(No Model.) 2 Sheets—Sheet 1.

C. WITTKOWSKY.

METHOD OF MANUFACTURING CASKS OR BARRELS FROM VENEERS.

No. 601,993. Patented Apr. 5, 1898.

Fig. 1.

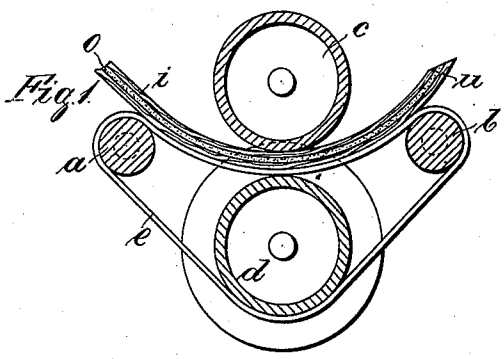


Fig. 2.

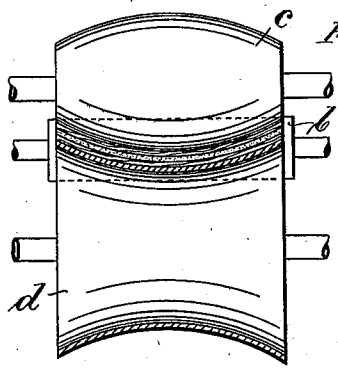


Fig. 3.

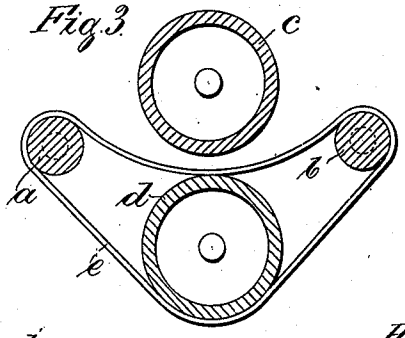


Fig. 4.

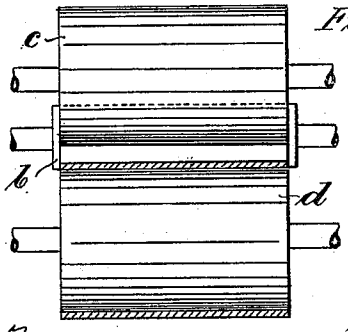


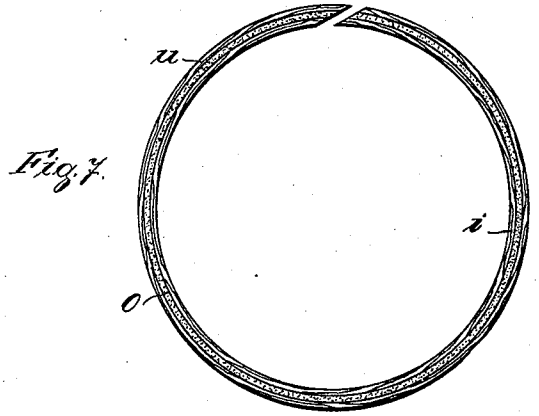
Fig. 5.



Fig. 6.



Fig. 7.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

C. WITTKOWSKY.

METHOD OF MANUFACTURING CASKS OR BARRELS FROM VENEERS.

No. 601,993. Patented Apr. 5, 1898.

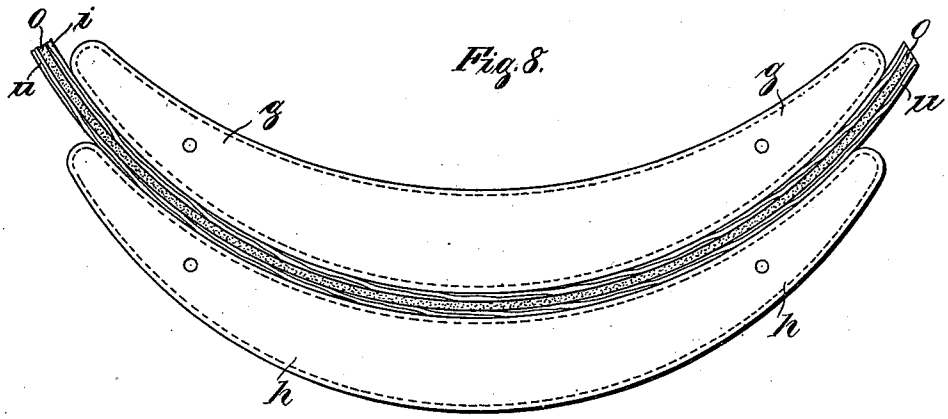


Fig. 8.

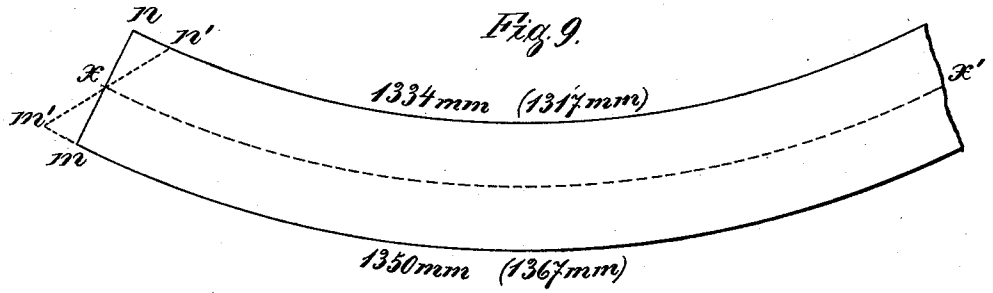


Fig. 9.

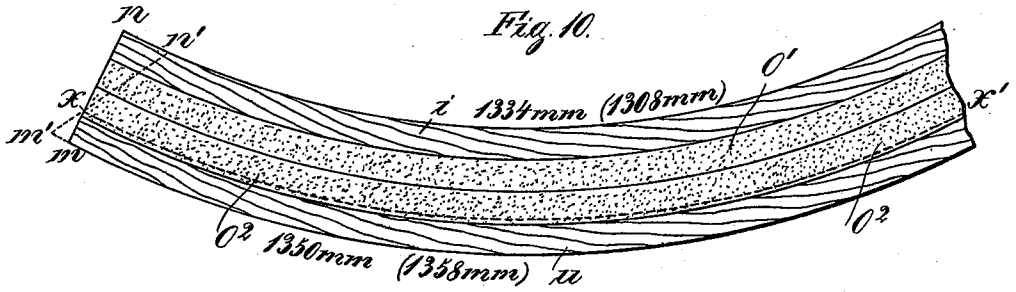


Fig. 10.

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UNITED STATES PATENT OFFICE.

CARL WITTKOWSKY, OF BERLIN, GERMANY.

METHOD OF MANUFACTURING CASKS OR BARRELS FROM VENEERS.

SPECIFICATION forming part of Letters Patent No. 601,993, dated April 5, 1898.

Application filed May 27, 1897. Serial No. 638,386. (No model.) Patented in Germany December 3, 1895, No. 95,451; in Hungary February 3, 1896, No. 5,906; in France February 5, 1896, No. 253,725; in Belgium February 10, 1896, No. 119,760, and in Austria September 18, 1896, No. 3,590.

To all whom it may concern:

Be it known that I, CARL WITTKOWSKY, a subject of the King of Prussia, German Emperor, and a resident of Berlin, in the Kingdom of Prussia, German Empire, have invented an Improved Method of Manufacturing Casks or Barrels from Veneers, (for which patents have been obtained in Germany, No. 95,451, dated December 3, 1895; in Austria, No. 3,590 Bd. 46, dated September 18, 1896; in Hungary, No. 5,906, dated February 3, 1896; in France, No. 253,725, dated February 5, 1896; in France, additional patent, dated July 18, 1896, and in Belgium, No. 119,760, dated February 10, 1896,) of which the following is an exact specification.

It has oftentimes been tried to manufacture a cylindrical or bulged barrel-mantle from a continuous piece of wood produced from the stem of a tree by a circular cut made around said stem. Said piece of wood or annular board or plate, in which the grain ran parallel to the longitudinal axis thereof, was then subjected to a rolling process. This latter process, however, very often produced clefts and cracks in the wood, and the barrel or cask having its mantle formed out of said rolled piece of wood could, further, owing to the natural contraction and expansion of the wood, not be kept constantly tight, as no means existed to hinder said expansion and contraction in a mantle having its grain running parallel to its longitudinal axis. Said contraction and expansion would not be so objectionable if one could succeed in producing a barrel-mantle in which the grain would run around the circumference of the mantle. There is, however, the difficulty that the grain of the wood does not allow of the expansion on the outer side and contraction on the inner side, especially if the thickness of the wood is proportionate to the size of the barrel. In such cases considerable splits and breaks are found to occur. It should be borne in mind that the mantle to be produced is not to consist of a single veneer having a thickness of from 0.5 to 1.0 millimeter, but rather of a board or plate having a thickness of from six to ten millimeters. To roll boards of that thickness in such a manner that the grains run perpendicular to the longitudinal axis of the barrel has not been attained up to now, and the object of my invention therefore is to overcome the obstacles in the way of the purpose in question.

In order to make my invention more clear, I refer to the accompanying drawings, in which similar letters denote similar parts throughout the different views, and in which—

Figure 1 is a vertical section through a bending-machine having two pressing and heating rollers *c d* and two bending-rollers *a b*. Fig. 2 is a front view of the two pressing and heating rollers. Fig. 3 is a view similar to Fig. 1, but showing a slightly-modified form of construction. Fig. 4 is a view similar to Fig. 2 and showing the rollers *c d* of Fig. 3. Figs. 5 and 6 show longitudinal sections through preliminarily-curved veneer plates, which will fully be referred to hereinafter. Fig. 7 shows the plate of Fig. 5 curved into cylindrical shape, and Fig. 8 shows the plate of Fig. 5 located between two press-molds for effecting said preliminary curving. Fig. 9 is a section through a piece of a curved board or plate formed by only one layer, and Fig. 10 is a similar view showing the curved board or plate arranged according to my improved method. These two views, Figs. 9 and 10, are also duly hereinafter referred to and are inserted to more fully explain the principle of the invention.

In carrying my invention into practice I first unite at least three veneers *i o u*, Fig. 5, by a suitable cementing medium in such manner that the grain of the middle parallel veneer *o* runs perpendicular to the grains of the two outer ones, and the grains of the two outer cross-veneers run across the longitudinal axis of the barrel-mantle to be produced. In order to clearly distinguish the said three veneers, I shall term them the "interior" veneer, the "exterior" veneer, and the "middle" veneer. By the first term I mean that veneer which is located at or forms the inside surface of the cylinder or mantle. By the second term I mean that veneer which is located at or forms the outside surface of the

cylinder or mantle, the grain of these two always running across the longitudinal axis, and by the third term I mean that veneer which is located between said other two, the grain of the middle veneer always running parallel to the longitudinal axis. The interior veneer and the middle veneer are thus two distinct or different parts.

I prefer to effect the union of the three veneers by aid of slightly-curved press-molds *g h*, Fig. 8, and I further prefer to employ as a cementing medium such a one which after having become perfectly dry may again be made sticky by the application of heat and pressure. Moreover, the cementing medium should be waterproof, and I have found that casein-glue answers best these conditions. However, albumen-glue and similar substances may also be employed.

The aforesaid manner of arranging the veneers with the grain of the one perpendicular to that of another and uniting them to a plate is based on the known facts that a tension of wood in the direction of its grain occurs but in a very slight degree, whereas the compression in this direction may be comparatively great. Compressing wood in a direction perpendicular to that of the grain does not offer any difficulty.

The veneers that are to form the curved board are first coated with the cementing medium. The latter is then allowed to become dry, and the veneers are now placed between the press-molds *g h*, which are heated. Owing to the action of this heat the cementing medium becomes sticky again for a short time, and the veneers are now united under pressure. A curved polyply veneer plate results, having a long radius of curvature, but without any internal tension. In such a polyply veneer plate the strength of the outer veneers—*i. e.*, the exterior and interior one—is greatly increased by the middle one, because the grains of the latter cross those of the two former. The two outer veneers are completely prevented against breaking on the bending of the plate, and they are further prevented against separating into a number of rings. Thus there is obtained in either direction the necessary strength and durability of the mantle after the plate has been bent to a cylinder—that is to say, the plate may be bent into the proper cylindrical shape without losing any of its resistibility in either direction. This is due to a compression of the wood (on bending the preliminarily-curved plate into cylindrical shape) occurring only with regard to the middle veneer (or veneers) and to the interior one; but at the same time the uniting of the veneers, located in the aforesaid manner to a plate, enables me to bend this plate into a cylindrical shape without exerting a greater tension than the nature of the exterior veneer admits, for instead of excessively forcing the exterior veneer in tension, which undoubtedly would cause it to break, I succeed in compressing the interior one. This compression becomes possible by the aid of the intermediate middle veneers *o*, the grains of which running parallel to the longitudinal axis admit any compression wanted. This will become more clear by comparing Figs. 9 and 10.

In Fig. 9 is shown a section through a piece of a curved board or plate drawn on a greatly-enlarged scale. This plate or board consists of one piece and is already preliminarily curved. I will assume that the outer surface or mantle-surface proper of the board has a length of thirteen hundred and fifty millimeters, and that the length of the other surface or inside surface be sixteen millimeters less, or amount to thirteen hundred and thirty-four millimeters, respectively, and I will further assume that the line *m n* of Fig. 9 extends in a radius of the curve of said plate or board. If now the board is passed through a bending-machine, so as to receive a cylindrical shape, then the increase in length of the outside surface corresponds exactly to the decrease in length of the inside surface, so that the line *m n* receives the position of the dotted line *m′ n′*. In other words, if the outside surface increases in length for, say, seventeen millimeters, or up to thirteen hundred and sixty-seven millimeters, respectively, then the length of the inside surface will be reduced by seventeen millimeters, or down to thirteen hundred and seventeen millimeters, respectively. The triangle *m m′ x* is equal to the triangle *n n′ x*, and it is thus obvious that the neutral zone (indicated by the dotted line *x x′*) remains in its usual place. Contrary to this natural effect in bending a board I arrive by a plate consisting of the united veneers in the location as mentioned above at a very small admissible degree of tension of the exterior veneer and a much increased compression of the middle and interior veneer or veneers.

I now refer to Fig. 10, in which the board or plate is composed of four veneers *i o′ o² u*, which are arranged according to the principle of my invention. If a board or plate of this kind is bent, as aforedescribed, then the increase in length of the outside surface of the board or plate amounts to eight millimeters only, whereas the reduction in length of the inside surface amounts to twenty-six millimeters, provided the original measures be the same as have been assumed with regard to Fig. 9. The neutral zone *x x′*, which in any case must be supposed to pass through the point of intersection *x* of the lines *m n* and *m′ n′*, is thus located no longer in its usual place, but has become transposed very near to the exterior veneer *u*. It is thus clearly to be seen from the above that the extension of the exterior veneer remains within admissible limits, or that said veneer is fully prevented against receiving clefts and cracks.

In order to increase the flexibility and pliability of the exterior veneer *u*, I first moisten it with water (or steam) and then direct

(again) a jet of steam against it. This is effected before the preliminarily-curved plate, after its having become perfectly united and dry, is passed through the bending-machine, which is preferably such as represented in Figs. 1 to 4. The form of construction shown in Figs. 1 and 2 is intended for bulged mantles, whereas the other form of construction, Figs. 3 and 4, is intended for cylindrical ones. Instead of three rollers, as is generally the case in bending-machines, I prefer to make use of four rollers, the fourth being arranged below the middle one. D, Figs. 1 to 4, is said fourth roller, which is heated, as is also the middle roller *c*.

a and *b* are the two bending-rollers, and *e* is a strap that facilitates passing the boards through the machine. By the rollers *c* and *d* the board on passing between them is heated, as well as subjected to pressure. The mantle, formed in the manner aforedescribed, is free from any internal tension. This is due, first, to the veneers being united already prior to being bent; second, to the veneers being united in a curved state; third, to the grain of the interior and exterior veneers running across and those of the middle veneer or veneers running parallel to the longitudinal axis of the cylinder or mantle, and, fourth, to the veneer plate being softened by steam before the bending.

I call special attention to the fact that I do not place the wood within a closed vessel and let it be acted on by the steam for several hours, but I direct a jet of steam (having, preferably, a pressure of from two to three atmospheres) only against one side or surface—*i. e.*, against the mantle-surface proper of the veneer board and only for a short time, (a minute or two.)

In Fig. 8 I have shown the three veneers located between the molds *g h*. Fig. 5 shows the preliminarily-curved veneer board, and Fig. 7 shows the board curved into cylindrical shape. Instead of using one middle veneer only I may employ two or more, (see o' o^2, Figs. 6 and 10,) provided the direction of the grains of the second, third, and so on be equal to that of the first. There may be still other modifications; but it is indispensably requisite that there be at least the exterior and the interior veneer, the grains of which run around the mantle, and at least one middle veneer arranged between said other two and having its grain extending perpendicularly to those of the said two.

I am well aware of the fact that a number of veneers have already been united by glue in a curved or rolled state, but in that case the veneers were wound around a drum and were united to each other while in that rolled position. In such cases the whole circumference of the drum must then be kept under pressure until the glue has become dry, and it is obvious that a great loss of time is caused by said known method. By my improved method, however, I can produce a barrel-mantle in from one to three minutes, and besides all other advantages there is the very important one that a mantle produced according to my method is absolutely free from splits and cracks and has a rigidness and resistibility which excels that of any other make.

Having thus fully described the nature of this invention, what I desire to secure by Letters Patent of the United States is—

1. The method of manufacturing veneer mantles for barrels and casks, consisting in uniting at least two veneers having the same direction of grains, with at least one veneer arranged between said two and having its grain running perpendicular to the grains of said two former veneers, subjecting the veneer plate thus formed after its having been united and dried to the action of a jet of steam, and finally bending the said plate under heat and pressure, in such a manner, that the grains of the said two former veneers run around the mantle, for the purpose as described.

2. The method of manufacturing veneer mantles for barrels and casks, consisting in uniting at least two veneers having the same direction of grains, with at least one veneer arranged between said two and having its grain running perpendicular to the grains of said two former veneers; moistening the veneer plate thus formed, after its having been united and dried, subjecting the said plate to the action of a jet of steam, and finally bending it under heat and pressure, in such a manner, that the grains of the said two former veneers run around the mantle, for the purpose as described.

3. The method of manufacturing veneer mantles for barrels and casks, consisting in uniting in a curved state at least two veneers having the same direction of grains, with at least one veneer arranged between said two and having its grain running perpendicular to the grains of said two former ones; moistening the curved veneer board thus formed, subjecting it to the action of a jet of steam, and finally bending it under heat and pressure, in such a manner, that the grains of the said two former veneers run around the mantle, for the purpose as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CARL WITTKOWSKY.

Witnesses:
W. HAUPT,
HENRY HASPER.