METHOD OF MANUFACTURING TUBULAR MATERIAL


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9 Claims. (Cl. 144—309)

This invention relates to tubular material and to a method of manufacturing said material.

One object of the invention is to provide a method of producing tubular material from wood veneer whereby said tubular material can be of lengths greater than the initial available width of the wood veneer and yet formed on standard convolute winding machines. More specifically, in accordance with this object of the invention, the tubular material is produced by first forming a web of any desired length from a plurality of sheets of wood veneer, each sheet being formed of a plurality of strips of wood veneer, and then winding said web convolutely on a mandrel and adhesively uniting the adjacent convolutions to each other to form the tubular material.

Another object of the invention is to produce tubular material from wood veneer by winding a web of said veneer convolutely on a mandrel together with a pre-formed web of bonding material, preferably a web of paper or other suitable fibrous sheet material coated and/or impregnated with a thermoplastic adhesive for bonding the several convolutions of the tubular material securely to each other, said last mentioned web also serving as a carrier and guide for the wood veneer in the operation of winding the tubular material into tubular formation.

A further object of the invention is to produce an improved tubular material from wood veneer.

A yet further object is generally to provide an improved method of making tubular material from wood veneer.

The above and other objects of the invention will be fully understood from the following description with reference to the accompanying illustrative drawings.

In the drawings:
Fig. 1 is a plan view of a sheet of wood veneer and illustrates one step in the method of the present invention;
Fig. 2 is a plan view of a part of a web formed from a plurality of sheets of veneer and illustrates another step in the method of the present invention;
Fig. 3 is a perspective view, on a larger scale, of a length of tubular material made in accordance with the present invention;
Fig. 4 is an enlarged fragmentary perspective view of the tubular material illustrated in Fig. 3, with parts cut away for the purpose of illustration;
Figs. 5 and 6 are views similar to Fig. 2 illustrating other forms of the invention;
Fig. 7 is a perspective view illustrating more or less diagrammatically the method of forming the sheet material into lengths of tubular material in accordance with the present invention.

Referring now more particularly to the drawings, there is shown in Fig. 1 a sheet 10 of wood veneer. Said sheet comprises a plurality of strips 12 of wood veneer disposed in abutting edge to edge relation as indicated at 14 and united in said relation by any suitable adhesive, preferably a heat reacting glue or resin, such as, for example, a urea formaldehyde resin or bone glue, which is interposed between the adjacent side edges of adjacent strips, respectively. The veneer strips 12 are of the widths and lengths initially available in one-piece veneer strips. It will be understood that the width of sheet 10 is determined by the number of strips united with each other in said edge to edge relation, the length of said sheet depending upon the available length of the strip.

The web 16, illustrated in Fig. 2, is formed by joining a plurality of sheets 16A to each other in edge to edge relation, as indicated at 18, said sheets being secured to each other in said relation in the web by any suitable adhesive, preferably by a heat reacting glue or resin which may be the same as that utilized for joining the strips 14 to each other to form the sheet 10. Sheets 16A are formed by cutting the same from companion sheets 10 along lines extending obliquely of sheet 10, preferably at angles of 45°, as indicated by the dotted lines in Fig. 1, whereby the grain of the wood in sheet 16A runs obliquely of said sheet. Accordingly, as is shown, the strips 12 in each companion sheet 10A of the web extend obliquely to the longitudinal line of the web, and pursuant to one form of the invention as herein illustrated the strips 12 extend in opposite directions in the alternate sheets of the web, it being noted that the grain of the web extends longitudinally of said veneer strips 12 and obliquely of the companion sheet and of the web. It will be understood that a web of any desired length may be produced by joining a plurality of sheets 16A to each other and that the width of said web depends upon the number of veneer strips 12 which are secured to each other for producing the sheet 10 and upon the width of said strips thus joined to each other in the sheet.

The method of forming the tubular material 20 from the web 16 in accordance with the present invention comprises winding said web convolutely on a mandrel and bonding the adjacent surfaces of the convolutions to each other. More specifically, in accordance with the preferred mode
of practicing the present invention web 16 is wound together with a pre-formed web 22 of bonding material such as a web of paper or other suitable fibrous sheet material coated and/or impregnated with a bonding web which is preferably a thermoplastic adhesive, such as, for example, a phenol-formaldehyde resin. Said web 22 may be of any desired thickness, but is preferably of the order of three-tenths of one inch in thickness, and the quantity of resin material carried by said web preferably constitutes a substantial proportion, say about 65%, of the weight of said web. It will be understood, however, that I do not wish to be limited to this specific material for bonding the convolutions of the veneer to each other, except to the extent specified in the claims.

More particularly, bonding web 22 is directed from the supply roller 24 to the mandrel 8 and the rollers 28 and 26, and the web 16 which is supported on a table 30 above web 22 is likewise supplied to the mandrel between the latter and said rollers 28 and 26. Any suitable means (not shown) may be provided for releasing the web 22 longitudinally therewith, but the wood veneer web 16 is free from tension, said web being moved longitudinally of table 30 by web 22 which acts as a carrier and guide therefor as well as the means for bonding the convolutions of web 16 to each other. Preferably, in producing a length of tubular material 30, a length of the web 22 is first wound by itself around the mandrel and after several convolutions of web 22, say five or six convolutions, are wound around the mandrel, the veneer web 16 is fed into the light of the mandrel and roller 28 so that as web 22 continues to move, it carries with it the veneer web 16 and the latter is thus wound around the mandrel together with said web 22. A pressure roller 32 is provided for pressing the adjacent convolutions tightly against each other as they are formed on the mandrel. It will be understood that the mandrel is heated so that as webs 16 and 22 are wound thereon, the thermoplastic adhesive carried by web 22 is softened and rendered effective for bonding the veneer convolutions to each other. Further, it will be understood that the pressure of roller 32 contributes to the production of a secure bond between said veneer convolutions and thus producing the tubular material. If desired, an additional quantity of the phenol-formaldehyde or other bonding material may be applied to the webs while they are wound around the mandrel, preferably by forming a pool of said bonding material at the height between mandrel M and the roller 28.

It will be understood that the wood-veneer web which is formed from a plurality of veneer sheets as described above may be so constituted that the grain of the veneer extends in any desired direction which may be uniform throughout the length of the web or which may be different in different parts of the web, respectively. Thus, as illustrated in Fig. 5, the wood veneer web 16A is formed of a plurality of veneer sheets 18 which are joined to each other in edge to edge relation to form the desired length of web as described above with reference to Fig. 2, but as here shown, the sheets 10 are arranged in the web so that the veneer strips extend longitudinally and transversely of said web in different companion sheets of the web. Similarly, as illustrated in Fig. 6, the wood veneer web 16B is formed from a plurality of sheets 10 and 18A so that the grain of the strips extend longitudinally and obliquely in companion veneer sheets at different longitudinally extending portions of the web. It will be understood that the veneer web 16A or 16B is wound convolutely on the mandrel 8 together with the web 22, as hereinbefore described with reference to the web 16 for producing the tubular material.

It will be understood that the wood veneer may consist of any suitable wood, preferably a hard wood such as, for example, poplar, mahogany, birch, maple, hickory, walnut, etc. and that, if desired, the same or different woods may be used in different sheets from which the web is formed and further that each sheet may be formed of strips of the same or of different wood veneers. While the thickness of the veneers are preferably substantially thin, say of the order of about 1/16 of an inch to about 1/8 of an inch. Also, the thickness of the wall of the tubular material may vary depending upon the intended use of the tubular material; for example, the thickness of the material may range from about 1/4 of an inch to about 3/8 of an inch. It will be understood, however, that all references to dimensions of the veneer end of the tubular material are to be considered merely as illustrative and not in a limiting sense.

The tubular materials embodying or produced in accordance with the method of the present invention may be used for various purposes, for example, for forming tubules or pipes, for making containers for various substances, solid and liquid, for various structural elements, etc., being understood that the uses specifically referred to are by no means exhaustive of the uses to which this material may be put. If desired, the wood-veneer may be treated with any suitable material for rendering the same resistant to moisture or various chemicals. For forming a tube or pipe of any desired length from the tubular material, a plurality of lengths of said tubular material may be secured to each other in end to end relation in any suitable way with fluid tight joints being provided in any suitable way between said end members and the tubular member.

While I have shown and described the preferred embodiment of my invention it will be understood that the latter may be embodied otherwise than as herein shown or described and it will be understood that in the illustrated embodiment certain changes in the details of construction and in the arrangement of parts may be made. Therefore I do not wish to be limited to the invention as herein shown or described except to the extent which may be required by the scope of the appended claims.

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

1. In the method of making tubular material which comprises forming a continuous web of
wood veneer from a plurality of strips of wood veneer joined to each other in edge to edge relation and convolutely winding said web of wood veneer on a mandrel, the step of feeding a pre-formed dry web of bonding sheet material under tension to the mandrel with said continuous web of bonding material superposed on said pre-formed web and carried in non-tensioned condition to the mandrel by said pre-formed web whereby said pre-formed web of bonding material and said web of wood veneer are wound together into tubular formation with a convolution of said web of bonding material between each two adjacent convolutions of wood veneer for bonding the latter to each other in tubular formation.

2. The method of making tubular material from wood veneer according to which a continuous web of said wood veneer, formed from a plurality of wood veneer sheets secured in edge to edge relation, is wound convolutely around a rotary mandrel, said method comprising feeding a pre-formed web of bonding material under tension and in dry condition to said mandrel, and forming said continuous web of wood veneer together with and superposed on said web of bonding material to said mandrel whereby said web of wood veneer is carried in non-tensioned condition to the mandrel by said web and is carried around the mandrel and is wound convolutely into tubular formation on said mandrel with a convolution of said web of bonding material between each two adjacent convolutions of wood veneer for bonding the latter to each other in tubular formation.

3. The method of making tubular material from wood veneer according to which a web of said wood veneer, formed from a plurality of wood veneer sheets secured in edge to edge relation, is wound around a rotary mandrel, said method comprising feeding a pre-formed web of bonding material under tension to said mandrel, and continuously feeding said web of wood veneer together with and superposed on said web of bonding material to said mandrel whereby said web of wood veneer is carried in non-tensioned condition to the mandrel by said tensioned web and is carried around the mandrel and is wound into tubular formation on said mandrel with portions of said web of bonding material interposed between adjacent surfaces, respectively, of said wood veneer for bonding said surfaces of the wood veneer to each other in tubular formation.

4. The method of making tubular material which comprises joining a plurality of strips of wood veneer to each other in side-edge to side-edge abutting relation thereby forming a sheet of wood veneer of desired width, cutting said first mentioned sheet along lines extending obliquely across said strips to form a rectangular sheet in which said strips are disposed obliquely to the edges of said rectangular sheet, joining a plurality of said rectangular sheets in edge to edge relation to form a web of wood veneer of the desired length, and convolutely winding said web of wood veneer and a pre-formed web of bonding material together into tubular formation with convolutions of said web of bonding material interposed between adjacent convolutions of wood veneer for bonding the latter to each other in said tubular formation.

5. The method of making tubular material from wood veneer according to which a web of said wood veneer, formed from a plurality of sheets of wood veneer secured in edge to edge relation, is wound convolutely around a rotary mandrel, said method comprising feeding a pre-formed web of bonding material under tension to said mandrel, and feeding said web of wood veneer together with and superposed on said web of bonding material to said mandrel whereby said web of wood veneer is carried in nontensioned condition to the mandrel by said web and is carried around the mandrel and is wound convolutely into tubular formation on the mandrel with a convolution of said web of bonding material between each two adjacent convolutions of said web of wood veneer, said web of bonding material comprising sheet material carrying a thermoplastic adhesive in dry condition, and applying heat and pressure to the said portions of said webs on said mandrel for activating said thermoplastic adhesive and for bonding the adjacent wound portions of said wood veneer to each other in tubular formation.

6. The method of making tubular material which comprises joining a plurality of strips of wood veneer to each other in side-edge to side-edge abutting relation thereby forming a sheet of wood veneer, cutting said first mentioned sheet along lines extending obliquely across said strips to form a rectangular sheet in which said strips are disposed obliquely to the edges of said rectangular sheet, joining a plurality of said rectangular sheets in edge to edge relation to form a web of wood veneer of the desired length, and convolutely winding said web of wood veneer and a pre-formed web of bonding material together into tubular formation with convolutions of said web of bonding material interposed between adjacent convolutions of wood veneer for bonding the latter to each other in said tubular formation.

7. The method of making tubular material which comprises joining a plurality of strips of wood veneer to each other in side-edge to side-edge abutting relation thereby forming a sheet of wood veneer, cutting said first mentioned sheet along lines extending obliquely across said strips to form a rectangular sheet in which said strips are disposed obliquely to the edges of said rectangular sheet, joining a plurality of said rectangular sheets in edge to edge relation to form a web of wood veneer of the desired length, and convolutely winding said web of wood veneer and a pre-formed web of bonding material together into tubular formation with convolutions of said web of bonding material interposed between adjacent convolutions of wood veneer for bonding the latter to each other in said tubular formation.
edge abutting relation thereby forming a sheet of wood veneer, cutting said first mentioned sheet along lines extending obliquely across said strips to form a rectangular sheet in which said strips are disposed obliquely to the edges of said rectangular sheet, joining a plurality of said rectangular sheets in edge to edge relation, and with the strips in certain of said sheets running in a direction opposite to the run of the strips in others of said sheets thereby forming a web of wood veneer of the desired length and having the grain of the wood running differently in different longitudinally extending portions of the web, and convolutely winding said web of wood veneer and a pre-formed web of bonding material together into tubular formation with convolutions of said web of bonding material interposed between adjacent convolutions of wood veneer for bonding the latter to each other in said tubular formation.

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