No. 701,903. Patented June 10, 1902.

E. R. LOCHMAN.

CARVING MACHINE.

(Application filed July 8, 1901.)

(No Model.) 5 Sheets—Sheet 1.

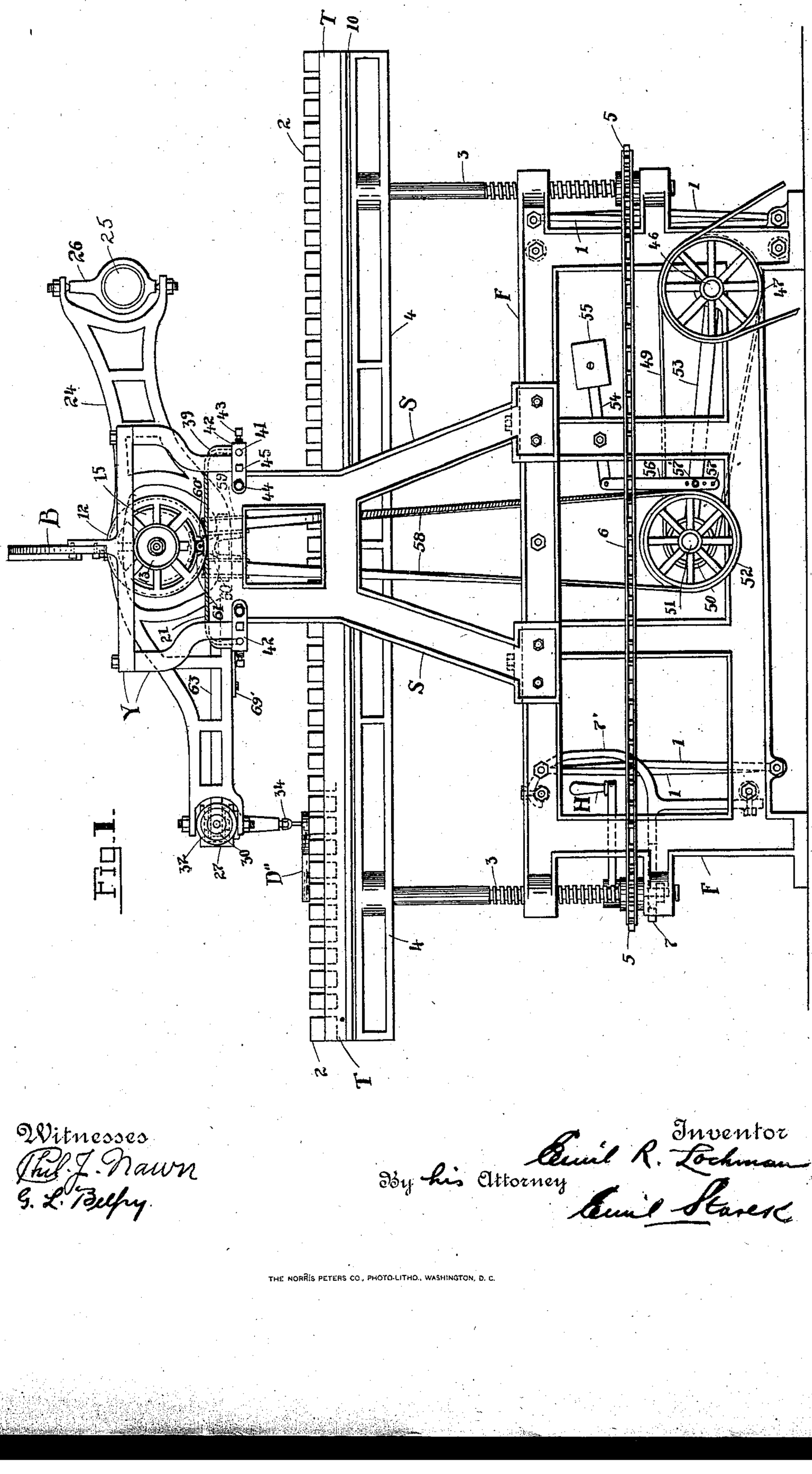

FIG. 1.

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(No Model.) 5 Sheets--Sheet 2.

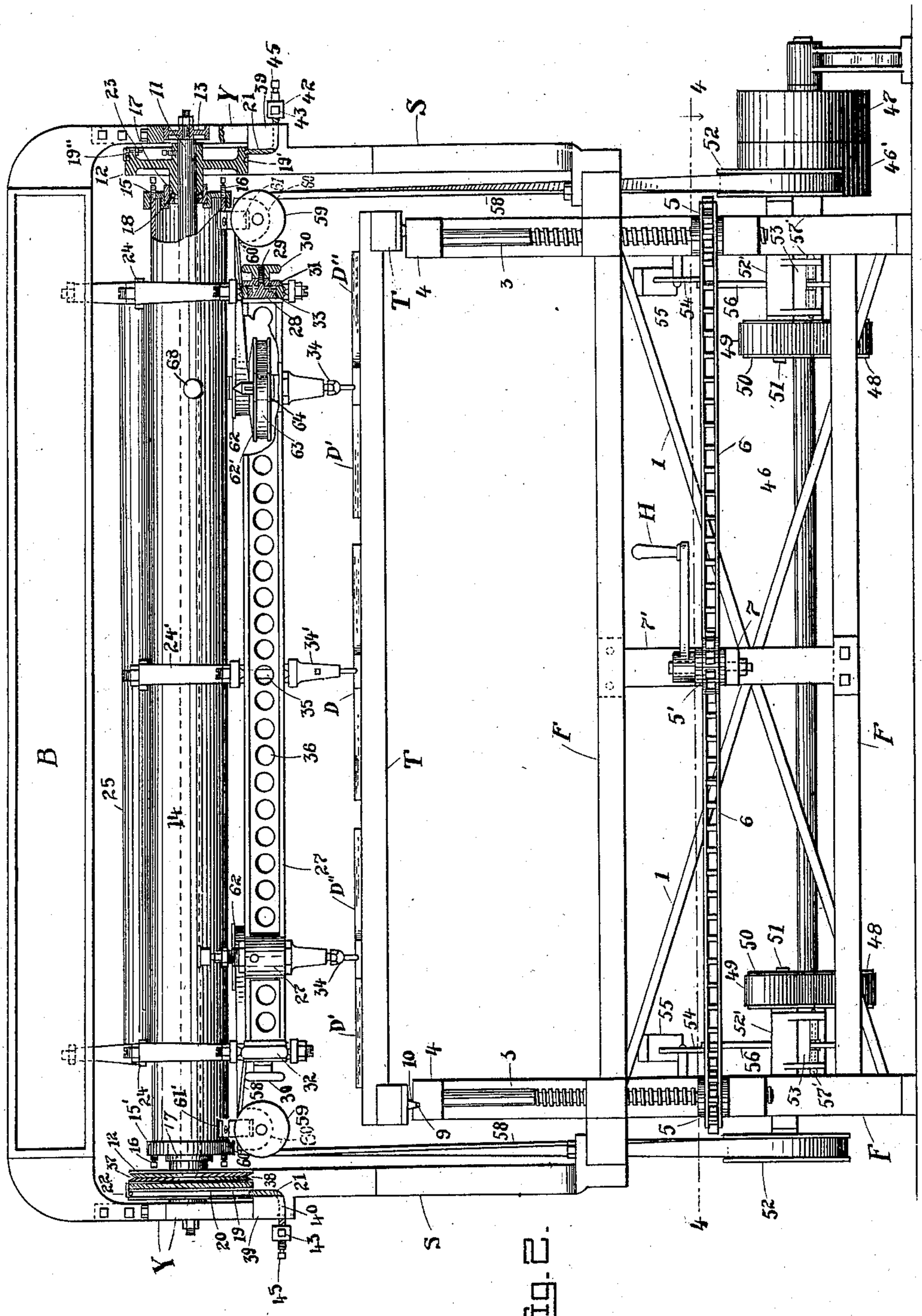

FIG. 2.

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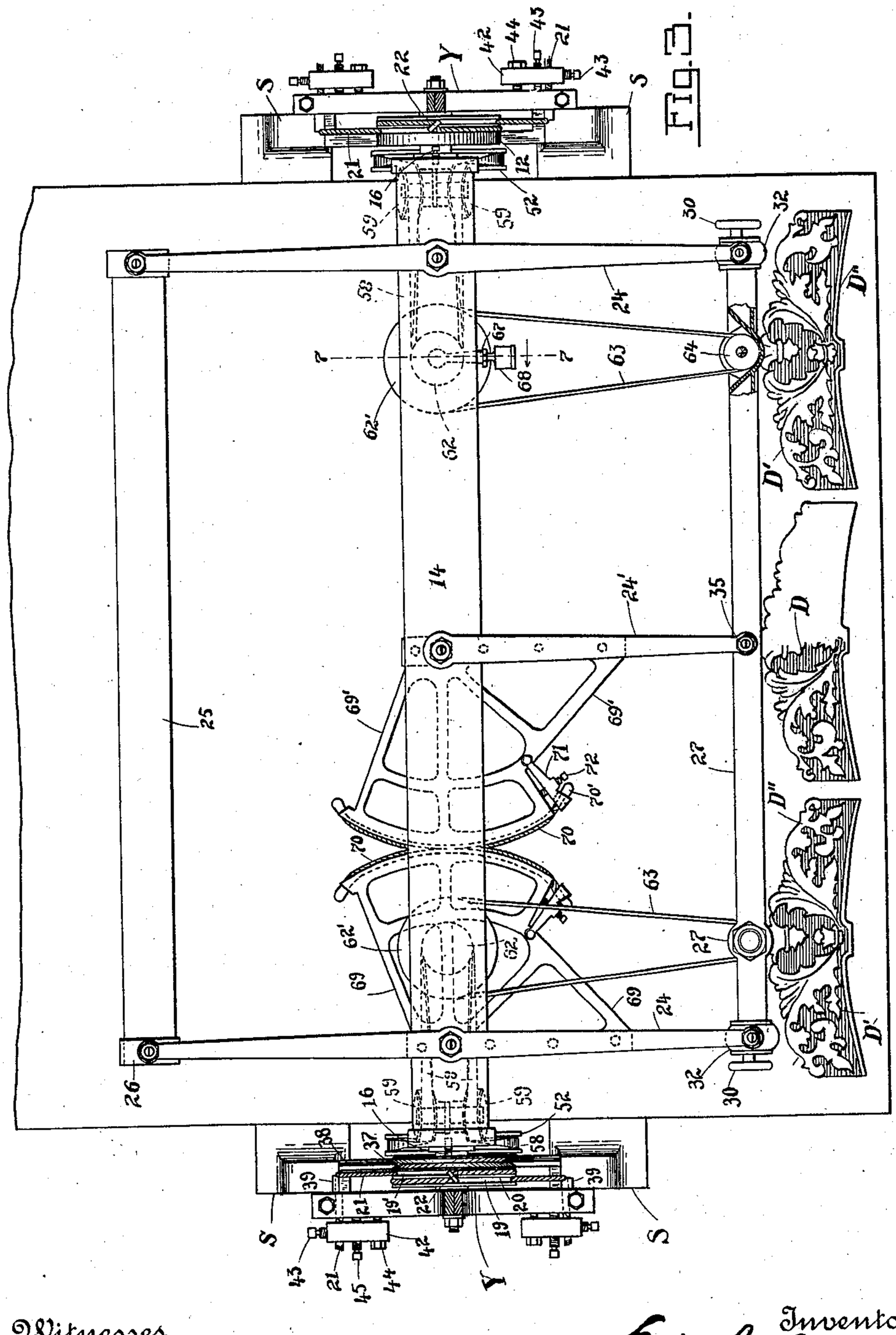
(Application filed July 8, 1901.)

(No Model.) 5 Sheets—Sheet 3.

FIG. 3.



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No. 701,903. Patented June 10, 1902.

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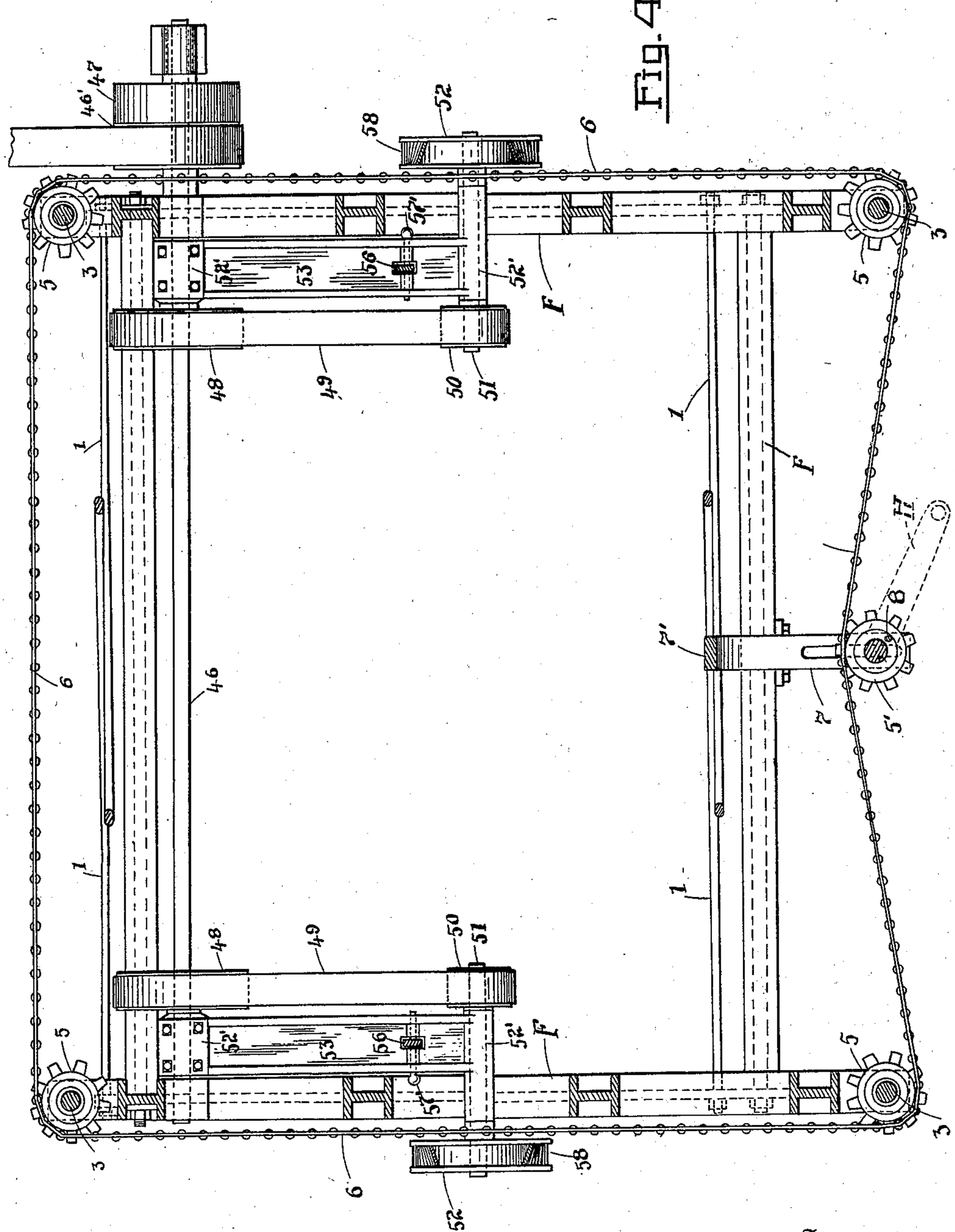
CARVING MACHINE.

(Application filed July 8, 1901.)

(No Model.) 5 Sheets—Sheet 4.

Fig. 4.



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CARVING MACHINE.

(Application filed July 8, 1901.)

(No Model.) 5 Sheets—Sheet 5.

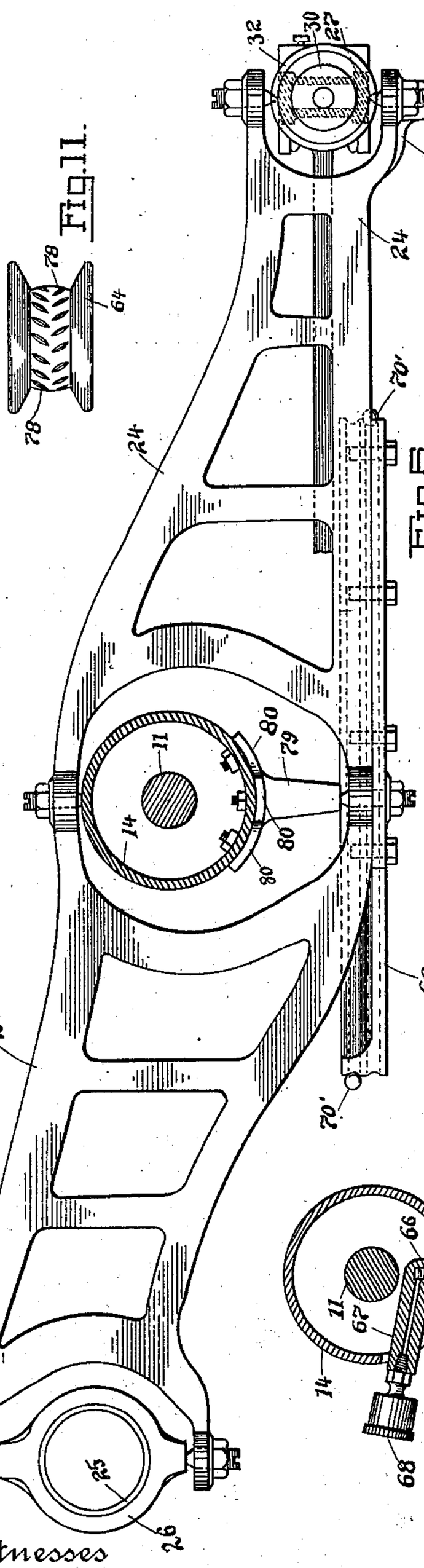

Fig. 6.

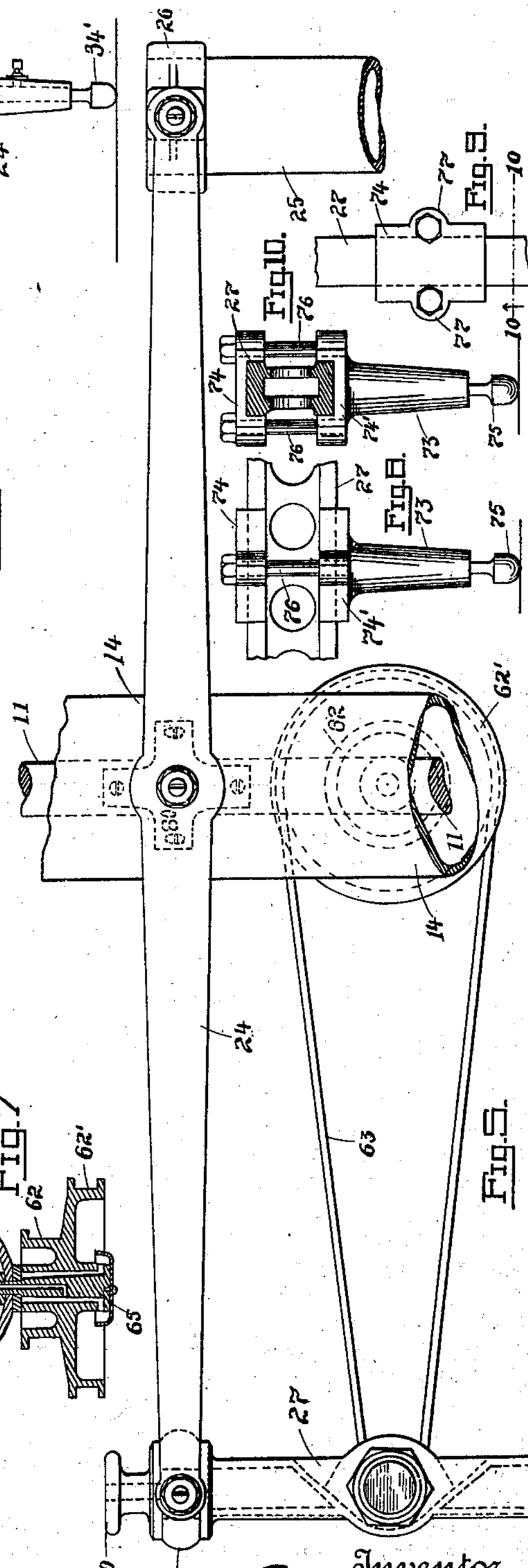

Fig. 10.

Fig. 9.

Fig. 8.

Fig. 7.

Fig. 5.

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UNITED STATES PATENT OFFICE.

EMIL R. LOCHMAN, OF ST. LOUIS, MISSOURI.

CARVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 701,903, dated June 10, 1902.

Application filed July 8, 1901. Serial No. 67,487. (No model.)

To all whom it may concern:

Be it known that I, EMIL R. LOCHMAN, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Carving-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in wood-carving machines; and it consists in the novel construction and arrangement of parts more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a side elevation of the machine. Fig. 2 is a front elevation thereof. Fig. 3 is a top plan view. Fig. 4 is a horizontal section on line 4 4 of Fig. 2. Fig. 5 is a detail top plan showing the connection of one end of the tool-supporting bar to the swinging arm mounted on the tool-carriage and the connection between said arm and the outer tube of the carriage, the reverse cutting attachment being omitted. Fig. 6 is a side elevation of one of the outer swinging arms, showing the manner of securing the same to the outer tube (shown in section) of the tool-carriage and showing the reverse cutter attachment in edge view. Fig. 7 is a cross-sectional detail taken on line 7 7 of Fig. 3, through the tube of the tool-carriage along a plane passing through the spindle and step-pulley from which motion is imparted to the tool-spindle and showing also the oiling device therefor. Fig. 8 is a front elevational detail showing manner of clamping the substitute tracer to the tool-supporting bar. Fig. 9 is a top plan thereof. Fig. 10 is a cross-section on line 10 10 of Fig. 9; and Fig. 11 is a detail elevation of the tool-spindle pulley, showing the specific belt-gripping surface formed thereon.

The present invention relates to that class of wood-carving machines in which the stock is mounted or supported on a horizontally-disposed stock-holding table or board adjustable horizontally and vertically by mechanism of any approved construction, though in the present instance a specific adjusting device is resorted to by reason of its special adaptability.

The object of the invention is to construct a machine which will be simple, light, and durable; one possessing a minimum number of parts, whereby the danger of getting out of order is reduced to a minimum; one in which, irrespective of the feed to which the stock-board and operating-table may have imparted to it, a limited range of operation is inherent in the cutting-tools along said board, such limited movement of the tool series insuring results eminently uniform in all essential particulars.

A further object is to construct a machine adaptable for the ready attachment to or removal therefrom of a reverse cutting attachment—that is to say, an attachment whereby any particular pattern traced by the tracer-tool may have its reverse counterpart reproduced by the cutting-tools, and finally to construct a machine presenting further and other advantages better apparent from a detailed description of the invention, which is as follows:

Referring to the drawings, F represents a suitable supporting-frame (braced by the cross tie-rods 1 1) adapted to support the operating-table T, which in turn carries the stock board or frame 2. Projecting from the frame F at each end thereof are standards S for the support of the tool-carriage, the upper ends of the standards being connected by a tie-bar B. The operating-table is adjustable both vertically and horizontally, as apparent from the following mechanism: Mounted at the corners of the frame F are adjusting screw-bolts 3 3, each carrying at the bottom of the screw-threaded portion a nut freely rotatable about said portion and resting on the frame, the upper ends of the bolts being rigidly secured to the tracks 4, on which the table is supported. The periphery of each nut carries a sprocket-wheel 5, over which passes a sprocket-chain 6, the forward lap of the latter additionally passing over a rotatable driving sprocket-wheel 5′, mounted at the middle of the front of the frame on the end of an arm or bracket 7, forming a part of a vertical brace 7′, bolted to the frame. The hub of the wheel 5′ is actuated by an operating-handle H, the socket of which is passed over the stud of the hub in the nature of a key, whereby when rotation is imparted to the handle the chain will be driven in the

proper direction, thus imparting rotation to the several sprocket-wheel nuts and accordingly raising or lowering the bolts 3 and the table supported thereby. The engagement between the handle H and the hub of the sprocket-wheel 5′ is accomplished by a pin 8, (see Fig. 4,) carried by the handle, entering a socket formed for its reception in the hub of said wheel, although any other equivalent mechanical arrangement would answer the same purpose. To allow for a horizontal adjustment or feed of the table T along the tracks 4, one of the latter is provided with a groove 9, which receives a corresponding tongue 10 at the base of the table, permitting the latter to be advanced horizontally along the tracks and properly guided by the tongue and groove referred to.

It was stated above that the standards S serve to support the tool-carriage, the latter having a motion of translation backward and forward in a plane parallel to the plane of the operating-table, the range of such reciprocating movement of the carriage being limited to the width of the housing within which the opposite ends of the tool-carriage shaft are confined. This housing is formed by the upper surface or edge of the standard proper and the yoke Y, carried by (or forming part of) the standard, said upper edge and the inner edge of the horizontal member of said yoke forming tracks or ways for the travel of the wheels respectively supporting and guiding said carriage, as presently to be seen.

The composition of the tool-carriage is as follows: The said carriage comprises a central longitudinal axis or shaft 11, whose opposite ends have secured thereto the supporting-wheels 12 12 and the exterior guide-rollers 13 13, the former running on horizontal tracks formed by the upper edges of the standards S and the latter running along the inner edges of the horizontal members of the yokes Y, as previously specified, it being understood that the wheels 12 are rigidly secured to said shaft 11, while the rollers 13 are loose thereon, the result being to cause the latter to revolve in a direction opposite to that of the former, such arrangement being necessary since the rollers run on a track above the axis of the shaft 11, while the wheels 12 run on ways below such axis. Surrounding said shaft 11 is a pipe-section or tube 14, whose opposite screw-threaded ends are coupled to the shaft by caps or disks 15, whose peripheral flanges 15′ are screwed to said ends and when properly adjusted are finally secured by the tightening-bolts 16, carried by the disks and driven against the ends of the pipe. The outer face of each disk has formed thereon a pocket for the reception of a cup 17, between whose peripheral walls and the hub of the wheel 12 are inserted antifriction-balls 18. The snug adjustment of the parts, whereby no possible lost motion will be possible, is effected by carefully adjusting the position of the disks 15 along the tube 14, the construction permitting the cup 17 and balls carried thereby to be forced snugly against the hubs of the wheels 12. To hold the carriage steady while rolling back and forth in its ways, each wheel 12 has formed thereon two parallel peripheral grooves 19 19′, connected by a diagonal depression 19″, cut in the rib 20, separating the grooves, the grooves receiving a suitable band or cable 21, which is partially wrapped about the outer groove 19, thence crosses the depression 19″, and then wraps about the opposite half of the groove 19′, the ends of the cable being respectively connected to the front and back of the standards S and the portion of the cable crossing the depression 19″ being secured by a staple 22, straddling the cable at that point, the arms of the staple being passed through the flange of the wheel and then fastened by nuts 23, passed over their screw-threaded ends. It is obvious from the connections just described that upon pulling or pushing the tube 14 in either direction motion will be imparted to the wheels 12 and the carriage be reciprocated accordingly. It is also apparent that owing to the limited reciprocation imparted to the carriage the portion of the band 21 spanning the depression 19″ will never leave the wheel, since the band will never be unwrapped from the wheel to that extent. At each end the carriage-tube 14 is pivotally embraced by the horizontally-swinging arms 24, the pivots of the arms gripping the tube so as to rotate the same about its axis when said arms are swung in a vertical plane, it being understood that the tube 14 is free to rotate about the shaft 11 from the connections already described. The middle of the tube 14 is likewise embraced by an arm 24′, which carries the tracer. The arms 24 extend a suitable distance rearwardly to insure a perfect balance for the same, said rear ends being connected by a pipe 25, whose opposite ends are mounted in rings 26, pivotally connected to said rear extensions. The forward forked ends of the arms 24 have pivotally mounted between them the tool-supporting bar 27, the connection being effected as follows: The opposite ends of the bar 27 are provided with reduced cylindrical extensions or bosses 28, from which extend the stems 29, having screw-threaded ends, about which are passed the clamping-nuts 30, adapted to bear against the washers 31 and force the latter firmly against the adjacent faces of the rings 32, which are passed about the bosses 28. The latter are additionally provided with pins 33, which enter suitable sockets in the washers. The forked ends of the arms 24 directly and pivotally embrace the rings 32. The arrangement just described permits any rotary adjustment of the tool-supporting bar 27 by first rotating the same to any position (the nuts 30 being first loosened for the purpose) within the rings 32 and then firmly driving home the nuts, after which the bar 27, rings 32, washers 31, and nuts 30 form for all purposes a single mechanical

unit. The tool-spindles 34 are mounted in the bar 27 in any well-known manner, rotation being imparted to each spindle by connections presently to be described. The forward forked end of the tracer-arm 24′ pivotally embraces the bar 27 directly above the tracer 34′, being pivotally connected to the bar by a coupling-pin 35, dropped through the upper member of the fork and through the upper and lower walls of the bar, the latter being virtually a hollow beam the vertical walls of which are provided with openings 36 to lighten the weight thereof. It is apparent from the foregoing that by seizing the tracer 34′ and swinging the same to the right or left along the stock operated on the tool-spindles 34 and the arms 24, carrying the same, will assume the same movement, and likewise if the tracer is lifted or depressed the arms 24 and tool-spindles 34 will move jointly with it, it being understood that the tube 14, to which they are coupled, is free to rotate about the shaft 11. Thus it is seen that while the tool-carriage can have imparted thereto a limited rectilinear movement over the stock-table in a plane parallel to the latter the tools have an independent swinging movement both in vertical and horizontal planes about the axis (shaft 11) of said carriage. Reverting back to the tool-carriage, motion is imparted thereto by rolling the same on the wheels 12, which latter are embraced by the cables 21, which insure rigidity for the parts and insure a response for the wheels to the slightest pressure on the carriage. One of the wheels 12 has formed thereon a peripheral groove 37, with which there engages a corresponding rib 38 on the standard S, whereby any lateral binding of the carriage is reduced to a minimum. Should the cable 21 in time become loose and fail to sufficiently grip the periphery of the wheel 12, it may be tightened as follows: As seen from the drawings, after the end of the cable leaves the wheel 12 it is passed downwardly over the rounded corner of a projection 39 of the casting forming the standard S, thence outwardly through a groove or depression 40 formed along the lower edge of said projection, and finally passing through an eye 41 of a block 42, in which eye it is securely held by the tightening-screw 43. The block has its opposite end secured by means of a screw 44 to the standard, the opening in the block through which said screw 44 passes being sufficiently large to allow for a slight oscillating movement thereof in a horizontal plane. Through the middle of the block is passed a screw-threaded bolt 45, the base of which bears against the standard S, and by turning the bolt 45 in proper direction it will force the end of the block through which the cable is passed away from the standard, drawing on and tightening the cable.

As the tool-carriage is directly connected to the main drive-shaft through intermediate belt connections, which allow for the reciprocations thereof under all circumstances, it will be in order at this time to describe these connections.

The main drive-shaft 46 carries tight and loose pulleys 46′ 47, respectively driven from any suitable source of power. (Not shown.) Interior to the pulleys 46′ 47 and fixed to the main drive-shaft at each end thereof is a pulley 48 of equal proportions, a belt 49 leading therefrom and passing over a smaller pulley 50 at the inner end of an oscillating shaft 51, whose outer end carries a peripherally-grooved pulley 52 exterior to the ends of the frame F. Embracing the opposite ends of the shafts 46 and 51, respectively, are the opposite looped ends 52′ 52′ of an arm 53, the shaft 46 serving as a fulcrum or axis of oscillation for said arm. The normal tendency of the free end of the arm 53 is to drop or gravitate, serving, as it does, to carry the pulleys 50 and 52 and their common shaft 51. This tendency to drop is arrested by a lever 54, pivoted to the frame and carrying an adjustable weight 55 on one arm thereof, the opposite arm of the lever being connected pivotally to a connecting-link 56, whose lower end is provided with a series of openings 57 for the passage of a pin 57′, securing it to the oscillating arm 53. The object of the openings 57 is to enable the operator to adjust the point of connection according to the degree to which the belt 58, leading from the pulley 52 to the tool-carriage, has stretched. The loops of the belt 58 pass over the vertically-rotating guide-pulleys 59, mounted in a saddle 60, pivotally suspended by ears 60′ from the lug 61, forming the lower projection of a casting 61′, secured to the tube 14. After leaving the pulleys 59 the laps of the belt 58 pass around the upper reduced section 62 of the step-pulley 62 62′. Over the large section 62′ there passes forward a belt 63, which likewise passes over the grooved pulley 64, carried by the tool-spindle. The stationary spindle 65 of the pulley 62 62′ is mounted to the carriage-tube 14 by the following mechanism: The inner end of the spindle is screwed into a nipple 66, which forms the base of a longitudinally-perforated arm 67, projecting through the peripheral wall of the tube, the said projecting end carrying an oil-cup 68, from which and through the perforated arm the oil is fed to the pulley 62 62′, the spindle having oil-passages leading to the nipple. The purpose of mounting the pulleys 50 and 52 at the end of the oscillating arm 53 is now apparent. As the carriage reciprocates in its backward and forward travels on the standards S it is apparent that it will draw the belt 58 after it, and were the shaft 51 mounted in fixed bearings it would be impossible to move the carriage. Of course the oscillation imparted to the free end of the shaft 51 as a result of the reciprocations of the tool-carriage is but slight. It is also obvious why the pulleys 59 are mounted in a pivotally-suspended saddle. The tension of the laps of the belt 58 will retain the sad-

dle in an approximately horizontally suspended position under all circumstances, owing to the pivotal suspension thereof, not only during the reciprocations of the carriage, but in case of a rotary oscillation imparted to the tube 14 during any vertical sweep of the arms 24 24′.

Under the normal and prevailing operations of the machine the tracer-arm 24′ is coupled to the tool-supporting bar 27 through the medium of the coupling-pin 35, and any swing which may be imparted to the tracer-arm 24′ in a horizontal plane is responded to by a like sweep of the arms 24 24 and the tool-spindles mounted in the bar 27. In some cases, however, it is desirable while the tracer 34′ is making a sweep in one direction that the tool-spindles shall sweep in a diametrically opposite direction. This operation is resorted to where it is desirable to produce a reverse counterpart of the design or pattern traced by the tracer. I accomplish this result by a reverse cutting attachment which, while in general principles resembling the attachment shown and described in United States Letters Patent granted to me under date of September 25, 1900, numbered 658,380, in the present machine it forms a permanent part thereof and can be readily thrown out of engagement by a simple removal of its actuating-cords. It consists of the rocking segments 69 69′, respectively, secured directly to one of the arms 24 and the tracer-arm 24′, the curved grooved rocker-faces of the segments being united by two straps or cords 70, one end of each strap being connected to one end of one rocker-face and the opposite end to the opposite end of the opposite rocker-face, the rocking surfaces under the circumstances acting as two gear-wheels. While the reverse cutter attachment is in engagement the coupling-pin 35 is removed, thereby permitting the tracer tool and arm to swing horizontally in one direction while the tool-spindles are sweeping in the opposite direction. It thus becomes possible with a single pattern or design D (the reverse cutter being out of engagement) to produce under the normal operation of the machine a duplicate carved copy D′ thereof and upon coupling the reverse cutter to produce a reverse counterpart D″ from the same original design. The manner of disengaging the reverse cutter to allow for the machine to operate normally is apparent from the following construction: The opposite ends of the straps or cords 70 have terminal heads 70′, which partially enter the open or forked ends of the grooves formed for the reception of the cords. One head of each cord, however, is partially embedded or embraced by the forked end of the pivoted arm 71, through which passes a screw-bolt 72, bearing against the rocking segment carrying the same. By screwing the bolt the tendency is to force the free end of the arm 71 outward, drawing on the cord and securing it in place. To disengage the rocking segments, the bolt 72 is unscrewed, thereby loosening the cord sufficiently to permit removal of the same from the machine, when the tracer-arm can be coupled to the tool-supporting bar 27, as previously described.

It will be noticed from the foregoing that whether the machine operates under normal conditions or while the reverse cutter is brought into operation the axes of both the tracer-tool and the tool-spindles are disposed substantially at right angles to the plane of the operating-table T, so that no provision is made for any appreciable amount of under cut or upper cut, as these require a certain amount of inclination for the axes of the tools. When, therefore, any appreciable under cut or upper cut is desired, the tracer-arm 24′ must be removed and discarded altogether, (its presence not permitting any angular or rotary adjustment of the bar 27, since when coupled to said bar the latter could not be turned on account of the pin 35, and when uncoupled therefrom the tracer-tool would assume a different inclination from the tool-spindles,) and a distinct tracer-arm 73 must be substituted. This tracer-arm is secured at the center of the bar 27 or at any convenient point between the two tool-spindles as follows: Embracing the bar 27 above and below are plates 74 74′, the lower carrying the arm 73 and tracer 75, the plates themselves being coupled at points exterior to the bar 27 by bolts 76 passing through lugs 77. Under this arrangement any rotary adjustment can be given to the tool-supporting bar 27 through the medium of the bosses 28, stems 29, and clamping-nuts 30, as previously explained, and hence any desired inclination can be given to the tracer 75 and the revolving tool-spindles carried by the bar 27 for purposes of under-cutting or upper-cutting.

The designation "tool-carriage" in the present specification has reference to the tube 14, wheels 12, and their accessories, as previously outlined.

In the drawings several features appear in detail not herein described; but these form either the subject-matter of my patent already referred to or are well known in the art, and hence no specific reference thereto is made herein. There is one particular, however, in which the pulley of the tool-spindle is improved, as best shown in detail in Fig. 11. The periphery of said pulley has formed thereon on each side of the center a series of elongated depressions 78, tapering at each end, the axes of the depressions on each side being inclined to the center line of the periphery of the pulley. This inclination of the axes of the depressions serves to guide the belt toward the center of the pulley, and the edges of the depressions insure a perfect grip on the belt.

To insure a maximum degree of rigidity for the connections between the tube 14 and arms 24 24′, the pivots of said arms are separated a distance quite in excess of the outer diameter of the tube, the connection being effected by

causing the upper pivot to grip the tube direct, whereas the lower pivot is embedded at the end of a lug or teat 79, secured directly to the tube by screws passed through the flanges 80 at the base of the teat. The outer set of teats 79 serve also to separate the laps of the belts 58, leading from the pulleys 59 of the saddle 60.

It is to be understood that I may depart in a measure, especially in the matter of minor details, from the construction herein set forth without affecting either the nature or spirit of my invention.

Having described my invention, what I claim is—

1. In a carving-machine, a suitable operating-table, a tool-carriage comprising an inner longitudinal shaft and an outer tube freely rotatable about the same mounted in proximity to said table, and having a motion of translation parallel therewith, swinging arms mounted on the carriage and adapted to sweep in planes parallel, and at right angles to the operating-table, and tools in coöperative connection with the free ends of said arms, substantially as set forth.

2. In a carving-machine, a suitable operating-table, means for adjusting the same in planes parallel and at right angles to the operating-surface thereof, a tool-carriage comprising an inner longitudinal shaft and an outer tube freely rotatable about the same mounted in proximity to the table and having a motion of translation parallel with the operating-surface of the table, swinging arms mounted on the carriage and adapted to sweep in planes parallel to and at right angles to the operating-surface of the table, and tools, in cooperative connection with the free ends of said arms, substantially as set forth.

3. In a carving-machine, a suitable operating-table, a tool-carriage comprising an inner longitudinal shaft having a motion of translation in a plane parallel to the operating-surface of said table, and an outer tube freely rotatable about said shaft, swinging arms pivotally mounted about said tube and adapted to sweep in planes parallel and at right angles to the said operating-surface, and tools in cooperative connection with the free ends of said arms, substantially as set forth.

4. In a carving-machine, a suitable operating-table, means for feeding or advancing the same in a plane parallel to the operating-surface thereof, a tool-carriage having an inner longitudinal shaft and an outer tube rotatable about the same mounted in proximity to the table and having a reciprocating motion parallel to said operating-surface, swinging arms mounted on the carriage and adapted to sweep in planes parallel, and at right angles to the operating-surface, and in lines at right angles to the direction of the feed of said table, and tools in coöperative connection with the free ends of said arms, substantially as set forth.

5. In a carving-machine, a suitable tool-carriage having a central longitudinal shaft, means for supporting and guiding the opposite ends thereof, a tube enveloping said shaft and freely rotatable about the same, and a series of arms connected to said tube, and tools in coöperative connection with the free ends of said arms, substantially as set forth.

6. In a carving-machine, a tool-carriage having a central longitudinal shaft, wheels for supporting the opposite ends of the shaft, ways on which said wheels travel, a tube enveloping said shaft and freely rotatable about the same, a series of tools, and intermediate connections between the tools, and the tube, substantially as set forth.

7. In a carving-machine, a tool-carriage having a central longitudinal shaft, wheels for supporting the opposite ends thereof, a hollow tube enveloping the shaft, terminal adjustable disks secured to the ends of the tube, a cup located along the outer surface of each disk, and antifriction-balls interposed between each cup and the hub of the adjacent wheel, substantially as set forth.

8. In a carving-machine, a tool-carriage having a central longitudinal shaft, wheels for supporting the opposite ends of the shaft, parallel peripheral grooves formed in the wheels, and cables wound about the grooves and having their free ends secured to a stationary part of the machine, substantially as set forth.

9. In a carving-machine, a tool-carriage having a central longitudinal shaft, wheels for supporting the opposite ends thereof, parallel peripheral grooves formed in the wheels, a cable wrapped about the grooves and having its opposite ends secured to a stationary part of the machine, a diagonal depression cut from the rib separating the grooves to allow the wrap of the cable to cross from one groove to the other, and a staple for securing the portion of the cable spanning said depression, substantially as set forth.

10. In a carving-machine, a tool-carriage having a central longitudinal shaft, wheels for supporting the opposite ends thereof, parallel peripheral grooves formed in the wheels, a cable wound about the grooves, suitable rounded and grooved projections formed on a stationary part of the machine about which the ends of the cable pass, a block having a fixed end and a free end, the free end having an eye for the reception of the end of the cable, a screw for securing the cable within the eye, and a screw operating through an intermediate portion of the block for forcing the free end away from the machine and thus tightening or drawing upon the cable, substantially as set forth.

11. In a carving-machine, a suitable reciprocating tool-carriage means for supporting the same, a main drive-shaft, a swinging arm having one end loosely embracing said shaft, a second or counter shaft disposed parallel to the main shaft, and carried by the other end of said arm, belt-and-pulley connections be-

tween the shafts, a driving-pulley carried by the counter-shaft, a saddle pivotally suspended from the tool-carriage, guide-pulleys mounted in said saddle, a second pulley mounted on the tool-carriage, a belt passing over the driving-pulley on the counter-shaft and the second pulley on the tool-carriage, and having its respective laps passing over the pulleys of the saddle, the counter-shaft being adapted to rise and fall with the reciprocations of the carriage, a weighted balance-lever pivoted to the stationary part of the machine, and a link pivotally coupling the end of one arm of said lever, to the arm interposed between the main shaft and counter-shaft, substantially as set forth.

12. In a carving-machine, a suitable tool-carriage having an inner longitudinal shaft, stationary ways for supporting and guiding the opposite ends thereof, an outer rotatable tube inclosing said shaft, swinging arms pivotally mounted on said tube, a tool-supporting bar carried between the free ends of said arms, a tracer-arm similarly pivoted to the tube, and having a forked forward end embracing the tool-supporting bar, and a coupling-pin passed through said fork and into said bar, substantially as set forth.

13. In a carving-machine, a tool-carriage having an inner longitudinal shaft, means for supporting the same, an outer tube enveloping said shaft, a stationary spindle projecting from the periphery of the tube, a pulley mounted on the spindle, a nipple coupled to the inner end of the spindle and having a longitudinally-perforated arm passing through the wall of the tube and an oil-cup at the other projecting end of said arm, the spindle being provided with suitable oil-passages leading to the pulley, substantially as set forth.

14. In a carving-machine, a series of swinging arms, a tool-supporting bar at the free ends of the said arms, the opposite ends of the bar having each formed therewith a cylindrical boss, a stem projecting beyond each of said bosses, a ring loosely embracing each boss, a clamping-nut passed about the stem, a washer interposed between the nut and boss, pins or pegs projecting from the ends of the boss and entering the washer, the free ends of the swinging arms pivotally embracing the rings, substantially as set forth.

15. In a carving-machine, a tool-carriage having a longitudinal shaft, stationary ways for guiding and supporting the opposite ends thereof, said shaft being movable in a direction parallel to itself, a tube enveloping said shaft and freely rotatable about the same, and a series of tools connected to said tube, substantially as set forth.

16. In a carving-machine, a tool-carriage having a longitudinal shaft, wheels for supporting the opposite ends thereof, ways or tracks on which said wheels travel, a tube enveloping said shaft and freely rotatable about the same, and a series of tools connected to said tube, substantially as set forth.

17. In a carving-machine, a tool-carriage having a central longitudinal shaft, wheels for supporting the opposite ends of the shaft, ways or tracks on which said wheels travel, a tube enveloping said shaft and freely rotatable about the same, and a series of tools connected to said tube, substantially as set forth.

18. In a carving-machine, a tool-carriage having a central longitudinal shaft, wheels for supporting the opposite ends of the shaft, peripheral grooves formed in the wheels, and cables wound about the grooves and having their free ends secured to a stationary part of the machine, substantially as set forth.

19. In a carving-machine, a tool-carriage having an inner longitudinal shaft, wheels for supporting the opposite ends of the same, cables wound about the wheels and having each one end fastened to the wheel and the opposite end to a stationary part of the machine, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

EMIL R. LOCHMAN.

Witnesses:
EMIL STAREK,
G. L. BELFRY.