(No Model.) 2 Sheets—Sheet 1.

T. L. SMITH.

CARVING MACHINE.

No. 452,322. Patented May 12, 1891.

Fig. 5.

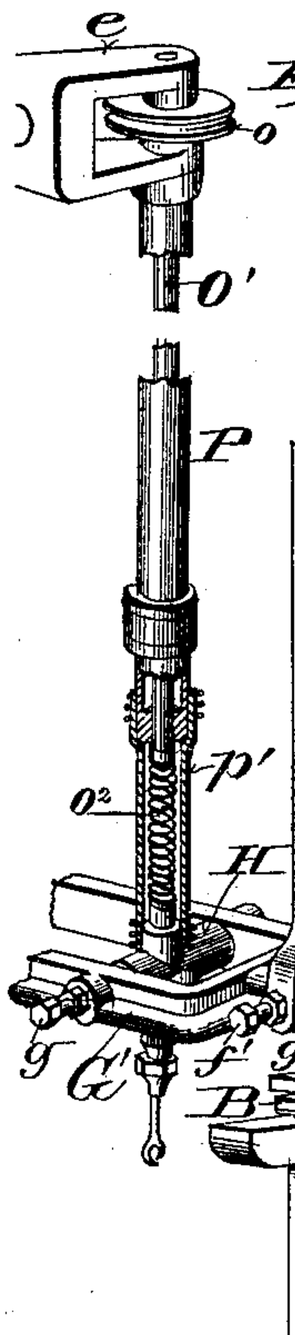


Fig. 1.

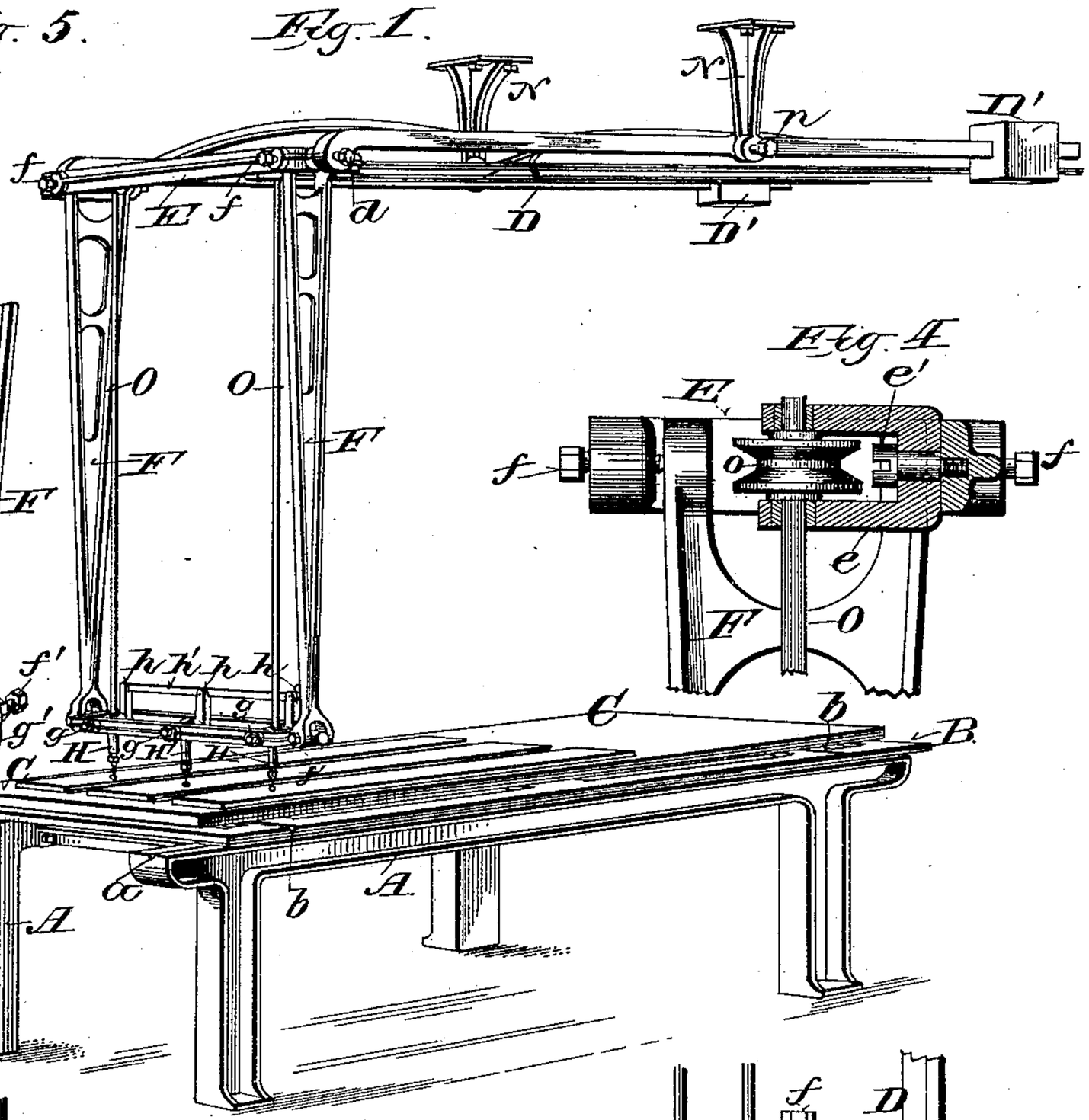


Fig. 4.

Fig. 2.

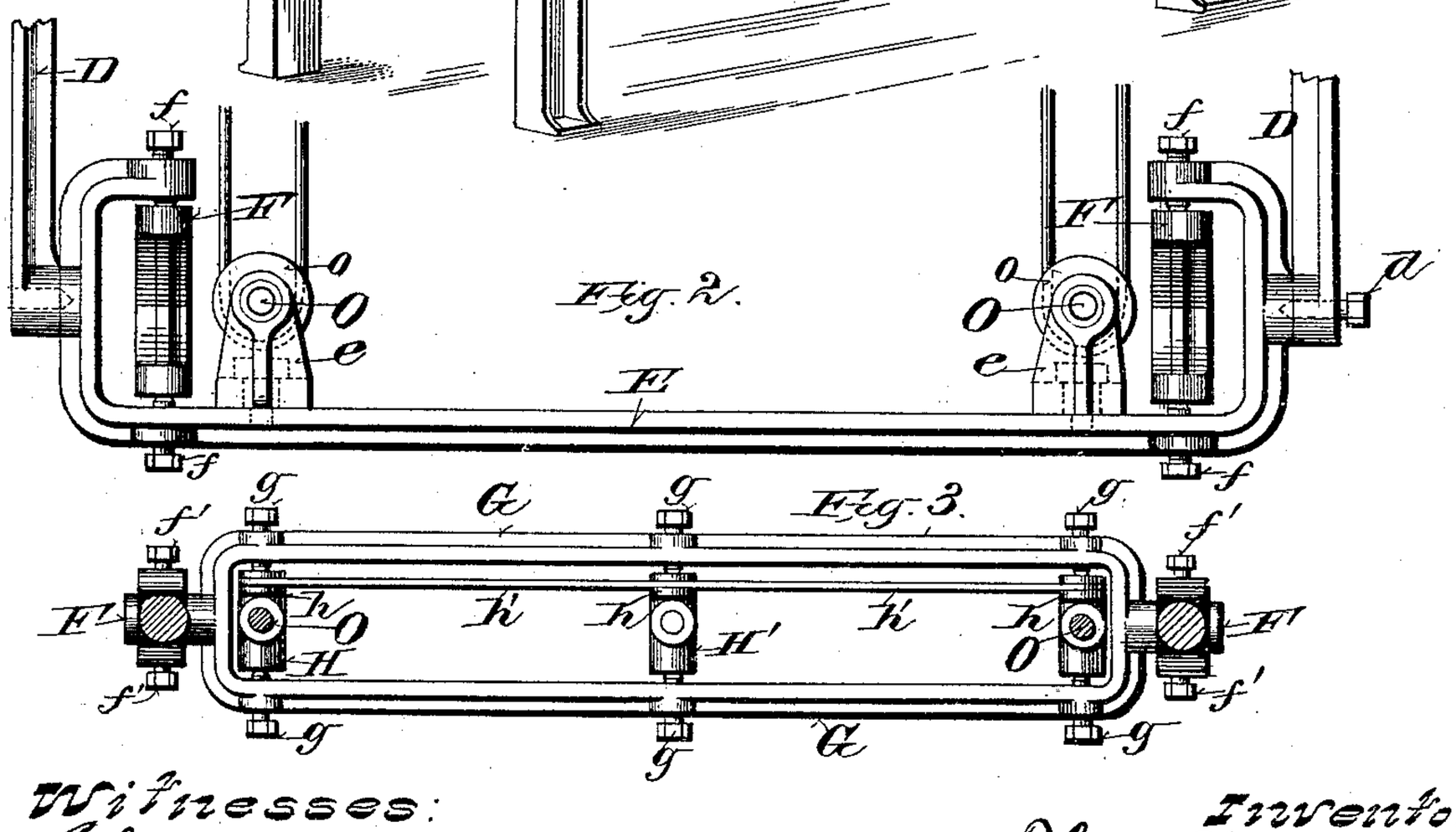
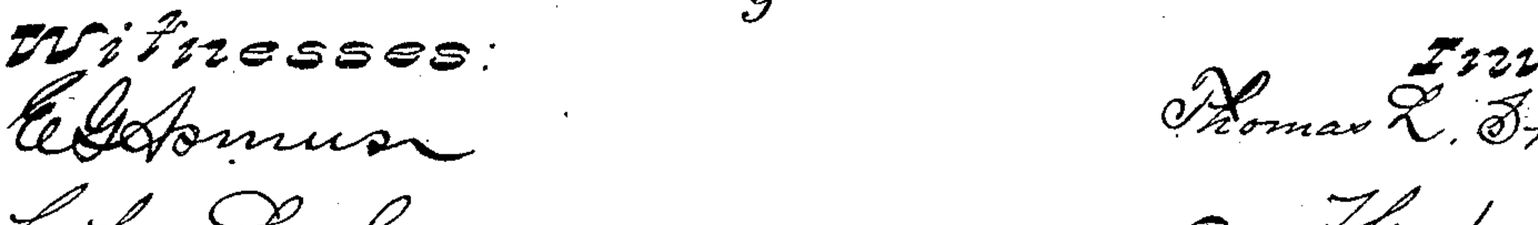


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

T. L. SMITH.

CARVING MACHINE.

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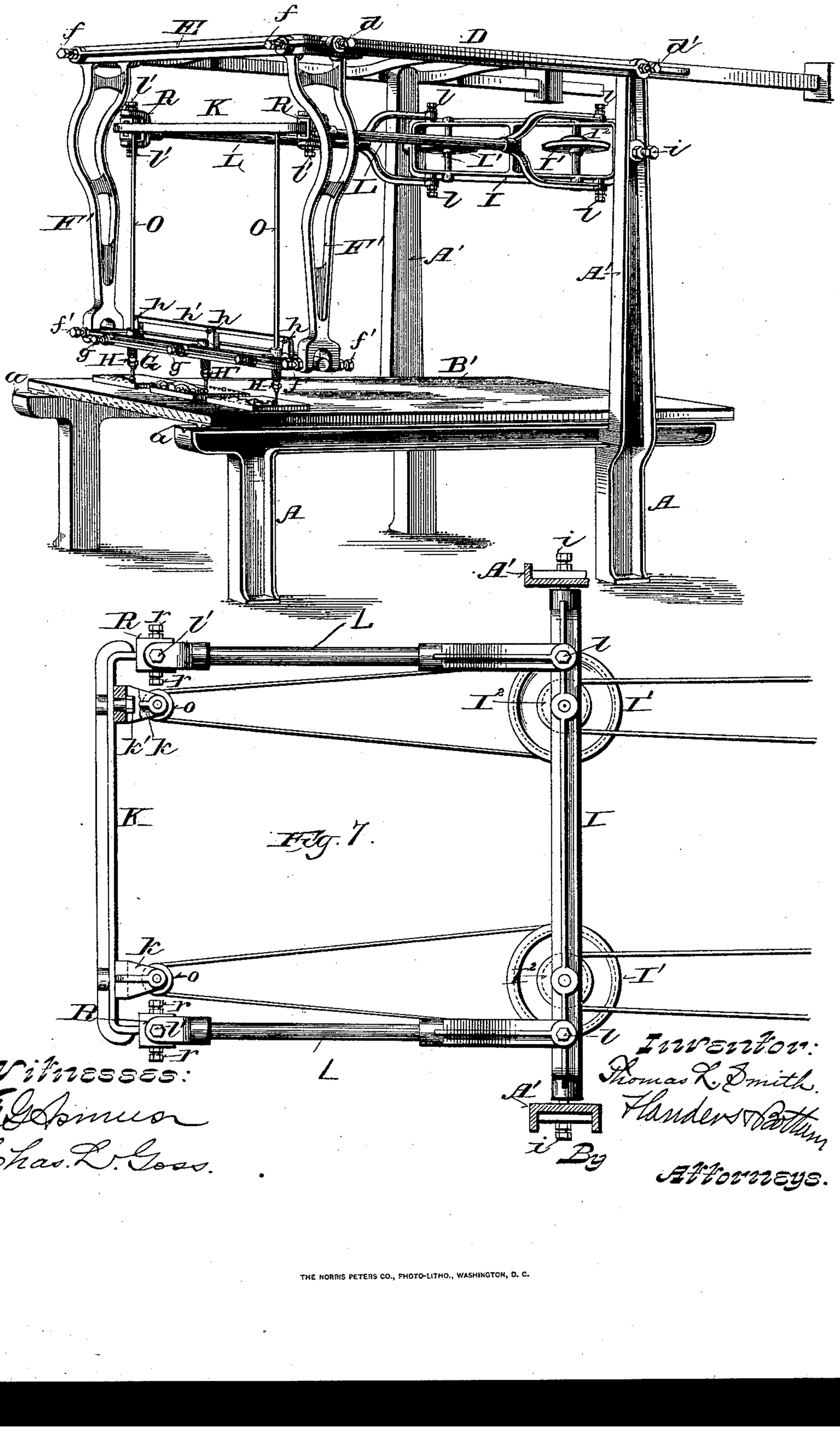
Fig. 6.



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UNITED STATES PATENT OFFICE.

THOMAS L. SMITH, OF REEDSBURG, ASSIGNOR TO THE MILWAUKEE CARVING COMPANY, OF MILWAUKEE, WISCONSIN.

CARVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 452,322, dated May 12, 1891.

Application filed June 23, 1888. Serial No. 278,041. (No model.)

To all whom it may concern:

Be it known that I, THOMAS L. SMITH, a citizen of the United States, residing at Reedsburg, in the county of Sauk and State of Wisconsin, have invented certain new and useful Improvements in Carving-Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The main object of my invention is to produce or duplicate carvings from a pattern or model by tracing the pattern or model with a guiding tool or follower, which causes a like or similar movement of a cutting tool or tools, and to that end to relieve the carriage of belt-pull and shake or vibration in transmitting power to the cutting tool or tools.

It consists, essentially, of certain peculiarities of construction and arrangement of the tool supporting and guiding mechanism, of the cutting-tool-driving mechanism, of the support for holding the work and pattern or model, &c.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is a perspective view of my improved machine. Fig. 2 is a plan view, on an enlarged scale, of the pulley-yoke from which the tool-carriage is suspended. Fig. 3 is a similar view of the tool-carriage. Fig. 4 is a cross-section of the pulley-yoke through one of the pulley-brackets. Fig. 5 is a detail in perspective of a modified form of the tool-carriage and of the cutting-tool-driving mechanism. Fig. 6 is a perspective view of a machine containing a modified form of the cutting-tool-driving mechanism; and Fig. 7 is a plan view of the pulley-yokes and their connections in said modified machine.

A represents the frame of the machine, which supports the work-table. It is formed with longitudinal ways *a a* for the lower longitudinally-sliding section B of the work-table, which is provided on its upper face with transverse ways *b b* for the upper transversely-sliding section C of the work-table.

D is a rigid rectangular frame, supported at each side and arranged to oscillate on the ends of cone-pointed screws *n n* in the hangers N N or other suitable supports. Between projecting arms or ears at the front end of the frame D is supported the pulley-yoke E on the ends of cone-pointed screws *d d*, in a line parallel with the axis on which said frame D oscillates. At each end of said yoke, in lines intersecting its axis of oscillation at right angles, are pivoted between cone-pointed screws *f f* the upper ends of the depending vibratory arms F F.

G is the tool-carriage, made in the form of an open elongated quadrangle and provided at the center of each end with projections which are pivoted in lines at right angles thereto between the lower bifurcated ends of the arms F F on cone-pointed screws *f' f'*.

H H H' are tool-holders, cruciform in shape, as shown most clearly in Figs. 3 and 5. The horizontal limbs of said tool-holders are swiveled at the ends between the sides of the carriage G on cone-pointed screws *g g*, in lines intersecting the axis of said carriage at right angles. The horizontal limbs of said tool-holders are provided with upwardly-projecting arms *h h*, which are connected by a horizontal rod *h'*, so that any lateral inclination of one tool-holder upon the pivot-bolts *g* will produce a like inclination of the other tool-holders. Each of the upright limbs of said tool-holders is provided at the lower end with jaws or fastenings for securing the guiding and cutting tools therein.

To the pulley-yoke E, just inside of the arms F F, are swiveled on studs or screws *e'*, as shown in Figs. 2 and 4, the rearwardly-projecting bifurcated pulley-brackets *e*.

O O are upright driving-shafts, journaled at their upper ends in the brackets *e*, and provided between the limbs of said brackets with grooved pulleys *o*, and journaled at their lower ends in the upright limbs of the cutting-tool holders H, so as to conform to the angular movement of the carriage-supporting arms F F. The driving-shafts O O are formed or provided at their lower ends in said tool-

holders with jaws, chucks, or other suitable fastenings, (not shown,) by means of which the cutting-tools are secured thereto. The rear side of the pulley-yoke E, inside of the rear pivot-screws *f*, is made open, and each of the pulleys *o o* is connected by a belt with a suitable driving-pulley (not shown) at or near the rear end of the oscillating frame B.

The rearwardly-projecting portion of frame D is provided with adjustable counterweights D′ D′, by means of which the front end of said frame and the tool-carriage, with its connections suspended therefrom, are counterbalanced.

Referring to Fig. 5, O′ represents a modified form of the driving-shaft, bearing at its upper end, like the shafts O, in a swiveled bracket *e*, but provided at its lower end, just above the tool-holder H, with a flexible section o^2. The rigid upper portion of the shaft O′ is inclosed in a rigid tubular sheath P. The lower flexible portion of said driving-shaft is inclosed in a flexible sheathing *p′*, attached at its lower end to the tool-holder H and at its upper end to the sheath P, which at that point is provided with a bearing for the lower end of the rigid portion of said driving-shaft. The tool-carriage G′ is formed at the middle of each end, in the line of its axis, with trunnions *g′*, which bear in sleeves g^2, pivoted at right angles to said trunnions on cone-pointed screws *f′*, between the lower bifurcated ends of the vibratory arms F. This construction permits of the oscillation of the carriage G′ upon its axis and the inclination of the tools in any direction for the purpose of undercutting.

My improved machine operates as follows: The pattern or model and the blanks to be carved are firmly secured to the upper section C of the work-table, the blanks on each side of the model or pattern in proper position to be operated upon by the cutting-tools. The work is then moved into convenient position to be operated upon and the cutting-tools rapidly rotated. The surface of the pattern is traced by the guiding-tool, which produces a like and simultaneous movement of both the cutting-tools. The vibratory arms, swinging backward and forward on the pivot-bolts *d d* and sidewise on the pivot-bolts *f f*, allow the carriage G to be moved freely in any lateral or horizontal direction, and the frame D oscillating on a horizontal axis in the line of the pivot-bolts *n n* permit of the free vertical movement of the tool-carriage. A slight under-cut can be made by swinging the carriage laterally or endwise, so as to carry the driving-shafts O O and the cutting-tools in line therewith away from a perpendicular in any desired direction, and by moving the work-supporting table in a corresponding direction into proper position to be operated upon by the cutting-tools.

By the employment of driving-shafts having flexible sections, like that shown in Fig. 5, more abrupt under-cuts can be made without moving the upper rigid portions of the driving-shafts and the carriage-supporting arms F F out of perpendicular positions or moving the work correspondingly.

Referring to Figs. 6 and 7, illustrating a machine containing a modified form of driving mechanism, I represents a pulley-yoke supported at the ends on cone-pointed screws *i i* in uprights A′ A′, rising from the frame of the machine, so as to oscillate on a horizontal axis. To this yoke at or near its ends are pivoted on cone-pointed screws *l l*, in lines intersecting its axis of oscillation at right angles, the bifurcated rear ends of vibratory arms L L. A little inside of the pivot-bolts *l l* and parallel therewith are journaled in said yoke I, shafts each provided with a larger and a smaller pulley I′ and I^2. In the front bifurcated ends of the arms L L are pivoted in lines parallel with the axes of screws *l l* recessed swivel-blocks R R on cone-pointed screws *l′ l′*.

K is a yoke formed at the ends with rearwardly-projecting offsets, which are pivoted in the swivel-blocks R R on cone-pointed screws *r r* in a line parallel with the axis of oscillation of yoke I. To the rear side of the yoke K are pivoted the bracket-bearings *k* on studs or screws *k′*, as shown in Fig. 7.

The rigid cutting-tool-driving shafts O O bear at their lower ends in the tool-holders H H, as previously described, but at their upper ends they are supported and bear in the brackets *k k*, which are bifurcated to receive the pulleys *o o*, fixed on said shafts and centered in the axis of oscillation of the yoke K, so that the pull of the driving-belts will be exerted directly through the pivot-screws *r r* and *l′ l′* on the arms L L in the direction of their length. The yoke K, being movable independently of the tool-carriage and its guiding mechanism, permits the inclination to the tool-carriage of the shafts O O and the cutting-tools without moving the tool-carriage or its guiding mechanism for that purpose. In this manner undercutting may be done without employing the upper transversely-sliding section C of the work-table, (shown in Fig. 2,) a simple longitudinally-sliding table B′ being used.

The arms F′ F′ are bent outwardly adjacent to the ends of yoke K, to permit of a greater vibration laterally of the arms L L, and the rigid oscillatory frame D is supported at each side on cone-pointed screws *d′ d′* in the upper ends of the standards A′ A′. Otherwise the tool-carriage guiding and supporting mechanism is essentially like that described in connection with Fig. 1.

With the form of driving mechanism last described the frame D may be suspended in an upright position, and the arms F′ F′, connecting the tool-carriage therewith, may be placed in a horizontal position, so that the driving mechanism and the carriage-guiding

mechanism will be separated and cannot interfere with each other in their independent movements.

It will be observed that in the driving mechanism described in connection with the main construction and several modifications the rigid tool-driving shafts are extended upwardly from the tool-carriage and have bearings and pulleys at their upper ends apart from and independent of the tool-carriage, so that the belt-pull, instead of being exerted upon the tool-carriage, is received either by the frame D or the arms L L. Any vibration, shake, or movement of the tool-carriage by the driving-belts is thus avoided and the carriage is left free to respond more readily to the force exerted by the operator in moving it.

In place of the arms *h h* and connecting-rod *h'*, a rigid spindle may be attached to the guiding-tool holder, extended upwardly parallel with the shafts O O, and jointed to the yoke E or yoke K by means of a bracket similar to brackets *e* or *k*, or by any other suitable connection. By this means the inclination of either tool will cause a like inclination of the others.

I do not claim, broadly, in this application as my sole invention the combination of a rigid frame capable of oscillation on a horizontal axis, a tool-carriage provided with a guiding and one or more cutting tools and vibratory arms having jointed connections at opposite ends with said oscillatory frame and with said carriage; nor the combination of a rigid frame capable of oscillation on a horizontal axis, vibratory arms having jointed connections with said frame, a tool-carriage having jointed connections with the opposite ends of said arms, a guiding and a cutting tool carried by said carriage, and driving mechanism connecting the cutting-tool with a suitable source of power, so as to conform to the movement of said carriage; nor the combination, with a rigid frame capable of oscillation on a fixed horizontal axis, a tool-carriage connected with said frame by vibratory arms, tool-holders provided with a guiding and a cutting tool and having jointed connections with said carriage, and driving mechanism connecting the cutting-tool with a suitable source of power in such manner as to conform to the movement of said carriage; nor the combination of a frame capable of oscillation on a horizontal axis, a yoke carried by said frame and capable of oscillation on an axis parallel to that upon which said frame swings, a tool-carriage connected with said yoke by vibratory arms which have jointed connections therewith, and a guiding and a cutting tool carried by said carriage, such combinations constituting the joint invention of myself and Paul W. Post, for which an application for Letters Patent, Serial No. 270,072, was filed in the United States Patent Office April 9, 1888.

I claim—

1. In a carving-machine, the combination, with a frame supported in a horizontal position in suitable bearings and capable of oscillation on a horizontal axis, of a tool-carriage provided with a guiding and a cutting tool suspended from said frame by vibratory arms having jointed connections therewith, and a counter-weight or counter-weights attached to said frame on the opposite side of its axis of oscillation, substantially as and for the purposes set forth.

2. In a carving-machine, the combination, with a rigid frame supported in a horizontal position on suitable bearings and capable of oscillation on a horizontal axis, a pulley-yoke carried by said frame and capable of oscillation on a parallel axis, a tool-carriage provided with a guiding and a cutting tool, and tool-holders having jointed connections therewith, of vibratory arms having jointed connections with said pulley-yoke and tool-carriage in lines at right angles with the axes thereof, a bracket-bearing swiveled to said pulley-yoke, and a rigid driving-shaft journaled at its upper end in said bracket and at its lower end in the cutting-tool holder, substantially as and for the purposes set forth.

3. In a carving-machine, the combination, with a rigid horizontal frame capable of oscillation on a horizontal axis, of a yoke carried by said frame and capable of oscillation on a parallel axis, depending vibratory arms having jointed connections at their upper ends with said yoke in lines at right angles to its axis, a tool-carriage supported by and having jointed connections with the lower ends of said arms, tool-holders having jointed connections with said carriage in lines at right angles to its axis, bracket-bearings swiveled to said yoke, upright driving-shafts journaled at their upper ends in said brackets and provided with pulleys and journaled at their lower ends in the cutting-tool holders, and a belt or belts connecting said pulleys with a suitable driving pulley or pulleys, substantially as and for the purposes set forth.

4. In a carving-machine, the combination, with a rigid frame capable of oscillation on a horizontal axis, of an oscillatory yoke having pivotal connections with said frame in a line parallel to its axis, a tool-carriage connected with said yoke by depending vibratory arms and constituting therewith a jointed parallelogram, connected guiding and cutting tool holders having jointed connections with said carriage, a bracket swiveled to said yoke, a rigid driving-shaft provided at its upper end with a pulley and journaled in said bracket and in the cutting-tool holder, and a work-table composed of two sliding sections movable at right angles to each other, substantially as and for the purposes set forth.

5. In a carving-machine, the combination, with a movable tool-carriage provided with a guiding and a rotary cutting-tool, of guiding mechanism connecting said carriage with a suitable support, a rigid driving-shaft connected with said rotary cutting-tool and ex-

tending upwardly therefrom and provided at or near its upper end with a pulley, a movable jointed bearing for said shaft near said pulley capable of receiving the belt-pull and preventing its transmission to the tool-carriage, and a belt connecting said pulley with a driving-pulley, substantially as and for the purposes set forth.

6. In a carving-machine, the combination, with a movable tool-carriage provided with a guiding and a rotary cutting-tool, of a rigid shaft connected with said rotary cutting-tool and provided with a pulley, a movable jointed bearing independent of said carriage supporting said shaft near its pulley so as to receive the belt-pull, and a belt connecting said pulley with a driving-pulley, substantially as and for the purposes set forth.

7. The combination, in a carving-machine, with rocking rods having weights at their rear ends, of vertical rods articulated at their upper ends to said rocking rods and a head having apertures for the passage of the carving devices and connected with said vertical rods by universal joints, substantially as and for the purposes set forth.

8. In a carving-machine, the combination, with an apertured head, a spindle-carrier pivoted therein, and a hand-piece connected with said spindle-carrier, of vertical rods suspending said head and connected therewith by universal joints, horizontal rocking rods, to the front ends of which said vertical rods are articulated, and weights at the rear ends of said rocking rods, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

THOMAS L. SMITH.

Witnesses:
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O. G. HORTON.