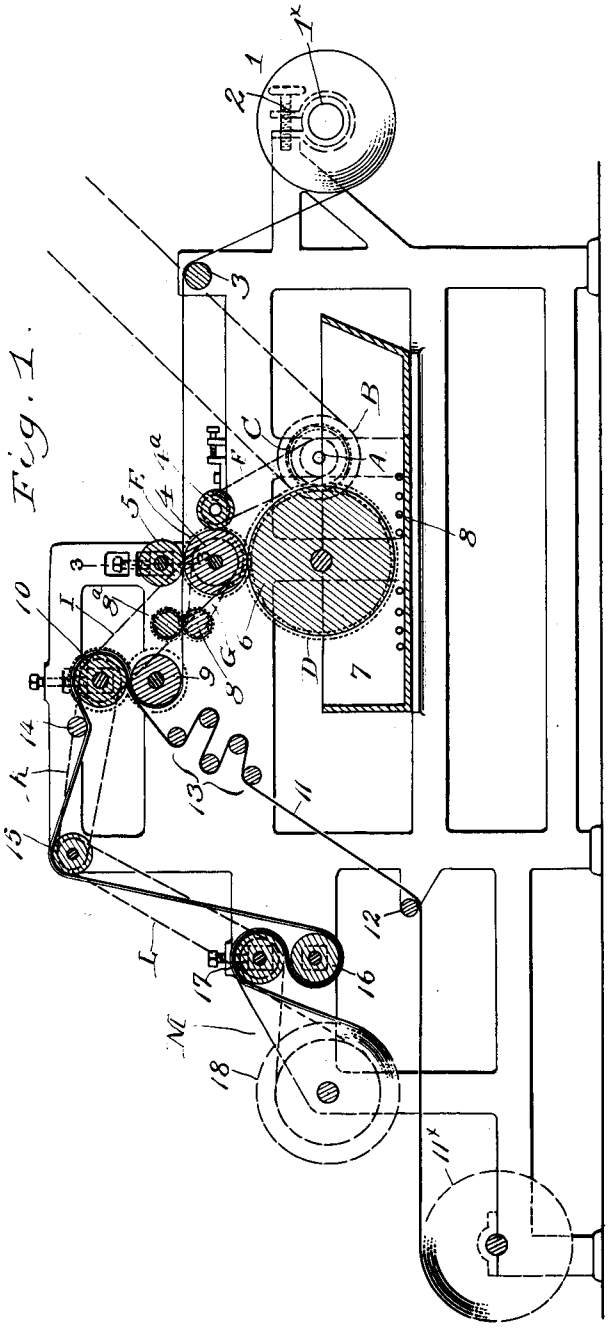
Oct. 30, 1928. 1,689,354

J. R. McKENNA

METHOD OF FORMING COMBINED PAPER AND FABRIC MATERIAL

Filed March 11, 1925 3 Sheets-Sheet 1

Fig. 1.



INVENTOR.

BY J. R. McKenna

Rogers, Kennedy & Campbell

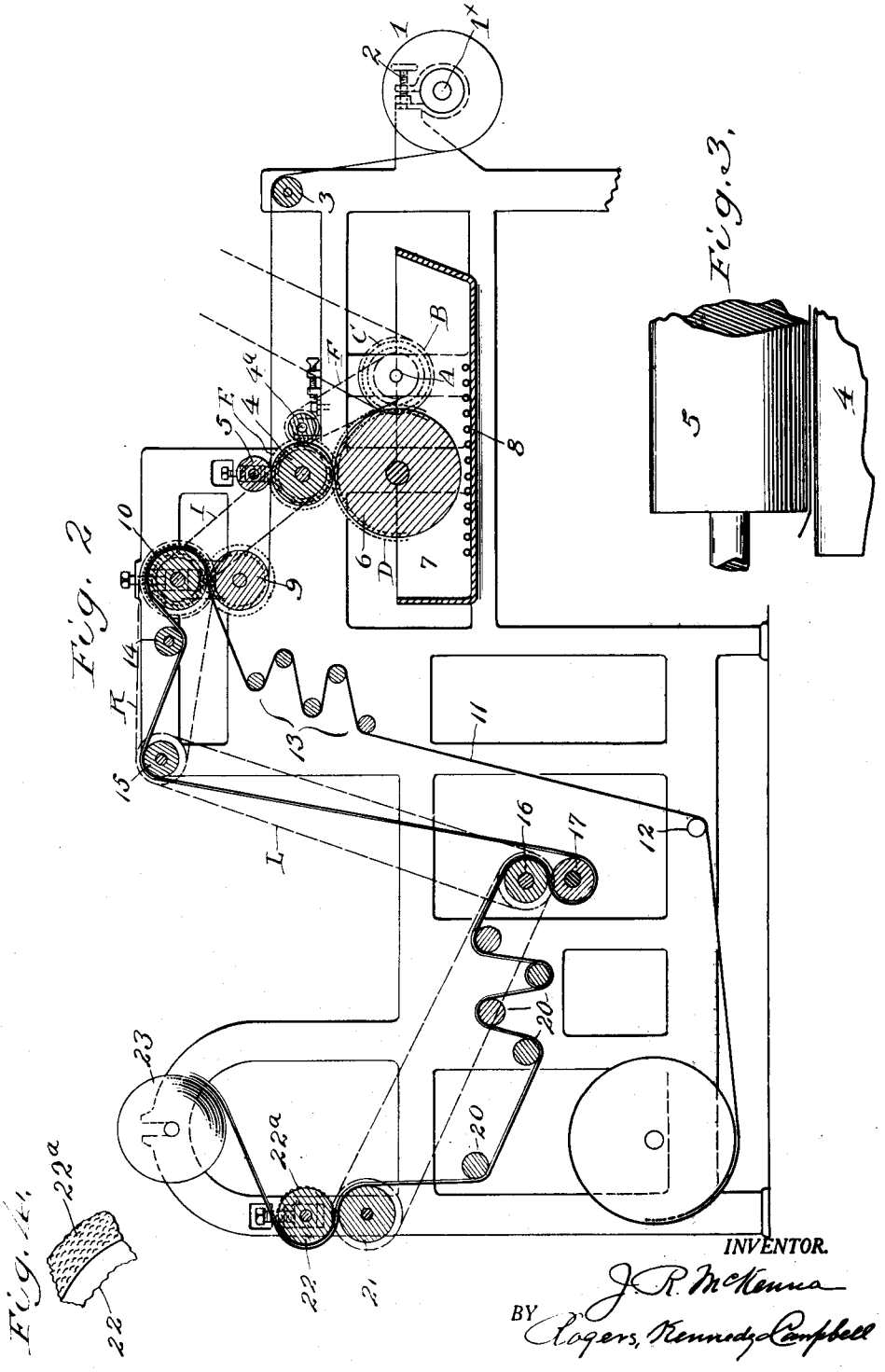
ATTORNEYS.

Oct. 30, 1928. 1,689,354

J. R. McKENNA

METHOD OF FORMING COMBINED PAPER AND FABRIC MATERIAL

Filed March 11, 1925 3 Sheets-Sheet 2



INVENTOR.

J. R. McKenna

BY Rogers, Kennedy & Campbell

ATTORNEYS

Oct. 30, 1928. 1,689,354

J. R. McKENNA

METHOD OF FORMING COMBINED PAPER AND FABRIC MATERIAL

Filed March 11, 1925 3 Sheets-Sheet 3

Fig. 10

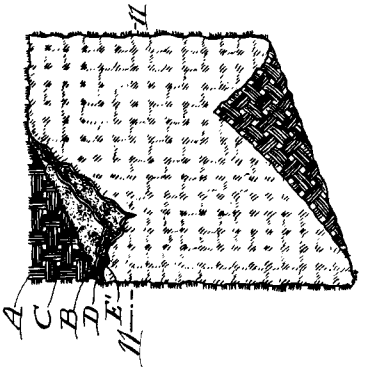


Fig. 11.

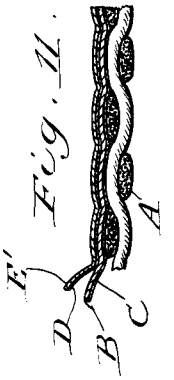


Fig. 8.

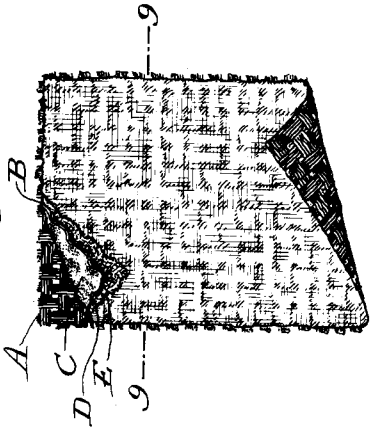


Fig. 9.

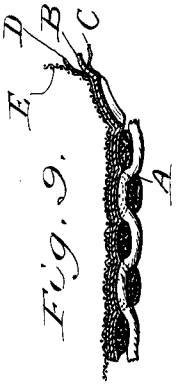


Fig. 7.



Fig. 5.

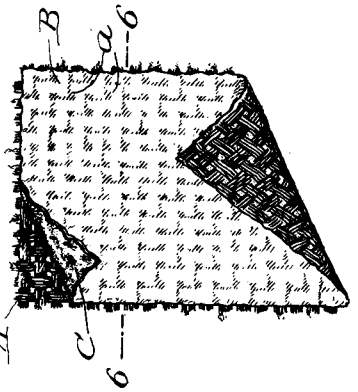


Fig. 6.



INVENTOR.
J. R. McKenna
BY Rogers, Kennedy & Campbell
ATTORNEYS

Patented Oct. 30, 1928. 1,689,354

UNITED STATES PATENT OFFICE.

JAMES R. McKENNA, OF CLEVELAND, OHIO.

METHOD OF FORMING COMBINED PAPER AND FABRIC MATERIAL.

Application filed March 11, 1925. Serial No. 14,647.

This invention relates to a combined fabric and paper material and to the means for and method of manufacturing the same. By combined fabric and paper material is meant a textile or woven fabric, such for instance as burlap or the like, and a lining or covering of paper cemented or otherwise fixed to one face thereof for the purpose of making the fabric impervious to the passage therethrough of granular or pulverulent substances by closing or covering the meshes of the same. This combined material has been used for the manufacture of bags or sacks for holding finely granular and pulverulent substances. To prevent the escape of the fine particles through the meshes of the burlap, and in order to enable the fabric to stretch under the pressure or strains of the contents, without at the same time rupturing the paper lining, a crimpy or crinkled paper has been employed for such lining having the property of yielding or stretching without tearing at a strain less than that which the fabric will bear without rupture.

My invention is directed to a combined material of this type of improved form and construction, with the two materials united in such a way as to form in effect a unitary practically homogeneous structure, in which there will be no liability of the paper stripping or separating from the fabric, and in which the paper will yield or stretch without rupture at a stress less than that which the textile fabric will bear; and with these and other objects in view, the invention consists in the method of uniting the two materials by supplying a suitable adhesive between their adjacent faces, and subjecting the same to pressure to cause the paper and adhesive to become embedded in and to penetrate into the meshes or weave of the fabric. The invention consists also in the improved apparatus for practicing said method; and in the improved combined material produced by such method.

The paper by being embedded in the meshes of the fabric, presents an uneven or crimped or crinkled surface, due to the penetration of the paper into the fabric at the points corresponding to the meshes, and as a result the paper will possess elastic or yielding properties which will enable the same to stretch in all directions, more particularly in the direction of the bias of the woven material or backing, so that the woven material may stretch under the stresses of the load without rupturing the paper lining.

The two materials, the textile or woven fabric and the paper lining, may be manipulated in different ways to bring about the union in the manner described, it being important that the adhesive supplied between the two sheets to cause them to adhere to each other, be applied throughout the entire area of the paper sheet and not only at intervals, and this to the end that in the embedding of the paper into the meshes of the fabric, the adhesive material will also be caused to enter the meshes with the embedding portions of the paper. For instance a crimped or crinkled paper may be provided and subjected to tension to stretch the same and thereby temporarily remove the wrinkles so as to produce a smooth plain surface, and an adhesive coating applied to the surface to fully cover the same and the paper sheet laid against the fabric sheet, and after removing the tension on the paper sheet so as to enable the latter to resume its former condition with the folds and wrinkles therein, the two sheets are subjected to pressure to cause the protuberant portions of the crinkled paper and the adhesive to become embedded in the meshes of the fabric. Or a smooth unwrinkled paper may be employed, the adhesive coating applied thereto, and the same laid against the burlap sheet and the two passed between pressure rolls, one of which, that contacting with the paper, has its peripheral surface formed with a wavy or crimpy pattern consisting of depressions and adjacent protuberances, which by pressure on the paper, will give the same a corresponding pattern and will force the protuberances into the meshes of the fabric, together with the adhesive, and thereby unite the two in the manner above described. Or the two sheets may be manipulated in other ways, the important requirements being that the paper sheet shall be coated throughout its area with the adhesive material, and that the paper, together with the adhesive material, will become embedded in the meshes of the fabric, thereby bringing about a very close and perfect unification of the two and producing a combined fabric of great strength, impervious to the passage of granular or pulverulent materials, and capable of yielding and stretching under the stresses of the load without break or rupture.

In the accompanying drawings I have shown two forms of apparatus, one where the operation is started with the employment of a crinkled paper as above described, and the other where the operation is started with a smooth or plain paper, but it will be understood that the invention is not limited to the employment of such specific forms of apparatus in carrying the improved method into effect, and that other forms of apparatus may be employed; or the materials may be manipulated by hand to bring about the character of union referred to.

In the accompanying drawings:

Fig. 1 is a side elevation of a machine suitable for the practice of my improved method, where the operation is started with a crimped paper.

Fig. 2 is a similar view of a machine for carrying out the method, where the operation is started with a smooth paper.

Fig. 3 is a cross section on the line 3—3 of Figs. 1 and 2.

Fig. 4 is a fragmentary view showing the face of the pressure roll of the machine of Fig. 2 by which the paper is given its crimped or crinkled form and embedded into the meshes of the fabric.

Fig. 5 is a perspective view of the improved combined material in its preferred form as made up of a textile or woven fabric and a paper lining united thereto.

Fig. 6 is a sectional view on the line 6—6 of Fig. 5.

Fig. 7 is a perspective view of the same in more conventional form, a part of the paper lining being removed to better show the embedding or penetration of the paper and adhesive into the meshes of the fabric.

Fig. 8 is a view similar to Fig. 5 showing the combined material having a layer of cotton fabric applied to the paper.

Fig. 9 is a sectional elevation of the same on the line 9—9 of Fig. 8.

Fig. 10 is a view similar to Fig. 8 showing the combined material with two thicknesses of paper applied to the fabric.

Fig. 11 is a cross section of the same on the line 11—11 of Fig. 10.

In the description to follow I will describe my invention carried out in connection with a textile or woven fabric in the form of burlap designed more particularly for making sacks or bags, but it will be understood that other forms of fabric may be employed without departing from the scope of the invention, the important feature of the invention being the attachment of a paper lining to woven fabric by embedding the paper, together with the intermediate adhesive compound into the meshes of the fabric to secure their firm and effective union. The said adhesive compound consists preferably of a waterproof compound having asphaltum as its base, although other forms of adhesive compounds may be employed within the scope of the invention. In the specification and claim wherever reference is made to a fabric it is intended to include any textile or woven fabric suitable for realizing the aims and advantages of the invention; and wherever reference is made to an adhesive composition or compound it is intended to include any form of adhesive which will serve to connect the paper lining to the fabric as hereinbefore pointed out.

The combined fabric of my invention in its simplest form is shown in Figs. 5, 6 and 7 where it will be seen that it consists of a base A of woven or textile fabric, a covering sheet or lining B of paper, and a suitable intermediate adhesive compound C, preferably waterproof, the paper together with the adhesive compound being embedded and anchored at intervals as at *a* into the meshes or weave of the fabric. The two materials by this mode of connection are firmly united to each other, and the paper is given a crimped or crinkly condition which imparts to it the property of stretching in all directions, so that a bag made up from such combined material is well adapted to hold granular or pulverulent material without the latter sifting through the meshes of the fabric, and the stretch or yield of the fabric under the stresses of the loads can occur without danger of rupturing the paper lining, which latter will yield without tearing under the greatest stretch of which the fabric is capable without giving away.

In Fig. 1 is shown a machine suitable for the formation of a combined material of this construction. In this machine a supply of crinkled paper in the form of a roll 1, is supported in the machine frame at one end of the same, the journal 1^{x} of the roll having applied to it a friction brake 2 for producing a tension on the strip in the upwinding of the same. From the supply roll the paper passes upwardly over an idler roller 3 journaled in the machine frame, then horizontally between a rotary roller 4 and overlying rotary weighted pressure roller 5, the purpose of the roller 4 being to apply the adhesive compound to the surface of the paper strip to enable it to be connected to the textile or woven fabric strip which is fed to the coated paper in a further stage of the operation presently to be described. The roller 4 rotates in contact with a larger roller 6 beneath it suitably journaled in the machine frame and immersed in a pan 7 containing a supply of the adhesive compound, which is kept in liquid form by a steam coil 8 in the bottom of the pan or by other suitable heating means. The roller 6, suitably driven as hereafter described, acts to transfer coating material to the surface of the roller 4 with which cooperates a coating distributing roller 4^{a}, and the roller 4 by con-

tacting with the lower face of the paper strip, acts to spread and distribute the adhesive compound over the surface of the paper. It is preferred that the width of the pressure roller 5 be slightly less than the width of the paper strip as shown in Fig. 3, so that the marginal edges of the paper strip will not be pressed down on the roller 4, and consequently will not be coated with the adhesive compound, the purpose of this arrangement being to keep the marginal edges, say a half an inch at each side of a strip say forty inches in width, clean and free of the adhesive composition.

From the coating roller 4 the coated paper passes between tension rollers 8 and 8^a, thence under and upwardly around a roller 9 between it and a roller 10 arranged thereover, which rollers are journaled for rotation in the machine frame and are positively rotated in opposite directions to draw the material between them. At this point the textile or woven material 11 is fed into the machine and passes with the coated paper, in contact with the coated side of the same, between the two rollers 9 and 10, the pressure of which acts to subject the two materials and intermediate adhesive compound to a squeezing and pressing action to bring about their adhesion and combination. The burlap 11 entering between the rollers 9 and 10 is drawn by said rollers along with the coated paper, from a supply roll 11^x of the burlap suitably mounted in the machine frame near its rear end, and from the supply roll the material passes under a fixed horizontal bar 12 thence upwardly and back and forth around a number of horizontal bars 13 arranged adjacent the roller 9, whereby the strip of material is subjected to a moderate degree of tension as it is drawn with the coated paper between the rollers 9 and 10. The combined material after emerging from between the rollers 9 and 10 passes upwardly and around the roller 10 and thence under an idler roller 14 and rearwardly over a similar roller 15, which rollers are suitably mounted in the machine frame. From the roller 15 the combined material passes downwardly and rearwardly around the lower side of a roller 16, thence upwardly around said roller and between it and an overlying roller 17. These rollers 16 and 17 are mounted in suitable journals in the machine frame and are operated as will be presently described so as to draw the combined material between them, and they act to subject the combined material and intermediate adhesive compound to a further squeezing and pressing action, the effect of which is to cause the protuberant portions of the crinkled paper to enter and embed and anchor themselves, together with portions of the adhesive compound, in the meshes or weave of the burlap fabric. After passing between the rollers 16 and 17, the finished combined material is wound on a roller 18 mounted in the machine and driven by suitable means, and when the roll of finished material reaches a sufficient diameter, the material is severed and the roll removed from the machine.

In the passage of the paper strip from the supply roll to the rollers 9 and 10, where the burlap is applied to and combined with the coated strip, the parts of the machine are so operated that the length of paper from the supply roll to the rollers 9 and 10 will be subjected by the action of rolls 8 and 8^a to sufficient tension to stretch it out and thereby remove the crinkled or wrinkly condition and present a smooth surface to the action of the coating roller 4, so that the adhesive composition will be applied throughout the entire surface of the strip. Subsequently this tension is relieved, to the end that the paper may resume its former or wrinkled condition, so that when subjected to the squeezing action of the pressure rollers 9 and 10 and 16 and 17, the protuberant portions of the wrinkled paper will be embedded and anchored in the meshes of the fabric as previously described, and to effect this relief of the tension, the rollers 8 and 8^a are driven at a speed relatively faster than the rollers 9 and 10 which will relieve the tension on the paper and permit it to resume its former wrinkled condition before the combined material passes between the rollers 9 and 10.

The various operative parts of the machine above described are in the present instance driven as follows:

A driving shaft A is mounted in suitable bearings in the machine frame and has on one end a driving pulley B driven by a belt from a suitable source of power. At its opposite end the shaft A has fixed to it a gear C meshing with a pinion D on the roll 6 by which means the roll 6 is positively rotated. The pinion D meshes with a pinion E on the roll 4 and imparts rotary motion to said roll. The distributing roll 4^a is driven by a belt F from the driving shaft A and the upper tension roller 8^a is driven by a belt G from the roller 4. Roller 10 is driven by a belt I from the roller 4 and in turn it drives roller 15 by means of a belt K. Roller 17 is driven from roller 15 by a belt L, and roller 18 is driven from roller 17 by a belt M.

It will be understood that tension rollers 8 and 8^a are driven at relatively higher speed than the rolls 9 and 10 so that, as before explained, the tension rollers will act to draw the length of material passing between the rollers 4 and 5 taut and make the material wrinkle-free, and after the material passes between the tension rollers, it will become slack again before it enters the rollers 9 and 10 so as to permit the wrinkles to reform.

In the method of operation just described as practiced by the machine of the form

shown in Fig. 1, the operation is started by the employment of a crimped paper, and in order to enable the adhesive to be applied throughout the surface of the paper, the latter is first stretched to make it smooth to receive the adhesive, and the tension is thereafter relieved to permit the crimps to reform so that they may be embedded into the meshes of the fabric. As before stated however I may start out with a plain smooth paper and form the crimps or wrinkles therein in a later stage of the operation by a specially patterned roller which will at the same time act to embed the paper into the meshes of the fabric. A machine for this purpose is shown in Fig. 2 where it will be seen that the form and construction of the parts is the same up to the roller 15 as those shown in Fig. 1, except that the tension rollers 8 and 8^a are omitted from Fig. 2 since it will not be necessary to draw the material taut and remove the wrinkles as in the case of Fig. 1. From this point in the machine of Fig. 2, the combined material passes downwardly and between rolls 16 and 17, then back and forth over and around a series of fixed bars 20, and after leaving the last bar of the series, the material passed upwardly around a roller 21 and between it and an overlying pressure roller 22, which rollers are driven by suitable means to draw the combined material between them. In this form of apparatus the paper, up to the point where it enters the pass between the rollers 21 and 22, is smooth and free from wrinkles, and in order therefore that in the finished combined material issuing from between these rollers, the paper will be embedded in the meshes of the fabric and will be made elastic so that it can stretch without rupture in accordance with the invention, the surface of the roller 22 is formed with a crimped or crinkled pattern 22^a consisting of protuberant portions and adjacent depressions, as shown in Fig. 4, and in the passage of the combined material beneath this roller, the latter will act to impart its design to the paper and give the same a crimped form, while at the same time embedding and anchoring the protuberant portions of the paper into the meshes of the adhering fabric, together with the adhesive compound, whereby the finished product will possess all of the characteristics of the product produced by the machine of Fig. 1 and illustrated in Figs. 5, 6 and 7. In order that the patterned roller 22 may act with these functions and effects, the underlying roller 21 is in the form of a solid paper roll so that the patterned roller will be prevented from cutting the paper or fabric, it being understood that the patterned roller is mounted relative to the underlying roll to act with great pressure against the combined fabric passing between the rollers. From the rollers 21 and 22 the finished combined material passes upwardly and is wound on a winding roller 23 suitably journaled in the machine frame, and when the diameter of the roll of finished material becomes sufficiently large, the material is severed and the roll removed from the machine.

I may instead of employing the patterned roller 22 to form crimps or wrinkles in a plain smooth paper as just described, use this roller to supplement the action of the machine of Fig. 1, in which it will be remembered, a crimped paper was employed and the crimps forced into the meshes of the burlap fabric in the passage of the combined material between the rollers 9 and 10. To combine the operation of the patterned roller with the operation of the machine of Fig. 1, the combined material issuing from between the rollers 16 and 17 would instead of being wound onto the roll 18, be led around fixed bars similar to the bars 20 of Fig. 2, and then between the patterned roller 22 and the underlying cooperating roller 21. In such case there would be a very effectual embedding action of the paper into the meshes of the fabric, as the action of the patterned roller on the previously embedded paper, would be to bring about a more certain and effective embedding and seating of the paper and adhesive into the meshes of the fabric.

In certain cases it may be desirable to apply a covering or layer of cotton fabric E to the crimped paper B as shown in Figs. 8 and 9, so that the combined material of this form would be composed of a base of the burlap fabric A, a layer of adhesive C, a covering of crimped paper B, a second layer of adhesive D, and a covering of cotton fabric E cemented to the paper, the cotton fabric being embedded into the burlap fabric along with the crimped paper. Such a combined material could be conveniently produced by the machine of the forms above described, for instance, by feeding into the machine of Fig. 1 from the tension roller 1^x, a combined material of the form shown in Figs. 5 and 6 with the paper on the underside to receive a coating of the adhesive compound, and then combining with this material, a cotton fabric fed into the machine along with the combined material between the rollers 9 and 10.

Or, it may be desirable in other cases to make up the combined material with a double layer of paper such as shown in Figs. 10 and 11 where it will be seen that the combined material comprises a base A of fabric, a layer of adhesive C, a covering B of crimped paper, a second layer of adhesive D, and a second covering E^1 of crimped paper. A material of this form could be conveniently produced by feeding into the machine from the tension roller 1^x a combined material of the form of

Figs. 5 and 6 with the paper on the underside to receive a coating of adhesive compound, and by combining with this material a crimped paper fed into the machine between the rollers 9 and 10 along with the combined material.

In the foregoing description and accompanying drawings I have set forth my invention in respect to the method of procedure, the apparatus employed, and the structural form of the material, in the particular detailed form which I prefer to adopt. It will be understood that these details may be variously changed and modified without departing from the spirit of the invention, and further it will be understood that the invention is not limited to any particular form or construction of the parts of the apparatus, or to any particular sequence of steps of the method of procedure, or to any particular structural form of the product produced by such method, except in so far as such limitations are specified in the claim.

Having thus described my invention, what I claim is:

The method of uniting crimped or crinkled paper with woven fabric, which consists in providing a crimped or crinkled paper, stretching the same to temporarily remove the crimps and produce a smooth surface, applying an adhesive coating to the smooth surface of the paper, laying the coated paper against the fabric, relieving the paper of stretch to permit the crimps to reform, and subjecting the combined material to pressure to cause the crimps of the paper and the adhesive to become embedded in the meshes of the fabric.

In testimony whereof, I have affixed my signature hereto.

JAMES R. McKENNA.