

H. F. LOEWER.
LAST LATHE.

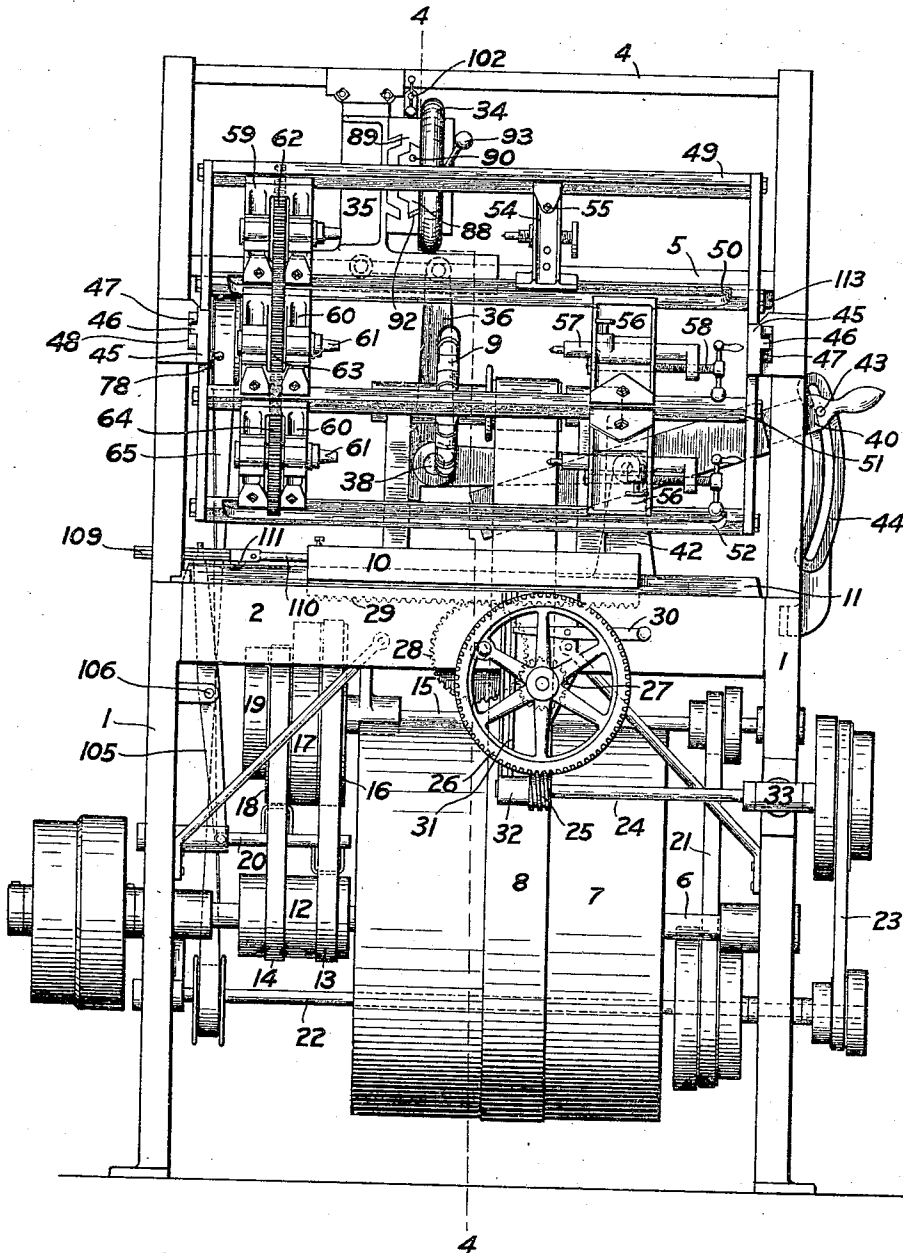
APPLICATION FILED OCT. 12, 1908.

Patented Aug. 30, 1910.

8 SHEETS—SHEET 1.

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FIG. 1.



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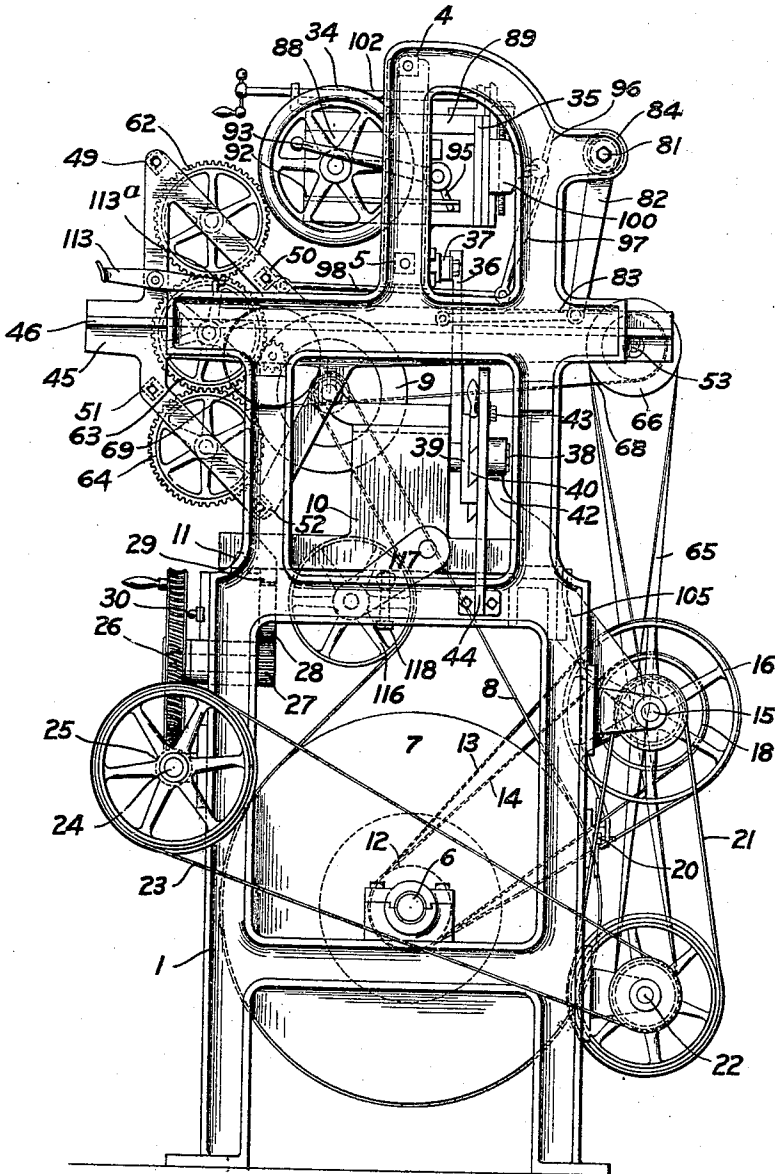
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8 SHEETS—SHEET 2.

FIG. 2.



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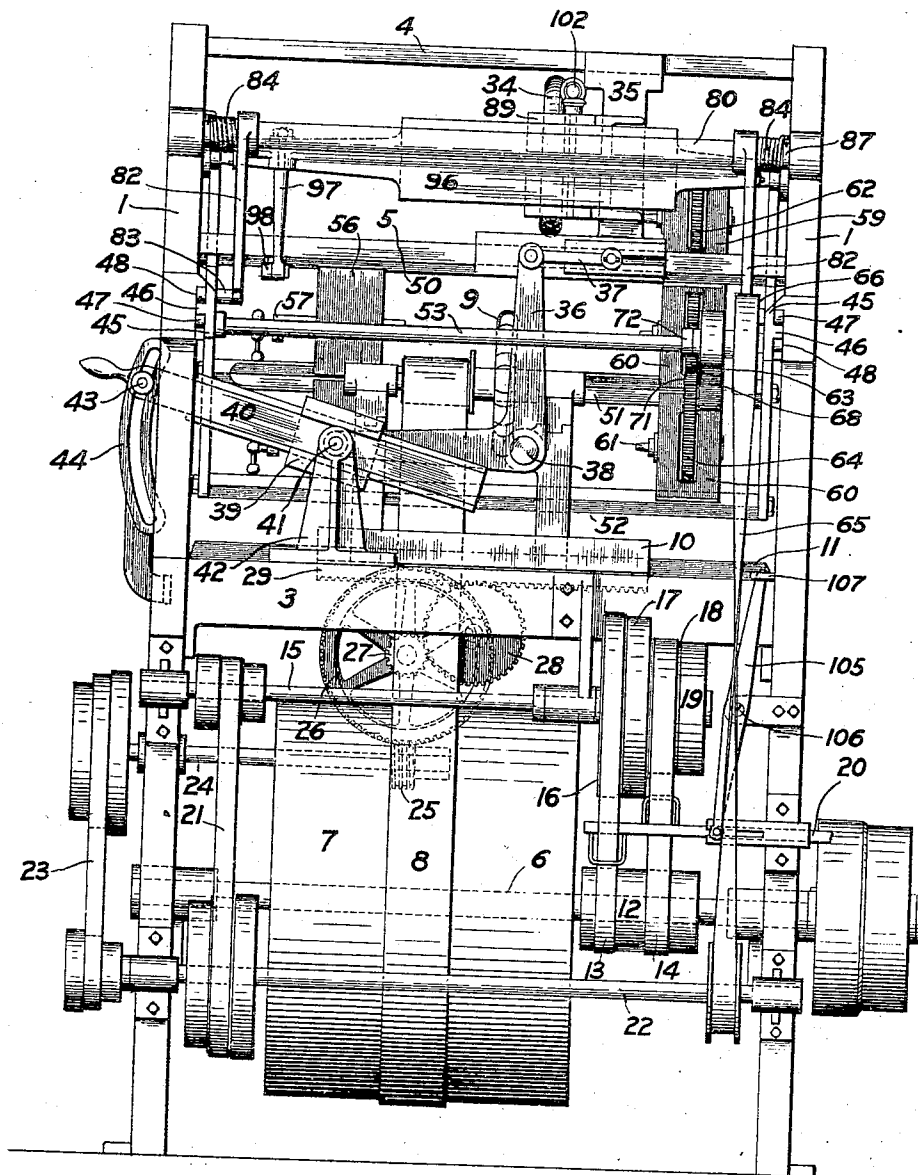
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8 SHEETS—SHEET 3.

FIG. 3.



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8 SHEETS—SHEET 4.

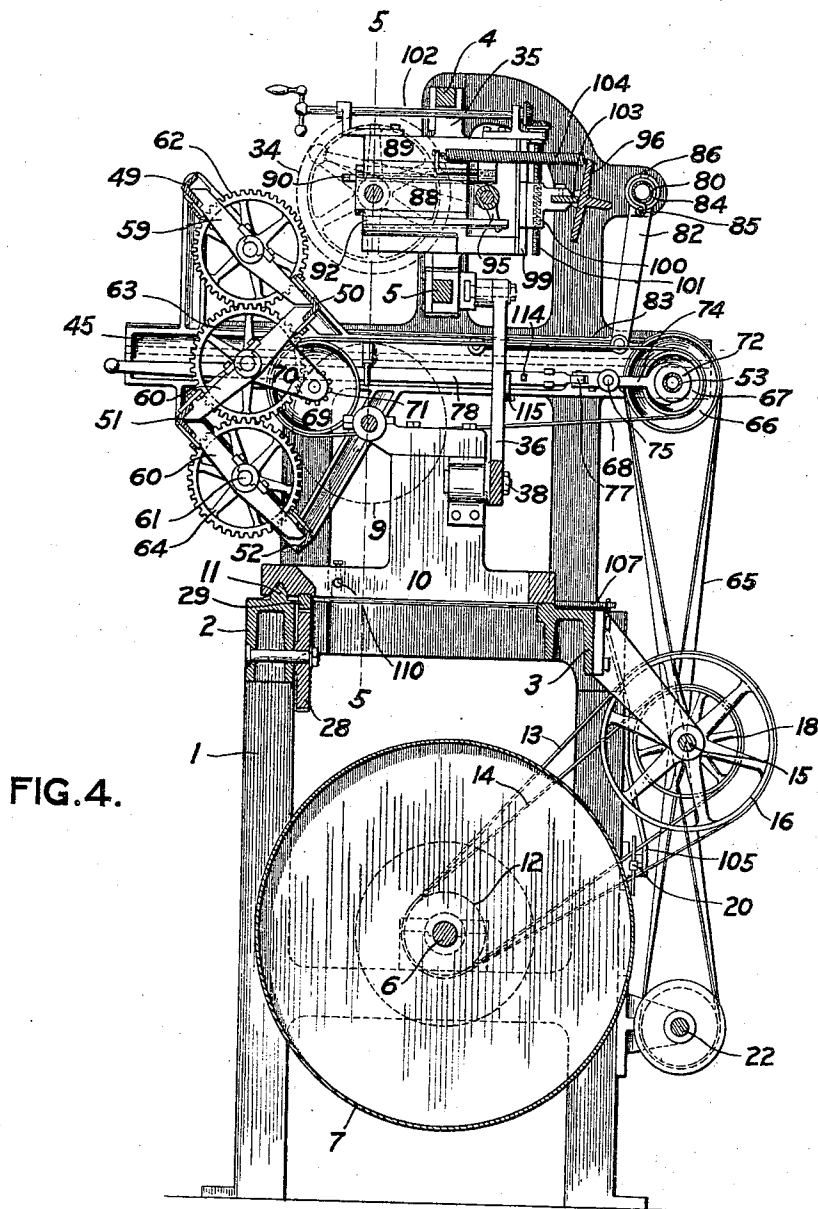


FIG. 4.

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8 SHEETS—SHEET 5.

FIG. 5.

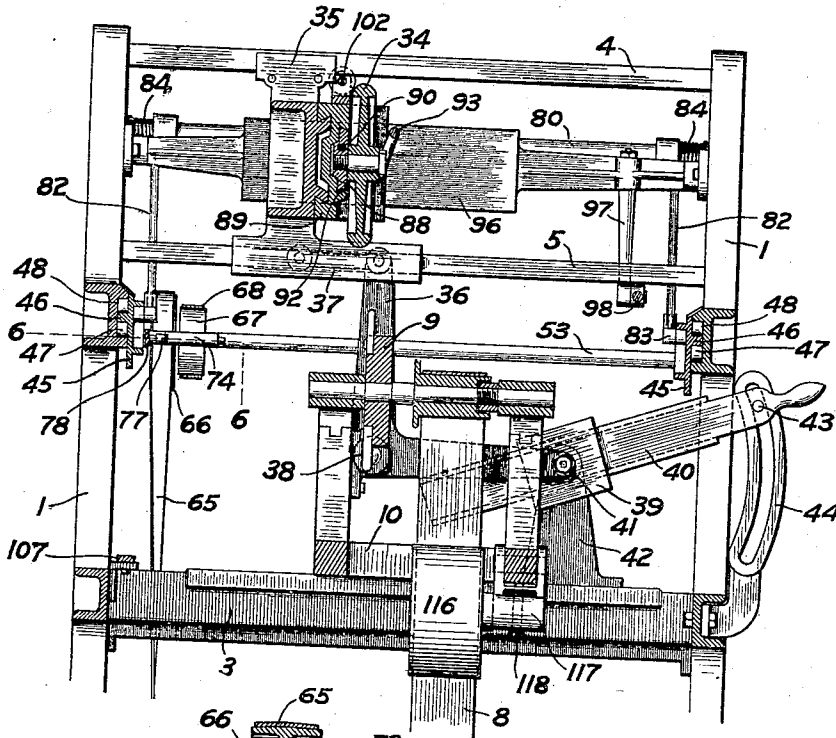


FIG. 6.

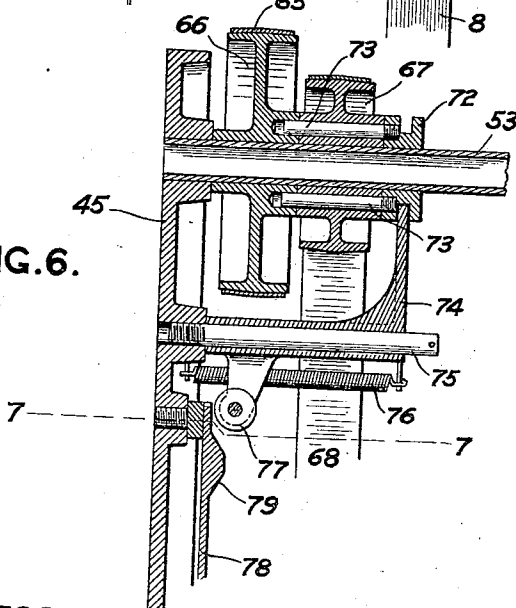
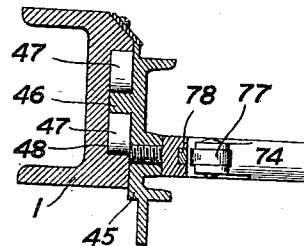


FIG. 7.



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8 SHEETS—SHEET 6.

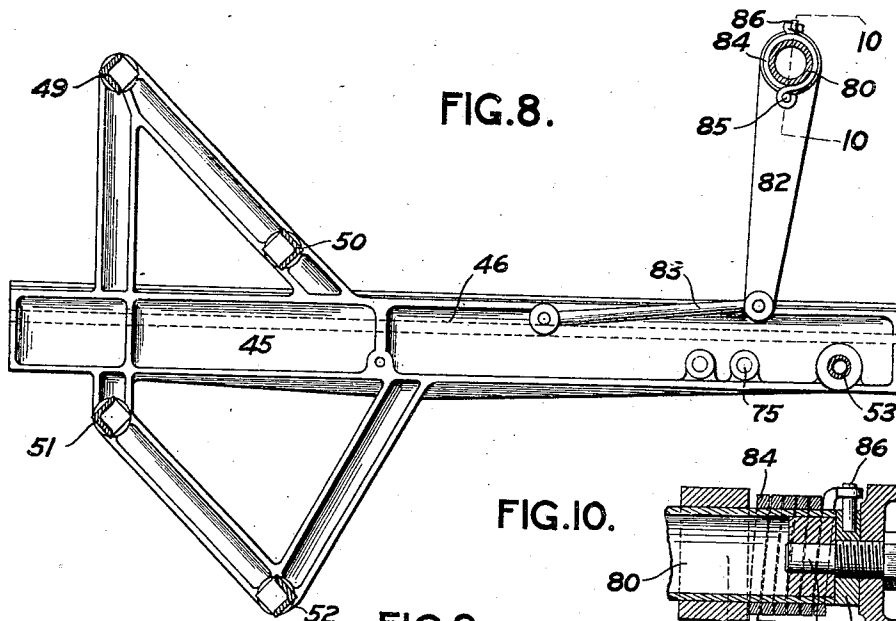
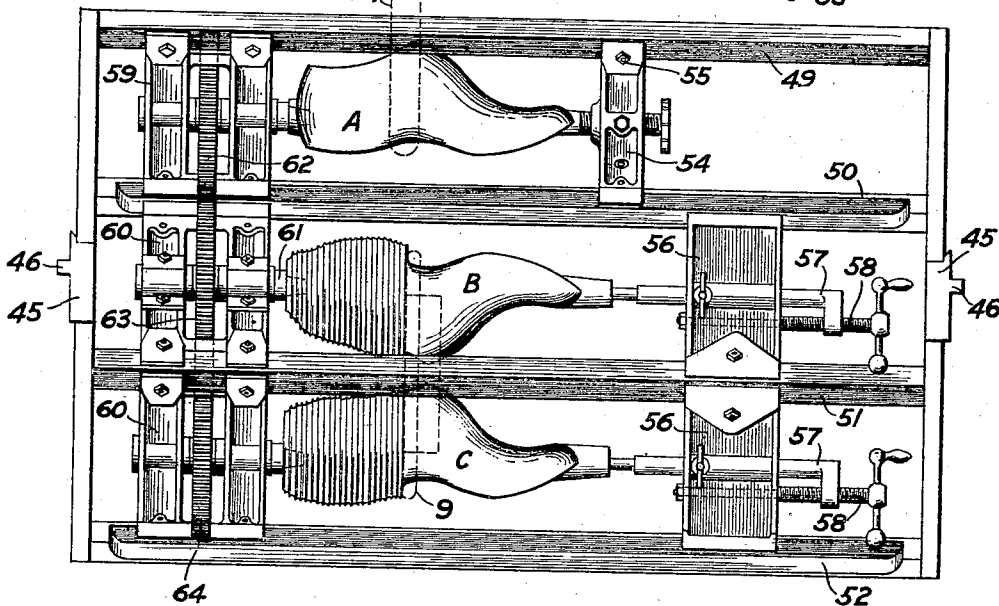
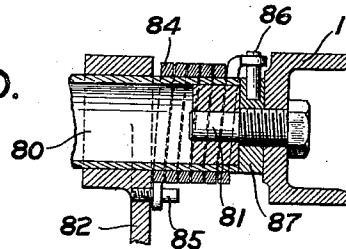


FIG. 10.



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8 SHEETS—SHEET 7.

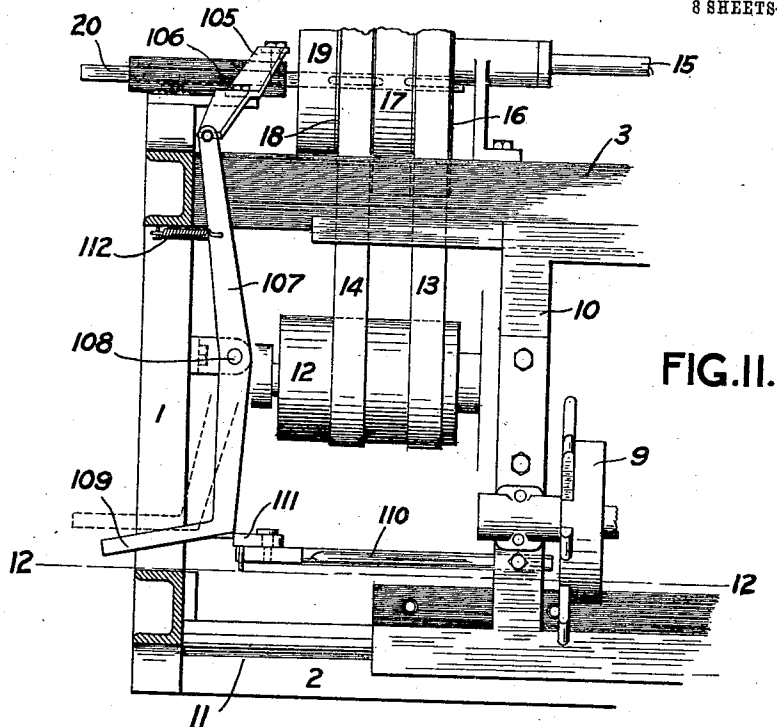


FIG. 11.

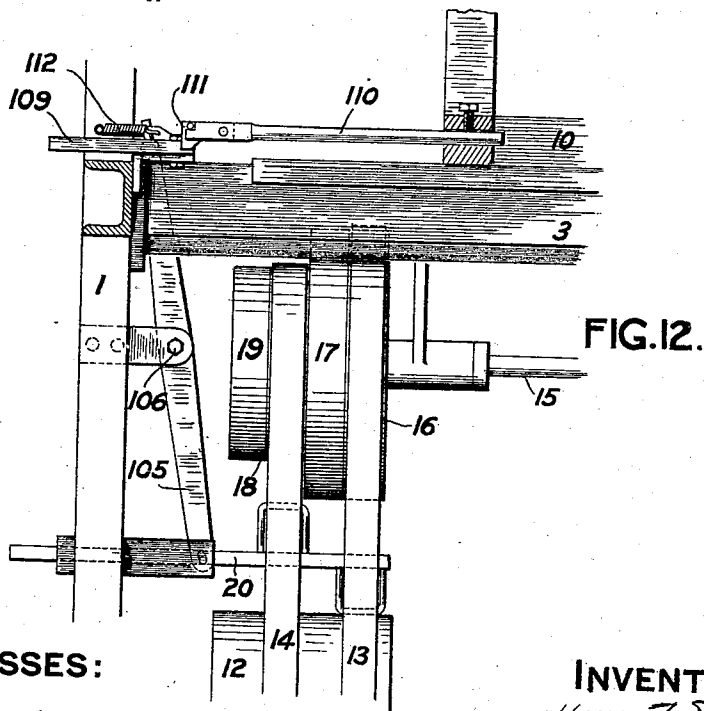


FIG. 12.

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8 SHEETS—SHEET 8.

FIG. 13.

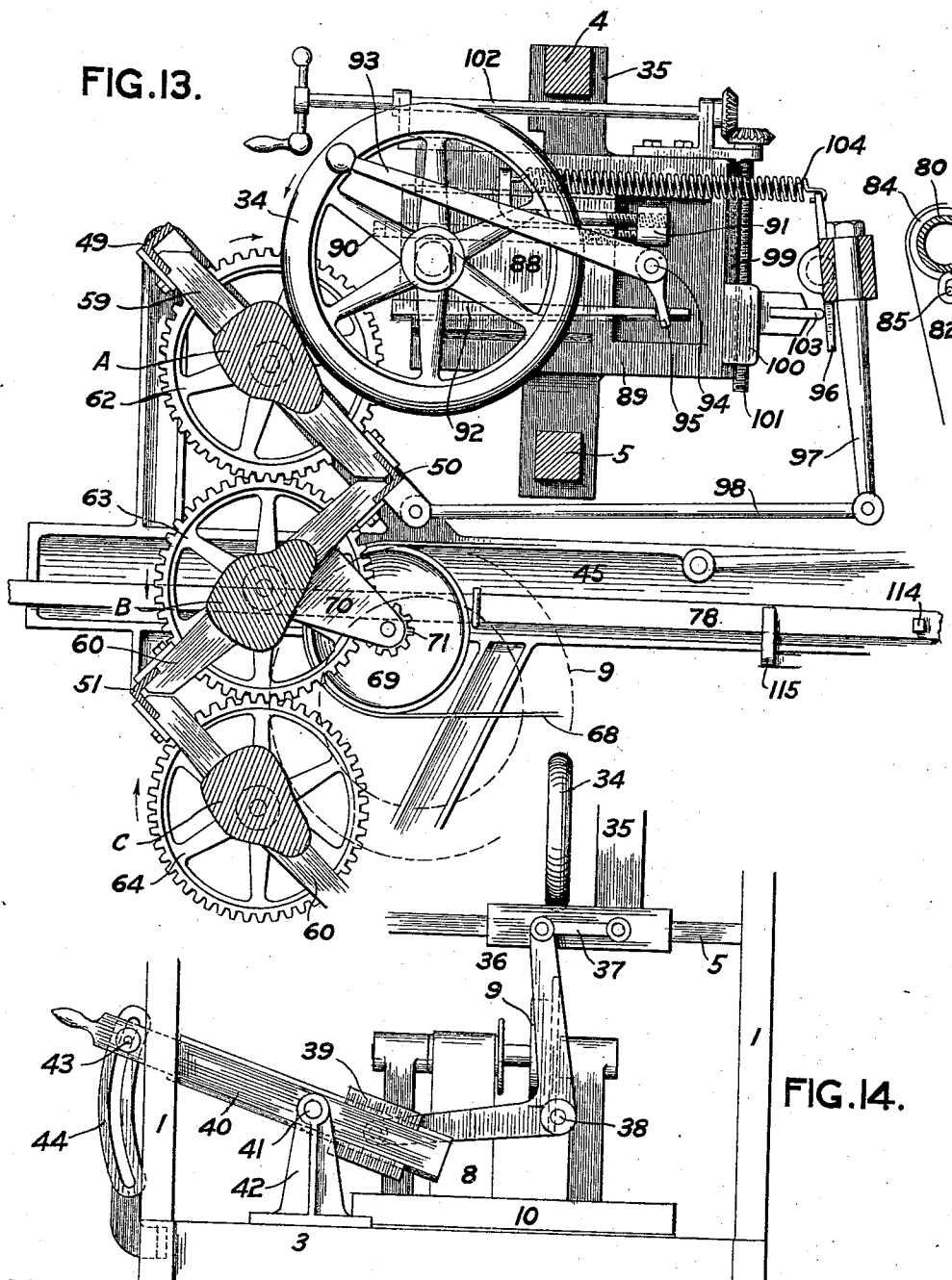


FIG. 14.

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UNITED STATES PATENT OFFICE.

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Specification of Letters Patent. Patented Aug. 30, 1910.

Application filed October 12, 1908. Serial No. 457,326.

To all whom it may concern:

Be it known that I, HENRY F. LOEWER, a citizen of the United States, and resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Last-Lathes, of which the following is a specification.

This invention relates to last lathes, and has for its object the production of a machine capable of turning out at one operation from a single model both a right last and a left last.

It also embodies novel mechanism whereby lasts of different length and width may be made.

In the drawings:—Figure 1 is a front elevation of the complete machine; Fig. 2 is a side elevation; Fig. 3 is a rear elevation; Fig. 4 is a vertical section on the line 4—4 of Fig. 1; Fig. 5 is a section on the line 5—5 of Fig. 4, looking toward the rear; Fig. 6 is a top plan of a section taken on the line 6—6 of Fig. 5; Fig. 7 is a vertical section on the line 7—7 of Fig. 6; Fig. 8 is an inside elevation showing part of the last-carriage; Fig. 9 is a front elevation of the last-carriage, with lasts and model in place; Fig. 10 is an enlarged view of a section on the line 10—10 of Fig. 8; Fig. 11 is a plan view of the variable feed mechanism; Fig. 12 is a front elevation of the same; Fig. 13 is a cross-section of the last-carriage showing lasts and model in place; and Fig. 14 is a partial rear elevation, with certain parts occupying different positions than shown in Fig. 3.

The main frame consists of vertical side-pieces 1, 1, rigidly connected by a front cross bar 2, a rear cross bar 3, and guide bars 4 and 5.

The main driving shaft 6 is revolvably supported in bearings on said side pieces, and carries a drum 7 that is connected by a belt 8 to the cutter-wheel 9. The latter is hung in a longitudinally-movable carriage 10 that is supported on the cross bars 2 and 3, being guided by a V-shaped rib 11 on the former that enters a corresponding groove in its under side (Fig. 4). As the carriage with the cutter wheel is moved in along the work, the belt 8 moves along the drum 7.

The cutter-bearing carriage is moved horizontally along the work as follows: On the shaft 6 is a pulley 12 (Fig. 1) from which

belts 13 and 14 drive a transverse countershaft 15. The pulleys on the latter shaft, with which the belts 13 and 14 connect, comprise two pairs of tight and loose pulleys of different sizes, 16 and 17, and 18 and 19, respectively. The two tight pulleys 17 and 18 are in the center of the group, and the two loose pulleys 16 and 19 are at the ends. A belt-shifter 20 automatically throws the belt 13 onto the tight pulley 17, and the belt 14 onto the loose pulley 19, at a certain point in the operation of the machine, thereby changing the speed of the countershaft 15. A description of this automatic operation of the belt shifter will be postponed till other parts of the machine have been described. The said shaft 15 is connected with a parallel shaft 22 by a belt 21, and this in turn drives a shaft 24 at the front of the machine by a belt 23 (Fig. 1). The carriage itself is geared to the last mentioned shaft 24 as follows: a worm 25 on the shaft 24 that engages a worm-gear 26, a pinion 27 on the shaft of said worm-gear that meshes with a gear 28 that in turn engages a rack 29 on the under side of the carriage 10 and so moves the latter along on the guide-rib 11 toward the left side of the machine (Fig. 1). When it is desired to disengage the carriage from the driving mechanism, it can be done by disengaging the worm 25 from the worm-gear 26 through the operation of a lever 30, which controls a vertical slide bar 31 that is attached to the bearing or shaft hanger 32. By raising the end of the lever 30, the bar 31 is depressed till it lowers the worm 25 out of mesh with the gear 26, thus stopping the carriage 10. In order to permit the shaft 24 to move sufficiently for this, the bearing 33 is pivoted in the side-frame 1. When the worm 25 and the worm-gear 26 have been disconnected, the carriage may be returned to the right side of the machine by rotating by hand the worm-gear 26. Besides the cutter-carriage, there is another horizontally movable carriage 35 (Fig. 13) on which is pivoted the model-wheel 34 by which the lasts are formed. This carriage is mounted slidably on the guide bars 4 and 5. Its movement will hereinafter be described. These two carriages move horizontally together, and in order that lasts of different lengths may be cut by the same

model, the connection is capable of adjustment that will cause the carriages to move at different speeds.

The model wheel carriage 35 is connected 5 to the cutter-carriage 10 by a link 37 and one arm of a bell-crank lever 36 (Fig. 3). This bell-crank is pivoted on the carriage 10 at 38, and its horizontal arm, extending toward the right side of the machine, is 10 pivoted to a block 39. The latter is grooved to receive a bar 40 upon which it slides. Said bar 40 is pivoted in turn at 41 in a fixed bracket 42, so that it may be tilted at an angle from the horizontal, as shown, 15 and is held in the desired position by a set-screw 43 that engages a slotted bracket 44.

It should be noted that the pivot 41 of the bar 40 lies in the same horizontal plane with the pivot 38 of the bell-crank 36, so 20 that when the bar 40 occupies a horizontal position, the arms of the bell-crank 36 are, respectively, horizontal and vertical, and accordingly the cutter-carriage 10 and the model wheel carriage 35 move along their re- 25 spective guides at equal speeds and at a fixed distance apart. On the other hand, if the bar 40 is tilted as shown in Fig. 3, the block 39 is forced to move downward at an angle as it is carried along, pulling with it the lower 30 end of the bell-crank 36, and tilting the upper end of the latter back toward the right side of the machine at an angle which increases uniformly as the carriage 10 progresses, so that the distance between the 35 vertical planes of the cutter 9 and the model wheel 34 is gradually diminished (Fig. 14). The result is, that when the cutter-carriage 10 reaches the end of its path, it will have moved a greater distance than the model- 40 wheel-carriage 35, and accordingly the cutter 9 will have produced a last that is uniformly longer than the model. If the bar 40 is tilted oppositely, a last is produced that is shorter than the model, for then the up- 45 per end of the bell-crank 36 is tilted toward the left side of the machine so that the carriage 35 is caused to move faster and farther than the carriage 10.

The model A and the lasts B and C are 50 carried on a reciprocating frame that comprises two side bars 45, 45, that have tongues 46. The latter lie between rollers 47 within slots 48 in the side-frames 1 (Fig. 7). The frames 45 are braced firmly at proper dis- 55 tances apart, near their front ends, by bars 49, 50, 51 and 52, of an L-shaped section (Fig. 1), and at their rear ends by a revoluble shaft 53 (Fig. 3). The bars 49, 50, 51 and 52 constitute supports for the head- 60 stocks and tail-stocks that carry the model and lasts. The model tail-stock 54 extends between the bars 49 and 50, and is held in place by a clamping plate and bolt 55, (Fig. 1), while the last tail-stocks 56, 56 are simi- 65 larly supported on the bars 50, 51 and 52,

and have each a spindle 57 adapted to enter the block of wood from which the last is to be cut, (Fig. 1). Said spindles 57 are tightened by means of hand-screws 58.

The model head-stock 59 and the last 70 head-stocks 60, 60 are clamped tightly upon the bars 49, etc., and are in vertical alignment. The spindles 61 of said head-stocks carry gears 62, 63 and 64, which mesh together (Fig. 13). The upper and lower 75 gears, 62 and 64, of the set revolve in the one direction, and the central gear 63 in the opposite direction. A driving connection is made between the gear 63 and the shaft 22 that includes a clutch whereby the revolution 80 of the model and lasts can be stopped when desired.

The shaft 53 before described as revolubly supported in the sliding frames 45, is driven 85 from the shaft 22 by a belt 65. Adjacent the pulley 66 (Fig. 6), over which the belt runs, upon the shaft 53, is a loose pulley 67, which is connected by a belt 68 to a pulley 69 that is pivoted in brackets 70 on the central head- 90 stock. The shaft of the pulley 69 last mentioned carries a pinion 71, which engages the gear 63. Accordingly, when the loose pulley 67 is connected to the continuously-run- 95 ning tight pulley 66, the gears 62, 63 and 64 are revolved as indicated in Fig. 13, but when the pulleys are disconnected said gears stop. The clutch for this connection is shown in Fig. 6. On the shaft 53 is a slid- 100 ing collar 72 in which are pins 73 that project through the hub of the pulley 67 and into sockets in the hub of the pulley 66. Said collar is engaged by a yoke 74 that is slidable upon a stud 75, and held in yield- 105 ingly by the spring 76, so as to force the pins 73 into the hub of the pulley 66, thereby coupling it to the pulley 67 and driving the latter. The yoke 74 has at its front end a roller 77, and in line therewith is a bar 78 that extends to the front of the frame 45 and is supported in suitable guides. Near the 110 rear end of the bar 78 is a projection 79, which strikes the roller 77 when said bar is pushed toward the rear of the machine, and thereby moves the yoke 74 toward the right, till it pulls the pins 73 out of the pulley 115 66. Thereupon the pulley 67 stops, and with it the gears 62, 63 and 64, whose spindles carry the model and the lasts.

The frames 45 are constantly forced toward the rear of the machine by the mechanism shown in Figs. 8 and 10. A shaft or 120 tube 80 extends across the machine and is revolubly supported on studs 81 that are screwed through the side frames 1, 1, (Fig. 10). Arms 82 are fixed upon the shaft 80, 125 and their lower ends are connected to the frames 45 by links 83. Coiled around each end of the shaft 80 is a stiff spring 84, one end of which engages a pin 85 in said arm, the other end a similar pin 86 that projects 130

from a washer 87 that is screwed upon the stud 81. These two springs are so arranged that their tendency to uncoil gives a continuous backward pull upon the arms 82.

5 Accordingly, the frames 45, and the parts attached to them, are at all times forced toward the rear of the machine, so that the model A is held tightly against the model wheel 34. Inasmuch as the model wheel is

10 stationary, and the model, as it revolves, presents an irregular and eccentric surface to it, the model is at times caused to move forward, but is always held in contact with the wheel by the springs. As said model

15 moves back and forth, the frames 45 and the rough lasts B and C are carried with it, while the cutter 9 maintains the same position relatively to the last centers as the model wheel 34 does to the model center.

20 Thus it follows that when any given point on the face of the model is in a certain position with respect to the center of the model wheel at a given point in its revolution, corresponding points on the last blocks A

25 and B, respectively, are in corresponding positions with respect to the cutter 9, and the latter cuts the wood away up to that point. So the operation continues, the carriage 10 and the model wheel moving across

30 the machine as before described, and the model and last-carrying frame reciprocating at right angles to them. Owing to the fact that the cutter 9 is located midway between the blocks B and C, and the latter

35 revolve in opposite directions, one becomes a right and one a left last.

Means are also provided in this invention whereby the lasts may be made wider or narrower than the model, and these may be

40 used with, or independently of, the mechanism described above for varying the length of the last. To this end the model wheel 34 is pivoted in a block 88 (Fig. 5) that is dove-tailed into another block 89, which in

45 turn is similarly mounted and is slidable upon the carriage 35. The block 88 is adjusted relatively to the block 89 by means of a set-screw 90 that is threaded through the former and bears against a lug 91 (Fig.

50 13). In order to maintain the block 88 firmly in position when adjusted, a tapered gib 92 is provided between said block and the block 89 (Fig. 13). The gib is drawn backward to lock the two blocks together,

55 by means of a lever 93 that is pivoted at 94 and has a short arm 95 adapted to engage a slot in the gib. Pivoted in the side-frames 1, 1 is a plate 96 (Fig. 13), the pivotal points of which are in line horizontally with the

60 center of the model wheel 34. An arm 97 projects downward from said plate near one end, and a link 98 connects it with the bar 50 and therefore with the last-and-model-carrying frames 45. On the back side of

65 the block 89 is a vertical guide 99, on which

is a block 100. Said block is moved up or down by the rotation of a screw-threaded spindle 101 that is bevel-gear to a horizontal spindle 102 on the top of the block 89. The block 100 carries a bearing point 70 103, so that by turning the spindle 102 the said bearing point may be carried above or below the pivots of the plate 96. The bearing point 103 is held in contact with said plate by the action of a spring 104, one end 75 of which is fastened to the plate and the other end to a hook that projects from the lug 91 (Fig. 13). As the frames 45 and the parts attached to it reciprocate, the plate 96 is rocked on its pivots by reason of its connection to said frame through the arm 97 80 and the link 98. If the bearing point 103 is in line with the pivotal center of the plate 96, the rocking of the latter has no effect on the block 89 and the model wheel 34. If, 85 however, the block 100 is raised or lowered so that the bearing point 103 is no longer in line with the pivots of the plate 96, then the block 89, and accordingly the model wheel 34, is moved slightly forward or back- 90 ward at every stroke of the frames 45. In Fig. 13 the bearing point 103 is shown resting against the plate 96 below the center. Whenever the frames 45 are carried forward 95 by an elevation on the model striking the model wheel, the link 98 and arm 97 are moved forward also, and the block 89 is carried a short distance forward by the motion of the plate 96. The model, of course, is at all times held close to the model wheel, 100 as before described, by the action of the springs 84. As the cutter 9 cannot also move forward so as to keep in the same vertical line with the model wheel, it follows that the blocks B and C will not be cut as 105 deeply as would be the case if the model wheel remained stationary. Therefore a pair of lasts is produced that are wider than the model at all points, in the same ratio that the distance of the bearing point 103 110 from the pivots of the plate 96 bears to the total length of the arm 97. If the bearing point 103 is moved above the pivots of the plate 96, it is obvious that an opposite result is obtained. The model wheel then 115 moves backward slightly at each forward stroke of the frames 45, and the latter do not move as far forward as would be the case if the model wheel were stationary. The blocks B and C are thus cut deeper at 120 all points, and a pair of lasts is produced uniformly narrower than the model A.

In order to prevent undue strain upon the moving parts, mechanism is provided whereby the rotative speed of the lasts and 125 model, and also the rate at which the carriage 10 moves, is reduced during the time that the cutter is passing over the widest parts of the lasts, for the cut must be deeper at the middle of the last than at the toe and 130

heel. This is accomplished by means of the belt-shifter 20 described above, which when moved toward the left (Fig. 1), brings the belt 13 onto the large tight pulley 17, and places the belt 14 on the small loose pulley 19, where it becomes inoperative, as far as driving the shaft 15 is concerned. Obviously the shaft 15 runs faster with the belt-shifter 20 in the position shown in Fig. 1 than it does when moved to the left, as just described. The automatic mechanism for operating this belt-shifter is shown in Figs. 11 and 12. A lever 105, pivoted at 106 in a stationary bracket, is connected at its lower end to the bar 20, and at its upper end with a horizontal lever 107 that is pivoted at 108. The front end of the latter lever is bent into an L-shaped portion 109 (Fig. 11). Fixed in the left side of the carriage 10 is a bar 110 that has at its end a dog 111. Said dog engages the front face of the lever-end 109 as the carriage 10 proceeds toward the left, and before the latter reaches the middle of its travel, the lever 107 will have been forced to the position indicated by the dotted lines in Fig. 11 and the belt-shifter thereon into the "slow" position. The lever-end 109 then lies parallel to the carriage 10, and the dog 111 passes along its face. When the said carriage has moved far enough to let the dog 111 slip past the end of the part 109, a spring 112 pulls the lever 107 into its former position, and in so doing returns the lever 105 and throws the belt-shifter 20 back into "fast" position, so that lasts and model will revolve at their former speed during the time that the carriage 10 is completing its travel, and the cutter 9 is working on the heel portions of the lasts. When the carriage 10 is returned to the right side of the machine, the dog 111 does not move the lever 107, for it tilts up and drags across it because of the bevel on its under side (Fig. 12). After passing the lever 107, said dog drops down and is ready to engage it when the carriage moves again to the left.

The last-carrying frame has means for holding it in an extreme forward position, clear of the cutter and model wheel, into which it is drawn by hand after the cutting operation, for the purpose of removing and replacing the lasts and model. Said means consists of a lever 113 that is pivoted at one end to one of the oscillating frames 45, and has at its other end a notch 113^a (Fig. 2). When the frame 45 is pulled forward by hand, as aforesaid, the lever 113 drops so that the notch 113^a engages the corner of the stationary frame 1, and holds the frames 45 and attached parts from moving backward under the influence of the springs 84. Furthermore, when the frames 45 are pulled forward to the position last described, the last and model spindles are automatically stopped. To accomplish this, the clutch-

disconnecting bar 78 carries a pin 114 (Fig. 13) that strikes an inwardly-projecting lug 115 on the frame 1. Said bar is thus moved backward and disconnects the pulleys 66 and 67 as hereinbefore described.

In order to maintain a sufficient tension upon the cutter-driving belt 8 so that it cannot slip on the cutter-pulley, an idler 116 is provided. Said idler is suspended from the carriage 10 in a frame 117 (Fig. 5), and a set-screw 118 that passes through a swivel-nut in said frame affords a convenient means of drawing said pulley downward upon the belt 8 and so tightening it. It is understood that the belt 8 also travels along the drum 7 with the carriage 10 as it progresses, so as to maintain its alinement with the cutter-pulley.

What I claim is:

1. In a machine for turning irregular forms, the combination with a suitable supporting frame, of a spring-controlled, work and model-carrying frame adapted to reciprocate horizontally therein; a cutter with its carriage adapted to move horizontally also but at right angles to the movement of the frame first mentioned; a model-wheel with its carriage movable parallel with said cutter carriage; means for operating said cutter carriage; a differential connection between said cutter carriage and said model-wheel carriage, consisting of a bell-crank lever that is pivoted to the first carriage, and is connected at one end with the other carriage; and an adjustably inclined guide in the path of the horizontal movement of said lever with the cutter carriage, and adapted to engage its other end.

2. In a machine for turning irregular forms, the combination with a suitable supporting frame, of a spring-controlled, work and model-carrying frame adapted to reciprocate horizontally therein; a cutter with its carriage adapted to move horizontally also but at right angles to the movement of the frame first mentioned; a model-wheel with its carriage movable parallel with said cutter carriage; means for advancing said work-carrying frame toward said cutter carriage; an adjustably inclined guide bar pivoted alongside the path of the cutter carriage; a block adapted to slide thereon; and a bell-crank lever that is pivoted to the cutter carriage, adjacent to the guide, which is connected at one end with the model-wheel carriage, and at the other with said sliding block.

3. In a machine for turning irregular forms, the combination of means for supporting two blocks and a cutter on independent, substantially parallel axes, said means having provision for relative transverse movement of said axes, in which movement the cutter axis is always in a plane lying between and substantially equidistant

from the axes of the blocks, a model and a model-wheel, means for supporting the model and the model-wheel on substantially parallel axes, said means having provision
5 for relative transverse movement of said axes, in which movement the axis of the model-wheel is always in a plane lying substantially the same distance from the axis of the model as the distance between the axis of
10 each block and said plane passing through the axis of the cutter, connections between the parts by which the distance between the

cutter axis and the axes of the blocks is controlled by the distance between the axes of the model-wheel and the model, means for
15 rotating the cutter, the model and the blocks, and means for imparting relative longitudinal motion to the parts to cause the model-wheel to traverse the model and the cutter to traverse the blocks.

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Witnesses:

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