No. 822,997. PATENTED JUNE 12, 1906.

E. F. SMITH.

VENEER DRIER.

APPLICATION FILED FEB. 9, 1905.

2 SHEETS—SHEET 1

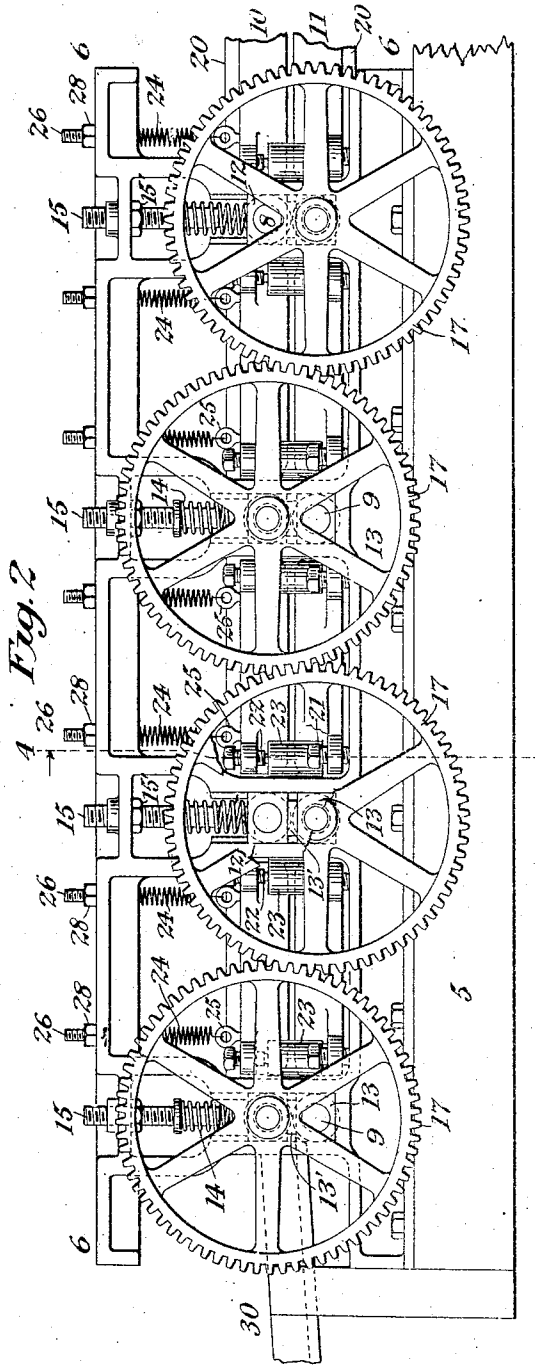


Fig. 2

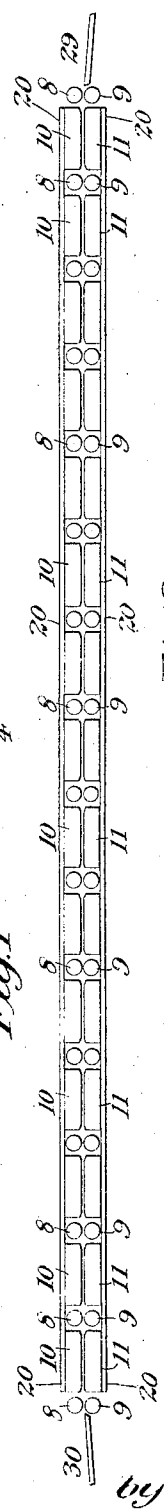


Fig. 1

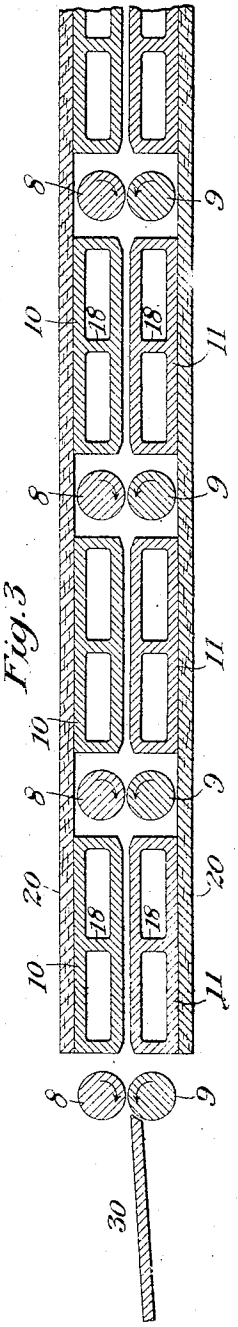


Fig. 3

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2 SHEETS—SHEET 2.

Fig. 4

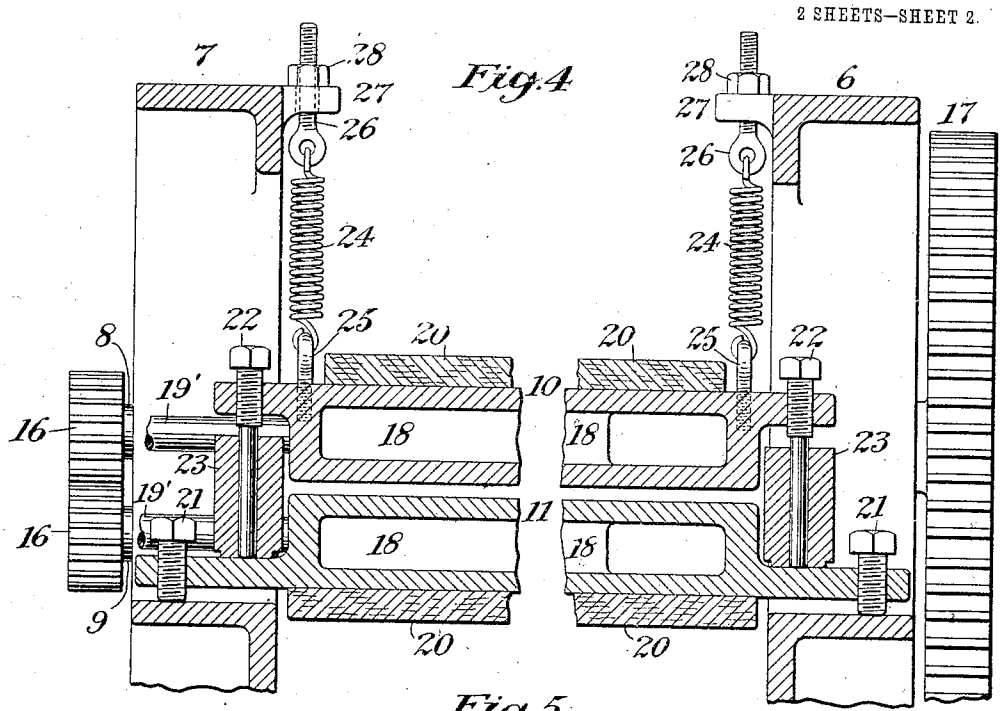
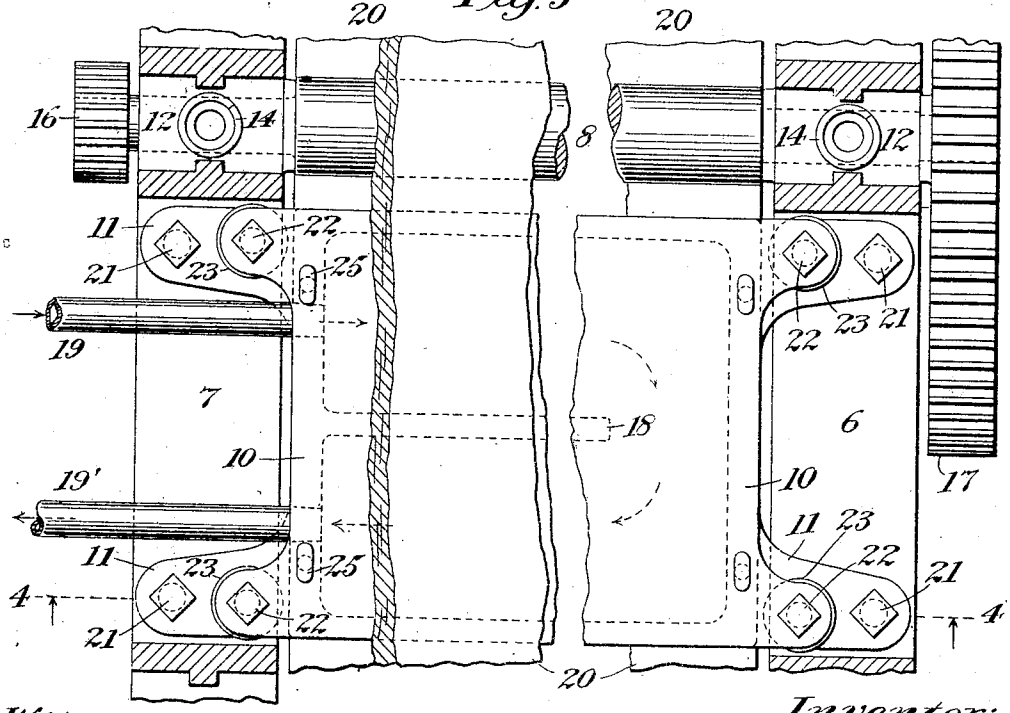


Fig. 5



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UNITED STATES PATENT OFFICE.

EDWIN F. SMITH, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO EDWIN F. SMITH COMPANY, OF PHILADELPHIA, PENNSYLVANIA A CORPORATION OF NEW JERSEY.

VENEER-DRIER.

No. 822,997. Specification of Letters Patent. Patented June 12, 1906.

Application filed February 9, 1905. Serial No. 244,895.

To all whom it may concern:

Be it known that I, EDWIN F. SMITH, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Veneer-Driers, of which the following is a specification, reference being had therein to the accompanying drawings, forming a part thereof.

This invention relates to veneer-driers or apparatus or machines for drying wood in the form of thin sheets.

One of the objects of the invention is to effect such drying uniformly and without subjecting the material to drafts or currents, such as would unevenly dry the material, causing local shrinkages and cracking, or such as would dry the surfaces only, leaving the interior undried.

Another object of the invention is to apply the heat to the material in closest proximity to the surfaces thereof and substantially constantly, but not at the pressure devices or feed-rollers whereby the progression of the material relatively to the heat-applying surfaces is effected, thereby avoiding a wasteful application of heat and avoiding compacting of the surfaces, such as would impair the escape of moisture from the interior of the material and applying the heat economically, effectively, and penetratively, and permitting the ready evaporation, expansion, and escape of the moisture as well from the interior as from the surfaces of the material.

My invention also has for its objects simplicity of construction, durability, certainty and effectiveness of operation, and the realization and attainment of other objects and advantageous features, which will be apparent from the following description of a veneer-drier embodying my invention.

The drawings illustrate a veneer-drier embodying my invention, the full length of the machine being shown in Figure 1 and one-fourth of the length thereof in Figs. 2 and 3.

Fig. 1 is a side elevation, drawn to small scale, of the feed-rollers, heating-plates, and other parts throughout the full length of the complete machine, omitting the framework, supports, and connecting and controlling mechanism. Fig. 2 is a side elevation, partly broken away, of one-fourth of the complete machine, including the delivery end thereof. Fig. 3 is a longitudinal vertical section of parts shown in Fig. 2, including the feed-rollers, heating-plates, heat-insulating covering, and delivery-board. Fig. 4 is an enlarged vertical transverse section taken on a plane indicated by the lines 4 4, Figs. 2 and 5, with middle parts broken away. Fig. 5 is a sectional plan, drawn to the same scale as Fig. 4, with middle and other parts broken away, showing a part of the length of the machine, including one set of feed-rollers and one set of heating-plates.

In the construction of the machine shown I build up the framework of a plurality of side frames 6 and 7, resting upon and bolted to a suitable bed 5, each side frame 6 and each side frame 7 carrying the bearings for four sets of upper feed-rollers 8 and lower feed-rollers 9 and providing supporting and controlling means for its proportion of the upper heating-plates 10 and lower heating-plates 11. In the machine shown I provide sixteen pairs of feed-rollers spaced apart longitudinally, so that the veneer will always be gripped by the rollers of one pair, and fifteen pairs of heating-plates located between the pairs of feed-rollers, and therefore each of the side frames 6 and 7 is one-fourth of the full length of the machine, and these side frames are quadruplicated to produce the full-length machine.

Each of the side frames comprises an upper and a lower longitudinal part and vertical connecting-standards in pairs, each pair of standards receiving and holding against horizontal movement the journal-boxes at one end of a pair of feed-rollers, the lower journal-boxes 13 resting solidly upon the frames and the upper journal-boxes 12 resting upon spacing-blocks 13′ between the upper and lower journal-boxes and yieldingly held against upward thrust by helical compression-springs 14, the compression-springs bearing down upon the tops of the upper journal-boxes 12 and being adjustably held at their upper ends by thrust-bolts 15, passing through threaded holes in the frame and clamped by jam-nuts 15′, the thrust-bolts and journal-boxes having centering projections partly entering the springs. The function of the feed-rollers is not only to feed the veneer through the machine, but also to apply pressure thereto and control

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the shape thereof, preventing warping or curling during the drying operation and maintaining the veneer in the desired flat condition in the machine shown and delivering it in such condition, and the compression-springs 14 will be properly adjusted to cause the feed-rollers to exert the desired pressure. These feed-rollers in the preferred embodiment of my invention shown are not internally heated and are not employed for the application of heat. They become to some extent heated by reason of their inclusion in a heated chamber formed by the internally-heated plates and heat-insulating material, as hereinafter described, and also by reason of the proximity of the heating-plates, as is desirable; but they are not heat-applying devices.

At the outside of the frame, on the side shown to the rear in Fig. 2 and to the left in Figs. 3 and 4, small gear-wheels 16 are provided, one fixedly secured to the outer end of each feed roller shaft, whereby each upper feed-roller is rotatively connected to its lower feed-roller, these small gear-wheels 16 being provided with long teeth, so that they will accommodate the several adjustments of the vertical distances between the feed-rollers required by the different thicknesses of veneer dried in the machine. At the other side of the frame larger gear-wheels 17 are provided, rotatively connecting the pairs of feed-rollers and fixedly secured on the ends of the shafts of upper and lower feed-rollers alternately, the upper feed-roller of one pair being joined to the lower feed-roller of the next adjacent pair and the lower feed-roller of that pair to the upper feed-roller of the next adjacent pair, and so on. By this connecting-gearing the upper feed-rollers will be rotated in one direction and the lower feed-rollers will be rotated in the opposite direction, and all of the feed-rollers will be rotated at the same speed. Power may be applied to any roller shaft or gear and would be so applied as to rotate the feed-rollers at comparatively slow speed.

Each of the heating-plates 10 11 is shown as consisting of a hollow plate having an interior chamber divided by a vertical partition 18, this partition extending from one end of the plate to a point at such a distance from the other end of the plate as to leave sufficient steam-circulating space between this end of the partition and the adjacent end of the interior chamber, and a steam-inlet pipe 19 enters the end of each plate from which the central partition extends and at one side of such partition, so that the steam may enter the plate at this side of the central partition and traverse the entire length of the plate at this side thereof and pass around the end of the partition and traverse the entire length of the plate at the opposite side of the partition and escape through a steam-outlet pipe 19′ at the same end of the plate at which the steam-inlet pipe 19 enters the plate. This arrangement assures a uniform and thorough heating of the entire surface of each plate. The plates are arranged in pairs with the lower surface of each upper plate and the upper surface of the corresponding lower plate in close proximity to each other, but spaced apart so as to permit the veneer to pass through the space intervening between these heated surfaces. The upper face of each upper plate and the lower face of each lower plate are covered with suitable heat-insulating material 20, and this heat-insulating material is continued over the upper rollers and under the lower rollers, so that it bridges the longitudinal spaces between the plates, and thus the plates and rollers and the necessary clearance-spaces between them are inclosed on top and bottom, thereby preventing the escape of vapor and minimizing the radiation of heat both upward and downward, but also protecting the veneer from drafts of cold or dry air. By the inclosing means thus provided the veneer is maintained in a moist and heated atmosphere throughout its movement through the drier. It will be noted, however, that the thin openings between the adjacent and opposed heated surfaces of the plates are not laterally inclosed and also that there are lateral openings about the feed-rollers from the spaces longitudinally between the plates, and thus ample provision is made for the escape, expansively and as a result of the constant application of heat, of the vapor which is generated from the moisture in the veneer. The close proximity of the surfaces of the heating-plates to the veneer prevents the evaporation of moisture from the surfaces more rapidly than from the interior of the veneer and prevents rapid escape of the moisture locally, which would result in warping, uneven shrinkage, and distortion of the veneer. The heat is applied penetratively and the moisture driven off exhaustively as well from the interior as from the surface of the veneer. As the moisture is driven off the veneer shrinks; but the uniformity of the drying operation assures a uniformity of shrinkage, and the veneer is frequently shrunk in the machine to an extent measured in inches, but without warping, cracking, or splitting.

I provide for the proper support and adjustment of the lower heating-plates 11 by means of adjusting screws 21, threaded into lateral projections of the lower plates located at each corner thereof, these adjusting-screws resting upon the upper surfaces of the lower horizontal parts of the side frames 6 and 7. I provide for the support and adjustment of the upper heating-plates by adjusting-screws 22, threaded into lateral projections of the upper plates at each corner thereof, these adjusting-screws being of considerable length,

so as to rest upon the upper surfaces of the corresponding corner projections of the lower plates and being of reduced diameter and smooth cylindrical surface below their threaded portions, so as to provide bearings for the side guide-rollers 23, the function of which is to promptly correct such slight tendencies to oblique movement as would lead to the lateral escape of sheets of veneer from the drier. I also provide additional and yielding supporting means for the upper plates, such means consisting of helical extension-springs 24, located at each corner of each upper plate and held at their lower ends in eyescrews 25, these eyescrews being screwed into the upper plates and held at their upper ends in eyebolts 26, these eyebolts passing freely through brackets 27 of the frame and being adjusted by means of nuts 28. The function of these supporting-springs 24 is to support so much of the weight of the upper plates as to diminish the resistance of these plates to upward movement, so as to permit them to yield in the event of irregularity in the thickness of the veneers, such as would otherwise result in jamming the machine. For example, the weight of each upper plate in the machine shown is about three hundred pounds, and the supporting-springs may be so adjusted as to support very nearly all of this weight, thus diminishing the resistance to upward movement to the small part of the weight of each plate which is not thus supported. To permit of the entrance between the plates of irregular or thickened portions of veneer, I chamfer the adjacent faces of the plates at their front ends, so as to provide inclined abutting end faces, and I make similar provision at the rear end faces to permit the machine to be reversed and veneer backed out of it. This provision of yielding supporting means for the upper plate permits the plates to be safely adjusted in such close proximity to each other as to allow only free clearance for the veneer passing through the thin spaces between the plates, as is desirable, in order that the heated surfaces may be in close proximity to the veneer.

At the entrance end of the drier a feed-board 29 is provided, Fig. 1, and at the delivery end of the drier a delivery-board 30 is provided. The veneer is entered between the adjacent surfaces of the rollers 8 and 9 of the first pair of feed-rollers and gripped thereby and carried between the adjacent heated surfaces of the plates 10 and 11 of the first pair of heating-plates and then between the rollers of the second pair of feed-rollers, and so on through the machine, constantly exposed to the heat radiated from the heating-plates, which are almost in contact with the veneer passing between them and held in the desired flat condition by the feeding and pressure rollers 8 9 and protected from drafts of dry or cold air, with provision for the expansive escape of the vapor generated by the direct and intimate application of heat to the veneer, so that in its passage through the machine the moisture in the veneer is substantially evaporated and expanded out of the veneer, and the veneer is delivered upon the delivery-board 30 in a dry and flat condition and ready when sufficiently cooled for any of its various uses.

It is obvious that various modifications may be made in the construction shown and above particularly described within the principle and scope of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. A veneer-drier comprising heating and inclosing means provided with opposite heat-applying surfaces arranged substantially horizontally and in such close proximity to each other as to allow only sufficient clearance for the veneer to pass freely between the surfaces, such surfaces being clear of obstructive projections or corners, the heating and inclosing means being provided with openings for the expansive escape of vapor, and non-heat-applying feeding and pressure means arranged to come in contact with the veneer at intervals in its passage between the heat-applying surfaces.

2. A veneer-drier comprising heating and inclosing means provided with opposite heat-applying surfaces arranged substantially horizontally and in such close proximity to each other as to allow only sufficient clearance for the veneer to pass freely between the surfaces, such surfaces being clear of obstructive projections or corners, the heating and inclosing means being provided with openings for the expansive escape of vapor, and non-heat-applying feeding and pressure means arranged to come in contact with the veneer at intervals in its passage between the heat-applying surfaces, the heating and inclosing means being of such length as to maintain the veneer in a moist atmosphere and in a heated condition until a substantially complete evaporation of the moisture is attained.

3. A veneer-drier comprising heating-plates having oppositely-arranged heat-applying surfaces for applying the heat intimately to the veneer simultaneously on both sides thereof, such opposite heat-applying surfaces being arranged in close proximity to each other and spaced apart only sufficiently to permit the veneer to pass between them and having chamfered corners and no obstructive projections, and non-heat-applying feed-rollers for the veneer, the heating-plates and feed-rollers being arranged successively with the heating-plates spaced apart longitudinally and the feed-rollers arranged in the longitudinal spaces between the heating-plates and at substantial distances therefrom.

4. A veneer-drier comprising heating-

plates having oppositely-arranged heat-applying surfaces for applying the heat intimately to the veneer simultaneously on both sides thereof, such opposite heat-applying surfaces being arranged in close proximity to each other and spaced apart only sufficiently to permit the veneer to pass between them and having chamfered corners and no obstructive projections, substantially horizontal non-heat-applying feed-rollers for the veneer, the heating-plates and feed-rollers being arranged successively with the heating-plates spaced apart longitudinally and the feed-rollers arranged in the longitudinal spaces between the heating-plates and at substantial distances therefrom, and inclosing means covering the longitudinal spaces between the heating-plates at top and bottom, the heating-plates and inclosing means having openings for the lateral expansive escape of vapor from the veneer.

5. A veneer-drier comprising upper and lower heating-plates having oppositely-arranged surfaces in close proximity to each other but spaced apart so as to permit the veneer to pass through the space intervening between such surfaces, yielding supporting means constructed to diminish the weight whereby the two plates are held together and thereby to diminish the force necessary to further separate the plates, and means for causing relative movement of the veneer and the plates.

6. In a veneer-drier, in combination, heating-plates arranged in pairs, the plates of each pair having their adjacent surfaces in close proximity to each other but spaced apart so as to permit the veneer to pass through the intervening space, yielding supporting means for one of the plates of each pair, and feeding means for causing relative movement of the veneer and the heating-plates with the veneer between the heating-plates, the feeding means and pairs of heating-plates being arranged successively with the pairs of heating-plates between the feeding means.

7. A veneer-drier comprising heating plates arranged in pairs, the plates of each pair having their adjacent surfaces in close proximity to each other but spaced apart so as to permit the veneer to pass through the intervening space, yielding supporting means for one of the plates of each pair, feed-rollers in pairs, and yielding means controlling the feed-rollers, the pairs of feed-rollers and the pairs of heating-plates being arranged successively with the pairs of heating-plates between the pairs of feed-rollers.

8. A veneer-drier comprising heating-plates arranged in pairs, the plates of each pair being arranged one above the other with adjacent oppositely-arranged surfaces, retractive supporting means for the upper plate of each pair, constructed to support a part only of the weight of the upper plate and thereby to diminish the force necessary to lift the upper plate and feeding means for feeding veneer between the adjacent surfaces of the plates, the feeding means and pairs of heating-plates being successively arranged with the feeding means at the proper distances to control the veneer and with the pairs of heating-plates between the feeding means.

9. In a veneer-drier, in combination, heating-plates having oppositely-arranged surfaces in proximity to each other, side guide-rollers in proximity to the lateral margins thereof, and feed-rollers arranged in pairs successively at proper distances to control the veneer, the heating-plates being arranged between the feed-rollers.

10. In a veneer-drier, in combination, a pair of heating-plates arranged one above the other with adjacent oppositely-arranged surfaces, a suitable frame, adjustable supporting means for the lower plate and resting upon the frame, adjustable supporting means for the upper plate and resting upon the lower plate, and means for feeding the veneer between the plates.

11. In a veneer-drier, in combination, a pair of heating-plates arranged one above the other with adjacent oppositely-arranged surfaces, adjustable supporting means for the upper plate and resting upon the lower plate, and side guide-rollers rotatively mounted upon such supporting means.

12. In a veneer-drier, in combination, heating-plates arranged in pairs, the plates of each pair being arranged one above the other with adjacent oppositely-arranged surfaces, feed-rollers arranged in pairs successively, the pairs of heating-plates being arranged between the pairs of feed-rollers, adjustable supporting means for the upper plate of each pair of plates and resting upon the lower plate of the pair, and side guide-rollers rotatively mounted upon such supporting means.

13. In a veneer-drier, in combination, a pair of heating-plates arranged one above the other with adjacent oppositely-arranged surfaces, rigid supports for the upper plate and additional spring-supports for the upper plate, and means for feeding veneer between the plates.

In testimony whereof I have affixed my signature in presence of two witnesses.

EDWIN F. SMITH.

Witnesses:
A. R. HUNTER,
W. S. BABCOCK.