No. 648,114. Patented Apr. 24, 1900.

E. POLLARD.

APPARATUS FOR GROOVING AND CUTTING WOOD.

(Application filed Dec. 20, 1898.)

(No Model.) 8 Sheets—Sheet 1.

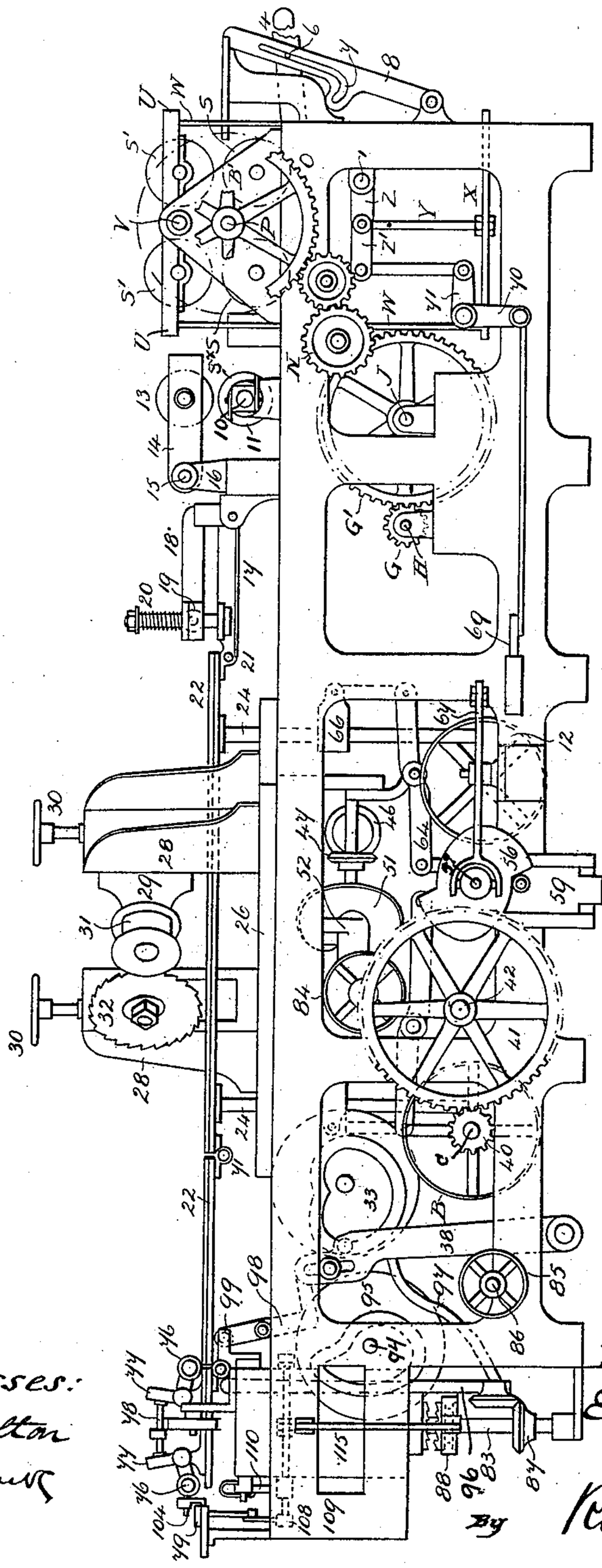

Fig. 1.

Witnesses:
E. B. Bolton
Odenwald

Inventor:
Edwin Pollard
By Richards & Co
His Attorneys.

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E. POLLARD.

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(No Model.) 8 Sheets—Sheet 2.

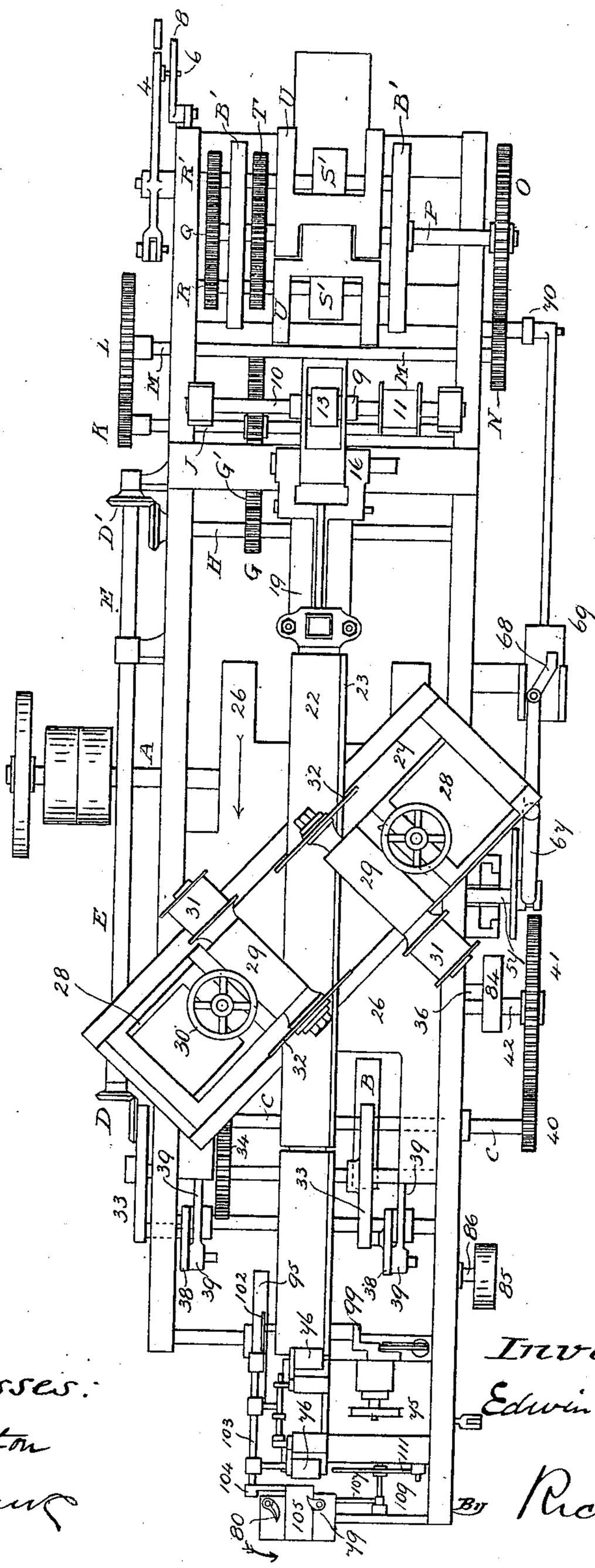

Fig. 2.

Witnesses:
E. B. Bolton
Oldhamm

Inventor:
Edwin Pollard
By Richards & Co
his Attorneys.

No. 648,114. Patented Apr. 24, 1900.

E. POLLARD.

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(No Model.) 8 Sheets—Sheet 3.

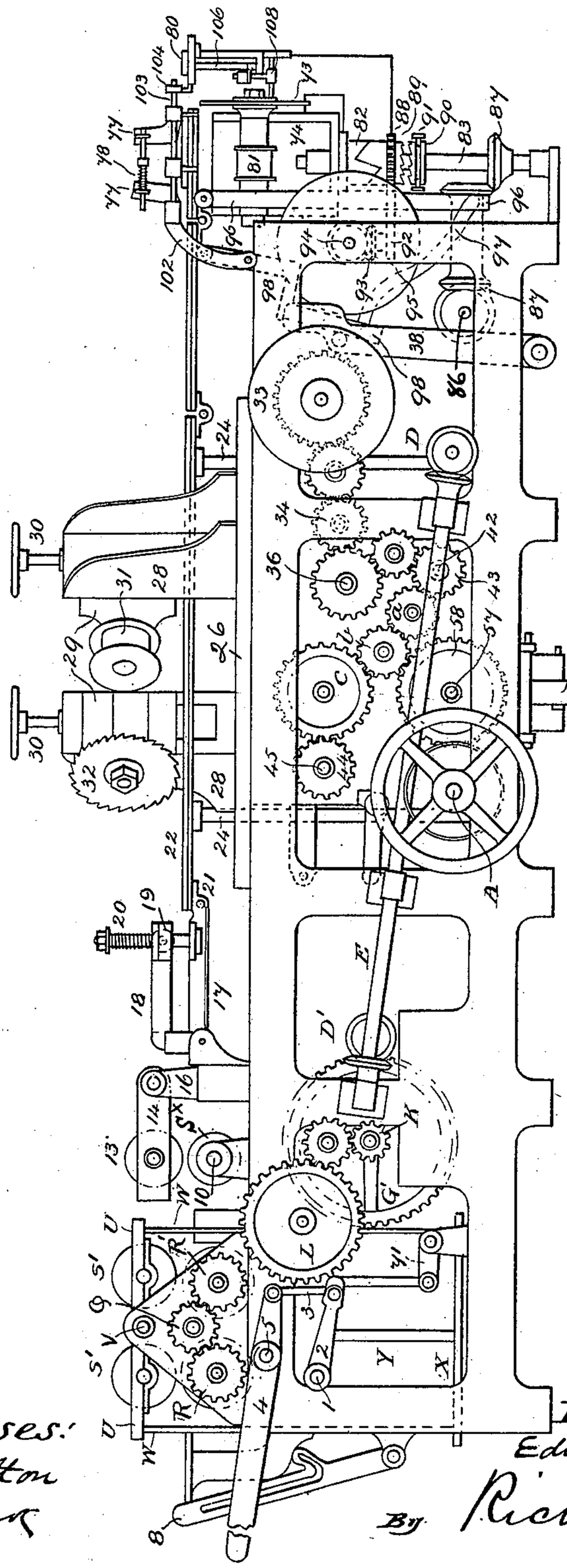

Fig. 3.

Witnesses:
E. R. Bolton
O. Dunnock

Inventor:
Edwin Pollard
By Richards & Co
his Attorneys

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E. POLLARD.

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(No Model.) 8 Sheets—Sheet 4.

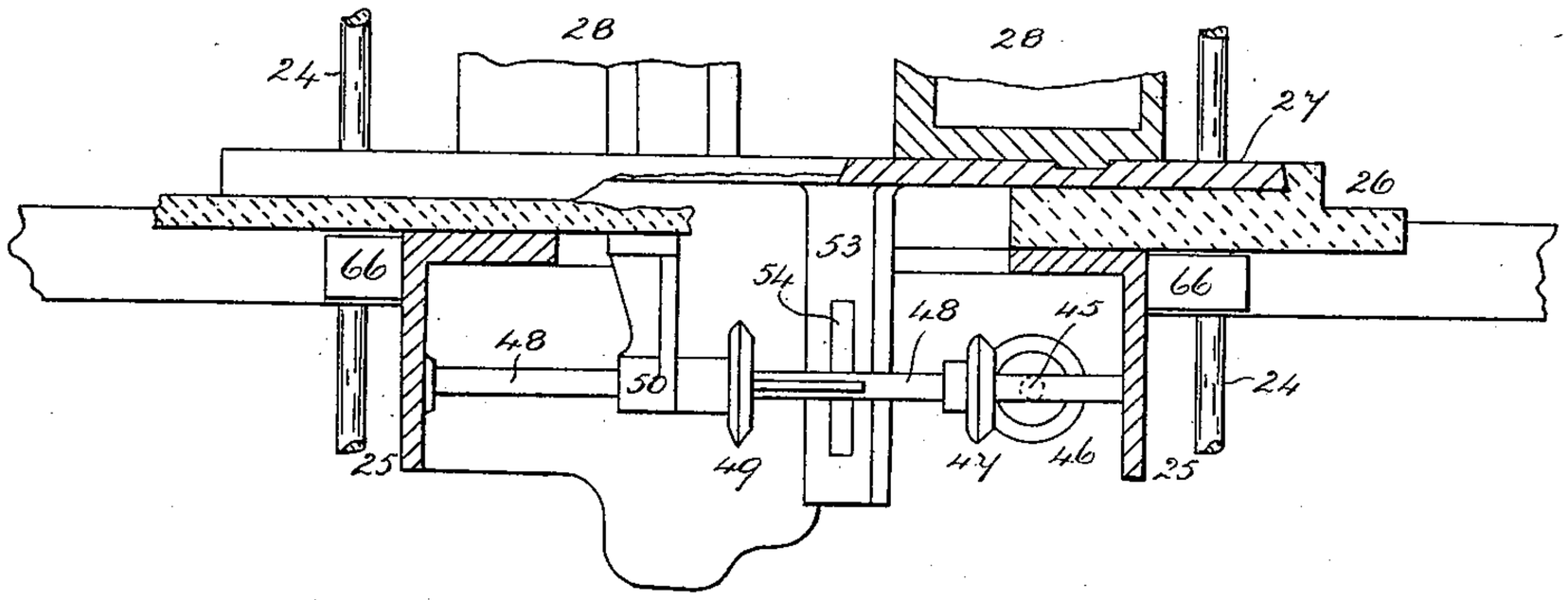

Fig. 4.

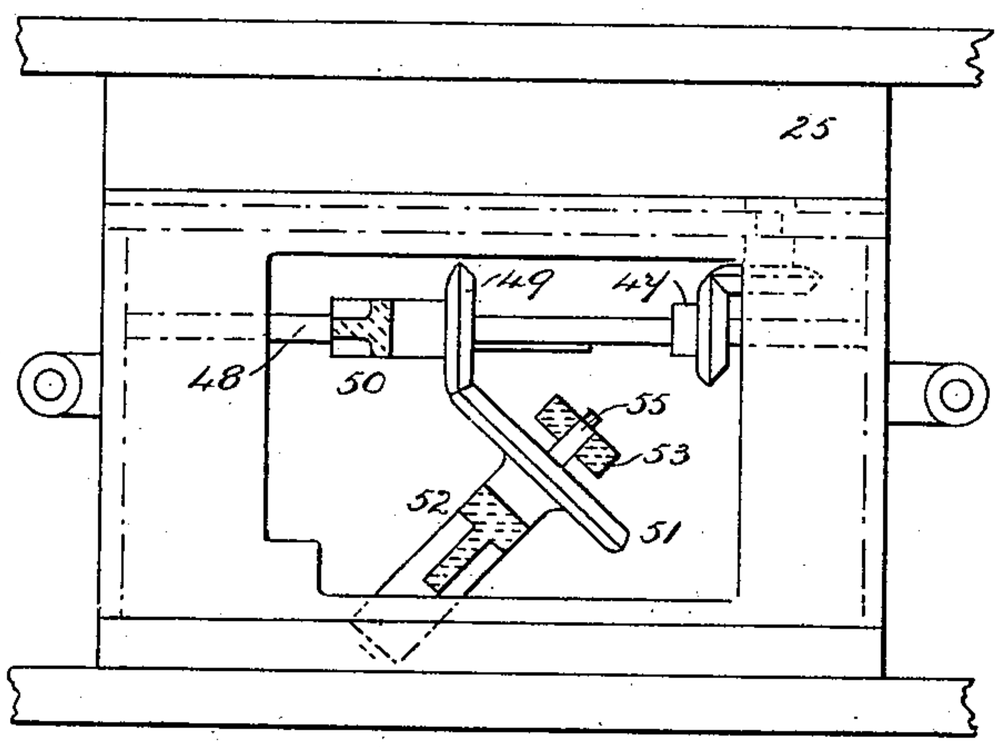

Fig. 5.

Witnesses:
E. R. Bolton
Otto Munn

Inventor:
Edwin Pollard
By Richards & Co
his Attorneys.

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E. POLLARD.

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(No Model.) 8 Sheets—Sheet 5.

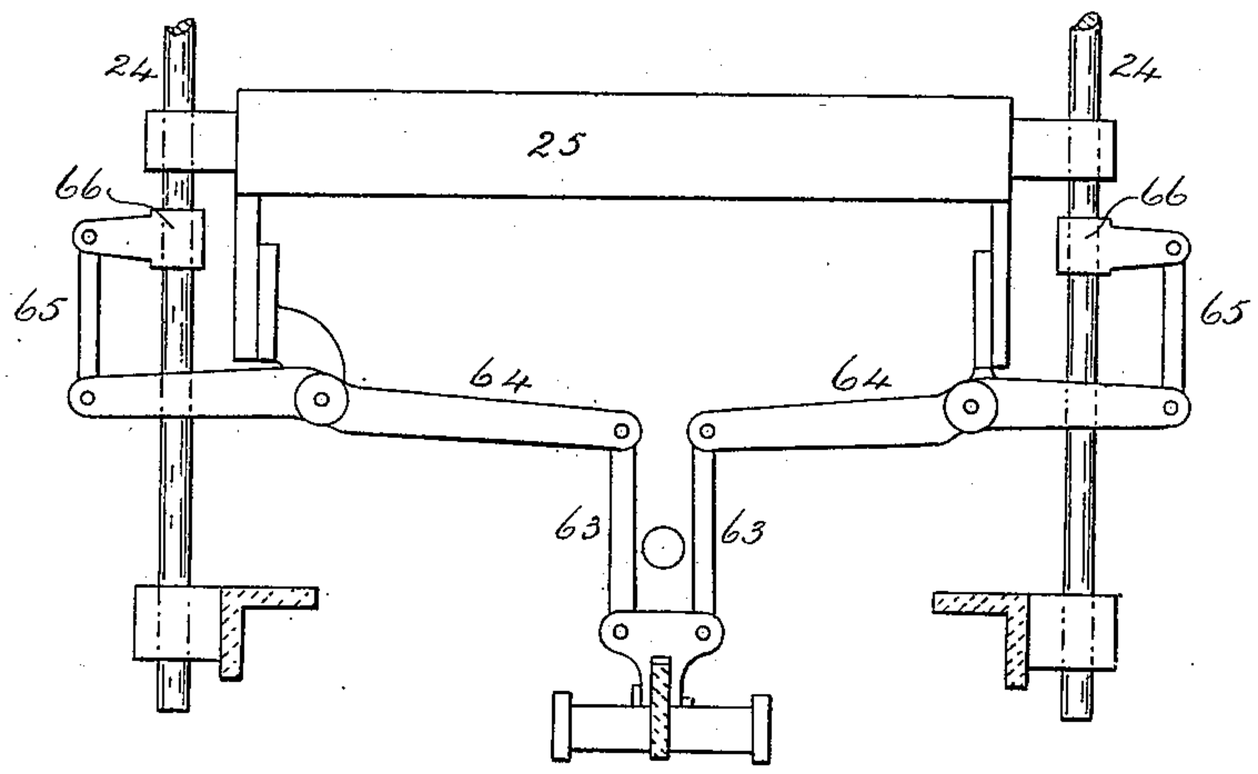

Fig. 6

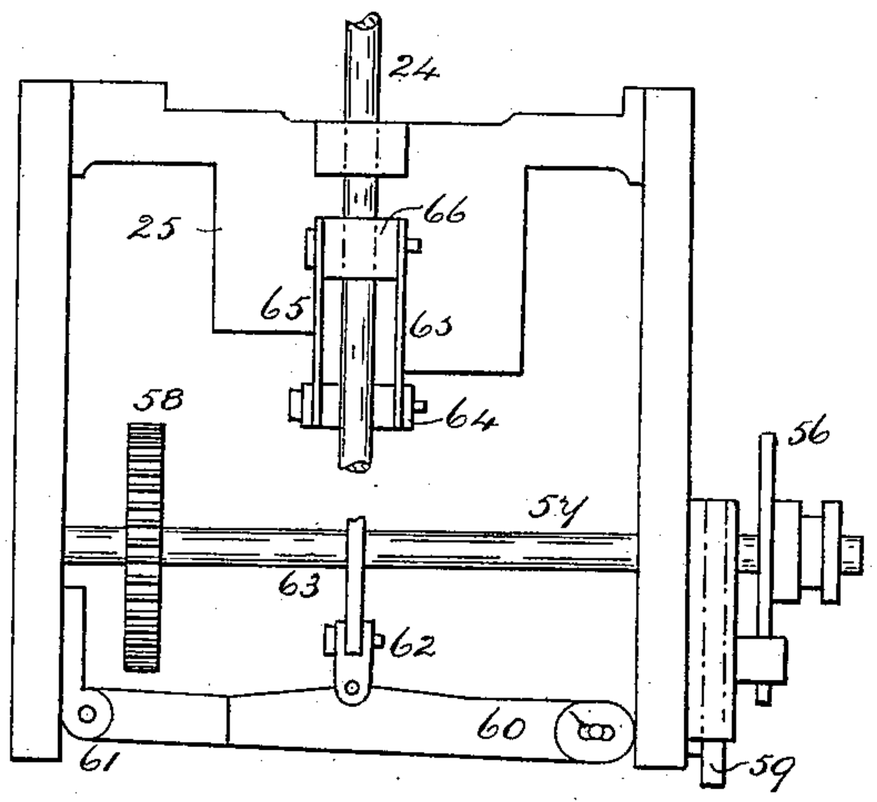

Fig. 7.

Witnesses:
E. B. Bolton
O. Duncan

Inventor:
Edwin Pollard
By Richards & Co
his Attorneys.

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E. POLLARD.

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(No Model.) 8 Sheets—Sheet 6.

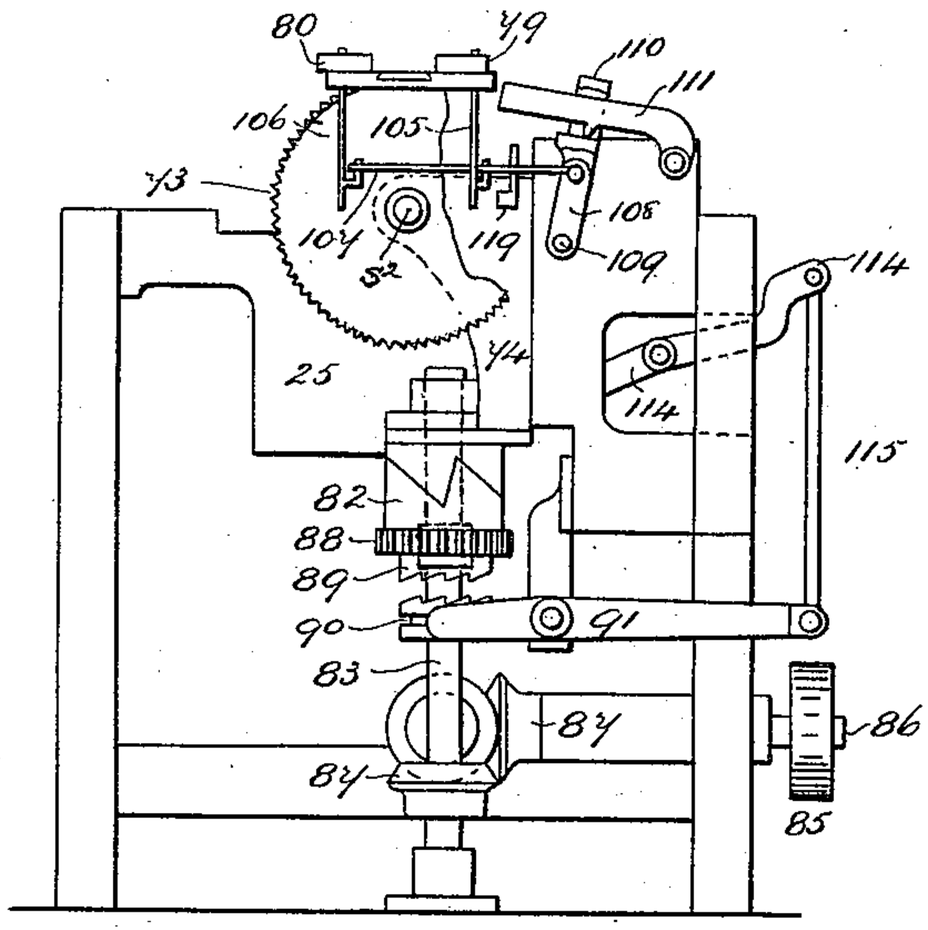

Fig. 10.

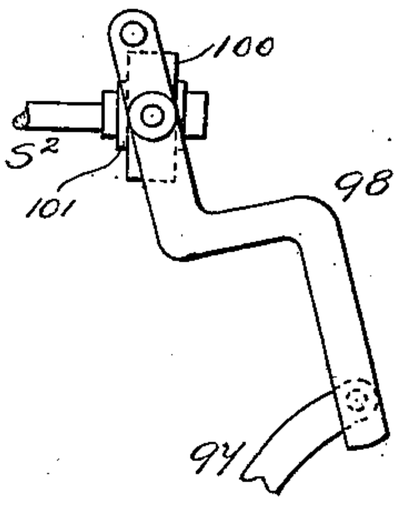

Fig. 8.

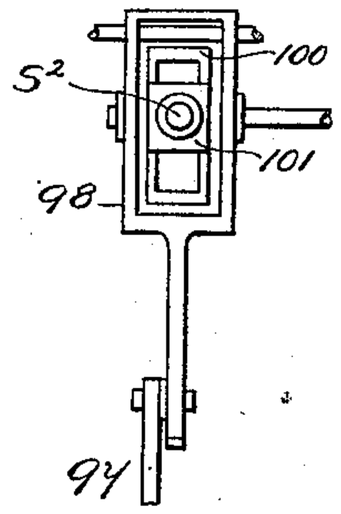

Fig. 9.

Witnesses:
E. B. Bolton
A. D. Cummings

Inventor:
Edwin Pollard
By Richards & Co
his Attorneys.

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E. POLLARD.

APPARATUS FOR GROOVING AND CUTTING WOOD.

(Application filed Dec. 20, 1898.)

(No Model.) 8 Sheets—Sheet 7.

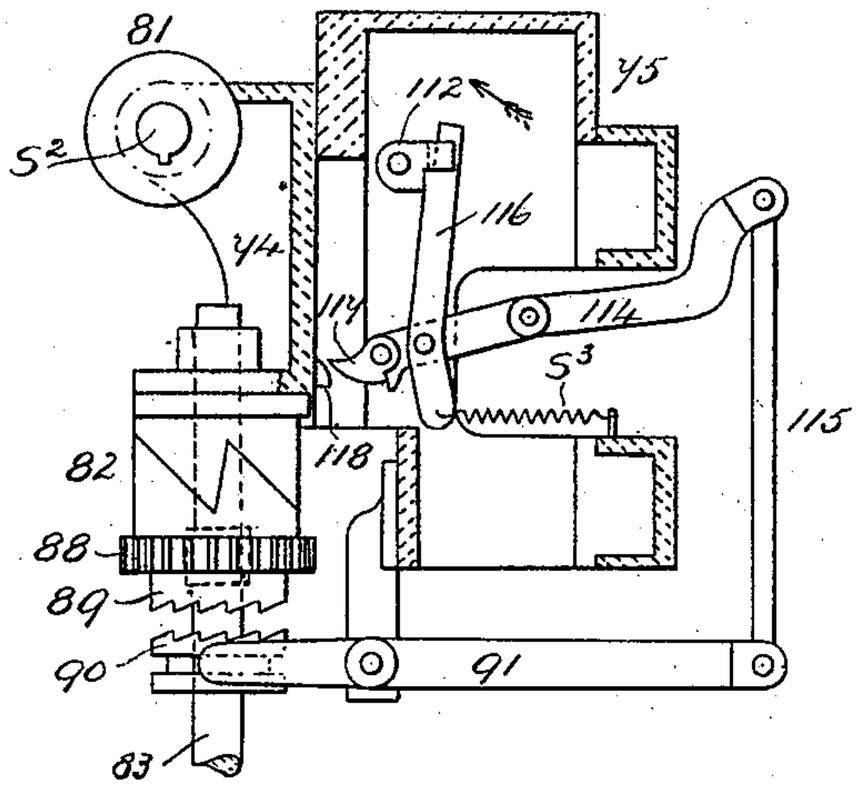

Fig. 12.

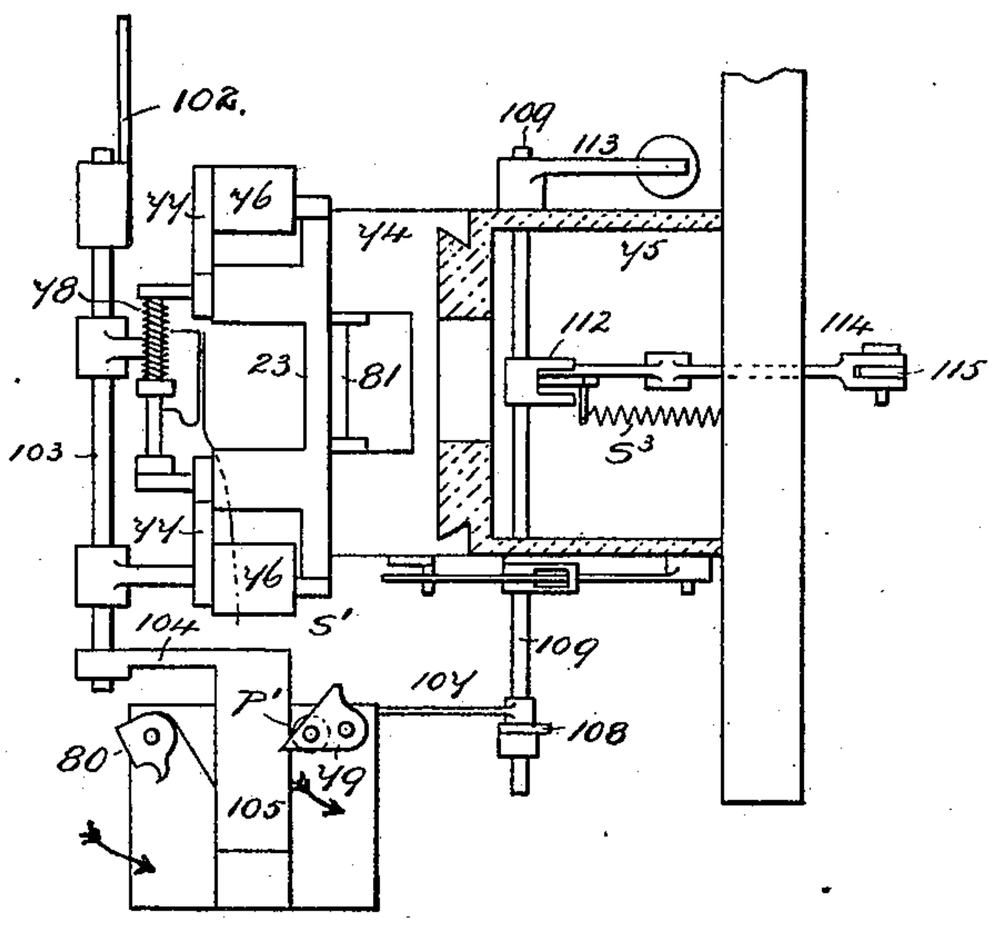

Fig. 11.

Witnesses:
E. B. Bolton
O. Duncan

Inventor:
Edwin Pollard
By Richardson & Co
his Attorneys.

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E. POLLARD.

APPARATUS FOR GROOVING AND CUTTING WOOD.

(Application filed Dec. 20, 1898.)

(No Model.) 8 Sheets—Sheet 8.

Fig. 14.

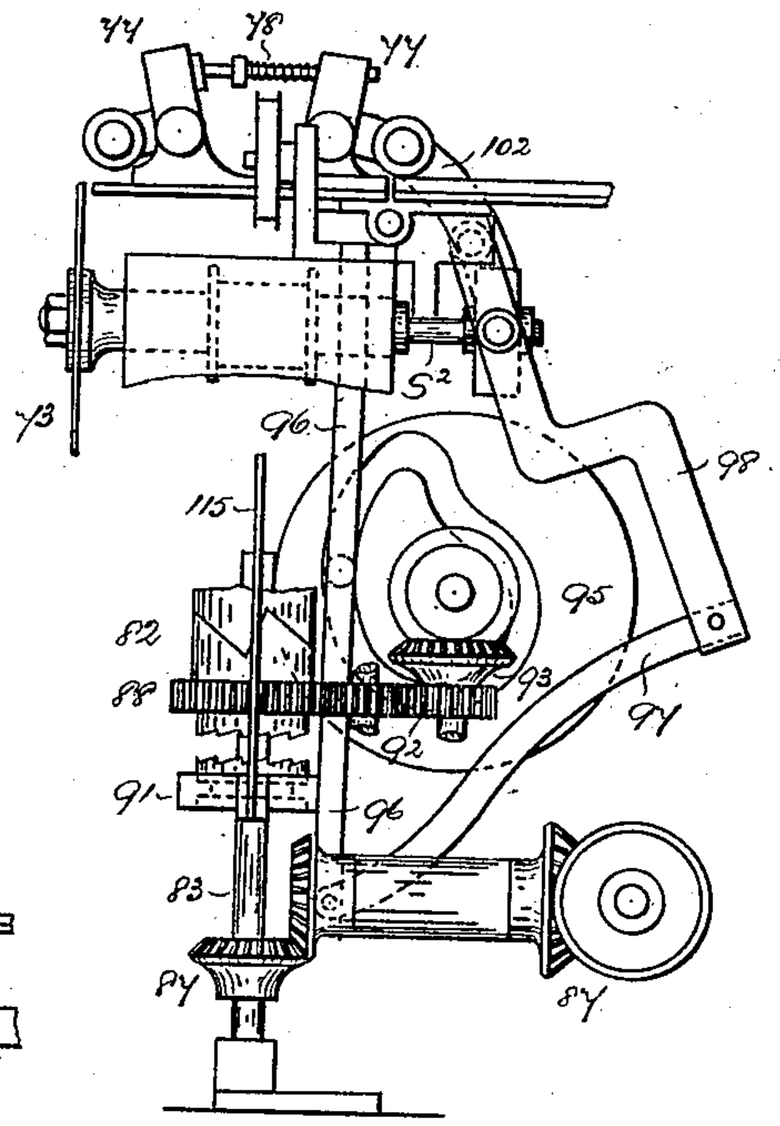
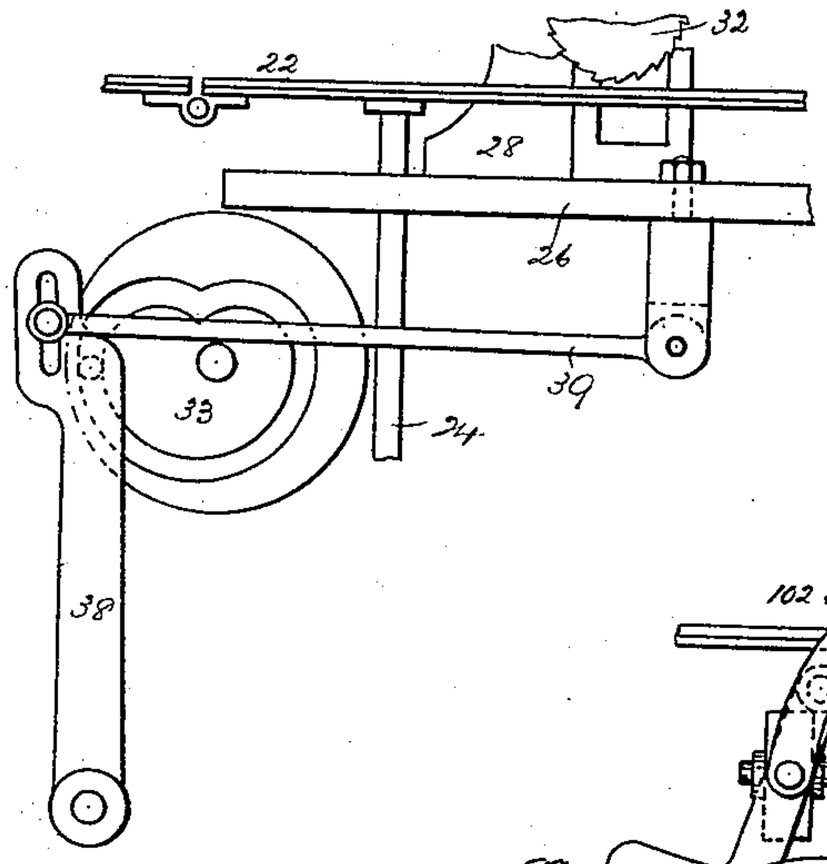


Fig. 13.



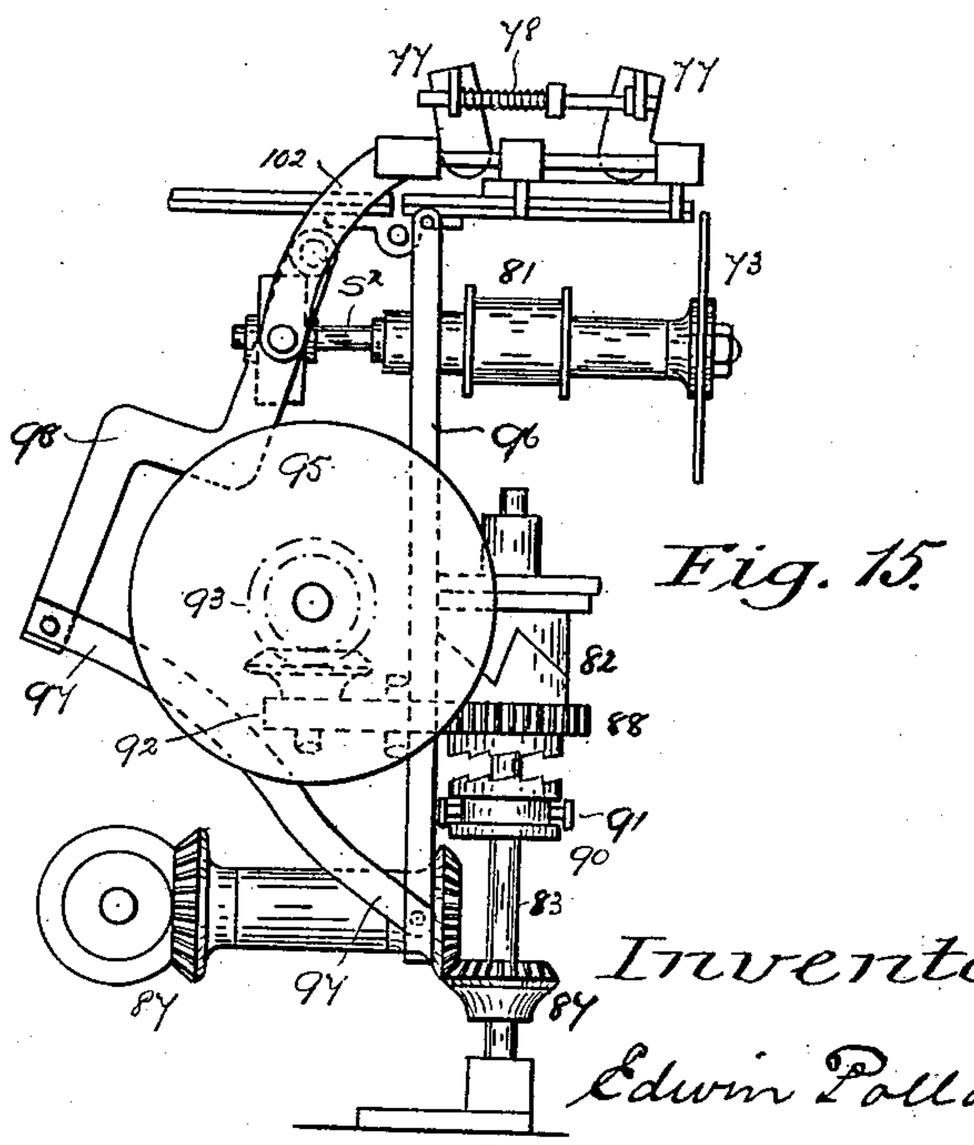


Fig. 15.

Witnesses:
C. B. Bolton
Otto Munn

Inventor:
Edwin Pollard
By Richards & Q
his Attorneys.

UNITED STATES PATENT OFFICE.

EDWIN POLLARD, OF SILSDEN, ENGLAND, ASSIGNOR TO THE POLLARD & METCALFE, LIMITED, OF SAME PLACE.

APPARATUS FOR GROOVING AND CUTTING WOOD.

SPECIFICATION forming part of Letters Patent No. 648,114, dated April 24, 1900.

Application filed December 20, 1898. Serial No. 699,863. (No model.)

To all whom it may concern:

Be it known that I, EDWIN POLLARD, a subject of the Queen of Great Britain and Ireland, residing at Silsden, in the county of York, England, have invented certain new and useful Improvements in Apparatus for Grooving and Cutting Wood Suitable for Fire-Lighters; 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.

The object of this invention is to construct a machine by which long laths of wood fed to one end of the machine may be grooved longitudinally on one side and diagonally on the other and in addition to the grooving to so arrange the machine that the grooved laths are cut into the required lengths automatically without the attendant having to handle the wood after it has been fed to the machine at one end thereof.

In explaining my invention in detail reference is made to the accompanying sheets of drawings, in which—

Figure 1 represents a front elevation of a machine constructed according to my invention. Fig. 2 is a plan, and Fig. 3 an elevation, of the opposite side to that shown by Fig. 1. Fig. 4 represents a longitudinal section through the stationary bed-plate supporting the reciprocating table upon which is placed a saddle in a diagonal direction. Fig. 5 is a plan of the stationary bed-plate, showing the gearing mounted within same, the brackets supporting the gearing being in section. Fig. 6 is a detached detailed side elevation of the stationary bed-plate and of the levers for operating the rising-and-falling table supporting the traveling laths when receiving the diagonal cuts. Fig. 7 is an end view of Fig. 6. Fig. 8 is a detached detailed side elevation of a lever connected to the rear end of the spindle of the circular saw utilized for cutting the grooved laths into short lengths. Fig. 9 is a front elevation of the same. Fig. 10 is an end elevation of the machine with some of the parts supporting the shafts removed for more clearly showing the mechanism. Fig. 11 is a plan, partly in section, showing the mechanism for operating a sliding catch-box for raising the circular saw for cutting the grooved laths into short lengths; and Fig. 12 is an end view of the same, partly in section, showing the arrangement of levers. Fig. 13 is a detached detail showing the connection between lever 38 and the under side of table 26. Fig. 14 is a detached detail view showing one side, and Fig. 15 a view showing the other side, of the mechanism for operating the saw-spindle S^2, the frame of the machine in both cases being removed.

The machine is driven by the main shaft A. A small pulley placed on the said shaft drives, by means of a belt, the pulley B, secured on the shaft C. This shaft drives, by bevel-wheels D, the diagonal shaft E, which in turn, by bevel-wheels D′, drives the shaft H, on which is secured a small spur-pinion G, gearing into wheel G′, secured on shaft J, to one end of which is secured a pinion K, gearing through an intermediate pinion into spur-wheel L, secured on shaft M, on the opposite end of which is secured a pinion N, gearing through an intermediate pinion with the wheel O, partly cut away in elevation for more clearly showing the mechanism behind same. The spur-wheel O is secured on shaft P, on the opposite end of which is secured a pinion Q, gearing into the pinions R and R′, secured on the axles of the bottom feed-rollers S, the top feed-rollers S′ being driven from the shaft P by similar spur-pinions T. (Shown in plan Fig. 2.) Motion to the other parts of the machine is hereinafter described in connection with the various parts. The top feed-rollers S′ are supported by brackets U U, carried by pin V, passing through the brackets B′, and to the opposite end of the brackets U U rods W are attached, which are also secured to a plate X, which may be weighted to give an increase of pressure, if required, to the top feed-rollers S′. This plate X is attached by rod Y to a lever Z, secured on shaft 1, on the end of which is secured another lever 2, coupled by a link 3 to long lever 4, supported on pin 5, attached to the machine-frame. When the long lever 4 is in the position shown, the top feed-rollers S′ are in position for feeding the wood laths of a certain thickness to the machine; but if the said lever be depressed so that the pin 6, secured to the lever, engages with the curved portion 7 of the slot-hole in arm 8 the

top feed-rollers S′ are then raised clear of the wood laths, thus stopping the feed.

Wood laths are fed one after another to the machine and carried forward by the revolving feed-rollers S and S′ over revolving cutters $S^{\times}$, secured, the same as in ordinary grooving-machines, to the revolving shaft 10, driven by the pulley 11 from a pulley 12 on main shaft A. A pressure-roller 13 is mounted in cage 14, hinged at 15 to a bracket 16, to which are also hinged two bars. The lower bar 17 is so placed that the laths travel over the upper surface, and above is the to pbar 18, supporting a small roller 19, kept in contact with the lath traveling over the bar 17 by the compression of spiral springs 20.

Hinged to the bar 17 at 21 is a table 22, prepared with a fence or guide-bar 33 along one side of same, the table being supported by the upright bars 24 and reciprocated in a vertical direction in the manner as hereinafter described, the wood laths being kept in contact with the table 22 and fence 23 in any suitable manner.

Between the side frames of the machine is secured a stationary bed-plate 25, (shown by details Figs. 4, 5, 6, and 7, Fig. 4 representing a longitudinal section through the said plate,) upon which is placed a reciprocating table 26, provided with a saddle 27, placed diagonally in relation to the reciprocating table 26. Upon the said saddle are mounted two adjustable standards 28, each standard being provided with a sliding bracket 29, operated by the hand-wheel and screw-bar 30. A revolving spindle passes through each of the said brackets, and each spindle is fitted at one end with a driving-pulley 31 and at the other end with one or more circular saws 32.

Reciprocating motion is given to the table 26 by the rotating cams 33, driven by a train of spur-wheels 34, mounted within the side frames of the machine, one of the said train of wheels gearing with a spur-wheel secured on shaft 36, secured some distance behind the spur-wheel 37, which is also secured on shaft 36. Engaging with the groove of each cam 33 is a lever 38, and to each lever is coupled a rod 39, the said rods engaging with the under side of the reciprocating table 26, so that by the rotation of the cams 33 a reciprocating motion is imparted to the said table and to the standards 28, mounted on the diagonally-placed saddle 27.

As the wood laths are propelled through the machine in the manner as before described longitudinal grooves are cut on the under side by the rotating cutters secured to the square portion 9 of the revolving shaft 10 and diagonal grooves on the top side of the laths by the circular saws 32, driven by the respective pulleys 31, the standards 28 reciprocating with the table 26, and in addition the said standards are also made to reciprocate in a diagonal direction. Thus a compound motion is given to the standards and circular saws 32, supported thereby, one direction being longitudinally and the other diagonally in relation to the side frames of the machine.

The rotary motion imparted to shaft 36 is derived from shaft C, upon one end of which is secured a pinion 40, gearing into spur-wheel 41. Secured on shaft 42 on the opposite end of the said shaft is a spur-wheel 43, driving the wheel 44 through the train of wheels *a*, *b*, and *c*. The wheel 44 is secured on shaft 45, on the opposite end of which, within the bed-plate 25, is a bevel-wheel 46, gearing into bevel-wheel 47, secured on shaft 48, upon which is mounted a sliding bevel-wheel 49, backed up by bracket 50. The sliding bevel-wheel 49 gears into a larger bevel-wheel 51, (shown by plan view of bed-plate 25 in Fig. 5,) the said larger bevel-wheel being supported by a bracket 52, secured to the under side of the reciprocating table 26.

The saddle 27 is mounted upon a reciprocating table 26 in a diagonal direction, and to the under side of the said saddle is formed or secured a bracket 53, the face of which is arranged at the same angle in relation to the side frames of the machine as the saddle 27, the bracket 53 having a long slot-hole 54, with which engages a wheel-stud 55 of wheel 51, supported by a bracket 52, secured to the under side of the reciprocating table 26, as is also bracket 50, supporting shaft 48, so that the bevel-wheels 49 and 51 are always in gear, and by the shafts of said wheels being supported by brackets 50 and 52 independent of the saddles 27 enables the stud 55 in wheel 51 on the rotation of the said wheel to operate the bracket 53 and saddle 27 in a line parallel to the face of the wheel 51—that is to say, in a diagonal direction in relation to the side frames of the machine and table 22, supporting the traveling lath—so that as the rotating circular saws 32, mounted upon brackets 28, which are attached to saddle 27, are passed across the lath supported by table 22 diagonal grooves are cut in the lath during the time the said table 22 is elevated.

The diagonal grooves are cut in the lath supported by table 22 during the time the reciprocating table 26 is traveling in the direction of the arrow (see Fig. 2) and the saddle 27, with circular saws traveling in one direction or the other. After the diagonal grooves are cut across the lath by the circular saws 32 traveling across same in one direction the table 22 descends quickly a distance for the lath to be clear of the circular saws and there remains until the reciprocating table 26 is moved quickly by the cams 33 to its original position, the said table taking the bevel-wheels 49 and 51 along with it. The table 22 is then raised and other diagonal grooves cut across the traveling lath on the return of the diagonally-placed saddle 27 and circular saws to their original position, when the table 26 is again returned quickly and the operation repeated.

The rising and falling of the table 22 is accomplished by the rotating cam 56, mounted

on shaft 57, driven by spur-wheel 58. The table 22, as shown, is down in the position for a lath placed upon the said table to be clear of the circular saws 32, and in order to raise the said table into position for effecting the diagonal cutting the rotating cam 56 acts upon and depresses a stud secured to plate 59, which is connected to one end of a lever 60, the opposite end of the lever being supported by a bracket 61. To this lever is connected a shackle 62, coupled by links 63 to levers 64, supported on fulcrum-pins, the opposite ends of said levers being coupled by links 65 to arms 66, secured on upright bars 24, attached to the table 22.

The revolving cam 56 is capable of being moved on the shaft 57 clear of the projecting stud secured to plate 59 by the operation of the lever 67, one end of which engages with the said cam and the other by a stud with the groove 68 in sliding plate 69, which is connected by a rod to the lever 70, secured on a shaft to which is also secured a lever 71, coupled by a link to one end of lever Z', secured on shaft 1, so that should the long lever 4 be depressed for the stud 6 to engage with the curved portion 7 of arm 8 the plate 69 will slide in supporting-bracket and move the cam 56 clear of the stud. The table 22 is also hinged at 71, and in order that the grooved laths may be cut into short lengths suitable for fire-wood a circular saw 73 (see Fig. 10) is mounted on a rising-and-falling bracket 74, made to slide on a bracket 75, secured to one of the side frames of the machine. Above the said brackets the table 22 is continued; but this portion is stationary and provided with pressure-rollers 76, mounted to levers 77, between which are a bar and compressed spiral spring 78. The grooved lath passing under the pressure-rollers 76 is held close to a similar fence to 23 by a flat spring S', and on the lath coming in contact with a small pulley P' in cam 79 the cam is moved in the direction of the curved arrow, the said cam being mounted upon an upright shaft connected to another upright shaft to which is attached another cam 80, provided with a flat spring for keeping the lath in contact with the small pulley P' during the cutting of the lath by the circular saw 73, made to travel during the cutting operation in the same direction and at the same speed as the grooved lath in the manner as hereinafter described.

The cams 79 and 80 are respectively secured to the upright shafts 105 and 106, each shaft having a projecting arm or crank, which arms are coupled together by a link 107. When the cams are in the position shown by Figs. 2 and 11, the mechanism for operating the rising-and-falling circular saw 73 is out of gear; but a lath as it is traveling from the rollers 76 on coming in contact with the small pulley p', mounted in the cam 79 some distance from the upright shaft supporting same, the traveling lath causes the cam 79 to move in the direction of the arrow, and by the two cams 79 and 80 being coupled together by link 107 in the manner as before described upright shaft 106 and cam 80, attached thereto, are also turned in the direction of the arrow, so that the flat spring (shown by the single line in the drawing Fig. 11) is brought in contact with the traveling lath, pressing same against small pulley p', by which pressure support is given to the projecting portion of the lath while the circular saw 73 is cutting through the lath. The flat spring secured to cam 80 is introduced, bringing pressure upon the lath and to allow for any irregularities in the width of the laths passed through the machine. So long as the cam 79 is held back by a lath pressing on the small pulley p', so long will the circular saw 73 continue to rise and fall and cross-cut the traveling lath.

The circular saw 73 is driven by a belt passing over pulley 81, mounted on the saw-spinple S^2, provided with a feather-key engaging with the said pulley. The rising-and-falling bracket 74, supporting the circular saw 73, is operated by a clutch 82, the top portion of which is secured to the bracket 74. The lower portion of the clutch 82, spur-wheel 88, and catch-box 89 are all secured together in any convenient manner and are supported upon a fast collar on upright shaft 83, as shown in dotted lines in Fig. 12, so as to be free thereon to permit the shaft 83 to rotate without operating said parts. Below the catch-box 89 is a sliding member 90, splined to the shaft, so that when the two portions 90 and 89 are brought into engagement by the operation of the lever 91 the lower portion of clutch 82 rotates, thereby raising the upper portion and bracket 74 a distance equal to the height of the inclines. The shaft 83 is driven immediately from a pulley 84, which communicates its motion to a pulley 85 by a belt (not shown) secured on shaft 86, which in turn communicates its motion to the shaft 83 by the train of bevel-gears 87. (Shown clearly on the right of Fig. 3.) The spur-wheel 88 has rotary movement imparted to it each time the revolving clutch-box 90 is moved into gear with 89.

The spur-wheel 88 drives the spur-wheel 92, (see dotted lines in Fig. 3,) to which is secured a bevel-wheel 93, gearing with a similar wheel secured on shaft 94, upon which is a cam 95, with the groove of which engages a stud projecting from the lever 96, (see Fig. 1,) supported by a pin at the top, the bottom end of the lever being connected by a bar 97 to a lever 98, hinged on a stud supported by bracket 99. This lever is shown in detail side elevation by Fig. 8 and front elevation by Fig. 9 drawn to an enlarged scale, and within the recess of the said lever is pivoted a frame 100, in which is mounted a sliding block 101, flanged on each side, so as to slide easily within the said frame, and connected with the end of the saw-spindle S^2, so that on the oscilla-

tion of the lever 96 by the cam 95 a varying lateral reciprocating motion is given to the circular saw 73, traveling in one direction at the same speed as the lath during the cutting, then returning quickly.

Connected to a stud projecting from the lever 98 is an arm 102, (see Fig. 3,) secured to one end of the bar 103, to the opposite end of which is secured an arm 104, attached to a narrow sliding plate 105, mounted in end plate and to which a to-and-fro motion is given simultaneously with the circular saw 73.

The putting into gear of the sliding bottom catch-box 90 with the upper portion 89 for raising the circular saw into position for cutting the grooved laths into lengths is accomplished in the following manner, and is shown more particularly on reference to Fig. 10, drawn to an enlarged scale, representing an end view of the machine, parts of which are removed for showing more clearly the mechanism for raising and lowering the circular saw 73: Fig. 11 represents a plan, partly in section, showing the mechanism for putting the sliding bottom catch-box 90 into gear with the upper portion 89; and Fig. 12, an end view, partly in section, showing the arrangement of levers. Both these illustrations are drawn to a larger scale than Fig. 10.

The cams 79 and 80 are secured to the respective upright shafts 105 and 106. Each shaft is arranged with a short projecting arm or crank coupled together by a link 107. The connection is continued to lever 108, secured on shaft 109, to which is secured another lever 110, the upper portion of which is arranged with a slot-hole through which a lever 111 passes. The shaft 109 extends through the bracket 75, attached to the machine side frame, and on the said shaft is secured a slotted lever 112. Also on the end of said shaft is secured a weighted lever 113.

Supported by a bracket is a lever 114, coupled by rod 115 to lever 91, engaging with the sliding bottom catch-box 90, and to lever 114 is hinged another lever 116, notched at the upper end and held in contact with the slotted lever 112 by a spring S^3, and to the end of lever 114 is hinged a short catch-arm 117.

On the end of the grooved lath proceeding under pressure-rollers 76 and coming in contact with the small pulley P′, mounted in cam 79, the cams 79 and 80 are moved in the direction of the curved arrows, and by the said cams being attached to the upright shafts 105 and 106, which are connected by link 107 to the lever 108, secured on shaft 109, the said lever and shaft are moved in the direction that slotted lever 110 is moved into—a more vertical position than shown by Fig. 10—the said lever moving such a distance that lever 111 is allowed to descend and the catch or gib-piece on the under side of said lever to engage with the side of lever 110, and thereby hold lever 110 in a vertical position. On shaft 109, to which lever 110 is secured, is also secured a slotted lever 112, the upper portion of lever 116 engaging between the slotted portion, as shown by Fig. 16, so long as the revolving clutch 90 is held out of gear with 89; but when shaft 109 is moved in the direction of the curved arrow in Fig. 12 the gib portion 112^a of lever 112 presses against lever 116 and moves the same a distance sufficient for the narrow notch near the top of lever 116 to be disengaged with lever 112, thus liberating levers 114 and 91 from the held-up position shown by Fig. 10 and 12, so that by the weight of the long or outward ends of the levers, combined with the weight of the connecting-rod 115, exceeding that of the other ends of the said levers and revolving clutch-box 90 combined the long or outward ends of the said levers descend by gravity, thus raising the revolving clutch-box 90 into gear with 89, thereby causing same spur-wheel 88 along with the bottom portion of clutch 82 to rotate one-half of a revolution, and thus raise the bracket 74 and circular saw 73 a sufficient distance for the saw to cut through the traveling grooved lath, the saw while cutting traveling in the same direction and speed as the lath, the traveling of the saw in a horizontal direction being accomplished by the cam 95, driven by the spur-wheels 88 92 and bevel-wheels 93, so proportioned that the cam 95 makes one complete revolution for each half-revolution of wheel 88, the connection between the cam 95 and saw-shaft S^2 being accomplished by the levers 96 and 98. On the descent of the circular saw and sliding bracket 74 a projection 118 on same strikes the upper side of catch-arm 117, thereby raising rod 115 and disengaging the sliding bottom catch-box 90; but so long as the cams 79 and 80 are held apart by a lath between same the sliding bottom catch-box 90 is allowed to go into gear after each descent; but in case the said cams are allowed to move toward each other—that is, to the position shown—the bottom sliding catch-box 90 is held out of gear by the notch near the top of lever 116 engaging with the slotted lever 112. Each time the circular saw and sliding bracket 74 are raised a projecting bar 119, secured to said bracket, raises one end of lever 111, thus liberating the catch-lever 111 from lever 110, and, providing the cams 79 and 80 are not held apart by the grooved lath proceeding from under the pressure-rollers 76, the notch near the top of lever 116 engages with the slotted lever 112 and keeps the sliding bottom catch-box 90 out of gear with the other portion 89.

What I claim is—

1. A woodworking-machine having rotary cutters for cutting longitudinal grooves on one side of a traveling lath, means for feeding said lath into and through the machine, diagonally-arranged circular saws located on the opposite side of said lath, and means for moving said saws across and also in the same direction as the traveling lath for cutting diagonal grooves in the upper surface of the

laths, and for moving them back to initial position before another cut, substantially as described.

2. In a woodworking-machine, a rising-and-falling work-supporting table with means for operating the same, a longitudinally-reciprocating carrier-table with means for operating it, a saddle carried by said table and movable diagonally thereof, means for moving said saddle, and a rotary cutter carried by said saddle, substantially as described.

3. In a woodworking-machine of the class described the combination with the work-supporting table and means for continuously feeding the strip to be operated on, of a cutting-saw arranged normally out of the path of said strip, means normally inoperative for bringing said saw into operating position causing the saw to travel in the same direction as the strip while cutting, clutch mechanism for connecting said means with a moving part of the machine, a cam arranged in the path of the strip adapted to be displaced thereby, and connections from said cam to the clutch whereby the movement of said cam effects the moving of the saw into operating position, substantially as described.

4. In a woodworking-machine of the class described, the combination with the movably-supported spindle S^2 and saw 73 carried thereby, of a rotating cam 95 with lever 96 connected by bar 97, to pivoted lever 98, supporting pivoted frame 100 and sliding block coupling said lever to said spindle for the purpose of traversing said spindle and saw in the same direction of the strip while cutting and in the opposite direction when clear of the strip, substantially in the manner as described.

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

EDWIN POLLARD.

Witnesses:
JOHN GILL,
C. T. WAUGH.