

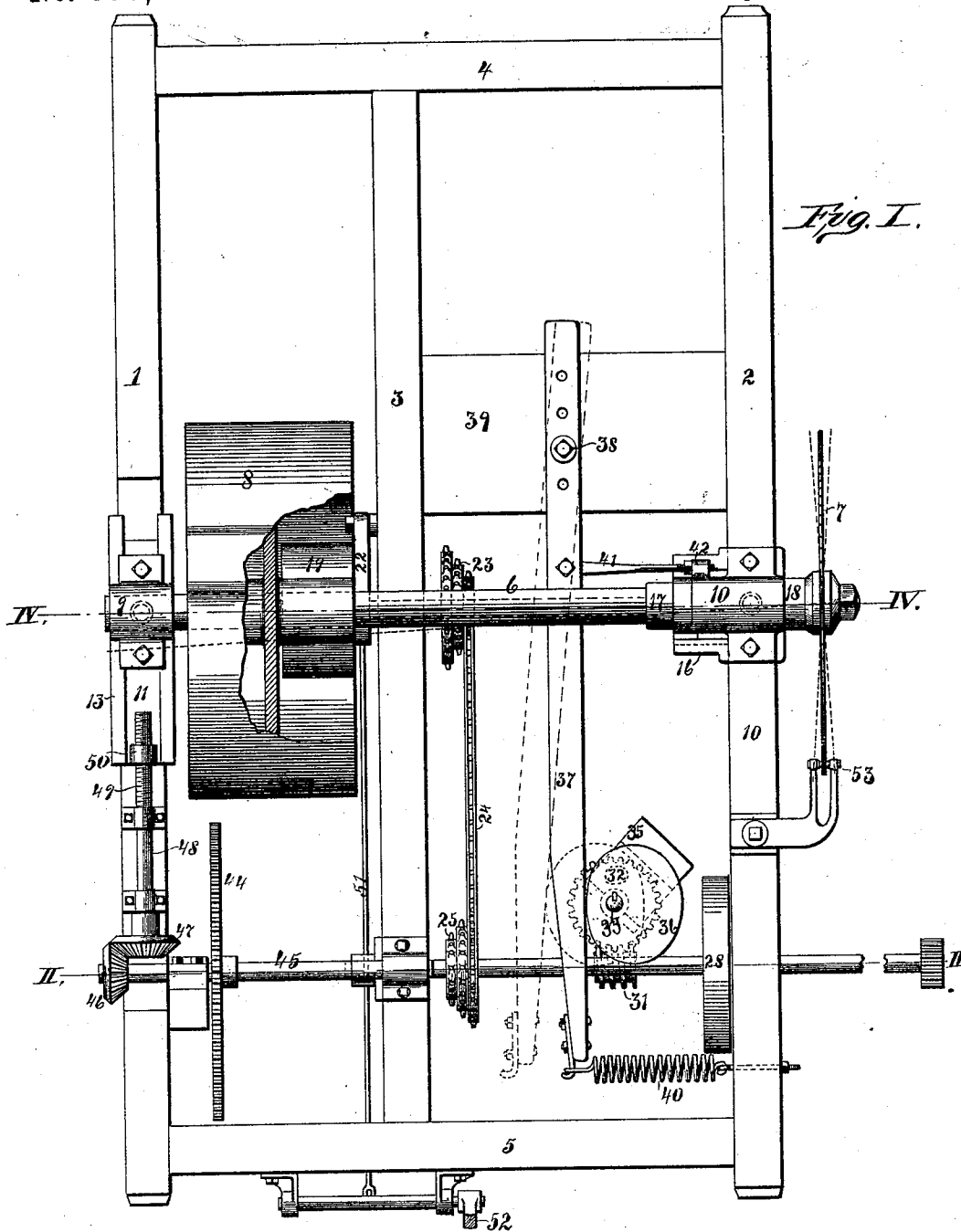
(No Model.)

3 Sheets—Sheet 1.

F. J. RANDALL.
JOIST CROWNING MACHINE.

No. 519,682.

Patented May 8, 1894.



Attest:
Halcolm G. Ellis
A. W. Benson

Inventor
Frank J. Randall
By Knight Bros.
Attys

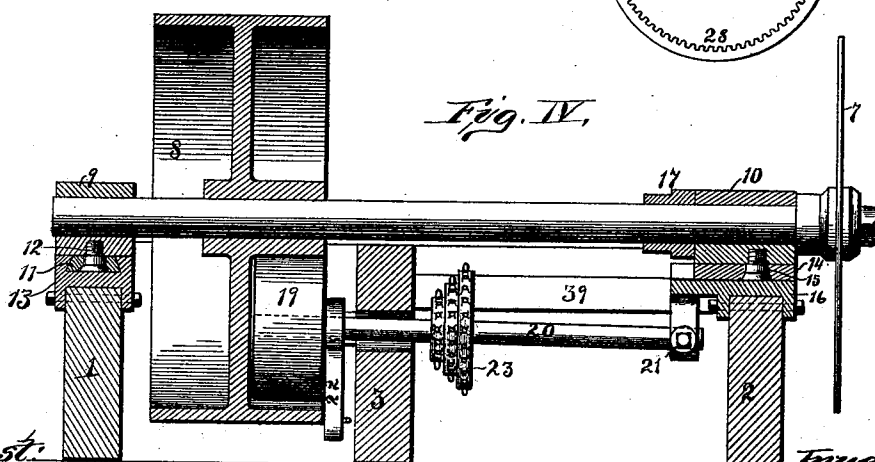
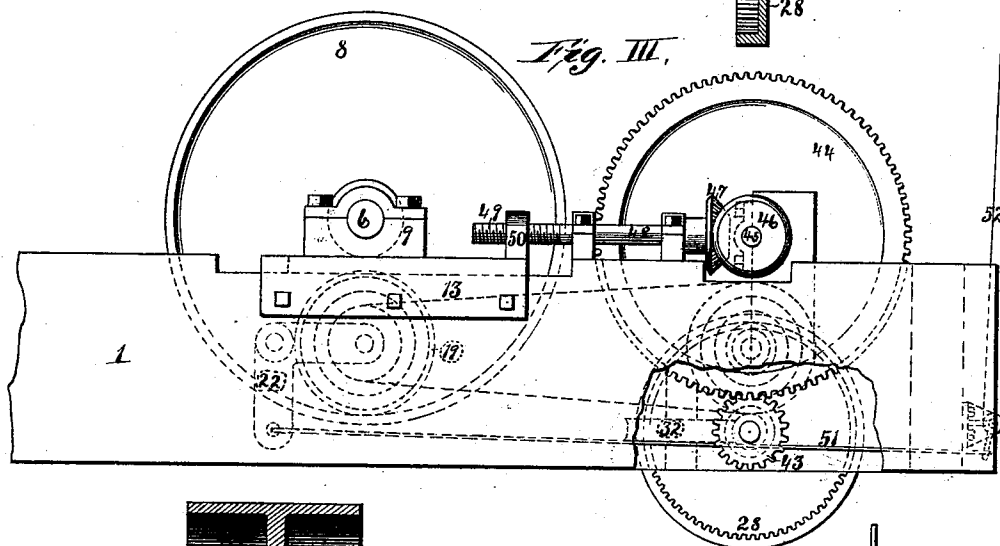
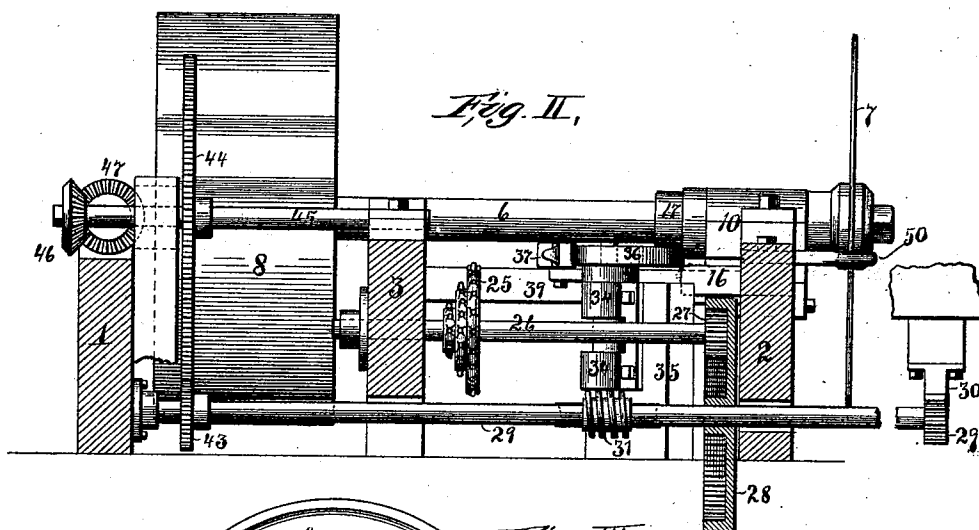
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3 Sheets—Sheet 2.

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Fig. V,

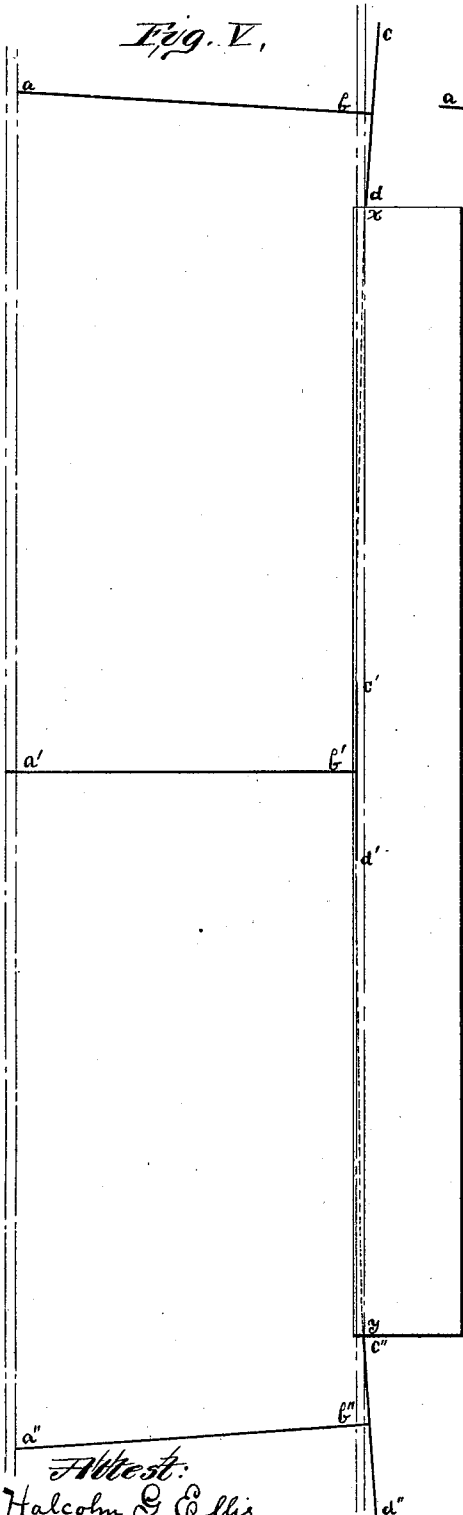


Fig. VI,

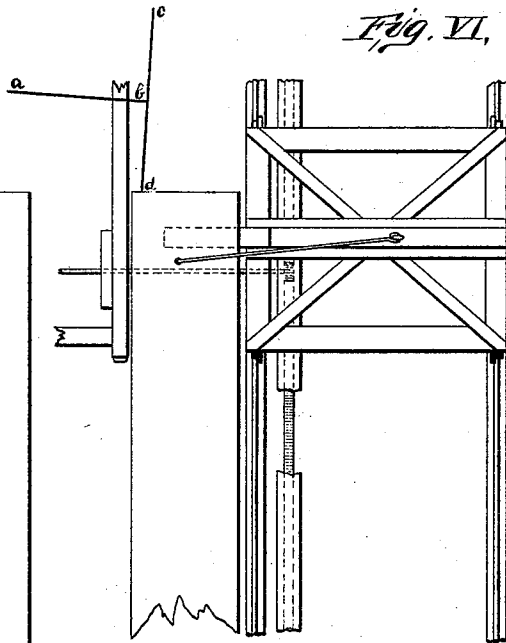


Fig. VII,

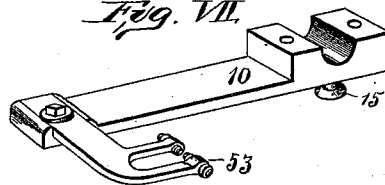
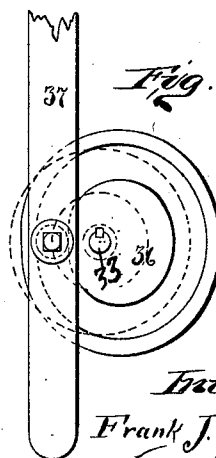


Fig. VIII,



Attest:
Harold G. Ellis
A. M. Brown

Inventor
Frank J. Randall
By Knight-Bros.
Attys

UNITED STATES PATENT OFFICE.

FRANK J. RANDALL, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE KNAPP & STOUT CO. COMPANY, OF SAME PLACE.

JOIST-CROWNING MACHINE.

SPECIFICATION forming part of Letters Patent No. 519,682, dated May 8, 1894.

Application filed December 14, 1893. Serial No. 493,695. (No model.)

To all whom it may concern:

Be it known that I, FRANK J. RANDALL, of the city of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Joist-Crowning Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

10 This invention has for its object to produce a circular cut or crowning on a joist, without moving the joist on its carriage, which effect is brought about by changing the angle of cut of the saw to the direction in which the joist is moving, and at the same time moving
15 the saw laterally to the direction of the cut.

Figure I shows a top view of the machine; part of the main pulley wheel being broken away to show the interior and reversing mechanism. Fig. II is a vertical section on line II—II, of Fig. I. Fig. III is a side elevation of Fig. I, looking from the left. Fig. IV is a vertical section on lines IV—IV, Fig. I. Fig. V is a view illustrating the different positions
25 of the saw during its progress of crowning a joist. Fig. VI shows the method of attaching the joist to the carriage, and the position of the saw as it begins to cut. Fig. VII is a detail view of the lower part of the bearing for
30 the mandrel nearest the saw, and shows the saw guide. Fig. VIII is a view of a modification of the eccentric feature of this machine, which will be explained farther on.

The machine is mounted upon a wooden
35 frame, consisting of longitudinal beams 1 and 2, having a partition beam 3 parallel with them, and head beams 4 and 5, to which the partition beam is attached, and which are secured to the main beams 1 and 2, all in the
40 manner usual in saw mills of this type. Across this frame work extends the mandrel 6, to one end of which is attached a circular saw 7, by the usual means. A drive pulley 8 is secured to the mandrel between the beams 1
45 and 3. The mandrel is supported in two bearings 9 and 10 respectively over the beams 1 and 2. The bearing 9 has secured to its under side a sliding block 11, by a pivot 12, shown in section in Fig. IV. This sliding
50 block fits in a guide plate 13, which is secured to the beam 1. The direction of the slot in

the top of this guide plate is parallel to the direction of the beam 1, so that the sliding block 11 will travel or slide in a direction parallel to the direction of the beam 1. The
55 bearing 10 has secured to its under side a sliding block 14 by a pivot 15, the said block fitting into a groove in the guide plate 16, secured to the beam 2, this groove runs in a direction perpendicular to the beam 2, consequently the bearing sliding block 14 will
60 travel in a direction transversely to that of the beam 2, and carry the bearing 10 with it.

The mandrel 6, where it rests in the bearing 9, is a plain cylinder, having no collar or
65 shoulder, or other projection to interfere with its uniform diameter for some distance from the bearing 9. At the end of the mandrel which rests in the bearing 10, there is on the inside of the bearing a collar 17, secured to
70 the mandrel, and at the other end of the bearing is secured the mandrel head 18. This fixes the position longitudinally of the mandrel 6, with respect to the bearing 10, so that if the bearing 10 is moved in a direction per-
75 pendicular to the beam 2, it carries the mandrel with it, also the saw 7.

Within the pulley 8, and beneath the mandrel 6, there is suspended a friction pulley
80 19, as in the ordinary saw mill. This pulley 80 is mounted upon a shaft 20, having its bearing nearest the drive pulley in a bell-crank 22, the other end of the shaft 20 being mounted in a tilting bearing 21, and also upon this shaft 20 is mounted the sprocket wheel 23.
85 This sprocket wheel connects by a chain 24 to a similar sprocket wheel 25, mounted upon a shaft 26. This shaft 26 carries a pinion 27 at the end nearest the beam 2, which pinion plays on an inside gear wheel 28, which in
90 turn is mounted on a shaft 29, all of said shafts being perpendicular to the direction of the beams 1 and 2. This shaft 29 extends out through a hole or opening in the beam 2, and at its outer end carries a pinion wheel
95 29', which operates in a rack 30 on the under side of the carriage, and moves the carriage backward and forward. There is also on the shaft 29 a worm 31, which operates in a horizontal gear wheel 32, mounted on a vertical
100 shaft 33, in bearings 34, on a post 35. At the upper end of this shaft 33 is a horizontal cam

36, the periphery of which bears against a lever 37. This lever is pivoted by a bolt 38 to a horizontal partition 39, between the beams 2 and 3, and is held in contact with the cam 36 by a spring 40, attached to the loose end of the lever 37, and to the beam 2. From this lever 37 extends a connecting rod 41, attached to a lug 42 on the bearing 10. From this it is evident that as the cam 36 revolves, it will cause the lever 37 to vibrate, and by the connecting rod 41, cause the bearing 10 and the saw 7 to move back and forth in a direction perpendicular to the direction of the beam 2. Connected to the shaft 29 there is also a gear-wheel 43, which operates in a much larger gear wheel 44, placed above it, and supported on a shaft 45, which is parallel to the shaft 29. This shaft 45 has, at its end nearest the beam 1, a miter gear wheel 46, which plays in a similar gear 47, whose shaft 48 is parallel to and supported by the beam 1. The end of this shaft 48 terminates in a screw 49, which screw turns in a threaded lug 50 on the sliding block 11. It will be seen from this, that as the shaft 29 is turned, it will cause the screw 49 to turn through the medium of the gear wheels 43 and 44 and the miter gear 46 and 47; as the shaft 48 is secured by bearings in its position on the beam 1, its revolution causes the sliding block 11 to move in the groove on the plate 13, in a direction parallel with the beam 1.

The reversing mechanism of the carriage is operated by moving the friction pulley 19 from its position in contact with the inside of the rim of the pulley wheel, to a position in contact with the hub of said pulley wheel. This is accomplished by moving the bell crank 22 by means of a rod 51, which is connected with a suitable lever 52. When the bell crank 22 is moved so that the friction pulley 19 bears against the rim of the pulley 8, the feeding mechanism of the saw is called "reversed;" that is, the carriage is then running back into a position to have new lumber placed upon it, preparatory to running forward against the saw. This movement takes place when the pulley 19 is against the rim of the wheel, which being of much larger circumference than the hub of the pulley, causes the carriage to reverse very quickly. When the carriage is reversed to a position ready to have material placed upon it, the saw 7 is in a position indicated by the lines *c, d*, of Fig. V, and the mandrel is in a position indicated by the lines *a, b*. When the lumber is placed upon the carriage, and the lever 52 moved so that the friction pulley 19 bears against the hub of the pulley 8, the carriage begins to move forward, the saw being first in the position indicated by the lines *c, d*. When the carriage has reached a point midway between the two extremities of its position, the saw will be in the position indicated by the line *c', d'*, Fig. V, and the mandrel 6 will be in the position *a', b'*; that is to say, the saw will be parallel to the di-

rection of travel of the carriage, and the mandrel will be perpendicular to that direction. As the carriage proceeds, the saw begins to tilt, and when the cut is finished the saw is in the position indicated by the lines *c'', d''*, and the mandrel is in the position of *a'', b''*. From this it will be seen that the position of the saw, during the progress of the carriage from one end of its track to the other, would be that indicated on the dotted line *x-y*, of Fig. V.

The gear wheel 32 and worm 30 are so constructed that the cam 36 will make one complete revolution, while the carriage is moving from one end of its track to the other. The gear wheels 43 and 44 are so constructed that the bearing 9 will be drawn by the screw 49 from one end of the groove in guide plate 13 to the other end, being drawn in a direction opposite to the movement of the carriage, consequently while the carriage moves from its initial position to the end of the cut, the saw will be first tilted away from the direction of the carriage travel, it will be gradually drawn away from the material, until the middle of the cut is reached, when the saw will be parallel to the direction of the carriage travel, and at the greatest distance from the opposite edge of the material, then as the carriage proceeds, the angle of the cut and of the saw will gradually be inclined toward the carriage, and the saw will be brought farther toward the carriage. In this way the joist will receive what is called a "crown;" that is, it will be sawed on the segment of a circle, the widest part of the joist being the center.

To regulate this machine for different lengths of joist, the bolt 38 is removed and placed in a position farther or nearer to the cam 36, different holes in the lever 37 being provided for this purpose. For very short joists the bolt is placed as far as the last hole from the cam 36. This allows more lateral play for the mandrel and saw. The joist in this case is placed on the center of the carriage, and the carriage allowed to proceed a certain distance, being one-half of the difference between the length of the short joist and of the longest joist for which the machine is calculated before the saw enters the wood. This effects a cut on a segment of shorter radius, so that the short joist can be crowned as much as the longer joists.

The bearing 10 has its lower half extended out to hold a saw guide 53 of the usual construction. This saw guide 53 must be attached to the bearing 10, that it may swing parallel with the saw.

Fig. VIII shows a modification of the cam 36, for the purpose of dispensing with the spring 40. The cam has a groove in its upper surface, and a sliding block secured to the lever 37 fits in this groove, consequently when the cam revolves, the lever is carried back and forth, being held in contact with the cam by the groove holding the sliding block.

The preferred form is that shown in Fig. I, with the spring.

By removing the cam 36 and disconnecting the gear operating the screw 49, first setting the saw parallel to the direction of the carriage travel, this machine may be used as a regular saw mill.

I claim as my invention—

1. A joist crowning machine, provided with an oscillating and transversely sliding mandrel carrying the saw, and means for automatically oscillating and changing the lateral position of the mandrel and saw during the travel of the carriage.

2. A joist crowning machine, having a mandrel mounted in a longitudinally sliding bearing at the inner end, to which end is attached the saw, the mandrel having shoulders on either side of the inner bearing, and being free in the outer bearing, and means for automatically oscillating and sliding the mandrel laterally during the travel of the carriage, substantially as described.

3. A joist crowning machine, having a mandrel 6, carrying a saw 7 at its inner end, and supported by the bearings 9 and 10, and having shoulders on either side of bearing 10; the bearing 9 to slide in a direction parallel to the movement of the carriage, and the bearing 10 to slide in a direction transversely to the movement of the carriage, and means for automatically changing the positions of both bearings 9 and 10, simultaneously, during the travel of the carriage, substantially as described.

4. The combination in a joist crowning machine of the mandrel 6 supported in bearings

9 and 10, the bearing 9 sliding in a direction parallel to the movement of the carriage, and the bearing 10 sliding in a direction transversely to the movement of the carriage, the mandrel being provided with shoulders on each side of the bearing 10, a cam 36 operating the lever 37, which is connected to and moves the bearing 10, and with it the mandrel 6 and saw 7; a screw 49 operating to slide the bearing 9 in its guide plate 13, and means for automatically revolving the cam 36, and a screw 49; substantially as described and shown.

5. The combination in a joist crowning machine of the mandrel 6, supported in a longitudinally sliding bearing 9, and a transversely sliding bearing 10, the mandrel having shoulders on each side of the bearing 10, a cam 36 operated by a worm 31 and gear 32, which moves the lever 37 connected to the bearing 10, and slides said bearing in the guide plate 13, a screw 49 operated by gear wheels, and which is connected to the bearing 10 and slides the said bearing in the guide plate 13; all substantially as described and shown.

6. The combination in a joist crowning machine and saw mill of the oscillating and transversely sliding mandrel and saw, means for automatically operating this sliding and oscillating movement of the mandrel and saw, which means may be connected or disconnected to the carriage propelling mechanism, substantially as and for the purpose described.

FRANK J. RANDALL.

In presence of—

A. M. EBERSOLE,
CLARA G. EDWARDS.