No. 658,380. Patented Sept. 25, 1900.

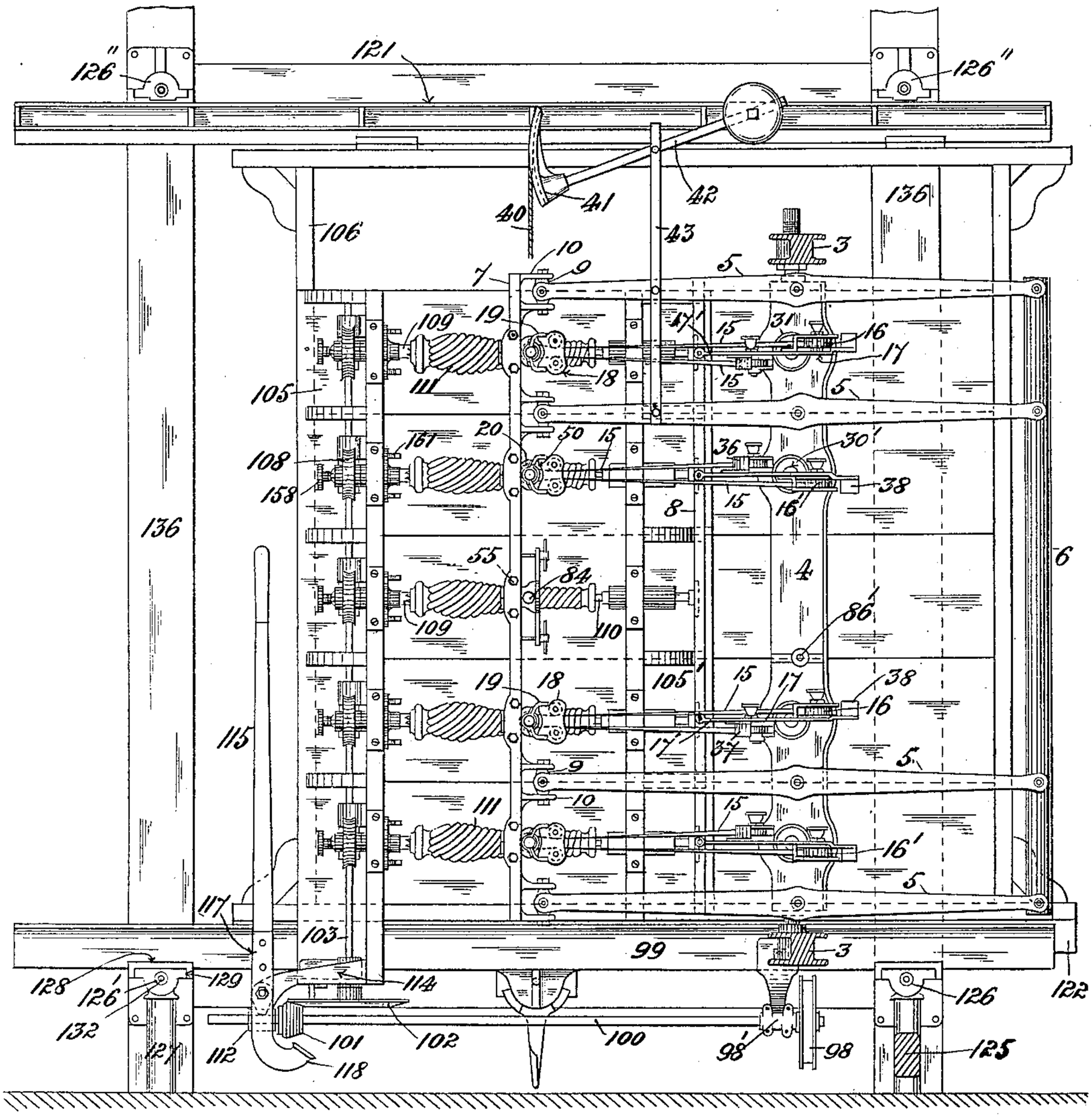
E. LOCHMAN.

CARVING MACHINE.

(Application filed June 30, 1898.)

(No Model.) 8 Sheets—Sheet 1.

Fig. 1.



WITNESSES
Edward W Farrell.
George L. Bilby.

INVENTOR,
Emil Lochman
by
Emil Stanek atty.

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Fig. 2.

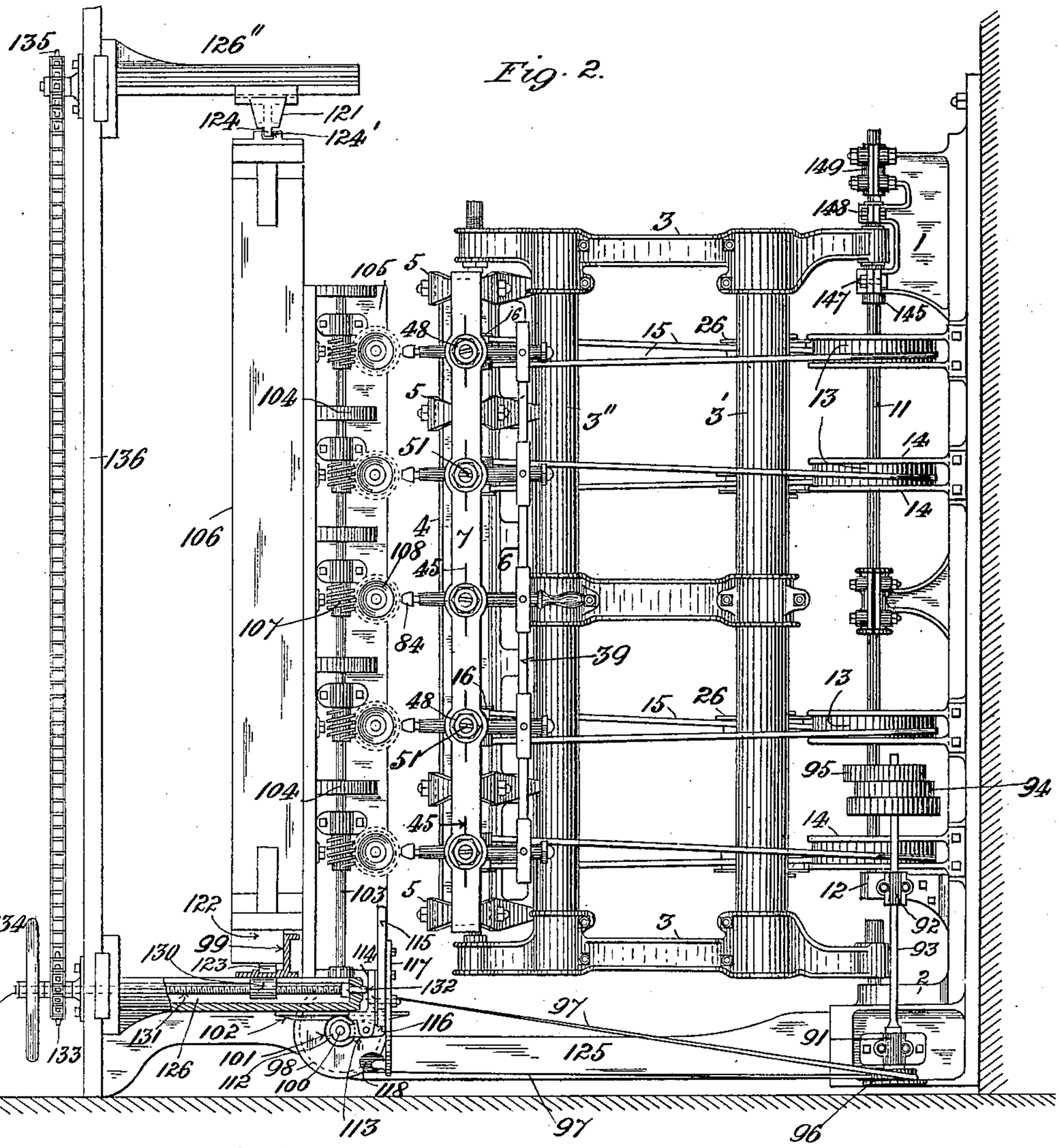


Fig. 3.

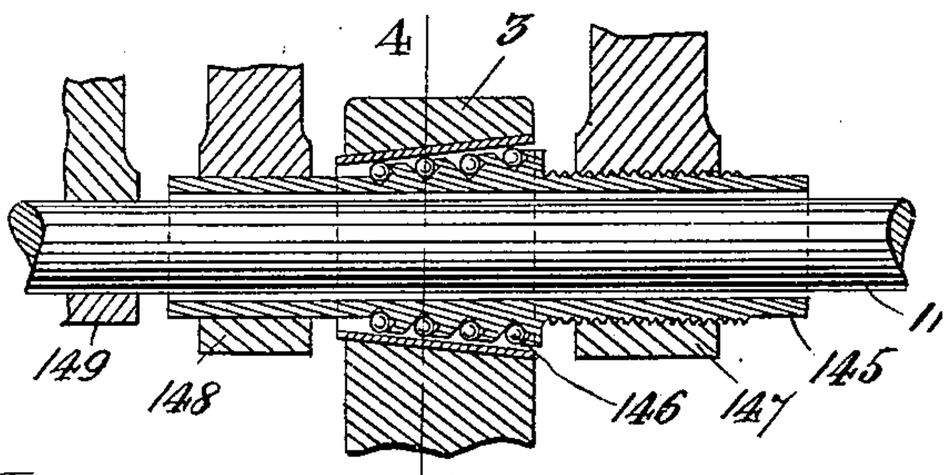
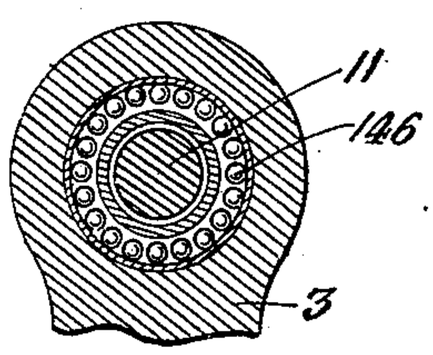


Fig. 4.



WITNESSES
Edward W. Farrell.
George L. Bilby.

INVENTOR
Emil Lochman
by
Emil Starek atty.

No. 658,380. Patented Sept. 25, 1900.

E. LOCHMAN.

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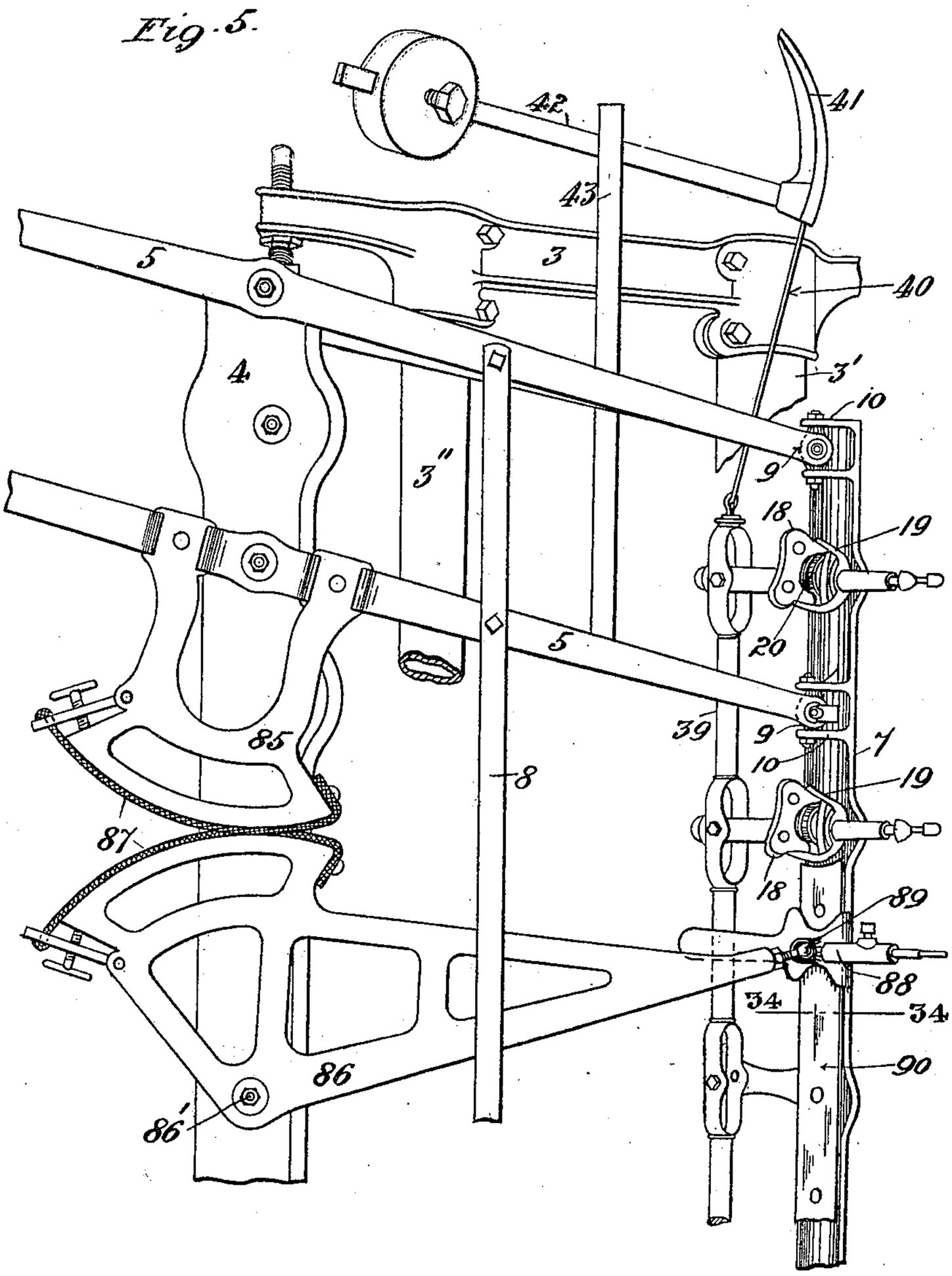
(No Model.) 8 Sheets—Sheet 3.

Fig. 5.



WITNESSES
Edward W. Farrell
George L. Bugby

INVENTOR,
Emil Lochman
by
Emil Starek atty

No. 658,380. Patented Sept. 25, 1900.

E. LOCHMAN.

CARVING MACHINE.

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(No Model.) 8 Sheets—Sheet 4.

Fig. 6.

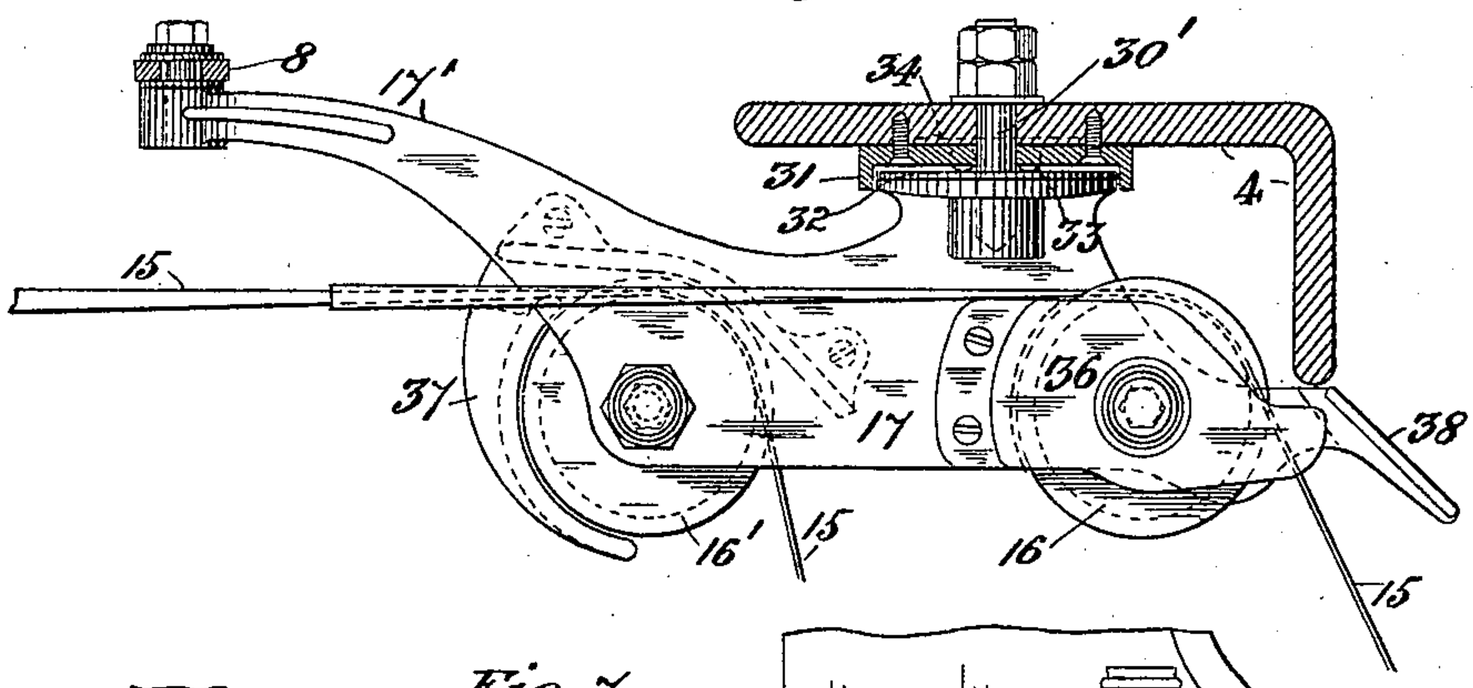


Fig. 7.

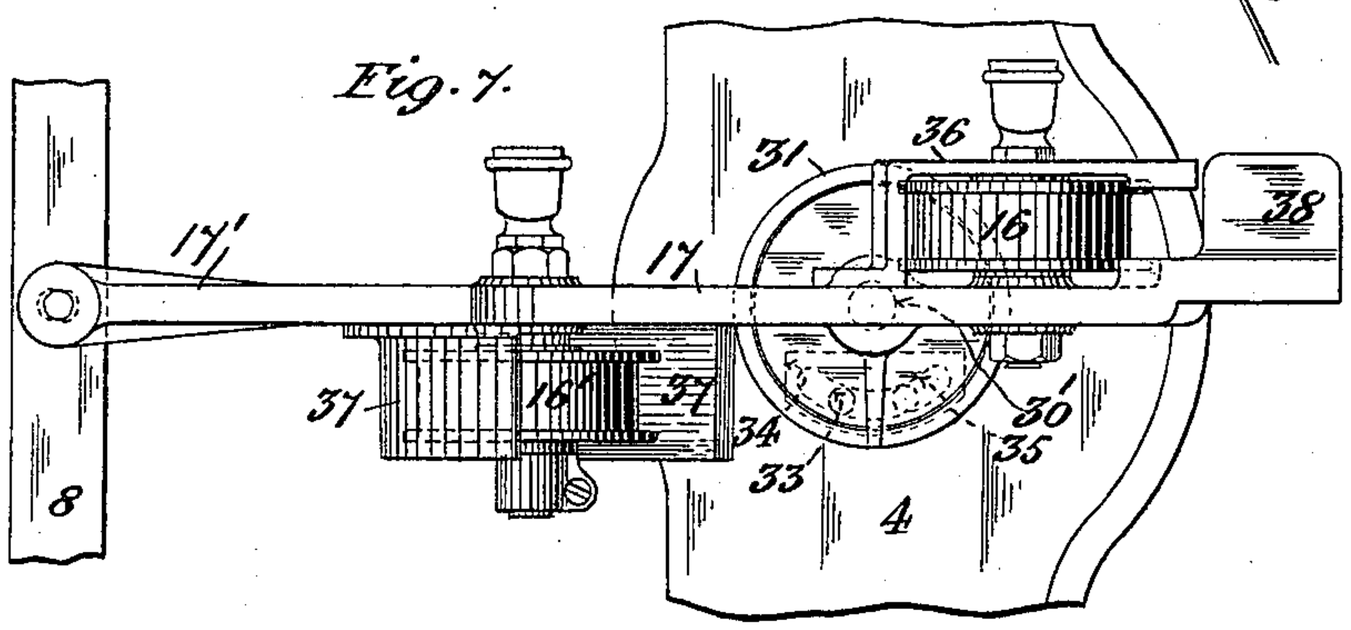


Fig. 8.

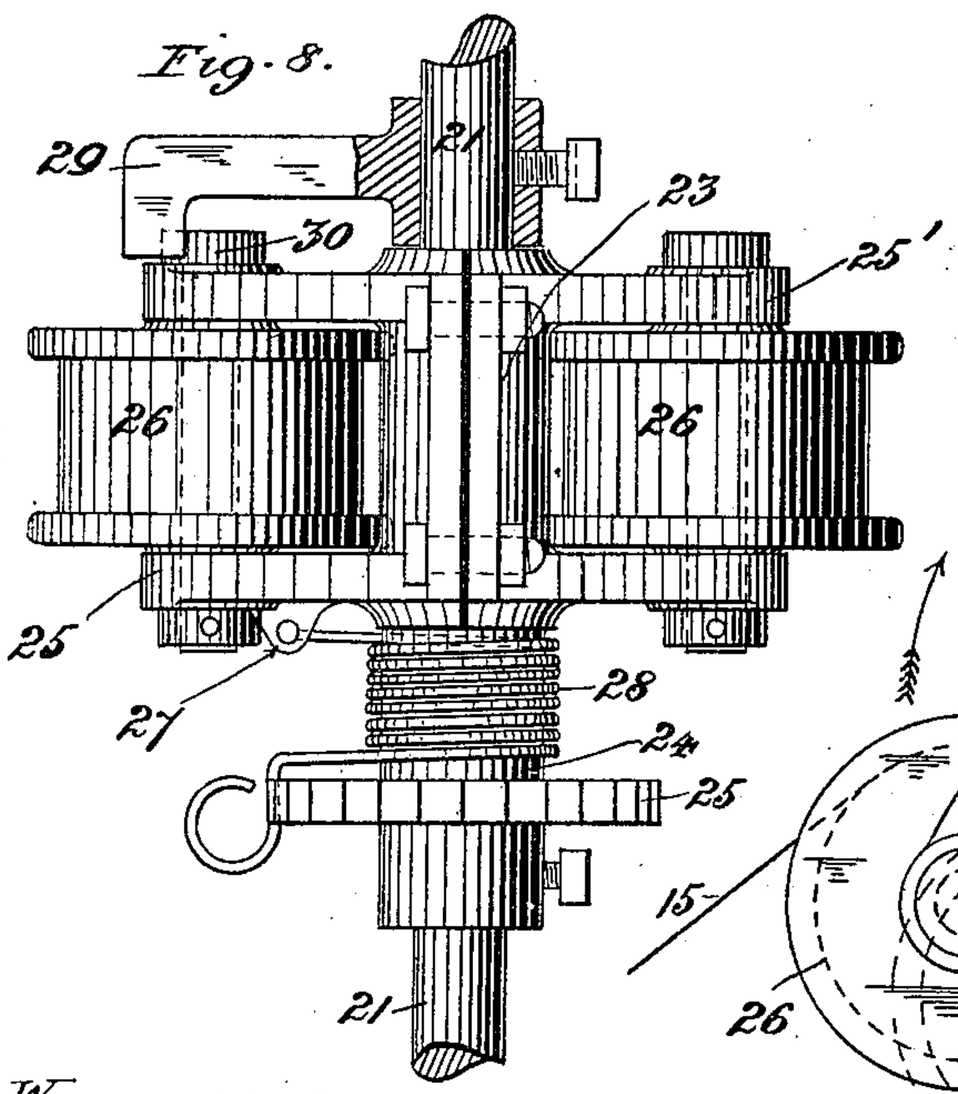
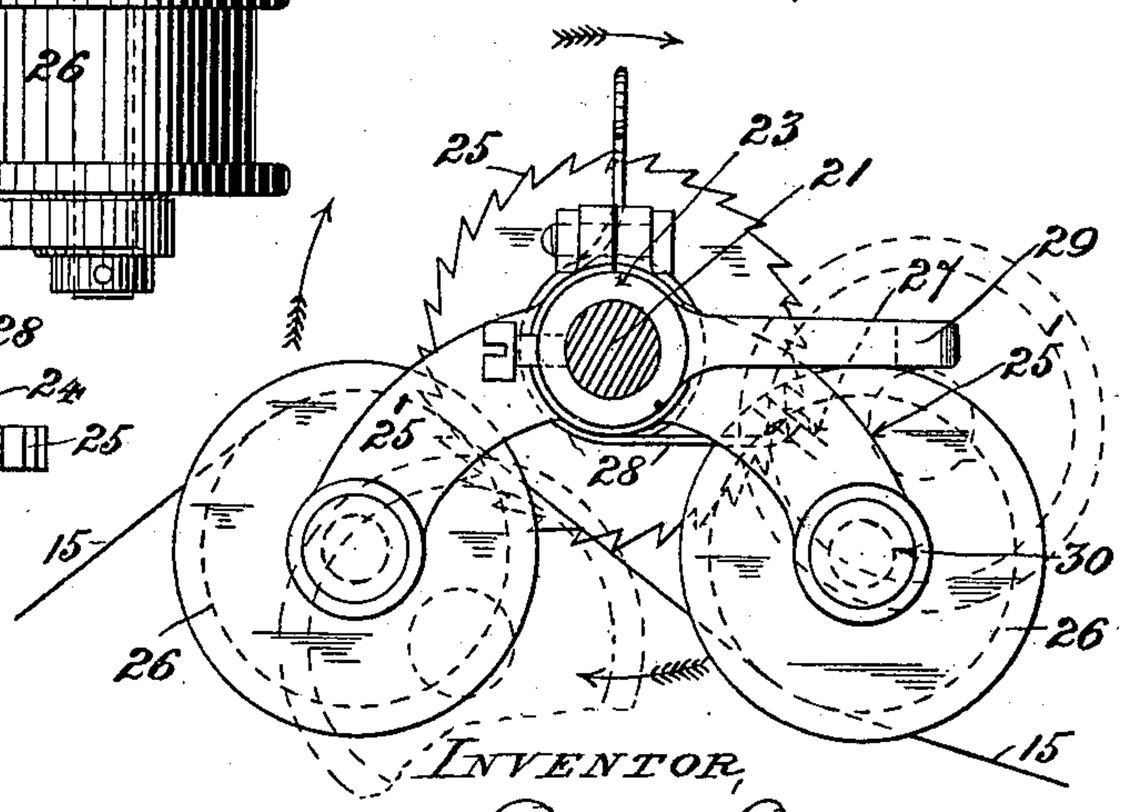


Fig. 9



WITNESSES
Edward W Farrell
George L Wilfry

INVENTOR,
Emil Lochman
by Emil Starek Atty

No. 658,380. Patented Sept. 25, 1900.

E. LOCHMAN.

CARVING MACHINE.

(Application filed June 30, 1898.)

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Fig. 10.

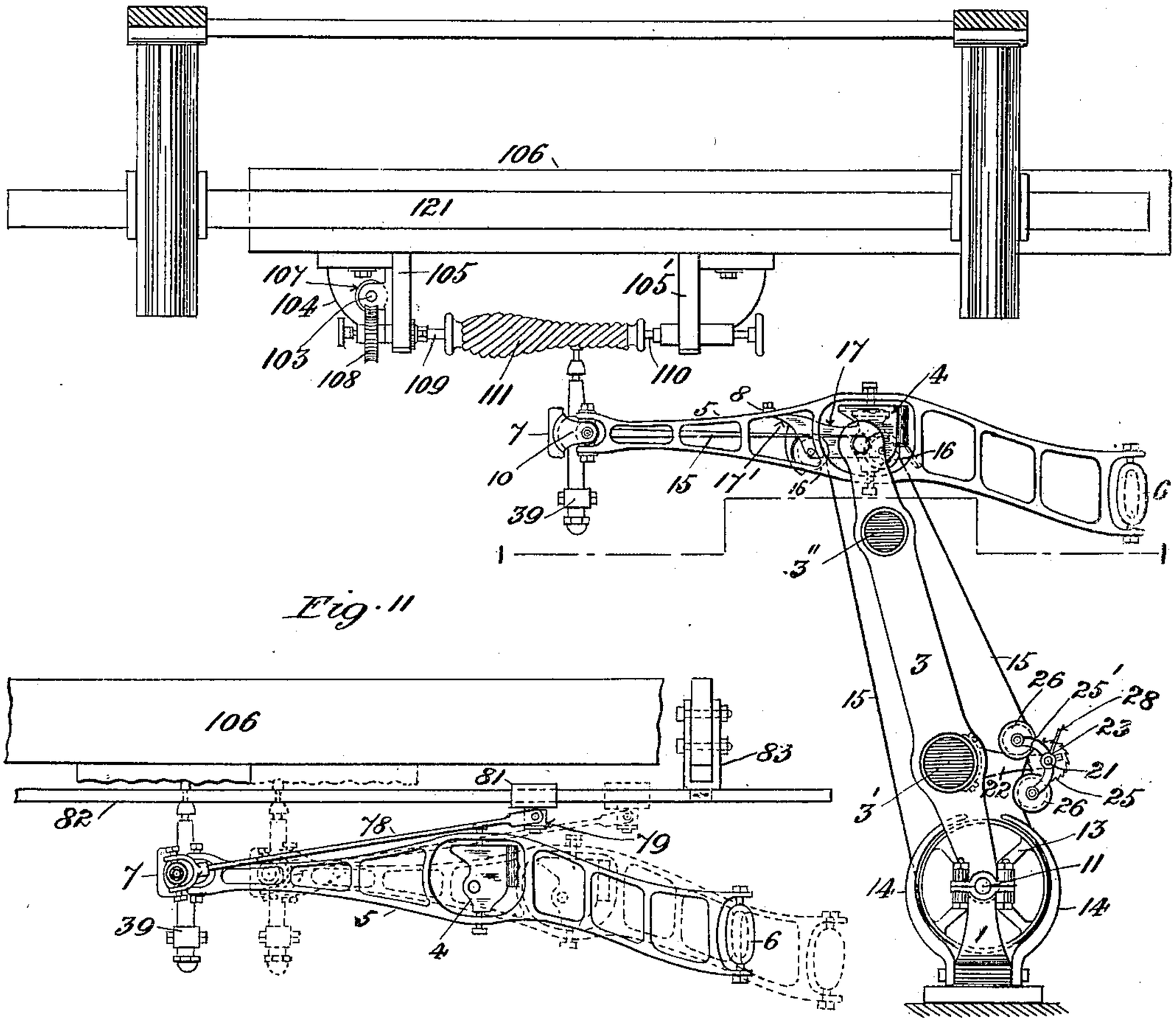


Fig. 11

Fig. 12.

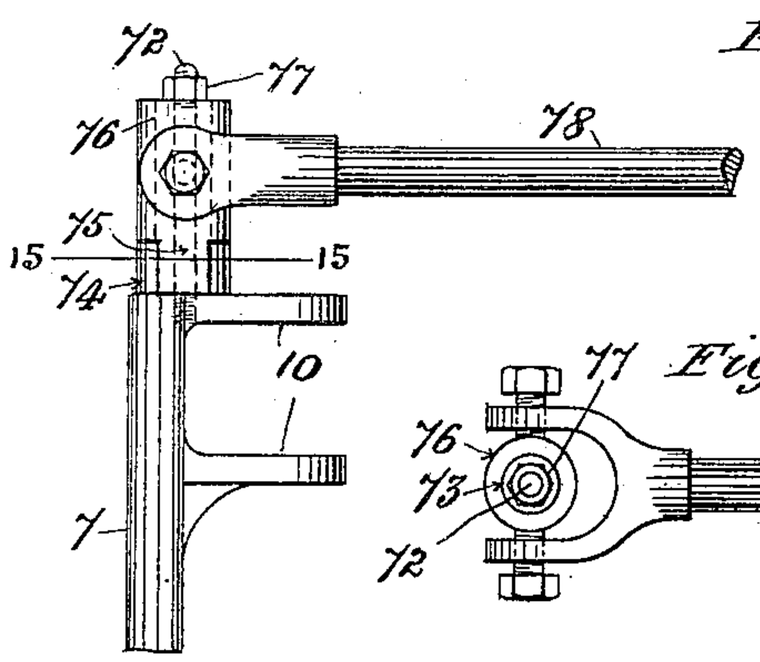


Fig. 13.

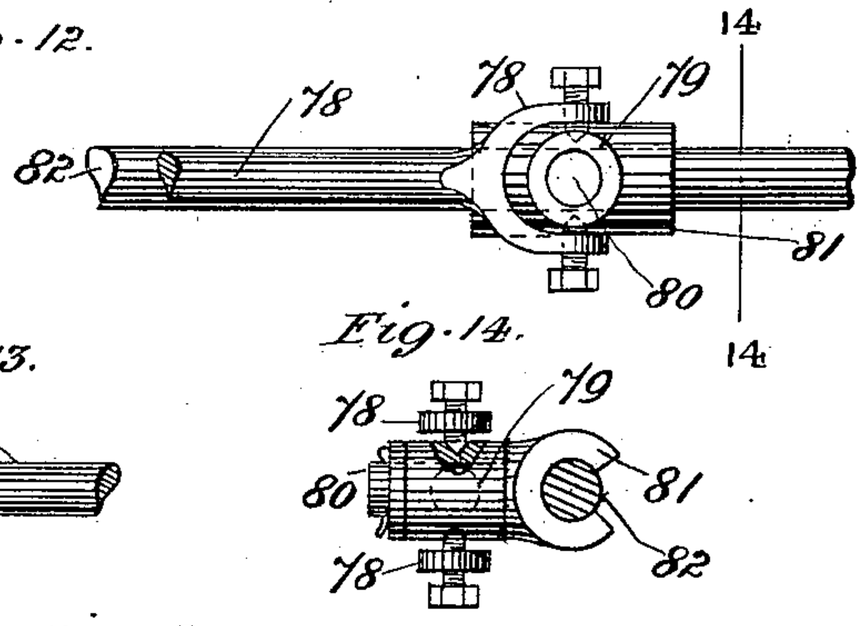
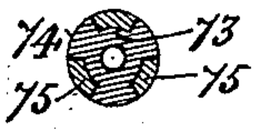


Fig. 14.

Fig. 15



WITNESSES
Edward W Farrell
George L Belfry

INVENTOR,
Emil Lochman
by
Emil Starec, atty

No. 658,380. Patented Sept. 25, 1900.

E. LOCHMAN.

CARVING MACHINE.

(Application filed June 30, 1898.)

(No Model.) 8 Sheets—Sheet 6.

Fig. 16.

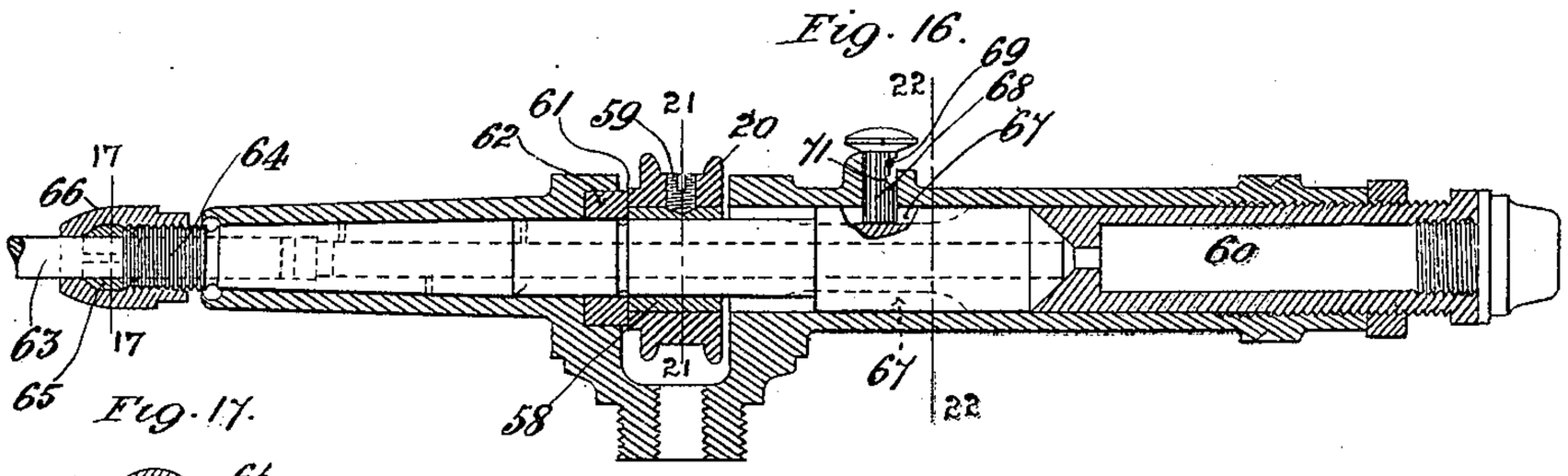


Fig. 17.

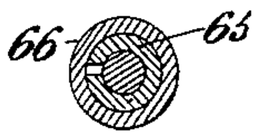


Fig. 18.

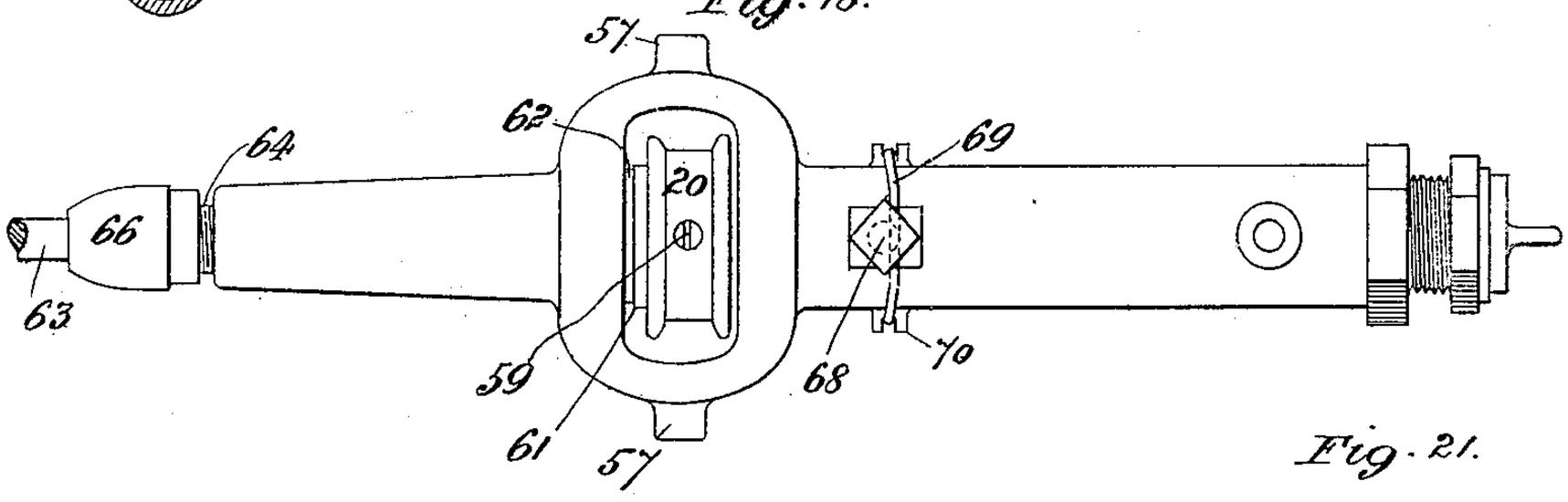


Fig. 19.

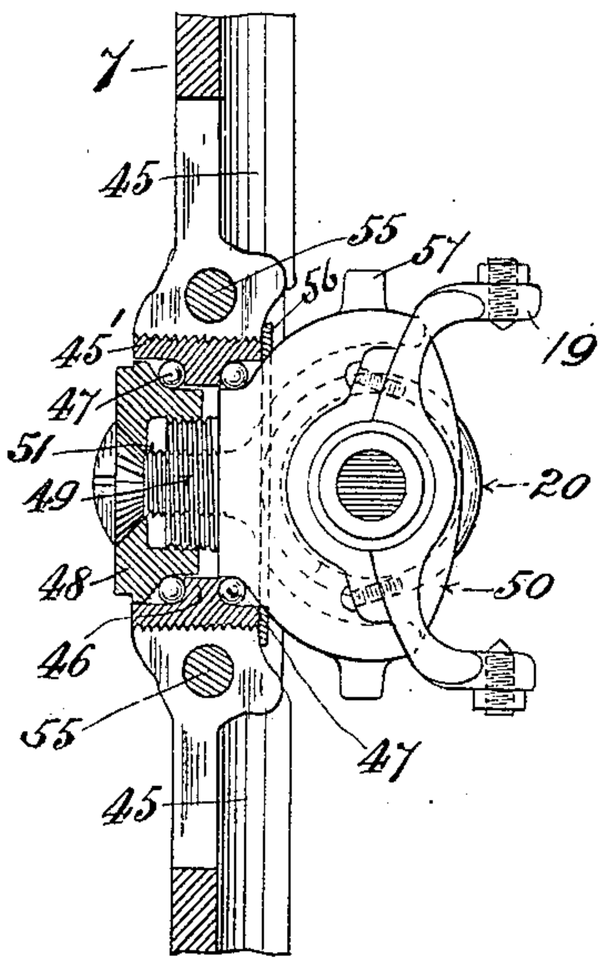


Fig. 20.

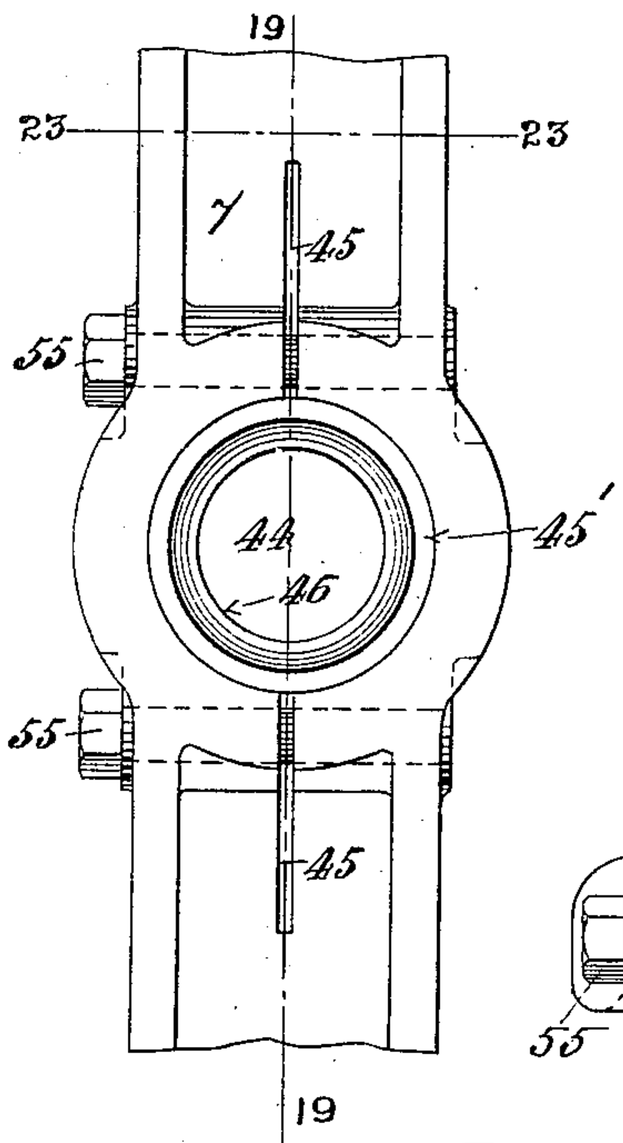


Fig. 21.

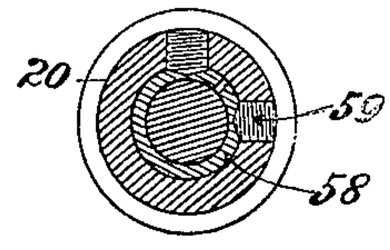


Fig. 22.

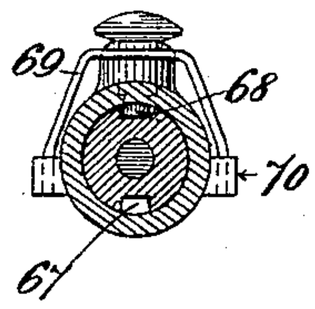
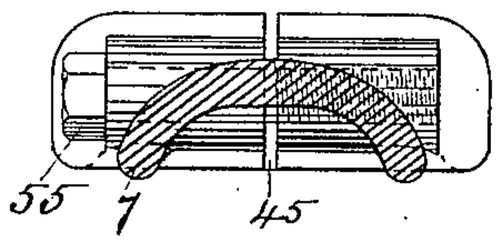


Fig. 23.



WITNESSES
Edward W Farrell
George L. Bugby

INVENTOR,
Emil Lochman
by
Emil Starek atty

No. 658,380. Patented Sept. 25, 1900.

E. LOCHMAN.

CARVING MACHINE.

(Application filed June 30, 1898.)

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Fig. 24.

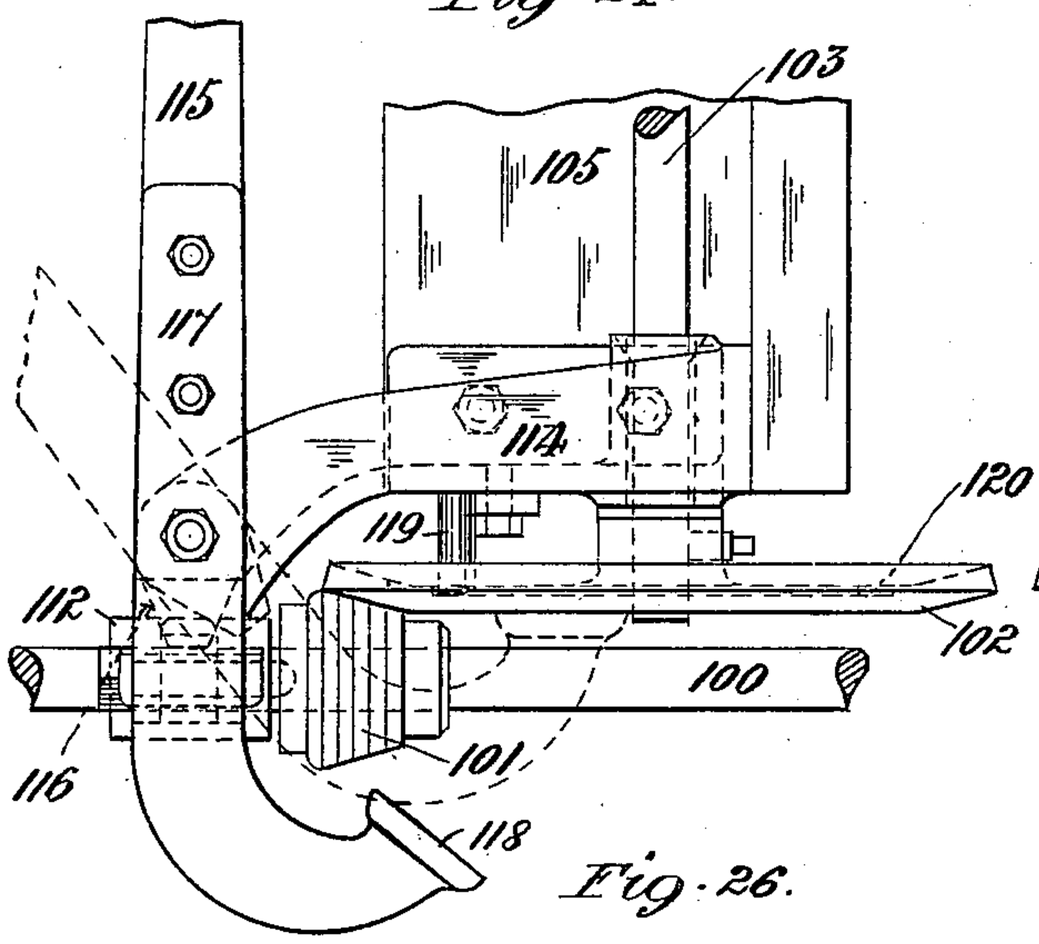


Fig. 26.

Fig. 25.

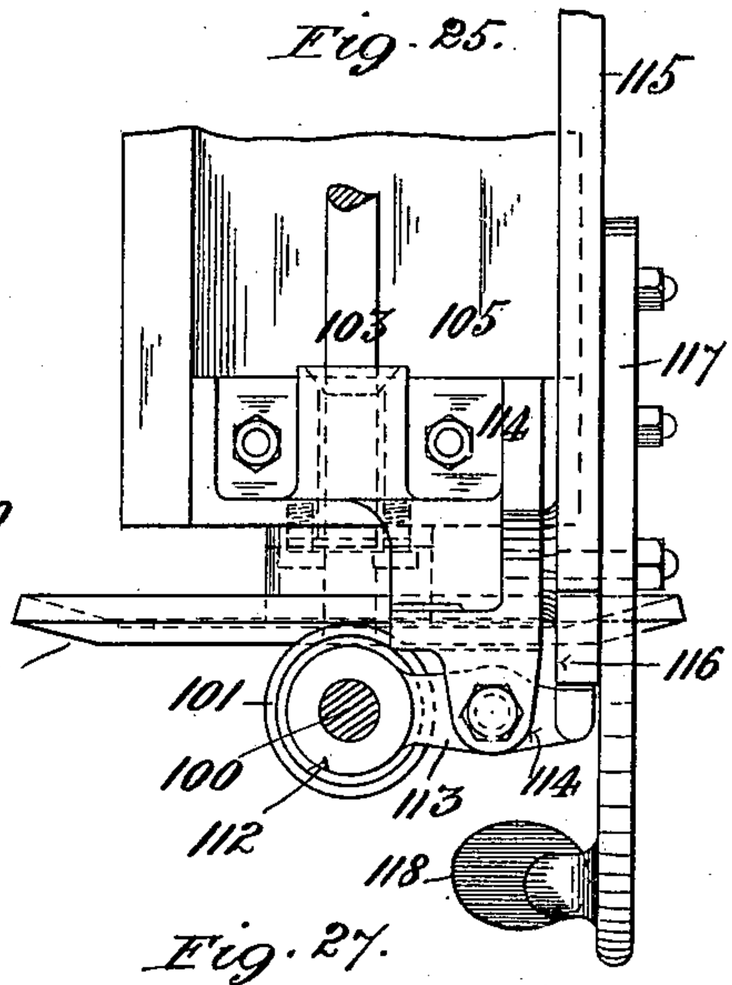


Fig. 27.

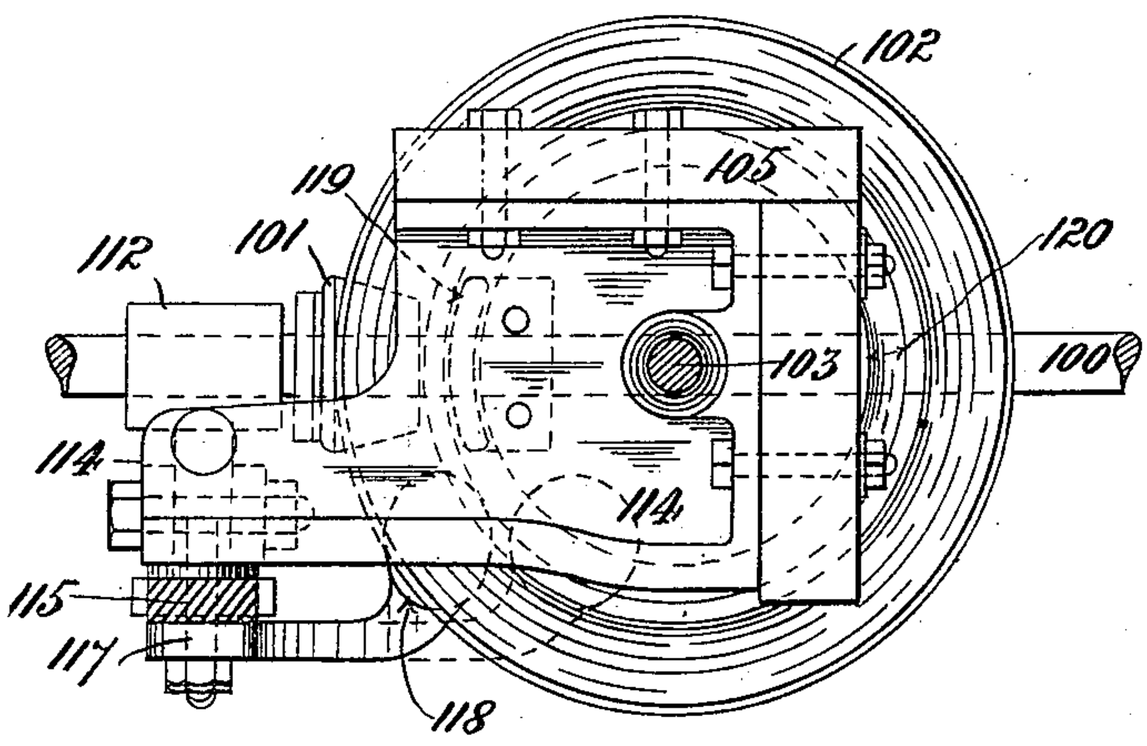
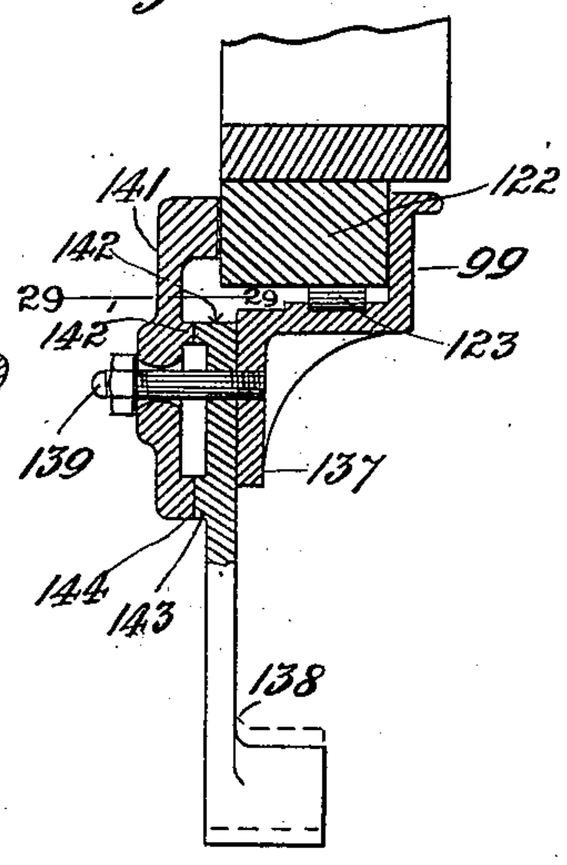


Fig. 28.



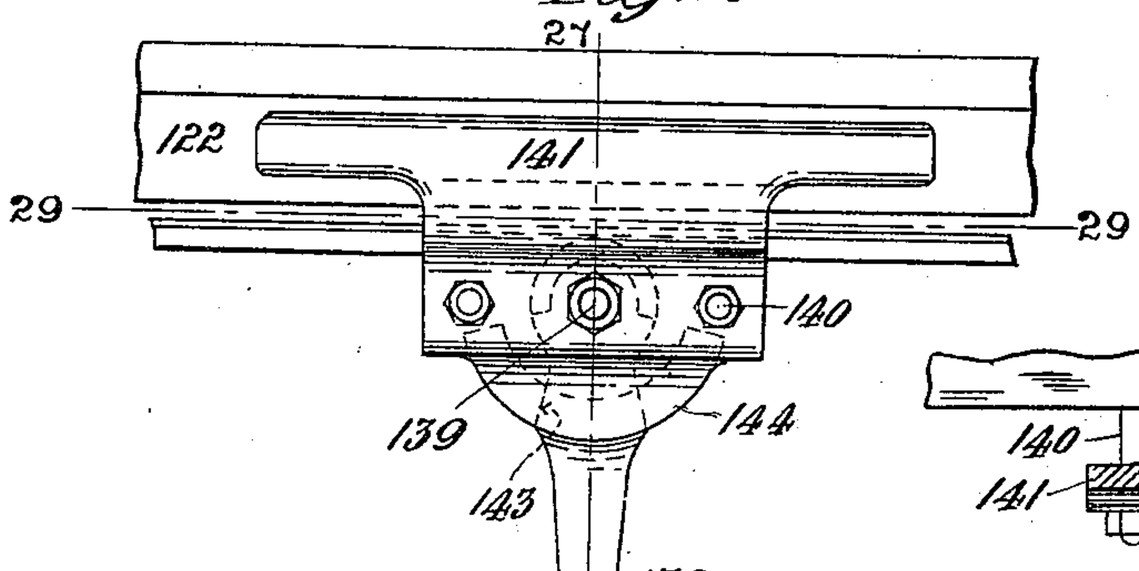
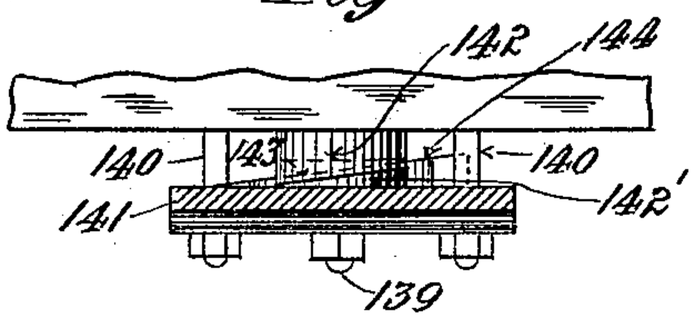


Fig. 29.



WITNESSES,
Edward W Turrell
George L Duffy

INVENTOR,
Emil Lochman
by
Emil Starck atty

No. 658,380. Patented Sept. 25, 1900.

E. LOCHMAN.

CARVING MACHINE.

(Application filed June 30, 1898.)

(No Model.) 8 Sheets—Sheet 8.

Fig. 30.

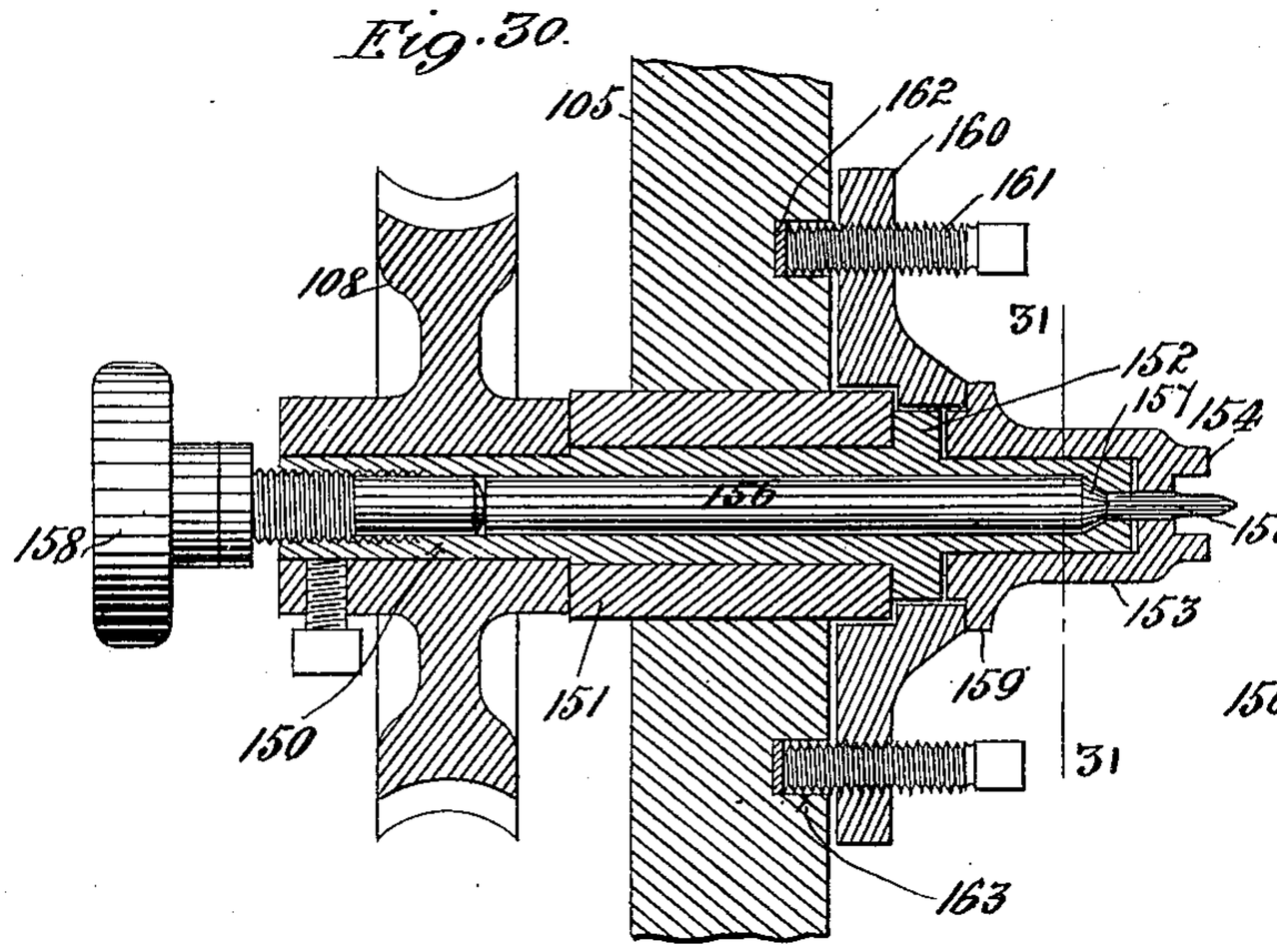


Fig. 31.

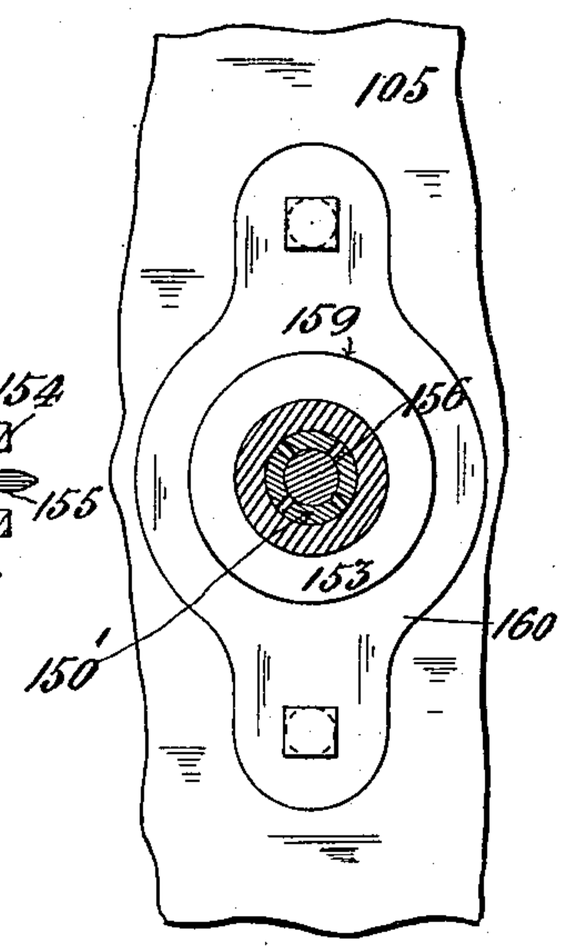


Fig. 32.

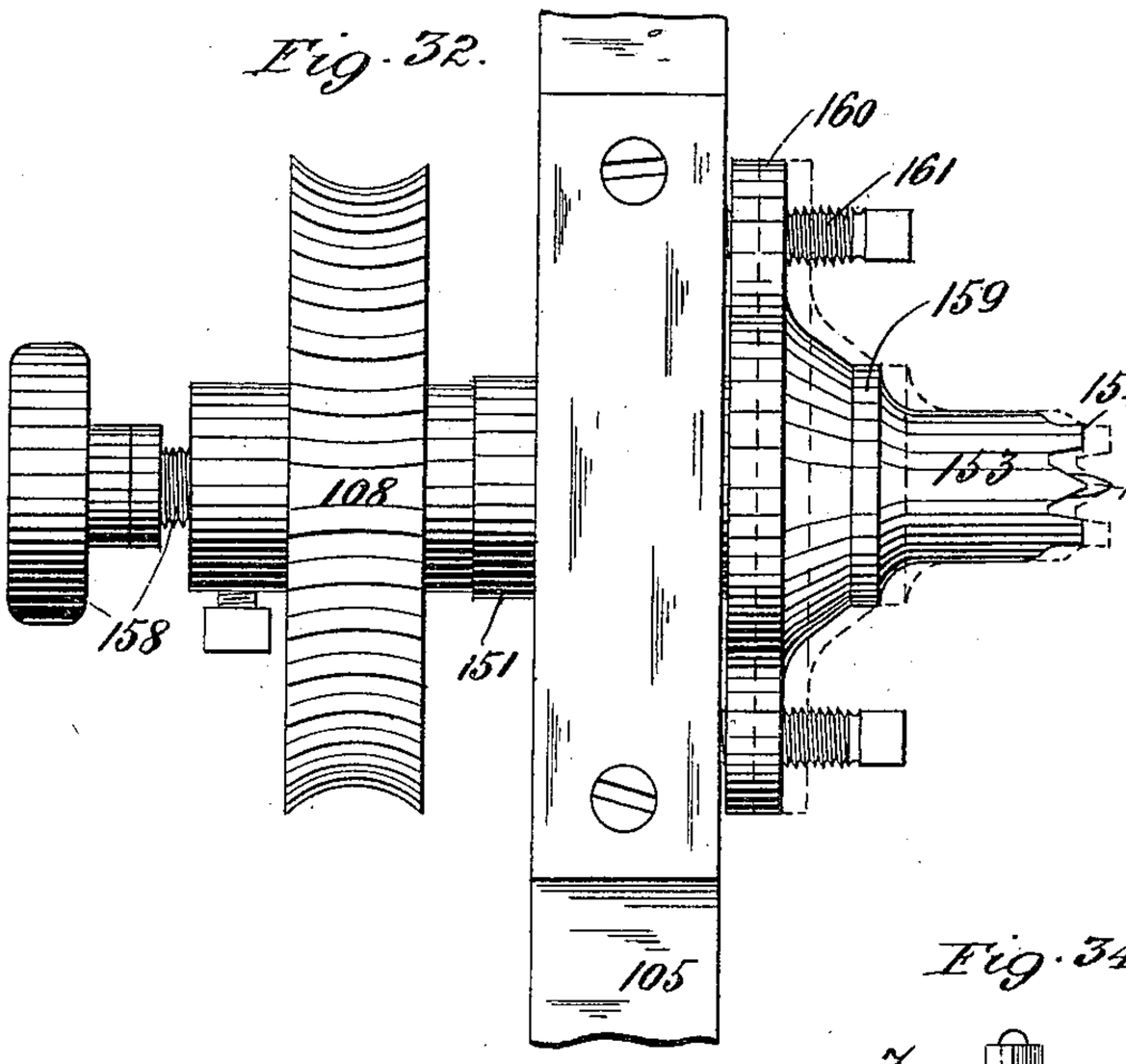


Fig. 33.

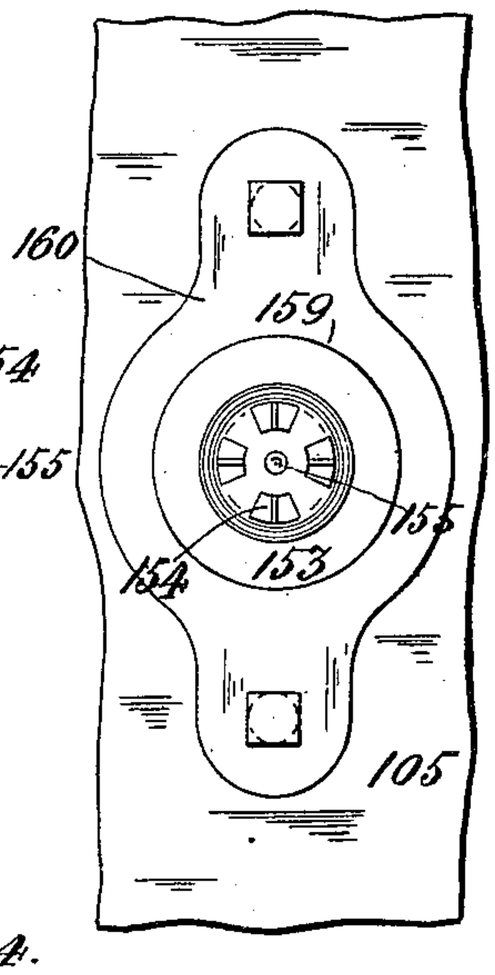
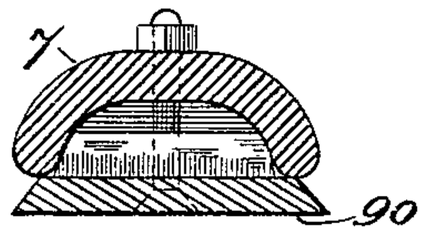


Fig. 34.



WITNESSES
Edward C. Farrell
George L. Bisby.

INVENTOR,
Emil Lochman
by
Emil Starek, atty

UNITED STATES PATENT OFFICE.

EMIL LOCHMAN, OF ST. LOUIS, MISSOURI.

CARVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 658,380, dated September 25, 1900.

Application filed June 30, 1898. Serial No. 684,867. (No model.)

To all whom it may concern:

Be it known that I, EMIL LOCHMAN, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Wood-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 arrangement and combination of parts more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a vertical sectional elevation on the line 1 1 of Fig. 10, looking toward the stock-frame, the connecting-bar for the rear end of the tools being omitted from this view for the sake of clearness. Fig. 2 is a side elevation of the machine with the inner frame swung substantially as shown in Fig. 10 and with the rear lower boxing of the stock-frame removed. Fig. 3 is a longitudinal middle section of the upper pivot of the inner frame. Fig. 4 is a transverse section taken on line 4 4 of Fig. 3. Fig. 5 is an elevation in perspective of the upper portion of the outer swinging frame folded partially back against the inner frame and looking from the front of the machine, this view illustrating the "reverse-cutting" attachment. Fig. 6 is a plan view of the pulley-supporting bracket pivoted to the post of the outer frame, the post being shown in section. Fig. 7 is an elevation thereof. Fig. 8 is an elevation of the belt-tightener looking from the top toward Fig. 9. Fig. 9 is a top plan view of the belt-tightener, showing the rod carrying the same in section. Fig. 10 is a top plan view of the machine with the inner frame shown swung slightly to the left, this view omitting, however, many details for the sake of clearness. Fig. 11 is a top plan view of the outer frame in so far as it illustrates the application of the tool-constraining mechanism. Fig. 12 (shown broken in the middle) is a side elevation of the tool-constraining machanism, being virtually a side elevation of Fig. 11 with the frame omitted. Fig. 13 is a top plan of the clutch and connecting-rod coupled thereto. Fig. 14 is a section on line 14 14 of Fig. 12. Fig. 15 is a section on line 15 15 of Fig. 12. Fig. 16 is a middle longitudinal section of the tool-casing, showing the tool-spindle in elevation. Fig. 17 is a section on line 17 17 of Fig. 16. Fig. 18 is a side elevation of the tool-casing with the yoke carried thereby removed. Fig. 19 is a longitudinal sectional detail of the tool-supporting beam, showing the manner of mounting the tool-casings, the section being on line 19 19 of Fig. 20, but showing in addition an end view of the tool casing and the pulley-block-supporting yoke mounted thereon. Fig. 20 is a rear elevation of the tool-supporting beam at the point where the tool-casing is attached. Fig. 21 is a cross-section on line 21 21 of Fig. 16. Fig. 22 is a section on line 22 of Fig. 16. Fig. 23 is a section on line 23 23 of Fig. 20. Fig. 24 is a side elevation of the detail illustrating the mechanism for connecting and disconnecting the pinion of the drop-shaft to and from the disk which drives the rotating spindles carrying the rotatable stock. Fig. 25 is an end view of the same. Fig. 26 is a top plan thereof. Fig. 27 is a vertical section on line 27 27 of Fig. 28, showing the detail of the clamping device by which the stock-frame is securely held in its guideways. Fig. 28 is a front elevation thereof. Fig. 29 is a section on line 29 29 on Figs. 27 and 28. Fig. 30 is a middle longitudinal section of the rotatable stock-holding spindle. Fig. 31 is a section on line 31 31 of Fig. 30. Fig. 32 is a side elevation of the spindle. Fig. 33 is an inner end view, and Fig. 34 is a section on line 34 34 of Fig. 5.

The present invention is an improvement on the general construction of carving-machine described in United States Letters Patent granted to me under date of November 17, 1896, No. 571,535, and, like it, has for its objects to develop a maximum amount of efficiency, to insure a ready and easy manipulation of the tool-spindles, to insure the development of high speeds for the spindles, to reduce friction to a minimum, and to insure diversity of adjustment among the several parts. In addition to these, however, the objects of the present device are to reduce the actual number of shafts by which the tool-belts are driven; to provide special devices for tightening the tool-belts; to provide special means for hanging or suspending the inner section of the frame of the machine; to provide means

for driving or rotating the stock operated on from the main shaft by which the tool-belts are driven; to provide means for disengaging such driving mechanism at the will of the operator; to provide means whereby during the swinging of the frame the tools may be moved parallel to themselves—that is to say, may preserve a constant angle with the plane of the stock-frame; to provide certain reverse-cutting attachments whereby the pattern of any stock operated on may be the reverse counterpart of a pattern previously or subsequently turned out by the machine; to provide special means for mounting the several tool-casings; to provide a special construction of tool-spindle, especially in the particular of mounting the spindle-pulley; to provide a special construction of tool-chuck; to provide means whereby the tools of each pair shall simultaneously rotate in opposite directions; to provide a special arrangement of guide-pulleys for the tool-belts to effect such reverse rotation, and to provide further and other details more apparent from a detailed description of the construction, which is as follows:

Referring to the drawings, 1 and 2 represent, respectively, the upper and lower supporting-brackets, between which the inner vertical frame 3 of the machine is swung. Pivotally mounted between the free ends of the upper and lower members of the frame 3 is the angular post 4, said post constituting the pivot about which the outer frame of the machine revolves. This outer frame (or extension) comprises the post 4, already referred to, the series of vertically-oscillating arms 5, pivotally embracing the post 4 at approximately their medial portions, the rear connecting-post 6, the front tool-supporting beam 7, and the connecting-rod 8. The rearward extensions of the arms 5 are curved away from the stock-frame in order to allow for a full and uninterrupted oscillation of the frame in a horizontal plane in front of the stock-frame. Like in my patented construction already referred to, the tool-supporting beam in the present case is pivotally secured to the front ends of the arms 5 by means of blocks or pieces 9, pivotally mounted between the ends of the arms 10 of a U-shaped bracket, the forked ends of the arms 5 pivotally embracing each block.

In the particulars already described the present device does not vary materially from the patented machine referred to, except in the addition of the rearward extensions to the arms 5, by which the latter and the tools supported by them are held rigid and better balanced. In the present machine, however, I have provided means whereby the spindles of the tool-casings are driven direct from the main drive-shaft, thereby dispensing with the necessity of mounting a supplemental shaft in the post 4, as was done in the old machine. The main drive-shaft 11 is concentric with the axis of oscillation of the inner frame 3, the lower end of the shaft being supported on an independent bracket 12, projecting from the beam or wall carrying the machine, and the upper end of the shaft passing through the bracket 1 and through the upper pivot of the said frame 3. The shaft is driven from any suitable source of power (not shown) and has disposed thereon belt-pulleys 13, corresponding in number to the number of tools carried by the beam 7, each pulley being provided with a juxtaposed curved belt fork or guard 14, secured in position along the supporting beam or wall of the machine, above and below the peripheral edges of the pulley and extending beyond the same, whereby the slipping of the drive-belts 15 off the pulleys is prevented. One lap of each tool-driving belt 15, after passing through a belt-tightener, to be specifically described, passes over one of the guide-pulleys 16, mounted on a bracket 17, pivotally secured along the inner surface of the outer wall of the post 4, (it being remembered that the post 4 has two walls, being virtually an angle-bar, as best seen in Fig. 6,) thence along one of the pulleys of the pulley-block 18, mounted between the arms of the yoke 19, embracing the tool-casing, and thence over the pulley 20, carried by the tool-spindle. The opposite lap of the belt after leaving the pulley 20 passes along the remaining pulley mounted in the pulley-block 18, and thence over the remaining guide-pulley 16′, mounted on the opposite side of the bracket 17, whence it passes back to the main drive-pulley 13, the laps of the belt embracing the inner and outer pillars 3′ 3″, respectively, of the frame 3. That the bracket 17, carrying the pulleys 16 16′, may conform to the various angles to which the arm 5 of the outer frame may be dipped in their vertical sweep along the stock operated on, the said bracket is provided with a forward extension or arm 17′, the free end of which is pivotally secured to the rod 8, by which the series of arms is connected.

The belt-tighteners (shown in relative position in the plan view, Fig. 10, and illustrated in detail in Figs. 8 and 9) are mounted on a cylindrical rod 21, disposed parallel to the pillar 3′ and secured thereto by arms 22. Each tightener is composed of a split tubular portion 23, revolubly mounted and loosely passed over the rod and supported by the hub or collar 24 of the ratchet 25, slipped over and screwed to the rod. Extending diametrically from the tube 23 are arms 25′, between the free ends of which are mounted the pulleys 26, one of the lower arms being provided with a depending lug 27, to which is secured one end of a spring 28, coiled about the hub 24 and having its opposite or free end so arranged as to engage the teeth of the ratchet-disk 25. The position of the belt as it passes over the pulleys 26 is shown in Fig. 9, and it is apparent that by running the free end of the spring along the teeth of the ratchet-disk the spring will be wound up, causing the pulleys

to exert pressure against the belt in the direction shown by the arrows in Fig. 9. It may be remarked, in passing, that while the machine is in motion a maximum tension is exerted on that lap of the belt coming directly from the tool-spindles toward the main drive-pulley, and hence a maximum amount of slack will be imparted to the lap to which the tightener is applied. When the machine is at rest, the slack on both laps will be equalized, this resulting in a tightening or shortening of the slack side and rocking the tightener-arms and pulleys carried by them more nearly in line with the belt, or approximately as shown by dotted lines in Fig. 9. Thus the present tightener yields and conforms to the degree of tension inherent in the lap passing through it. In order to prevent the tightening-arms from swinging too far under the tightening action of the belt as the machine is being stopped, I provide each tightener with a limiting-arm 29, against which the head of the spindle 30 of the nearest pulley strikes. Were it not for the limiting-arm 29 the chances are that as the belt stretched from prolonged use the arms of the tightener would have too much play between their extreme positions as the machine was alternately stopped and started and the belt would have a tendency to slip off the pulleys while the latter were thus shifting from one extreme to the other. Of course when the belt becomes too long for the slack to be taken up by the tightener it is removed from the machine and accordingly shortened.

As stated above, each bracket 17 is pivoted to oscillate in a vertical plane along the inner surface of the outer wall of the post 4. The pivotal pin 30′ (see Fig. 6) of the bracket passes through a cup 31, secured to the post, within which cup the seat of the bracket operates, said seat being provided with a wearing-plate 32, bearing against the antifriction-rollers 33, which in turn bear against a second wearing-plate 34, located between the cup and post, the base of the cup being provided with a curved slot 35 for the reception and guidance of the rollers. The pulleys are protected and the belt is guided in a measure by the housings 36 37, respectively, the inner end of the bracket being further provided with a deflected wall 38 to guide the lap of the belt as it approaches the nearest pulley. Upon an inspection of Figs. 1 and 2 it will be seen that with each alternate bracket 17 each pulley is disposed on the opposite side to that along which it is disposed on the adjacent or nearest bracket—that is to say, the disposition of the pulleys is just the reverse of that on the adjacent bracket. The reason of this is that the lap which leaves the forward pulley on one bracket must first pass over the pulley mounted on the tool-spindle, while in the next bracket the lap which leaves the forward pulley must pass under the pulley of the corresponding tool-spindle, thereby imparting to each tool-spindle a rotation which is opposite to that of its neighbor. The object of this arrangement is that if all the tools rotated simultaneously in the same direction the velocity at which they must revolve would have a tendency, as their cutting ends came in contact with the stock, to force the end of the frame carrying the tools away from the work, whereas by imparting a contrary rotation to each succeeding tool this tendency to thus force the tools away from the work is overcome.

Like in my patent above referred to the rear ends of the spindle-casings are pivotally connected to a connecting-bar 39 to enable the operator to tilt all the tools simultaneously, the upper end of the bar in the present casing being connected to the lower end of a cord 40, passing over a guide-shoe 41, carried at the end of a weighted lever 42, pivotally mounted at the upper end of a staff or bar 43, pivotally connected to the two upper vertically-sweeping arms 5 at points forward or in advance of the connecting-rod 8, by which the series of arms are united. The balance-lever 42 of course enables the operator to tilt the series of tools without undue exertion.

The manner of mounting the tool-casings to the front tool-supporting beam in the present device is substantially the same as in my patented machine in all essential particulars, with, however, the following modification, special reference being had to Figs. 19 and 20. The tool-supporting beam is provided with a series of circular openings 44, from the top and bottom of which lead passages 45 in diametrically-opposite directions, the opening being adapted to receive a ring 45′, provided along the interior peripheral surface with a medial ridge 46, against each side of which are adapted to bear the antifriction-rollers 47, held in place on the one side by a nut 48, screwed over the screw-threaded lateral reduced extension or boss 49 of the pocket 50 of the tool-casing, and on the opposite side by the base of the pocket thus drawn firmly against the rollers by the action of the nut. The parts are additionally secured by a bolt 51, driven through the opening of the nut into the interior-screw-threaded portion of the boss 49. The yoke 19, which spans the tool-casing on either side of the pocket and between the ends of whose arms the pulley-block 18 is hinged, is substantially the same as in my patent above referred to. In order to securely hold the ring 45′ to the beam, the yielding sides of the latter on each side of the splits 45 are made to hug the walls of the ring by the terminal nuts of the fastening-bolts 55, which draw the sides toward each other. A suitable packing-ring 56 is interposed between the base of the pocket and the inner end of the ring 45′. The lugs 57 limit the tilting of the yoke about the tool-casing.

The tool-casing and spindle and the manner of attaching the cutting-tool are also im-

proved over the construction shown in the patent. In the present device the spindle is provided with a split band 58, which is inserted into the hollow of the pulley 20, the base of the groove of the latter being provided with openings for the reception of the binding-screws 59, which as they are driven against the band force the latter against the tool-spindle, and thus hold the pulley securely in place. To prevent the spindle (which is conical) from binding, a result which might follow if the oil-cup 60 were driven too forcibly against it, I provide the forward end of the pulley 20 with an annular shoulder 61, which bears against a seat 62, carried by the casing. The forward end of the tool-spindle is provided with a socket for the reception of the shank 63 of the cutting-tool, the latter being gripped by a chuck of the following construction: The terminal expanded exteriorly-screw-threaded head 64 of the spindle is provided with an inner tapering or outwardly-flaring mouth. Embracing the shank is a split ring 65, tapering toward its opposite ends. Over the ring is adapted to be passed a nut 66, whose inner surface conforms to the contour of the ring, and as the nut is driven home along the outer screw-threaded surface of the head 64 it will cause the bevel end of the ring to follow along the bevel walls of the mouth of the said head, thus causing the ring to close tightly against the shank of the tool. (See Figs. 16 and 17.) In screwing on the nut 66 it is desirable that while the tool-casing is being held with one hand and the nut driven with the other the spindle remain stationary. This I accomplish by forming two longitudinal grooves 67 along the outer peripheral surface of the spindle, either groove being adapted to receive the inner end of a pin 68, mounted in the casing-wall, and while the machine is in operation held out of engagement with the groove by a resilient spring-wire 69, having its opposite ends secured between the lugs 70, disposed along the casing, and its medial portion engaging the lower of two transverse notches 71, cut in the shank of the pin. When it is desired to engage the pin with the base of the groove, the wire is allowed to snap into the outer notch, whereupon any movement of the spindle is prevented. (See Figs. 16 and 22.) This device is a very effective one for holding the spindle stationary while the tool is being inserted into the spindle.

Under ordinary circumstances as the frame carrying the tool is swung in front of the stock-frame and the stock carried thereby (that is to say, swung in a horizontal plane) it is obvious that as both the inner and outer frames are swung about fixed centers the tools themselves will describe the path of an arc of a circle. In certain classes of work, however, especially flat work, it is desirable while the tool is being advanced in a horizontal plane along the work by the swinging of the inner frame that the tool shall move laterally along the stock-frame and at an angle therewith, to which the axis of rotation of the tool is initially set. This is accomplished by the following tool-constraining mechanism: Forming an upper extension of the tool-supporting beam is a cylindrical rod 72, about which is passed a tubular sleeve 73, having an expanded cylindrical base 74, the latter having cut-away portions or segments, into which are received the depending fingers or extensions 75 of an outer sleeve 76, the walls of the outer sleeve being of a thickness equal to that of the base 74, so that when the two sleeves are coupled they form practically one cylinder. (See Fig. 12.) They in fact constitute a clutch the inner member of which is frictionally and rigidly held against the top of the tool-supporting beam by a nut 77, passed over the outer screw-threaded end of the rod and forced against the top of the inner sleeve. Pivotally embracing the walls of the outer detachable sleeve is the outer forked end of a connecting-rod 78, whose opposite or inner forked end embraces a collar 79, loosely mounted on a projecting stud 80, forming a part of a sleeve 81, adapted to slide back and forth along a bar 82, horizontally disposed in front of the stock-frame and held in place by the terminal brackets 83, carried by said frame, the sleeve being split along its periphery to readily pass by the bracket. (See Fig. 14.) Of course inasmuch as the connection between the tool-supporting beam 7 and the series of arms 5 is a pivotal one, (as in the patented construction,) the tool-supporting beam being susceptible of independent oscillation in a horizontal plane, it is apparent that while the arms 5 or the frame of which they constitute the main part may swing in the arc of a circle the tools may be constrained to move in parallel lines—that is, parallel to the direction in which the tool is originally set. In Fig. 11 I show the tool set originally at right angles to the stock-frame, and when the outer frame has been shifted and swung to the dotted position shown in said figure the constraining mechanism above referred to will compel the tool to move parallel to itself. That the tool shall move parallel to itself is important with certain classes of work, especially flat work. The special pivotal connections of the opposite ends of the connecting-rod enable the latter to conform to any vertical sweep of the arms 5. For the sake of illustration I have shown the tool as being constrained to move in lines perpendicular to the stock-frame; but it is apparent that this angle can be initially changed by tilting the tool-supporting beam and the sleeve 73 sufficiently to cause the clutch mechanism to couple at any other angle, and when once coupled to the connecting-rod the tool-supporting beam must remain at the angle to which it and the tools carried thereby have been set. When the constraining mechanism is not intended to be used, the outer sleeve is simply uncoupled and the end of the connect-

ing-rod carrying the same is suspended to some convenient and stationary portion of the frame. The tools are then again free to describe any angles which the operator may give them during the swinging of the frame. It may be stated in passing that mere friction will retain the clutches or sleeves in their coupled position after once being united in the manner indicated, whatever be the degree to which the arms of the outer frame may be tilted in a vertical plane.

In the machine so far described the tracer 84 is secured directly to the tool-supporting beam, as in my patented construction referred to, so that whatever movement is imparted to the tracer will be imparted to the series of tools, and whatever may be the pattern traced by the tracer will be faithfully and exactly reproduced by the tools. It becomes desirable, however, under certain circumstances to produce carvings which shall be the reverse counterparts of the pattern traced by the tracer—for example, in ornamental scroll-work, where one piece of ornament faces a similar piece—as, for instance, two heads or the like. For work of this kind it is essential that the tracer shall pass over the pattern in a direction directly contrary to that which the tools assume. For this purpose I provide the present machine with what I shall denominate as the "reverse-cutting" attachment. Temporarily bolted or otherwise secured to the second arm 5 from the top of the frame and along the front of the same is a rocking segment 85, whose curved rocking face is adapted to coöperate with a corresponding curved face of a rocker-arm 86, temporarily pivoted at the bearing 86′ on the post 4 immediately below the arm 5, carrying the segment 85, the rocking faces being united by two straps or cords 87, 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, but superior to the latter in that they are much more sensitive, there being no loss of play under the present construction. When the reverse-cutting attachment is employed, the regular tracer 84 is removed and a suitable tracer 88 employed. (See Fig. 5.) The body portion of this tracer is connected by a ball-and-socket joint 89 to the free end of the rocker-arm 86, the forward face of the tracer-body being grooved, so as to loosely embrace the rear face and beveled sides of a plate 90, temporarily secured within the hollow of the tool-supporting beam, (it being understood that the cross-section of the tool-supporting beam is substantially trough-shaped, as seen in the drawings,) along which the tracer is guided during the vertical sweep or swing of the rocker-arm. It will be apparent that as the rocker-arm 86 is depressed or rocked downward the segment 85 and arm to which it is secured, and hence all the arms 5 of the frame, will rock upward, and when the rocker-arm is rocked upward the arms 5, and hence the tools carried by them, will rock downward. It therefore follows that for any pattern that may be traced by the tracer 88 the reverse counterpart will be carved by the series of tools. When it is desirable to discontinue the reverse cutting, the rocking segment and rocker-arm and tracer are detached and the original tracer is restored.

In the majority of cases the stock operated on is held stationary to the stock-frame during the carving operation; but in many instances it is desirable to rotate the stock, especially for such work as ornamental posts and the like. For such cases I make provision to rotate the stock from power imparted from the main drive-shaft and by mechanism which is as follows: Mounted in a bearing 91 at the base of the machine and guided within a second bearing 92, projecting from the main shaft-supporting bracket 12, is a vertical counter-shaft 93, carrying at its upper end a cone-pulley 94, to which motion may be imparted by a belt (not shown) from the cone-pulley 95, (of which only the upper portion is visible in the drawing, Fig. 2,) carried by the main shaft. The lower end of the counter-shaft is provided with a horizontally-disposed pulley 96, from which leads a belt 97 to a vertically-disposed pulley 98, mounted at the end of a bracket or arm 98′, pivotally secured to the lower horizontal stock-frame guide-bar 99. The drop-shaft 100 of the pulley 98 extends forward along and parallel to the base of the stock-frame, the forward end thereof being provided with a bevel-pinion 101, normally meshing with a bevel-plate or driving-disk 102, carried at the lower end of a vertical worm-shaft 103, which passes through a series of bearing-webs 104, forming the reinforcing-webs of the walls of a vertical angle-bar bracket 105, serving as a support for said shaft, the said angle-bar bracket being bolted to the stock-frame 106. Distributed along the shaft 103 are a series of worm-pinions 107, which mesh with a corresponding series of worm-wheels 108 at the outer ends of the rotatable stock-holding spindles 109, mounted in the projecting wall of the angle-bar bracket 105. Correspondingly secured to the stock-frame is a second angle-bar bracket 105′, provided with a series of dead-spindles 110 for retaining the opposite ends of the rotatable stock 111.

It has been stated that the pulley 98 was mounted at the end of a bracket 98′, pivotally secured to the lower stock-frame guide-bar 99. This construction is necessary to enable the operator at will to engage the pinion 101, carried at the forward end of the shaft 100, with or disengage it from the driving-disk 102, according as he desires to impart motion to the stock 111 or to stop the same. The mechanism by which this engagement or disengagement is accomplished is as follows: Embracing loosely the shaft 100 at a point in advance of the pinion 101 is a sleeve

112, carried at the free end of the long arm of a lever 113, pivoted to a depending jaw of the bracket 114 at the base of the angle-bar bracket 105, so that virtually the forward or free end of the drive-shaft 100 is suspended from the long arm of the lever 113, and the pinion 101 carried thereby is kept in engagement with the driving-disk 102 by keeping the end of the long arm carrying the sleeve raised sufficiently to effect such engagement. This is accomplished by the tripping-lever 115, pivoted vertically to the side of the bracket 114, the lower end of the lever being provided with a toe 116, having a horizontal base and inclined sides, (and being, in effect, a cam with sharp angles.) When the tripping-lever is in a vertical position, the base of the toe squarely engages the upper surface of the short arm of the lever 113, thus holding or forcing the long arm upward and forcing the pinion 101 into engagement with the driving-disk 102. When the lever is tripped so as to disengage the base of the toe from the lever 113 and to a position substantially as indicated by the dotted position in Fig. 24, the short arm of the lever 113 will rise (under the weight carried by the long arm) and the long arm will drop, thus disengaging the pinion from the disk 102 and stopping the rotation of the stock 111. In order to stop the rotation of the disk 102 suddenly upon the disengagement therefrom of the pinion 101, I secure to the tripping-lever a lateral arm or extension 117, having a terminal curved brake-shoe 118, which when the tripping-lever is tilted to its disengaging position will cause the brake-surface of the shoe to engage the under surface of the disk 102 and serve as a brake therefor. In order to prevent straining of the disk 102 by the forcing of the pinion 101 into engagement therewith, I secure to the base of the bottom bearing of the worm-shaft 103 a bracket 119, having a curved depending arm which bears against the base of a circular groove 120, formed on the upper face of the disk 102, the arm serving to prevent any straining of the disk when the pinion 101 is forced into engagement therewith, and freely working in the groove 120 when the disk is in motion.

Like in my patented machine above referred to, the stock-frame as a whole is removable and adjustable to and from the tool-supporting frame. In the present device the stock-frame is removably mounted between the lower guide-bar 99 and the upper guide-bar 121, the lower guide-bar being an angle-bar in cross-section, the upper surface of its horizontal member supporting the bottom timber 122 of the stock-frame, which travels along said member on rollers 123. The upper guide-bar is provided with a suitable tongue 124, entering a corresponding groove 124′, formed at the upper end of the stock-frame, so that the entire stock-frame can be removed from or inserted into position between the guide-bars. The latter are adjustable to and from the swinging frame in substantially the same manner as shown in my patented machine. Extending outwardly from the wall along which the frame swings is a rigid bracket 125, supporting the stock-frame at one end. The end of said bracket is provided with a boxing 126, there being a similar boxing 126′ supported on legs 127 under the opposite end of the stock-frame. Cast or formed integral with the guide-bar 99 are extensions 128, having depending lips or guiding-walls 129, which embrace the sides of the walls of the boxings 126 126′. Cast along the under surface of the horizontal member of the guide-bar 99 and located between the depending walls 129 is a lug 130, through which passes an adjusting screw or bolt 131, having bearings at each end of the pocket or boxing 126, (126′,) the inner end of each bolt terminating in a supporting-stud 132 and the outer with an extension 131′, carrying a sprocket-wheel 133, one of said extensions being provided with a hand-wheel 134. The sprocket-chain passes over suitable sprocket-wheels 135, mounted along the outside and at the upper end of the vertical timbers 136, from which project rearwardly similar boxings 126″, having adjusting-screws similar to the screws 131, but not shown in the drawings. By thus turning the hand-wheel 134 in one direction or the other the sprocket-chain will impart simultaneous rotation to all the adjusting-screws, causing the upper and lower guide-bars, between which the stock-frame is mounted, to travel toward or from the swinging frame at the pleasure of the operator. It is to be understood, of course, that the screws confined in the boxings 126″ pass through lugs corresponding to the lugs 130 of the lower guide-bar 99.

In order to hold the stock-frame rigidly in place between the upper and lower guide-bars when once properly adjusted to any desirable position, I employ the following clamping mechanism: Pivoted approximately along the middle of the length of the lower guide-bar 99 and to a front vertical depending bracket or arm 137 of the same is a foot-lever 138, the pivotal pin 139 thereof and the pins 140, disposed on each side thereof and projecting from said arm, being of sufficient length to support a clamping-plate 141, (see Fig. 28,) having a slight rocking motion on said pins, the foot-lever being interposed between said clamping-plate and bracket. The short arm of the lever or that portion extending above the pivotal pin 139 terminates in a curved wedge 142, whose inclined wall coöperate with a similarly-inclined surface 142′, formed on the adjacent wall of the clamping-plate, and carried by the foot-lever at a suitable distance below the pivotal pin is a second curved wedge-shaped formation 143, coöperating with a wedge-shaped curved bearing-surface 144, formed at the base of the clamping-plate. If the foot-lever is tilted in a direction as seen by the arrow in Fig. 28—that is, so as to cause the surface 143 to

wedge against the surface 144—the wedge 142 will be released from the surface 142′, thus permitting the clamping-plate to rock, so as to force the upper edge thereof firmly against the timber 122 and hold the latter firmly against the adjacent wall of the guide-bar 99. On the other hand, should the foot-lever be tilted in the opposite direction the wedge 142 will force itself against the surface 142′ and wedge 143 will slide off or down the wedge 144, thus rocking the clamping edge of the plate 141 away from the timber 122, loosening the latter from the guide-bar and permitting the stock-frame to be shifted along the bar to any other position or to be entirely removed. The limits to which the foot-lever may be oscillated are indicated by its full and dotted positions in Fig. 27.

It was stated above that the axis of oscillation of the inner frame was concentric with the axis of rotation of the main drive-shaft 11. The latter has an independent lower bearing or support 12; but the upper portion passes through the upper pivot of the frame. That the shaft may be free from strain on the part of the swinging frame, I construct the upper pivot or bearing for said inner frame as follows: The inner pivotal end of the upper member of said inner frame embraces the medial peripherally-grooved conical portion of a tube 145, the grooves serving to retain antifriction rollers or balls 146, about which the frame can swing with the least amount of friction. The lower screw-threaded portion of the tube 145 is mounted in the lower section 147 of the upper bracket or bearing 1, screw-threaded on the interior, whereby the tube and rollers 146, carried by it, can always be screwed upward and firmly against the walls of the conical opening formed in the pivotal end of the upper member of the swinging frame. The upper smooth portion of the tube passes through the middle section 148 of the bracket 1, and the upper projecting end of the shaft 11, which passes loosely through the tube, is carried or guided by the upper section 149 of the bracket 1. By this arrangement, therefore, the inner frame can swing freely about the axis of the drive-shaft without coming in contact with the shaft, which is free to revolve under all circumstances.

In my present machine the stock-holding spindles 109, by which the rotatable stock is held at one end, are made adjustable longitudinally or in the line of the axis of suspension of the stock and rotatably in a plane at right angles thereto. The object of this adjustment is to enable the operator to accurately mount the several stock-pieces, so that the patterns carved on them shall conform one to the other in all essential particulars—that is to say, both as to relative position and extent. The detailed construction of the stock-holding spindle is particularly illustrated in Figs. 30 to 33, inclusive, to which reference is specially made in this connection. The worm-wheel 108 of each spindle is securely mounted at the outer projecting end of the tubular rotatable portion 150 of the spindle, the said tube 150 being mounted in a hollow cylindrical bearing or bushing 151, carried by the outwardly-projecting wall of the bracket 105, the tube being limited outwardly by a collar or ring 152, one face of which bears against the inner end of the bushing, while the opposite face is adapted to limit in its inward movement the edge of a hollow cup-shaped chuck 153, passed over the longitudinally-split inner extension 150′ of said tube. Disposed about the face of the cup 153 are a series of gripping-teeth 154, the center of the base having passed therethrough the inner pointed stem 155 of a longitudinally-adjustable rod 156, confined within the tube 150, the pointed end or stem 155 serving to accurately center the stock gripped by the chuck. Connecting the stem 155 and the rod 156 proper is a conical portion 157, whose surface is snugly embraced by the corresponding inner conical surface of the split members of the extension 150′, whereby as the rod 156 is driven inwardly (as subsequently to be described) the cone 157 will act as a wedge, expanding the members of the extension and forcing them into firm frictional engagement with the walls of the chuck, thus retaining the latter in place. The rod 156 is forced into engagement with the split members of the extension 150′ by the inner smooth end of an operating-screw 158, whose screw-threaded portion is mounted at the outer end of the tube 150. By loosening the screw 158 the grip of the split members or arms of the extension 150′ is released from the chuck, leaving the latter free to revolve about said extension, and thus permitting the operator to carefully adjust all the stock of the series in the plane of rotation of such stock, bringing the corresponding points of each piece to be carved into accurate relation to the tools by which the carving is effected.

Formed about the edge of the cup-shaped chuck 153 is a peripheral flange 159, adapted to bear against the adjacent surface of an adjusting-plate 160, which is provided with an opening to loosely pass over the collar 152 and adjacent end of the chuck, the opening being sufficiently enlarged to simultaneously pass over the inner projecting end of the bushing 151. (See Fig. 30.) Passed through suitable screw-threaded openings formed in the plate 160 are adjusting-screws 161, the inner ends of which are adapted to bear against suitable wearing plates or disks 162, located at the bottom of suitable depressions 163, formed in the bracket 105 for their reception. By turning the screws 161 in one direction it is obvious that they will force the plate outwardly, thus shifting the chuck longitudinally outward—that is, in the line of the axis of suspension of the stock—as seen by the dotted position of the parts in Fig. 32, it being understood, of course, that the screw 158 is previously unscrewed to cause the split arms of the exten-

sion 150′ to loosen their grip on the chuck. By thus providing means for longitudinally shifting within certain limits the chucks of the various spindles stock actuated by the latter can be adjusted longitudinally with greater precision and nicety, enabling the operator to make the points of beginning for any particular design on the several stock-pieces to conform accurately one to the other. Of course when the chuck is once gripped by the arms of the split end of the tubular portion of the spindles it becomes virtually a part of the latter, so that in effect the operator by the present device adjusts the spindle both longitudinally and in a plane at right angles to the axis of suspension, said plane corresponding to the plane of rotation of the stock.

Having described my invention, what I claim is—

1. In a carving-machine, a suitable frame swinging about an axis, a second frame swinging on said frame about a second axis, a series of tools at the free end of the second frame adapted to sweep in a plane parallel to said second axis, a drive-shaft located in the line of the axis of suspension of the first frame, and a single intermediate belt connection between said shaft and each tool, for imparting motion to the tools, the laps of each belt being disposed on opposite sides of the axis of suspension of the second frame, substantially as set forth.

2. In a carving-machine, a suitable frame swinging about an axis, a second frame swinging on said frame about a second axis, a series of tools at the free end of the second frame adapted to sweep in a plane parallel to said second axis, a drive-shaft located in the line of the axis of suspension of the first frame, and a single intermediate belt connection between said shaft and each tool, for imparting motion to the tools, substantially as set forth.

3. In a carving-machine, a suitable inner swinging frame, an outer frame comprising a post pivotally mounted at the free end of the inner frame, and a series of arms carried by said post and adapted to sweep in a vertical plane, a series of tools carried at the free end of the outer frame, a series of brackets pivotally mounted on the post and corresponding in number to the number of tools, belt-pulleys mounted on the brackets and adapted in alternate series, to direct the belts passing over them to pass below and above the pulleys carried by the tool-spindles, whereby the tools will have imparted to them alternately a motion of rotation in opposite direction, a main drive-shaft located in the path of the axis of oscillation of the inner frame, and a series of pulleys mounted on said shaft, substantially as set forth.

4. In a carving-machine, a stock-frame, a suitable swinging frame located adjacent thereto, a series of tools carried at the free end of said swinging frame, and suitable devices for constraining the angular relation of the tools during their movement along the stock-frame, to lines parallel to any predetermined position to which the axis of rotation of the tool has been set to operate in front of the stock-frame, substantially as set forth.

5. In a carving-machine, a suitable inner swinging frame, an outer swinging frame carried by the inner frame, a tool-supporting beam at the free end of the outer frame, a connecting-rod having one end coupled to the tool-supporting beam, a guide-bar for guiding the opposite sliding end of the connecting-rod, whereby the movement of the tools must be in parallel lines during the oscillation of the outer frame, substantially as set forth.

6. In a carving-machine, a suitable inner swinging frame, an outer swinging frame carried thereby, a tool-supporting beam at the free end of the outer frame, a connecting-rod having one end adapted to be temporarily coupled to the tool-supporting beam, a guide-bar mounted in front of the stock-frame, and a sliding sleeve mounted on the guide-bar, the opposite end of the connecting-rod being pivotally secured to the sliding sleeve, whereby the tools are constrained to move in parallel lines during the oscillation of the swinging frames, substantially as set forth.

7. In a carving-machine, a suitable swinging frame, a tool-supporting beam carried thereby, a tracer operating in connection with the tools, and means for moving the tool-beam and tools carried thereby in one direction in a plane parallel to the surface of the stock-frame, while the tracer is moving in the opposite direction in lines parallel to the same plane, whereby the work carved by the tools is a reverse counterpart of the pattern traced by the tracer, substantially as set forth.

8. In a carving-machine, a suitable frame having a series of swinging arms, a tool-supporting beam carried at the free ends of said arms, a rocker carried by one of the arms, a rocking bar pivoted in proximity thereto, and having a rocking face coöperating with the rocking face of the rocker, suitable bands or cords connecting the end of one rocking face with the opposite end of the opposite rocker, a tracer carried at the free end of the rocking bar, and means for guiding the tracer along the tool-supporting beam, substantially as set forth.

9. In a carving-machine, a tool-supporting beam, a guide-plate adapted to be secured thereto, a tracer partially embracing the walls of said plate, and means for sliding the tracer back and forth along the guide-plate in directions opposite to the tools carried thereby, substantially as set forth.

10. In a carving-machine, a suitable inner swinging frame, an outer swinging frame having a pivotal post mounted at the free or swinging end of the inner frame, a series of pivoted and swinging arms carried by the post, a tool-supporting beam at the free end of the outer frame, a series of pulley-support-

ing brackets mounted on the post, a drive-shaft located in the path of the axis of oscillation of the inner frame, a rod having a series of belt-tighteners carried by the inner frame, a series of drive-pulleys mounted on the drive-shaft, and a series of independent tool-driving belts passing from the pulleys on the main shaft, over the pulleys carried by the brackets, and over the pulleys carried by the tool-spindles, substantially as set forth.

11. In a carving-machine, a suitable swinging frame, a series of tools carried at the free end thereof, a drive-shaft for said series, belts connecting the tools with the drive-shaft, a belt-tightener for each belt carried by the frame and located between the drive-shaft and tool series, each tightener comprising a rotatable sleeve, arms radiating outwardly from said sleeve, pulleys carried by said arms, a rod about which said sleeve is passed, a stationary ratchet-disk carried by the rod, a spring coiled about the rod and having one end secured to one of the arms and its opposite or free end adapted to engage the teeth of the ratchet, the lap of the belt being adapted to pass between the pulleys, substantially as set forth.

12. In a carving-machine, a suitable swinging frame, a series of tools carried at the free end thereof, a drive-shaft for said series, belts connecting the tools with the drive-shaft, a belt-tightener for each belt carried by the frame and located between the drive-shaft and tool series, each tightener comprising a stationary rod, a rotatable sleeve loosely mounted thereon, a stationary ratchet-disk located below the sleeve and clamped to said rod, arms radiating from the sleeve, pulleys mounted at the outer ends of said arms, between which the lap of the belt passes, a spring coiled about the rod below the sleeve, one end of the spring being secured to one of the arms and the free end being adapted to engage the teeth of the ratchet-disk, and an arm carried by the rod and adapted to come in contact with the tightener and limit its rotation or swing about the rod, substantially as set forth.

13. In a carving-machine, suitable guide-bars adapted to support between them a sliding stock-frame, a foot-lever pivoted at the base of the lower guide-bar, a rocking clamping-plate supported on pins and located adjacent to the foot-lever and exterior thereto, a wedge terminating the short arm of the lever and coöperating with a corresponding wedge-surface formed on the clamping-plate, a second and corresponding wedge formed along the long arm of the lever at a point suitably removed from the pivot thereof and cooperating with a wedge-surface formed in the clamping-plate, whereby upon tilting the foot-lever in one or the other direction the clamping-plate is rocked back and forth about its supporting-pins, the gripping edge of the plate being adapted to bear against the lower timber of the stock-frame, substantially as set forth.

14. In a carving-machine, an inner swinging frame, an outer swinging frame carried thereby, a stock-frame mounted in front of the outer frame, a pulley mounted on a pivoted bracket at the base of the stock-frame, means for rotating said pulley from the main drive-shaft, a shaft extending from said pulley parallel to the stock-frame, a pinion at the forward end of the shaft, a driving disk or plate meshing with said pinion, a worm-carrying shaft extending upwardly from said disk along the stock-frame, a series of worm-wheels and spindles coöperating with the worm-pinions of said shaft, and means for retaining the pinion carried by the lower shaft, in engagement with the driving-disk or disengaging the pinion from said disk, substantially as set forth.

15. In a carving-machine, a suitable shaft adapted to drive a series of stock-holding spindles, a disk at the lower end thereof, a horizontally-disposed shaft having at its forward end a pinion for driving said disk, the opposite end of the shaft carrying a pulley mounted in a bracket or arm pivotally secured at the base of the stock-frame, a sleeve loosely embracing the horizontal shaft at a point in proximity to the pinion, said sleeve forming the end of one arm of a lever pivoted in proximity to the shaft, a pivoted tripping-lever having a toe adapted to engage the opposite arm of the lever and rock the latter so as to disengage the pinion end of the horizontal shaft from the disk, or reëngage it at the will of the operator, the parts operating substantially as and for the purpose set forth.

16. In a carving-machine, a suitable pulley-supporting bracket, a pulley mounted on each face of the same, an oscillating brace for said bracket, a pivotal pin passing through the base, a cup for said base, a post to which said cup is secured, wearing-plates secured to the base and post respectively, a curved slot formed in the base, suitable antifriction-rollers confined within the slot and bearing against the respective bearing-plates, and an arm forming an extension of the bracket and adapted to be pivotally secured to the connecting-rod by which the arms of the frame are joined, substantially as set forth.

17. In a carving-machine, a tool-casing, a spindle for the same, a groove formed longitudinally along the periphery of the spindle, a pin projecting through the casing and having a series of transverse notches, a spring secured to the casing and having a portion adapted to engage the notches, for holding the pin in any adjusted position, and means for imparting rotation to the spindle upon a disengagement of the pin therefrom, substantially as set forth.

18. In a carving-machine, a suitable swinging frame, a pivotal support for the same comprising a hollow tube, brackets for the

support of the opposite ends of the tube, a peripherally-grooved cone-shaped portion adapted to retain antifriction-rollers, the pivotal end of the frame embracing said peripherally-grooved cone-shaped portion and rollers carried thereby, and adapted to swing about the same, and a drive-shaft passing loosely through the tube, substantially as set forth.

19. In a carving-machine, a suitable swinging frame, a pivotal support for the same comprising a hollow tube having a lower exteriorly-screw-threaded portion, a medial peripherally-grooved conical portion and an upper smooth cylindrical portion, bearings for said screw-threaded and smooth portions, the pivotal end of the frame being swung from the conical portion, bearing-balls interposed between the conical portion and the frame embracing the same, said balls being adapted to travel in the peripheral grooves, and a shaft loosely passing through the tube and having supporting-bearings below and above the tube, the parts operating substantially as and for the purpose set forth.

20. In a carving-machine, a suitable frame swinging about an axis, a second frame swinging on said frame about a second axis, a series of tools at the free end of the second frame adapted to sweep in a plane parallel to said second axis, a drive-shaft located in the line of the axis of suspension of the first frame, and a single intermediate belt connection between said shaft and each tool, for imparting motion of rotation in one direction to a portion of the tool series, and an opposite rotation to the remaining tools of the series, substantially as set forth.

21. In a carving-machine, a suitable inner swinging frame, a drive-shaft located in the path of the axis of oscillation thereof, an outer frame comprising a post pivotally mounted at the free end of the inner frame, and a series of arms carried by said post and adapted to sweep in a vertical plane; a series of tools carried at the free end of the outer frame, a series of brackets pivotally mounted on the post, and belt-pulleys mounted on the brackets on each side of the axis of suspension of the outer frame, and on opposite faces of the brackets, for guiding the belts leading from the drive-shaft to the tool-spindles, substantially as set forth.

22. In a carving-machine, a suitable frame having a series of swinging arms, tools carried at the free ends of said arms, rockers operating in connection with the arms, one rocker being connected to the tools and the other to the tracer, whereby as the latter sweeps in one direction the tools will sweep in a direction opposite thereto, substantially as set forth.

23. In a carving-machine, a suitable swinging frame, a series of tools carried at the free end thereof, a drive-shaft for said series, belts connecting the tools with the drive-shaft, a belt-tightener for each belt carried by the frame and located between the drive-shaft and tool series, each tightener comprising a rod, a pair of pulleys rotatable about the same, the lap of the belt being adapted to pass between the pulleys and a resilient spring for simultaneously forcing the pulleys against the opposite faces of the lap, substantially as set forth.

24. In a carving-machine, suitable rotatable stock-holding spindles, and means for separately and individually adjusting the latter both in the line of the axis of rotation of the stock, and in a plane at right angles thereto, substantially as set forth.

25. In a carving-machine, a suitable swinging frame, a series of tools carried thereby, a drive-shaft, a stock-frame, said frame having a series of hollow tubular rotatable spindles, one end thereof being provided with suitable yielding arms, a chuck adjustable longitudinally along the same, means for forcing the arms into positive frictional engagement with the walls of the chuck, and intermediate connections between the drive-shaft and spindles for rotating the latter, substantially as set forth.

26. In a carving-machine, a suitable swinging frame, a series of tools carried thereby, a drive-shaft, a stock-frame, said frame having a series of hollow tubular rotatable spindles, yielding arms carried at one end of the same, a chuck passed over said arms and rotatable about the same, means for forcing the arms into positive frictional engagement with the inner walls of the chuck, and intermediate connections between the drive-shaft and spindles for rotating the latter, substantially as set forth.

27. In a carving-machine, a suitable swinging frame, a series of tools carried thereby, a drive-shaft, a stock-frame, said frame having a series of hollow tubular rotatable spindles, yielding arms terminating one end thereof, a chuck passed over said arms, a movable rod mounted in the tube and adapted upon movement in one direction to wedge the arms apart and force the same into frictional contact with the inner walls of the chuck, and intermediate connections between the drive-shaft and spindles for rotating the latter, substantially as set forth.

28. In a carving-machine, a suitable swinging frame, a series of tools carried thereby, a drive-shaft, a stock-frame, said frame having a series of hollow tubular rotatable spindles, having a series of split members or arms at one end thereof, a chuck passed over said arms, a movable rod mounted in the tube and adapted upon movement in one direction to wedge or force the arms into positive engagement with the walls of the chuck, a plate against which the chuck is adapted to bear, means for shifting the position of the plate and thus adjusting the position of the chuck in the direction of the axis of suspension of the stock, and intermediate connections between the drive-shaft and spindles for rotating the latter, substantially as set forth.

29. In a carving-machine, a suitable swinging frame, a series of tools carried thereby, a drive-shaft, a stock-frame, said frame having secured thereto a bracket having a hollow rotatable stock-holding spindle mounted therein, a controlling-screw mounted at one end of the spindle, a split extension forming the opposite end of the spindle, a rod carried in the hollow of the spindle and having a conical portion adapted to be embraced by the arms formed at the split end of the spindle, a chuck passed over the split end of the spindle, and rotatable about the same, a plate interposed between the bracket and the chuck, means for moving the plate to and from the bracket in the line of suspension of the stock, that is to say, in the axis of rotation of the spindle, and thus adjusting the position of the chuck longitudinally and intermediate connections between the drive-shaft and spindles for rotating the latter, the parts operating substantially as and for the purpose set forth.

30. In a carving-machine, a suitable swinging frame, a series of tools carried thereby, a drive-shaft, a stock-frame, said frame having a series of hollow tubular rotatable spindles, a chuck passed over one end of the same, a movable rod carried in the tube of the spindle and adapted to force the walls of the spindle and chuck into positive engagement, a terminal stem forming a part of the rod and passing through the base of the chuck for centering the stock-pieces, and intermediate connections between the drive-shaft and spindles for rotating the latter, substantially as set forth.

31. In a carving-machine, a suitable frame having a series of swinging arms, tools at the free ends thereof, a rocker carried by one of the arms, a rocking bar pivoted in proximity thereto, and having a rocking face coöperating with the rocking face of the rocker, a tracer carried at the free end of the rocking bar, and adapted, upon movement of the latter, to swing in one direction, while the tools swing in the opposite direction, substantially as set forth.

32. In a carving-machine, a suitable frame swinging about an axis, a second frame swinging on said frame about a second axis, a series of tools at the free end of the second frame adapted to sweep in a plane parallel to said second axis, a drive-shaft located in the line of the axis of suspension of the first frame, and a single intermediate belt connection between said shaft and each tool, for imparting motion of rotation in one direction to a portion of the tool series, and an opposite rotation to the remaining tools of the series, the laps of each belt being disposed on opposite sides of the axis of suspension of the second frame, substantially as set forth.

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

EMIL LOCHMAN.

Witnesses:
EMIL STAREK,
GEORGE L. BELFRY.