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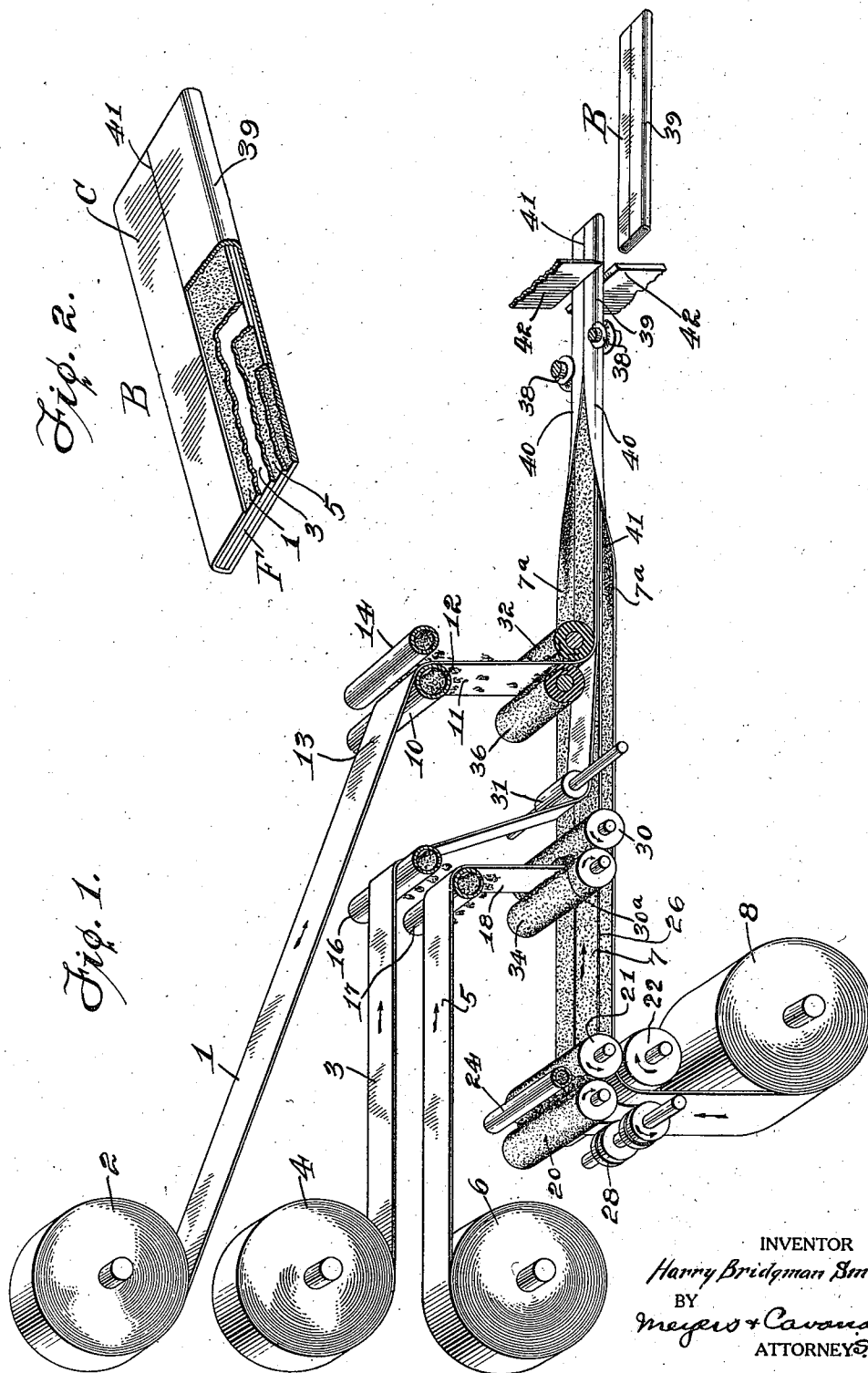
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METHOD OF MAKING CLOTH BOARDS AND SIMILAR ARTICLES

Filed Oct. 18, 1923

2 Sheets-Sheet 1



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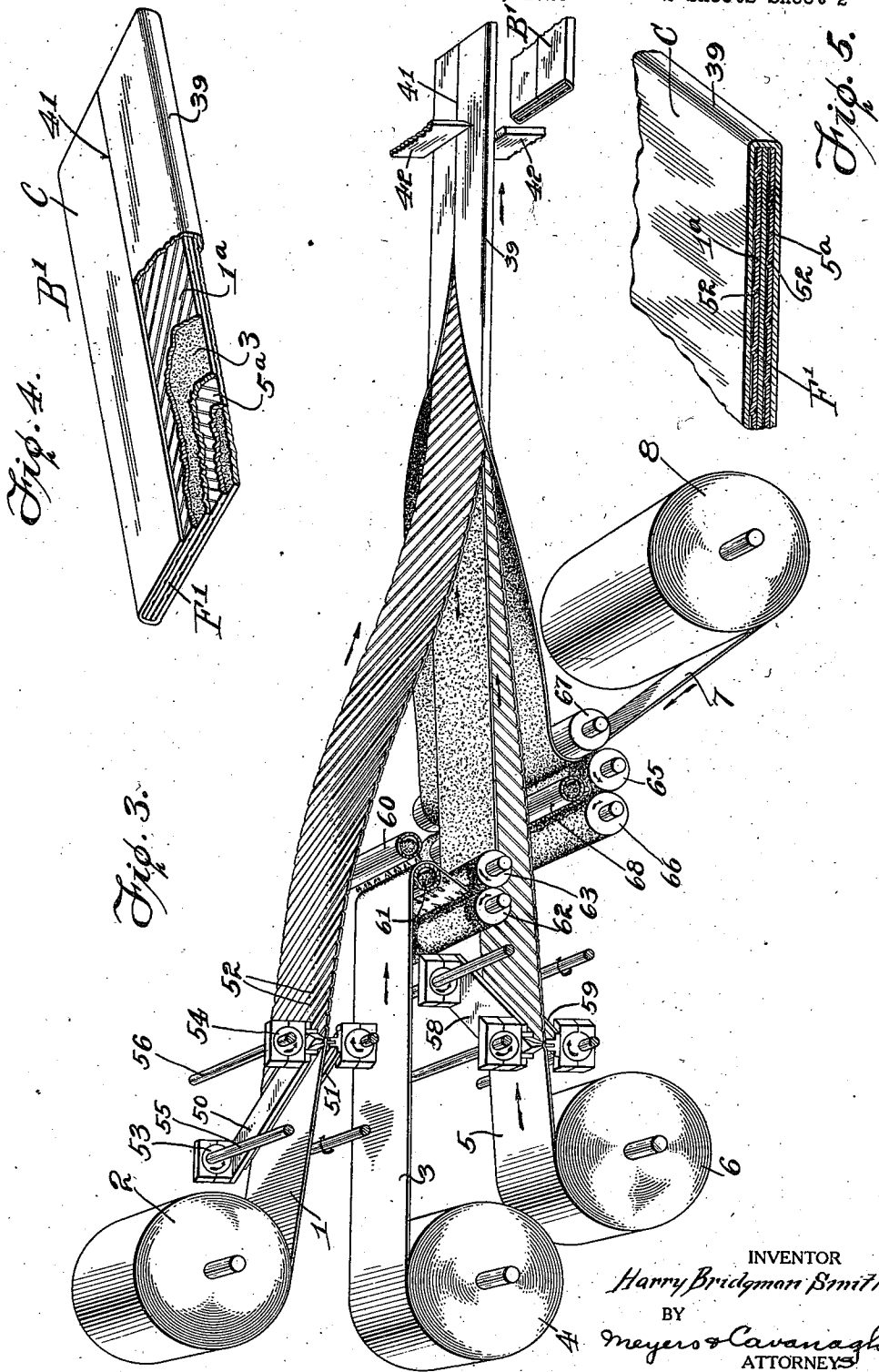
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UNITED STATES PATENT OFFICE.

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METHOD OF MAKING CLOTH BOARDS AND SIMILAR ARTICLES.

Application filed October 18, 1923. Serial No: 669,389

My invention relates to methods of producing cloth boards and similar articles of the general character disclosed in companion applications executed on even date herewith.

The general object of the invention is to provide very rapid and economical methods of producing these articles, which are at the same time adapted for the production of cloth boards composed of inexpensive materials and which are unusually light and strong and have other desirable characteristics as sufficiently pointed out in the above mentioned companion applications.

An important characteristic of the invention is the generally continuous method of handling the materials to produce a continuous assembly and producing the individual articles by severing the assembly transversely.

Another important characteristic is the provision of a production method in accordance with which one or more strips or webs of suitable core material are advanced from rolls, creased or embossed when such treatment is desired, adhesively treated, and a continuous strip or web of envelope or cover material is advanced from a roll, this web being much wider than, and usually more than twice as wide as the core strips, the cover web being, when desired, scored or creased to facilitate folding, treated with adhesive whenever necessary in view of the mode of applying adhesive to the core materials, the various strips or webs are brought together to form a continuous assembly, at a suitable point in the concurrent advance of the materials the projecting margins of the cover web are folded over and the entire cover or envelope is secured in adhesive engagement with the core, and at a suitable point in the advance of the completed assembly so produced, it is severed transversely at suitable intervals to produce the individual cloth boards or analogous articles.

The characteristics and advantages of the invention are further sufficiently explained in connection with the following detail description of the accompanying drawings, which sufficiently explain representative performances of the process. After considering these examples, persons skilled in the art will understand that many variations may be made within the principles of the inven-

tion, and I contemplate the employment of any methods or method steps which are properly within the scope of the appended claims.

Figure 1 is a perspective diagrammatic view explaining one performance of the method.

Figure 2 is a perspective view of a cloth board produced by this method, certain parts being broken away for explanatory purposes.

Figure 3 is a similar view explaining a variation of the method, with particular reference to embossing the filler strips or certain of them.

Figure 4 is a perspective view of a cloth board produced by the method of Figure 3, with materials broken away for explanatory purposes.

Figure 5 is a perspective end view of a portion of the same, enlarged.

In the method as exemplified in Fig. 1, a strip or web 1 of suitable core or filler material is drawn from a roll 2; another web 3 of filler material is drawn from a roll 4 and a third web 5 of filler material is drawn from a roll 6. In some cases only one strip or web of filler material may be used or any reasonable plurality of strips or webs may be provided depending on the desired nature or thickness of the materials, the necessary strength or thickness of the board to be produced, and other considerations. When a plurality of webs are provided they may be similar and of similar thickness, or the character of the materials in the different webs may be different or they may be of different thicknesses.

In most cases the filler is composed of a plurality of webs of cardboard or like material of substantial but moderate thickness so that it may be conveniently furnished in roll form.

A strip or web 7 of suitable cover or envelope material is advanced from a roll 8. The cover web may be of any suitable fibrous sheet material usually paper of substantial thickness and toughness, or cardboard of suitable thickness, usually somewhat thinner than the filler webs although not necessarily so. The cover web is wider than the filler strips and usually more than twice as wide, to provide for folding the cover web completely about the filler, to

provide a complete smooth-surfaced envelope therefor.

The further steps of the method will now be described as particularly illustrated in Fig. 1, without attempting to explain all the practicable variations, these variations so far as they are not particularly explained being comprehended in the scope of the appended claims.

10 Filler web 1 is drawn over a suitable guide 10 which in this case is a glue pipe, and one or both surfaces of the web are treated with adhesive. For instance, glue may be discharged on surface 11 by perforations 12 in pipe 10 and glue may be applied to the other surface 13 through perforations in another glue pipe 14. Filler web 3 is passed over a suitable guide which, for convenience, is a glue pipe 16, but since this web in the present case is a central web of a three layer core assembly and the confronting faces of the other webs are adhesively conditioned, it is unnecessary to supply glue to either face of web 3. Filler web 5 is passed over a suitable guide which is conveniently a glue pipe 17 and the glue is supplied to surface 18 of the web through perforations in pipe 17 and glue is applied to the other face of the web through perforations in glue pipe 16 above mentioned which is conveniently located for this purpose.

Provision is made for applying glue to one surface of the cover web 7. When glue is applied all over this surface it is possible to omit the application of glue to the under surface of filler web 5 and the upper surface of filler web 1. The various glue applications may be regulated as may be convenient, so long as glued surfaces are provided for the complete adhesive attachment of the cover web to and about the core.

In the present example two glue rolls 20 and 21 are arranged above a surface of the cover web adjacent to a guide roll 22 over which the web passes. One of the rolls 21 constitutes the glue applying roll and is in contact with the web and the other roll is free from it. The rolls 20 and 21 are in contact along an approximately horizontal line, and they are driven in opposite directions with their engaging faces moving downward as indicated by arrows. Preferably, one of the rolls is driven faster than the other; for example, when roll 21 travels at the surface speed of the web, roll 20 may be driven either faster or slower to produce a rubbing contact and a more even distribution of glue on the surface of glue applying roll 21. Glue is supplied from perforations in the lower surface of a glue supply pipe 24 to the trough-like receptacle provided by the surfaces of rolls 20 and 21 above their line of contact, forming a pool or puddle of glue supported by

the roll surfaces; and excess glue spills away at the end of the rolls and may be caught in any suitable trough (not shown). In this way the surface of roll 21 is evenly supplied with a film of glue of suitable thickness, and this is applied to the upper surface of web 7 when it is desired to coat that web.

When necessary or desirable on account of the quality or thickness of the cover web, or for other reasons, longitudinal scores, creases or folding lines 26 may be formed in the cover web, the positions of these lines corresponding to the longitudinal edges of the core material about which the web is to be subsequently folded. It is usually convenient to produce these scores or creases prior to application of glue to the web and before assembly contact of the cover web with other materials. For this purpose any suitable creasing or scoring devices 28 are indicated in positions anterior to glue roll 21. The particular devices illustrated may be rotary scoring wheels or creasers cooperating with guide roll 22 or they may be grinding wheels to remove a part of the web material. Any known or suitable scoring or creasing devices may be employed.

At suitable points in the advance of the materials they are brought into assembly contact. The order of engagement of the different webs may vary greatly. In some cases all of the filler webs may be brought together to form a filler assembly which may then come in contact with the cover web; otherwise the filler may be progressively built up after certain parts of it have been brought in contact with the cover web, as in the present example.

Filler web 5 whether glued on one surface or on both surfaces as above stated, is passed under a guide and pressing roll 30 which presses the filler web in adhesive engagement with the central zone of the cover web 7 between the folded lines 26, if those lines are produced upon the cover, or otherwise in the position indicated by the lines in Figure 1.

Web 3 is led under a guide and pressing roll 31, and web 1 is led under a similar roll 32, which brings the adhesively coated under surface of the web in contact with the upper surface of web 3, completing the core structure, which from that point proceeds with the envelope web, constituting the continuous assembly, which is complete so far as its components are concerned, but not fully formed or shaped into desired complete cross-sectional form.

It is desirable in conjunction with the method of applying adhesive above described, to additionally spread or uniformly distribute the adhesive upon the webs and this is conveniently, although not necessarily

ly, done in conjunction with the application of the successive webs to the assembly by pressing rolls 30 and 32, reference to web 3 and its pressing roll 31 being omitted because in the present example no adhesive is applied to that web. For this purpose a glue distributing roll 34 is arranged adjacent to roll 30 and web 18 is led between the two rolls and yielding pressure is applied to the journals of rolls 34, so that as the web passes between the rolls it is pressed and the adhesive on one or both faces is rolled or squeezed and uniformly distributed. The rolls 30 and 34 rotate as indicated by arrows and exert a squeezing effect upon the web and the adhesive carried thereby, and when the adhesive is supplied in suitable quantity there is usually a slight excess of adhesive which, by the squeezing action and movement of the rolls is formed into a shallow puddle or mound of adhesive 30^a, supported by the adjacent roll surfaces and in contact with the faces and edges of the web 18, so that the web passes through this puddle and is very completely and effectively coated. To provide further for the effective application of the adhesive the rolls may in certain cases be driven at different speeds so that, for example, while roll 30 is usually driven at the surface speed of the web, roll 34 may be driven faster or slower to produce a rubbing effect and thus still further improve the uniformity of distribution and application of adhesive to the web. A glue distributing roll 36 is similarly arranged adjacent to pressing roll 32, to act upon web 1 and distribute or regulate the adhesive thereon in a similar manner.

The completely assembled materials now proceed to a convenient point at which the projecting margins 7^a of the cover web are folded about the longitudinal edges of the core strips and upon the upper flat surfaces of the core and pressed in position to secure them by adhesive previously placed upon the cover web or the upper surface of the top core web 1. Any suitable devices (not shown) may be used for performing these operations. At a suitable point in the further progress of the assembly its edges are acted upon by any suitable devices sufficiently indicated by channel-edged pressing rolls 38, to smoothly press the envelope edges; and preferably these rolls are so formed, or the assembly is so treated, that edges 39 are convexly rounded and any sharp corners at 40 are substantially eliminated.

The cover web is desirably of such width that when folded over and secured as above explained, its longitudinal edges 41 do not overlap but closely meet or abut to provide a smooth surface finish.

At a suitable point in the further advance

of the now completely formed assembly it is severed transversely by any suitable devices sufficiently represented by cutters 42, the severing operations being performed usually at regular intervals to produce the individual cloth boards B. While reciprocating cutters are here shown for the sake of simplicity, the severing devices may be so arranged, for instance by mounting them on rolls, that there need be no stoppage of movement of the continuous assembly incident to the cutting operation, or for any other reason.

Any suitable devices (not shown) may be provided to insure the proper advancing movement of the materials, for instance any suitable traction devices may be provided anterior to the cutting point to properly advance the continuous assembly.

The result of the said operations is the production in rapid succession of completed cloth boards or similar articles which, in accordance with the particular production method described, and as sufficiently shown in Figure 2, comprise a core or filler structure F consisting of a plurality of sheets or layers of fibrous material 1, 3 and 5, adhesively secured together, and a cover or envelope C consisting of a sheet of fibrous material wider than the core sheets and folded about them to completely and smoothly cover the broad sides and longitudinal edges of the core, and adhesively secured, and having smoothly and convexly rounded edges 39. The characteristics and advantages of the product are further described in one of the above mentioned companion applications.

Figures 3, 4 and 5 show a modification and variation of the production method with a view particularly to producing a cloth board or like article in which some or all of the filler seats are creased, ribbed or embossed in order to produce an article having greater strength or stiffness, or greater thickness with a given quantity or weight of material, resulting in an immense economy in the amount of cardboard or other fibrous material used, and a very considerable economy in adhesive and also producing a board which is exceptionally light for given dimensions, strength and stiffness, and therefore is very economical both as to its original cost and in respect to shipping costs either when the boards are shipped in quantity to textile manufacturers or converters, or when fabric bolts including such cloth boards, are shipped to jobbers or other consumers.

For this purpose, in the particular performance of the method illustrated in Figure 3, the webs 1, 3 and 5 are arranged and advanced as in the previous example, and prior to assembly contact one or more of the webs are treated to produce suitable embossed formations thereon. In the broader aspect

of the invention the word "embossed" or similar words indicating operations performed on the webs, are used in a broad sense to indicate the production of any suitable projections and depressions in the core webs. In a more limited sense, of course, I refer to ribs of a more or less continuous character formed in the webs and for convenience such ribs are usually straight and are usually arranged transversely of the webs, in view of the relative difficulty of producing longitudinal ribs or creases, in the present particular example, the ribs are produced in a generally transverse direction, but are arranged diagonally of the webs and so that different webs, or adjacent webs, have the ribs running in different directions or at different angles. Embossing operations may be performed upon all of the webs, but in the present example only the upper and lower core webs are treated, and the central core web is left plain or smooth. To perform the stated operations web 1 is passed between cooperating diagonally arranged creasing devices 50 and 51 which have cooperating elements acting on upper and lower surfaces of the web to produce the spaced ribs 52 thereon. The nature of the embossing elements, and the character of the ribs may vary greatly, but in a preferred instance the elements which actually operate upon the web are such that the fibrous or laminated structure of the web or board is more or less broken down and drawn together to form a rib which is convex in this instance on the upper side of the web and concave on the lower side, this being of the general character which I designate as a crimp-crease. The creasing elements 50 and 51 are each controlled by two eccentrics 53 and 54 mounted on shafts 55 and 56 respectively, and the shafts are driven at a suitable speed in the direction indicated by the arrows, so that as the creasing elements converge they move along with the web and the crimping or embossing action is performed while the elements are moving substantially or exactly at web speed, and then as the operation is completed the elements are separated and so return to a forward position, again converge and perform a creasing operation, and so on. The particular mechanism diagrammatically shown and briefly explained is of my invention and is more fully disclosed and claimed in a separate application. While in many cases it is preferred to use mechanism of this type for the indicated purpose, any other creasing or embossing mechanism adapted or adaptable for the purpose may be employed.

The lower web or other outer filler web 5 is operated upon by any suitable or similar embossing devices, such as 58 and 59, the ribs on this web, however, being preferably arranged diagonally at a substantial angle

to those of web 1. The diagonal angle of the ribs on their respective webs, and their relative angle may vary considerably, the relative angle as here shown being substantially 90°.

While adhesive may be applied to surfaces of the embossed webs by any known or suitable devices, to adhesively secure them together or to the cover web, it is preferable in some cases, as illustrated in the present specific example, to apply adhesive to secure the core structure together to the central web 3, both surfaces of this web being adhesively coated by glue pipes 60 and 61, the latter of which acts as a guide for the web, this arrangement being substantially as described in connection with the glue devices 10 and 14, Figure 1. The central web is then conducted between rolls 62 and 63, which distribute the glue upon the web surfaces and apply the central web to the lower web 5 substantially as in the case of the devices 32 and 36 or 30 and 34, Figure 1.

The upper core web 1 after the embossing operation is shown as continuing onward in spaced relation to web 3, largely for the sake of illustrative convenience. When desired all of the core webs may be brought together and pressed to provide a continuous core assembly prior to association with the cover web or else they may be successfully built up upon the cover web as described in connection with Figure 1.

The cover web 7 is advanced from the roll 8, creased or scored when desired, and its upper or inner surface is adhesively coated by glue rolls 65 and 66 cooperating with the guide rolls 67 and supplied with glue by a glue pipe 68, substantially as in the previous example.

The materials are now brought together and adhesively secured, and the continuous assembly is completely formed and severed to produce individual cloth boards B¹, by operations substantially similar to those explained in connection with Figure 1.

The product in this case is a cloth board comprising a core structure F¹ consisting of an intermediate sheet 3 of smooth flat fibrous material, and outer sheets or layers 1^a and 5^a of embossed fibrous sheet material, the ribs being in this particular example diagonally arranged, and diagonal in relation to each other, the core parts being firmly secured together by adhesion of ribbed surfaces of the outer sheets to the intermediate sheet 3. By suitable or obvious variations of the method as described, adhesive for securing the core members together may be applied to the crest of the ribs, instead of to the intermediate sheet 3, or the intermediate sheet may be omitted and then adhesive will be supplied to the crest of the ribs of one or both of the embossed sheets, to secure them together, or in some cases only one

embossed core sheet may be provided and in that case it is secured adhesively to the envelope.

The core structure consisting in this specific example of the three sheets as described, is enclosed in the envelope C which, in this example, is a single piece of fibrous sheet material smoothly covering and closely adhering to the broad faces and longitudinal edges of the core, having abutting (and not overlapped) edges 41, and also preferably having rounded longitudinal edges 39 as explained in connection with Figure 2. The advantages, characteristics, and variations in structure of such cloth boards including corrugated material, are further sufficiently explained in one of my above mentioned companion applications.

Certain creasing instrumentalities and other mechanical features represented in the drawings are more fully disclosed and are claimed in other applications, and no claim is here made to these mechanical features.

Reference is hereby made to co-pending application, Ser. No. 653,506, filed July 24, 1923, which discloses a method analogous in certain respects to the present method.

What I claim is:

1. A method of producing cloth boards and similar articles, comprising advancing a continuous web of fibrous sheet envelope material of substantial thickness, producing therein longitudinal creases substantially in line with edges of filler material to be applied, advancing one or more continuous narrower webs of thick fibrous sheet filler material, applying the filler webs in superposed relation to the envelope web to produce a continuous assembly supplying adhesive to certain web surfaces prior to assembly contact, folding the envelope web along the crease lines and securing outer portions of the envelope web upon the filler material, and transversely severing the continuous assembly so produced to produce the individual articles.

2. A method of producing cloth boards and similar articles, comprising advancing a continuous web of fibrous sheet envelope material, producing therein longitudinal creases substantially in line with edges of filler material to be applied, advancing one or more continuous narrower webs of fibrous sheet filler material of substantial thickness, applying the filler webs in superposed relation to the envelope web to produce a continuous assembly, supplying adhesive to certain web surfaces prior to assembly contact, the adhesive being applied substantially over the entire area of certain of the sheet surfaces sufficient to provide adhesive connection of the multiple sheets throughout substantially their entire engaging areas, folding the envelope web along the crease lines and securing outer portions of the envelope

web upon the filler material, pressing the longitudinal envelope edges to produce a smooth rounded formation thereof, and severing the continuous assembly so produced transversely to produce the individual articles.

3. A method of producing cloth boards or similar articles, comprising advancing a continuous web of fibrous sheet envelope material, creasing the material on longitudinal lines substantially corresponding to edges of filler material to be applied, advancing one or more continuous webs of fibrous sheet filler material substantially narrower than the envelope web, applying adhesive over substantially the entire areas of certain surfaces of certain of the filler webs, sufficient to provide adhesive connection of the various webs throughout substantially their entire engaging areas, uniformly distributing the adhesive on said surfaces, bringing the webs successively in assembly contact to produce a continuous assembly in which the filler is superposed on the envelope web with margins of the latter projecting laterally from the filler, folding and adhesively securing the envelope margins upon the filler to completely enclose the same, and severing the complete continuous assembly so produced transversely at regular intervals to produce the individual articles.

4. A method of producing cloth board and similar articles, comprising advancing one or more continuous webs of sheet filler material, diagonally embossing certain of the webs, advancing a continuous web of sheet envelope material substantially wider than the filler webs, applying adhesive to certain of the web surfaces, bringing the webs in assembly contact with the filler located substantially centrally of the envelope webs, folding and adhesively securing projecting margins of the envelope upon the filler to completely enclose the same, and severing the continuous assembly so produced transversely at regular intervals to produce the individual articles.

5. A method of producing cloth boards and the like comprising advancing at least two continuous webs of sheet filler material, producing diagonal creases on one of the webs, advancing a continuous web of sheet envelope material substantially wider than the filler webs, supplying adhesive to certain of the web surfaces, bringing the webs together with the filler webs located substantially centrally upon the envelope web, folding and adhesively securing projecting margins of the envelope upon the filler to enclose the same, and serving the completed continuous assembly transversely to produce the individual articles.

6. A method of producing cloth boards and the like, comprising advancing a plurality of continuous webs of sheet filler

material, producing diagonal ribs on two of the webs with the ribs on the different webs at a substantial angle to each other, advancing a continuous web of sheet envelope material substantially wider than the filler webs, supplying adhesive to certain of the web surfaces, bringing the webs together with the filler webs located substantially centrally upon the envelope web, folding and adhesively securing projecting margins of the envelope upon the filler to enclose the same, and severing the completed continuous assembly transversely to produce the individual articles.

15 7. A method of producing cloth boards and similar articles, comprising advancing continuous webs of sheet filler material, producing diagonal ribs in angular relation upon at least two of the webs, advancing a

20 continuous web of substantially smooth and flat sheet filler material between two ribbed filler webs, advancing a continuous web of sheet envelope material substantially wider than the filler webs, supplying adhesive to

25 certain web surfaces, bringing the webs in assembly contact with the plain filler web interposed between two of the ribbed webs and adhesively secured thereto and with the

filler structure superposed upon the envelope web and adhesively secured thereto, folding over and adhesively securing projecting envelope margins upon the filler to completely enclose the same and produce a complete continuous assembly, and severing the assembly transversely at regular intervals to produce the individual articles.

8. A method of producing laminated articles, including the steps of advancing a sheet of material, applying cooperating diagonally arranged creasing instrumentalities to opposite surfaces of the sheet to form diagonal ribs or creases therein, advancing the instrumentalities at substantially sheet speed while in creasing contact therewith, withdrawing the instrumentalities from sheet contact and retracting them in a direction generally opposite to sheet movement, again advancing the instrumentalities to sheet contact, and repeating the operation indefinitely to produce spaced creases or corrugations upon the advancing sheet.

Signed at Brooklyn, in the county of Kings and State of New York, this 5th day of Oct., A. D. 1923.

HARRY BRIDGMAN SMITH.