No. 859,678. PATENTED JULY 9, 1907.

W. S. MELLEN.

PROCESS OF FORMING A FABRIC.

APPLICATION FILED SEPT. 29, 1904.

3 SHEETS—SHEET 1.

Fig. 1.

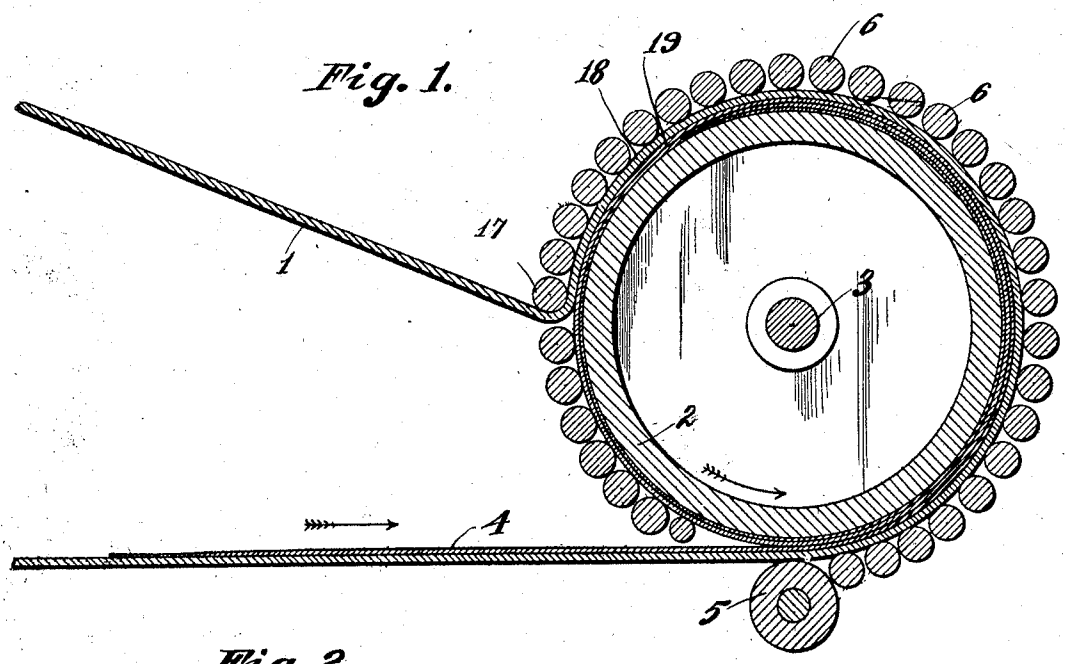


Fig. 2.

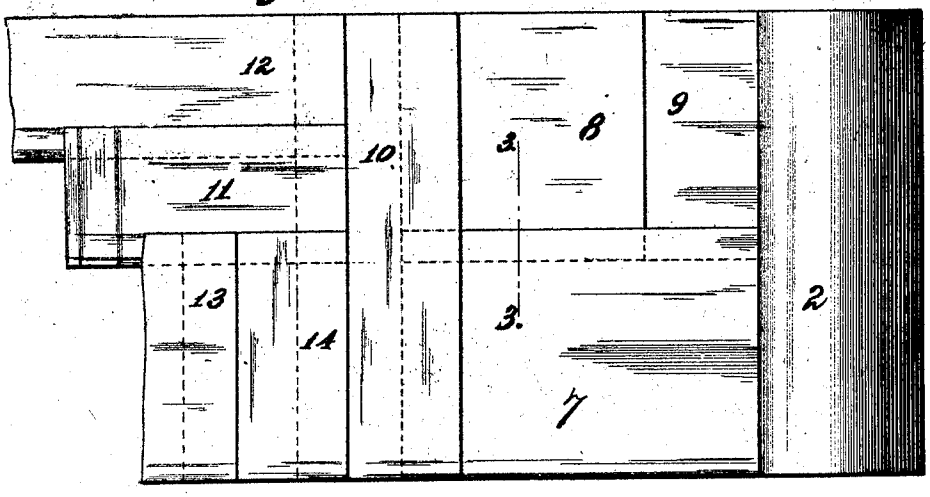


Fig. 3.

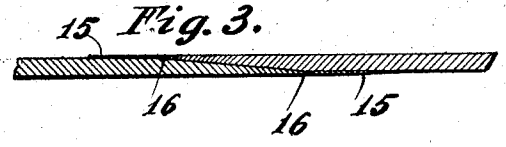
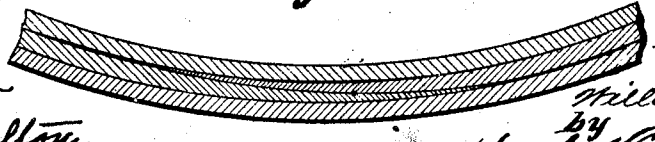


Fig. 4.



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3 SHEETS—SHEET 2.

Fig. 5.

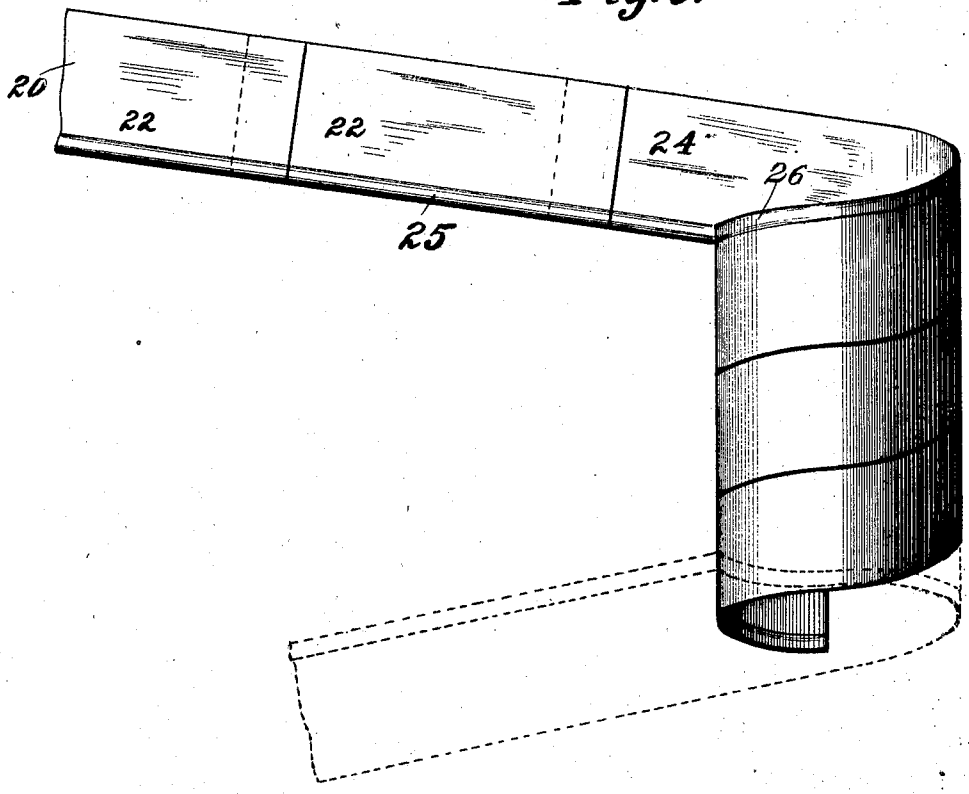
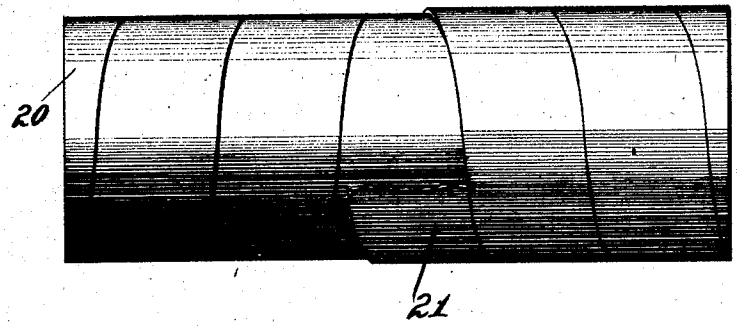


Fig. 6.



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3 SHEETS—SHEET 3.

Fig. 7.

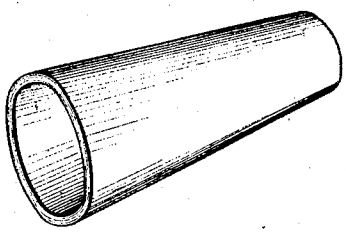


Fig. 8.

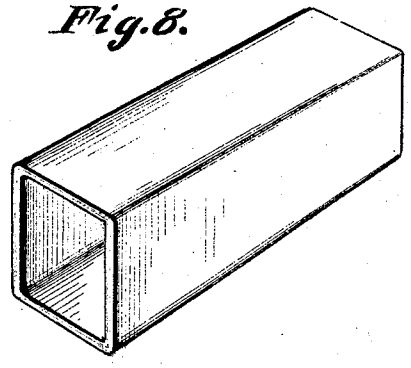


Fig. 9.

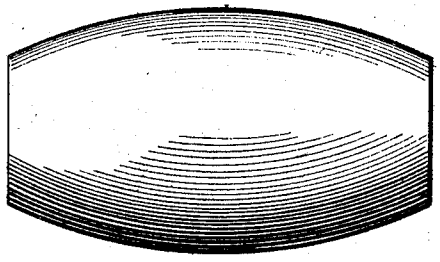


Fig. 10.

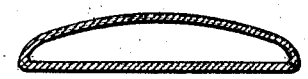


Fig. 11.



Fig. 12.



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UNITED STATES PATENT OFFICE.

WILLIAM S. MELLEN, OF ST. LOUIS, MISSOURI, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NATIONAL VENEER PACKAGE COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

PROCESS OF FORMING A FABRIC.

No. 859,678. Specification of Letters Patent. Patented July 9, 1907.

Application filed September 29, 1904. Serial No. 226,437.

To all whom it may concern:

Be it known that I, WILLIAM S. MELLEN, a citizen of the United States, residing at the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Processes of Forming a Fabric, of which the following is a specification.

This invention relates to the process of forming a new article of manufacture also invented by me and made the subject of a separate application for patent filed contemporaneously, herewith.

The process consists both in the formation of the material and the method of constructing specific articles therefrom.

In the drawings, in which like numbers of reference denote like parts wherever they occur, Figure 1 is a sectional view through the essential parts of one end of my apparatus for practicing this process; Fig. 2 is a top plan view of the roller and of the material as it is being fed toward the same; Fig. 3 is a sectional view on the line 3—3, Fig. 2, of part of the sheet of material, showing a joint between two of the component pieces; Fig. 4 is a sectional view of a fragment of the completed article; Figs. 5 and 6 show a modification; Figs. 7 to 12 are merely illustrative figures, showing a few among the many forms into which the fabric, hereinafter described, can be shaped, Fig. 7, for instance, illustrating same in the form of a stave column; Fig. 11, the same cylinder flattened into a board; Fig. 8, the same cylinder reformed into rectangular shape; Fig. 9, the material differently formed for the manufacture of a barrel; and Figs. 10 and 12, other shapes which may be useful.

In order that the process may be better understood, I shall briefly describe so much of the apparatus as is exhibited in the drawings, it being understood that an application for patent accompanied by a complete description and illustration of said apparatus is filed contemporaneously herewith. An endless belt or conveyer 1 passes underneath the hollow cylinder 2 and around the same. Said cylinder is mounted on a shaft 3, which causes the same to rotate when itself revolved. The belt 1 travels in the direction indicated by the arrow in Fig. 1 and carries with it the material 4, out of which the specific articles are to be made. The material 4 and the belt 1 pass between the cylinder 2 and the roller 5 and are thereby guided to follow the circumference of the cylinder 2 and are tightly held in contact with same by the plurality of compressor-rollers 6 (or other suitable means) which practically surround said cylinder 2.

The primary idea connected with this process is that it may be used for the purpose of turning to practical account all kinds of inferior lumber such as is at the present time thrown away or otherwise wasted or used for a relatively less important object. It is obvious, of course, that this process is not restricted to the use of cheap or inferior lumber, but that I can just as well practice the process while using high grade lumber. Its practical and commercial importance, however, arises from the fact that by the use of this process inferior or very poor lumber or a mixture of such lumber and high grade lumber can be utilized to the same advantage as lumber of a superior or superfine character. Moreover, waste pieces of lumber, such as are too short for ordinary use, can be made use of and also a mixture of different kinds of wood, so that, if desired, the finished product may comprise a mixture of spruce, elm, oak, and pine, or any of these as may be desired, so that the weakest wood by reason of its combination with the strongest wood possesses in the finished article the strength of that strongest, so that elm, for instance, is like oak. Furthermore, the result of my process of treating scrap wood or other kinds of lumber is that, where no effort is made to strengthen the product, as by the introduction of oak or other strong wood into the combination, the scraps or pieces of ordinary wood, as welded together by my process, constitute a material of unusual strength, adapted to a large variety of uses, such, for instance (to name only a few out of a great number), as barrels and kegs of all kinds, boards of all kinds, staff columns, conduits and tubes, fence and other kinds of posts, telegraph poles, water tanks and water buckets, book cases, and all other articles made of lumber, and water spouts, etc.

The process consists, first, of peeling the wood off of the logs as commonly practiced now in producing "veneer." After the peeling just mentioned and before the wood is ready for the forming machine, it is cut into strips of any desired length or width. The length and width of the several pieces of quasi veneer may differ and vary as much as and more than is indicated in Fig. 2. In this figure, 7 is a long strip of "veneer", while 8 and 9 are only half so long, but equally wide. 10 is a strip which is as wide as 8 and 7 put together, but not so long as either. It will be observed that the grain of the wood in the piece 10 runs at right angles to the grain of the wood in strips 7, 8, and 9 and in the strips 11, 12, and 13, although it runs in the same direction as the grain in 14. Before the strips of "veneer" are laid in the position indicated in Fig. 2 on the endless belt 1, they are prepared by being chamfered along the edges of same adjacent to the next connecting piece. For instance, the piece 10, illustrated in Fig. 2, will be chamfered so as to connect in the manner hereinafter described with the pieces 7 and 8, which are also chamfered on their ends adjacent to the piece 10, and likewise on their edges adjacent to each other, as indicated by the dotted lines in Fig. 2. The piece 8 is again chamfered at the end or edge adjacent to the piece 9, and the piece 9 is chamfered at its end adjacent to the

piece 8 and also on its side next to the piece 7. These statements regarding the chamfering of the several pieces are only made by way of illustration to show that every piece entering into the composition of the ultimate fabric is chamfered on its ends or edges which overlap and connect with the next adjoining piece of "veneer". This is true no matter what the shape of the several pieces may happen to be and in whatsoever direction the grain of the pieces runs. It is unnecessary that the several pieces should be of like size or shape, but they may be of any size or shape. It is preferable, however, that they shall be of such shape that their chamfered edges will neatly overlap each other, and, while this can be arranged with the pieces bearing any shape, yet it is obvious that for practical purposes and ordinary uses rectangular shapes will ordinarily and preferably be used, as less labor and trouble is involved in so preparing them that they will fit each other.

In arranging the several pieces of "veneer" on the belt, as indicated in Fig. 1 and as shown in Fig. 2, it is possible to form a plurality of layers of "veneer" and in so doing so to arrange the strips in the second layer that they will cross over and present solid matter at the joints of the underneath layer, and also so that the grain of the piece in the second layer overlying, for instance, the piece marked 10 in the first layer will have its grain running longitudinally, instead of transversely, as in the piece marked 10. Moreover, the second layer, or any other layer, can, if desired, be made of diagonal strips so as to cross from one side to the other of the fabric, thus binding all parts toegther and strengthening same. In so arranging the pieces of "veneer", it is obvious that a fabric of superior strength will be produced by forming one layer with the strips running diagonally toward the left and in the next layer having said strips running diagonally to the right.

In the chamfering or skiving of the strips of "veneer" the strips are first skived to a featherlike edge for a narrow width, which would vary in different sizes of pieces of "veneer", but in ordinary sizes would be about one inch in width. This featherlike edge is of equal thickness throughout its length and breadth, but from the inner edge of same the skiving or chamfering assumes a different form, so as to produce a beveled edge, said bevel slanting toward the center of the strip of material or "veneer". This double character of the chamfering or skiving of the strips of "veneer" is of great importance, as it results in the overlapping strips being welded and bound to each other much more strongly and securely than if the chamfering produced a bevel cut clear to the edge. The featherlike portion of the chamfered edge of a strip of "veneer" is indicated at 15 in Fig. 3, and 16 denotes the beginning of the beveled portion.

The chamfered or skived portions of the strips of "veneer" (if, for instance, but a single layer is to be formed) are treated with adhesives, same being applied with the object of causing the overlapping skived portions to adhere to each other and thus to form a continuous fabric. If the object to be formed is one which will be exposed to the weather, as, for instance, a railroad tie, each strip may as a whole at this time be treated with such preservative as is suitable, usually creosote in the case of a railroad tie. If the article to be formed is to be composed of more than one layer of fabric, then not only the chamfered or skived portions of each strip, but also the entire surface of each piece of "veneer" would be covered with an adhesive substance, in order that the superimposed layer will be firmly attached to the lower layer throughout its length.

The strips of "veneer" being in the position shown in Fig. 2, and having been partly inserted under the cylinder 2, the machine is started into operation, whereby said cylinder 2 revolves in the direction indicated by the arrow. As the layer or layers of fabric 4 are held in tight compression against said cylinder 2 by the compression rollers 6 when said cylinder 2 rotates as just described, the belt 1, with the material carried thereby, travels forward in the direction indicated by the arrow in Fig. 1 and around the cylinder 2, thus carrying with it the strips of "veneer" depicted in Fig. 2. Roller 17 serves to change the direction of the belt 1 which passes off into the distance and encircles an idler (not shown). The strips of "veneer", chamfered and coated with adhesives, as before stated, are bound closely together under the heavy pressure of feed roll 5 and the compression rollers 6 against the cylinder 2, said cylinder 2 acting as a former and imparting to the wood strips wound around it a cylindrical shape, as a fabric thus formed under pressure does not follow the endless belt 1 when its direction is changed as at 17, but follows round the cylinder 2 between it and the remaining pressure rollers 6 until it unites with the remainder of the material at the place of beginning. When it is desired to make an article of several thicknesses or layers, it may either be done in the way previously described, or as indicated in Fig. 1, where, after one cylinder 18 has been formed on the former 2, another one 19 may be formed immediately around same by simply continuing to feed the material on the belt 1, and this may be repeated *ad libitum*. The sectional view in Fig. 4 shows the nature of the overlapping chamfered joint of the center cylinder where the article is composed of three layers of fabric.

It will be observed in the first place, that the practice of this process results in the formation of a new product in the shape of a fabric composed of strips of quasi veneer suitably chamfered at their ends and edges and attached to each other by adhesives, the same being compacted together until it assumes the form of a continuous fabric by power applied to it. In the second place, the practice of the process as hereinabove described results in the formation of any article that it is desired to manufacture out of the fabric constituting the new product just described, such articles so manufactured being given their desired form whatever that may be, and varying according to what the article is, at the same time that the power is applied to compact the several strips or pieces of quasi veneer into the fabric above mentioned, said form being imparted to the fabric at the time stated, in order that it may receive same.

Heretofore, it has been deemed impossible to form into a cylindrical shape, or any other shape analogous thereto, anything except continuous strips or pieces of wood, because of the liability of same to give way at the joints. By my process, however, the strips of "veneer" are formed under pressure at the same time

that they are compressed into adhesive union with each other. By this simultaneity of welding and forming, a joint is made which, by reason of the pressure applied, contains no air spaces, and whereby the joint is both formed and welded at the same time, great strength and permanency being thus secured.

In the modification of this process, illustrated in Figs. 5 and 6, the strips 20 and 21 may be formed in the same manner as the broader strip depicted in Fig. 2, and, in any event, the successive sections 22, 23, 24, etc., will be united together by the same method of chamfering, overlapping of the parts, the use of adhesives, etc., heretofore described, but the cylinder or other article to be formed would be evolved not by the longitudinal forward movement of a piece of fabric, such as exhibited in Fig. 2, but by the guidance of a strip, such as strip 20, in such a manner as to be fed at an angle to the former, such as cylinder 2, for instance, said strip 20 having the chamfered edge 25. In this method of forming the article, the strip 20 would be fed at just enough of an angle so that when same has once encircled the cylinder 2 the under or inside skived edge of the strip 20 that is following laps over and cements or welds to a similar skived edge 26 on the upper or outside edge of the strip 20. As the strips are fed into the machine, other strips may be attached to the ends of those passing in, so that in appearance it is as if one long ribbon were being fed into the machine. In this way an article with a continuous circumference, like that illustrated in Fig. 5, may be formed, and when a suitable size is reached, the end of the strip 20 may be cut off and the ends made even. When the strip 20 has been cut off at one end of the cylinder 2, it may be fed into the machine at the opposite end and with the opposite angle, as indicated by the dotted lines in Fig. 5, so that, when wound around the cylinder 2 and, also, around the article formed thereon, as depicted in Fig. 5, a construction like that shown in Fig. 6 is produced, in which it will be observed that the strip 20 winds spirally in one direction, while the strip 21 winds spirally in the opposite direction, whereby is produced an article not only of double strength, by reason of being made of two layers, but of enhanced strength, by reason of the joints formed in the winding of strip 20 being crossed by strip 21, the joints of which latter strip are formed in the opposite direction. It is obvious that as many laminations as desired may be formed.

The finished tube may be withdrawn from the former-drum or cylinder 2, and can be finished according to the purpose for which it is to be used. For instance, if intended for a stave column, which is the article of manufacture which is illustrated in the drawing, and generally described herein, it is ready to trim and polish for use. For some other purposes, it may need to be again softened and molded to the desired shape, which shape may be either square, hollow, solid, or flat, like a board. A board, for instance, would be molded by flattening a cylinder of this new fabric. The material is very pliable while passing through the process described, but the article formed thereby is of extraordinary strength.

One of the most important features of this process of manufacture consists in the manner by which a laminated article is made. As layer is wound upon layer in the manner hereinabove described, the pressure of the successive layers gradually increases the pressure upon the first layer, so that an enormous aggregate pressure can be reached. Thus, if the first winding of the material around the former-drum is effected under a certain pressure the pressure of the second wind or layer of material will be double on the former-drum that of the first layer. An equal amount of pressure will be added by the next layer, so that the pressure on the first layer, when the third one has been wound, will equal double the pressure of the first lamination on the former-drum when first wound therearound. The result is a laminated product of unusual strength.

Having thus described my said invention, what I claim and desire to secure by Letters-Patent is:

1. The process of making articles of impressible material consisting in chamfering or skiving the material on edges that connect with each other; applying adhesives to said chamfered portions; causing said chamfered portions to overlap similarly chamfered portions; and passing said composite fabric through a compressor which simultaneously compacts the joints between said connecting edges and imparts a form other than flat to said composite fabric to form the article.

2. The process of making articles of material thin like veneer consisting in first chamfering or skiving edges of a plurality of pieces of said material; treating said chamfered portions with adhesives; causing chamfered portions so treated to overlap chamfered portions of adjacent pieces; and passing same through a compressor which simultaneously compacts the joints between said pieces and imparts a form other than flat to the composite fabric to form the article.

3. The process of making articles of thin impressible material consisting in first chamfering the edges of a ribbon or strip of said material; then applying adhesives to said chamfered portions; then winding said strip or ribbon so that the chamfered edge of one side of said strip overlaps and becomes attached to the chamfered edge on the opposite side of the same strip at a more advanced point of the wind; and then applying pressure whereby simultaneously the joint between said edges is compacted and strengthened and a form other than flat imparted to the fabric to form the article.

4. The process of making ligneous fabric, consisting in chamfering or skiving the edges of a plurality of thin pieces of wood so that at the edge of each there is first a straight skived portion, and further back from the edge a beveled skived portion; treating said chamfered portions with adhesives; overlapping said chamfered portions; compacting the whole together by pressure suitably applied whereby the fabric is given a form other than flat while its fragmentary constituents are being caused to adhere together; and winding laminations thereof, with adhesives between same, one upon another.

5. The process of making a fabric of material thin like veneer consisting in chamfering or skiving edges of a plurality of pieces of said material; treating said chamfered portions with adhesives; overlapping said chamfered portions; preliminarily compacting the joints between said pieces together by pressure suitably applied; imparting a form other than that of a plain sheet to said fabric; and increasing the strength of said joints by applying additional pressure thereto, said last pressure being caused by winding another lamination or laminations of similar composite fabric upon the first lamination, adhesives between laminations being provided.

In testimony whereof I have affixed my signature in presence of two witnesses this 24th day of September, 1904.

WILLIAM S. MELLEN.

Witnesses:
M. E. LETCHER,
GLADYS WALTON.