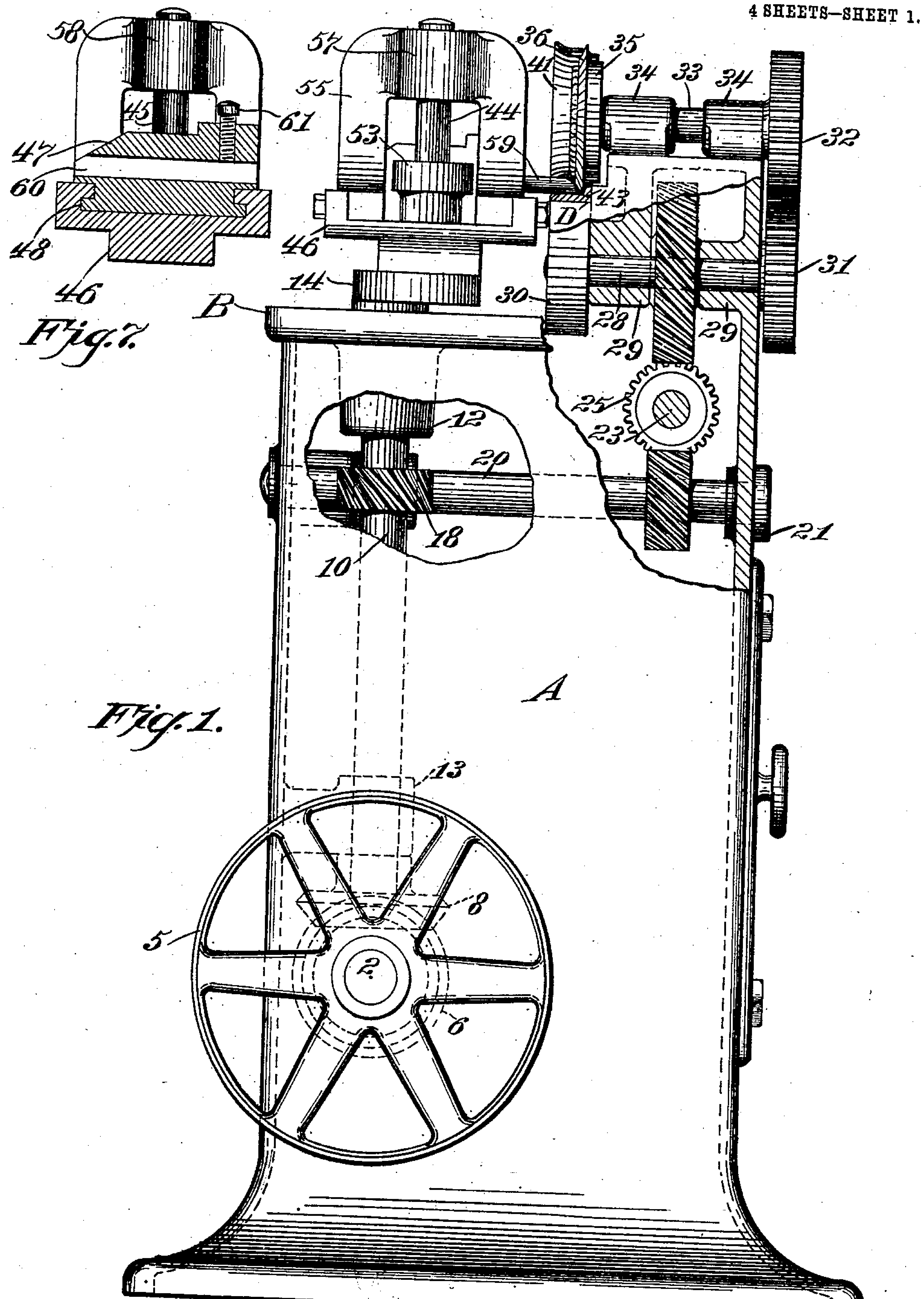
F. H. RICHARDS.
CARVING MACHINE.
APPLICATION FILED MAY 8, 1902.

914,676.

Patented Mar. 9, 1909.
4 SHEETS—SHEET 1.



Witnesses;
Ralph Lancaster.
Fred E. Maynard.

Inventor:
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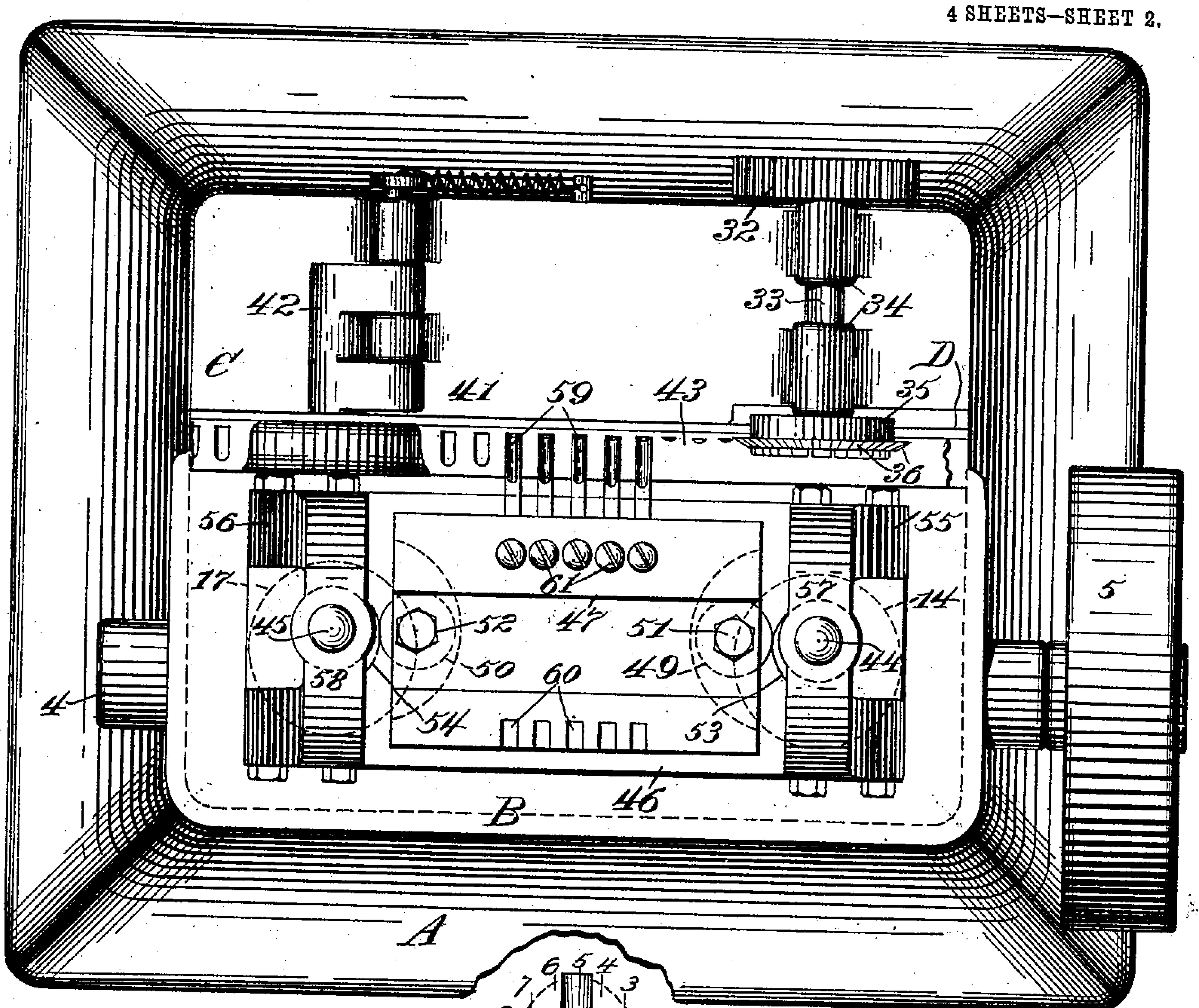

Fig. 2.

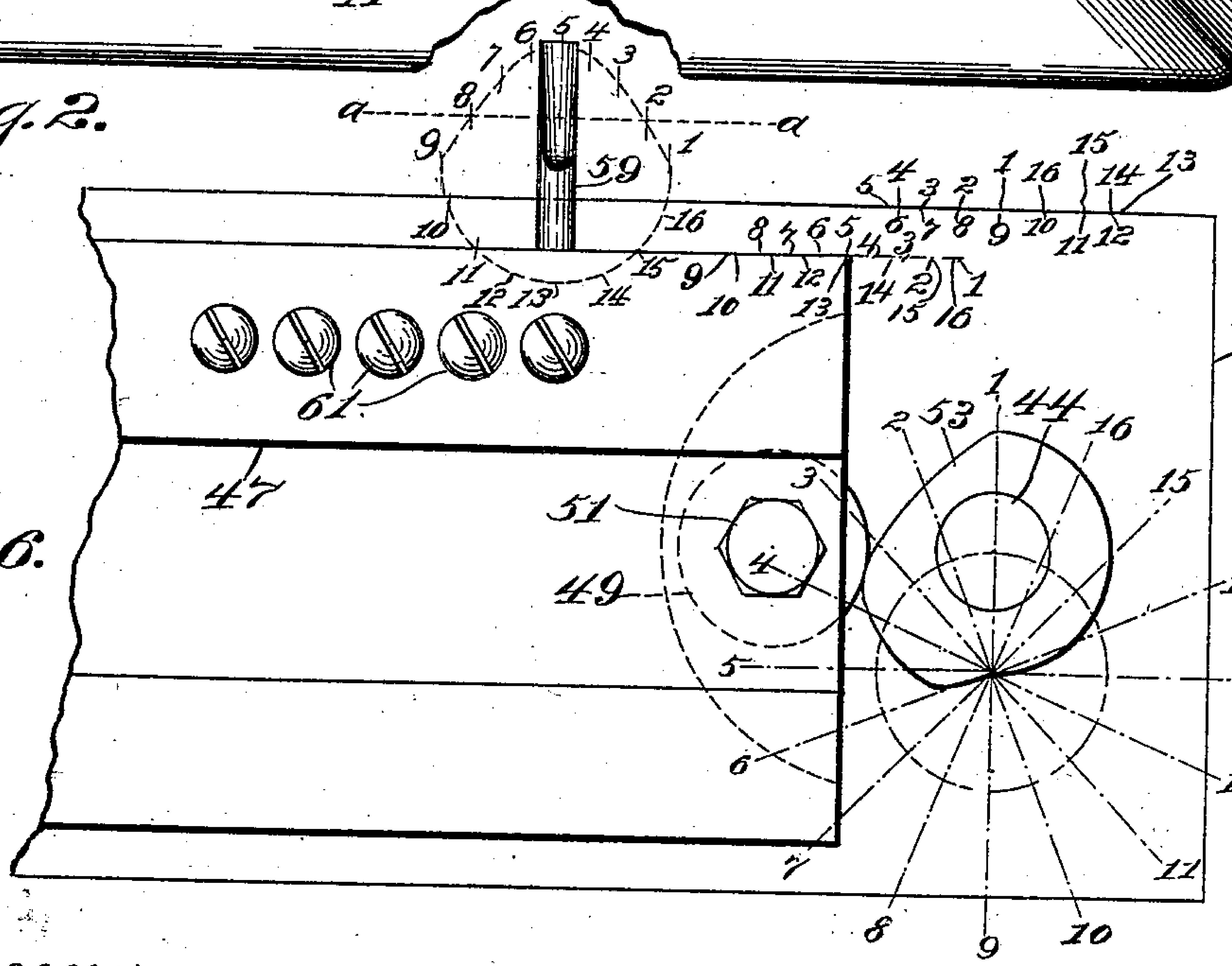

Fig. 6.

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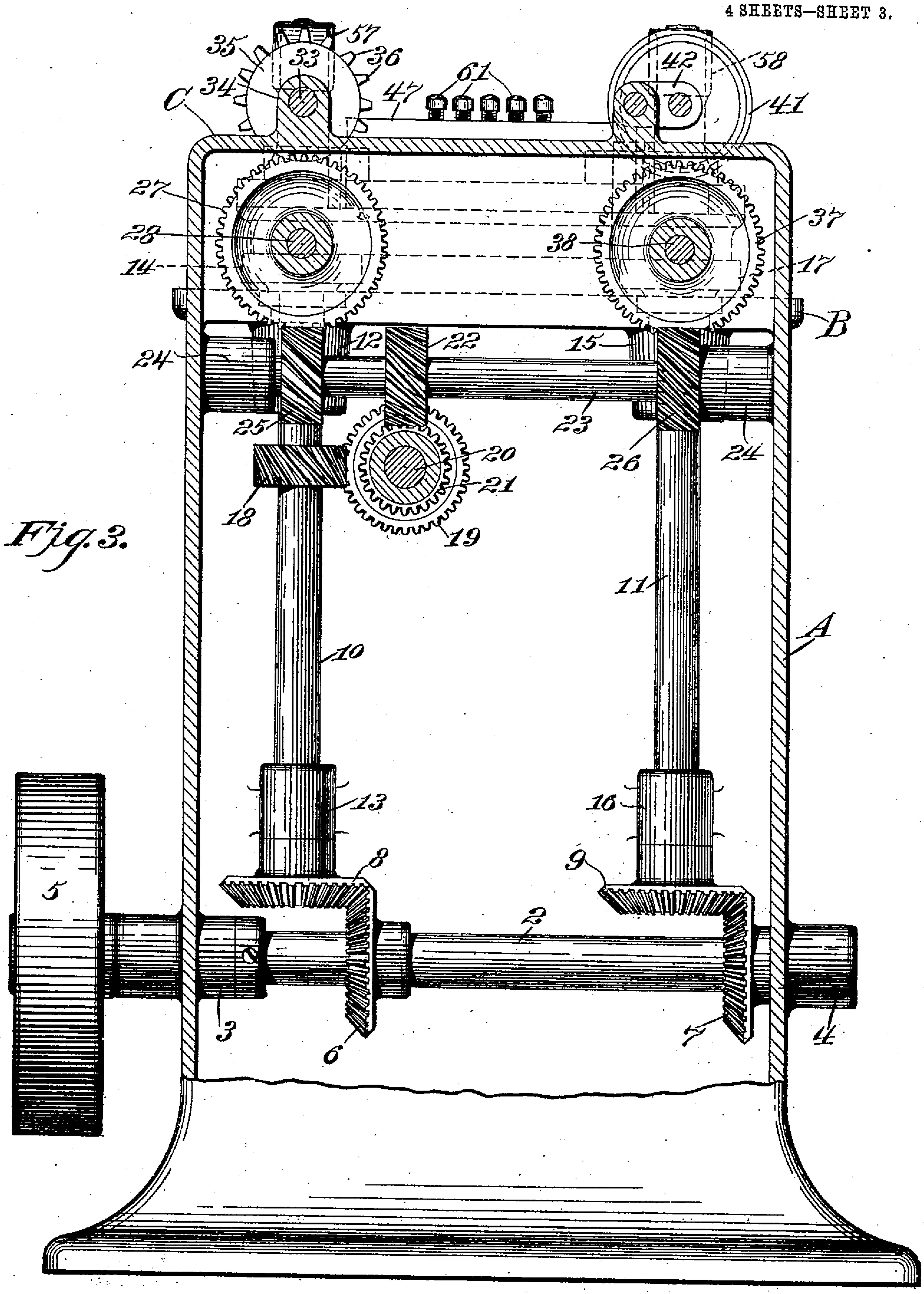

Fig. 3.

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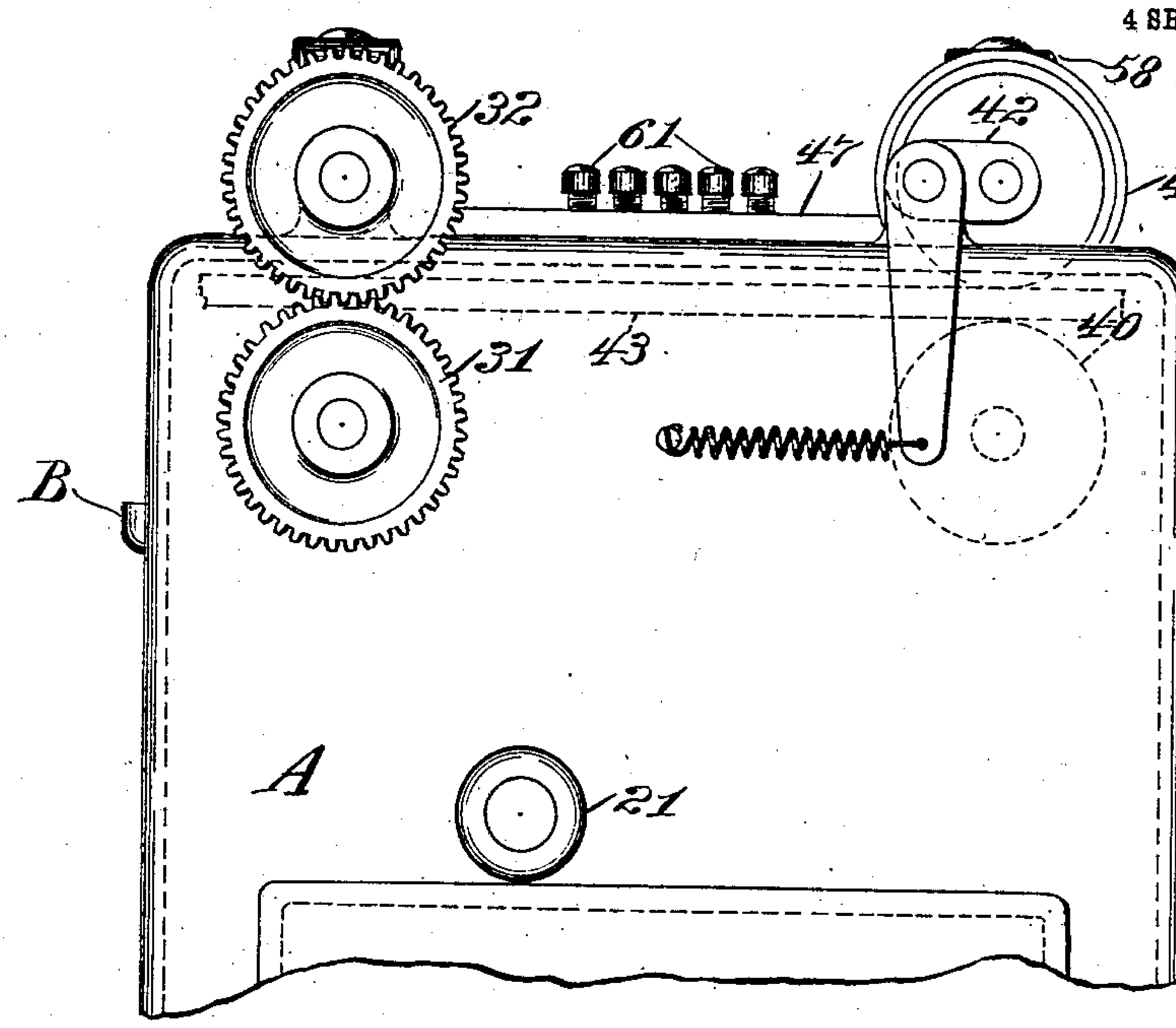

Fig. 4.

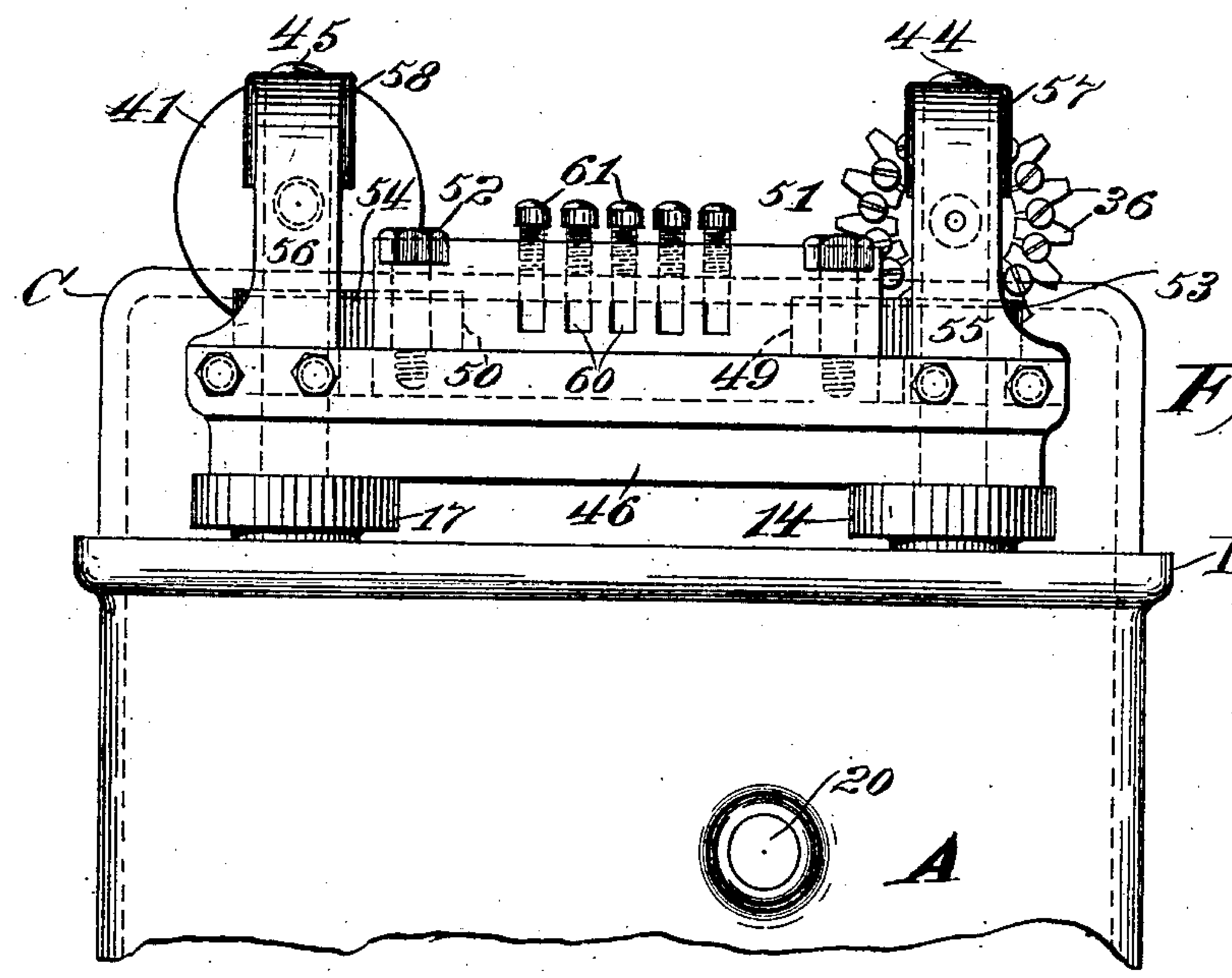

Fig. 5.

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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

CARVING-MACHINE.

No. 914,676. Specification of Letters Patent. Patented March 9, 1909.

Application filed May 8, 1902. Serial No. 106,411.

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 carving machines and relates more particularly to a carving machine in which the feed of the stock is continuous.

This invention consists in the employment of a crank-driven member and supplementing means coacting therewith to produce a corresponding movement of cutting elements relatively of a continuously moving stock during their cutting movement and the combinations and organizations of cutters, driving means, feed, gearing and constructional features herein described and claimed.

One of the objects of my invention is to provide a compact, practical and efficient organization of cutters, feed and driving gear which will permit of the continuous operation of carving moving stock and particularly admit of the making of relatively deep incisions in continuously moving stock.

I have illustrated one embodiment of my invention in the accompanying drawings, in which like reference characters refer to like parts throughout the several views.

Figure 1, is a front elevation of a carving machine embodying my invention with front wall of frame partly cut away. Fig. 2, a plan view; Fig. 3, a vertical section taken longitudinally of the machine; Fig. 4, a detail right-hand side elevation of the upper portion of the machine; Fig. 5, a detail left-hand side elevation of the upper portion of the machine. Fig. 6 a diagrammatic plan detail of the tool carriage and carrier, and Fig. 7, a cross section of the tool carriage and carrier.

Referring to the drawings the machine is mounted and assembled on a box-like frame A.

A main driving shaft 2 is horizontally mounted longitudinally of the frame A in bearings 3 and 4 in the end walls of said frame A. The shaft 2 projects through the bearing 3 and without the frame A and is provided upon its projecting portion with a fast driving pulley 5.

Within the frame A two miter gears 6 and 7 are mounted fast on the driving shaft 2 and respectively mesh with miter gears 8 and 9 respectively mounted fast on the lower ends of two parallel vertical shafts 10 and 11.

The upper end of the vertical shaft 10 projects through a table B which constitutes a portion of the top of the frame A and is journaled in a bearing 12 depending from said table B. The lower end of said shaft 10 is journaled in a bearing 13 projecting inwardly from one side wall of the frame A. The upper projecting end of said shaft 10 carries a fast crank plate 14 the hub of which crank plate bears on the table B and restricts the shaft 10 from downward movement. The hub of miter gear 8 abuts the lower face of bearing 13 and restricts the shaft 10 from upward movement.

The upper end of the vertical shaft 11 projects through table B and said shaft is journaled in a bearing 15 depending from said table B. The lower end of said shaft 11 is journaled in a bearing 16 projecting inwardly from one side wall of the frame A. The upper projecting end of said shaft 11 carries a fast crank plate 17 the hub of which crank plate bears on the table B and restricts the shaft 11 from downward movement. The hub of miter gear 8 abuts the lower face of bearing 16 and restricts the shaft 11 from upward movement.

That portion of the frame A not topped by the table B is extended upward and topped by a platform C and along that edge of said platform C adjacent the table B is formed a stock guide D parallel with the table B, platform C and the plane of mounting of the shafts 10 and 11. A spiral gear 18 is mounted fast on the shaft 10 and meshes with and drives a spiral gear 19 fast on a shaft 20. The shaft 20 is horizontally mounted in bearings 21 transversely of the frame A. A spiral gear 21 fast on the shaft 20 meshes with and drives a spiral gear 22 fast on a shaft 23. The shaft 23 is horizontally mounted longitudinally of the frame A in bearings 24 in the walls of frame A. The shaft 23 carries two fast spiral gears 25 and 26. The spiral gear 25 meshes with and drives a spiral gear 27 fast on a shaft 28. The shaft 28 is horizontally mounted transversely of the frame A in bearings 29 depending from the platform C and projecting from the wall of the frame A. The shaft 28 carries a fast feed roll 30, the periphery of which feed roll 30 projects through and slightly above the floor of the stock guide D. The end of shaft 28 opposite to that which carries feed roll 30 projects without the frame A and carries a fast spur gear 31 which meshes with and drives a spur gear 32 mounted fast on the projecting end of a shaft 33 which shaft is horizontally mounted parallel with and directly above the shaft 28 in bearings 34 upstanding from the platform C. One end of the shaft 33 projects over the stock guide D and carries fast a rotary cutter chuck 35. The rotary cutter chuck is provided with peripherally directed tools 36. The spiral gear 26 meshes with and drives a spiral gear 37 fast on a shaft 38. The shaft 38 is horizontally mounted transversely of the frame A in bearings 39 depending from the platform C and projecting from the wall of the frame A. The shaft 38 carries a fast feed roll 40 the periphery of which feed roll 40 projects through and slightly above the floor of the stock guide D. A presser roll 41 is mounted upon a pivoted frame 42 and is pressed downwardly over the stock guide D directly above the feed roll 40.

I have shown a piece of stock 43 lying in the stock guide D and the operation of the feed rolls and the rotary cutter is as follows: The stock 43 is gripped by the feed roll 30 and carried forward, the tools 36 making a series of incisions in its surface as the chuck 35 rolls evenly over it. The cutting action of the rotary cutter in a measure holds the stock down against the feed roll 30 but a more positive effect is obtained by making a portion of the periphery of the chuck act as a presser roll. As the stock is fed along it is engaged by the feed roll 40 which aids the movement, and finally ejects the incised piece. The presser roll 41 holds the stock against the feed roll 40 and insures a better grip by said roll.

There are fifteen tools 36 shown in the chuck 35 and the gearing rotates said chuck and also the feed rolls one revolution to three revolutions of the drive shaft 2 and the shafts 10 and 11.

The crank plates 14 and 17 respectively carry wrist pins 44 and 45 which have the same throw and which are set at the same angles from the plane of mounting of the shafts 10 and 11 in such manner that they are always the same distance apart and always at equal distances from the stock guide D. The wrist pins 44 and 45 are journaled in and move a carrier 46 which rests upon the crank plates 14 and 17. The carrier 46 is mounted parallel with the stock guide D and is given a translational movement by the wrist pins 44 and 45 always remaining parallel with the stock guide D.

The carrier 46 moves toward and away from the stock guide and this movement is utilized directly as will hereinafter appear. The carrier 46 also moves lengthwise of the stock guide D in the direction of the feed of the stock 43 during that half of its translational movement in which it most nearly approaches said stock guide D. This movement lengthwise of the stock guide D during this half movement is not uniform owing to the circular movement of the carrier and does not conform with the progressive movement of the stock 43.

I mount a tool carriage 47 in guides 48 on the top face of the carrier 46 to slide longitudinally of said carrier and parallelly of said stock guide D. Loose rollers 49 and 50 are mounted in recesses at either end of the carriage 47 on studs 51 and 52.

I mount peripheral cams 53 and 54 respectively on wrist pins 44 and 45 just above the upper face of carrier 46, the hubs of which cams 53 and 54 keep the carrier 46 from rising from the crank plates 14 and 17. The cams 53 and 54 are mounted fast on the wrist pins 44 and 45 and peripherally engage the rollers 49 and 50 on the tool carriage 47 holding the tool carriage between them in its guides 48. The cams 53 and 54 are configured to give the tool carriage 47 a movement longitudinally of the carrier 46 as they turn with the wrist pins 44 and 45 which will complement the varying motion of the carrier 46 to result in a uniform movement of the tool carriage 47 relatively of the stock guide D during that half of the translational movement of the carrier 46 during which the tool carriage is caused to approach most nearly the stock guide D. Yokes 55 and 56 are bolted to the carrier 46 which provide bearings 57 and 58 for the carrier 46 on the wrist pins 44 and 45 above the cams 53 and 54 which equalizes to a considerable extent the wear and strain on said wrist pins 44 and 45 above and below the cams 53 and 54 caused by the thrust on the tool carriage 47 which will be apparent hereinafter.

In the embodiment shown five tools 59 are secured in tool slots 60 in the tool carriage 47 by set screws 61, the said tools being set at distances apart equal to those of the tools 36 in the rotary cutter chuck 35.

The operation of the tools 59 and their operating mechanism is clearly shown in Fig. 6, in which sixteen successive positions of the several parts during one revolution of the shafts 10 and 11 are indicated by numerals from 1 to 16 and the face of the stock 43 at the point where the tools 59 enter the same is indicated by the dotted line *a*—*b*.

Referring to Fig. 6, the tools enter the stock at the position 2 while the motion of the tool carriage 47 with the stock begins at the position 1. With this arrangement the tool carriage 47 acquires momentum before the actual cutting action begins which produces a more balanced action of the machine and greatly diminshes the vibration caused by the too sudden occurrence of resistance at any one point in the cycle.

The rotary cutter and the tool carriage 47 are positioned in such a manner relative of the connected driving trains that the tools 59 will exactly register at the position 2 with incisions previously made by the tools 36. The throw of the wrist pins 44 and 45 is such that after one set of incisions has been made by the tools 59 the five tools 59 will be returned by one revolution of the shafts 10 and 11 and exactly register with the next succeeding five incisions made by the tools 36. As the shafts 10 and 11 make three revolutions to one of the rotary cutter the tools 59 will make fifteen incisions in the same time that the fifteen tools 36 on the rotary chuck make fifteen incisions

The tools 59 are carried during the times they are within the profile of the stock at exactly the same speed as the stock 43 and hence make a clean incision. It will be noted that the deeper the tools 59 enter the stock and hence encounter more resistance they are driven slower, which equalizes in a measure the amount of power necessary to drive them and further aids in establishing a balanced movement of the machine.

It is obvious that I may use a greater or less number of tools on each of the tool-carrying members and proportion the parts to accord, as well as employ other arrangements of the details of construction to suit the exigencies of the particular case, without departing from the scope of my invention.

The box-like form of support shown is particularly advantageous in a machine of this character as the gearing is entirely inclosed and protected from defilement by the dust and chips and guarded from possible contact with the operator.

Having described my invention I claim—

1. In a carving machine, the combination with a carrier, of a plurality of parallel synchronously rotating shafts, equal-throw cranks on said shafts connected to and carrying said carrier for translating the same through a circular orbit, a tool carriage independently movable on said carrier, cams on said cranks in continued operative connection with the tool carriage for moving said tool carriage on said carrier and varying the normal speed and orbit of the said tool carriage, a positively-driven feed roll geared with said shafts to have a peripheral velocity equal to the velocity of movement of said tool carriage, means for positively driving said feed shafts, and a rotatable peripheral cutter connected to said roll to have a peripheral velocity equal to that of said feed roll.

2. In a carving machine, the combination with a carrier, of a pair of synchronously rotating equal-throw cranks connected to and carrying said carrier for translating the same through a circular orbit, a tool carriage independently movable on said carrier, cams on said cranks in continued operative connection with the tool carriage for moving said tool carriage on said carrier and varying the normal speed and orbit of the said tool carriage, a positively-driven feed roll geared with said cranks to have a peripheral velocity equal to the velocity of movement of said tool carriage, and a rotatable peripheral cutter connected to said feed roll to have a peripheral velocity equal to that of said feed roll.

3. In a carving machine, the combination with a carrier, of means for translating the same through a circular orbit, a tool carriage independently movable on said carrier, means for moving said tool carriage on said carrier and varying the normal speed and orbit of the said tool carriage, a feed roll, means for positively driving the feed roll with a peripheral velocity equal to the velocity of movement of said tool carriage, and a rotatable peripheral cutter connected to said feed roll to have a peripheral velocity equal to that of said feed roll.

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Witnesses:

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