No. 824,146. PATENTED JUNE 26, 1906.

F. H. RICHARDS.

CARVING MACHINE.

APPLICATION FILED JULY 17, 1902.

5 SHEETS—SHEET 1.

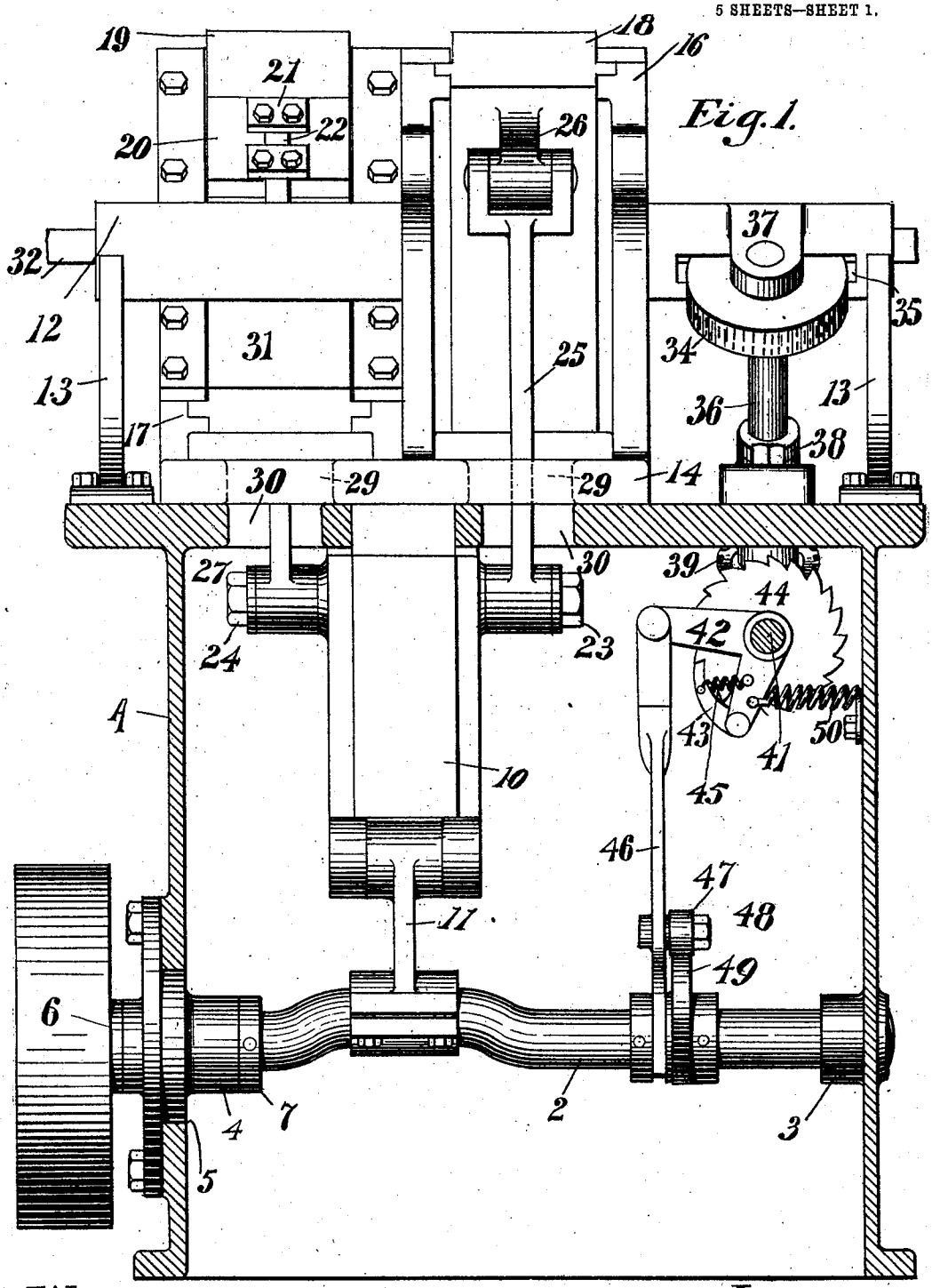

Fig. 1.

Witnesses.
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E. A. Jarvis.

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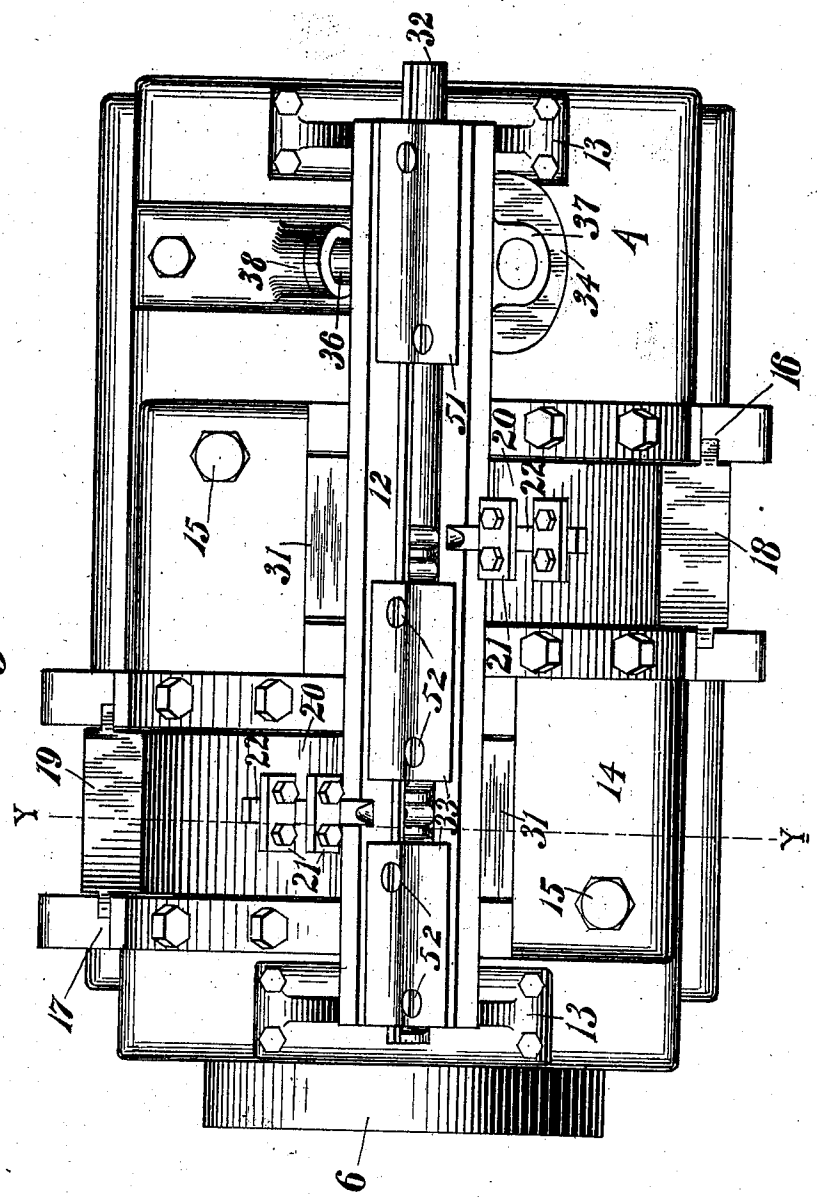
5 SHEETS—SHEET 2.

Fig. 2.



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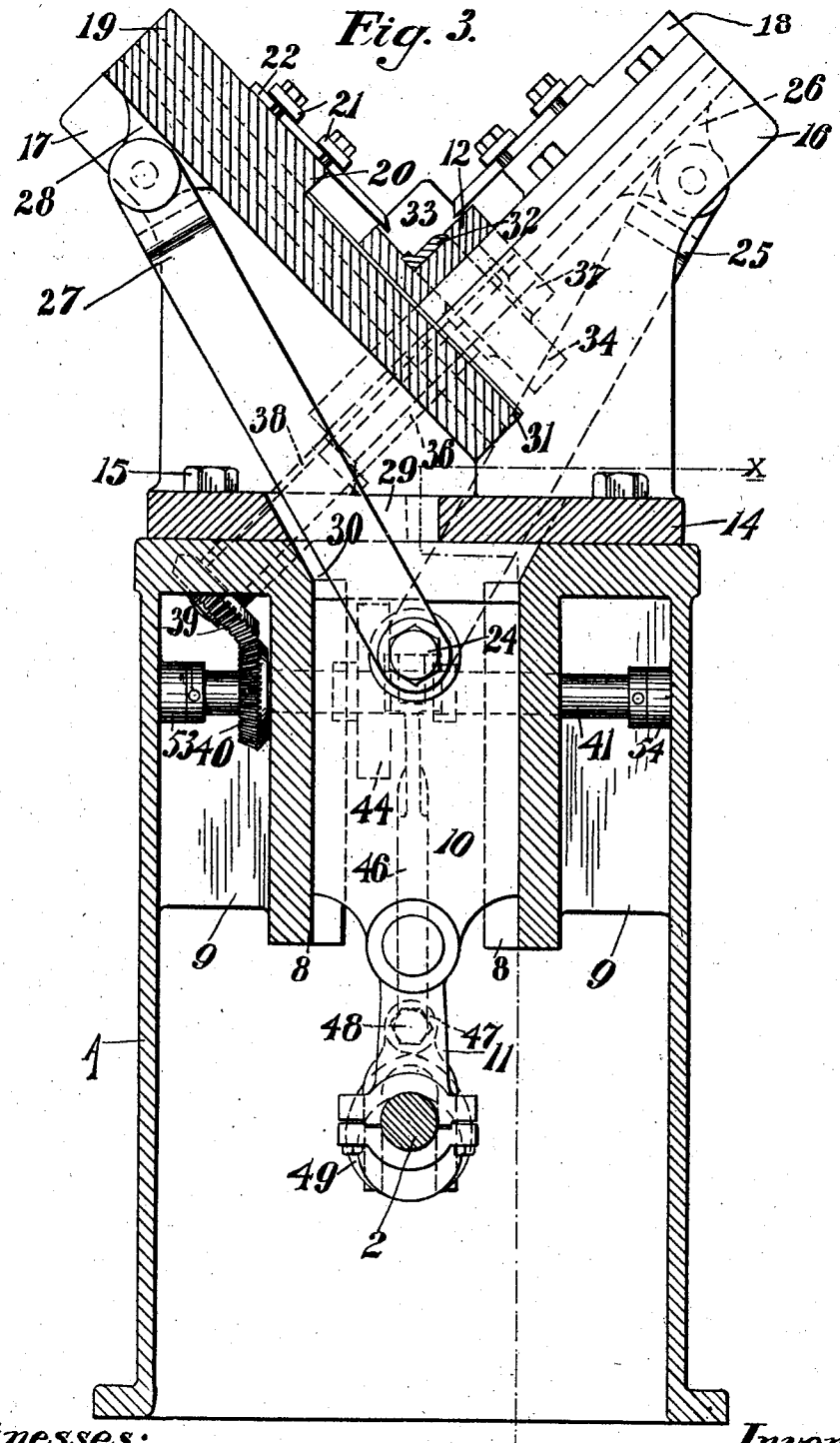
6 SHEETS—SHEET 3.

Fig. 3.



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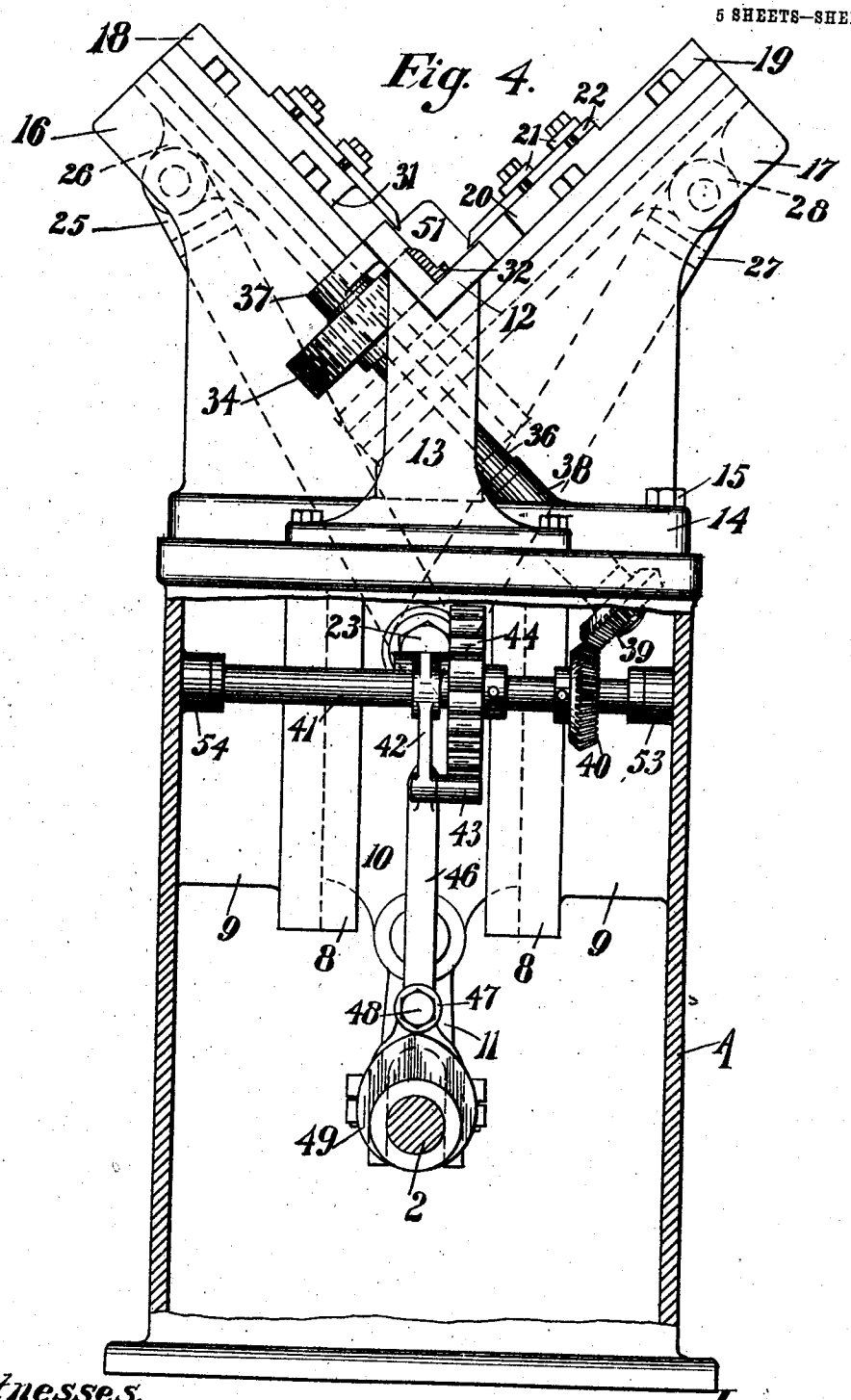
5 SHEETS—SHEET 4.

Fig. 4.



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5 SHEETS—SHEET 5.

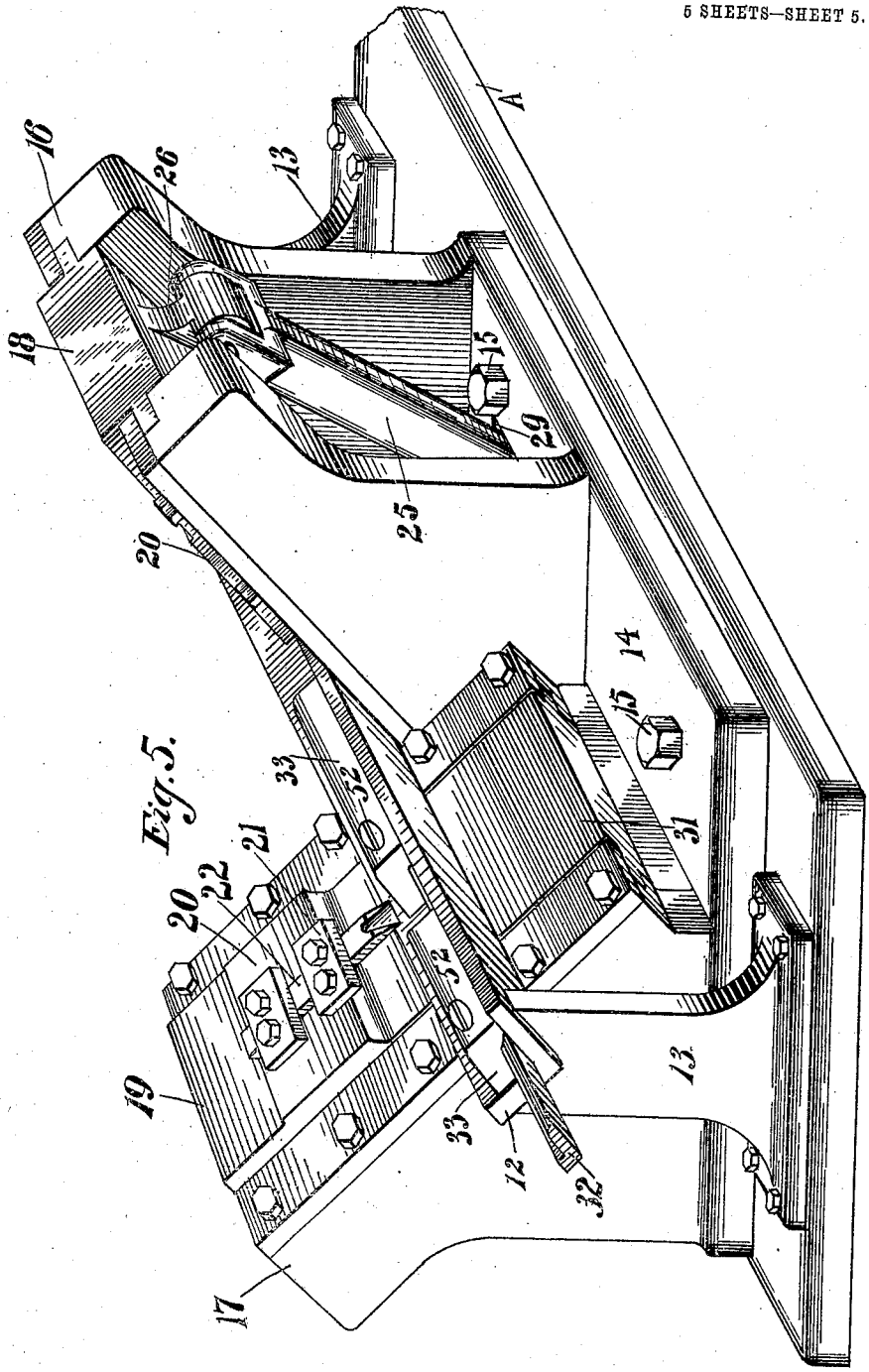

Fig. 5.

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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

CARVING-MACHINE.

No. 824,146. Specification of Letters Patent. Patented June 26, 1906.

Application filed July 17, 1902. Serial No. 115,920.

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Carving-Machines, of which the following is a specification.

My present invention pertains to machines for carving repeat ornaments or a repeating series of ornaments on wood, moldings, or the like, and relates to that class of carving-machines wherein two or more tools or chisels coact to incise stock to produce the contour or configuration of said ornaments.

In machines of this character speed and durability are especially sought for; and some of the objects of the present invention are to provide a carving-machine of improved design and practical construction conceived with the express purpose of improvement and advancement to these ends.

This invention consists in those novel features of construction and organization embodied in the machine illustrated, described, or claimed in the accompanying drawings, specification, and claims.

I have illustrated one embodiment of my invention in a carving-machine of the intermittent-feed type; but the same may in principle and in many detailed features be applied to other types of carving-machines or machines designed for other work, but having more or less analogous operations.

Like reference characters denote like parts throughout the several views of the drawings.

Figure 1 is a side view of the machine, showing the base or frame sectioned on line *x x* of Fig. 3; Fig. 2, a plan view; Fig. 3, a vertical cross-section on line *y y* of Fig. 2; Fig. 4, a front view showing front wall of frame cut away, and Fig. 5 a detail in perspective of the superstructure.

Referring to the drawings, the machine is mounted and assembled on a box-like frame A. A one-piece crank-shaft 2 is mounted longitudinally of the frame A in a bearing 3 in the front wall and a bushing-bearing 4 in the rear wall, said bushing-bearing 4 being designed to close an aperture 5 in said rear wall made large enough to permit of the insertion of the crank-shaft 2. The crank-shaft 2 projects without the bearing 4 and is provided with a fast driving-pulley 6, the hub of which pulley and a fast collar 7, abutting opposite sides of the bearing 4, restrict the shaft 2 against longitudinal movement.

Guides 8 8 depend from the top of the frame A interiorly thereof and are further supported by webs 9 9 between said guides 8 and the walls of the frame A. A cross-head 10 is mounted to slide in the guides 8 8 and is connected with the crank of crank-shaft 2 by a connecting-rod 11. A stock-guide 12 is mounted on supports 13 13, upstanding from the top of the frame A and lies parallel to and directly above the shaft 2. The stock-guide 12 forms a right angle in cross-section and is set with the flanges of said angle equally inclined from the perpendicular. The supports 13, together with the stock-guide 12, are removable from the frame A. A plate 14 is secured to the top of the frame A by bolts 15 and carries oppositely-inclined slideways 16 and 17, set one before the other close to the stock-guide 12 and each inclined at approximately the same angle as that of the flange of said stock-guide next thereto.

It will be seen that the stock-guide 12 lies in the V made by the slideways 16 and 17. A slide 18 is mounted in the slideway 16, and a slide 19 is mounted in the slideway 17. Both of the slides 18 and 19 are provided with tool-beds 20 on their upper surfaces, and tool-clamps 21 serve as means for securing the tools 22 to said tool-beds 20. Studs 23 and 24 project laterally from either side of the cross-head 10, directly beneath the center lines of the slides 18 and 19, respectively. A connecting-rod 25 is jointed to a lug 26, depending from the under side of the slide 18 and connects said slide with the stud 23 on the cross-head 10. A connecting-rod 27 is jointed to a lug 28, depending from the under side of the slide 19 and connects said slide with the stud 24 on the cross-head 10. The connecting-rods 25 and 27 pass down through apertures 29 in the plate 14 and apertures 30 in the top of the frame A to the interior of the frame A. The tool-beds 20 are raised above the lower portions 31 of the slides 18 and 19, so as to bring the tools 22 to the correct height to incise a piece of stock 32, shown lying in the stock-guide 12. The stock-guide 12 adjacent each of the tools is provided with blocks 33, which are secured to the stock-guide by screws 52 and have interior surfaces corresponding to the configuration of the stock, thus forming an inclosed stock-guide except at the points where the

tools are designed to operate and serve to obviate springing or other lateral movement of the stock at the knives.

A feed-roll 34 is mounted with its axis parallel to one of the flanges of the stock-guide 12 and with its periphery projecting through an aperture 35 in said flange and slightly above the inner surface of the stock-guide, so as to obtain a positive grip on the stock lying therein. The feed-roll 34 is mounted fast on a shaft 36, mounted in a bearing 37, projecting from the stock-guide, and a bearing 38, supported in the top of the frame A. The shaft 36 passes through the bearing 38 to the interior of the frame A, where it is geared, through bevel-gears 39 and 40, to a horizontal transverse shaft 41, mounted in bearings 53 and 54 in the walls of frame A. An oscillatable lever 42 is loosely pivoted on the shaft 41 directly above the driving-shaft 2 and carries a pawl 43, adapted to engage a ratchet-wheel 44, fast on shaft 41. The pawl 43 is maintained in contact with the ratchet-wheel 44 by a spring 45. A connecting-rod 46 is jointed to the lever 42 and has a bifurcated lower end, which embraces the driving-shaft 2. A roller 47 is loosely mounted on a stud 48, projecting from the connecting-rod 46 and is adapted to ride upon a heart-shaped cam 49, fast on the driving-shaft 2. A spring 50, connected from the lever 42 to the wall of the frame A, maintains the roller 47 in constant contact with the cam 49. A block 51, similar to blocks 33, is secured to the stock-guide directly above the feed-roll 34 and serves to keep the stock in position to be engaged by said feed-roll.

The operation of the machine is as follows: Stock is placed in the stock-guide 12 and under the block 51 when it is engaged by the feed-roll 34 and fed forward intermittently. As the driving-shaft 2 is rotated the cam 49, contacting the roller 47, carries the connecting-rod 46 upward, and the pawl 43, engaging a tooth of the ratchet-wheel 44, rotates the shaft 41 during this movement. This rotation of the shaft 41 is communicated to the shaft 36 and feed-roll 34 through the gears 39 and 40, accomplishing the feed of the stock during a half-revolution of the driving-shaft 2. During the other half-revolution of the driving-shaft 2 the connecting-rod 46 is moving downwardly and the pawl 43 is returning idly over the tooth of the ratchet-wheel 44, allowing the feed-roll 34 to remain at rest, accomplishing a period of non-movement of the stock. As the driving-shaft 2 rotates, the slides 18 and 19 reciprocate simultaneously, the tools 22 reaching, entering, withdrawing, and leaving the stock lying in the stock-guide 12 during one-half revolution of said driving-shaft 2 or a little less than one-half. During the remaining half-revolution of the driving-shaft the tools 22 complete their outward movement and move forward to the stock again entirely without the profile of the stock. The crank of the driving-shaft 2 and the heart-cam 49 are set with such relation to one another that the feeding movement shall take place during that half-revolution when the tools are entirely without the stock, and the movement of the tools within the profile of the stock in making the incisions and leaving the stock shall take place during that half-revolution when the feed-roll 34 is at rest. The distance fed at each feed of the roll and the distance between the tools is such that an incision made in the stock by the first tool will exactly register with some succeeding position of the second tool during the period of rest. It will therefore be seen that the tools operate simultaneously, but make the contradistinctive incisions of separate repeats at each stroke, that portion of the stock operated upon by the first tool assuming at some succeeding stroke the position assumed by that portion of the stock which was operated upon by the second tool when said first-mentioned portion was operated upon by said first tool. The tools act in transverse intersecting lines, which, in the form herein illustrated, are in parallel planes, and the working strokes of the tools are so timed for coöperation with a relatively intermittently advancing feed motion that they will repeatedly coöperate in the production of a completed design at the intervals of the measure of the repeat, the measure of the advance of the stock relatively to the tools being the distance apart of the centers of the repeat designs, each tool at each change of position of the stock performing its portion of the cutting of a design. The two carriages 18 and 19, it will be noticed, are of such length that they extend both above and below the stock-guide throughout the stroke, giving a very long purchase on the gibs. It will also be noted that the connecting-rods connecting the cross-head with the carriages are jointed to the carriages directly beneath the tool, so that the purchase is applied as close to the point where the resistance occurs as possible and prevents, in a great measure, binding of the carriages in the guides. The action of the crank is applied to the cross-head vertically and any pounding action will be of a vertical nature and will be taken up by the foundation and will not be the cause of lateral vibration. The power is applied to both carriages at the same time on opposite sides of the central line and the thrusts will counteract one another and prevent lateral vibration. The tools and carriages being set side by side and not operating upon the same point on the stock, allow the tools to be actuated simultaneously without bringing their cutting edges into contact.

It is obvious that various changes may be made in the details of construction and gen-

eral arrangement of the parts to adapt the machine to particular kinds of work without departing from the spirit of the invention.

I claim—

1. In a carving-machine, a plurality of tool-carriages reciprocatable in laterally-displaced non-coincident parallel lines transversely of one another, a cross-head reciprocatable on the line bisecting the angle made by and equidistant from said tool-carriages, connecting-rods connecting said cross-head with said tool-carriages, a crank mounted in the line of reciprocation of said cross-head, and adapted to carry the tools on said carriages to a common line defining the limits of travel of the tool, and a connecting-rod connecting said crank with said cross-head.

2. In a carving-machine, a plurality of tool-carriages mounted to reciprocate in laterally-displaced non-coincident planes transversely of one another past the crossing-points of their paths, a tool on each carriage, and means for reciprocating said carriages to carry said tools to a common line defining the limits of travel of the tools.

3. In a carving-machine, a plurality of carriages mounted to reciprocate in laterally-displaced non-coincident planes transversely of one another past the crossing-points of their paths, a knife on each carriage, and means for synchronously reciprocating said carriages to carry said knives to a common line defining the limits of travel thereof.

4. In a carving-machine, a plurality of tool-carriages mounted to reciprocate in laterally-displaced non-coincident lines transversely of one another past the crossing-points of their paths to carry their tools to a common line defining their inner limit of travel, and a stock-guide disposed in the angle formed by said carriages and parallel to the faces of each of said carriages.

5. In a carving-machine, a plurality of tool-carriages mounted to reciprocate in laterally-displaced non-coincident parallel lines transversely of one another, a cross-head reciprocatable on the line bisecting the angle formed by said carriages and equidistant from said carriages and below the intersection of the paths of said carriages, connecting-rods connecting said cross-head with the under side of each of said carriages, a crank mounted in the line of reciprocation of said cross-head and a connecting-rod connecting said crank and said cross-head.

6. In a carving-machine, a plurality of tool-carriages mounted to reciprocate in laterally-displaced non-coincident parallel planes transversely of one another past the crossing-points of their paths, a stock-guide disposed in the angle formed by said carriages and parallel to the respective faces of which said carriages are adapted to reciprocate, and tools mounted upon the faces of said carriages to meet a common line lying parallel to and within the angle of said stock-guide at the lower extremes of the movements of said carriages.

7. In a carving-machine, a plurality of tool-carriages mounted to reciprocate in laterally-displaced non-coincident parallel planes transversely of one another, a stock-guide disposed in the angle formed by said carriages and parallel to the faces of each of said carriages, a cross-head reciprocatable below and equidistantly from said carriages on a line bisecting the angle made by said carriages, connecting-rods connecting said cross-head with said carriages, a driving-shaft mounted parallel to said stock-guide and intersecting the line bisecting the angle of said carriages, a crank in said driving-shaft in line with said cross-head and a connecting-rod connecting said crank and cross-head.

8. In a carving-machine, the combination of a plurality of tool-carriages mounted to reciprocate transversely of one another in paths equally inclined from the vertical, and in adjacent planes, a knife mounted on each carriage, stock-feeding means operable transversely of the lines of travel of said carriages, a cross-head reciprocatable vertically in line with the point of crossing of the paths of travel of said carriages, connecting-rods connecting said cross-head with said carriages, a driving-shaft mounted in the same plane with and perpendicular to the path of said cross-head, a crank in said driving-shaft in line with said cross-head for carrying the tools on said carriages when connected, to a common line defining the limits of travel of the knives, and a connecting-rod connecting said crank and said cross-head.

9. In a carving-machine, the combination of a plurality of tool-carriages mounted to reciprocate in laterally-displaced non-coincident parallel lines transversely of one another in paths equally inclined from the vertical, a cross-head reciprocatable vertically in line with the point of crossing of the paths of said carriages and midway between said carriages, connecting-rods connecting said cross-head with said carriages, a driving-shaft mounted in the same plane with and perpendicular to the path of said cross-head, a crank in said driving-shaft in line with said cross-head, and a connecting-rod connecting said crank and said cross-head.

10. In a carving-machine, the combination of a plurality of tool-carriages mounted to reciprocate transversely of one another, a stock-guide disposed in the angle formed by said carriages, and parallel to the faces of each of said carriages, tools mounted upon the faces of said carriages to meet a common line lying within the angle of said stock-guide at the lower extremes of the movements of said carriages, a cross-head reciprocatable below said carriages on a line bisecting the

angle made by said carriages, and connecting-rods connecting said cross-head with the under side of said carriages at points beneath said tools.

11. In a carving-machine, the combination of a plurality of tool-carriages mounted to reciprocate in laterally-displaced non-coincident parallel lines transversely of one another, a stock-guide disposed in the angle formed by said carriages and parallel to the faces of each of said carriages, tools mounted upon the faces of said carriages to meet a common line lying within the angle of said stock-guide at the lower extremes of the movements of said carriages, a cross-head reciprocatable below said carriages, on a line bisecting the angle made by said carriages and midway between said carriages, and connecting-rods connecting said cross-head with the under sides of said carriages at points beneath said tools.

12. In a carving-machine, the combination of a plurality of tools mounted to reciprocate in laterally-displaced non-coincident parallel lines transversely of one another; a stock-guide disposed in the angle formed by said carriages, a cross-head reciprocatable on a line bisecting the angle formed by said carriages, connecting-rods connecting said cross-head and said carriages, a driving-shaft, a crank on said shaft, a connecting-rod connecting said crank and said cross-head and an intermittent stock-feed operatively connected with said driving-shaft to feed stock a distance equal to the distance between the centers of said tools measured along said stock-guide or a factor of said distance while said tools are traversing that half of their paths farthest from the said stock-guide.

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