

- [54] **METHOD FOR PRODUCING LAMINATED EMBOSSED WEBS**
- [75] Inventor: **Ernst Daniel Nystrand**, Green Bay, Wis.
- [73] Assignee: **Paper Converting Machine Company**, Green Bay, Wis.
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**Related U.S. Application Data**

- [60] Continuation of Ser. No. 24,980, March 19, 1970, abandoned, which is a division of Ser. No. 793,430, Jan. 23, 1969, Pat. No. 3,556,907.
- [52] U.S. Cl..... **156/209**, 156/219, 156/291, 156/292, 161/131
- [51] Int. Cl..... **B31f 1/20**
- [58] Field of Search ..... 156/219, 220, 209, 290, 156/291, 292

[56] **References Cited**

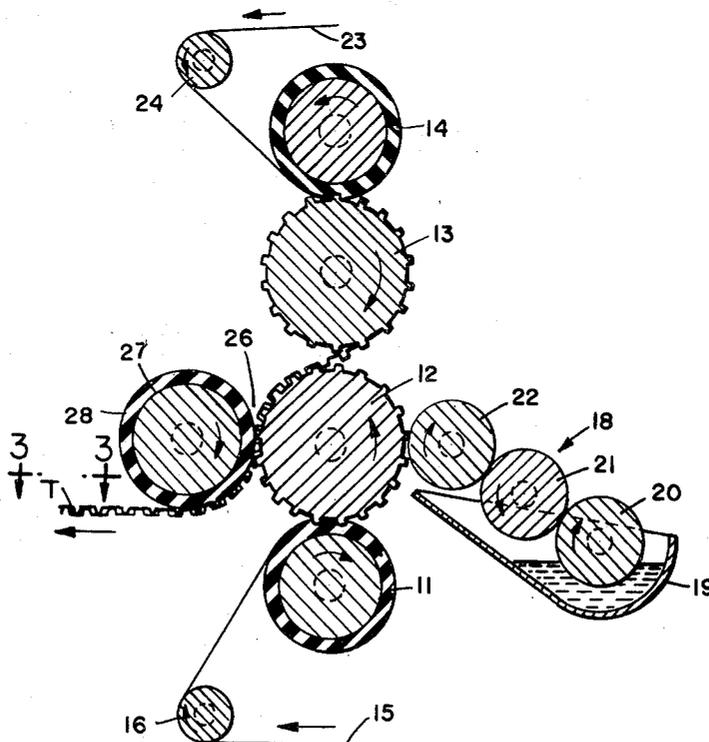
**UNITED STATES PATENTS**

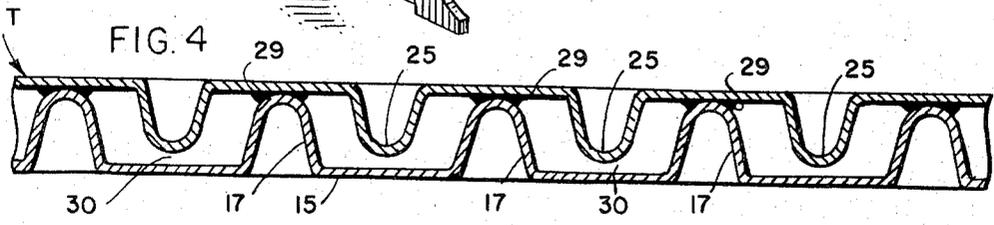
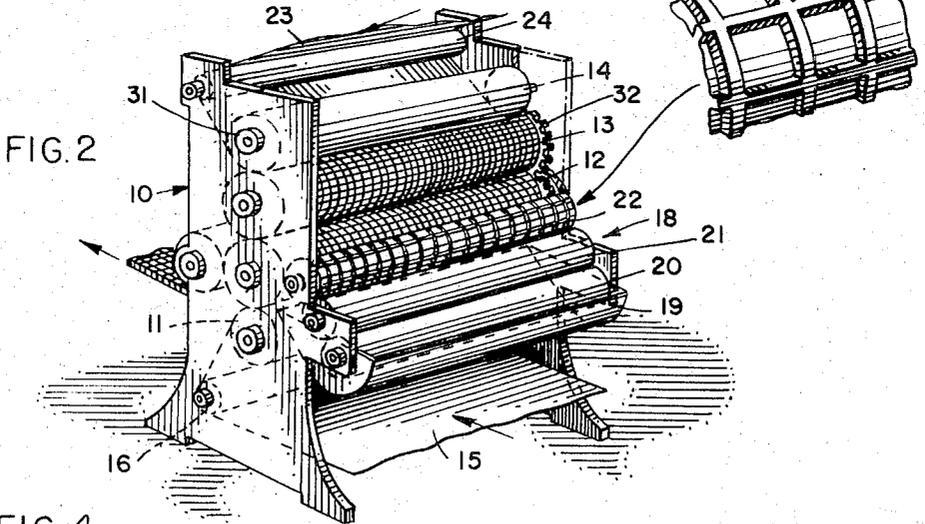
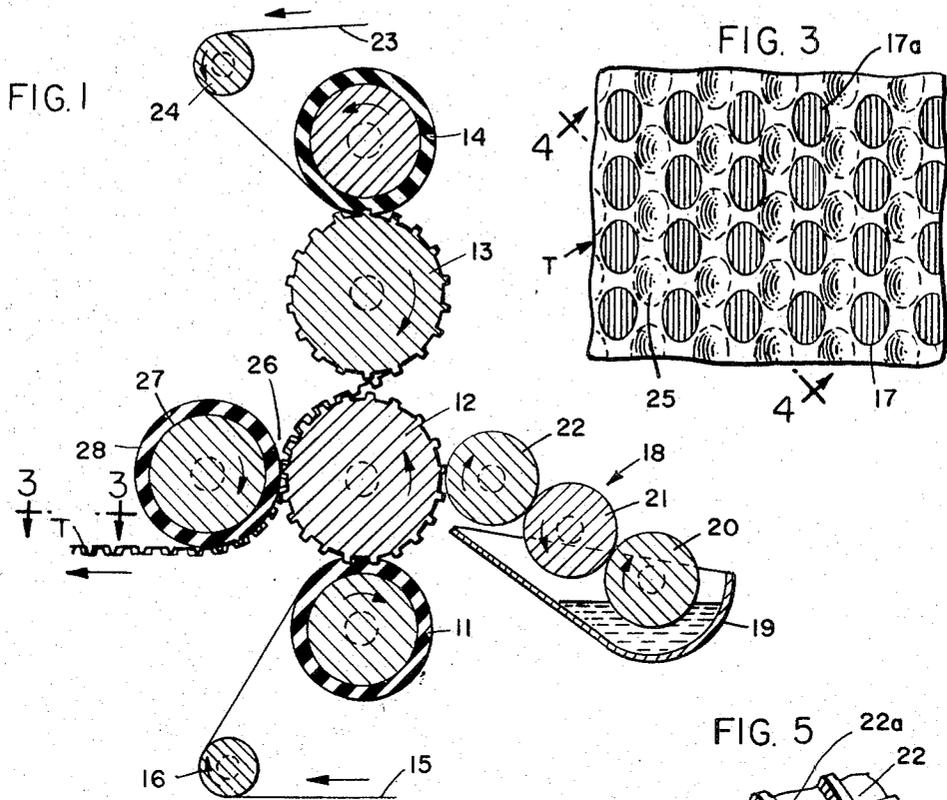
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*Primary Examiner*—Charles E. Van Horn  
*Assistant Examiner*—David A. Simmons  
*Attorney, Agent, or Firm*—Dawson, Tilton, Fallon & Lungmus

[57] **ABSTRACT**  
 A method for producing laminated embossed webs useful as toweling, napkins, placemats and the like. The method employs a novel arrangement of embossing and laminator rolls to achieve a nested configuration of the embossed, inwardly-extending projections, and avoids the speed limitations inherent in prior machines.

**2 Claims, 5 Drawing Figures**





## METHOD FOR PRODUCING LAMINATED EMBOSSED WEBS

This application is a continuation of my copending application Ser. No. 24,980, filed Mar. 19, 1970, now abandoned which in turn was a division of application Ser. No. 793,430, filed Jan. 23, 1969, now U.S. Pat. No. 3,556,907.

### BACKGROUND AND SUMMARY OF INVENTION

Embossed toweling has been made in the past by procedures such as are seen in U.S. Pat. No. 3,414,459. Toweling of this nature has "peg-to-peg" projections or embossments which are developed through rotating embossing rolls in synchronism with a high degree of precision. This necessarily limits production because the nip defined by the embossing rolls must be carefully controlled. In addition, the width of the machine is necessarily limited because of the possibility of "run-out" of the rolls, differential expansion and deflection along the length thereof due to dimensional differences which often are magnified during operation.

Through the provision of two embossing units plus a uniquely positioned laminator roll, I am simultaneously able to avoid the production limitations discussed above and at the same time provide a superior embossed laminate.

### DETAILED DESCRIPTION

The invention is described in conjunction with the accompanying drawing, in which:

FIG. 1 is a fragmentary schematic view of the inventive machine as would be seen from one side;

FIG. 2 is a reduced scale perspective view of the machine of FIG. 1;

FIG. 3 is a fragmentary plan view of the product issuing from the left-hand side of FIG. 1, and corresponds to that seen along the sight line 3—3 applied to FIG. 1;

FIG. 4 is an enlarged scale fragmentary sectional view taken along the line 4—4 applied to FIG. 3; and

FIG. 5 is a fragmentary perspective view of the adhesive applicator roll seen in FIG. 2.

In the illustration given, the numeral 10 generally designates a frame which is seen to include a pair of side elements for rotatably supporting a plurality of rolls. These rolls can be appreciated better from a consideration of FIG. 2 wherein a first embossing unit is made up of a platen roll 11 and an embossing roll 12. A second embossing unit consists of the embossing roll 13 and the platen roll 14. Each embossing roll 12 and 13 has a steel surface with a plurality of outwardly-extending projections formed thereon. Advantageously, the projections may number from about 10 to about 200 per square inch, and may project upwardly from the surface about 0.01 inches to about 0.05 inches whereby approximately 10% to about 75% of the surface of a web is embossed. For this purpose, the platen rolls may be covered with any suitable material currently used in the art, i.e., rubber, as shown, or paper, etc. The platen rolls may also be made of steel with mating protrusions.

The numeral 15 designates a web issuing from an unwind stand (not shown) and passing around an idler roll 16, and thereafter into the nip defined by the rolls 11 and 12. The projections on the roll 12 develop corresponding projection 17 seen in the web 15 in FIG. 3. Adhesive is applied to some or all of the high points of

these projections by means of the adhesive-applying unit generally designated 18 and which is seen to include a fountain 19 and a series of transfer rolls 20, 21 and 22 which are driven in conventional fashion. As seen in FIG. 5, the adhesive-applying roll 22 has provided thereon a pattern of raised surfaces as at 22a. This results in applying adhesive to less than all of the high points of the protrusions provided by the embossing unit which includes rolls 11 and 12. Through the use of a colored adhesive, a decorative, eye-pleasing pattern can be produced — which is visible by the user of the web product. A certain amount of the adhesive penetrates through the web 15 to make the pattern visible, and further, the web is generally at least translucent and almost transparent so that distinct color impressions can be obtained. For example, in the web product designated T in FIG. 3, six of the depressions, as at 17a, have been shaded to show a red coloration in a generally hexagonal design. This is readily achieved through the use of suitably engraved plates on the plate cylinder applicator roll 22.

In analogous fashion, an upper web is designated 23 and is seen to be passing around an idler roll 24 before being embossed by the coaction of rolls 13 and 14. The projections on the roll 13 develop corresponding projections in the web 23 — the developed projections being designated 25 in FIG. 3. Thereafter the webs are united in passing into the nip 26 defined by the rolls 12 and 27. The roll 27 is the so-called "marrying" roll and is seen to have a surface covered with resilient material 28 such as rubber having a rating in the range of about 50 to about 90 Durometer A.

In the illustration given, a steel roll is employed for the laminator roll 27 and the covering was achieved through initially gluing a layer of spiral-wrapped, hard, rubber-covered tape. The roll surface was then ground to present a smooth surface against the embossing roll 12. The pressure at the nip 26 was adjusted to the range of 50–60 pounds per linear inch, which was satisfactory for the starch-adhesive used in laminating. Alternatively, a smooth steel roll could be employed as the marrying roll 27 — without any covering, but the thin, hard, rubber covering permits operation without the accuracy otherwise required insofar as run-out and straightness is concerned. The covering, which, in production machines, may be of the order of ½ inch thick and 85 Durometer rubber, eliminates the danger of mushrooming the small embossing elements on the roll 12 when the usual nip pressures are present. An additional advantage from the use of a resilient covered roll is the lack of a need for a separate drive. The numerous protrusions on the embossing roll 12 drive the laminator 27 without difficulty.

The web issuing to the left of the roll 27 is generally designated T and corresponds to the showing in FIG. 3. The adhesive which is applied only to the high points of the projections 17 results in glue bonds of the type designated 29 in FIG. 4. In some cases I prefer to have the height of the projections 25 somewhat less so that a gap 30 exists between the projection 25 and the confronting portion of the web 15. In any event, the projections 17 are rigidly supported during laminating.

As seen in FIG. 2, the plurality of rolls 11–14, 16, and 24 are all rotatably supported on the frame 10 as by means of suitable bearings, one of which is designated 31. The rolls are rotated in synchronism by means of gears 32 from a power source (not shown).

Referring again to FIG. 1, it will be noted that there is a distinct clearance between the rolls 12 and 13, which means that no problems of width limitation due to run-out, deflection, bearing heating, and the like are encountered, as well as the fact that there does not have to be perfect register or synchronism between the rolls 12 and 13.

A wide variety of webs may be employed satisfactorily in the practice of the invention, depending upon the ultimate product. As illustrated, the product may be toweling having a basis weight of about 7 to about 50 pounds per ream (3,000 square feet). Other webs, such as film, foil, etc., may be employed, again depending upon the ultimate product. Products such as placemats, napkins, and the like are advantageously provided on the inventive machine. In any event, there is developed an advantageous beam action during the integration by virtue of the supported projections 17 on the web 15. Also, I prefer to employ the roll 27 with a diameter somewhat different from that of roll 12 so that the high points do not occur in the same position each revolution, providing, in effect, a "hunting" of the high points relative to the resilient covered roll 27.

It will be appreciated also that considerable leeway is provided in the embossing pattern. As is illustrated, the patterns in the two rolls are identical, so that there is a perfect interlacing or nesting of the projections of one web relative to the projections of the other web. However, one web may have more of an "open" pattern of projection so that several projections on the other web will be accommodated during the interlacing. The projections may be circular, triangular, oval, hexagonal, diamond-shaped, or have any other of a multiple choice of shapes. Orientation of the pattern of the projections on the two webs may be similar or dissimilar as desired. Choice of shapes of the projections may be similar or dissimilar on the two webs. In any event, there is provided a unique nested-embossment

type of web product where the nesting results in substantial bulk or air space and as can be appreciated from a consideration of FIG. 4; in other words, the embossments in one web do not occupy all of the space between embossments in the other web. This additionally makes possible the development of the attractive color pattern through the selective application of adhesive, and, to this, an additional advantage accrues in that less adhesive is required since only a predetermined number of protrusions receive adhesive.

While in the foregoing specification a detailed description of an embodiment of the invention has been set down for the purpose of illustration, many variations in the details herein given may be made without departing from the spirit and scope of the claims.

I claim:

1. A method for producing laminated embossed webs comprising separately embossing two webs each with a pattern of projections of about 10 to about 200 per square inch and a height of about 0.01 to about 0.05 inches, applying adhesive to at least some of the projections of one of said webs while the same is supported on an embossing roll, orienting said webs so that the projections face each other and interlace with each other so as to provide air spacing in the interlacing, and applying a linear laminating pressure by passing said webs through the nip defined by a marrying roll and the embossing roll which provided the projections on said one web to join said webs while said one web has the projections thereon supported and while maintaining the hardness of said marrying roll and the pressure in said nip to prevent distortion of the projections of the other said webs.

2. The method of claim 1 in which said laminating pressure is of the order of 50-60 pounds per linear inch.

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