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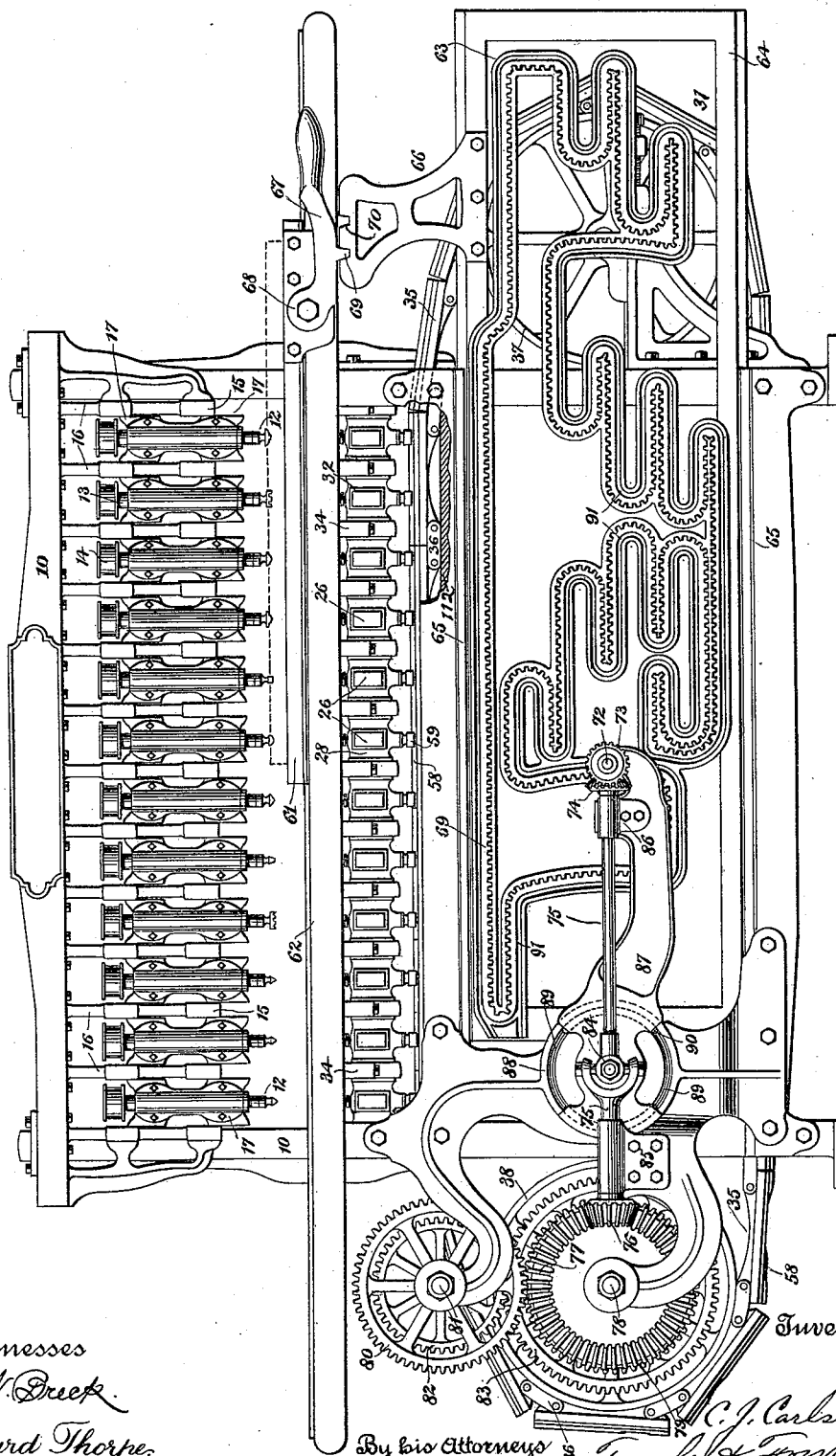
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C. J. CARLSTROM.
CARVING MACHINE.

No. 461,215.

Patented Oct. 13, 1891.

Fig. 1.



Witnesses
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(No Model.)

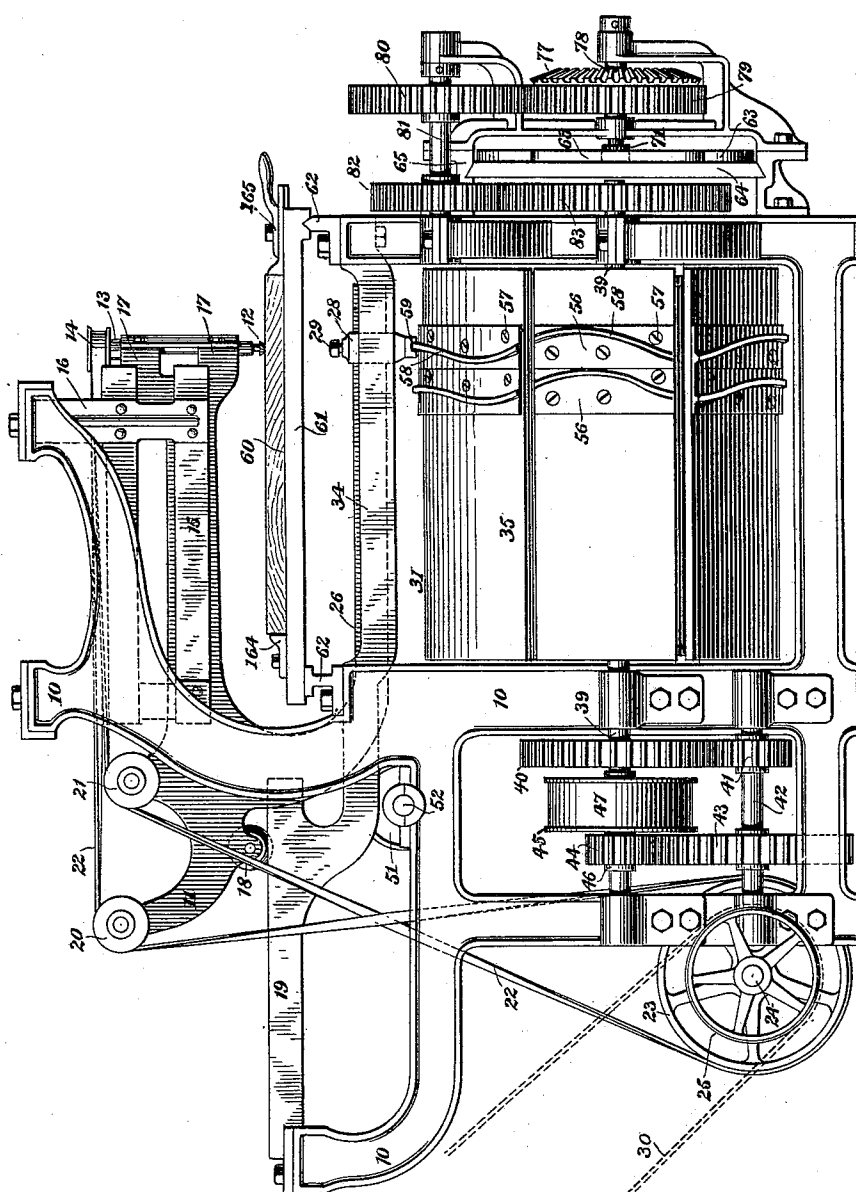
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Fig. 2.



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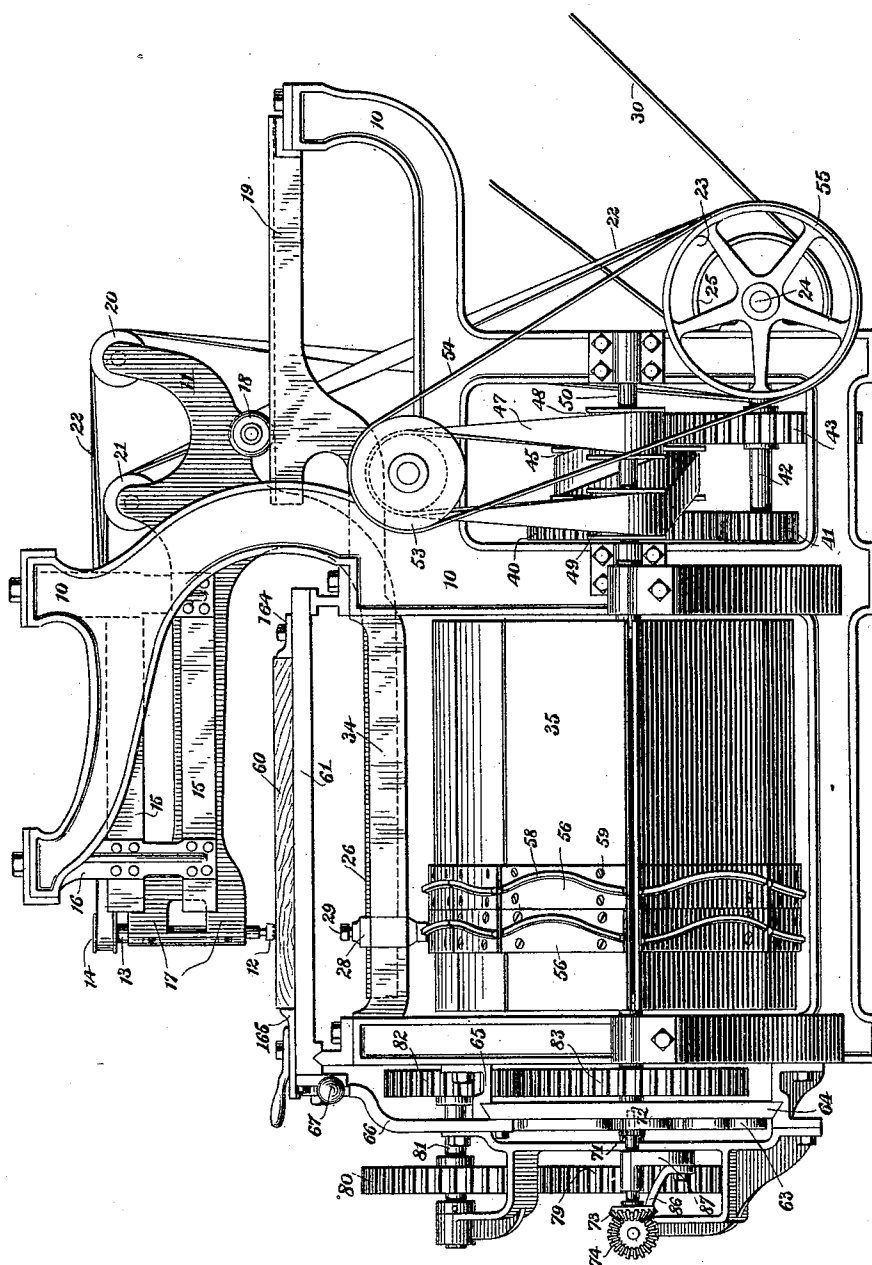
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Fig. 3.



Witnesses
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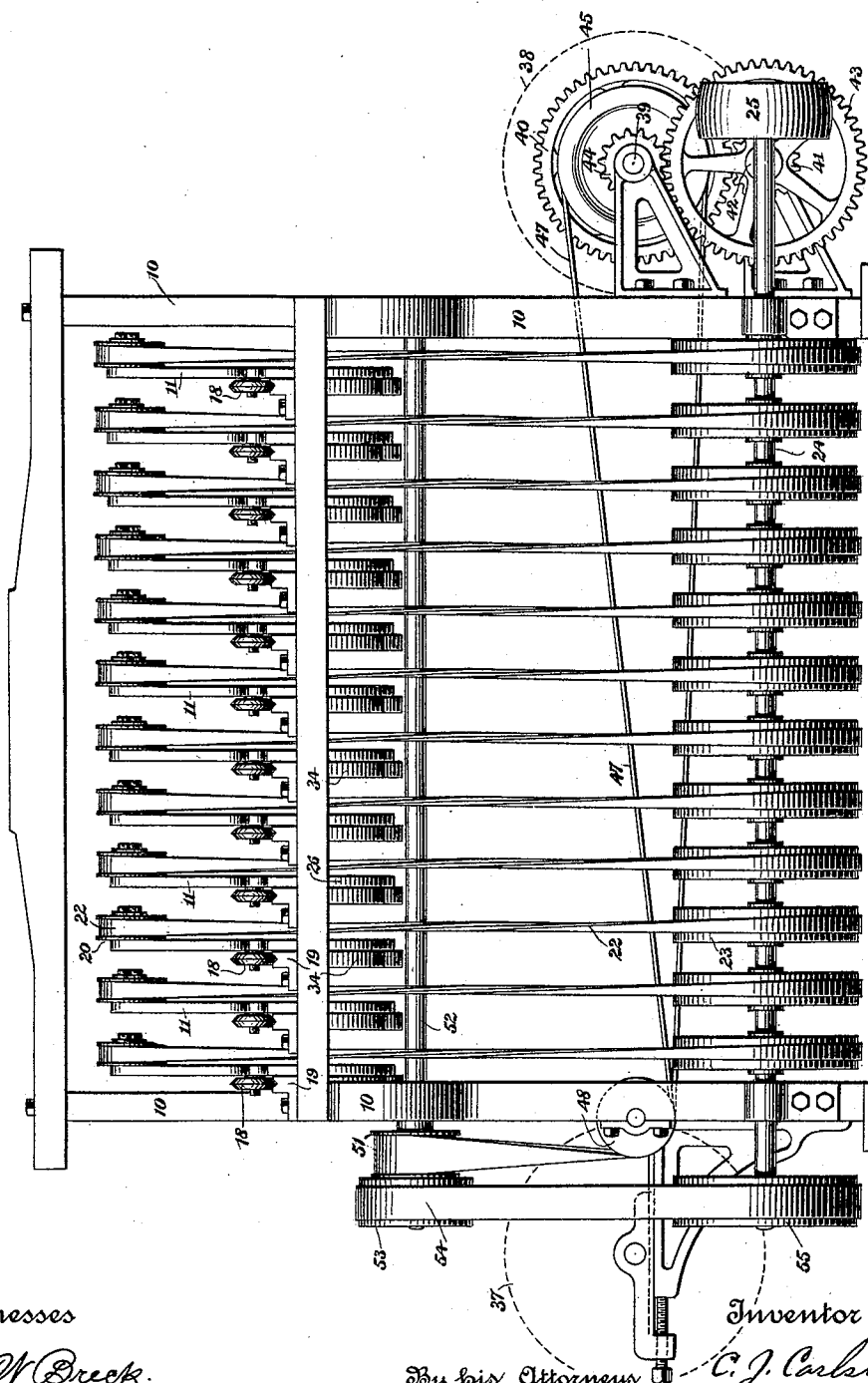
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Fig. 4.



Witnesses

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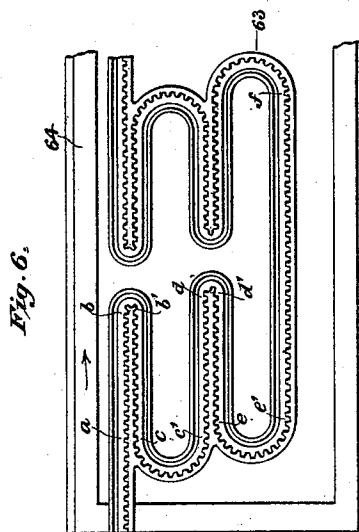
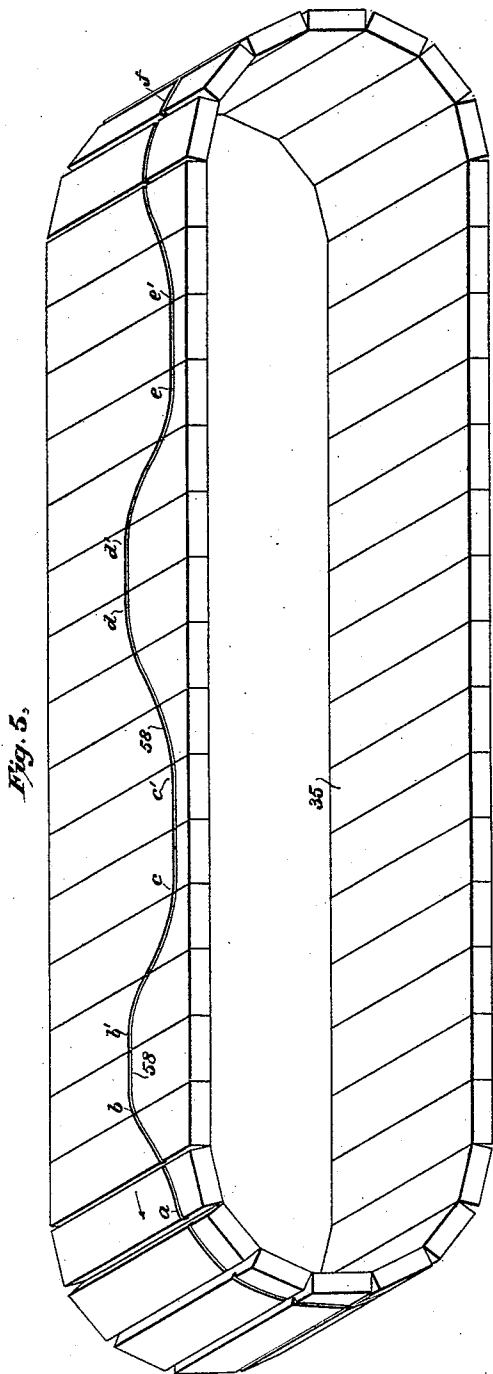
(No Model.)

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UNITED STATES PATENT OFFICE.

CARL J. CARLSTROM, OF JAMESTOWN, ASSIGNOR OF ONE-FIFTH TO WILLIS FOWLER, OF NEW YORK, N. Y.

CARVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 461,215, dated October 13, 1891.

Application filed August 21, 1890. Serial No. 362,603. (No model.)

To all whom it may concern:

Be it known that I, CARL J. CARLSTROM, a subject of the King of Sweden, residing at Jamestown, Chautauqua county, and State of New York, have invented certain new and useful Improvements in Carving-Machines, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the drawings forming part of this specification.

My invention relates to a machine for carving upon wood or other material designs in relief or intaglio.

The object of the invention is to provide an automatically-operating machine for rapidly turning out the work; and to this end the invention consists in the certain novel and peculiar arrangements and combinations of parts, all as hereinafter fully described, and then pointed out in the claims.

In the accompanying drawings, in which like figures of reference designate like parts throughout, I have illustrated an embodiment of my invention, the said drawings being as follows:

Figure 1 is a front view of my improved carving-machine. Figs. 2 and 3 are end views of the left and right hand ends of the machine, respectively. Fig. 4 is a rear view of the machine, the pattern-belt and the pattern-rack not being shown in this view. Figs. 5 and 6 are detached views of the pattern-belt and a portion of a pattern-rack, the joint use of which in the machine will outline the figure shown in Fig. 7, as will be fully hereinafter described.

Referring to the drawings, 10 designates the machine-framing, which is made of a suitable form to contain the operative parts of the machine. In the upper part of the framing are mounted a set of reciprocating and rocking tool-holders 11, which carry the carving-tools 12, driven by spindles 13, which are provided with pulleys 14. The tool-holders 11 are each arranged, preferably, vertically and are provided with guideways 15, supported by the hangers 16, which depend from the upper part of the machine-framing 10. The sides 17 of the tool-holders are formed suit-

ably to provide bearings for the holders, which slide on the guideways 15 during the movements of the tool-holder, there being sufficient friction between the bearings and the guideways to steady the holder in its movement. These tool-holders 11 are adapted to be reciprocated on their bearings over a range of movement as great as may be necessary—for instance, a range equal to the width of the work-table—the reciprocating movement being imparted thereto by means of a pattern-belt hereinafter described.

Each tool-holder 11 is provided, preferably near the end thereof remote from the end carrying the tool, with a supporting wheel or roller 18, which travels back and forth on a track 19, arranged horizontally in the machine-frame 10. This supporting-wheel 18 is preferably placed upon one side of the holder, and upon the other side thereof are mounted belt-pulleys 20 and 21, over which passes the spindle-driving belt 22, which drives the pulley 14 of the tool-spindle 13, and thus the carving-tool 12. The spindle-driving belts 22 are each driven by a pulley 23, mounted on the main shaft 24, which receives its motion from the main pulley 25, which may be driven by belt 30.

The tool-holders 11 are adapted to rock or vibrate on their supporting-wheels 18 as centers, the rocking motion being imparted thereto by means of the pattern-belt hereinafter to be described. Thus each tool-holder 11 may be rocked or vibrated in its plane of reciprocation on an axis normal to such plane. The belt-pulley 20 of each of the tool-holders is preferably located to the side of the rocking center thereof opposite that upon which the carving-tool is located, so that the tension on the spindle-driving belt 22 may tend to counterbalance the weight of the opposite end of the tool-carrier. The belts 22 after leaving the drive-pulleys 23 are crossed, one side passing over the pulley 20 and the other over the pulley 21, and thence to the spindle-pulley 14, so that as the tool-holders are moved toward the rear of the machine and are brought more directly over the drive-pulleys 23, which are located to the rear of the machine, the stretch of belt between pulleys 23 and 20 will lengthen, 100

while that between pulleys 23 and 21 will shorten, thereby compensating and keeping the tension on the belt uniform.

Each tool-holder 11 is provided with an arm 26, extending from near the rocking center thereof to slightly beyond the end of the tool-holder carrying the tool and forming a wide fork therewith, so as to embrace with ample clearance the work-table 61, the said arm 26 extending below the work-table and being provided with a guide 28, mounted adjustably thereon by means of set-screw 29, and which engages with the traveling pattern-belt 31. The guides 28 are formed with a central opening 32 for receiving the arm 26 of the tool-holder and are provided with flat side bearings 33, which slide on the guide-bars 34, fixed in the machine-framing in suitable positions. These guide-bars 34 are preferably extensions of the tracks 19, upon which the supporting-wheels 18 of the tool-holders travel. The reciprocatory and rocking movements of the tool-holders 11 are controlled by the patterns of the pattern-belt 31, which consist in the present construction, of suitable sections 35, hinged together by links 35, and constituting an endless sectional belt, which is mounted upon the drums 37 and 38, the latter of which effects the driving of the belt through means of shaft 39, gears 40 41, shaft 42, pinion 43, fixed upon the latter, gear 44, pulley 45, the gear 44 and pulley 45 being keyed upon a sleeve 46, turning loosely on shaft 39. The pulley 45 receives its motion through means of the band 47, which passes over guide-pulleys 48 and 49 on shaft 50 and which receives its motion from the main shaft 24 through means of pulley 51, shaft 52, band-wheel 53, belt 54, and pulley 55, fixed upon said main shaft. The patterns of the belt are composed of sections or plates 56, which are removably secured to the belt-sections 35 by means of fasteners or screws 57 and are provided with the pattern ribs or grooves 58, running longitudinally of the plates and shaped after a predetermined design. The pattern rib or groove 58 is engaged by the guide 28 of each of the tool-holders. In the case where the part 58 is a rib or projection the end of the guide 28 engaging the same is notched or forked, as at 59, to receive such rib or projection, which serves to move the guide 28 back and forth transversely of the pattern-belt, and thereby reciprocate the tool-holder and the tool carried thereby crosswise the work 60, which is clamped upon the work-table 61. The rocking or vertical movement of the tool-holder is imparted thereto by means of the pattern element 58 of the belt in accordance with the elevations or depressions of the same, as will be understood from the side view of the pattern-belt, as shown in Fig. 1. The pattern-belt therefore controls the extent of movement of the carving-tools carried by the holders transversely the work as well as the depth to which the tools are allowed to cut into the work. The guides 28

are adjusted upon the arms 26 of the tool-holders in such positions that the same vertical movement may be imparted to the carving-tool as is given to the guide by the elements in the pattern-belt. Such an arrangement is shown in the drawings, and it will be obvious that by placing the guides 28 either to one side or the other of the plane containing the carving-tool and the guide the extent of the vertical movement of the tool may be made greater or less than that of the guide controlling said tool, since such a variation of position will vary the distance of the guide from the center of the rocking motion of the tool-holder. The design of the pattern of each section thereof may be alike, or the design formed by every two or more sections together may be alike. There may be as many sets of the pattern-sections running side by side as there are tools to be controlled, in which case each set of pattern-sections would be engaged by but one guide 28, which, instead of then being in a straight line longitudinal of the pattern-belt, would be disposed one in advance of the other—that is to say, to a person standing in front of the machine, the carving-tool controlled by the guide which engages the set of pattern-sections near the front of the machine would be nearer to the observer than a carving-tool the guide of which engaged with pattern-sections nearer to the rear of the machine.

By virtue of having the tool-holders so constructed that they may be controlled by different sets of the pattern-sections the carving-tools carried by the holders may be positioned so as not to be in the same vertical plane, and hence the cutting done by one tool is not worked over by an adjacent tool when the reciprocating work-table 61 is made to traverse a greater distance than the distance between the two adjacent tools. The upper portion of the pattern-belt is supported and maintained in perfect horizontal position by means of the bed 112, as will be understood from Fig. 1.

The work-table 61 is mounted horizontally upon the ways 62, and is reciprocated on its length—that is, in the direction of the motion of the pattern-belt—and is controlled in its movements by my novel form of pattern-rack 63. The work-table is provided with the fixed dogs 164 at one side thereof and with a clamp 165 at the opposite side thereof, by means of which dog and clamp the board 60, upon which the tools are to carve, may be held firmly in position.

The pattern-rack 63 is formed after a predetermined design, the design depending upon the design that is to be carved. The pattern-rack 63 is mounted so that it may be reciprocated lengthwise, and to that end it is provided with a suitable guide-frame 64, which slides in the ways 65, secured to the machine-framing, and is detachably connected with the work-table 61 through means of the bracket 66 and the gravity latch or arm 67,

which is pivoted at 68 to the work-table and is formed with a projection 69, which takes into the notches 70, formed in the bracket 66. The end of the latch or arm 67 is formed with a handle for conveniently disconnecting the work-table from the bracket.

The pattern-rack 63 is formed with cogs or teeth and forms an endless or closed rack, which runs straight in parts, then curved or serpentine, as may be required by the design that is to be carved. The rack is fed or operated by means of a gear 71, mounted on an arbor 72, which is provided with a pinion 73, gearing with a bevel-pinion 74, which is driven by the shaft 75. The shaft 75 is driven indirectly by the shaft 39 of the pattern-belt drum 38 through means of the bevel-gears 76 and 77, shaft 78, pinions 79 80, shaft 81, and cog-wheels 82 and 83, the latter being keyed upon shaft 39, the peculiar arrangement of the gearing between the shafts 75 and 39 being rendered necessary on account of the range of movement of the pattern-rack 63, which by such arrangement is allowed to pass between the gears 79 80 and 82 83. The shaft 75, which feeds the pattern-rack, is formed with a joint 84, which in the present construction is in effect a universal joint. The end of the shaft 75, upon which is fixed the pinion 76, is mounted in a fixed bearing 85, while the other end thereof is mounted in a bearing 86, that is secured to a swinging frame 87. The frame 87 is mounted so as to swing in a plane parallel to the pattern-rack by means of a base-plate 88, formed with an annular groove 89, in which projects a tongue 90, formed upon the back of the frame 87. The arbor 72 is mounted upon the end of the swinging frame 87, and the joint in the shaft 75 has the same center of motion as the swinging frame 87, so that the end frame 87 and the shaft 75, mounted thereon, may be swung up or down while the shaft is running. The gear 71, which drives the pattern-rack, is held in engagement with the teeth of the rack by means of a groove or slot 91, which runs parallel with the rack throughout and into which projects one end of the arbor 72, upon which the gear 71 is mounted. It will now be understood that the rotation of the gear 71 will feed the rack in one direction or the other, according to the direction of rotation of the gear, when running on the horizontal or curved portions of the rack, but that it will not effect any movement of the rack when running on the vertical portions thereof. In this way the back-and-forth movements, as well as the periods of rest, of the work-table are under complete control of the pattern-rack.

In the foregoing description it will be seen that the design to be carved by my machine is controlled by the combined action of the two component pattern mechanisms, one being the pattern-belt which controls the tool-holders carrying the cutters and the other being the pattern-rack controlling the move-

ments of the reciprocating work-table. The joint effect of the simultaneous operation of the two pattern mechanisms above alluded to will be readily understood upon referring to Figs. 5, 6, and 7, wherein 31 is a form of pattern-belt in which the sections of the pattern-belt are formed with pattern-grooves 58, which run either straight or obliquely across the sections and form a continuous element running longitudinally of the belt. Fig. 6 shows a portion of a pattern-rack which when used in conjunction with the pattern of the belt shown in Fig. 5 will cause the outline shown in Fig. 7 to be carved. Supposing the feed-wheel 71 of the pattern-rack to be at point *a* in Fig. 6 and moving in the direction of the adjacent arrow and that the pattern-belt is passing under the guide 28 of one of the tool-holders at a point *a* in Fig. 5 and in the direction of the arrow, by the time the feed-gear 71 has fed the pattern-rack from *a* to *b*, Fig. 6, the pattern-belt will have passed under the guide 28 from *a* to *b*, Fig. 5, and the combined action of these pattern devices will cause the carving-tool to cut the line from *a* to *b* in Fig. 7. At this point there is a turn in the pattern-rack from *b* to *b'*, and as this is almost a dead-point in the work the pattern of the belt is so constructed from *b* to *b'* that the carving-tool is raised out of action. As the pattern-rack is fed from *b'* to *c*, Fig. 6, the pattern-belt is moved from *b'* to *c*, which resultant action causes the line to be cut on the work from *b* to *c*, Fig. 7. As the pattern-rack is fed from *c* to *c'* the belt moves from *c* to *c'*, and conjointly they produce the sharp turn *c* in the work. As the pattern-rack is moved from *c'* to *d* the pattern-belt is simultaneously moved from *c'* to *d*, and the joint action produces on the work the cut from *c* to *d*. The turn from *d* to *d'* in the pattern-rack, combined with the stretch from *d* to *d'* in the pattern-belt, produce together another sharp angle in the work at *d*. The simultaneous movement of the pattern-rack from *d'* to *e* and of the pattern-belt from *d'* to *e* will jointly result in the cutting of the line from *d* to *e* on the work. The turn from *e* to *e'* in the pattern-rack and the stretch from *e* to *e'* in the traveling belt conjointly produce the angular turn *e* in the work, and then the movement of the rack from *e'* to *f* and of the belt from *e'* to *f* serve to cut the line from *e* to *f* on the work. (See Fig. 7.) In this way by the simultaneous action of certain parts of the pattern-rack and pattern-belt, the relations of which are prearranged in accordance with the design to be produced, the design is finally carved by the joint action of the two component patterns. The lines *xx* (shown in Fig. 7) are carved simultaneously by different spindles, the work having to be put through the machine a second time when the pattern is very intricate in order to accomplish this. Thus it will be seen that by having two co-operating pattern mechanisms I

am enabled to carve a great variety of work. Moreover, different patterns may be readily substituted and the work rapidly turned out.

I desire to be understood as not limiting myself to the precise form of constructions of the pattern-belt and pattern-rack and the reciprocating and rocking tool-holders herein shown or described or the particular form of the feeding mechanism for the pattern-rack, since these features, considered together or separately, are broadly new, as well as several other minor features which are particularly pointed out in the claims.

It will be observed that the depth to which a carving-tool may cut will depend upon the height of the rib 58 of the pattern when a rib is used or the depth of the pattern-groove when the groove is used. In the carved figure shown in Fig. 7 the points *b d* are represented in the pattern-belt in Fig. 5 by the lengths of the pattern-groove 58 between the points *b b' d d'*, the groove at this point being very shallow, so as to raise the carving-tool and prevent it from cutting.

When certain of the carving-tools are not in use, they may be removed from the holders, or the latter may be tilted so as to elevate their outer ends and hold the tools away from the work. If the work-table is stopped by disconnecting it from the pattern-rack while the machine is running, the bracket 66 will be moved relatively thereto by the pattern-rack, and therefore when the table is again to be connected to the pattern-rack another one of the notches 70 of the bracket will be brought into use, and for this reason there are to be a set of notches 70 in the bracket 66.

Having thus described my improvements in machines for carving wood, &c., what I claim as my invention, and desire to secure by Letters Patent, is—

1. In a carving-machine, the combination, with one or more carving-tools or cutters, of a sliding work-table having a prescribed range of movement and adapted to be given reciprocations of varied lengths within such sliding limits in the direction in which it slides, so that as the table is advanced over its sliding limits it may be reciprocated in such advancement, means for actuating the work-table, and a pattern formed on a predetermined design for automatically controlling the sliding and reciprocating movements of the table.

2. In a carving-machine, the combination, with one or more carving-tools or cutters and a component pattern controlling the movements thereof, of a sliding work-table having a prescribed range of movement and adapted to be given reciprocations of varied lengths within such sliding limits in the direction in which it slides, so that as the table is advanced over its sliding limits it may be given reciprocations in such advancement, means for actuating the work-table, and another component pattern formed on a predetermined design for automatically controlling the slid-

ing and reciprocating movements of the table, whereby the design cut or carved may be the resultant effect of the two said component patterns.

3. A carving-machine having two independent component patterns producing a resultant effect upon the work, one pattern controlling the movements of the carving-tools or cutters and the other pattern controlling the movements of the work-table, whereby the joint effect or action of the two patterns may produce the predetermined design.

4. The combination, with movable tool-holders of a carving-machine provided with a component pattern for controlling the movements thereof, of a movable work-table having actuating means, and a component pattern for controlling the movements of the table, whereby the joint effect of the pattern controlling the tool-holders and the pattern controlling the work-table may produce a predetermined design upon the work.

5. The combination, with the carving-tools of a carving-machine and a work-table, the said parts being relatively movable, of a movable pattern-rack formed on a predetermined design, and driving means connected with the rack for feeding the same in accordance with the design thereof, for the purpose set forth.

6. The combination, with a reciprocating work-table of a carving-machine, of a reciprocating pattern-rack connected therewith and controlling the reciprocating movements of the table, and a suitably-driven gear-wheel meshing with and driving the pattern-rack, for the purpose set forth.

7. The combination, with a reciprocating work-table of a carving-machine and a reciprocating pattern-rack controlling the movements thereof, of movable tool-holders capable of moving the tools transversely of the reciprocating work-table and provided with a traveling pattern for moving them transversely of the table, for the purpose set forth.

8. The combination, with a movable work-table of a carving-machine, of a movable pattern provided with actuating means controlling the movements of the table, and detachable and adjustable connections intermediate the work-table and the said pattern, whereby they may be disconnected at will, for the purpose set forth.

9. The combination, with a set of movable tool-holders of a carving-machine, of a set of traveling patterns for controlling the movements of the tool-holders, and an adjustable guide for each tool-holder, adapted to engage with one of the patterns, so that the pattern may effect the movement of the tool-holder, for the purpose set forth.

10. The combination, with a movable tool-holder of a carving-machine and the work-table thereof, of a traveling pattern for controlling the movement of the tool-holder, and a guide mounted adjustably upon the tool-holder, engaging with the pattern, for the purpose set forth.

11. In a carving-machine, the combination, with a reciprocating tool-holder rocking in the plane of its reciprocation on an axis normal to such plane, carrying a carving-tool, and provided with belt-pulleys and a driving-belt for driving the tool, of a traveling pattern for controlling the reciprocatory and rocking movements of the tool-holder.

12. In a carving-machine, the combination, with a reciprocating and rocking tool-holder provided with a supporting-wheel having a track therefor, the said holder rocking on the wheel as a center, of a traveling pattern for controlling the reciprocations and rocking movements of the holder, for the purpose set forth.

13. In a carving-machine, the combination, with a reciprocating and rocking tool-holder formed with three arms or extensions, one of said arms carrying a carving-tool, of a traveling pattern for engaging with one of the other arms for controlling the reciprocation and rocking of the holder, and the other one of said arms being provided with a supporting-wheel provided with a track, for the purpose set forth.

14. In a carving-machine, the combination, with a reciprocating and rocking tool-holder carrying a carving-tool and a pattern for controlling the reciprocatory and rocking movements of the holder, of a supporting-wheel for the holder, having a track therefor, an extension upon the holder projecting to the other side of the wheel from where the tool is mounted and provided with a guide-belt pulley, and a driving-belt for driving the carving-tool, and said belt passing over the pulley upon the extension of the holder, whereby the tension on the belt may not retard the movements of the tool-holder, substantially as described.

15. In a carving-machine, the combination, with a reciprocating work-table, of a reciprocating pattern-rack connected therewith and formed on a predetermined design and provided with means for feeding or driving the same, for the purpose set forth.

16. In a carving-machine, the combination, with a reciprocating pattern-rack formed on a predetermined design and provided with a gear for feeding the same, of a jointed shaft geared to the gear feeding the rack and adapted to swing on its joint in a plane parallel to the rack, substantially as and for the purpose set forth.

17. In a carving-machine, the combination, with a reciprocating pattern-rack provided with a groove or slot running parallel with the rack throughout, of a swinging frame moving in a plane parallel to the rack and provided with a shaft adapted to swing therewith, a pinion upon the shaft, and an arbor provided with a pinion gearing with the pinion on said shaft and having a gear-wheel meshing with the rack, one end of said arbor taking into the said groove or slot in the rack

for holding the same in gear, substantially as and for the purpose set forth.

18. In a carving-machine, the combination, with a reciprocating pattern-rack, of a swinging frame moving in a plane parallel to that of the rack, a bed-plate provided with an annular groove and a tongue or projection upon said frame taking in said groove, a shaft mounted upon and swinging with the said frame and provided with a pinion, an arbor mounted upon the frame and having a pinion meshing with that of the shaft, and a gear upon the arbor meshing with the rack, substantially as and for the purpose set forth.

19. In a carving-machine, the combination, with a reciprocating pattern-rack having a groove or slot running parallel with the rack throughout, of a swinging frame moving in a plane parallel to that of the rack, a jointed shaft having the end thereof to one side of the joint mounted at a fixed point and having the other end thereof mounted upon the swinging frame and provided with a pinion, an arbor mounted upon the swinging frame and provided with a pinion meshing with the pinion of said shaft, a gear upon the arbor meshing with the rack, and one end of said arbor projecting into the said groove or slot of the rack, substantially as and for the purpose set forth.

20. In a carving-machine, the combination, with a reciprocating and rocking tool-holder, such as 11, provided with a supporting-wheel 18, upon which it rocks as a center, and a track 19 for the supporting-wheel, of a traveling pattern for controlling the movements of the tool-holder, substantially as and for the purpose set forth.

21. In a carving-machine, the combination, with a reciprocating and rocking tool-holder, such as 11, provided with a supporting-wheel 18, upon which it rocks as a center, and a track 19 for said wheel, of a spindle for driving the carving-tool, provided with a pulley 14, the guide-pulleys 20 and 21, mounted upon said tool-holder, the former being located to the rear of the supporting-wheel 18, a spindle-driving belt 22, and a pulley 23 for driving the belt, substantially as and for the purpose set forth.

22. In a carving-machine, the combination, with a reciprocating and rocking tool-holder, such as 11, provided with a supporting-wheel 18, having a track 19 therefor, of an arm 26, extending from the tool-holder in a forward direction and provided with a guide for engaging a pattern, and a traveling pattern moving in engagement with the guide upon the arm 26 for controlling the movements of the tool-holder, substantially as and for the purpose set forth.

23. In a carving-machine, the combination, with a reciprocating and rocking tool-holder 11, provided with a supporting-wheel 18, having a track therefor, of an arm 26, extending

forwardly from the tool-holder and provided with a guide 28, and a pattern-belt 31, provided with sectional patterns 56 56, moving in engagement with the said guide 28, substantially as and for the purpose set forth.

24. In a carving-machine, the combination, with a set of reciprocating and rocking tool-holders 11, carrying the cutters and provided each with a supporting-wheel 18, having tracks 19 therefor and each formed with a forwardly-extending arm 26, provided with a guide 28, of a pattern-belt 31, provided with a series of sets of pattern-sections, such as 56 56, substantially as and for the purpose set forth.

25. In a carving-machine, the combination, with the reciprocating and rocking tool-holder 11, provided with a forwardly-extending arm 26, of a guide 28, mounted upon said arm 26 and provided with lateral bearings 33 33, the fixed ways 34 34, engaged by the bearings 33, and a traveling pattern for engaging the guide 28, substantially as and for the purpose set forth.

26. In a carving-machine, an endless pattern-belt having the removable and interchangeable pattern-sections 56 56 secured upon the outer face of the belt for controlling the relative movement between the cutters and the work, substantially as and for the purpose set forth.

27. In a carving-machine, a pattern-belt comprising sections 56 56, formed with the pattern element 58 and mounted upon the outer face of the belt, substantially as and for the purpose described.

28. In a carving-machine, the combination, with the reciprocating tool-holder 11, rocking in the plane of its reciprocation on an axis normal to such plane, of the guideways 15 15 for said tool-holder, substantially as and for the purpose set forth.

29. In a carving-machine, the combination, with the reciprocating work-table 61, provided with means for reciprocating it, of detachable connections intermediate the table, and the reciprocating means consisting in a latch 67, pivoted to the table, and a bracket 66, secured to the reciprocating means and formed with the notches 70, substantially as described.

30. In a carving-machine, the combination, with the cutters and the work-table having a relative movement, of a pattern-rack 63, formed on a predetermined design, for controlling the relative movement of the cutters and the work-table, and means for feeding the pattern-rack, substantially as and for the purpose set forth.

31. In a carving-machine, the combination, with the reciprocating work-table 61, of the reciprocating pattern-rack 63, formed on a predetermined design, connected with the table and controlling the movements thereof, and means for feeding or reciprocating the pattern-rack, substantially as described.

32. In a carving-machine, the combination,

with the reciprocating pattern-rack 63, formed on a predetermined design, of a swinging frame having mounted thereon a suitably-driven gear 71, meshing with the pattern-rack and feeding the same, substantially as described.

33. In a carving-machine, the combination, with the reciprocating pattern-rack 63, of a swinging frame 87, having a shaft 75 mounted thereon and moving therewith, the latter provided with a pinion 74, an arbor 72, mounted upon the swinging frame and provided with a pinion 73, meshing with the said pinion 74, and a gear 71, fixed upon said arbor 72 and meshing with and feeding the pattern-rack, substantially as described.

34. In a carving-machine, the combination, with the reciprocating pattern-rack 63, formed on a predetermined design, formed with a groove or slot 91, running parallel with the teeth thereof throughout the rack, of a swinging frame having mounted thereon a suitably-driven arbor 72, provided with a gear 71, meshing with the teeth of the pattern-rack and feeding the same, and one end of the arbor 72 taking into the slot or groove 91 of the rack for holding the driving-gear 71 in mesh with the rack, substantially as described.

35. In a carving-machine, the combination, with a reciprocating pattern-rack 63, of a swinging frame 87, moving in a plane parallel therewith, a shaft 75, provided with a joint 84 and having one end thereof mounted in a fixed bearing and the other end thereof mounted in a bearing fixed upon the swinging frame 87, a pinion 74, mounted upon the shaft 75, and an arbor 72, mounted upon the frame 87, a gear 71, meshing with the pattern-rack and driven by the arbor 72, a pinion 73, mounted upon said arbor and meshing with the pinion 74, and means for holding the gear 71 in mesh with the rack, substantially as and for the purpose set forth.

36. In a carving-machine, the combination of a reciprocating pattern-rack provided with means for feeding the same, comprising a swinging frame 87, having a shaft mounted thereon and swinging therewith, a base-plate 88, formed with an annular groove 89, and a tongue 90, formed upon the said frame 87 and working in the groove 89, substantially as and for the purpose set forth.

37. In a carving-machine, the combination, with a reciprocating pattern-rack 63 and a swinging shaft 75, geared thereto for feeding the same, of the shaft 39, provided with a cog-wheel 83, geared with the said shaft 75, substantially as and for the purpose set forth.

38. In a carving-machine, the combination, with the movable tool-holders 11 and a traveling pattern-belt having pattern-sections 56 56 for controlling the movements of the tool-holders, of a reciprocating work-table 61, a reciprocating pattern-rack 63, connected with and controlling the movements of the work-table, and means for feeding the pat-

terns, substantially as and for the purpose set forth.

39. In a carving-machine, the combination, with the movable tool-holders 11, a traveling
5 belt provided with pattern-sections 56 56 for controlling the movements of the tool-holders, and a drum 38, provided with a shaft 39 for driving the pattern-belt, of a reciprocating work-table 61, a reciprocating pattern-rack 63, connected therewith for controlling
10 its movements, and means for feeding or reciprocating the pattern-rack 63, such means being connected with and driven by the shaft 39 of the pattern-belt drum 38, substantially
15 as and for the purpose set forth.

40. In a carving-machine, the combination, with the movable tool-holders 11, having tool-spindles 13, provided with pulleys 14, and having the belt-pulleys 20 21 mounted there-
20 on, of a shaft 24, provided with pulleys 23, the spindle-driving belts 22, passing about the pulleys 23 20 21 14, a traveling pattern-belt for controlling the movements of the tool-holders, a drum 38, provided with a shaft
25 39 for driving the belt, a belt 47, driving the said shaft 39, and a shaft 52 for driving said belt 57, a belt 54 for driving said shaft 52 from said shaft 24, the reciprocating work-table 61, having a reciprocating pattern-rack
30 63 connected therewith for controlling its movements, and means for feeding or reciprocating the pattern-rack, such means being geared to and driven by the said shaft 39, substantially as and for the purpose set forth.

41. In a carving-machine, the combination, with a reciprocating and rocking tool-holder adapted to rock or vibrate in the plane of its
35 reciprocation on an axis normal to such plane, of a traveling pattern-belt, the said tool-holder having an arm extending across the pattern-belt and engaged and operated by a pattern thereon, for the purpose set forth.

42. In a carving-machine, the combination, with a movable tool-holder, of a traveling
45 endless pattern-belt provided upon its outer face with pattern ribs or grooves, the said tool-holder engaging the said pattern ribs or grooves and having its movements controlled thereby, for the purpose set forth.

43. In a carving-machine, the combination, with a work-table or device for holding the material to be carved, of a reciprocating tool-holder rocking or vibrating in the plane of
50 its reciprocation on an axis normal to such plane, for the purpose set forth.

44. In a carving-machine, the combination, with a work-table or device for holding the material to be carved, of a reciprocating tool-holder provided with a wheel, upon which it
60 travels, said tool-holder adapted to rock or vibrate on such wheel in the plane of its reciprocation on an axis normal to such plane, for the purpose set forth.

45. In a carving-machine, the combination,

with a reciprocating tool-holder rocking in 65 the plane of its reciprocation and on an axis normal to such plane, formed with two arms or extensions, one of said arms carrying a carving-tool or cutter, of a traveling pattern for engaging with the other arm for control-
70 ling the reciprocation and rocking of the holder, for the purpose set forth.

46. In a carving-machine, the combination, with a reciprocating tool-holder formed U-
75 shaped and rocking in the plane of its reciprocation and on an axis normal to such plane, one of said arms carrying a carving-tool or cutter, and a traveling pattern for engaging with the other arm, of a work-table or device for feeding the work in between the arms in a
80 plane normal to the movements thereof, for the purpose set forth.

47. In a carving-machine, the combination, with a reciprocating pattern-rack formed on a predetermined design, of a swinging frame
85 moving in a plane parallel to the rack and provided with a shaft adapted to swing therewith, and a pinion upon said shaft, and an arbor provided with a pinion gearing with the said pinion on the shaft and having a gear-wheel
90 meshing with the rack, the said pattern-rack being provided with guiding means running parallel with the rack throughout for receiving and guiding the said arbor and holding the said gear-wheel in mesh with the rack. 95

48. In a carving-machine, the combination, with a reciprocating tool-holder rocking in the plane of its reciprocation and on an axis normal to such plane, such as 11, formed U-
100 shaped, one of said arms provided with a tool or cutter, such as 12, and the other said arm engaging with a traveling pattern, which effects the reciprocating and rocking movements of the holder, of a work-table or device for feeding the work, such as 61, adapted to
105 feed the work in between the two arms of the holder, substantially as and for the purpose set forth.

49. In a carving-machine, the combination, with one or more carving-tools or cutters and
110 a traveling endless component pattern controlling the movements thereof, of a sliding work-table and another component pattern connected with and operating said table and adapted to slide within prescribed limits and
115 to be given reciprocations of varied lengths or strokes within such sliding limits, the said latter pattern provided with actuating means for reciprocating it and advancing it over its sliding limits. 120

In testimony whereof I have hereunto set my hand and seal, this 7th day of July, 1890, in the presence of the two subscribing witnesses.

CARL J. CARLSTROM. [L. S.]

Witnesses:

OLOF A. OLSON,

B. A. BARLOW.