(No Model.)

J. JACOBSON.

CARVING MACHINE.

No. 429,213. Patented June 3, 1890.

Fig. 1,

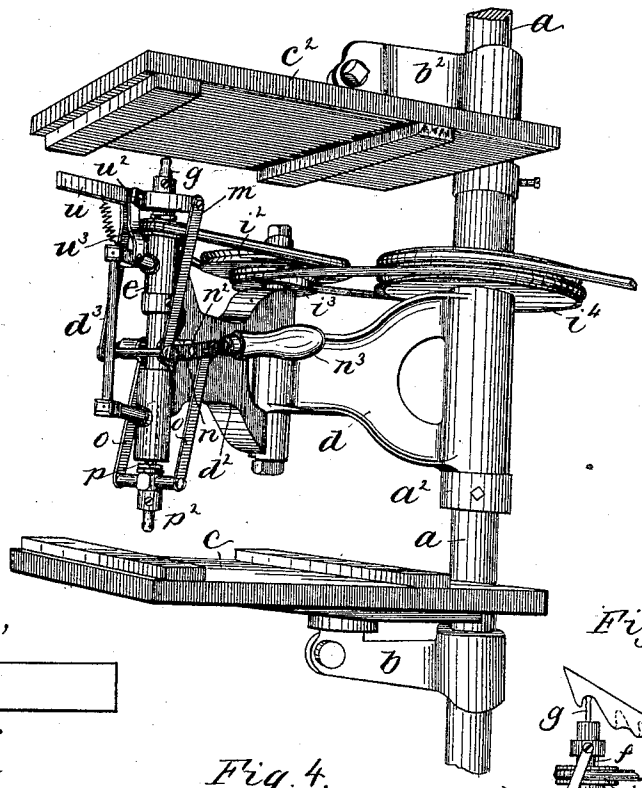


Fig. 2,

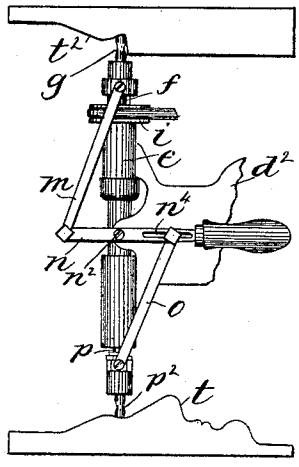


Fig. 4,

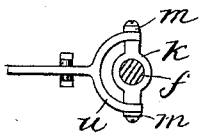


Fig. 5.

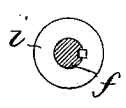
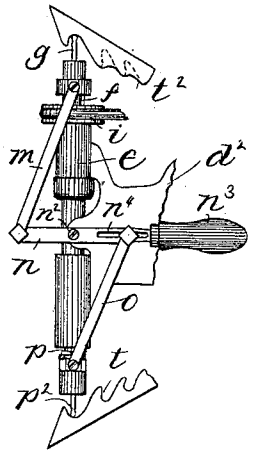


Fig. 3.



Witnesses.
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UNITED STATES PATENT OFFICE.

JOHN JACOBSON, OF WOBURN, MASSACHUSETTS.

CARVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 429,213, dated June 3, 1890.

Application filed October 10, 1888. Serial No. 287,766. (No model.)

To all whom it may concern:

Be it known that I, JOHN JACOBSON, of Woburn, county of Middlesex, and State of Massachusetts, have invented an Improvement in Carving-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to a machine for carving irregular surfaces on wood or other material, being, for example, adapted for carving any desired design in bas-relief from a corresponding pattern.

The invention relates especially to the mechanism for guiding the cutting-tool, so that it enters more or less deeply into the material being carved according as a controlling or guiding projection or pin falls and rises in passing over the depressions and salient portions of the surface of the pattern.

The tool-guiding mechanism is such that the elevations and depressions on the surface being cut correspond to those on the pattern, and the amount of elevation and depression in the surface being cut may be increased or decreased with relation to that of the pattern as desired, so that a surface having practically the same design or appearance as the pattern may be carved in higher or lower relief than the pattern, if desired.

The machine comprises suitable supports for the pattern and for the piece to be cut, which are placed opposite to and generally parallel with one another, and between which the cutting-tool and guide-pin have a practical universal movement in one plane, being supported at the end of a jointed arm, such as commonly employed for producing such universal movement in wood-working machines. The axes of the tool and its guide-pin are in line, and both have the same movement as the end of the tool-carrying arm, which movement may be called the "horizontal" movement, as it will be generally most convenient to have the arm move in a horizontal plane. Both the tool and guide-pin have also an endwise movement in said arm, which is independent of the rotary movement of the tool, the said endwise movement of the tool being made proportional to that of the guide by mechanical connections between them, shown as consisting of a lever connected at opposite sides of its pivot or fulsrum with the said tool and guide, respectively, by links or connecting-bars.

Figure 1 is a perspective view of the operative parts of a machine for carving irregular surfaces embodying this invention; Fig. 2, a side elevation of the tool-guiding mechanism and parts co-operating therewith; Fig. 3, a similar view illustrating the operation when it is necessary to undercut the surface; Fig. 4, a detail showing the tool-carrying arbor in transverse section and the device that governs its longitudinal movement in plan; and Fig. 5, a detail showing the tool-carrying arbor or spindle in section and its actuating-pulley in plan view, and showing the splined connection between said arbor and pulley.

The operative parts of the machine are shown in this instance as all supported on a column or standard a, upon which arms b b^2 are adjustably secured or clamped, themselves supporting platforms or tables c c^2, upon which the pattern and the piece to be carved are respectively fastened. Upon the said upright a is also supported a jointed arm d d^2, the portion d of which may swing freely about the column a as an axis, but is supported against endwise movement as by a collar a^2 fixed on said column. The portion d^2 of the arm is also pivoted on the end of the portion d, making an axis for the movement of the said portion d^2 parallel with the axis of the column a and capable of being revolved around the said column by the pivotal movement of the portion d of the said arm on the column a. The free end of the portion d^2 of said arm by this construction may have a universal movement in a plane at right angles to the axis of the column a, which is generally for convenience in vertical position, so that the end of the arm has its universal movement in a horizontal plane. The free or outer end of the portion d^2 of the arm has a bearing e for the arbor or spindle f, that carries the cutting-tool g, said spindle being longitudinally movable in said bearing e and having a spline-connection with a pulley i, (see Fig. 5,) which pulley is connected by a belt with a pulley i^3, that has its bearing at the axis of the joint between the portions d d^2 of the tool-carrying arm, and is connected with another pulley i^3, connected by a belt

with a pulley i^4, having its bearing on the column a above the arm d, and being connected with or forming part of the driving-pulley that receives the power from the counter-shaft or motor by which the machine is driven. The power is thus transmitted to the spindle f, that carries the cutting-tool g, which is rotated at high speed by the pulley i, and may also have a longitudinal movement, owing to the spline-connection between it and the pulley.

The end of the arm d^2 is shown as provided with a handle d^3 to facilitate the movement of said arm, by which its tool-carrying end is carried to all desired points in the horizontal plane.

The cutting-tool may in this manner be carried over all parts of the surface of the block being cut, and in order to regulate the depth to which it enters the said surface at each point thereon, so as to give definite relief to said surface in accordance with any desired design, the endwise movement of the tool-carrying arbor is controlled by a ring or collar k, which enters an annular groove in the tool-carrying arbor f, (see Fig. 4,) and is itself pivotally connected with links m, one at each side of the end of the arm d^2, said links being connected with a lever n, pivoted at n^2 near the end of the tool-carrying arm, and connected at the other end of its pivot or fulcrum n^2 by links o with a rod or spindle p, also having an endwise movement in a socket in the end of the arm d^2 in line with the spindle f, that carries the tool.

The spindle p carries a projection or finger p^2, having its end slightly convex or rounded and as fine as may be desired, which finger rests on the surface of the pattern, and is thus raised up toward the arm d^2 when the said finger p^2 passes over a high or projecting portion of the pattern from which the carving is being made and moves down or away from the said arm when the latter passes over a low or depressed portion of the pattern, as will be readily understood from Fig. 2, in which t represents the outline of a section of the pattern, and t^2 represents the piece partly carved to correspond with said pattern.

The lever n is shown as provided with a handle n^3, by which the operator may raise and lower the same, at least as far as permitted by the surface of the pattern, and it will be apparent that the connection from the guide-finger p^2 by links o to the lever n and from the latter by links m to the tool-spindle f will cause an outward or upward movement of the tool corresponding to an outward or downward movement of the guide-finger p^2, and the reverse.

By making the point of attachment either of the links o or of the links m, with the lever n adjustable along the lever, which may be effected by having the pivot of said links engage the lever in a longitudinal slot n^4, as shown, it will be seen that the upward and downward movement of the tool may be increased or diminished with relation to that of the guide-finger p, while remaining proportional thereto, so that, if desired, the relief of the surface being cut may be either increased or diminished with relation to that of the pattern without, however, changing the general effect of the design in any other particular than throwing it into higher or lower relief. The pattern and the piece being cut will usually be held parallel one with the other, as shown in Fig. 2; but, if it should be necessary at any point to undercut, both the pattern and the piece being carved may be set at equal inclination to the path of movement of the tool-carrying arm, as indicated in Fig. 4, where the guide-finger is shown as entering such an undercut portion of the pattern. The amount of entrance of the tool into the material being carved may be controlled by the handle n^3 until the tool has cut to the full depth permitted by the guide-finger p^2, and the said handle n^3 may be of such weight as to produce a sufficient pressure on the tool f to cause it to enter the material with the desired rapidity, or an additional lever u might be employed, having a suitable weight or spring to produce the same effect, the said lever u being connected with the collar k, that produces the longitudinal movement of the tool, and being fulcrumed at u^2 on links u^3, that are pivoted on one of the projections forming a portion of the handle d^3. When such weight or spring is employed to feed the tool outward, it is necessary for the operator merely to sweep the end of the arm d^2 around over the pattern until the tool has entered all the parts of the surface being cut as far as permitted by the projection p^2, the operator using the handle n^3 to raise the said projection p^2 when it comes to a steep part on the pattern over which the finger will not easily pass.

In using the apparatus it will generally be best to use a guide-finger p^2 and cutting-tool, each having a convex end of same size, so that the said guide-finger will follow the general elevations and depressions of the pattern-surface, but will not enter into the more minute recesses or depressions of said pattern-surface, and the tool will thus bring the surface of the piece being carved to the general configuration of the pattern, after which the more minute portions of the pattern may be cut into the piece being carved by employment of a smaller or more convex or pointed tool and a correspondingly-shaped guide-finger p^2.

The tables or supports c c^2 are adjustable on their arms b b^2, so as to permit the inclination of the pattern and the piece being cut, as shown in Fig. 3, the said tables having shanks or supports that hinge on the ends of the arms b b^2, being connected therewith by bolts, as shown in Fig. 1, so that by tightening the said bolts the tables may be held rigidly with relation to said arms b b^2 when adjusted to the proper inclination.

The invention is not limited to the specific connecting mechanism shown between the tool and the guide-pin, although that is believed to be the simplest and most efficient.

Other mechanical connections will be readily suggested which will be substantially equivalent to that shown, and the substitution of which would consequently be regarded as within the invention, the main feature of which consists in connecting the tool and guide-pin so that the longitudinal movements of one are in the opposite direction and proportional in amount to the longitudinal movements of the other.

I claim—

1. In a carving-machine, supports for the pattern and piece to be carved to the shape thereof, combined with a jointed tool-carrying arm and rotating tool supported in the end of said arm and longitudinally movable therein, and a guide-pin supported and longitudinally movable in the end of said arm in line with the axis of the tool, and connections between said guide-pin and tool, whereby the longitudinal movement of the latter is proportional and in the opposite direction to the longitudinal movement of the former, substantially as described.

2. The combination of the tool-carrying arm and tool-arbor having a rotary and longitudinal movement therein and provided with a ring engaging an annular groove in said arbor, with a guide-pin movable longitudinally in a passage in said arm opposite to and in line with the bearing-passage for the said tool-arbor, a lever pivoted on said arm and a link connected at one end with one arm of said lever and at its other end with the ring engaging the tool-arbor, and another link connected at one end with the other arm of said lever and at the other end with the said guide-pin, substantially as and for the purpose described.

3. The combination of the supporting column or standard a with arms b b^2, adjustable along said standard and provided with tables for supporting the pattern and piece to be cut, respectively, the jointed tool-carrying arm d d^2, pivotally connected with said column between the said arms b b^2, the tool and guide-pin supported in bearings opposite and in line with one another in the end of said arm, and connections between said tool and guide-pin, whereby longitudinal movement of the former is proportional and in the opposite direction to the longitudinal movement of the latter, substantially as described.

4. The combination of the main column or upright with the arms b b^2, adjustably secured thereon, and platforms or tables c c^2, having an adjustable hinged connection with said arms b b^2, the jointed tool-carrying arm pivotally supported on said columns between said arms b b^2, and the connected tool and guide-pin working in bearings in the end of said arm in line with one another, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN JACOBSON.

Witnesses:
JOS. P. LIVERMORE,
JAS. J. MALONEY.