(No Model.) 4 Sheets—Sheet 1.

G. A. ONCKEN.

WOOD WORKING MACHINERY.

No. 420,886. Patented Feb. 4, 1890.

Fig. 1.

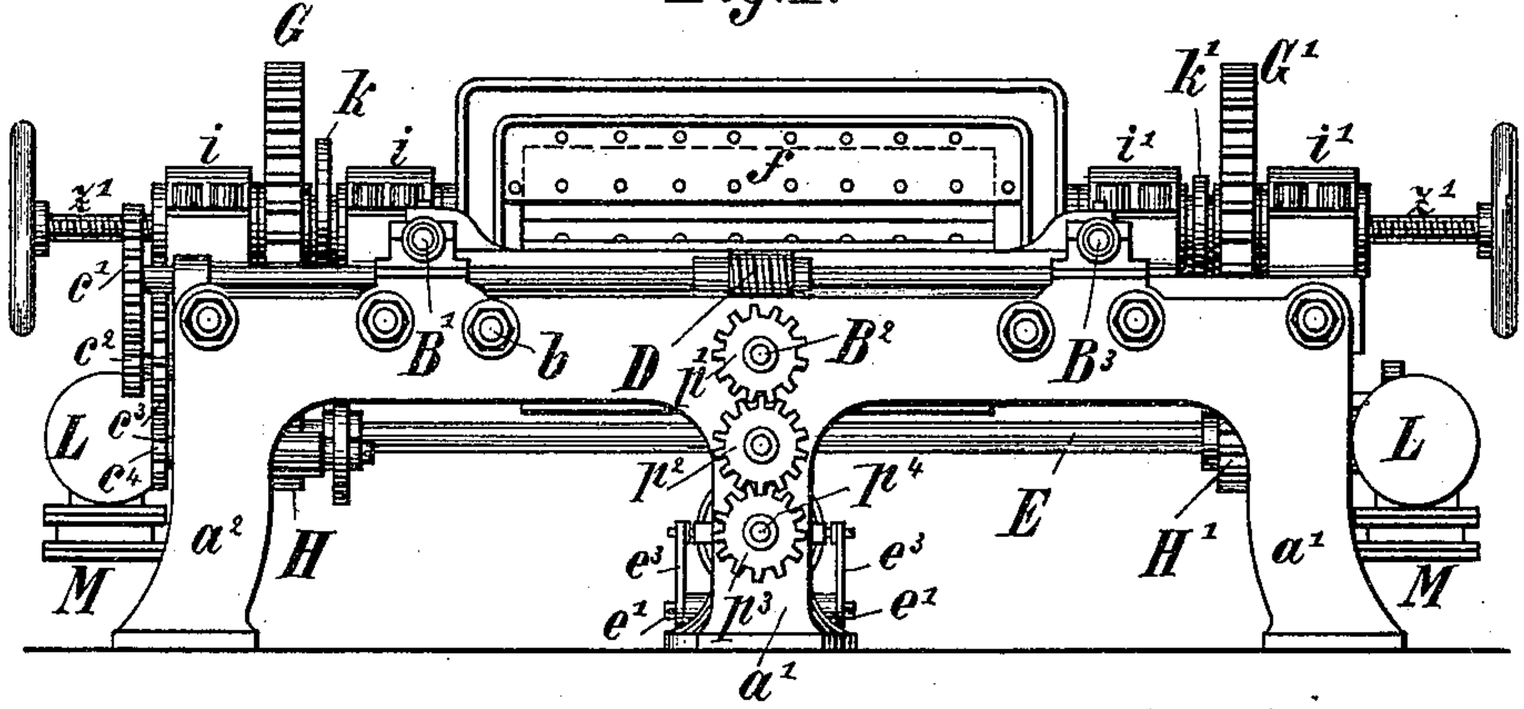


Fig. 2.

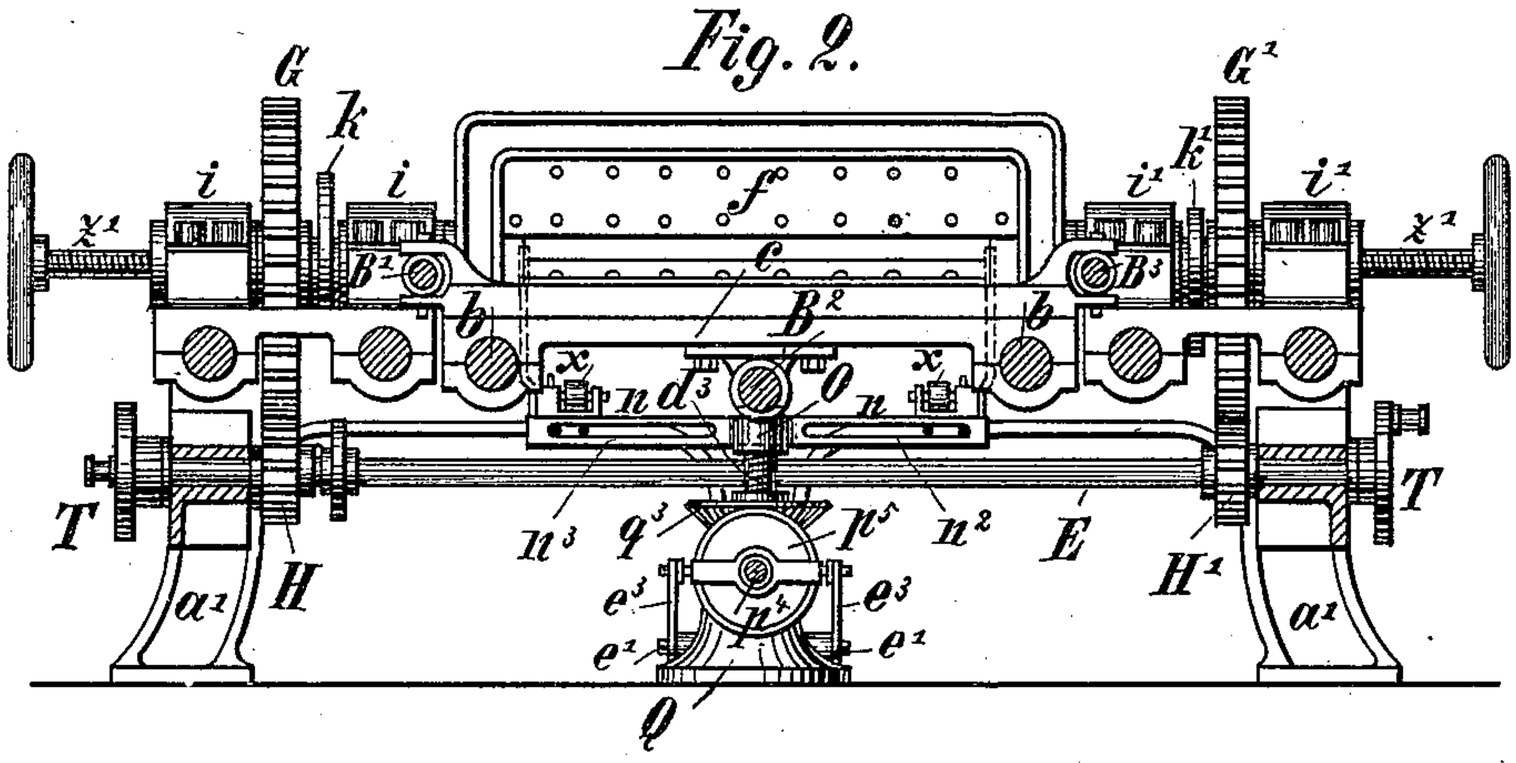
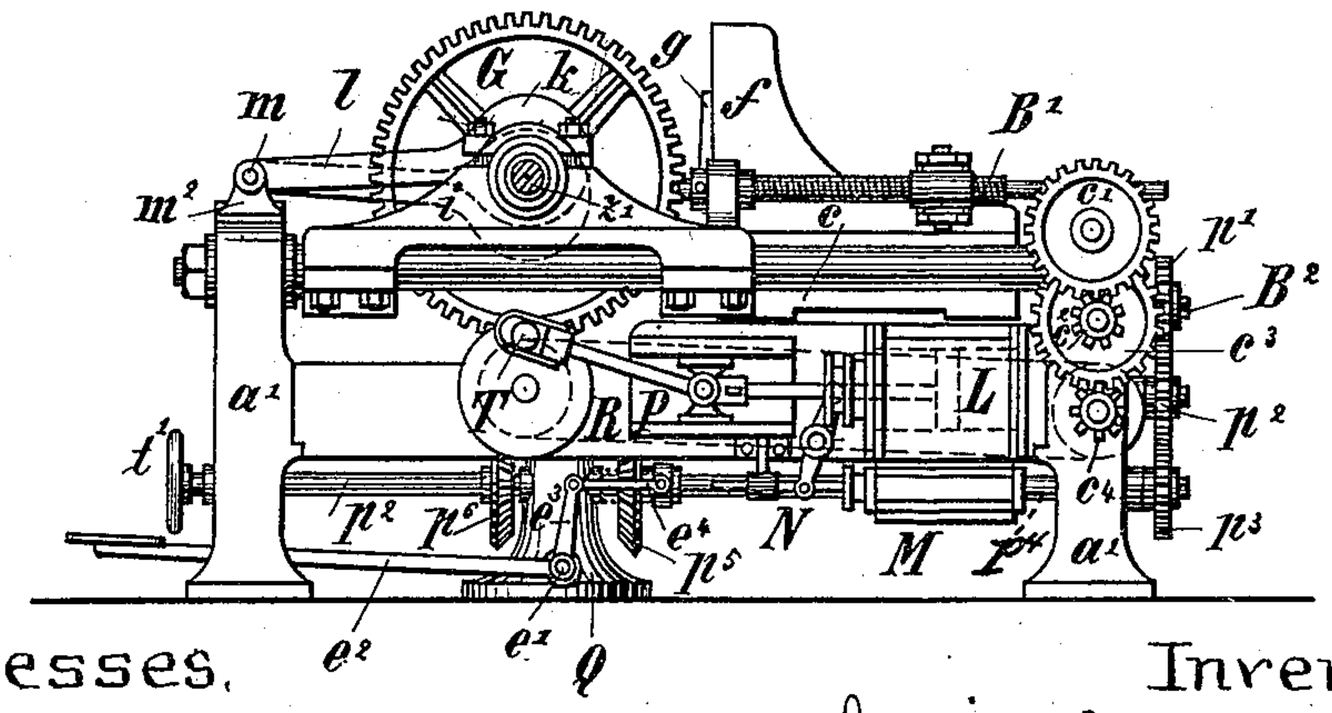


Fig. 3.



Witnesses.

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J. Thomas Tolhouse

Inventor.

Gustav Adolph Oncken

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(No Model.) 4 Sheets—Sheet 2.

G. A. ONCKEN.

WOOD WORKING MACHINERY.

No. 420,886. Patented Feb. 4, 1890.

Fig. 4.

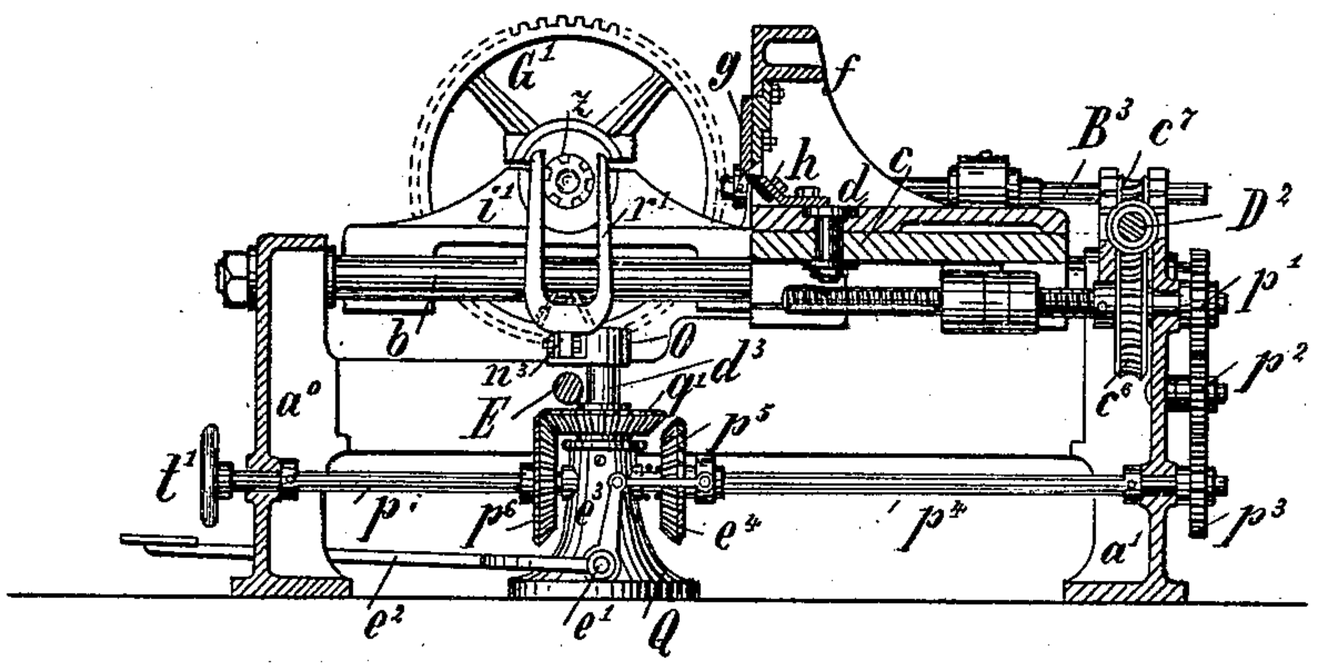
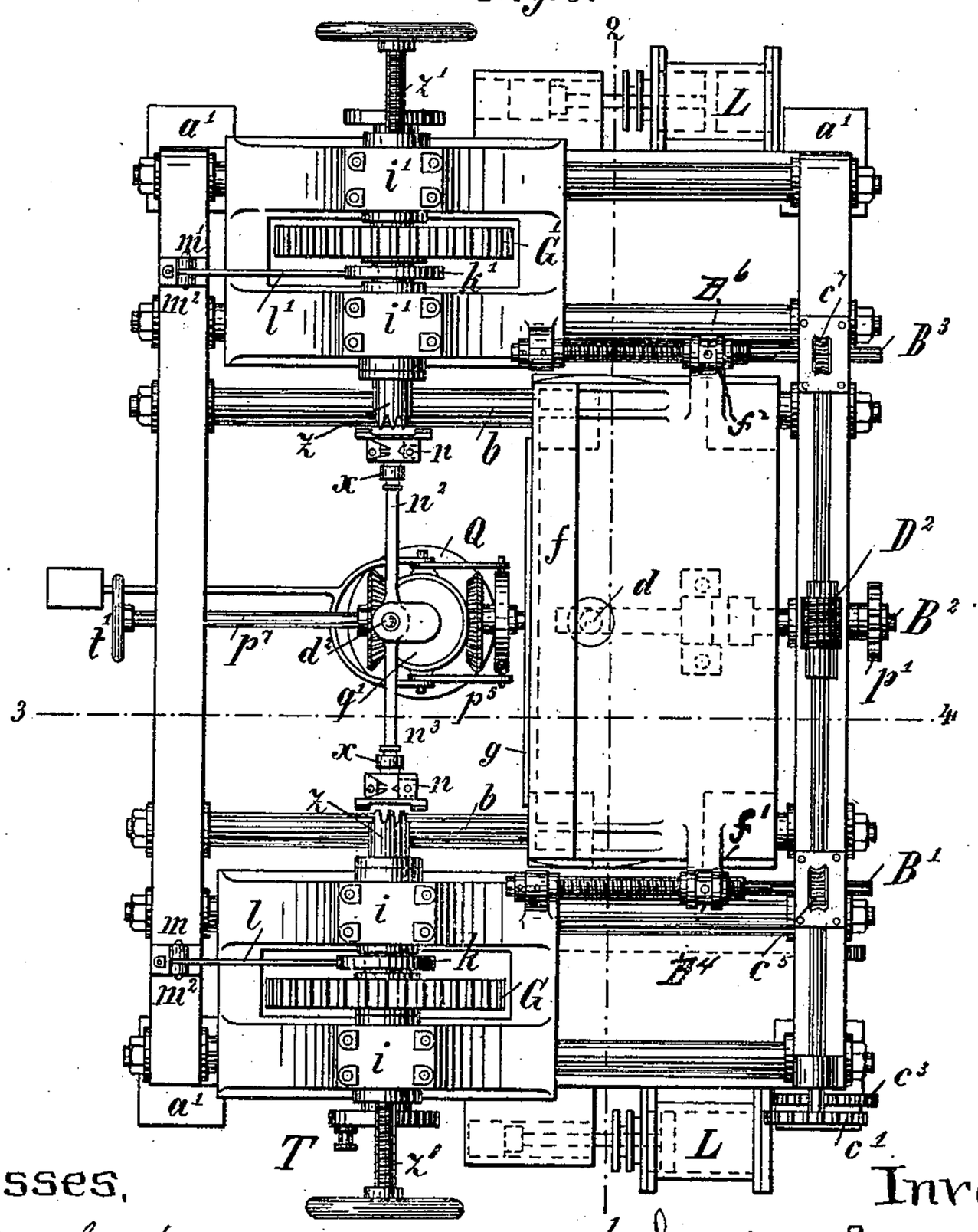


Fig. 5.



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(No Model.) 4 Sheets—Sheet 3.

G. A. ONCKEN.

WOOD WORKING MACHINERY.

No. 420,886. Patented Feb. 4, 1890.

Fig. 6.

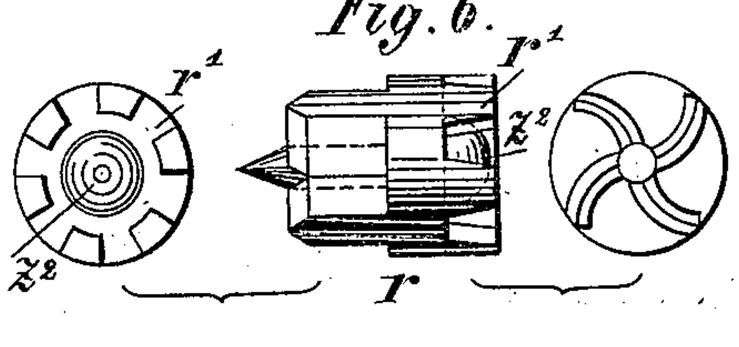


Fig. 7.

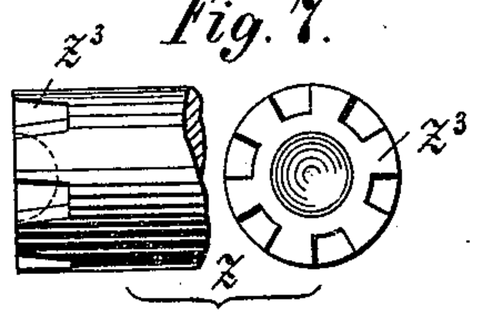


Fig. 9.

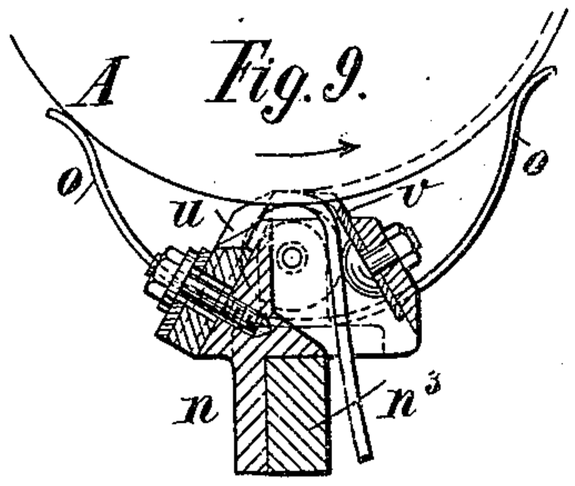


Fig. 8.

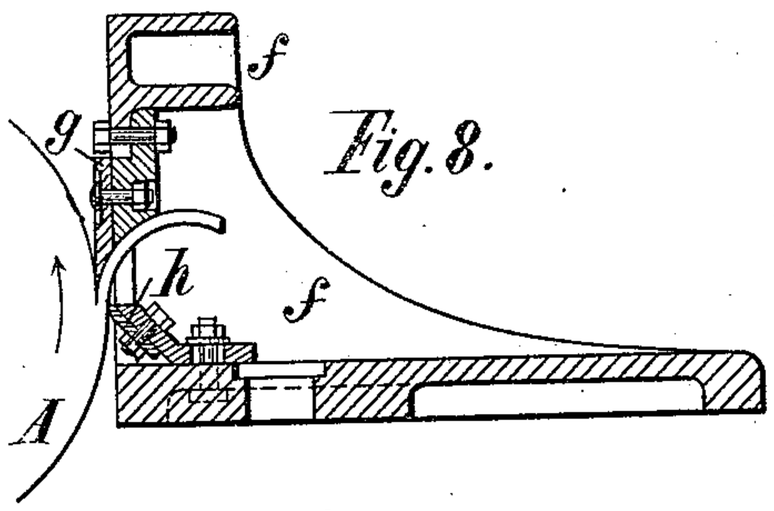


Fig. 10.

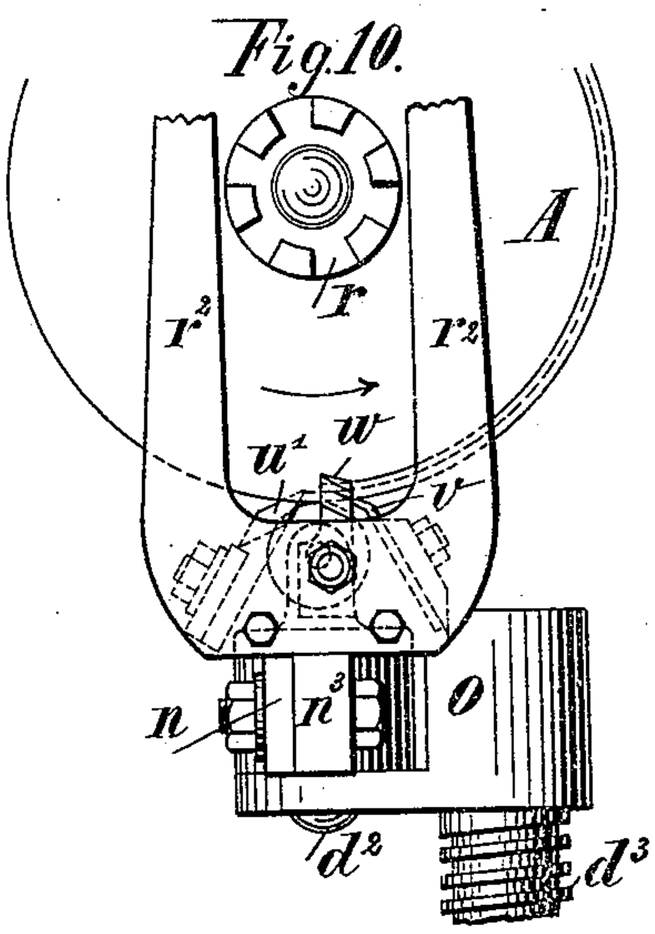


Fig. 11.

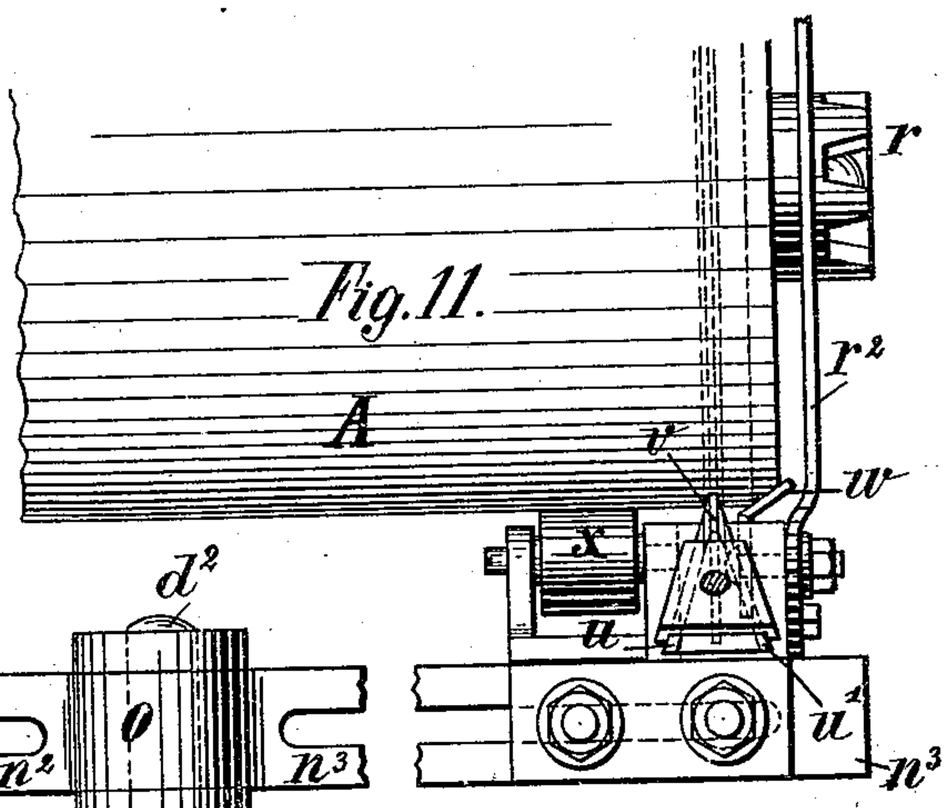


Fig. 12.

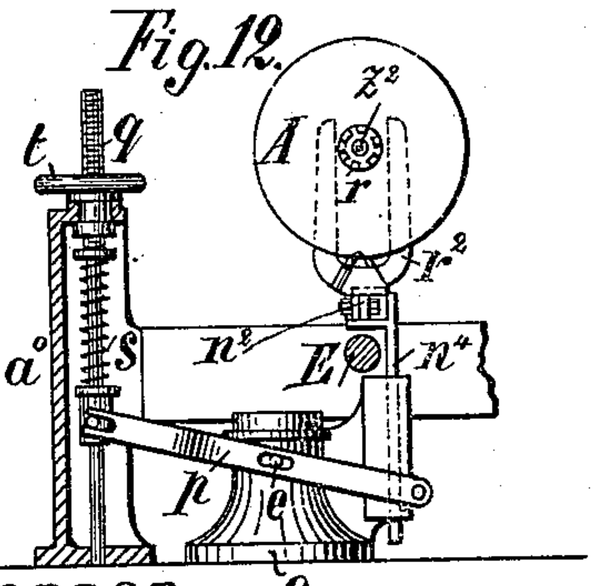
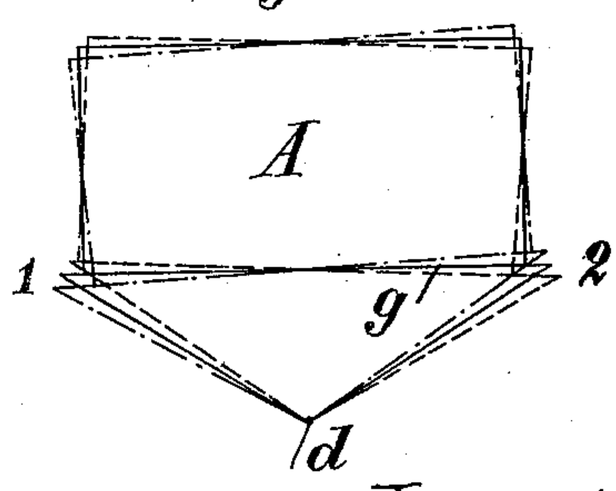


Fig. 13.



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(No Model.) 4 Sheets—Sheet 4.

G. A. ONCKEN.

WOOD WORKING MACHINERY.

No. 420,886. Patented Feb. 4, 1890.

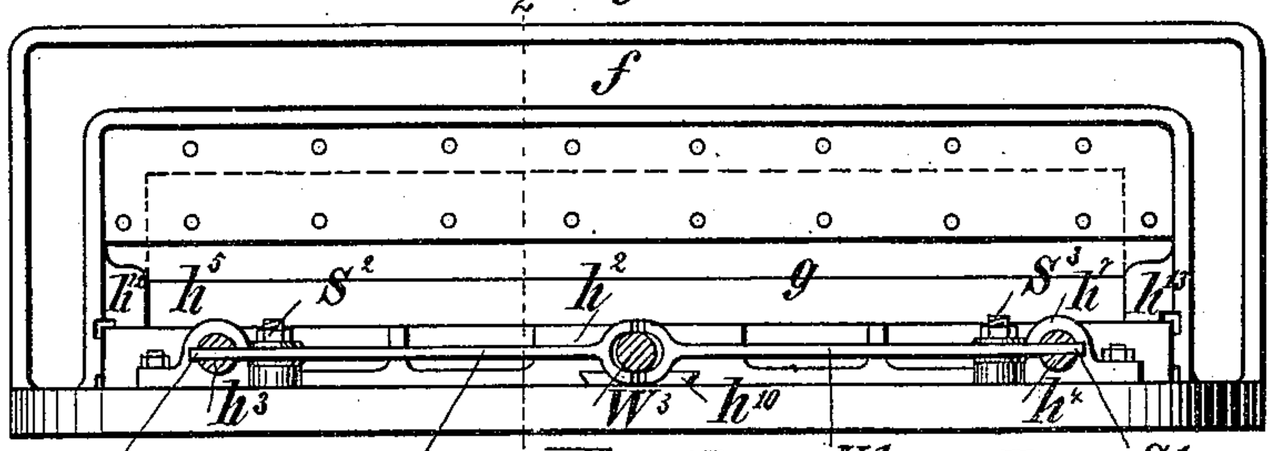

Fig. 14.

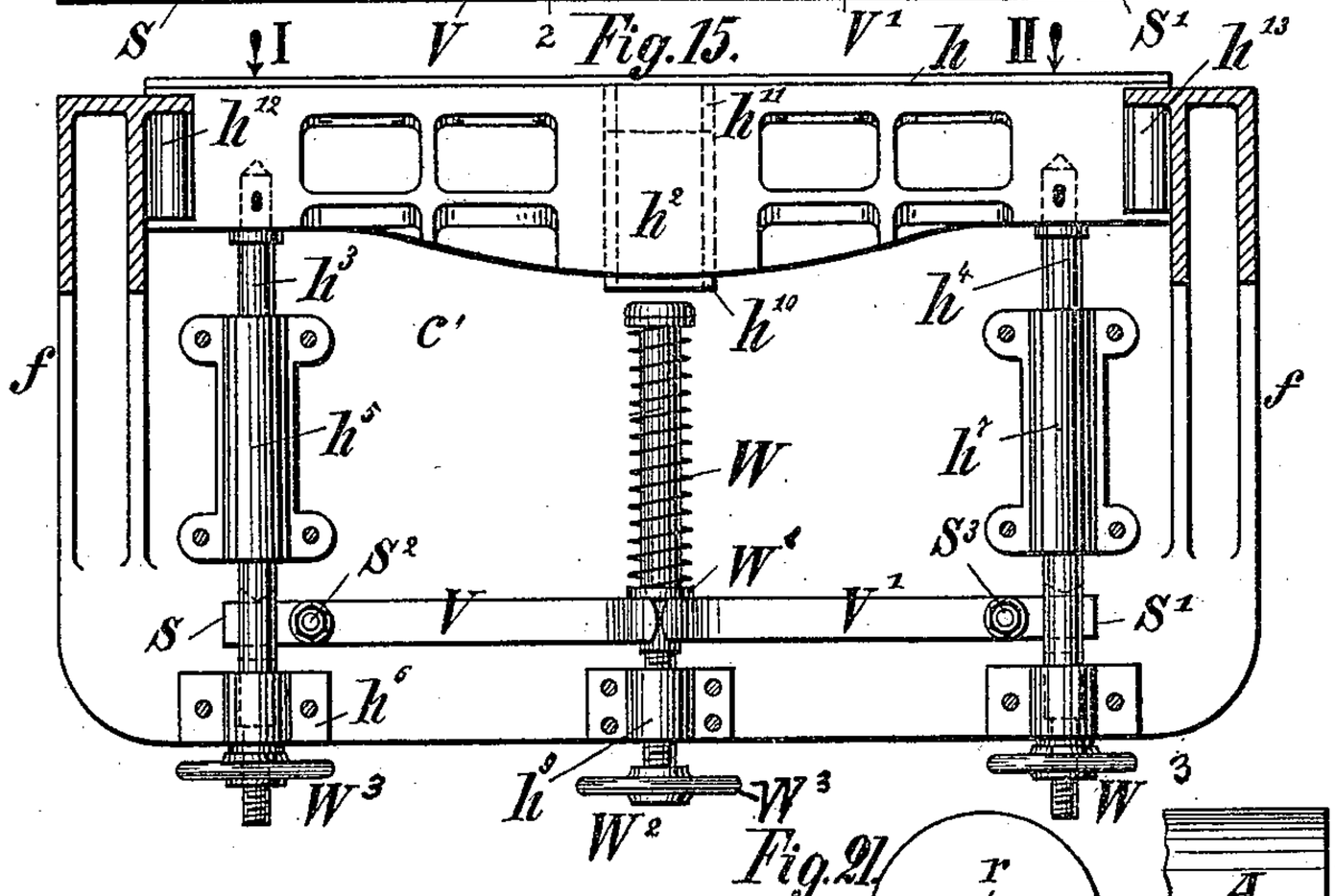

Fig. 15.

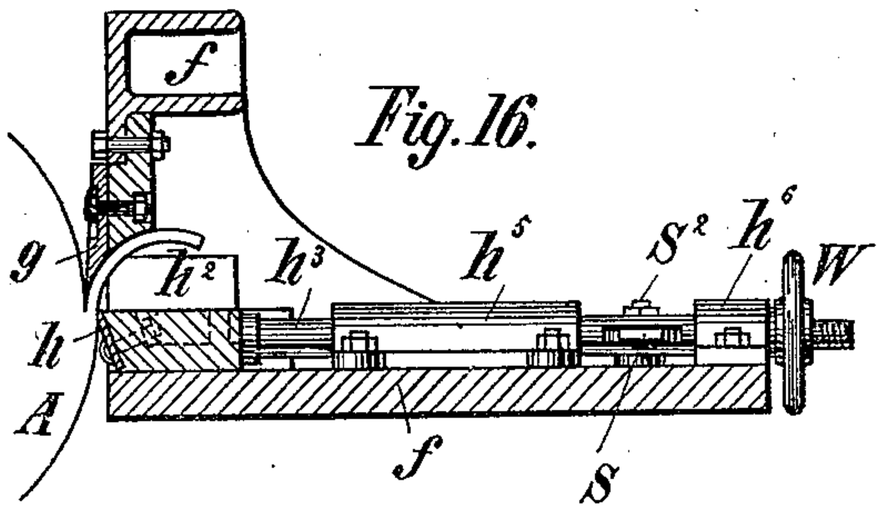

Fig. 16.

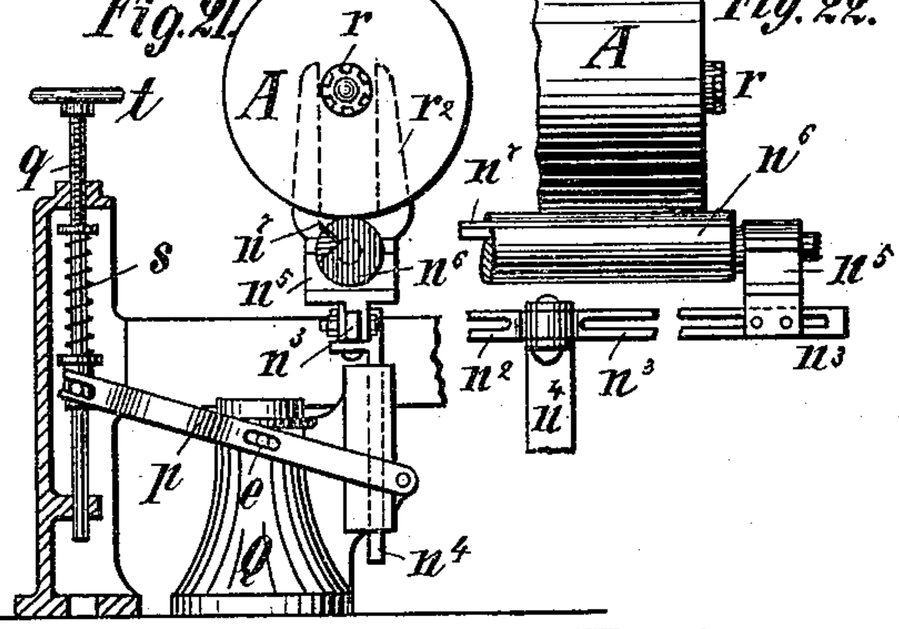

Fig. 21.

Fig. 22.

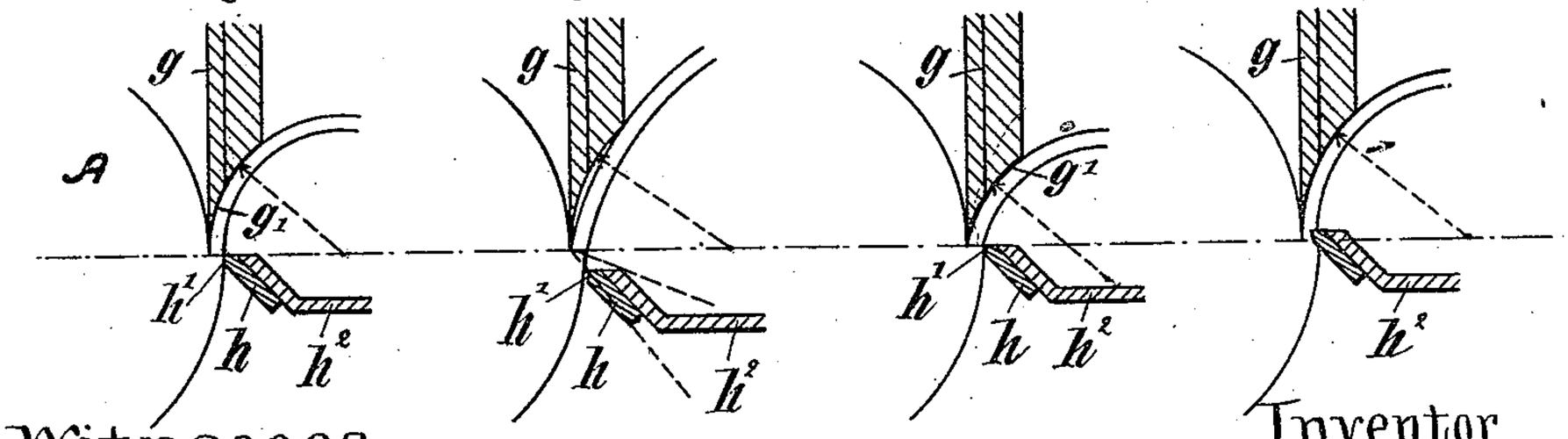

Fig. 17. Fig. 18. Fig. 19. Fig. 20.

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UNITED STATES PATENT OFFICE.

GUSTAV ADOLPH ONCKEN, OF FRANKENTHAL, BAVARIA, GERMANY.

WOOD-WORKING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 420,886, dated February 4, 1890.

Application filed February 25, 1889. Serial No. 301,095. (No model.) Patented in Germany June 12, 1886, No. 40,828, November 22, 1887, No. 44,007, and February 10, 1888, No. 45,052; in France November 14, 1887, No. 186,970; in England November 16, 1887, No. 15,728; in Sweden November 18, 1887, No. 1,518, and in Belgium December 21, 1887, No. 79,999.

To all whom it may concern:

Be it known that I, GUSTAV ADOLPH ONCKEN, a citizen of the United States, temporarily residing at Frankenthal, in the Kingdom of Bavaria and German Empire, have invented certain new and useful Improvements in Wood-Working Machinery, (for which I have secured Letters Patent in Germany, No. 40,828, dated June 12, 1886, No. 44,007, dated November 22, 1887, and No. 45,052, dated February 10, 1888; in Belgium, No. 79,999, dated December 21, 1887; in England, No. 15,728, dated November 16, 1887; in France, No. 186,970, dated November 14, 1887, and in Sweden, No. 1,518, dated November 18, 1887,) of which the following is a specification.

My invention relates to the cutting, grooving, and beveling of wood to form boards, staves, and the like, and to apparatus connected therewith.

According to my present invention a continuous board (not veneer) of from one to twenty-five millimeters in thickness is cut from a round or cylindrical block or log of wood rotating upon its axis, by setting a vertical knife, which is continuously displaced toward the axis of rotation of the wood, and also the rotating wood itself in horizontal oscillations upon different centers for the purpose of causing a to-and-fro movement of the cutting-edge of the knife at the cutting-line of the block, and thereby producing a better cutting effect. The breadth of the board is in this case equal to the entire length of the block or log used. With the machine can be connected a device for cutting on both sides a chine (groove) and chamfer for staves.

In the accompanying drawings, Figure 1 is a front elevation of the machine. Fig. 2 is a section on the line 1 2 of Fig. 5. Fig. 3 is a side view. Fig. 4 is a section on the line 3 4 of Fig. 5. Fig. 5 is a plan of the machine. Figs. 6 and 7 show, on an enlarged scale, the arrangement of the claws which serve to hold the block or log of wood during its rotation and rocking motion. Fig. 8 is a sectional detail view of the cutting-knife and its frame. Fig. 9 is a side view of the device for chamfering the end of the log. Fig. 10 is a similar view showing the forks for guiding the log. Fig. 11 is a rear view thereof. Fig. 12 is a side elevation of the mechanism for holding the chamfering-tool in contact with the log. Fig. 13 is a diagrammatical view showing the angles assumed by the log and cutting-knife during the cutting operation. Fig. 14 is a front elevation of the cutting-knife frame. Fig. 15 is a plan view thereof. Fig. 16 is a second sectional view of said frame, taken on the line 2 2, Fig. 14. Fig. 17 is a view showing the relative positions of the cutting-knife and presser-strip with relation to the line of axis of the log. Figs. 18, 19, and 20 are similar views of the forms embodying objections which are overcome by my invention. Fig. 21 is an enlarged view of Fig. 12, showing a modification of the log-support. Fig. 22 is a rear view of a portion of the latter.

By means of my invention a fixed relative motion is imparted to the knife and log, said motion being in the direction of the length of the knife or log, and at the same time the axis of rotation of the log and the cutting-edge of the knife and the upper edge of the presser-strip remain constantly parallel with each other, whereby a drawing cut is obtained.

The main frame of the machine consists of a solid table supported upon standards a^0 a'. Transverse rods b form guides for the support c, which is provided in the middle with a thick vertical pivot d. Upon this pivot d turns the knife-frame f, Fig. 8, to which is secured a knife g and below the latter a strip h, to prevent the splitting of the board to be cut.

The cut is effected, first, by a reciprocal movement of the knife g with the support c; secondly, by the oscillating motion of the knife-frame f around the pivot d; thirdly, by the rotary motion of the block or log A of wood to be cut, and, fourthly, by the to-and-fro motion of the said block A by means of two eccentrics k k', as will hereinafter be set forth, the axis of rotation of the log and the cutting-edge of the knife remaining continuously parallel with each other.

The forward motion of the support c, with the knife-frame f and knife g, is caused from the main shaft E, as usual, by means of screws B′ B² B³, communicating gears c' c^2 c^3 c^4, worm-wheels c^5 c^6 c^7, and endless screws D².

The oscillating movement of the support c and knife g around the pivot d, as well as of the block of wood in the horizontal plane during the rotation of the same, is obtained by displacing the bearings i i', in which the spindles z, provided with teeth z^3, that, engaging with the teeth r' of the claws r, set the block in rotation, turn at the same time parallel but in opposite directions to each other. For this purpose eccentrics k k' are keyed upon the said spindles z. The rods l l' of the said eccentrics are fastened by means of bolts m m' in the manner of hinges at m^2 upon the frame of the machine. As the frame f of the knife g is connected by means of the screws B′ B³ with the said bearings i i', it will partake of the sliding or reciprocal movement of the latter. For this reason the screws B′ B³ are journaled to the bearings i i', and their nuts B⁴ B⁶ engage with the brackets f' f^2 of the knife-frame f, so as to permit a certain play for the oscillating movement of the knife-frame f, and the ends of the screws fit into the worm-wheels c^5 c^7, so as to partake of the rotation of the same under the permission of an axial movement within the worm-wheels. The said eccentrics are accordingly set at one hundred and eighty degrees relatively to each other.

The spindles receive their turning motion by toothed wheels G G′, placed upon them and engaging with correspondingly-toothed pinions H H′ upon the main shaft E. The teeth of the wheels and pinions last mentioned are made of such length as to prevent bending thereof in the shifting of the bearings i.

In the interior of each spindle z is a pressing-screw z', that serves to push out the claws r or to press them into the ends of the block of wood.

The eccentrics k k' impart to the block of wood a rocking motion in the horizontal plane, which motion the edge of the knife g must follow, as it likewise makes an oscillating motion upon the pivot d. By this to-and-fro movement of the cutting-edge of the knife g, due to the rocking movement of the block in the opposite direction, and always along the cutting-line on the block, is obtained a very good cutting. It is of great importance, however, to the cutting effect of the knife, as well as to the tenacity of the wood, that a destruction of the structure of the wood during the cutting process may be prevented by a certain construction of the cutting device and its arrangement in relation with the rotating block or log of wood. I have found that the axis of rotation of the block A, Fig. 17, the cutting-edge of the knife g, and upper edge h' of the strip h, between which the cut board has to pass, must be arranged in a plane, and the rear face g' of the knife must be ground or concaved so as to form a part of a hollow cylinder or arc of a circle, the axis of which lying within the same plane as the axis of rotation of the block of wood, as indicated by the arrow, the cutting-edge of the knife, and the upper edge of the strip h. By this reason the strip h receives directly the whole pressure and forms at the same time a support for the board at that point where the wood has still its natural structure and strength. The knife itself has only to stand the absolute pressure against its cutting-edge, as its front face forms a tangent lying in the plane of the direction of pressure against the cutting-edge of the knife, as well as to the rotating block as to the board just separated from the block. The diagrams, Figs. 18 and 20, illustrate such positions of the strip h by which as well a destruction of structure of the wood as a deformation of the knife will be caused by the side pressure obtained by itself from the movement of the knife-support against the block.

The diagram, Fig. 19, illustrates an arrangement of the strip h in line with the cutting-edge of the knife, but having its rear face ground from a wrongly-placed center line. This circumstance will also cause breakage or splitting of the board.

It is further observed that on the employment of a cutting device having both the knife and the pressure-strip h immovably fastened to the continually-displaced support c the board cut off from the block will not under all circumstances keep a uniform thickness in accordance with the distance of the knife-edge from the strip h. To overcome this inconvenience, I construct the pressure-strip h in such a manner that it may yield within certain limits, determined by the hardness of the wood and the distance of the knife from the axis of rotation of the block of the wood. For this reason the strip h, Figs. 14, 15, and 16, is attached to a slide h^2, guided upon an adjustable plate c' of the frame f by the bolts h^3 h^4, passing through boxes h^5 h^7 of the frame f. The bolts h^3 h^4 of the slide h^2 bear against the arms S S′ of the angle-levers S V and S′ V′, which are pivoted at S² S³ and pressed under the action of a spring W against the ends of the bolts of the slide h^2. The tension of this spring wound around a nut W′ is regulated by means of the screw W², resting in bearings h^9 upon the plate c' and the hand-wheels W³, which also serve to release the angle-levers S V and S′ V′, and consequently the slide h^2, entirely from the action of the spring.

The thickness of the board to be cut from the log of wood, depending upon the distance of the pressing-strip h from the cutting-edge of the knife g, is governed by the slide h^2, the position of which may be varied within the limits of the boxes h^5 h^7, through which the bolts, fastening said slide to the frame f are passed. In case of a block or log of wood of

conical or otherwise irregular form is to be cut into boards and the knife-frame is continually moved against the block, the strips *h* will first yield at that end where it first touches the block. If this would happen, for instance, at I, the motion of the strip *h* would be transmitted by means of the arm S of the angle-lever S V upon the spring W, which at the same time releases the angle-lever S′ V′ correspondingly, and consequently the opposite end I I of the strip *h*, and the latter is caused to move under all circumstances parallel to the cutting-edge of the knife and the axis of rotation of the block of wood, notwithstanding the play permitted by the spring W. Therefore the board to be cut from the block of wood will be from one end to the other—that is, the length of the log of uniform thickness throughout, which effect has never been gained by any other known wood-cutting machine of this class.

In order that the block or log of wood shall during its rocking motion be held firmly between the claws *r*, Fig. 6, the latter are provided with a ball-pivot z^2, which loosely engages by its teeth with the teeth z^3 of the spindle *z*, Fig. 7. This arrangement of the claws enables the block to assume any position in an inclined direction—that is, the space between and the length of the teeth of the claws *r* and spindle *z* are such as to permit the former to assume almost any position obliquely to said spindle, which effect the continuous revolution of said claws.

The device for cutting the lateral chines and chamfers in the wood for staves and similar purposes consists of two cutting heads or supports *n*, adjustably fastened to the arms n^2 and n^3 and adapted to follow the horizontal oscillation of the block, as well as to be continuously elevated to the axis of the latter, depending upon the degree of the corresponding movement of the knife *g*. For this reason either spring-forks *o o* bear against the block on account of their elasticity whatever be the diameter of the latter, as shown in Fig. 9, or stationary forks r^2 engage with the claws *r′* of the block of wood, Figs. 10 and 11. These forks rest with their heads upon the supports *n*, adjustably fastened to the arms n^2 and n^3 of a slide n^4. This slide is by a forked lever-arm *p* guided in a socket Q in connection with a screw *q* and hand-wheel *t*, that permits the adjustment of the block by the said hand-wheel.

By means of the spring *s* and through the medium of the forked lever-arm *p*, pivoted in *e*, the spring-forks *o o*, Fig. 9, or stationary forks r^2, Fig. 12, are continuously pressed against the block. The proper tension of the spring *s* is obtained by the screw *q*, supported by the standard a^0.

Instead of elastically pressing the cutter heads or supports *n* toward the rotating block of wood, the arms n^2 n^3 may be pivoted to a screw d^3, by which the necessary forward motion is imparted to the said arms and the supports *n*.

The block A is carried and supported by rollers *x*, journaled in supports of arms n^2 n^3, and the thread of the screw d^3 has exactly the same pitch as the screws B′ B^2 B^3, by which the forward motion of the support *c*, with the knife-frame *f*, is caused. On the outer end of the screw B^2 is keyed a tooth-wheel *p′*, which transmits a continuously-rotating motion to the shaft p^4 by means of the gearing p^2 p^3. This shaft p^4 carries on its opposite end a bevel-wheel p^5, Fig. 4, which meshes with another bevel-wheel *q′* of the same diameter journaled by the socket Q and provided with inner thread to fit the screw d^3, so that the cutting device is moved in the direction of the radius of the block of wood exactly in the same proportion as the knife-frame *f*. Opposite to the bevel-wheel p^5 a second bevel-wheel p^6 on the shaft p^7 permanently engages with the wheel *q′*, and a hand-wheel *t′* is keyed to the same shaft p^7, journaled by the standard a^0. By means of this hand-wheel the operator of the machine is enabled to adjust the block of wood in such a position that the claws *r* in the axis of rotation of the block will meet the teeth z^3 of the spindle *z*, while the wheel p^5 is out of gear with the wheel *q′*.

The engaging and disengaging of the wheel p^5 is effected by means of a treadle or gear-lever e^2 e^3 e^4, turning upon the pivot *e′* of the post Q.

The heads or supports *n* of the device for cutting the lateral chine and chamfer, Figs. 9, 10, and 11, consists of two knives *u* and *u′*, which are placed at an acute angle to each other and effect the two lateral incisions of the crozing. A third knife *v* removes the wood to the depth of the lateral incisions, while a fourth knife *w* cuts the lateral chamfer. As mentioned, the wood has its fixed supporting-point on the rollers *x* at the two heads, while for regulating the depth and width of the chine and chamfer each of the knives is adjustable by itself. Moreover, in order to enable the two heads *n*, with the knives and the guiding-forks *o o* or r^2 r^2, to be adjusted according to the length of the block or log they are adapted to slide in two slots in the arms n^2 n^3 of the slide n^4. As in the horizontal oscillation of the block, this latter cutting device must of course follow the medium of the forks *o o* or r^2 r^2, and the arms n^2 n^3 of the supports *n* turn, as mentioned, upon a pivot d^2 of the slide n^4 or screw d^3. The machine is provided at the two ends with steam-cylinders L, valve-chest M, distributing-gear N, cross-head P, and connecting-rod R, which is applied to the crank-pin T, and thus actuates the driving-shaft direct.

In lieu of the short supporting-rollers *x* (or when the devices for cutting the lateral chines and chamfers are not employed) I may

use long rollers n^6, (see Figs. 21 and 22,) supported at their ends by bearings n^5, secured to arms n^2 n^3, said rollers having each a projecting stop-plate n^7, to hold the same fast against the log.

I am aware that prior to my invention machines for cutting a continuous board from a rotating log or block of wood by means of a horizontally-reciprocating or stationary knife have been made. I therefore do not claim such mode of cutting wood, nor the combination of such knives operating in conjunction with rotating logs or blocks of wood, broadly; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. As an improvement in wood-working machinery for making a continuous board from a log of wood, the reciprocal bearings herein described for such log, and the knife-frame carrying a knife and connected, substantially as described, to said bearings, and having conjoint oscillating movement therewith, whereby a reciprocal motion of the knife with respect to the log is secured, as set forth.

2. As an improvement in wood-working machinery for making a continuous board from a log of wood, the reciprocal bearings herein described for such log, the knife-frame carrying a knife and connected, substantially as described, to said bearings, and the presser-strip, said knife and strip having a conjoint oscillation with said bearings, whereby a reciprocal motion of the knife with respect to the log is secured, as set forth.

3. As an improvement in wood-working machinery for making a continuous board from a log of wood, the knife-frame carrying a vertically-disposed knife and having an oscillating movement, and the presser-strip beneath said knife and having a conjoint movement with said knife-frame, the axis of rotation of said log, the lower cutting-edge of said knife, and the upper bearing-edge of said presser-strip being on the same horizontal plane, substantially as set forth.

4. As an improvement in wood-working machinery for making a continuous board from a log of wood, the combination of the reciprocal bearings i i, the means for supporting a log between said bearings, and the oscillating knife-frame connected to said bearings and having a conjoint movement therewith, whereby the cutting-edge of the knife and the axis of rotation of the log remain continuously parallel with each other, as set forth.

5. As an improvement in wood-working machinery for making a continuous board from a log of wood, the combination, with the main frame or table, of the reciprocal bearings i i, having means for supporting a log therebetween, the eccentrics for imparting a reciprocal motion to said bearings, and the oscillating knife-frame connected to said bearings and having a conjoint movement therewith, whereby the cutting-edge of the knife and the axis of rotation of the log remain continuously parallel with each other, as set forth.

6. As an improvement in wood-working machinery for making a continuous board from a log of wood, the combination, with the reciprocal bearings carrying a rotating log therebetween, of the oscillating frame carrying a cutting-knife having an inner concaved surface forming an arc whose axial center is on the same horizontal plane with the edge of said knife and the axis of rotation of said log, substantially as set forth.

7. As an improvement in wood-working machinery for making a continuous board from a log of wood, the combination, with the reciprocal bearings carrying a rotating log therebetween, of the oscillating frame carrying a cutting-knife provided with a concaved rear surface and having a motion relatively to the log in the direction of the length thereof, and the yielding presser-strip whose upper edge, together with the cutting-edge of the knife and the axis of rotation of the log, is on the same horizontal plane, substantially as set forth.

8. As an improvement in wood-working machinery for making a continuous board from a log of wood, the combination, with the knife-frame carrying a knife and having an oscillating movement, and the yielding presser-strip connected to and moving with said frame, substantially as set forth, said presser-strip having a uniform movement throughout its length, the edges of said knife and presser-strip being continuously parallel, as stated.

9. As an improvement in wood-working machinery for making a continuous board from a log of wood, the combination, with the oscillating frame and the cutting-knife, of the yielding presser-strip having projecting end bolts secured in bearings of said frame, the opposite levers secured to said bolts, and the adjustable spring-pressure on the inner ends of said levers, substantially as set forth.

10. In a wood-working machine for making a continuous board from a log of wood, the combination, with the bearings for imparting to said log a rotary and a horizontal oscillating motion, of the knives for cutting lateral chines or chamfers in such board, said knives having a fixed movement relative to said log, with which they are continuously in contact, substantially as set forth.

11. In a wood-working machine for making a continuous board from a log of wood, the combination, with the bearings for imparting to said log a rotary and a horizontal oscillating motion, of the knives for cutting lateral chines or chamfers in such board, the arms to which said knives are secured, and the spring-pressed slide for holding said knives in contact with said log, substantially as set forth.

12. In a wood-working machine for making a continuous board from a log of wood, the claws designed to be secured to the ends of a log, the same being composed each of two

parts having intermeshing teeth and a ball-and-socket pivot-connection, substantially as set forth.

13. In a wood-working machine for making a continuous board from a log of wood, the combination, with the reciprocal bearings *i i* and the knife-frame having an oscillating motion, of the claws composed each of two parts, one of which is secured to a log and the other to said bearings, said parts having intermeshing teeth, whereby the motion of the log is continuously parallel with the cutting-knife, substantially as set forth.

14. In a wood-working machine for making a continuous board from a log of wood, the combination, with the reciprocal bearings and the claws for holding a log therebetween, of the forks or arms for guiding said log, the lateral arms to which said guide forks or arms are secured, the central screw to which said lateral arms are connected, the bearings for the log, and the means for raising the forks or arms, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 10th day of January, 1889.

GUSTAV ADOLPH ONCKEN.

Witnesses:
F. PREAKRAN,
HEINRICH HAYMANN.