(No Model.) 2 Sheets—Sheet 1.

# F. L. PALMER.

## MECHANICAL MOVEMENT.

No. 313,230. Patented Mar. 3, 1885.

Fig. 1.

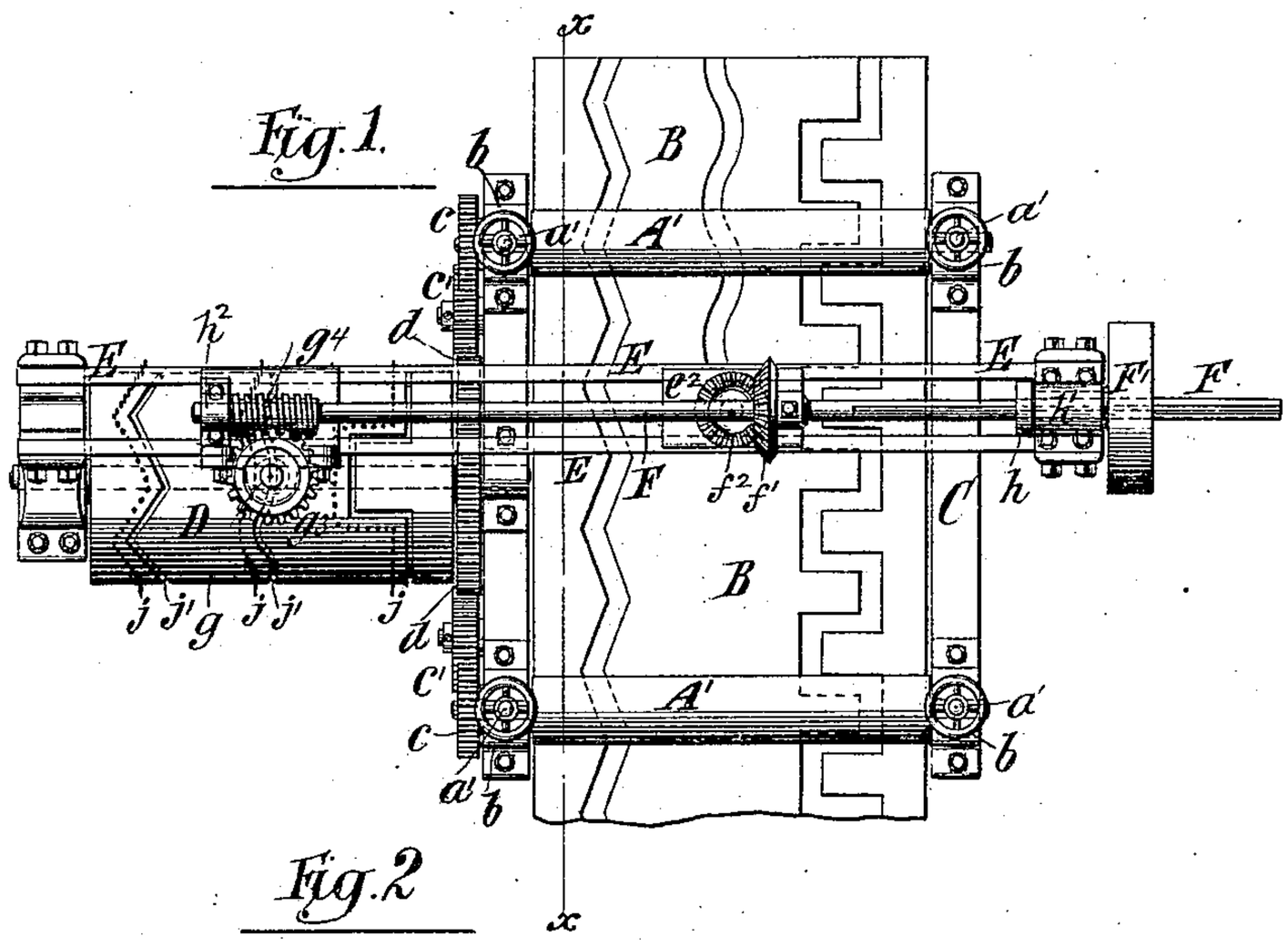



Fig. 2.

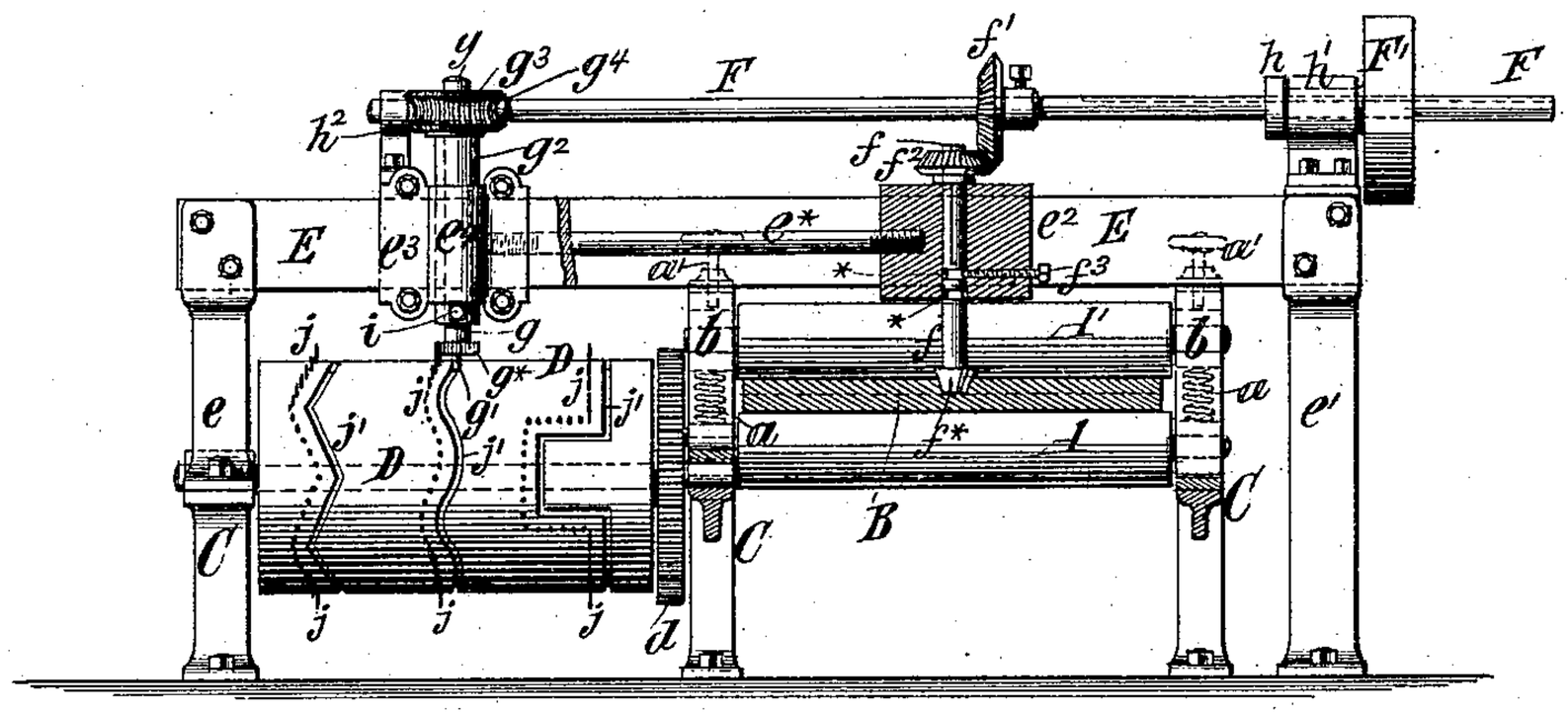
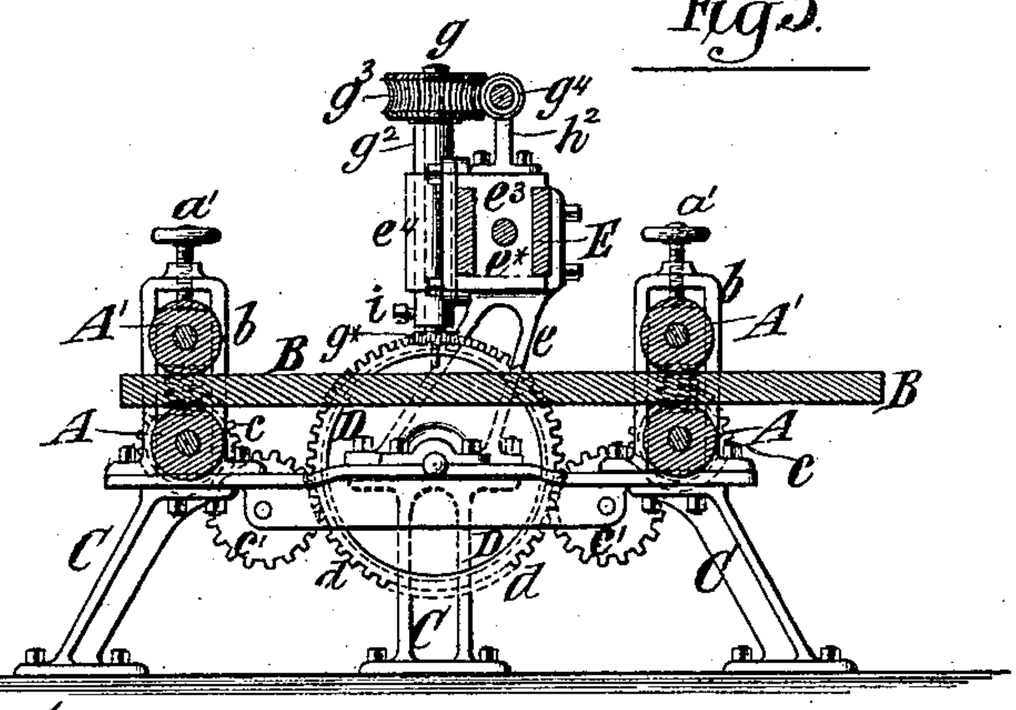



Fig. 3.

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(No Model.) 2 Sheets—Sheet 2.

# F. L. PALMER.

## MECHANICAL MOVEMENT.

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Fig. 4

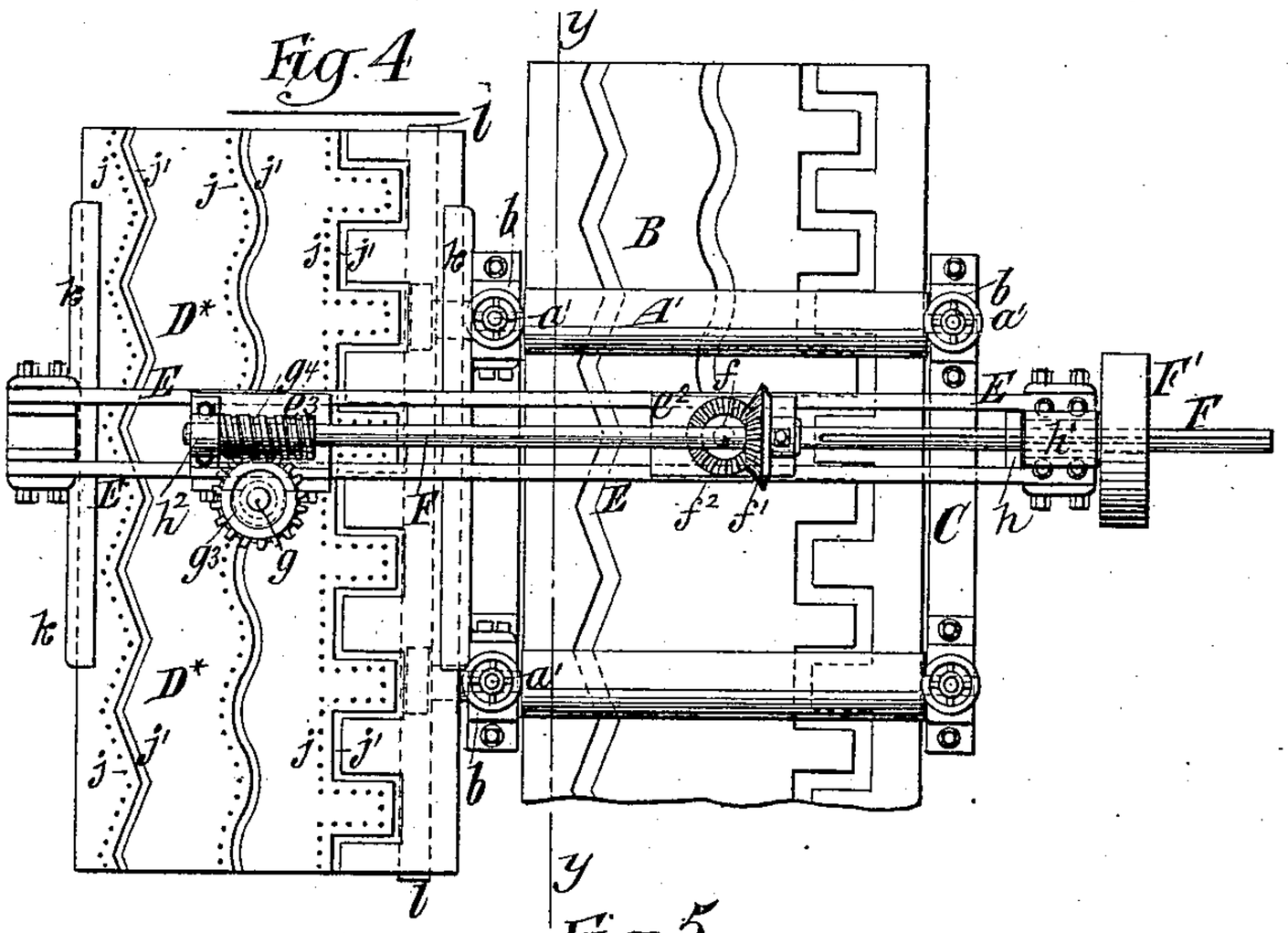



Fig. 5.

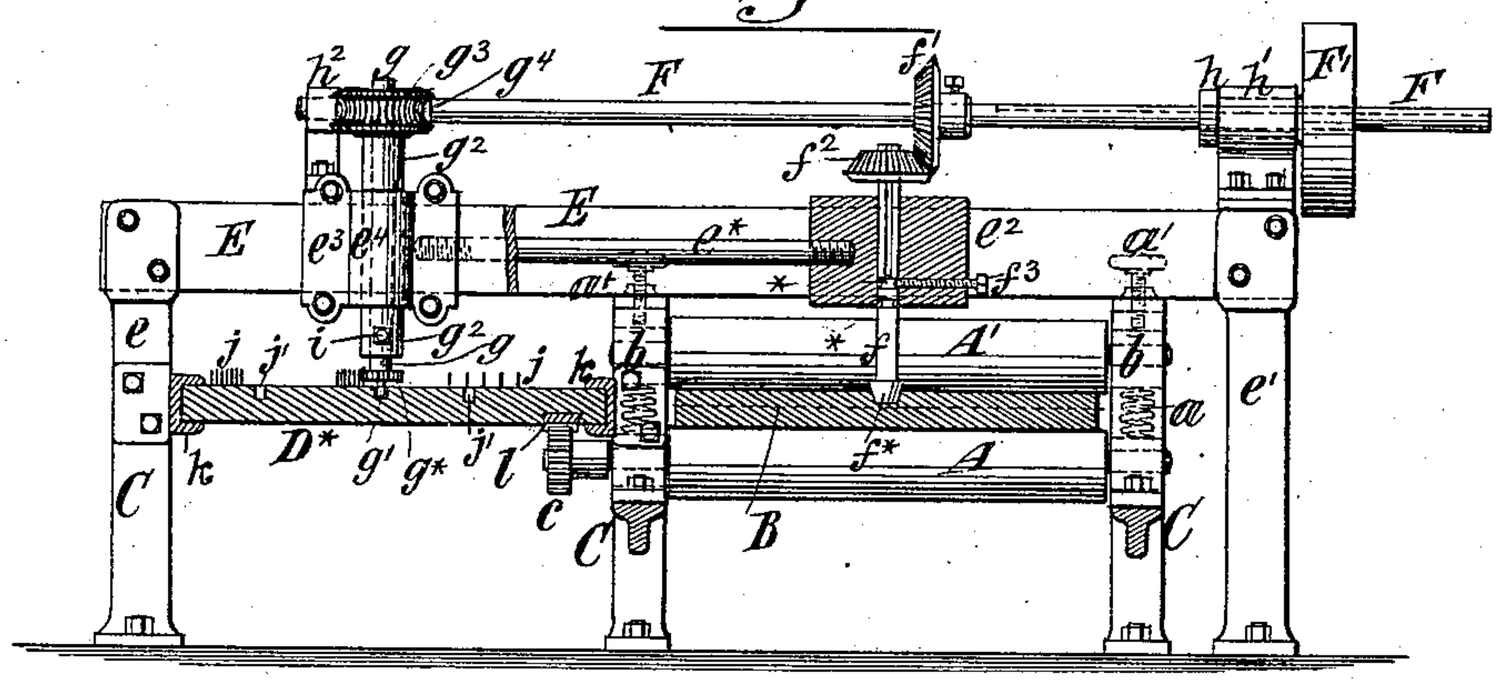
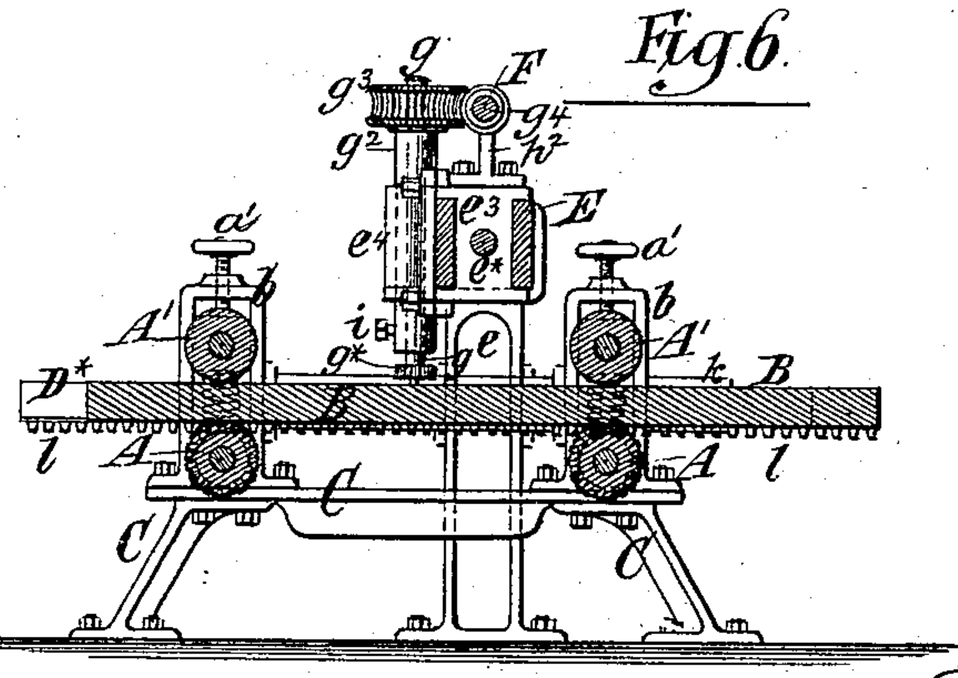



Fig. 6.




Witnesses:—
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# UNITED STATES PATENT OFFICE.

FRANK L. PALMER, OF NEW LONDON, CONNECTICUT.

## MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 313,230, dated March 3, 1885.

Application filed November 22, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK L. PALMER, of the city of New London, in the county of New London and State of Connecticut, have invented a new and useful Mechanical Movement, of which the following is a specification.

My new mechanical movement is more particularly intended for producing change in relative position between an implement or tool—such, for example, as a molding-cutter or cutting-tool—and the article to be operated on—such, for example, as a piece of wood to be molded or cut to form thereon any desired pattern of ornamentation or molding.

The advantages of my invention are more apparent when the change in relative position between the implement or tool and work or article to be operated on is to be universal, or along lines either straight or curved and extending in any direction; and the object of my invention is to effect such changes in relative position at a uniform speed, no matter what the direction of the lines along which change is effected.

The necessary elements of my movement are a rack or track arranged in pattern form, or, in other words, in any form corresponding to the line or lines along which the change in relative position is to be produced, and a positively-rotated pinion or wheel, or other positively-operating engaging device, which acts upon the said rack or track, and by such operation produces a change in relative position between the rack or track and engaging device, which is simultaneously produced in the relative position of the implement or tool and the work or article operated on.

In my United States Letters Patent No. 304,550, dated September 2, 1884, I have shown and described a mechanical movement comprising the two elements above described, one of said elements (in that example of the invention the engaging device) being capable of bodily movement in directions transverse to each other, and being so connected with the tool or implement, or the work or article operated on, as to simultaneously reproduce its movements in said tool or work.

In my United States Letters Patent No. 304,549, dated September 2, 1884, I have shown and described a mechanical movement comprising both the elements above referred to, and in which the pinion or other engaging device occupies a fixed position and imparts movement to a body on which is secured or formed a rack or track in pattern form, and which is capable of bodily movement in directions transverse to each other.

In accordance with my first-named Letters Patent it is essential that one of the two elements of the movement be capable of bodily movement in planes or directions transverse to each other, and in accordance with my last-named Letters Patent the rack or track or the body supporting it is capable of such bodily movement, while the engaging device occupies a fixed position. I have now discovered that a substantially similar result as to the change in relative position between the tool or implement and the work can be produced by the employment of a mechanical movement consisting of a pattern rack or track—that is to say, a rack or track in pattern form—and a positively-operating engaging device, which are capable of movement in planes or directions transverse to each other, and are so connected one with the tool or implement and the other with the work as to simultaneously impart their respective movements to the said tool or implement and work.

The sum of the speeds of the two elements in the above-described mechanical movement is always equal, the speed of either being automatically increased or diminished as the speed of the other diminishes or increases, and the movement of either ceasing entirely when the speed of movement of the other is at its maximum.

The invention furthermore includes a novel mechanism for imparting a variable rotary movement to feed-rollers, which consists in the combination, with a rack or track in pattern form and a support or carriage therefor, of feed-rollers geared with said support or carriage and a positively-operating engaging device acting upon the pattern rack or track and serving by its operation on said rack or track to produce a variable rotary movement of the feed-rollers.

In the accompanying drawings, Figure 1 represents a plan of a machine for molding wood or other material, and in which the relative change in position between the molding tool

or cutter and the work is produced by my mechanical movement, the pattern rack or track being arranged upon a cylinder capable of rotary movement, and the engaging device being capable of movement in a plane parallel with the axis of the pattern-cylinder. Fig. 2 is a partly sectional elevation of such machine. Fig. 3 is a transverse vertical section on the plane of the dotted line *x x*, Fig. 1. Fig. 4 is a plan of a similar machine in which the pattern rack or track is arranged upon a flat board or plate, the said board or plate and engaging device being capable of movement in planes or directions transverse to each other. Fig. 5 is a partly sectional elevation of the machine shown in Fig. 4, and Fig. 6 is a transverse vertical section thereof on the plane of the dotted line *y y*, Fig. 4.

Similar letters of reference designate corresponding parts in all the figures.

I will first describe the example of the invention shown in Figs. 1, 2, and 3.

A A′ designate pairs of feed-rollers, between which the work B, which may consist of a board, only a part of which is shown, is passed, and by which the work is fed forward. The lower or bed rollers, A, are rotated positively, as I shall soon describe, and the upper or pressure rollers, A′, are made adjustable by means of springs *a* and screws *a′* in a well-known manner to suit different thicknesses of work, and serve to hold the work down upon the moving bed-rollers A. The rollers above described are mounted in boxes in suitable housings, *b*, supported upon a frame-work. C, which may be of any suitable construction, and of wood or metal.

The bed-rollers A have upon their shafts or journals pinions *c*, which mesh into and are driven through intermediate pinions, *c′*, from a large wheel, *d*. Midway between the pairs of feed-rollers, and at one end thereof, is a cylinder or drum, D, which is journaled in suitable bearings in the frame-work C, and on the shaft of which is secured the wheel *d*. Hence it will be seen that any rotary movement of the cylinder or drum will be transmitted to the feed-rollers, and as the speed of the cylinder or drum increases, diminishes, or stops altogether the speed of rotation of the feed-rollers will correspondingly vary. In order to reproduce the exact pattern of the cylinder or drum D on the work B, the peripherical velocity of the feed-rollers should be the same as the drum, and as they are here shown as so much smaller in diameter it becomes necessary to quicken their speed of rotation by the large wheel *d* and pinions *c c′*.

Above the work is a guideway or slideway, E, which, as shown, is formed by parallel bars supported at opposite ends by standards or uprights *e e′*. To this slideway are fitted two blocks or pieces, $e^2$ $e^3$, connected by a rod or brace, *e**, and capable of movement together as one slide in a plane parallel with the axes of the feed-rollers and pattern-cylinder D.

In the block $e^2$ is journaled a cutter-spindle, *f*, carrying at the lower end a cutter-head, *f**, and in the block $e^3$ is a spindle or shaft, *g*, having at the lower end a pinion, *g**, and a projection, *g′*, beyond the pinion. The spindle *f* is arranged between the bars which form the slideway E, but the shaft *g* is arranged outside said bars.

Parallel with and above the slideway E is a shaft, F, which is or may be driven by a belt on a pulley, F′. As here shown, this pulley is formed with a sleeve, *h*, which is fitted to turn freely in a bearing, *h′*, and receive the shaft F through it. The shaft F is locked to to the pulley, so as to be turned therewith, by a feather fitting a groove in the shaft, whereby the shaft is left free to slide lengthwise through the pulley. The shaft F has upon it a bevel-pinion, *f′*, which is fast thereon, and gears into and drives a similar pinion, $f^2$, on the spindle *f*. The pinion $f^2$ is locked to the spindle *f* by a spline or groove, so as to turn the latter, but the spindle *f* may be raised or lowered in said pinion to bring its cutter *f** to or remove it from the work, and may be held in either an operative or inoperate position by any suitable devices. I have here shown a set-screw, $f^3$, inserted in the block $e^2$ and adapted to engage with one or other of two grooves, * *, in the spindle *f*, to hold it in one or other of its two positions.

The spindle *g* is mounted in a sleeve, $g^2$, which is fitted to turn in a bearing, $e^4$, on the block or slide $e^3$, but is incapable of lengthwise movement therein. On the upper end of the sleeve is a worm-wheel, $g^3$, which is driven by a worm or screw, $g^4$, on the shaft F. The spindle *g* turns with the sleeve $g^2$, and is capable of vertical adjustment therein and of being secured in position by a set-screw, *i*, for a purpose hereinafter described.

The shaft F is properly supported by the bearing afforded it in the sleeve *h* of the pulley F, and by a bearing, $h^2$, attached to and moving with the block $e^3$.

From the above description it will be clear that the slide $e^2$ $e^3$ *e**, its spindles *g f*, and all parts connected therewith move freely in a direction lengthwise of the slideway, and the shaft F moves also through the pulley-sleeve *h*, and transmits motion to the spindles *g f*, whatever be their position.

On the pattern cylinder or drum are one or more pattern racks or tracks, or racks or tracks *j* in pattern form. I have here shown three racks of different forms to illustrate my invention, and the racks are formed by lines of pins or pegs driven into or set in the periphery of the cylinder D. One track is shown as arranged in a zigzag line, another in a serpentine line, and a third in a line comprising portions directly circumferential and directly lengthwise of the cylinder. Adjacent to and parallel with each rack *j* is a guide, *j′*, which may consist of a simple groove in the periphery of the cylinder. The pinion *g** engages

with and acts upon the rack *j*, while the prolongation *g'* of the spindle *g* enters the guide *j'* and holds the pinion in engagement with the rack. Now it is obvious that inasmuch as the pinion *g** is positively rotated and is held in engagement with the rack that it must produce a change in relative position between said two parts at uniform speed. The cylinder or drum D can only move or rotate in a plane transverse to its axis, and the engaging device or pinion can only move in a plane parallel with the axis of the cylinder or drum. The rotation of the cylinder or drum transmits a forward feed to the work B, while the movement of the pinion *g** axially of the cylinder or drum transmits to the cutting-head *f** a movement transverse to the feed of the work.

When the pinion *g** is acting upon a portion of rack *j* which is directly circumferential, the whole movement is in the cylinder or drum, and the work is moved under the cutter in a straight line. On the contrary, when the pinion is acting on a portion of rack which is directly lengthwise of the cylinder, the whole movement will be in the tool *f**, and the latter will move directly transverse to the work, which is then stationary. The speed of these two movements is variable inversely to each other—that is, one always increases as the other decreases, and stops when the speed of movement of the other reaches its maximum. By loosening the set-screw *i* the spindle *g* can be raised in the sleeve $g^2$ sufficiently to free the pinion *g** and pin or prolongation *g'* from the rack and guide *j j'*.

In the examples of my invention shown in Figs. 4, 5, and 6, A A' designate the pairs of feed-rollers which feed forward the work B, as before described, and are supported in the frame-work C *b*, and may be adjusted by springs and screws *a a'*, as before described. In lieu of a cylindric pattern-drum, I here employ a pattern board or plate, D*, having formed upon or in its upper surface one or more racks, *j*, in pattern form, and adjacent guides or grooves *j'*, as shown in Fig. 4. This pattern board or plate is arranged in guides *k* to slide or move in a direction transverse to the axis of the feed-rollers, and on its lower side is a rack, *l*, which engages with pinions *c* on the journals of the feed-rollers, and so rotates them and feeds the work forward.

Above the work is a slideway, E, as before described, supported by standards or uprights *e e'*, and the arrangements of the blocks $e^2$ $e^3$, with their connecting-brace *e**, bearing $e^4$, and spindles *f g*, with the cutter *f** and pinion *g**, and the guide-pin *g'*, are all as before described. The spindle *f* is held against longitudinal movement by a set-screw, $f^3$, and grooves * *, and the spindle *g* is capable of similar adjustment in the sleeve $g^2$, and is there held by *i*.

The arrangement of the shaft F and pulley F', with their bearings, and the gearing for rotating the spindles *f g* are all represented as in Figs. 1, 2, and 3, and the same letters of reference are employed to designate them.

Now it is obvious that the positively-rotated pinion *g** when engaging with a rack portion, *j*, which is directly transverse to the length of the rollers A A', will move the pattern-board D* at full speed in that direction, and the cutter-head *f* will remain in fixed position, but rotating. On the contrary, when the pinion is acting upon a rack portion which is directly axially of the feed-rollers, the cutter *f** will move at full speed directly across the work, and the latter will remain motionless. It is therefore evident that the relative speeds of the work and cutter will vary as the pattern-rack varies in position, and that the speed of the work will always increase as the speed of movement of the cutter across the work decreases, and vice versa, the sum of the two speeds always remaining the same.

Any number of cutters might be arranged in a single slide and controlled by a single pinion; and it is obvious that the pattern rack or track may be of any form desired, the forms here shown indicating the wide variations which may be made in the pattern racks or tracks.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a rack or track in pattern form, and positively-operating engaging device acting thereon, the said rack or track and engaging device being each capable of bodily movement in a direction transverse to the plane or direction of movement of the other, whereby provision is afforded for producing change at uniform speed in the relative position of said parts by the action of the engaging device upon the rack or track, substantially as herein described.

2. The combination, with two carriages capable of bodily movement independently of each other, and each in direction transverse to the direction of movement of the other, of a rack or track in pattern form on one carriage, and a positively-operating engaging device acting upon said rack or track and mounted on the other carriage, substantially as herein described.

3. The combination, with a rotary carriage or cylinder, and a rack or track in pattern form thereon, of a carriage capable of movement in a plane parallel with the axis of said rotary carriage or cylinder, and a positively-operating engaging device mounted on the last said carriage and acting upon said rack or track, substantially as herein described.

4. The combination, with feed-rollers for work, and a carriage geared therewith and bearing upon it a rack or track in pattern form, of a second carriage movable in a plane parallel with the axis of said feed-rollers, a tool or implement supported by the last-mentioned carriage, and a positively-operating engaging device mounted on the last-men-

tioned carriage and acting upon said rack or track, substantially as herein described.

5. The combination, with a rack or track in pattern form, and a positively-operating engaging device acting thereon, the said rack or track and engaging device being each capable of bodily movement in a direction transverse to the direction of movement of the other, a guide arranged adjacent to the rack or track, and a pin or tracker connected with the engaging device and engaging with the guide, substantially as herein described.

6. The combination of a rack or track in pattern form, and a positively-rotated wheel engaging therewith, said rack and wheel being each capable of bodily movement in a direction transverse to the direction of movement of the other, whereby provision is afforded for producing change at uniform speed in the relative position of said parts by the action of the wheel on the rack or track, substantially as herein described.

7. The combination of a toothed rack in pattern form, and a positively-rotated spur-pinion engaging therewith, said rack and pinion being each capable of bodily movement in a direction transverse to the direction of movement of the other, whereby provision is afforded for producing change at uniform speed in the relative position of said parts by the action of the pinion on the rack, substantially as herein described.

8. The combination, with two carriages capable of bodily movement independent of each other, and each in a direction transverse to the direction of the other, of a rack or track in pattern form on one carriage, and a positively-rotated wheel on the other carriage engaging with said rack or track, substantially as herein described.

9. The combination, with two carriages capable of bodily movement independently of each other, and each in a direction transverse to the direction of movement of the other, of a rack or track in pattern form on one carriage, and a guide extending adjacent to said rack or track, a positively-rotated wheel on the other carriage engaging with said rack or track, and a pin or tracker connected with said wheel and engaging with said guide, substantially as herein described.

10. The combination, with feed-rollers for work, and a pattern-cylinder geared therewith and bearing upon its surface a rack or track in pattern form, of a positively-operating engaging device acting upon the rack or track and movable in a direction lengthwise of the cylinder, and a tool or implement movable with said engaging device and in the same direction, substantially as herein described.

11. The combination, with a rack or track in pattern form, and a support or carriage therefor, of feed-rollers geared with said support or carriage, and a positively-operating engaging device acting upon the pattern rack or track, and serving by its operation on said rack or track to produce a variable rotary movement of the feed-rollers, substantially as herein described.

FRANK L. PALMER.

Witnesses:
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FREDK. HAYNES.