

E. H. ANGIER.

APPARATUS AND METHOD FOR MAKING TRANSVERSELY REINFORCED MATERIAL.

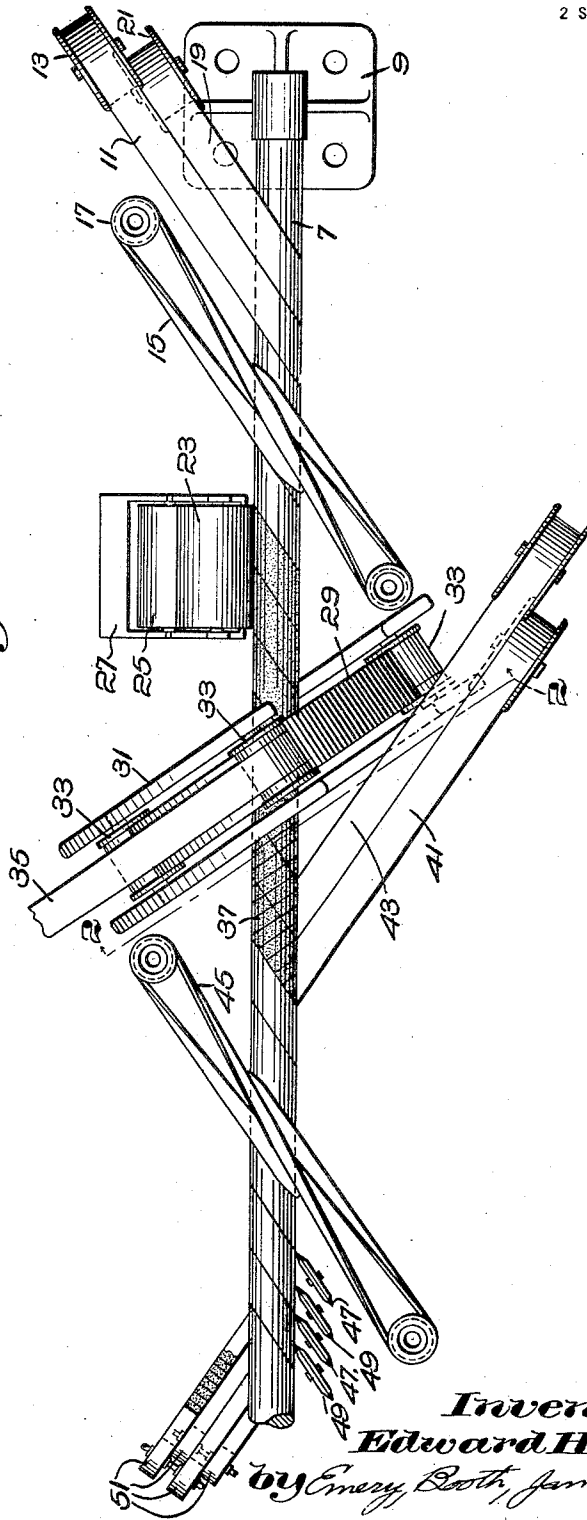
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1,332,534.

Patented Mar. 2, 1920.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

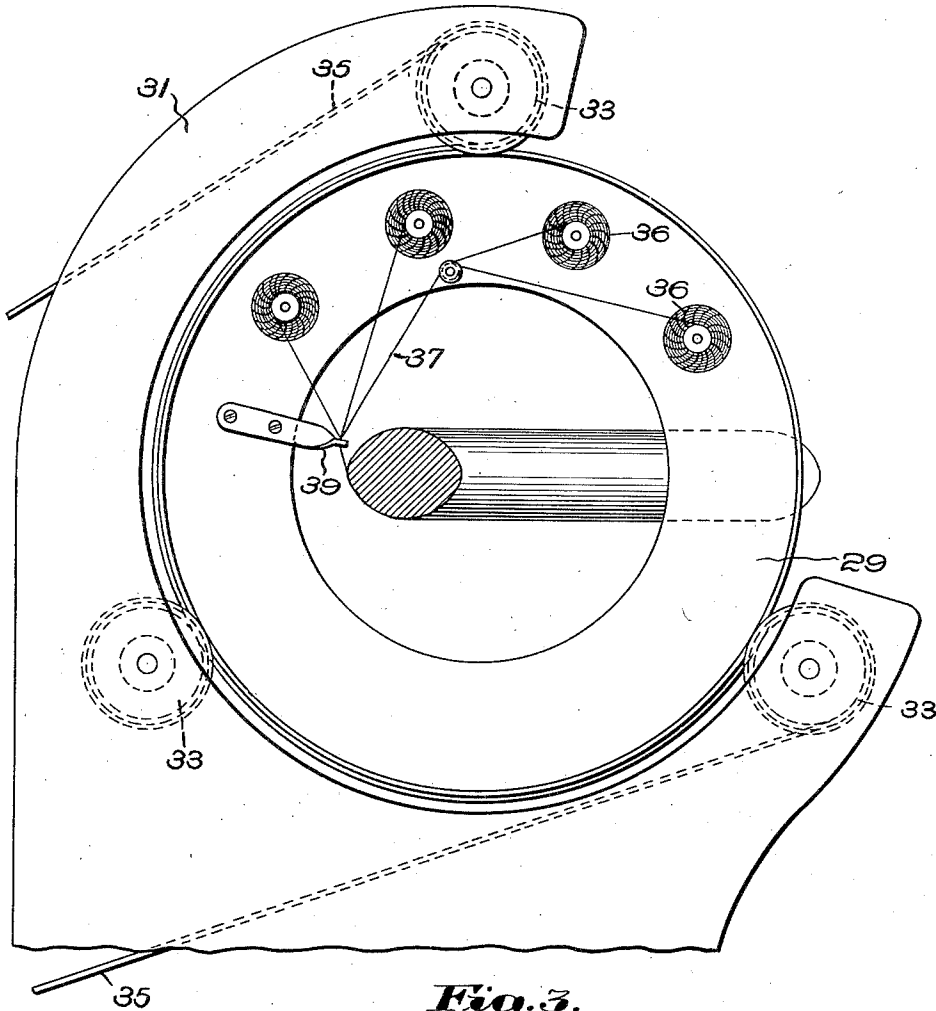
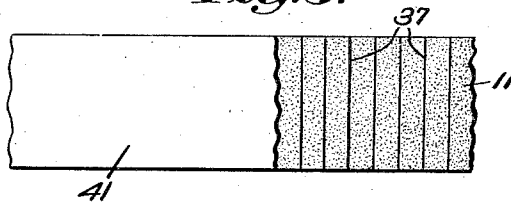


Fig. 3.



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UNITED STATES PATENT OFFICE.

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APPARATUS AND METHOD FOR MAKING TRANSVERSELY-REINFORCED MATERIAL.

1,332,534.

Specification of Letters Patent.

Patented Mar. 2, 1920.

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To all whom it may concern:

Be it known that I, EDWARD H. ANGIER, a citizen of the United States, and a resident of Framingham, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Apparatus and Methods for Making Transversely-Reinforced Material, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to a method of producing webs, for example of paper, which are provided with reinforcements of strands extending transversely to the length thereof and to a machine for practising the same. By webs I refer to material in the form of a strip which may be of indefinite length and comparatively, though not necessarily absolutely, narrow in width. For example, so-called paper tape may be considered a web or the wide rolls in which print paper is ordinarily marketed.

My invention contemplates a means of providing such a web with separate reinforcing strands extending parallel to each other transversely and preferably at right angles to the length thereof. In the embodiment of the invention here disclosed a web is provided consisting of two webs of paper connected together by suitable adhesive in which are embedded the reinforcing strands. Such a web if of suitable dimensions might be utilized in preparing the reinforced tape shown in my Patent No. 1,195,430 of Aug. 22, 1916, or it might be combined with other webs and with longitudinal threads to produce a compound web reinforced both longitudinally and transversely. Such a compound web if of proper width might be divided to form sheets.

My invention will best be understood by reference to the following description of the method of operation of the illustrative machine shown in the accompanying drawings wherein:—

Figure 1 is a partially diagrammatic plan view of the machine;

Fig. 2 is a section on the line 2—2 of Fig. 1; and

Fig. 3 is a plan, partially broken away, of a fragment of the completed web.

Referring to Fig. 1, the illustrative machine shown, by the use of which my method may be practised, comprises a suitable mandrel 7 which may be supported at either end

by standards 9 one of which is here shown. The mandrel 7 may be stationary or may be journaled in the standards 9, as desired. A paper strip or web 11 is led from a suitable supply roll 13 and applied in a helical course around the mandrel; and to draw the paper continuously from the supply roll and feed it forward along the mandrel in this course, I have here shown a belt 15 extending between pulleys 17 and wrapped at an intermediate point about mandrel and paper. As the belt is driven by any suitable power (not shown) it will draw the paper along on the mandrel, gradually unwinding it from the roll 13 and winding it about the mandrel.

Preferably the winding of the paper is such as completely to cover the mandrel. In the embodiment of the invention here shown the web 11 is comparatively narrow and in order to provide a comparatively steep pitch to the helix, particularly in order to facilitate the subsequent application of strands at the proper angle, I may use another web 19 drawn from a supply roll 21 and applied to the mandrel edge to edge with the web 11, the two being wrapped around the same in the manner of the threads of a multiple screw. The effect is substantially as if a web of double width were wrapped in a helix with the edges of the turns or spires of the helix in abutting contact. Any suitable number of webs can be applied to the mandrel in this manner.

Herein, as the paper is fed along the mandrel in its helical course, it is coated with a suitable adhesive, such for example as pitch, and I have herein shown an offset roll 23 bearing against the paper, which roll is supplied by the roll 25 running in a tank 27 of adhesive. The adhesive is indicated by the stippling in the figure. Within the scope of my invention the webs 11 and 19 might be already gummed and merely moistened at this point. The strand-like reinforcement is next applied to the webs and I have herein shown a wrapping shuttle 29. Referring to Fig. 2, this shuttle is an annulus supported in a frame 31 by rollers 33 and adapted to be driven by a belt 35 from any suitable source of power, not shown. On the shuttle are mounted spools 36 of thread or the like and the threads 37 are delivered to the surface of the mandrel through a suitable guide 39 in spaced parallel relation as indicated by the dotted lines in Fig. 1.

It will be understood that if threads were simply led from spools to the surface of the paper on the mandrel, the movement of the paper in its feeding movement would draw them out at substantially the same pitch as that of the web. In order that they may be drawn transversely across from spire to spire of the helix, the main body portions or standing parts of the strands are revolved. Herein the shuttle rotates in the opposite sense to the advance of the helix formed by the webs 11 and 21 and if, as in the present instance, the thread guide 39, and preferably the shuttle itself, is disposed at a right angle to the inclination of the spires of the helix and the shuttle is rotated in the opposite sense at twice the angular speed of the helix traveling along the mandrel, the threads will be wrapped as shown at right angles to the edges of the webs 11 and 13 and will adhere to the adhesive thereon.

The threads being applied as shown are herein next covered with a layer of paper. Herein two webs 41 and 43 corresponding to the webs 11 and 19 respectively are applied thereto so that in the continued feeding movement of the helical coil around the mandrel they will be drawn from their supply roll and superposed upon the webs 11 and 19 to provide a doubled web the parts of which are secured together by the adhesive in which the strands 37 are embedded. A driving belt 45 similar to the belt 15 may be utilized to facilitate movement of the superposed webs along the mandrel. The turn of the belt around the webs will also act to press together the superposed webs, causing them firmly to cohere.

The web or webs so applied to the mandrel may now be removed from the same and rewound, this being effected by severing the threads between adjacent spires by means of cutters 47. Herein I have also shown additional cutters 49 which slit the web and threads longitudinally of the former, so that the material is diverted from its helical path, as shown at the left of Fig. 1, in the form of four separate strips. Since the cut is in the general direction of the pitch of the helix with which the webs were wound and the threads 37 were wound on transversely thereto, the compound webs which were wound on the rewinding rolls 51 have parallel reinforcing strands extending transversely across the same from edge to edge, as shown in Fig. 3.

If desired, the webs 41 and 43 may consist of two webs of paper connected by adhesive in which longitudinal reinforcing strands are embedded, or compound webs of this nature might be formed simultaneously with the act of drawing them onto

the mandrel in the machine here shown. It will also be obvious that longitudinal reinforcing strands could be introduced directly with the webs 41 and 43 between the same and the webs 11 and 19 to be secured by the adhesive applied by the roll 23.

One or any suitable number of webs may be drawn onto the mandrel in the first instance and the helix may either be cut at the joints between the spires to produce an equal number of transversely reinforced webs or the webs themselves may be divided to produce a greater number, as in the present instance.

It will be noted that my method lends itself, as in the illustrated embodiment, to practice by continuously operating means, that there is no waste of thread at the edges of the strips and that it is not necessary to handle loose ends of thread.

Having thus described a particular machine by which the method of my invention may be practised and which illustrates that method, the principles exemplified thereby which I claim as new and desire to secure by Letters Patent I shall express in the following claims:—

1. The method of preparing transversely reinforced webs comprising the following steps:—coiling a web into a helix, securing reinforcing strands thereto by wrapping them thereabout transversely to the spires of the helix and severing the strands between the spires.

2. The method of preparing transversely reinforced webs comprising the following steps:—coiling a plurality of webs placed side by side into a helix, securing reinforcing strands thereto by wrapping them thereabout transversely to the spires of the helix and separating said webs by severing the strands between the spires.

3. The method of preparing transversely reinforced webs comprising the following steps:—coiling a web into a helix, securing reinforcing strands thereto by wrapping them thereabout transversely to the spires of the helix, severing the strands between said spires and also cutting the web and superposed strands longitudinally.

4. The method of arranging separate lengths of strand in parallel relation comprising the following steps:—feeding a carrier web in a helical path, adhesively securing a reinforcing strand to extend from spire to spire of the helix as it is drawn forward by the feeding movement of the web and severing strand and web longitudinally of the latter.

5. The method of arranging separate lengths of strand in parallel relation comprising the following steps:—feeding a carrier web in a helical path, adhesively coating the same, securing the end of a strand to a spire thereof, revolving the standing

part of the strand about the axis of the helix whereby the strand will be drawn by the feeding movement of the helix across from spire to spire and dividing the assembly by a cut lengthwise of the web.

6. The method of preparing transversely reinforced webs characterized by winding paper into the form of a tube with reinforcing strands extending helically thereabout and dividing the same into strips by helical cutting of pitch opposite to the pitch of said strands.

7. The method of preparing transversely reinforced webs comprising preparing a tube of paper and reinforcing strands adhesively connected with the strands extending helically of the tube and dividing the tube helically on the opposite pitch.

8. The method of preparing a transversely reinforced strip comprising forming paper into a tube, wrapping a strand helically thereabout and cutting the assemblage helically on opposite pitch.

9. The method of preparing a transversely reinforced web comprising wrapping paper helically into tubular form, securing a strand thereto crossing from spire to spire of the helix and cutting the strand between spires

10. A machine of the class described comprising a mandrel, means for coiling paper about the same, a wrapping shuttle and severing means cooperating with the mandrel to make a helical cut in the material thereon.

11. A machine of the class described comprising means for supporting and driving a web in a helical path, strand supply means revoluble about the axis of the helix and severing means adjacent the path arranged to make a helical cut in the material thereon.

12. A machine of the class described comprising cooperating means for winding a web and a reinforcing strand helically and severing means acting transversely of the strand to make a cut helical in form as regards the wound assembly.

13. A machine of the class described comprising a mandrel, means for drawing a web helically therealong, liquid applying means, a strand supply means having provision for laying the strands across the spires of the helix, a second drawing means whereby to superpose a second web and a severing device acting to cut the strands between the turns of the webs.

In testimony whereof I have signed my name to this specification.

EDWARD H. ANGIER.