No. 861,539. PATENTED JULY 30, 1907.

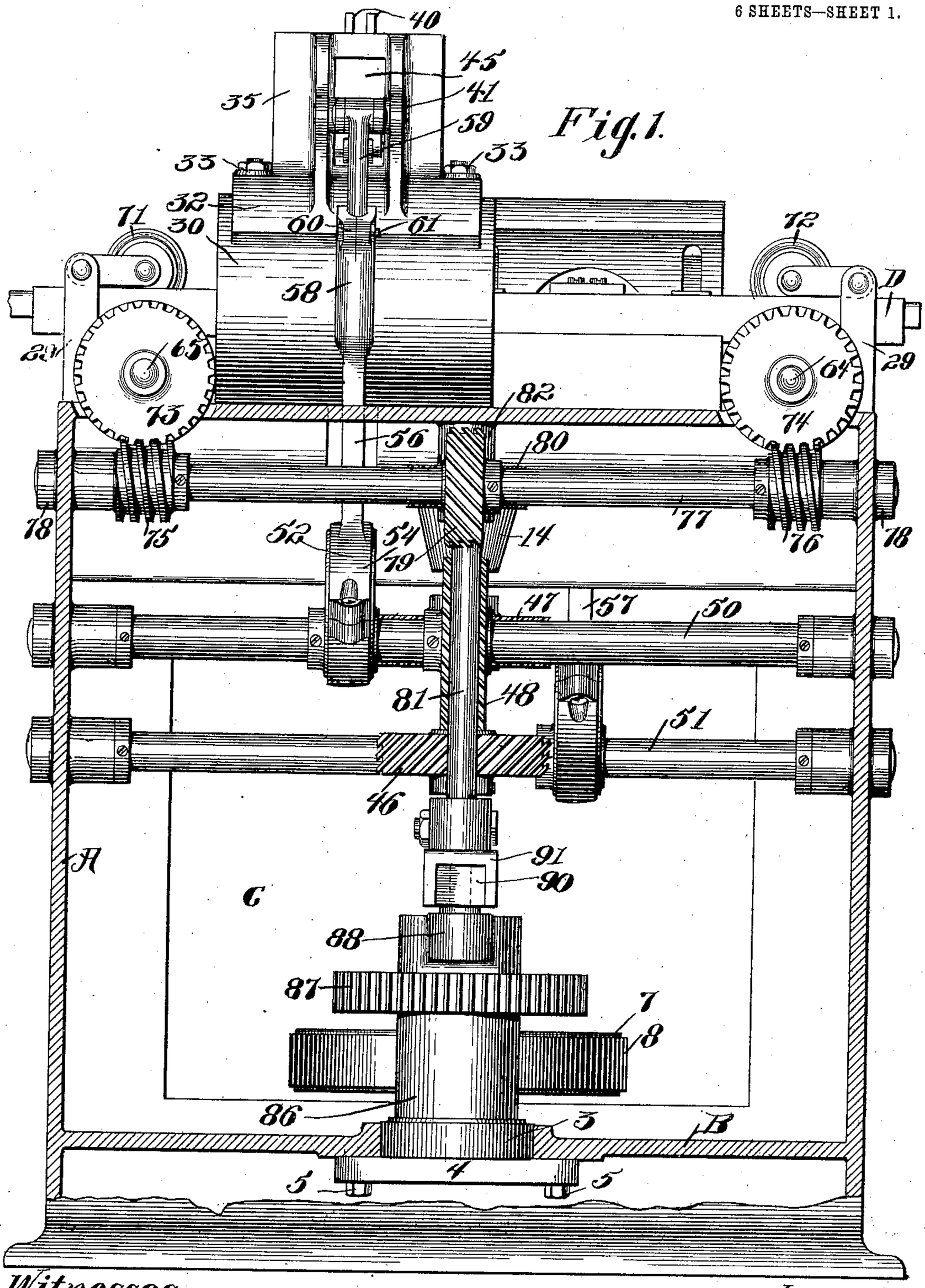
F. H. RICHARDS.

CARVING MACHINE.

APPLICATION FILED SEPT. 30, 1902.

6 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

F. G. Hachenberg.

Marcus B. Hopkins.

Inventor:

F. H. Richards.

No. 861,539. PATENTED JULY 30, 1907.

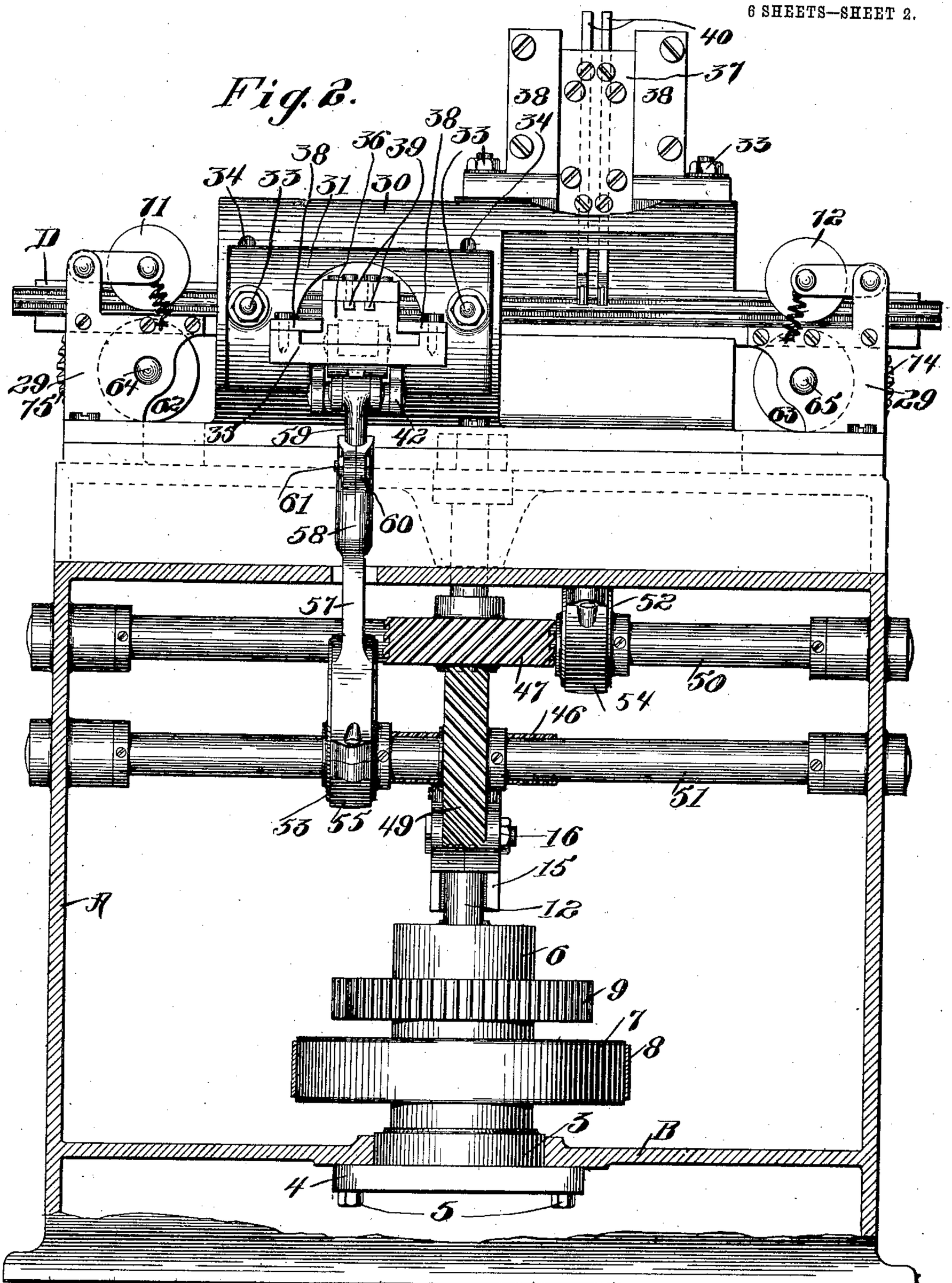
F. H. RICHARDS.

CARVING MACHINE.

APPLICATION FILED SEPT. 30, 1902.

6 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

F. G. Hachenberg.

Marcus B. Hopkins

Inventor:

F. H. Richards.

No. 861,539. PATENTED JULY 30, 1907.

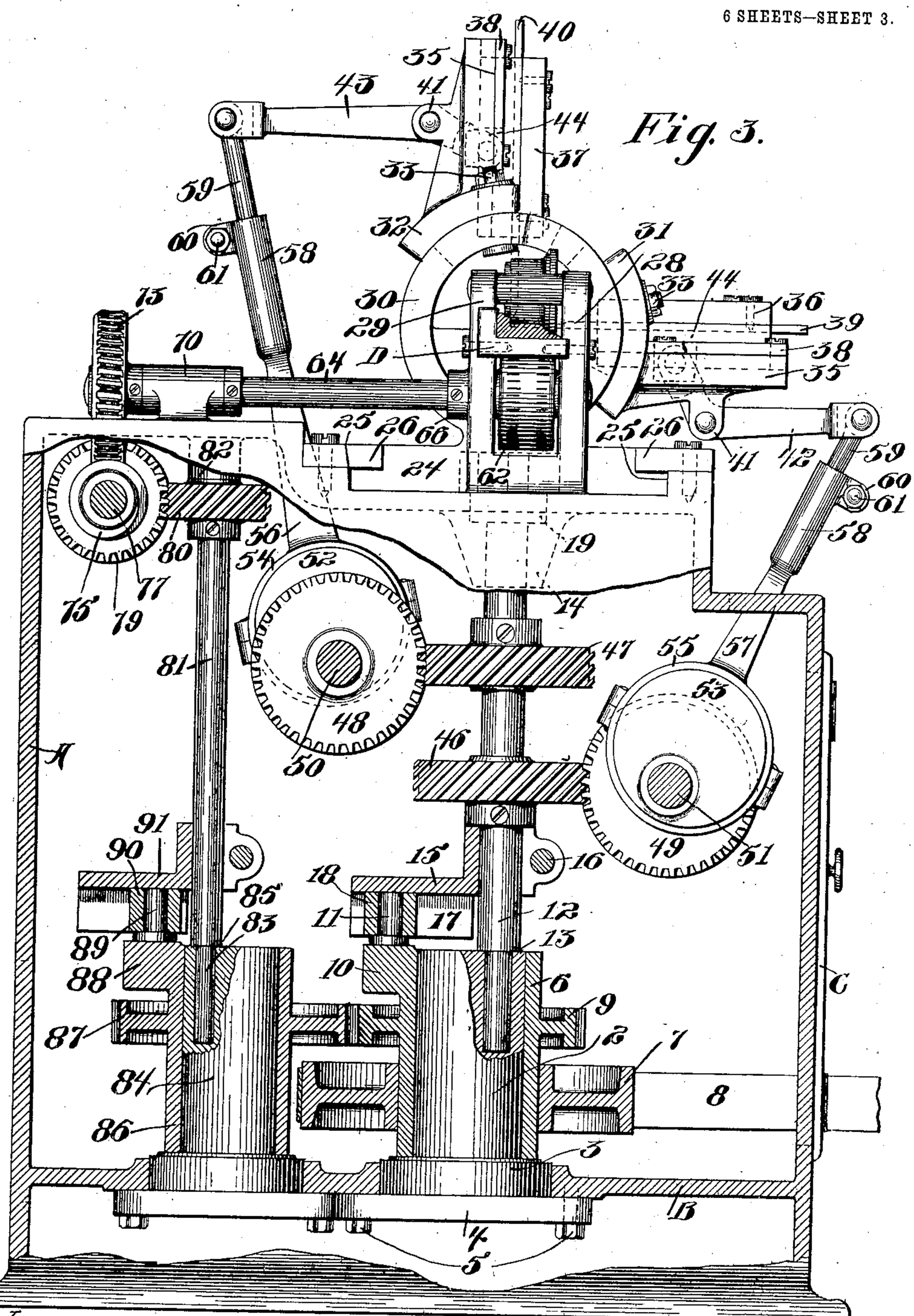
F. H. RICHARDS.

CARVING MACHINE.

APPLICATION FILED SEPT. 30, 1902.

6 SHEETS—SHEET 3.

Fig. 3.



Witnesses:

F. G. Hachenberg.

Marion B. Hopkins.

Inventor:

F. H. Richards.

No. 861,539. PATENTED JULY 30, 1907.

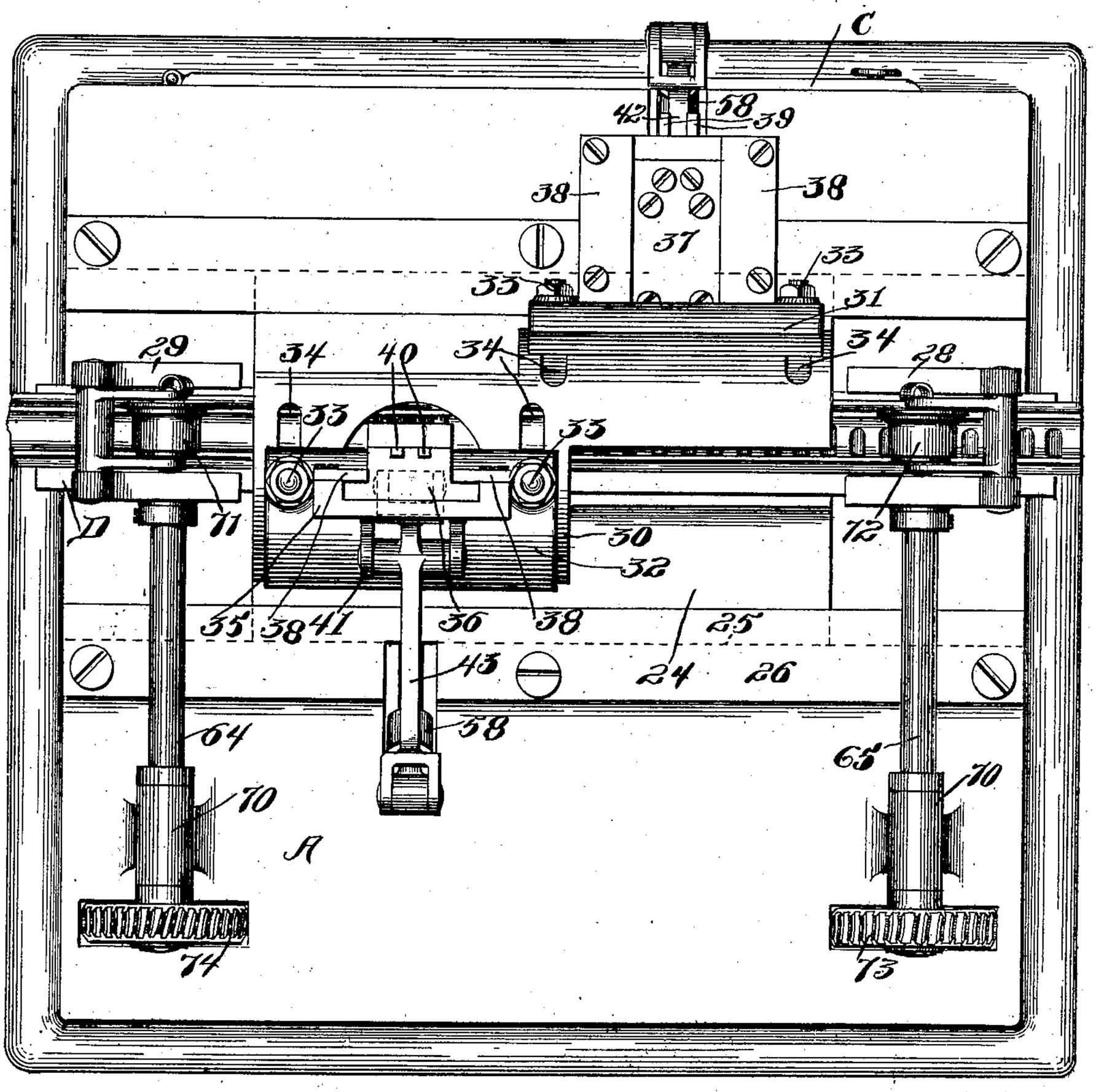
F. H. RICHARDS.

CARVING MACHINE.

APPLICATION FILED SEPT. 30, 1902.

6 SHEETS—SHEET 4.

Fig. 4.



Witnesses:
F. G. Hachenberg.
Marcus B. Hopkins

Inventor:
F. H. Richards.

No. 861,539. PATENTED JULY 30, 1907.

F. H. RICHARDS.

CARVING MACHINE.

APPLICATION FILED SEPT. 30, 1902.

6 SHEETS—SHEET 5.

Fig. 5.

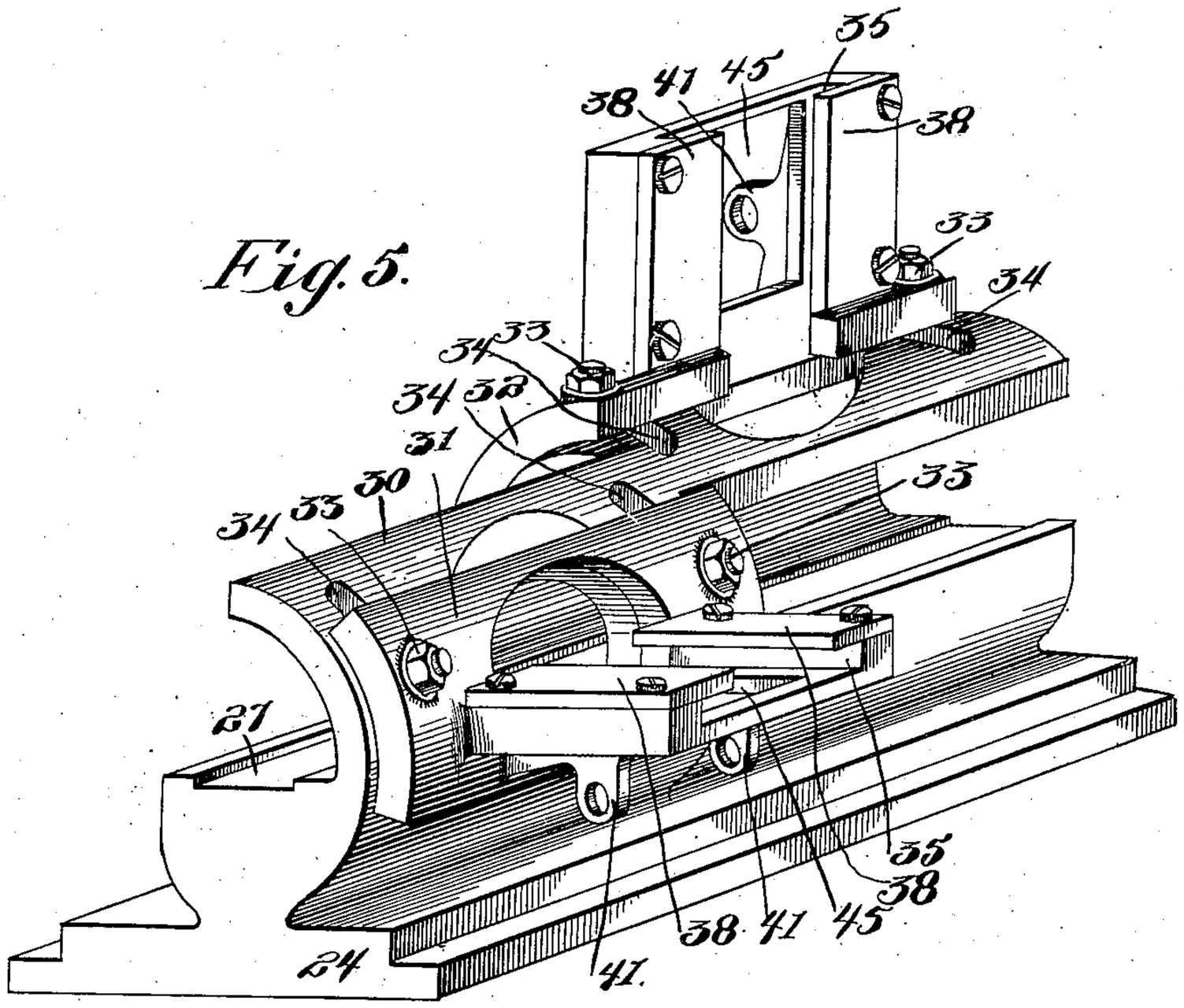


Fig. 6.

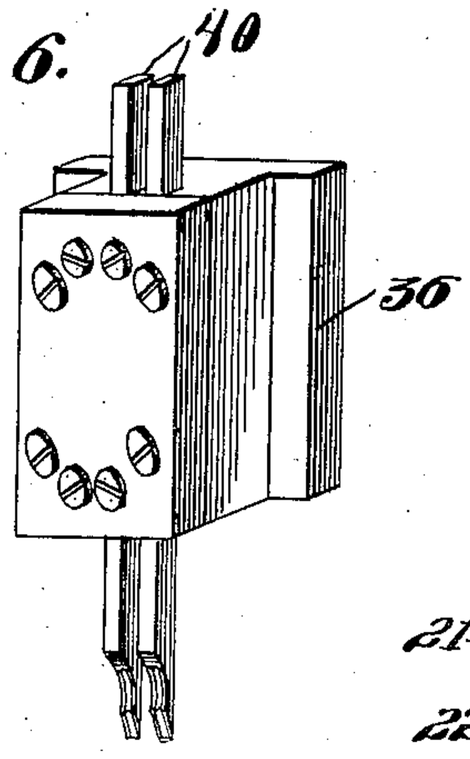


Fig. 7.

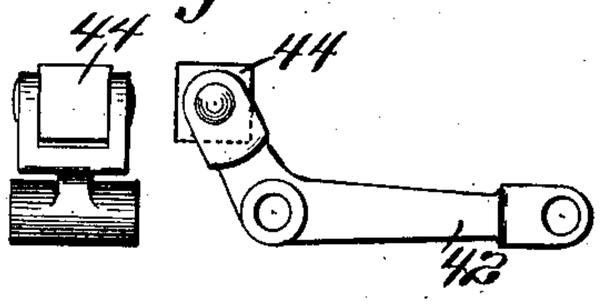


Fig. 8.

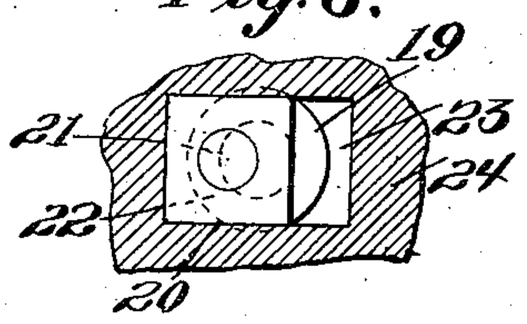
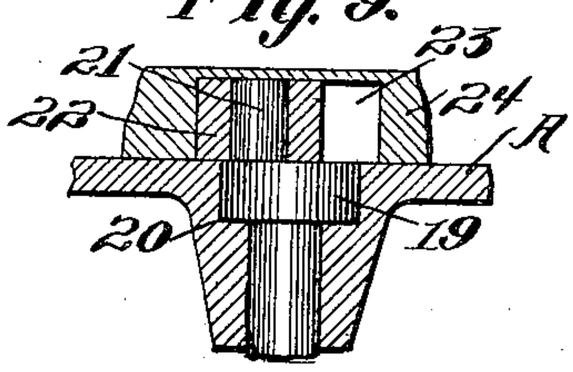


Fig. 9.



Witnesses:
F. G. Stachenberg.
Marcus O. Hopkins

Inventor:
F. H. Richards.

No. 861,539. PATENTED JULY 30. 1907.

F. H. RICHARDS.

CARVING MACHINE.

APPLICATION FILED SEPT. 30, 1902.

6 SHEETS—SHEET 6.

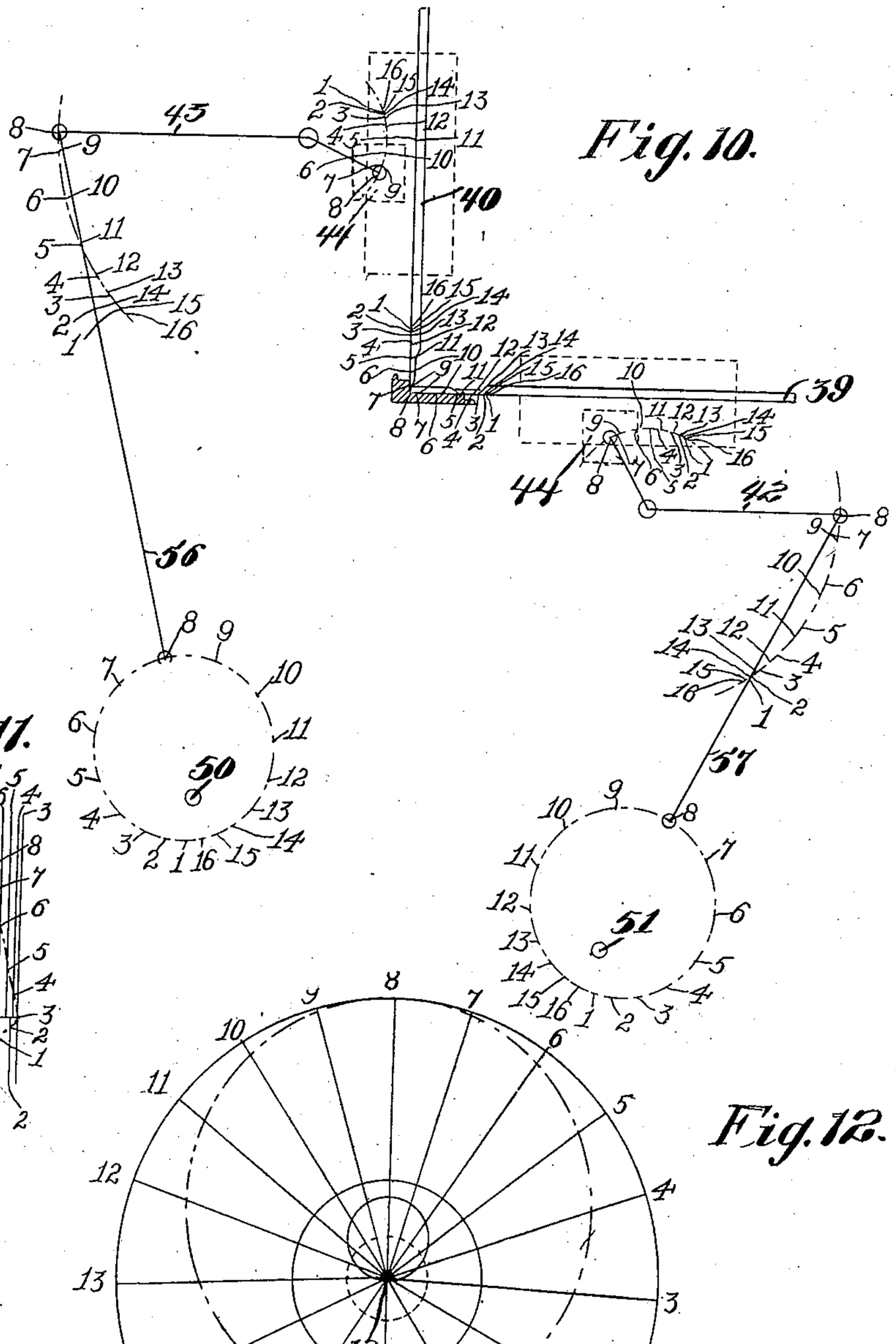


Fig. 10.

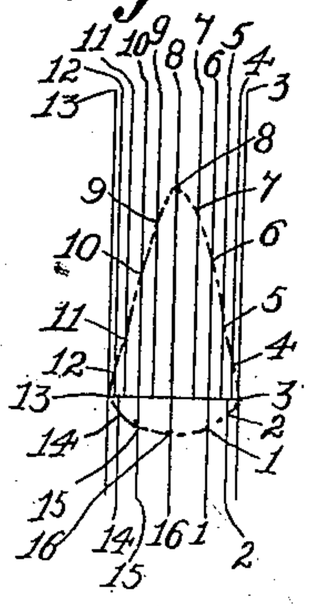


Fig. 11.

Fig. 12.

Witnesses:

F. G. Hachenberg.

Marcus G. Hopkins.

Inventor:

F. H. Richards.

UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

CARVING-MACHINE.

No. 861,539. Specification of Letters Patent. Patented July 30, 1907.

Application filed September 30, 1902. Serial No. 125,373.

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 moldings and the like and relates more particularly to machines wherein the operation is continuous, that is, the stock passes through the machine and is operated upon while in continuous motion.

This invention consists in the organization of mechanism for simultaneously feeding the stock and carrying the tools with the moving stock during their operation thereon; providing means of adjustment to enable work of different classes to be done upon the same machine; and so balancing the mechanisms with regard to the functions thereof as to secure the least possible vibration and wear in the parts.

Some of the objects of my present invention are to provide a machine wherein the power will be distributed as nearly equally among the working parts with regard to the inertia of the parts themselves and to the resistance to be met with in the operation of the machine as possible, to provide means of easy adjustment to accommodate different classes of work, and to provide a machine compact in structure, practical in operation, positive in the performance of its functions and efficient in point of economy of power, output, simplicity and the facility with which it may be operated and adjusted.

I have illustrated my present invention in one form in a carving machine in the accompanying drawings, in which like parts are designated by like reference characters throughout the several views and in which:

Figure 1, is a vertical longitudinal section on line looking toward the left hand of the machine; Fig. 2, a vertical longitudinal section 4 looking toward the right hand of the machine; Fig. 3, a rear view of the machine showing the front wall part broken away and sundry details in section; Fig. 4, a plan view; Fig. 5, a perspective view of the carrier with the slide rest superposed thereupon; Fig. 6, a detail of a tool carrier; Fig. 7, end and side views of a tool carriage operating lever; Fig. 8, a horizontal sectional detail of the carrier showing the crank and yoke driving connection thereof; Fig. 9, a vertical sectional detail of the base of the carrier and the top of the frame showing the driving crank and yoke connection; Fig. 10, a diagrammatical view illustrating the movements of the several parts of the tool operating mechanism; Fig. 11, a diagrammatical view showing the path of the cutting edge of a tool in its operation; and Fig. 12, a diagram of the movement of a speed varying transmitting device.

Referring to the drawings the machine is mounted and assembled upon a box-like frame A. The frame A has a bottom B in which two circular apertures of considerable diameter are provided. In one of said apertures is mounted a vertical stud 2 which has an enlarged concentric circular portion 3 which fits the said aperture in the bottom B, and a bottom flange 4 which abuts the under face of the bottom B and is bolted thereto by bolts 5. About the stud 2 is mounted a sleeve 6 which is adapted to rotate upon the said stud 2. The sleeve 6 is driven by a pulley 7 mounted fast thereon, which in turn is driven by a belt 8 which passes without the frame A through apertures in a door C forming a closure for an opening through which access is had to the interior of frame A. Cast or otherwise secured upon the sleeve 6 is a spur gear 9. At the upper end of the sleeve 6 is a projecting crank portion 10 integral with said sleeve upon which is mounted a wrist pin 11. The stud 2 is provided with a longitudinal bore which is eccentric to the axis of said stud 2 and on which is mounted a vertical shaft 12 having a shoulder 13 bearing upon the upper end of the stud 2. The upper end of the shaft 12 is journaled in a bearing 14 in the inclosing top of the frame A.

A crank 15 having a split hub and a binding screw 16 is mounted fast upon the shaft 12, the split hub and binding screw 16 forming means by which the crank 15 may be adjustably secured upon said shaft 12. The crank 15 is provided with a radial slot 17 in its under surface in which a box 18 is adapted to slide. The box 18 surrounds and is carried on the wrist pin 11 of the crank portion 10 of sleeve 6.

It will now be seen that upon the rotation of the sleeve 6 from the source of power, and by means of the belt 8 the wrist pin 11 through the box 18 and the crank 15 will drive the shaft 12 one complete revolution to each revolution of the sleeve 6, but as the shaft 12 is mounted eccentric to the sleeve 6 the radius of crank 15 will vary throughout its rotation owing to the sliding of the box 18 in the radial groove 17 and effect varying angular velocities of said crank 12 while at the same time completing the revolution simultaneously with that of the sleeve 6.

The upper end of the shaft 12 projects through the inclosing top of the frame A and carries a fast crank disk 19 which lies in a depression 20 in the inclosing top of the frame A flush with the upper surface of said inclosing top. A wrist pin 21 is mounted in the crank disk 19 and is journaled in and carries a box 22, which box 22 is adapted to slide in a groove or yoke 23 in the under surface of a carrier 24. The carrier 24 is mounted to slide in guideways 25 longitudinally of the frame A, gibs 26 maintaining said carrier 24 in said guideways 25. The rotation of shaft 12 will produce through the yoke connection just described a reciprocation of the carrier 24 longitudinally of the frame A.

The carrier 24 has a longitudinal groove 27 and a stock guide D is mounted and fixed upon the stand-

ards 28 and 29 at either end of the machine, and lies bridge like in the groove 27 of the carrier 24 but with a loose sliding contact, if any, so as not to impede the reciprocating movement of said carrier 24. The carrier is formed over the stock guide D in a cylindrical portion 30 forming an arch over said stock guide D.

Slide rests 31 and 32 having bases of cylindrical form are mounted on the outer surface of the cylindrical portion 30 of the carrier 24 and are angularly adjustable about said cylindrical portion 30 of the carrier 24 upon opposite sides thereof, and securable to said cylindrical portion 30 by bolts 33 passing through slots 34 in said cylindrical portion 30. Each of the slide rests 31 and 32 have radially extending guideways 35 in which tool carriages 36 and 37 are mounted to slide radially of the cylindrical portion 30 of the carrier 24. The bases of the slide rests 31 and 32 are apertured opposite guideways 35 to admit of the passage of tools 39 and 40 upon said tool carriages therethrough and the cylindrical portion 30 of the carrier 24 is apertured to admit of the passage of said tools 39 and 40 therethrough to the stock guide D at any position to which the slide rests may be adjusted. Gibs 38 retain the tool carriages within the guideways 35. The adjustability of the slide rest 31 permits of the adjustment of the guideways 35 from approximately a horizontal position to 45 degrees more or less toward the vertical and if desired the adjustment may be continued below the horizontal while the adjustability of the slide rest 32 permits of the adjustment of the guideways 35 upon said slide rest from a vertical position either way as may be deemed requisite. Such portions of the cylindrical portion 30 of the carrier 24 as are useless and increase the weight may be cut away as shown in Fig. 5.

The ears 41 project from the backs of each of the guideways 35 on the slide rests 31 and 32, and in which are pivoted levers 42 and 43 on the respective slide rests 31 and 32. Upon the short arms of levers 42 and 43 are pivoted two bearing blocks 44 which engage slide ways 45 in the back surfaces of the tool carriages 36 and 37, which slide ways 45 are perpendicular to the tool bed faces of said tool carriage. When the levers 42 and 43 are oscillated a reciprocation of the tool carriages is effected by means of the engagement of the bearing blocks 44 with the slide ways 45, the sliding of the blocks 44 in the slide ways 45 compensating for the arcal movement of the short arms of the levers 42 and 43.

Upon the vertical shaft 12 are mounted fast two spiral gears 46 and 47 which respectively mesh with spiral gears 48 and 49 respectively fast on horizontal shafts 50 and 51 mounted longitudinally of the frame A upon either side of the shaft 12. It will be seen that the shafts 50 and 51 will be driven by and at the varying velocities which are imparted to the shaft 12. Eccentrics 52 and 53 are mounted and respectively fast on shafts 50 and 51 and said eccentrics are provided with spherical peripheries. Eccentric straps 54 and 55 are mounted upon the eccentrics 52 and 53, said eccentric straps having inner spherical faces adapted to conform to the periphery of the eccentrics. Integral with the eccentric straps 54 and 55 and pivoted to the levers 43 and 42 respectively are extensible eccentric rods 56 and 57, which rods each consist of a hollow cylindrical portion 58 and a rod 59 telescoping with said hollow portion 58, the hollow portion 58 being provided with a contractible split ear portion 60 adapted to be clamped by means of a bolt 61 to rigidly connect the hollow portion 58 and the rod portion 59.

It will be seen that the movement of the carrier 24 will require some means of lateral give in the connections between the eccentrics and the tool carriages, and as the movement of the carrier is very slight considering the length of said connection I have provided a spherical eccentric for this purpose, the joint between the eccentric rods and the levers 42 and 43 being made to admit of sufficient elasticity to allow of the slight angular displacement necessitated at the upper end of the eccentric rods.

The rotation of the shafts 50 and 51 carrying the eccentrics 52 and 53 produces, owing to the set of said eccentrics upon said shaft, synchronous reciprocations of the tool carriages 36 and 37. The speed varying device which operates the shaft 12 produces a fast and slow movement in said shaft and the eccentrics 52 and 53 are set upon the shafts 50 and 51 in such manner that that end of the stroke of the tool carriages 30 and 37 nearest the stockguide is reached at the instant of the highest velocity in the travel of said tool carriages, which are influenced proportionately as to velocity in the same manner as the shaft 12 through connection with said shaft.

I have now described the mechanisms from the initial driving member through the speed varying devices to the carrier reciprocating with varying velocities and through the reciprocating tools mounted upon said carrier and driven at varying velocities through independent connections from the source of modified movement. The tool carriages and the tools mounted thereon are set at different positions lengthwise of the carrier 24 and as they are adapted to operate simultaneously it will be clearly seen that the tools are designed to incise the contra-distinctive or complementary incisions making up the contour of separate and distinct ornaments or repeats of the ornamental design to be imposed upon the stock.

Having described the mechanisms employed in shifting and operating the tools, I will now describe the mechanism employed in feeding the stock to correspond and co-act with the movement of the tools.

Feed rolls 62 and 63 are respectively mounted fast upon shafts 64 and 65, which are in turn mounted in bearings 66 and supports 29 on the frame A, and bearings 70 upstanding from the inclosing top of the frame A. The feed rolls 62 and 63 are preferably provided with roughened peripheries which extend through apertures in the floor of the stock guide D and slightly above said floor to engage the under side of the stock in the usual manner of feed rolls. Presser rolls 71 and 72 are resiliently mounted directly above the feed rolls and serve to press the stock upon said feed rolls to insure a good grip of the stock by the latter. Worm wheels 73 and 74 are respectively mounted fast on shafts 64 and 65 and mesh with worms 75 and 76 fast on a horizontal shaft 77 mounted longitudinally of the frame A in bearings 78 in the walls of said frame A. Both of shafts 64 and 65 together with the feed rolls thereon are driven from the shaft 77. A spiral gear 79 is mounted fast upon the shaft 77 and meshes with a spiral gear 80 fast on a vertical shaft 81 mounted in a

bearing 82 in the inclosing top of the frame A and a bore 83 in and eccentric to the axis of a stud 84 which stud 84 is similar to the stud 2 and is secured to the bottom B in the same manner thereas. The shaft 81 has a shoulder 85 which rests upon the end surface of the stud 84. The bore 83 in the stud 84 has the same degree of eccentricity with the axis of the stud 84 as the bore in the stud 2 has with the axis of said stud, but the bore 83 in the stud 84 is given a diametrically opposite position to the bore in the stud 2, that is, with reference to the plane of mounting of the studs 2 and 84 the bores therein are positioned 180 degrees apart.

A sleeve 86 similar to the sleeve 6 is mounted to rotate upon the stud 84 and is provided with a spur gear 87 positioned in a manner similar to that of the spur gear 9 upon the stud 2. The spur gear 87 on the sleeve 86 meshes with the spur gear 9 upon the sleeve 6 and is driven thereby driving the sleeve 86. The sleeve 86 is provided with a crank extension 88 at its upper end which carries a wrist pin 89 upon which a box 90 is journaled. The box 90 engages a radial groove in the under side of a crank 91 similar to the crank 15 on the shaft 12 to which crank 91 is adjustably secured upon the shaft 81.

The sleeve 86 receives its uniform rotation from the uniformly rotating sleeve 6 and imparts to the eccentrically mounted shaft 81 through the crank pin 89 and the radial groove connection with crank 91 a rotation at varying velocities of the shaft 81 which varying speed rotation is imparted from the shaft 81 to the shaft 77 and from thence to the shafts 64 and 65 and the feed rolls 62 and 63 which feed the stock at said varying velocities.

The crank mechanism herein illustrated is claimed in my co-pending application, Serial No. 122,677 filed September 9th, 1902 except in certain specific details which are claimed in this present application.

It will be seen that the carrier 24 as it receives its reciprocation from the shaft 12 utilizes the diametral movement of the crank consisting of crank disk 19 and wrist pin 21, that is, the diametral movement of a crank driven at the varying velocities effected by the first speed varying device, while the feed rolls developing the moving stock the movement at varying velocities obtained from the second speed varying device. It will also be seen that the tools are driven from one of the speed varying devices and the varying velocities obtained from said driver are utilized to effect a very quick movement of the tool into and out of the stock and a relatively slow movement of the tool during the time they are entirely without the profile of the stock.

I proportion the crank which reciprocates the carrier 24 and the transmission driving said crank with the feed rolls and the transmission driving said feed rolls to effect substantial coincident movements of the advance stock of the carrier 24 during the advance of the carrier 24 in the manner illustrated in my application for mechanical movement Serial No. 116,759, filed July 24, 1902, thereby obtaining a travel of the tool carrier 24 with and in the direction taken by the moving stock which very closely, and for all practical purposes, coincides with the advance of the stock during this time, and I adjust and time the tools to make the required incisions in the stock during this period of substantial coincidence of movement between the carrier carrying said tools and the moving stock utilizing the higher velocities of the variable speed transmitting device to effect the operative stroke of the tools during the period of coincidence of as great length and in as short a time as possible.

Certain other features herein illustrated are claimed in my copending application, Serial No. 107,023, filed May 12, 1902.

I have illustrated graphically in Fig. 10 a complete revolution in the moving parts taken from the eccentrics to the points of the tools and have shown 16 successive positions of the several parts representing 16 equal periods in one revolution of the initial driver. In Fig. 12 I have illustrated graphically and in the same manner the movements of the parts of one of the speed varying devices. In Fig. 11 I have illustrated graphically by means of the parallel lines the successive positions in the travel of the carrier 24, and by means of the dot-and-dash line I have indicated the movement of the point of the tool relatively of a fixed point upon the frame A.

The construction of the connecting rods rendering them extensible by adjustment permits of the placing of the path of the tool nearer or farther from the stock, and permits of the adjustment of the depth of the cut after the tool has been adjusted upon the tool carriage and also to accommodate the same to the adjustment of the tool slides around the carrier, and also permits regulation of the timing of one set of tools relatively to the other.

I have deemed it unnecessary to go into the minute details of the manner in which the substantial coincidence is effected by the co-action of two angularly movable members rotating with varying velocities, as the same would merely cause confusion and encumber the case, and as the same will be readily understood by reference to the above referred to application for mechanical movement.

It is obvious that various changes in constructional details and arrangement may be made in the device illustrated without departing from the spirit and scope of my invention, and it is also obvious that various substitutions of analogous parts and equivalent elements and combinations may be made in the said device without departing from the spirit and scope of my invention.

I do not wish to limit the protection which may be granted to me upon the present application to the use of the present invention in carving machines alone, but I wish to reserve to myself all uses of the same or elements therein or combinations of elements therein which may be patentable in all machines and devices of an analogous or semi-analogous nature.

Having described my invention, I claim—

1. In a carving machine, a support, a guideway on said support, a carrier having a cylindrical portion mounted to reciprocate in said guideway, and a carriage slide rest mounted for angular adjustment on and securable to the surface of said cylindrical portion.

2. In a carving machine, a support, a guideway on said support, a carrier having a cylindrical portion mounted to reciprocate in said guideway, a plurality of carriages, and means securable to the surface of said cylindrical portion and angularly adjustable thereon to support said carriage.

3. In a carving machine, the combination of a support, a guideway on said support, a carrier having a cylindrical portion and mounted to reciprocate in said guideway, and a slide rest mounted on and conforming to the surface of said cylindrical portion, said slide rest angularly adjustable on and securable to the surface of said cylindrical portion.

4. In a carving machine, the combination of a support, a guideway on said support, a carrier having a cylindrical portion and mounted to reciprocate in said guideway, and a plurality of slide rests mounted on and conforming to the surface of said cylindrical portion, said slide rests angularly adjustable on and securable to the surface of said cylindrical portion.

5. In a carving machine, the combination of a support, a guideway on said support, a carrier having a cylindrical portion parallel to its line of reciprocation, and a carriage support conforming to, angularly adjustable on and securable to the surface of said cylindrical portion.

6. In a carving machine, the combination of a support, a guideway on said support, a carrier having a cylindrical portion parallel to its line of reciprocation, and a plurality of tool carriage supports conforming to, angularly adjustable on and securable to the surface of said cylindrical portion.

7. In a carving machine, the combination of a support, a guideway on said support, a carrier having a supporting superstructure, at the region of the working point a plurality of carriages, and means mounted for angular adjustment on and securable to the surface of said superstructure to support the said carriages.

8. In a carving machine, the combination of a support, a guideway on said support, a carrier having a cylindrical portion and mounted to reciprocate in said guideway, a plurality of carriages and means to support the same mounted at separate points longitudinally of, angularly adjustable about and securable to the surface of said cylindrical portion.

9. In a carving machine, the combination of a support, a guideway on said support, a carrier having a cylindrical portion and mounted to reciprocate in said guideway, a plurality of carriages, and means to support the same mounted at separate points longitudinally and circumferentially of the surface of said cylindrical portion, said means angularly adjustable within certain limits upon and securable to the surface of said cylindrical portion.

10. In a carving machine, the combination of a support, a guideway on said support, a carrier having a hollow cylindrical portion and mounted to reciprocate in said guideway, a carriage, and means to mount the same upon and angularly adjustable upon the outer surface of said cylindrical portion, and a securing bolt carried by said means and engaging a circumferential slot in said cylindrical portion.

11. In a carving machine, the combination of a support, a guideway on said support, a carrier having a hollow portion and mounted to reciprocate in said guideway, circumferential segmental slots at separate points longitudinally and circumferentially of said portion, and a plurality of carriage rests mounted on, conforming to, and circumferentially adjustable on the outer surface of said portion, and securing bolts carried by said carriage rests and adapted to engage the inner surface of said portion through the said slots therein.

12. In a carving machine, the combination of a support, a guideway on said support, a carrier having a hollow portion and mounted to reciprocate in said guideway, a stock guide supported at either end upon said support and bridged through said hollow portion of said carrier, and a slide way on the inner surface of said hollow cylindrical portion of said carrier slidably abutting the under surface of said stock guide.

13. In a carving machine, the combination of a support, a guideway on said support, a carrier having a cylindrical portion and mounted to reciprocate in said guideway, a plurality of carriages means to support the same mounted upon, angularly adjustable on and securable to separate points longitudinally and circumferentially of the outer surface of said cylindrical portion of said carrier, said cylindrical portion of said carrier cut away at those points not traversed by said means in their angular adjustment thereon.

14. In a carving machine, the combination of a support, a guideway on said support, a carrier having a cylindrical portion and mounted to reciprocate in said guideway, a carriage rest mounted on, angularly adjustable about and securable to the outer surface of said cylindrical portion of said carrier, a slideway on said rest substantially radial of said cylindrical portion of said carrier, and a carriage mounted to reciprocate in said slide way.

15. In a carving machine, the combination of a support, a guideway on said support, a carrier having a cylindrical portion and mounted to reciprocate in said guideway, a plurality of slide rests mounted on, angularly adjustable about and securable to the outer surface of said cylindrical portion of said carrier, slide ways on said rests substantially radial of said cylindrical portion of said carrier, and carriages mounted to reciprocate in said slide ways.

16. In a carving machine, the combination of a support, a guideway on said support, a carrier having a hollow cylindrical portion and mounted to reciprocate in said guideway, a slide rest mounted on, angularly adjustable about and securable to the outer surface of said cylindrical portion of said slide rest, a slide way on said carriage substantially radial of said cylindrical portion of said carrier, and a slide mounted to reciprocate in said slide way, said cylindrical portion of said carrier cut away in line with said slide, such cut away portion extending circumferentially of said cylindrical portion to satisfy the said requirements throughout all positions assumed by said slide rest within the limits of its angular adjustment.

17. In a carving machine, the combination of a support, a guideway on said support, a carrier having a hollow cylindrical portion and mounted to reciprocate in said guideway, a plurality of slide rests mounted on, angularly adjustable about and securable to the outer surface of said cylindrical portion of said carrier at separate points longitudinally and circumferentially of said cylindrical portion of said carrier, slideways on said slide rests substantially radial of said cylindrical portion of said carrier, and slides mounted to reciprocate in said slideways, said cylindrical portion of said carrier cut away in line with said slides, said cut away portion extending circumferentially to satisfy said requirements at all positions of said slide rests within the limits of their angular adjustment.

18. In a carving machine, the combination of a support having a guideway, a carrier having a hollow cylindrical portion and reciprocably mounted in said guideway, a stock guide supported at either end upon said support and bridged through said hollow cylindrical portion, a carriage rest mounted on, angularly adjustable about and securable to the outer surface of said cylindrical portion, a slideway thereon substantially radial of said cylindrical portion, a carriage mounted to reciprocate in said slide way, said cylindrical portion of said carrier having an opening in line with said slide way, a tool mounted upon said carriage for approaching and retreating from said stock guide through said opening in the cylindrical portion of the carrier with the reciprocation of said carriage.

19. In a carving machine, the combination of a support, a guideway on said support, a carrier having a hollow portion mounted to reciprocate in said guideway, a stock guide supported at either end upon said support and bridged through the hollow portion of said carrier, a plurality of slide rests mounted on, angularly adjustable about and securable to the outer surface of said portion of said carrier at separate points longitudinally and circumferentially of said carrier, slideways on said rests substantially radial of said hollow portion of said carrier, slides mounted to reciprocate in said slideways, said hollow portion of said carrier being cut away to form an opening in line with said slide, a tool mounted upon said slides and adapted to approach and retreat from said stock guide through said opening in said carrier with the reciprocation of said slides.

20. In a carving machine, the combination of a support, a guideway on said support, a carrier mounted to re-

ciprocate in said guideway, a slide rest mounted on, angularly adjustable about and securable to the surface of said carrier, a slideway on said rest substantially radial thereof, a slide mounted to reciprocate in said slideway, a lever pivoted on said carriage and a transversely yielding connection between said slide and one arm of said lever.

21. In a carving machine, the combination of a support, a guideway on said support, a carrier mounted to reciprocate in said guideway, a slide rest mounted on, angularly adjustable about and securable to said carrier, a slideway on said slide rest substantially radial of said carrier, a slide mounted to reciprocate in said slideway, a transverse slideway in said slide, a sliding block mounted to reciprocate in said transverse slideway and a lever pivoted upon said slide rest, one arm of said lever being pivotally connected to said sliding block.

22. In a carving machine, the combination of a support, a driving shaft mounted in said support, a guideway on said support, a carrier having a cylindrical portion and mounted to reciprocate in said guideway, said driving shaft operatively connected with and to reciprocate said carrier, a slide rest mounted on, angularly adjustable about and securable to said cylindrical portion of said carrier, a slideway on said slide rest substantially radial of said cylindrical portion of said carrier, a slide mounted to reciprocate in said slideway, a lever fulcrumed upon said slide rest, a transversely yielding connection between said slide and said lever and an operative connection between said driving shaft and said lever to effect a reciprocation of said slide.

23. In a carving machine, the combination of a support, a driving shaft mounted on said support, a countershaft mounted on said support, a speed varying transmitting device between said driving shaft and said countershaft, a guideway on said support, a carrier having a cylindrical portion and mounted to reciprocate in said guideway, an operative connection between said countershaft and said carrier to reciprocate said carrier, a slide rest mounted on, angularly adjustable about and securable to said cylindrical portion of said carrier, a slideway on said slide rest substantially radial of said cylindrical portion of said carrier, a slide mounted to reciprocate in said slideway, a lever fulcrumed upon said slide rest, a transversely yielding connection between said slide and said lever and an operative connection between said countershaft and said lever to effect a reciprocation of said slide.

24. In a carving machine, the combination of a support, a driving shaft mounted on said support, a countershaft mounted on said support, a speed varying transmitting device between said driving and said countershafts, a guideway on said support, a carrier having a cylindrical portion and mounted to reciprocate in said guideway, an operative connection between said countershaft and said carrier to effect a reciprocation of said carrier, a slide rest mounted on, angularly adjustable about and securable to said cylindrical portion of said carrier, a slideway on said slide rest substantially radial of said cylindrical portion of said carrier, a slide mounted to reciprocate in said slideway, a lever fulcrumed upon said slide rest, a transversely yielding connection between said slide and said lever, an operative connection between said countershaft and said lever to effect a reciprocation of said slide, and adjusting means in said operative connection between said countershaft and said lever to permit of adjustment of said connection to compensate for the disproportion occasioned by the angular adjustment of said slide rest.

25. In a carving machine, the combination of a support, a driving shaft mounted on said support, a countershaft mounted on said support, a speed varying transmitting device between said driving and said countershafts, a guideway on said support, a carrier having a cylindrical portion and mounted to reciprocate in said guideway, an operative connection between said countershaft and said carrier to effect a reciprocation of said carrier, a plurality of slide rests mounted, angularly adjustable about and securable to the surface of said cylindrical portion of said carrier at separate points longitudinally and circumferentially of said cylindrical portion of said carrier, slideways on said slide rests substantially radial of said cylindrical portion of said carrier, slides mounted to reciprocate in said slideways, a plurality of levers each fulcrumed upon one of said slide rests, transversely yielding connections between said slides and said levers, operative connections between said countershaft and said levers to effect a reciprocation of said slides, and adjusting means in said operative connections between said countershaft and said levers to permit of adjustment of said connections to compensate for the disproportion occasioned by the angular adjustment of said slide rests.

26. In a carving machine, the combination of a support, a driving shaft mounted on said support, a countershaft mounted on said support, a speed varying transmitting device between said driving and said countershafts, a driven shaft driven from said countershaft, a guideway on said support, a carrier having a cylindrical portion and mounted to reciprocate in said guideway, a crank on said countershaft, a transverse guideway on said carrier engaged by said crank to form a means for effecting a reciprocation of said carrier by said countershaft, a slide rest mounted on, angularly adjustable about and securable to said cylindrical portion of said carrier, a slideway on said slide rest substantially radial of said cylindrical portion of said carrier, a slide mounted to reciprocate in said slideway, a lever fulcrumed upon said slide rest, a transversely yielding connection between said slide and said lever, a crank member mounted fast upon said driven shaft, and an adjustably extensible connecting rod between said crank member and said lever.

27. In a carving machine, the combination of a support, a driving shaft mounted on said support, a countershaft mounted on said support, a speed varying transmitting device between said driving and said counter shafts, a plurality of driven shafts driven from said countershaft, a guideway on said support, a carrier having a cylindrical portion and mounted to reciprocate in said guideway, a crank on said countershaft, a transverse guideway on said carrier engaged by said crank to form a means effecting a reciprocation of said carrier by said countershaft, a plurality of tool slides mounted on, angularly adjustable about and securable to said cylindrical portion of said carrier, slideways on said tool slides substantially radial of said cylindrical portion of said carrier, slides mounted to reciprocate in said slideways, a plurality of levers each fulcrumed upon one of said tool slides, transversely yielding connections between said slides and said levers, a plurality of crank members respectively mounted upon said driven shafts and adjustably extensible connecting rods between said crank members and said levers.

28. In a carving machine, the combination of a support, a guideway on said support, a carrier having a hollow cylindrical portion mounted to reciprocate in said guideway, a stock guide supported at either end upon said support and bridged through the hollow cylindrical portion of said carrier, a plurality of slide rests mounted on, angularly adjustable about and securable to the outer surface of said cylindrical portion of said carrier at separate points longitudinally and circumferentially of said cylindrical portion of said carrier, slideways on said slide rests substantially radial of said cylindrical portion of said carrier, slides mounted to reciprocate on said slideways, a driving member, a countershaft, a speed varying transmitting device between said driving shaft and said countershaft, an operative connection between said countershaft and said carrier organized to effect the reciprocation of said carrier by said countershaft, adjustable operative connections between said countershaft and said slides to effect the reciprocation of said slides from said countershaft, feed rolls mounted in proximity to said stock guide, and a speed varying transmitting device between said driving member and said feed rolls all organized to effect velocities in said carrier during its forward movement substantially equivalent to the concurrent peripheral velocities of said feed rolls and the approach and retreat of said slides to said stock guide during said forward movement of said carrier.

29. In a carving machine, the combination with a driving member, of a crank fast on said driving member, a second crank eccentrically mounted to and engaged by said first crank, a carrier reciprocated from said second

crank, a driven member geared to and driven from said driving member, a third crank fast on said driven member, a fourth crank eccentrically mounted to and engaged by said third crank, and a feed roll driven from said fourth crank all organized to effect velocities in forward movement of said carrier substantially equivalent to the concurrent peripheral velocities of said feed roll.

30. In a carving machine, a stud, a sleeve mounted on said stud, a crank fast on said sleeve, a second crank eccentrically mounted in said stud and engaging said first crank, a carrier reciprocated from said second crank, a second stud, a second sleeve mounted on said second stud geared and driven from said first sleeve, a third crank fast on said second sleeve, a fourth crank eccentrically mounted in said second stud, and a feed roll driven from said fourth crank all organized to effect velocities in the forward movement of said carrier substantially equivalent to the concurrent peripheral velocities of said feed roll.

31. In a carving machine, a stud, a sleeve mounted to rotate on said stud, a driving pulley mounted fast on said sleeve, a crank fast on said sleeve, a second crank eccentrically mounted in said stud and engaging said first crank, a carrier reciprocated from said second crank, a second stud, a second sleeve mounted to rotate on said second stud and geared to and driven from said first sleeve, a third crank fast on said second sleeve, a fourth crank eccentrically mounted in said second stud and engaging said third crank, and a feed roll driven from said fourth crank all organized to effect velocities in the forward movement of said carrier substantially equivalent to the concurrent peripheral velocities of said feed roll.

32. In a carving machine, the combination of a support having a guideway, a carrier mounted thereon and having a hollow cylindrical portion, a stock guide bridged through said carrier, a carriage rest mounted on said cylindrical portion for angular adjustment about the same, a slide way thereon substantially radial thereof, a carriage mounted thereon, the said cylindrical portion having an opening in the path of said carriage, a tool mounted on the carriage, and means for advancing and retracting the same toward and from said stock guide through such opening.

33. In a carving machine, the combination with a reciprocatory carrier, tool carriages reciprocatable thereon transversely of its line of reciprocation, and spherical eccentrics for severally reciprocating said carriages for accommodating the movement of the carriages axially of the eccentric.

34. In a carving machine, the combination with a reciprocatory slide, a tool carriage transversely reciprocatable thereon, a spherical eccentric, an eccentric strap thereon, and a driving connection between the strap and the carriage.

35. In a carving machine, the combination with a driving member, of a crank driven by said driving member, a second crank eccentrically mounted to and rotated by said first crank, a carrier reciprocated from said second crank, a third crank driven from said driving member, a fourth crank eccentrically mounted to and rotated by said third crank, a feed roll driven from said fourth crank all organized to effect velocities in forward movement of said carrier substantially equivalent to the concurrent peripheral velocities of said feed roll, a tool slide transversely reciprocable on said carrier, and means driven from one of said cranks for reciprocating said slide.

FRANCIS H. RICHARDS.

Witnesses:
FRED. J. DOLE,
JOHN O. SEIFERT.