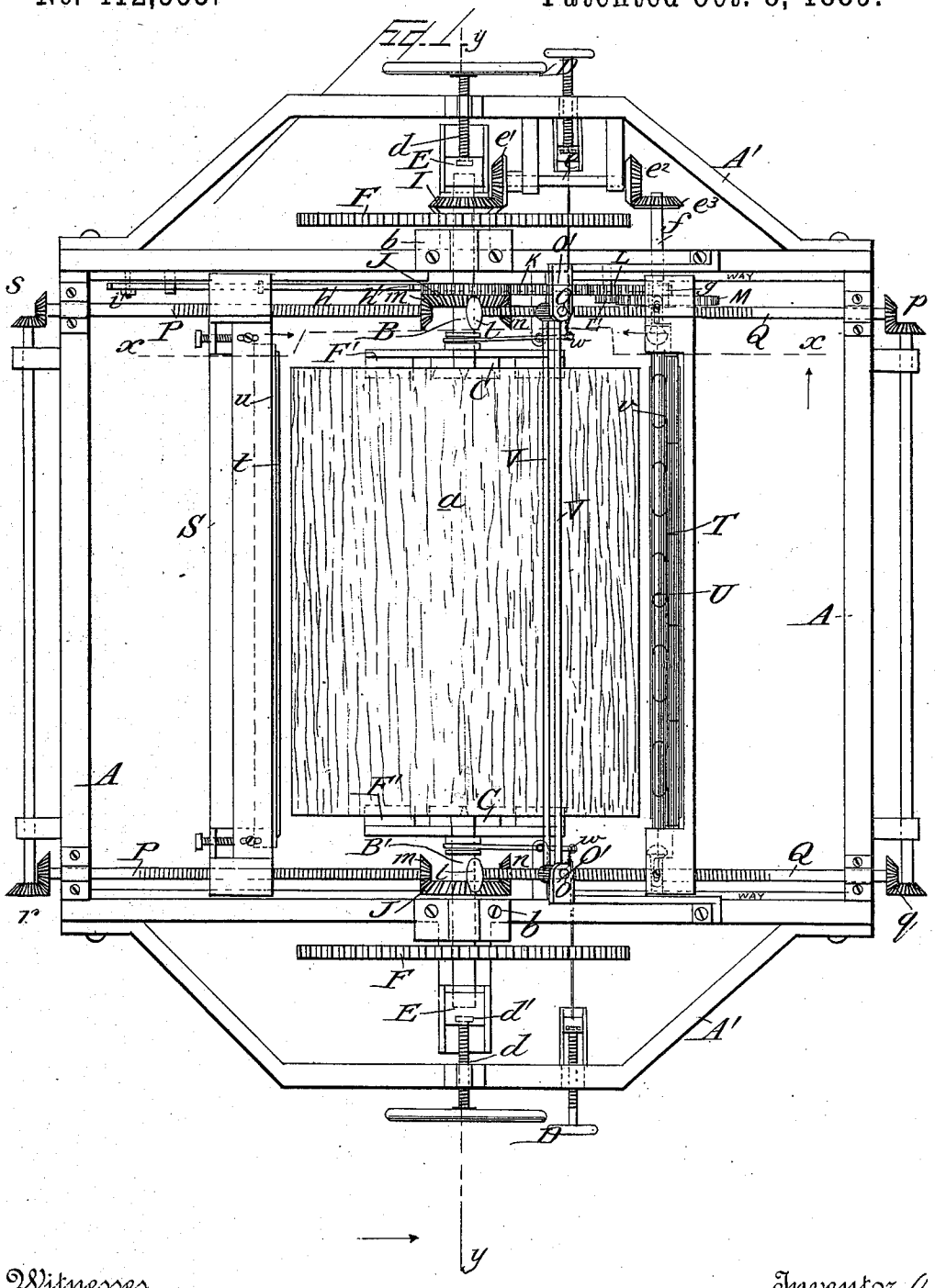
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H. S. SMITH.

ROTARY VENEER OR LUMBER CUTTING MACHINE.

No. 412,553. Patented Oct. 8, 1889.



Witnesses

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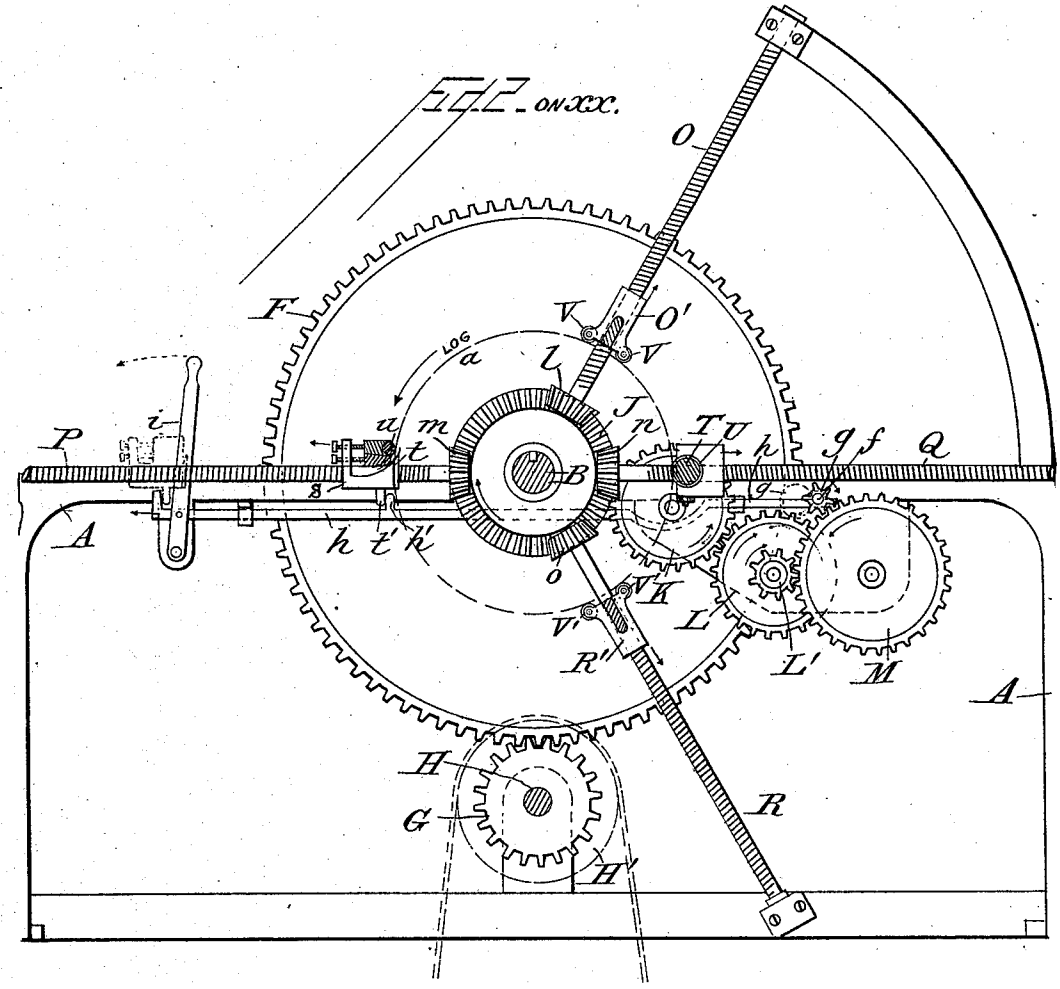
N. PETERS. Photo-Lithographer. Washington, D. C.

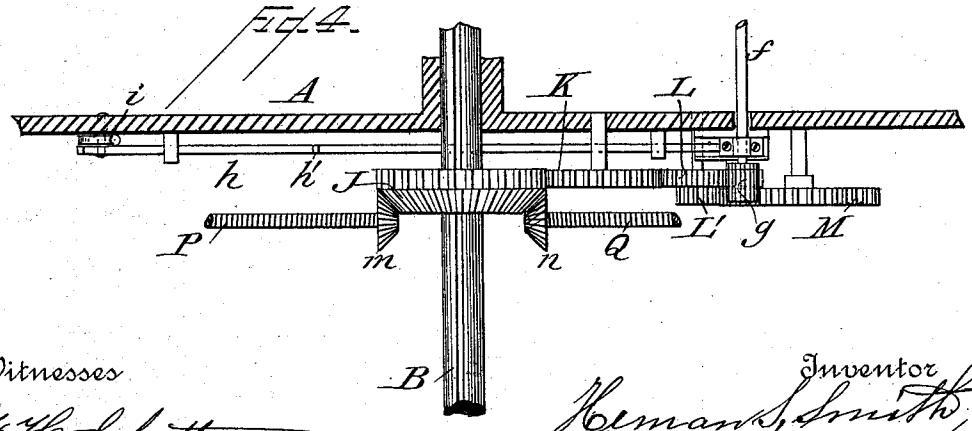
(No Model.) 4 Sheets—Sheet 2.

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ROTARY VENEER OR LUMBER CUTTING MACHINE.

No. 412,553. Patented Oct. 8, 1889.





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(No Model.) 4 Sheets—Sheet 3.

H. S. SMITH.

ROTARY VENEER OR LUMBER CUTTING MACHINE.

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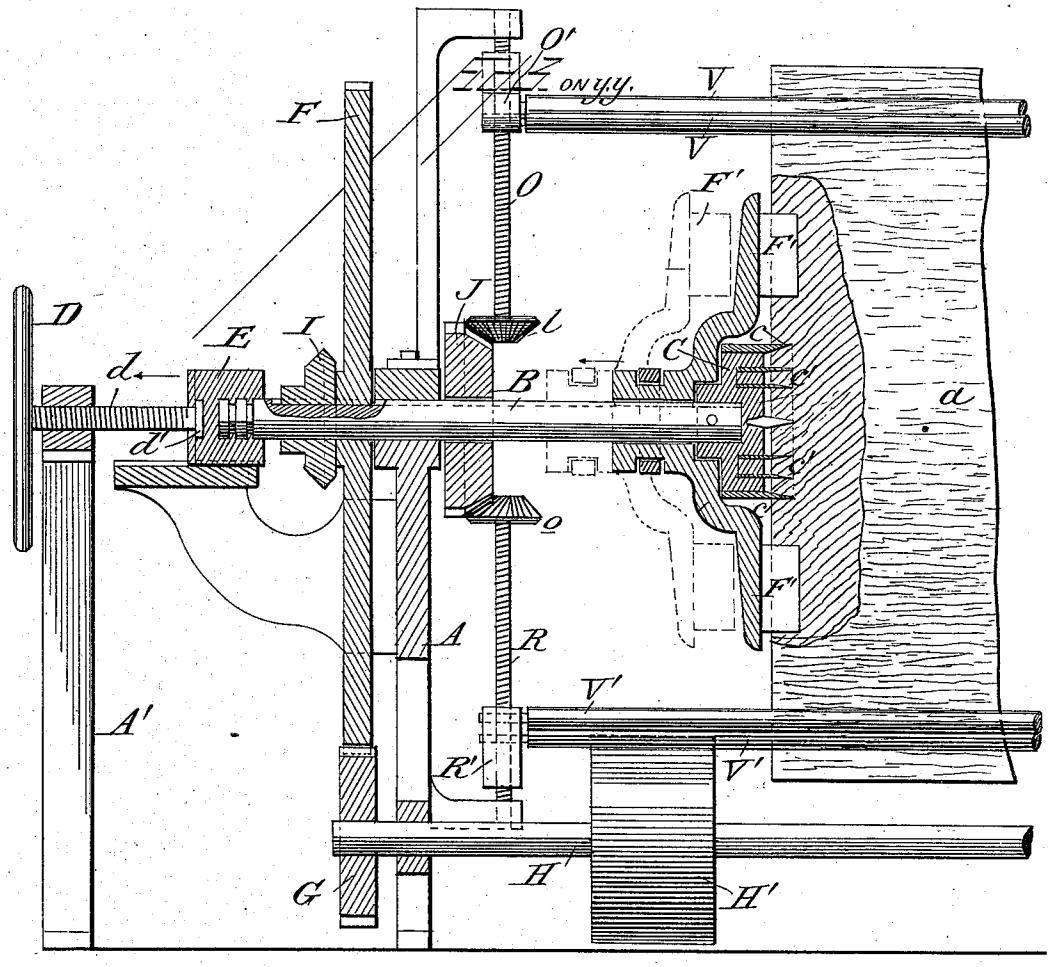


Fig. 5.

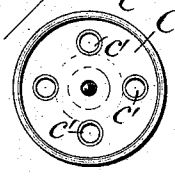
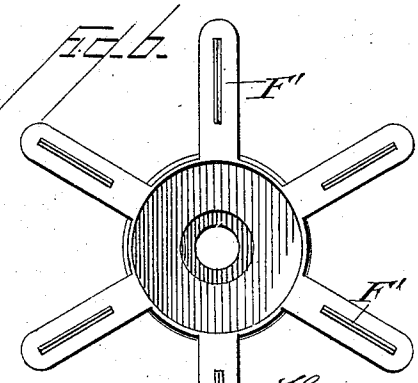


Fig. 6.



Witnesses

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(No Model.) 4 Sheets—Sheet 4.

H. S. SMITH.

ROTARY VENEER OR LUMBER CUTTING MACHINE.

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Fig. 7.

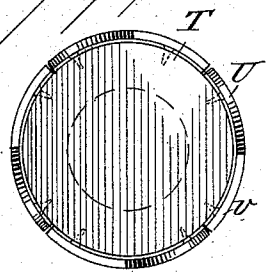


Fig. 8.

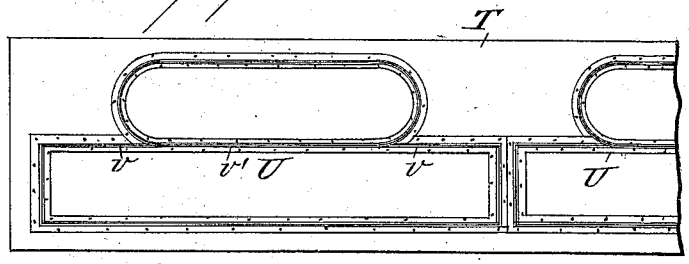


Fig. 9.

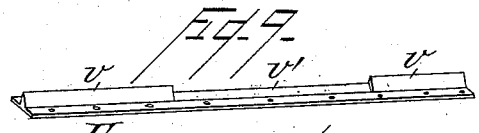


Fig. 12.

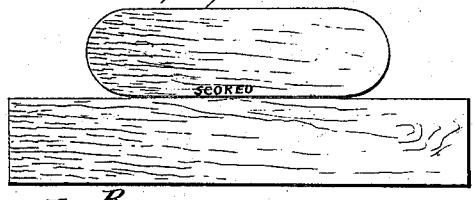


Fig. 10.

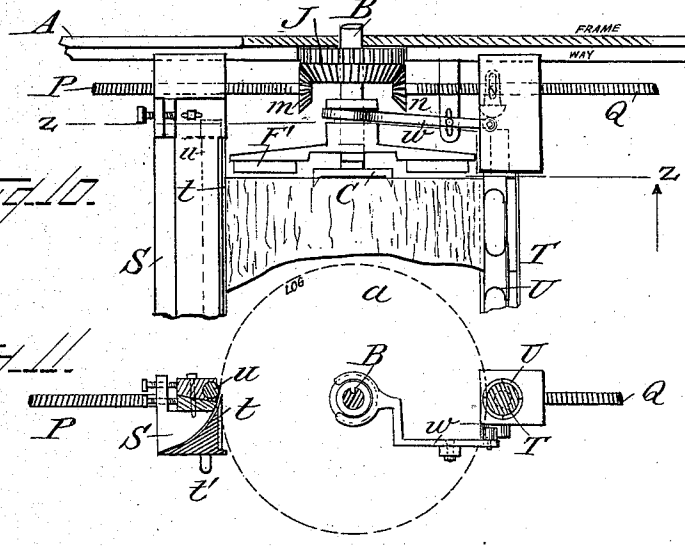


Fig. 11.

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UNITED STATES PATENT OFFICE.

HEMAN S. SMITH, OF GENEVA, NEW YORK.

ROTARY VENEER OR LUMBER CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 412,553, dated October 8, 1889.

Application filed November 2, 1888. Serial No. 289,831. (No model.)

To all whom it may concern:

Be it known that I, HEMAN S. SMITH, a citizen of the United States, residing at Geneva, in the county of Ontario and State of New York, have invented certain new and useful Improvements in Rotary Veneer or Lumber Cutting Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to that class of machinery used for cutting lumber of various kinds into veneers or sheets of wood for various purposes, the object of the invention being to so construct the machine that the wood may be cut with facility, ease, and rapidity, and that the resulting sheets of wood may possess any predetermined configuration or outline, as will be fully specified hereinafter; and the invention consists, essentially, in the construction, combination, and arrangement of parts, substantially as will be hereinafter described and then claimed.

In the accompanying drawings, illustrating my invention, Figure 1 is a top plan view of my veneer and lumber cutting machine complete. Fig. 2 is a transverse vertical section of the same on the line *x x* of Fig. 1. Fig. 3 is an enlarged detail longitudinal section on the line *y y* of Fig. 1, showing the structure of the chuck mechanism whereby the log is firmly grasped and held in such a position within the machine as to be readily acted upon by the cutting devices. Fig. 4 is a plan view of the gearing shown in Fig. 2, the adjacent portion of the frame-work being shown in section. Fig. 5 is an end elevation of one of the smaller chucks that are used to grasp a log or other piece of lumber that is to be acted upon. Fig. 6 is a similar end elevation of the larger or supplemental chuck which is used in connection with the smaller chuck for holding large logs more firmly than they could be held by the use of a small chuck alone. Fig. 7 is an end elevation of the roller provided with knife-patterns, which roller I term the "dividing-roller." Fig. 8 is a plan view of a portion of the surface of this roller, the knife-patterns thereon being of the form which I employ when the machine is to be used for cutting up lumber into blank sheets wherewith to make packing-boxes for fruits and other commodities. Fig. 9 is a detail perspective of a part of the knife-pattern. Fig. 10 is a detail plan view of certain of the parts shown in Fig. 1, said parts being shown in the position that they assume when the dividing-roller and the knife are acting on the log, and when said log is engaged by the smaller chucks only, the larger chuck is disengaged therefrom. Fig. 11 is a transverse section on the line *z z* of Fig. 10. Fig. 12 is a plan view of one of the fruit-box blanks, which the knife-pattern on the dividing-roller shown in Figs. 8 and 9 is designed to cut.

Like letters of reference designate corresponding parts throughout all the different figures.

I have denoted the general frame-work of the machine by A. This frame has no special or particular structure that needs detailed description here. It may vary to suit the exigencies of the individual machines with which it is used. Its purpose is to support in proper and convenient relation to each other the several mechanical parts of which the machine is made up; hence the detailed arrangement of its parts may vary within wide limits, and I reserve the liberty of building the frame A as may seem best and most satisfactory for the machinery.

It will be seen by reference to the drawings that a cylinder of wood *a* is secured between the inner opposing ends of two revolving spindles B and B′, having bearings *b* on the main frame of the machine, as shown. The cylindrical form of the wood upon which the machine is to act is preferred as being the most convenient form to have the work. It lies in a longitudinal horizontal position of the machine, the frame of which may of course be longer or shorter in machines of greater or less size, so that logs of different lengths may be accommodated in machines of different sizes. Of course the logs will as a general thing be cut to the proper lengths before they are inserted in the machine. The ends of the spindles B and B′ adjacent to the cylinder of wood or log are provided with dogs or chucks consisting of circular disks C, having suitable knives or sharpened projections *c c′*, which are adapted to grapple or firmly embed them-

selves into a log or cylinder of wood *a* securely during the cutting operation. An endwise movement is given to the spindles B or B′, as the case may be, (see, for instance, the spindle B in Fig. 3,) by means of a hand-wheel D, so that the dogs or chucks on the ends of said spindles may be pressed into or removed from the log or cylinder of wood with ease and convenience. The hand-wheel is secured rigidly on the outer end of a screw-shaft *d*, which is carried in an internally-screw-threaded screw-box on the extension A′ of the main frame A. The other end of the screw-shaft *d* enters a sliding box E, movable upon the upper surface of a bracket suitably projecting from the main frame of the machine. The extremity of the screw-shaft *d* is provided with a rigid collar *d′*, loosely set within the box E. The extremity of the spindle B (or spindles B′, as the case may be) also enters the box E and carries one or more collars thereon, whereby it is firmly connected to the box. Thus it will be evident that if the operator of the machine manipulates the hand-wheel D he will reciprocate the sliding box E and thus move the spindle B and its dog or chuck in one direction or the other. By this simple means the dogs or chucks are engaged with or disengaged from the log.

The spindles B and B′, in addition to being provided with the smaller chucks just described, have also larger or supplemental chucks consisting of the sleeved disks that have a feathered connection with the spindles, and are provided with radial arms F′, (see Fig. 6,) carrying knives or sharpened projections adapted to embed themselves in the log or wood cylinder. By reference to Fig. 3 it will be seen that these supplemental chucks have a certain degree of movement upon their spindles. They will usually be moved up by hand or by hand-wheels (shown in Fig. 1) and caused to engage the log, as shown in full lines in Fig. 3. They will be moved back and out of the log into the position shown in dotted lines in Fig. 3 by automatic mechanism, which will be hereinafter described when we come to speak of the operation of the dividing-roller. The spindles B and B′ are caused to rotate and thus impart a movement of revolution to the cylinder of wood or log, which may be firmly dogged thereto by means of the following mechanism: F F denote large gears carried upon the spindles B and B′, respectively, said gears being feathered to the spindles, so that the latter may be permitted to have a proper endwise movement during the chucking operation hereinabove referred to. The gears F F are engaged by pinions G, secured upon the horizontal driving-shaft H, journaled in the main frame, said pinions being of course beneath the gears F F. The driving-shaft H carries a pulley H′, to which power may be applied from beneath the machine for the purpose of actuating it. (See Figs. 2 and 3.) Feathered upon the spindle B, (see Figs. 1 and 3,) between the sliding box E and the gear F, is a bevel-pinion I, which engages another bevel-pinion *e′* on a horizontal shaft *e*, located in suitable bearings projecting from the extension A′, said spindle or shaft being at right angles to the direction of spindle B and carrying at its end opposite to where pinion *e′* is located another bevel-pinion e^2, which meshes with a pinion e^3 on the shaft *f*, journaled in the main frame. Said shaft *f* carries at its other end the pinion *g*. (See Figs. 2 and 4.) Upon the spindle B and also upon the spindle B′ is located a gear J, said gear J upon the spindle B being a double-faced gear—that is, having a bevel-face and also a flat face. These gears are located at a point adjacent to the main frame and between it and the chuck devices carried on the extremities of the spindles. The flat portion of the gear J on the spindle B engages with a gear K, carried on a stud projecting from the main frame, which in turn engages an intermediate gear L, likewise carried on a projecting stud, which also has thereon a small pinion L′, adapted to engage a gear M, supported on a stud projecting from the frame. The gear L′ may be removed, if desired, and another gear having a different diameter substituted therefor. Thus a change may be made in the movement of the gearing just described by substituting different-sized pinions for the pinion L′. The pinion *g* is adapted to engage either the gear M or the gear L, it being movable from one to the other, as shown in Fig. 2, the said movement of the gear *g* being effected by means of the rod *h*, connected to the shaft *f* and operated by means of a lever-handle *i*. (See Fig. 2.) In Fig. 2 the pinion *g* is shown in engagement with the gear M. It is manifest that if the lever-handle *i* be thrown in the direction of the arrow in that figure the shaft *f* will be moved sufficiently to transfer the gearing *g* from its engagement with the gear M and cause it to engage the gear L. A reverse movement of the pinion *g* from gear L into gear M may be effected by a reverse movement of the lever-handle, or it may be automatically accomplished by the engagement of a stud on the head-block which carries the knife with a projecting stud on the rod *h* in the manner to be hereinafter explained. The beveled portion of the gear J engages four beveled pinions *l*, *m*, *n*, and *o*, said pinions being rigidly secured to the inner extremities, respectively, of the screw-bolts or rods O P Q R, two of said screw-bolts or rods—to wit, P and Q—being horizontal, while the other two O and R are inclined at angles of forty-five degrees or more from the horizontal line, one of them, as O, extending upward, while the other, as R, extends downward. This remark about the bevel-face of the gear J engaging with the pinion is equally applicable to the gear J on the spindle B′, wherefore it may be said that the two gears J, which are loosely mounted upon the spindles B and B′, respectively, engage each a set of four pinions rigidly carried on the ends of

four screw-bolts or screw-shafts. Miter-gears *p*, *q*, *r*, and *s* serve to connect the outer extremities of the horizontal screw-bolts P and Q with horizontal rods running lengthwise of the machine, whereby these screw-bolts have a movement in unison. All this is clearly represented in Fig. 1. The screw-bolts P and Q are journaled in suitable boxings on the main frame. The screw-bolts P P carry the longitudinal head-block S, supporting the knife *t* and the roller *u*, (see Fig. 2,) said roller being embedded in a portion of the head-block, as shown, which portion is adjustable to and from the knife, so as to regulate the distance between the roller and the knife. The screw-bolts P P work in nut ends or screw-threaded portions of the head-block and thus slide it back and forth in suitable ways in the frame A. Thus the head-block, with its knife and pressure-roller, is moved up to the log correspondingly with the rotation of the latter, so that the veneer or sheet of wood is easily cut from the log.

In the improved operation of cutting wood by my machine it is necessary that the knife, the pressure-roller, and the log should be nicely relatively adjusted, and that all the several parts of the machine, including the gearing and the various screw-bolts, &c., should be accurately and nicely adjusted with relation to each other, so that the movements of all these parts may take place in proper unison to accomplish the objects and purposes of the machinery now being described. I have thus stated that the head-block which carries the knife and pressure-roller is located longitudinally in the machine on one side of the log or wood cylinder which is to be acted upon, and is moved horizontally toward and away from the log by means of the feeding-screws P P. Similarly located upon the other side of the log or cylinder of wood *a*, and likewise longitudinally positioned, and also sliding horizontally to and from the log *a* in suitable ways on the main frame by means of the screw-bolts or feed-screws Q Q, which pass through nut ends or screw-threaded portions of the same, is a roller, which I term a "dividing-roller," which carries upon its cylindrical surface knife-patterns. Said roller is designated by T. Its detailed structure is shown in Figs. 7, 8, and 9. This roller is provided with knife-patterns consisting of sharp edges or knives arranged upon its cylindrical surface so as to project slightly therefrom and being arranged in any desirable and convenient outline, so that said roller T will revolve in close contact with the log or cylinder of wood in the machine. (See Fig. 10.) These knives or patterns upon its cylindrical surface may embed themselves into the log, and thus cleanly cut thereupon any desired outline. This will be cut into the log for a depth equal to the thickness of the resulting veneer or sheet which the knife has been adjusted to sever from the wood. The dividing-roller will act upon the cylinder of wood in advance of the action of the knife, and hence any form of blank which said roller may have imprinted upon the wood will appear when the knife does its work, and the machine will in consequence turn out blanks for fruit-boxes or for other purposes all complete and ready for use. Multitudes of blanks of a certain pattern may thus be cut speedily and easily from the log. I have shown an example of one form of blank that may be cut by this method. In Fig. 12 the blank is shown in plan view. This veneer blank is intended for use in the construction of a basket intended to hold peaches, grapes, or other fruits. Two blanks of the kind shown in Fig. 12 will be sufficient to make a complete basket. They will be placed upon each other with their curved portions superimposed, and then the ends will be conveniently connected together by pins or other attaching means.

The form of knife-pattern which is necessary to cut the veneer-blank shown in Fig. 12 is indicated in Fig. 8, where it is seen that the knife is arranged so as to have the same outline (straight and curved) as is possessed by the blank in Fig. 12. It will be noted that between the rectangular portion of said blank and the curved end portion there is a scoring—that is, the substance of the veneer at this point is cut only partially through, but enough to make the veneer at this point thinner, so that the side may be easily bent up to form the basket.

U denotes the knife-pattern for making the basket-blank of Fig. 12. In Fig. 9 we see how one part of the knife-pattern used is changed in structure to effect the scoring indicated in Fig. 12. The two-parts *v* of the knife are of a sufficient size to cut into the log to a thickness equal to the resulting veneer; but the intermediate strip of the knife *v'* between the two parts *v v* does not project outward so far as the parts *v v*, and hence will cut into the blank only partially. It will be unnecessary to explain that the knife-pattern on the roller T, when arranged as shown in Fig. 8, will cut to the proper depth into the log before said log has reached the knife, and that when it does reach the knife the latter will cleave the veneer or sheet from the log and turn out blanks of the form shown in Fig. 12, perfect and ready for use.

I have stated above that automatic mechanism was arranged in connection with the dividing-roller, so that the supplemental chuck F might be disengaged from the log at the proper time. This automatic mechanism is shown clearly in Figs. 10 and 11. It consists simply of a pivoted lever *w*, having a bifurcated end which sits within an annular groove on the sleeve portion of the disk F, as shown very clearly in Fig. 3, as well as in Figs. 10 and 11. Said lever *w* is adjustably pivoted to a projection on the main frame. Its end is rounded, as shown in Figs. 10 and 11, or, better, provided with a small friction-

roller. A projection on the under side of the dividing-roller or the frame which carries it is adapted at the proper instant to strike the end of this lever *w*, and by oscillating it horizontally cause the bifurcated end thereof to throw the supplemental chuck out of engagement with the log, as is shown in Fig. 10. This will save the operator much trouble and difficulty in releasing the chuck promptly and effectively and at the proper instant. The screw-bolts O and R, which extend upward and downward, respectively, have their outer ends journaled in suitable bearings in the main frame of the machine. Upon these screw-bolts are the nuts O′ and R′. Connected to these nuts O′ O′ are two rollers V V, running longitudinally of the machine in contact with the wood or cylinder *a*. Said rollers are properly journaled in the nuts, and they exert the function of pressure-rollers, pressing hard upon the cylindrical surface of the log and holding it firmly and immovably while it is undergoing the operation of being cut by the knife into veneers or sheets of wood. Rollers V′ V′, similar to the rollers V V, are located beneath the log *a*, in contact therewith and journaled in the nuts R′ R′. Thus it will be seen that the pressure-rollers V V and V′ V′ will be fed forward constantly by the rotation of the screw-bolts O and R within the nuts O′ R′, so as to keep said pressure-rollers constantly in contact with the log. In my improved veneer and lumber cutting machine, therefore, we have a feature of a quadruple feed consisting of four rotative screw-bolts, which are geared to and simultaneously actuated by a single gear, and this series of four screw-bolts actuated by the gears is located at each end of the machine. One of these screw-bolts carries, as we have seen, the head-block having the cutter. Another carries the dividing-roller which imprints upon the wood the form of the veneer which it is desired to produce. The two remaining screw-bolts feed the pressure-rollers, which hold the log firmly and rigidly while it is being cut up. It may be here stated that the dividing-roller not only can cut upon the wood the form of the blank to be produced, but it can be so constructed as to print the blank also with the name of the maker of the boxes or with any other suitable inscription, as it may seem desirable to have thereupon.

I have now described in detail the construction of the several parts of my improved veneer and lumber cutting machine. It remains to describe the operation and to show how the gearing that connects with the flat face of the gear J may be made to reverse the operation of the feeding devices. When the log has been securely clamped in the machine, the cutting thereof may begin. The pinion *g* must then be in engagement with the gear L. If this be so, it will be obvious that the gear M will run loosely. Motion will be imparted from the pinion *g* to gear L, and thence to the gear K, which will actuate the gear J, and this in turn will operate the series of four bevel-pinions that engage therewith and thus drive the feeding devices, causing the knife to approach the log, also the dividing-roller to make its cuts into the log, and also the pressure-rollers will be kept in this way in close contact with the log. When the log has been reduced in size to a point where the resulting veneers or sheets of wood will be no longer serviceable—in other words, when the log has been entirely cut up, in so far as it is desired to do so—the traveling head-block that carries the knife will automatically reverse itself, and the entire quadruple feed will likewise be reversed, the automatic reversal being accomplished in the following manner: The head-block has projecting downwardly therefrom a lug or projection *t*′, which is adapted to come in contact, during the motion of the head-block, with an upwardly-projecting lug *h*′ on the rod *h*, that is connected to the shaft *f*, carrying pinion *g*. The lug *h*′ is placed at such a point upon the rod *h* that when the head-block has moved up as near to the center of the log as is desirable said lug will be struck by the lug on the head-block, and thus the rod *h* will be shifted endwise and the pinion *g* will be transferred from its engagement with the gear L and made to engage the gear M. It will be obvious from inspection of this gearing that when the pinion *g* is in engagement with the gear M, inasmuch as the pinion *g* revolves in the same direction at all times, the motion of the gear L will be reversed and it will rotate in a direction contrary to what it did when the pinion *g* engaged it directly. This will cause a reverse movement of the four feed-screws, and consequently the head-block, dividing-roller, and pressure-rollers will begin to recede from the log, after which the part thereof that remains may be removed from the machine and a new log placed therein.

Whenever during the operation of the machine it becomes desirable to reverse the machinery before the log has been entirely cut up, or for any reason to stop the cutting, the operator may lay hold of the hand-lever *i* and thus transfer the pinion *g* from one gear to the other, or place it in a position intermediate between the two gears where it will engage neither, in which event the feeding devices will be at rest, neither moving up nor receding from the log.

It will be obvious that in the construction of my improved veneer and lumber cutting machine many minor changes may be made in the detailed construction and arrangement of the several mechanical parts, and I do not wish to be confined to the precise structure and location of each element as hereinbefore explained, and I reserve the liberty, therefore, of varying the exact construction, in order to adapt the machine to the exigencies of individual cases.

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

1. In a veneer and lumber cutting machine, in combination with the spindle B, the chuck or dog on the end thereof, and a supplemental chuck consisting of a sleeved disk feathered upon the spindle and having arms carrying knives that engage the log, a bifurcated lever fulcrumed on the main frame of the machine engaging the supplemental dog and acted upon by a movable part of the machinery, so that at the proper instant the supplemental dog may be disengaged from the log, substantially as described.

2. In a veneer and lumber cutting machine, the combination, with the spindle B, carrying on its inner end a dog or chuck, of means for imparting thereto an endwise movement for the purpose of driving the chuck into the log or disengaging it therefrom, consisting of a box E, loosely engaged by the outer end of the spindle, which is provided with collars located inside of the box, and the screw-shaft d, having the collar d' located loosely within the box E, said screw-shaft being provided with an operating hand-wheel B, substantially as described.

3. In a veneer and lumber cutting machine, the combination of the series of four feed-screws O, P, Q, and R at one end of the machine and a similar series of feed-screws at the other end of the machine, said feed-screws being arranged substantially as described, the gears J, engaging pinions on said feed-screws, the spindles B and B′, the driving-gears thereupon, and the connecting-gearing between the driving-gears and the gear J at one end of the machine and between the feed-screws at one end and those at the other end of the machine, substantially as described.

4. In a veneer and lumber cutting machine, the combination of the four feed-screws O P Q R at one end of the machine and the four feed-screws O P Q R at the other end of the machine, said feed-screws P and Q being horizontal and said feed-screws O and R being inclined upward and downward, the head-block having the knife and pressure-roller and carried by the feed-screws P P, the upper pressure-rollers carried by feed-screws O O, the lower pressure-rollers carried by feed-screws R R, the dividing-roller carried by the feed-screws Q Q, the gears J J, engaging pinions on the several feed-screws, and the actuating mechanism whereby said gears J J are rotated in one direction to feed the cutter, dividing-roller, and pressure-rollers against the log or in another direction to cause them to recede from the log, substantially as described.

5. In a veneer and lumber cutting machine, the combination of the four feed-screws O P Q R at one end of the machine and a like number at the other end, the head-block S, having knife t and roller u and actuated by feed-screws P P, the dividing-roller T, actuated by the feed-screws U U, the upper pressure-rollers V V, journaled in boxes O′ O′, actuated by the feed-screws O O, the lower feed-screws V′ V′, journaled in boxes R′ R′, actuated by the feed-screws R R, the gears J J, connecting pinions on the several feed-screws, and actuating mechanism for said gears, substantially as described.

6. The combination of the spindle B, the driving-gears thereon, the double gear J, loosely mounted thereon, a feeding mechanism consisting of feed-screws having pinions engaged by the bevel-face of said double gear, the gear I, feathered upon spindle B, a shaft e, carrying beveled pinions e' and e^2, said pinion e' engaging the gear I, and said pinion e^2 engaging the pinion e^3 on the movable shaft f, carrying the pinion g, and the train of gears K, L, L′, and M, said gear K engaging the flat face of the double gear J, all arranged so that the pinion g may be caused to engage the gear M or the gear L, so that the feeding devices may move in one direction or the other, substantially as described.

7. In a veener and lumber cutting machine, the combination of the feed-screws having pinions thereon, the gears J, engaging said feed-screws, the spindles B and B′, carrying the dogs that engage the log, the driving-gears on said spindles, the connecting-gearing between said spindles and the gears J, and the rod h, connected to the movable shaft f, carrying transfer-pinion g, said rod h having the lug h', adapted to come into contact with a lug on the bottom of the head-block, substantially as and for the purpose described.

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

HEMAN S. SMITH.

Witnesses:
FRED E. TASKER,
S. HERBERT GIESY.