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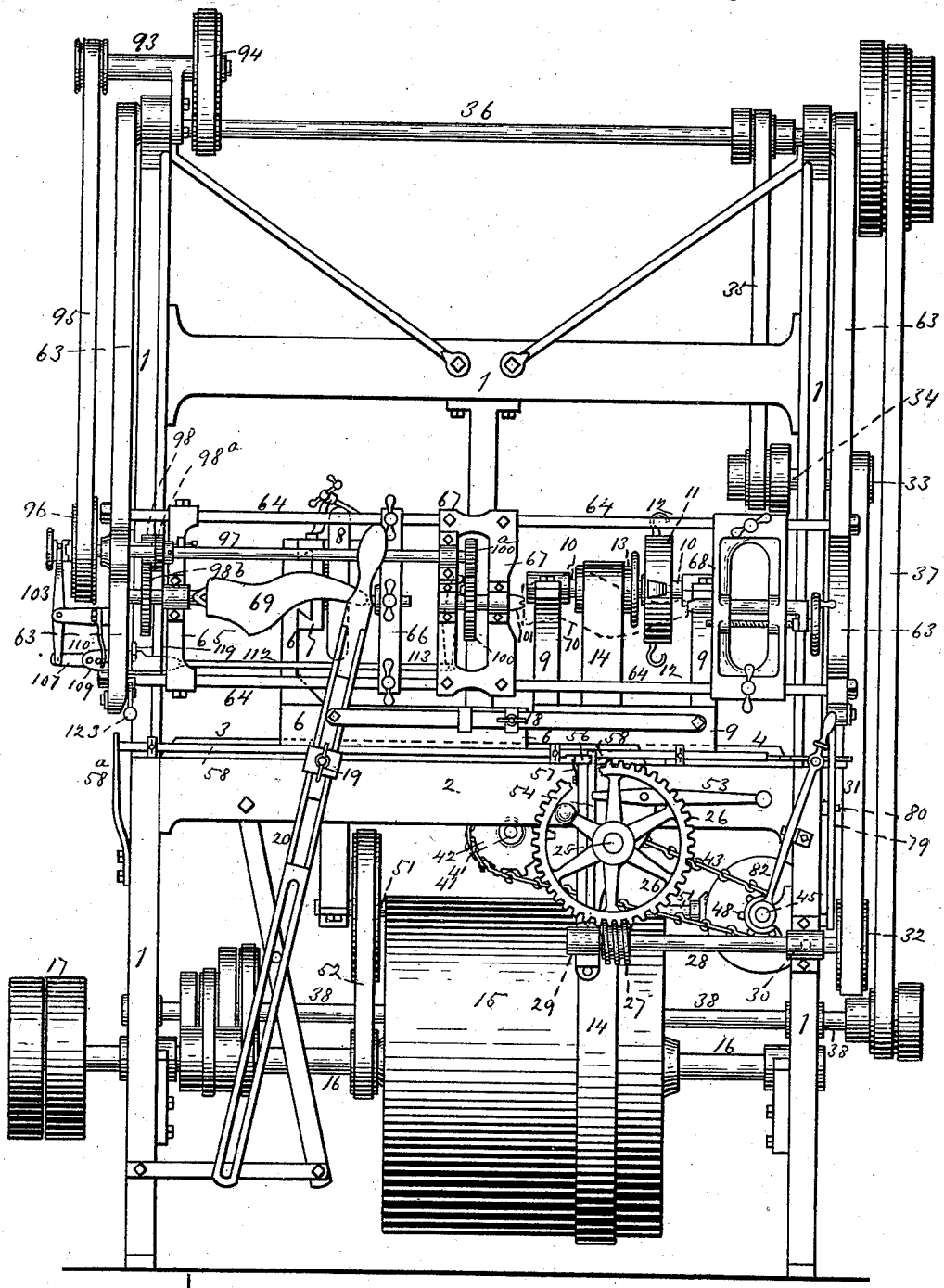
LATHE FOR TURNING LASTS, &c.

No. 544,891. Patented Aug. 20, 1895.



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Henry W. Williams

FIG. 1.

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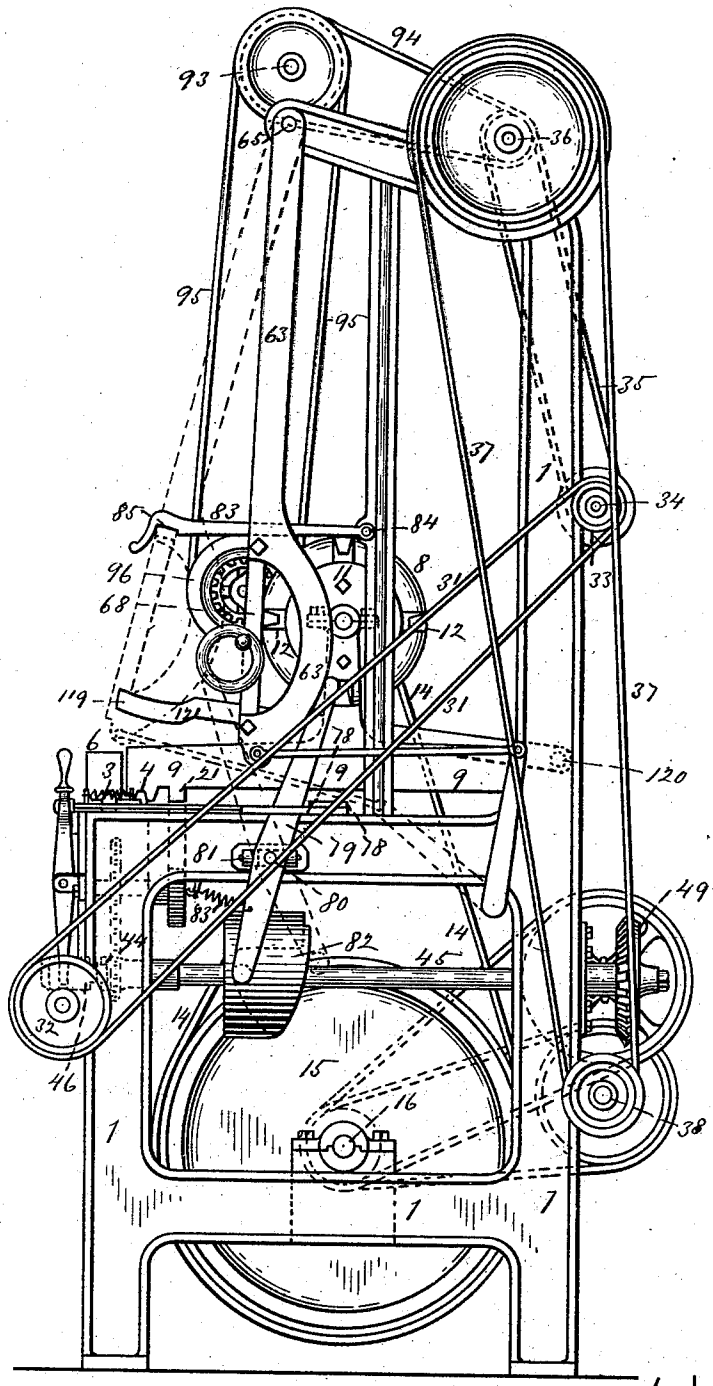

Fig. 2.

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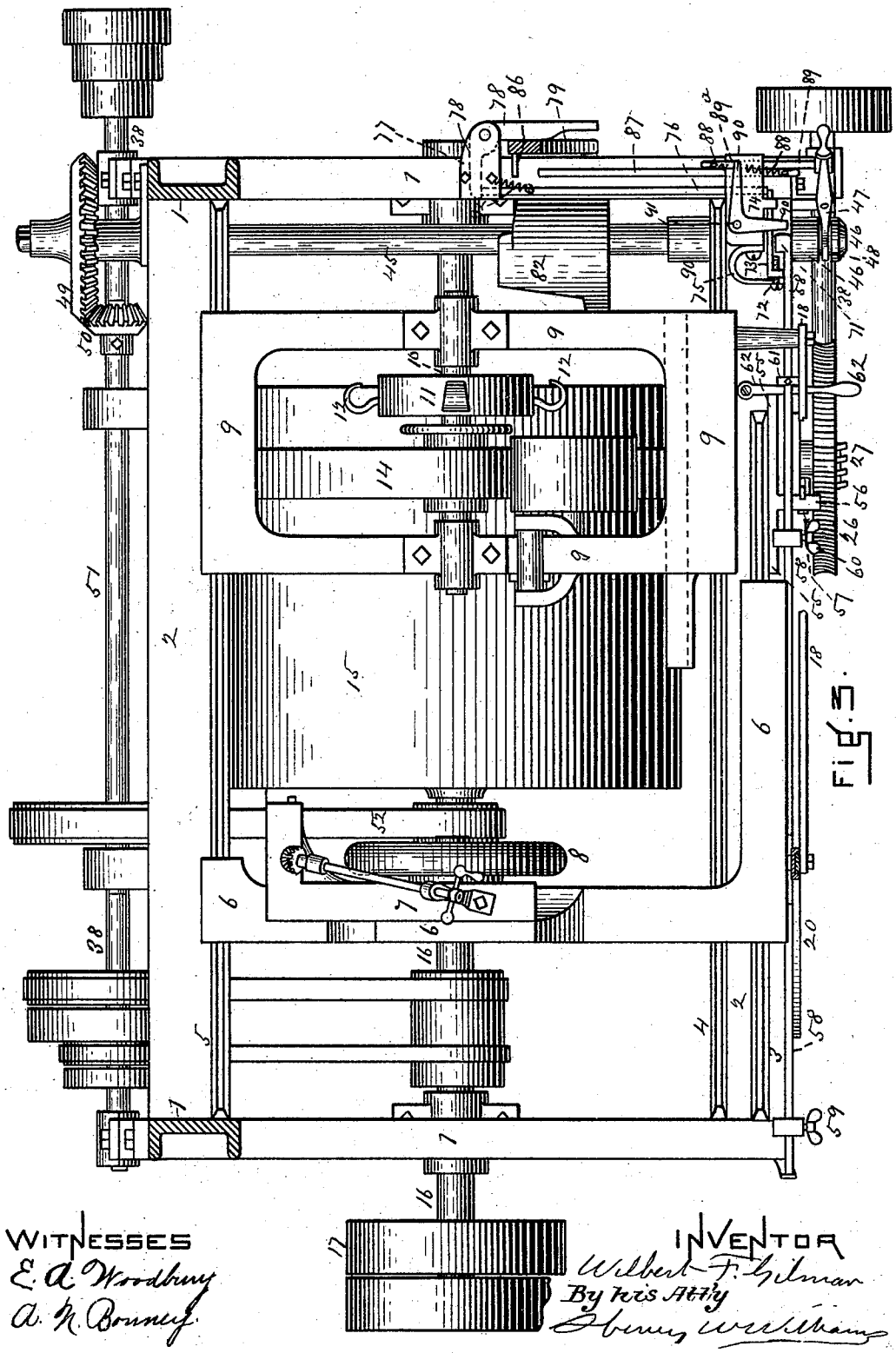

Fig. 3.

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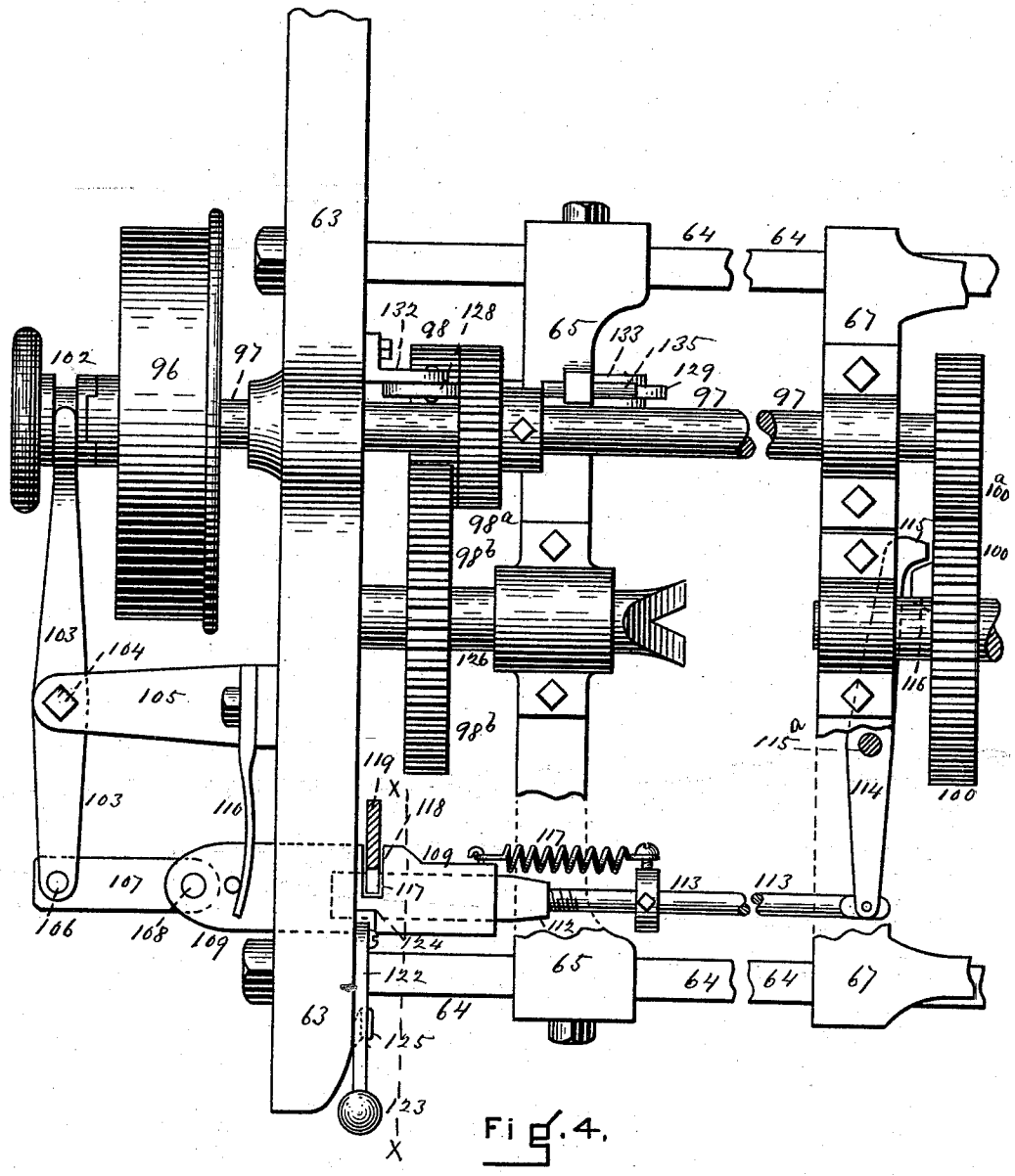

Fig. 4.

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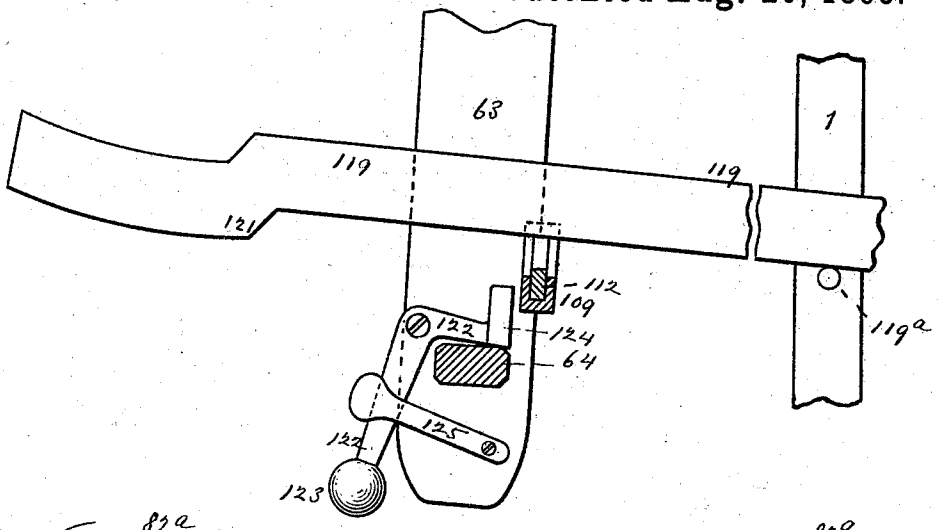

Fig. 5.

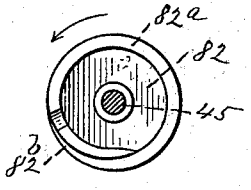

Fig. 8.

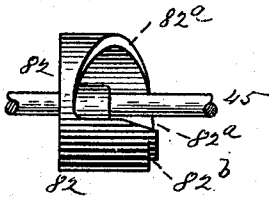

Fig. 9.

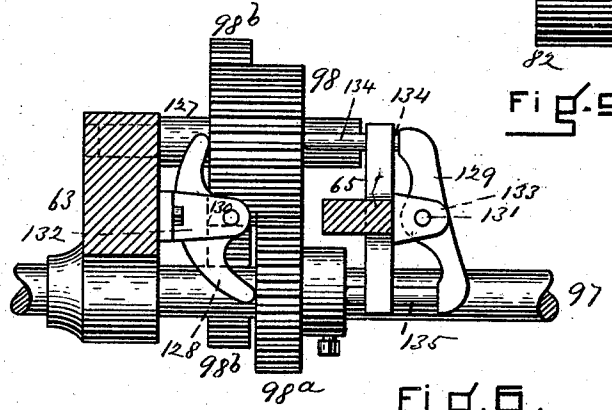

Fig. 6.

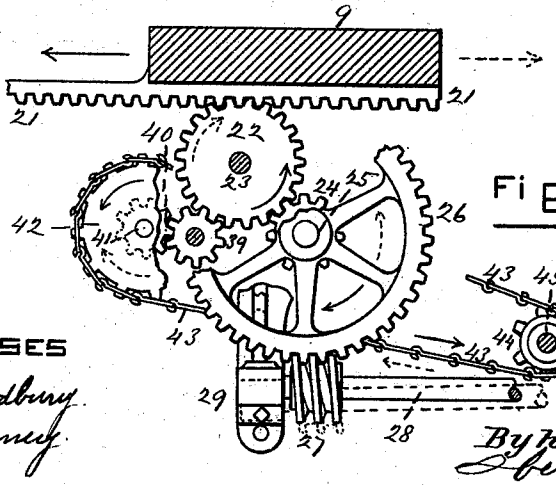

Fig. 7.

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UNITED STATES PATENT OFFICE.

WILBERT F. GILMAN, OF SPRINGFIELD, VERMONT.

LATHE FOR TURNING LASTS, &c.

SPECIFICATION forming part of Letters Patent No. 544,891, dated August 20, 1895.

Application filed January 25, 1895. Serial No. 536,190. (No model.)

To all whom it may concern:

Be it known that I, WILBERT F. GILMAN, a citizen of the United States, residing at Springfield, in the county of Windsor and State of Vermont, have invented new and useful Improvements in Lathes for Turning Lasts or other Irregular Forms, of which the following is a specification.

This invention relates more particularly, but not exclusively, to machines for turning or shaping last-blocks into lasts of the shape and form of a required model, such machines being of the general character illustrated and described in Letters Patent of the United States to Farley B. Gilman, granted February 16, 1892, and numbered 469,084; and the invention relates particularly to the improved mechanism hereinafter described, whereby the swinging frame supporting the model is pushed out automatically after the last is finished, whereby the carriages which sustain the cutter-head and the model-wheel are returned automatically into position for turning another last, whereby the product is stopped, right side up, uniformly at a selected point, and whereby the machine is improved in certain details of construction, all substantially as illustrated in detail in the accompanying drawings, in which—

Figure 1 is a front elevation of a last-turning lathe embodying my improvements. Fig. 2 is an end elevation of the same. Fig. 3 is a plan view taken above the table or sills with the swinging frame and upper portion of the frame removed. Fig. 4 is an enlarged detail in elevation illustrating the mechanism for stopping the product or completed last right side up. Fig. 5 is an enlarged sectional detail taken on line *x*, Fig. 4. Fig. 6 is an enlarged section and plan illustrating the mechanism for reversing the gears after a right or left last has been produced, in order that the machine may be adapted to produce a left or right last. Fig. 7 is an enlarged detail, in elevation and section, of the mechanism for reversing the movement of and returning the carriages. Figs. 8 and 9 are views of the cam for pushing out the swinging frame.

Similar figures of reference indicate corresponding parts.

The supporting-frame 1 of the machine sustains the table or sills 2, on which are horizontal tracks 3, 4, and 5, Figs. 1, 2, and 3, said tracks 3 and 4 being on the front sill, and for the accommodation of the model-wheel carriage and the cutter-head carriage, respectively, and the track 5 being on the rear sill and for the use of both carriages.

6 is the model-wheel carriage, on which the dovetailed slide 7 moves transversely, said carriage sustaining the model-wheel 8, all constructed as usual.

9 is the cutter-head carriage sustaining the shaft 10, fast upon which is the cutter-head 11, provided with suitable cutters 12, said shaft being driven by means of the pulley 13, connected by the belt 14 with the drum 15 fast on the driving-shaft 16, provided with suitable pulleys 17, connected with the power. The cutter-head carriage and the model-wheel carriage are connected by the adjustable bar 18, Fig. 1, pivotally secured at its opposite ends directly or indirectly to the said carriages. In this instance one end of the bar is secured to a slide 19 in the ordinary grading-lever 20, which is pivoted to the model-wheel carriage, none of the above being new in this invention. The cutter-head carriage is provided on its under side with a rack 21, Figs. 2 and 7, which is engaged by the intermediate gear 22, loose on the pivot 23, extending from the rear side of the front sill 2. The gear 22 is engaged by the pinion 24, fast on the rear end of the shaft 25, supported by the frame, while fast on the front end of said shaft 25 is the gear-wheel 26, engaged by the worm 27 on the horizontal shaft 28, having its bearings in the sliding box 29 and swiveled box 30, whereby the worm can be disengaged from and engaged with the gear 26, all of which is old in construction. The shaft 28 is driven by the belt 31, which connects the pulley 32 with the pulley 33 on the counter-shaft 34, which is belted by the band 35 to the shaft 36, which is connected by the belt 37 with the shaft 38, belted to the driving-shaft 16. The above mechanism drives the two carriages 6 and 9 toward the left, as indicated by arrows in full lines in Fig. 7. Thus far no novelty is claimed in the device.

An intermediate gear 39 meshes with the gear 22 and the pinion 40, fast on the shaft 41,

supported by the front sill 2. Fast on the same shaft is the sprocket-wheel 42, connected by the chain 43 with the clutch sprocket-wheel 44, loose on the shaft 45, supported by the frame. (See Figs. 2, 3, and 7.) The shaft 45 has splined on it a clutch 46, (see Fig. 3 and broken lines in Fig. 2,) which engages the sprocket-wheel 44 by means of the lever 47, pivoted to the frame and extending into the annular groove 48. The shaft 45 is engaged by means of the bevel-gears 49 and 50 by the shaft 51, Figs. 1 and 3, which is driven by the belt 52, connecting with the driving-shaft 16. To reverse the sliding movement of the carriages 6 and 9, the worm 27 is swung out of engagement with the gear-wheel 26 and the clutch 46 is moved into engagement with the sprocket-wheel 44, with the result that the pinion 39, which has been "running loose," engages the pinion 22, driving it in the direction indicated by the arrows in broken lines, Fig. 7, and returning the said carriages ready to operate on another last. The worm 27 is lifted into engagement in substantially the same manner as illustrated in the Letters Patent numbered 469,084, above referred to, a lever 53 pivoted to the sill 2, Fig. 1, lifting a hook 54, which engages the slide-box 29, such hook being held in engagement by means of a sliding bar 55, Fig. 3, from which an integral bolt 56 extends into a notch in the edge of said hook, being thrown into such engagement by a spring 57, Figs. 1 and 3, secured to the sill 2.

58 is a shipper-rod adapted to be moved endwise in suitable ways on the front sill 2, said shipper-rod being provided with adjustable stops 59 and 60 at opposite sides of the model-wheel carriage, and acted on by the spring 58^a, whereby the length of the traverse is regulated, more especially as regards the stop 60, which is located with relation to the length of the last. An engaging-lug 61 is secured to the rod 58, as shown in Fig. 3, with the result that as the sliding carriages move toward the left the carriage 6 strikes the stop 59, causing the lug 61 to strike the lever 62, which is pivoted to the sill. This lever is thus swung into engagement with the bar 55, which is moved thereby toward the left, and hence withdraws the bolt 56 from the hook 54, thus allowing the worm 27 to drop and stop feeding.

The movement of the carriages from right to left having been above described, before describing the means for starting the mechanism for returning the carriages from left to right it is advisable to give some description of the swinging frame for holding the model or pattern and the block to be formed into a last. This swinging frame has its vertical or side pieces numbered 63 and its cross-bars numbered 64, and it hangs freely from pivots 65, extending from the main frame, Figs. 1 and 2. The cross-bars 64 support the head-stocks and tail-stocks 65, 66, 67, and 68 for holding the model or pattern 69 and block 70. (Not new in this invention.) When the shipper-rod 58 is moved toward the left, as above described, an integral projection 71 at its right end strikes an adjustment-screw 72 in the key 73, sliding in a suitable groove in the bracket 74, secured to the frame. A C-spring 75 has one end secured to the bracket 74, while the other end presses against the end of the key 73. The right end of this key lies normally across the end of a rod 76, sliding longitudinally in suitable grooves in the brackets 74 and a bracket 77, also secured to the frame. This rod 76 is held normally against the key 73, as shown in Fig. 3, by a bell-crank 78, (indicated in full and broken lines in Fig. 3,) pivoted to the under side of the bracket 77. The outer arm of the bell-crank 78 is engaged by the cam-lever 79, whose upper end lies between the said arm and the frame of the machine. This cam-lever (see Figs. 2 and 3) is pivoted at 80 to a hinge 81 on the frame, so that it is capable of swinging longitudinally as well as transversely with the machine. Its lower end has a suitable roll, whereby it may be engaged by the cam 82, Figs. 2, 3, 8, and 9, fast on the shaft 45. The adjustment-screw 72 is so set that simultaneously with the stopping of the feeding of the carriages toward the left or just before the worm 27 stops feeding the key 73 releases the rod 76, which releases the bell-crank 78, thus leaving the upper end of the cam-lever 79 free to be forced out by the power of a spring 83, Fig. 2, extending from the frame to the lower portion of said lever, thus carrying the roll at the lower end of the lever 79 into engagement with the cam 82. The effect on the lever 79 of the rotation of the cam is to cause the roll on said lever to mount the edge 82^a and travel thereon until it is crowded off at 82^b. The upper end of the cam-lever bears against the rear side of the swinging frame 63, Fig. 2, giving it the desired movement forward until it reaches the position indicated in broken lines in Fig. 2, when it is locked by the dropping of a latch 83, pivoted at 84 to the frame of the machine, a notch 85 in said latch engaging the upper bar 64, Fig. 1, of the swinging frame. Thus the swinging frame is secured in a forward position until a new last is put in, when the operator lifts the latch 83 and allows the swinging frame to fall, so that the model 69 may bear against the wheel 8 in the manner common in machines of this description.

The cam-lever 79 has a projection 86 extending inwardly, Fig. 3, by means of which the start on the return—that is, from left to right—is made of the carriages 6 and 9 during the time that the cam is operating the lever. This projection 86 strikes the end of the longitudinally-sliding bar 87, (sliding in a groove in the frame,) which is connected at its opposite end by a spring 88 (shown as broken out in Fig. 3) with a parallel bar 89 sliding in a groove in the frame. The outer end of the bar 89 is pivoted to the shipping-lever 47.

Thus the lever 47 is made to move the clutch 46 into engagement with the sprocket 44, as above described, and start the return of the carriages. The spring 88 is intended merely to assist the horns of the clutch into engagement.

The movement of the return is ended by the carriage 6 striking the stop 60, which is secured adjustably to the bar 58, its position thereon being determined by the length of the model operated upon. The effect of the carriage striking this stop is to move the bar 58 toward the right and cause its right end to strike an arm of the bell-crank 90, Fig. 3, pivoted at 91 to the frame, causing the other arm to push back the sliding bar 89 by means of a shoulder 89[a] thereon, thus unclutching the mechanism. It will be noticed that the angle of inclination of the spring 83 is such that the cam-lever will be held in engagement with the cam until it is thrown off, and then the spring will pull it back into the position shown in Fig. 3, the cam-lever being held in the position shown in Fig. 3 by the bell-crank, which has become locked by the movement of the cam-lever. The spring 92, whose ends are secured to the bar 76 and bracket 77, operates by its pull on said bar (which bears against the bell-crank 78) to keep the bell-crank bearing against the upper portion of the lever 79 during its movement, such movement, by reason of the shape of the cam and the facility afforded by the hinge 81 and the pivot 80, describing substantially a rectangle.

The following-described mechanism is for stopping the rotation of the product (shown in broken lines 70, Fig. 1),—that is, the completed last—invariably at a selected point—that is to say, with the last right side up for the convenience of the operator in centering the block. A counter-shaft 93, Figs. 1 and 2, is belted at 94 to the shaft 36, and said counter-shaft is connected by the belt 95 with a loose clutch-pulley 96 on the shaft 97, having its bearings in the head-stocks 65 and 67. Suitable gears 98, 98[a], and 98[b] (below described) transmit motion to the spindle 99, which rotates the pattern 69, and suitable gears 100 and 100[a] transmit motion to the spindle 101 for turning the stock 70, none of which is claimed to be new in this invention. The normal position of the device when turning is with a clutch 102 in engagement with the clutch-pulley 96, such engagement being effected by the shipper 103, Figs. 1 and 4 pivoted at 104 to a bracket 105, secured to the swinging frame 63. The lower end of the shipping-lever 103 is pivoted at 106 to a link 107, which is pivotally connected at 108 with a slide-holder 109, sliding in the swinging frame. A spring 110, extending down from the bracket 105 against the pin 111, holds the slide-holder normally out and the clutch normally in engagement. The slide-holder 109 is hollowed out to receive the slide or sliding head 112, into whose outer end is screwed a rod 113, pivoted at its rear end to a lever 114, which is pivoted at 115[a] to the head-stock 67. The upper end of the lever 114 is formed with a projection 115, which is adapted to be engaged by the cam 116 on the side of the gear-wheel 100. A spring 117 connects the rod 113 with the slide-holder 109, and holds the slide 112 normally within it. With each revolution of the gear-wheel 100 the cam 116 strikes the projection 115 and by means of the lever 114 withdraws the rod 113 and slide 112 against the power of the spring 117, which returns them as soon as the cam has passed. This of course occurs constantly while the lathe is turning. The slide 112 is provided with a notch 117, which is coincident with a notch 118 in the slide-holder 109. 119 is a locking-bar pivoted at its rear end at 120 to the rear portion of the frame. (See Figs. 2, 4, and 5.) This bar is supported by a projection 119[a], extending from the frame, Fig. 5, in the position shown in the drawings—that is, out of engagement with the slide 112, but in engagement with the slide-holder 109—simply for steadying purposes. At the outer end of the locking-bar 119 there is a shoulder 121 on its under side. When the swinging frame is swung out and locked by the latch 83, which is done when the last is finished, as above described, the shoulder 121 on the locking-bar which is curved on an arc of a circle of which the pivot 65 is the center, Figs 2 and 5, engages the slide 112 by means of the notch 117. This locks the slide 112 and slide-holder 109 together, and the next time the projection 115 strikes the cam 116 the rod 113, slide 112, holder 109, and link 107 combine to cause the shipper 103 to unclutch the pulley 96 and the mechanism stops with the cam 116 under the projection 115, the momentum being very slight. The cam 116 is placed in such a position (previously determined by exact calculation) that the machine will stop with the finished last in the exact position desired, the usual position desired being right side up. When the swinging frame 63 is returned, the notched slide 112 swings free of the locking-bar 119 and the parts above named return to their original positions, the clutch 102 starting the mechanism again and the lever 114 vibrating by means of the cam freely but without effect upon the machine. It is sometimes desirable (as for adjusting the gears for reversing, for example) to rotate the gear 100 so as to remove the cam 116 from under the the projection 115. In order to do this without the clutch 102 setting the machine in motion, I provide the elbow-lever 122, Figs. 4 and 5, furnished with the weight 123. The upper end 124 of this lever is thickened, as shown, and a spring 125 holds the lever normally in the position indicated in Fig. 5. By releasing this spring the weight 123 moves the thickened end 124 up between the locking-bar 119 and the frame 63, thus preventing the clutch 102 from engaging the pulley 96. It is desirable to provide some mechanism for reversing

the pattern 69—that is, for forcing the pattern and the last to rotate in opposite directions—so that a reversed last may be produced—that is to say, a last which is the reverse of the pattern. In other words, reversing the pattern enables a right and a left last to be produced.

126 is the spindle which rotates the model or pattern. (See Figs. 1, 4, and 6.) 98^b is a gear-wheel fast on said spindle.

98^a is a gear-wheel splined on the shaft 97 so as to slide thereon.

98 is a gear-wheel on a pivot 127, Fig. 6, supported by the swinging frame 63.

128 and 129 are oppositely and inwardly curved levers pivoted at 130 and 131, respectively, to the brackets 132 and 133. Pins 134 and 135 extend from the opposite ends of the lever 129 to the gears 98 and 98^a, as shown. In the position illustrated in the drawings these gears are so arranged that the last being turned is the reverse of the model or pattern, the gear 98^a being in engagement with the gear 98, which is in engagement with the gear 98^b. To reverse the operation the gear 98^a is moved toward the left into engagement with the gear 98^b. This swings the lever 130 so that it pushes the gear 98 out of engagement entirely. When the gear is to be returned into the position shown, the lever 129, having one arm pushed out by the rod 135, pushes the gear-wheel 98 back into engagement by means of the rod 134.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a machine of the character described, the combination with the train of gears 22, 26 and 40 engaging the carriages and actuated by a worm on a shaft supported by the frame and the sprocket wheel 42, of the intermediate gear 39 adapted to engage with the gear 22 and the pinion 40, the sprocket wheel and clutch 44, 46 on the shaft 45, the former being connected by a suitable chain with the sprocket wheel 42, the shaft 51 connected with said shaft 45 and driven by a belt connected with the driving shaft, and mechanism for swinging the worm out of and into engagement with the gear and the clutch into and out of engagement with the sprocket wheel, whereby the intermediate gear 39 is adapted to engage the gear wheel 22 and return the carriages, substantially as set forth.

2. In a machine of the character described, in combination, the shipper rod 58 provided with the projection 71 at its right end and sliding longitudinally in the frame, the key 73 sliding in a bracket secured to the frame and provided with an adjustment screw adapted to be engaged by said projection, the spring 75 having one end secured to said bracket and the other pressing against the key, the longitudinally sliding rod 76 held normally against the key by a bell crank pivoted to a bracket supported by the frame, a cam supported by the frame, a cam lever engaged by said cam and engaging the outer arm of the bell crank, the swinging frame 63 suspended from the frame of the machine and engaged by said cam lever, and a suitable spring connecting the cam lever with the frame, whereby just before or simultaneously with the stopping of the feeding of the carriages the said key releases the rod 76 and bell crank 78 leaving the cam lever free to be carried by the spring into engagement with said cam, substantially as described.

3. In a machine of the character described, the cam 82 provided with the working edge 82^a and 82^b and actuated by the shaft 45, the cam lever 79 engaged by said cam, the swinging frame 63 suspended from the frame of the machine and engaged by said cam lever, the bell crank 78, the shipper rod 58 provided with the projection 71, the sliding key 73 provided with the adjustment screw 72, and mechanism intermediate with said screw and bell crank whereby the cam lever is released and placed into engagement with said cam by a spring, substantially as set forth.

4. In a machine of the character described, the combination of the cam lever 79 provided with the projection 86, a cam actuating said lever, the longitudinally sliding bar 87 supported by the frame and engaged by said projection, the parallel sliding bar 89, the spring 88 connecting said bars in the manner described, the shipping lever 47 pivotally secured to the outer end of the bar 89, the clutch 46 engaged by said lever, the sprocket 44, and mechanism intermediate with said sprocket and the carriages whereby they are started on their return, substantially as described.

5. In a machine of the character described, the combination of the carriages, the longitudinally sliding bar 58 supported by the frame and provided with adjustable stops, as 60, the bell crank 90 pivoted to the frame and adapted to be engaged by the end of said sliding bar, the sliding bar 89 supported by the frame and sliding longitudinally at right angles with the direction of the movement of the bar 58 and provided with a shoulder 89^a whereby it is engaged by said bell crank and the clutch 46 adapted to be engaged by said sliding bar 89, substantially as set forth.

6. In a machine of the character described, the cam 82 provided with the bearing edge 82^a 82^b, the cam lever 79 pivoted to a hinge which is pivoted to the frame whereby said lever is capable of swinging longitudinally and transversely with the frame the swinging frame 63 suspended from the frame of the machine and engaged by said cam lever, the bell crank 78 pivoted to a bracket on the frame, the bar 76 sliding on the frame, the spring 92 holding the end of said bar 76 against one arm of the bell crank whereby the other arm bears normally against the cam lever, and the spring 83 connecting the cam lever with the frame at a suitable angle of inclination to hold the cam lever into engagement with the cam until it is thrown off and

then pull it back into the position set forth, the movement of the cam lever describing substantially a rectangle, all arranged substantially as set forth.

7. In a machine of the character described, in combination, the shaft 97 having its bearings in the head stock 65 and 67 supported by the swinging frame and connected by suitable gears with the spindle which rotates the model or pattern, a clutch engaging a loose pulley on said shaft 97, a shipping lever engaging said clutch and pivotally supported by the swinging frame, the slide holder 109 sliding in the swinging frame and connected by a link with said shipping lever, a spring extending from the swinging frame and holding the clutch normally in engagement, the sliding head 112 moving longitudinally in said slide holder, the locking bar 119 pivoted to the frame and engaged by said sliding head, the rod 113 extending from said sliding head and connected with the slide-holder by a spring, the lever 114 pivotally secured to the head stock and having one end connected with the said rod 113, and the gear wheel 100 for transmitting motion to the spindle for turning the stock to be formed into a last, said gear wheel being provided on its side with a cam adapted to engage the lever 114 with each revolution, substantially as described.

8. In a machine of the character described, the combination of the cam gear wheel 100 transmitting motion to the spindle carrying the stock to be formed into a last, the slide-holder 109, slide 112, rod 113 and lever 114 engaged by the cam on the wheel 100 and connecting with the rod 113, said slide being provided with a notch 117 and said slide-holder with a coincident notch 118, a locking bar 119 pivotally secured to the frame and supported by a projection on the frame and adapted to enter into engagement with the slide and slide holder and lock them together by means of the notches aforesaid, and mechanism intermediate with the slide-holder and pulley 96 whereby the latter may be stopped with the cam on the cam-gear in engagement with the lever 114, substantially as set forth.

9. In a machine of the character described, the combination of the elbow lever 122 pivotally secured to the swinging frame and having the suitably thick upper end 124, a spring 125 holding the lever normally out of engagement, and the locking bar 119, the said lever being adapted when released by the spring to move its end 124 up between the locking bar and the swinging frame, thus preventing relative movement thereof, substantially as described.

WILBERT F. GILMAN.

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MILO E. KNIGHT.