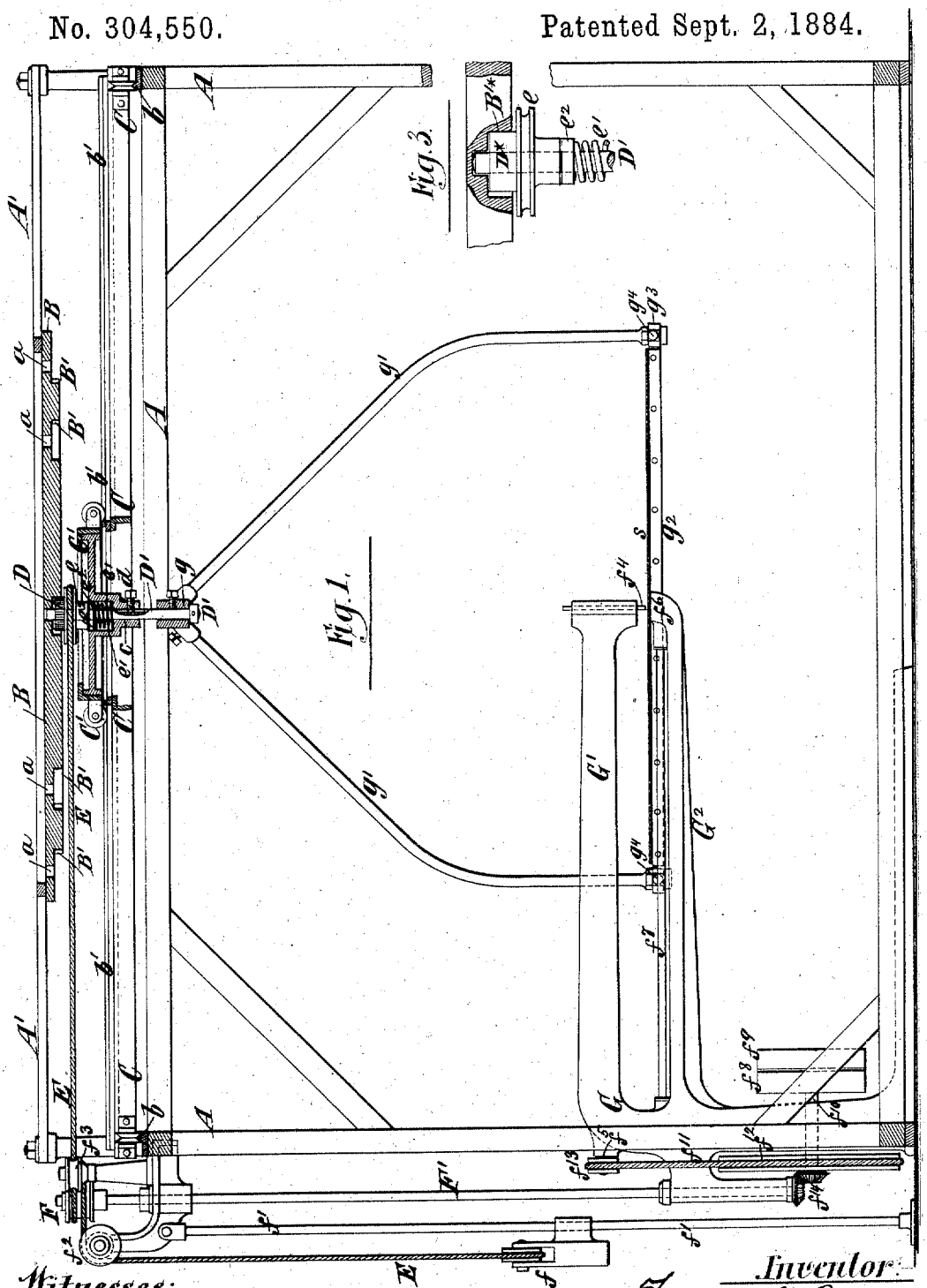
(No Model.) 7 Sheets—Sheet 1.

F. L. PALMER.

MECHANICAL MOVEMENT.

No. 304,550. Patented Sept. 2, 1884.



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Brown & Hall

(No Model.) 7 Sheets—Sheet 2.

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MECHANICAL MOVEMENT.

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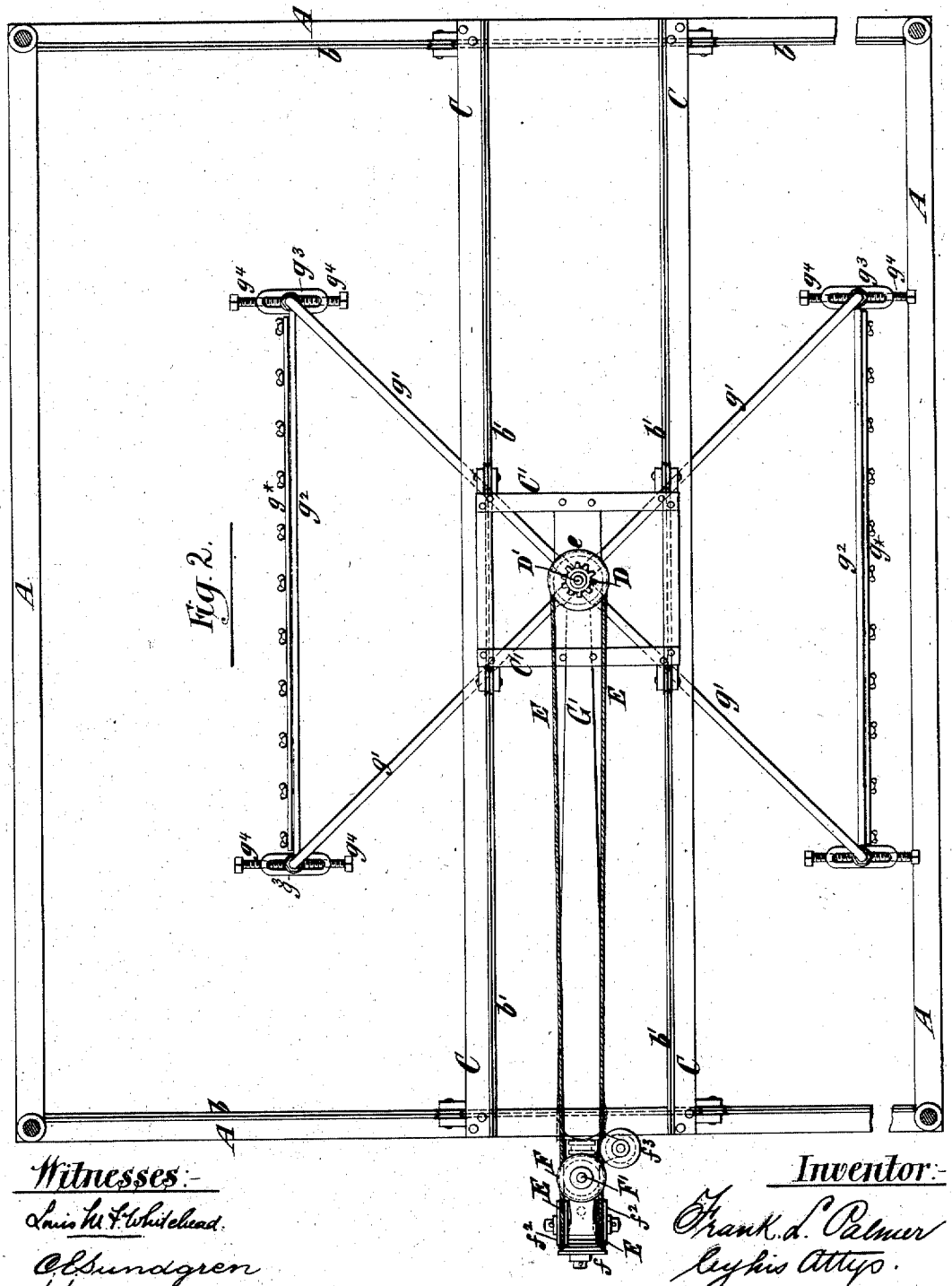

Fig. 2.

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(No Model.) 7 Sheets—Sheet 3.

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MECHANICAL MOVEMENT.

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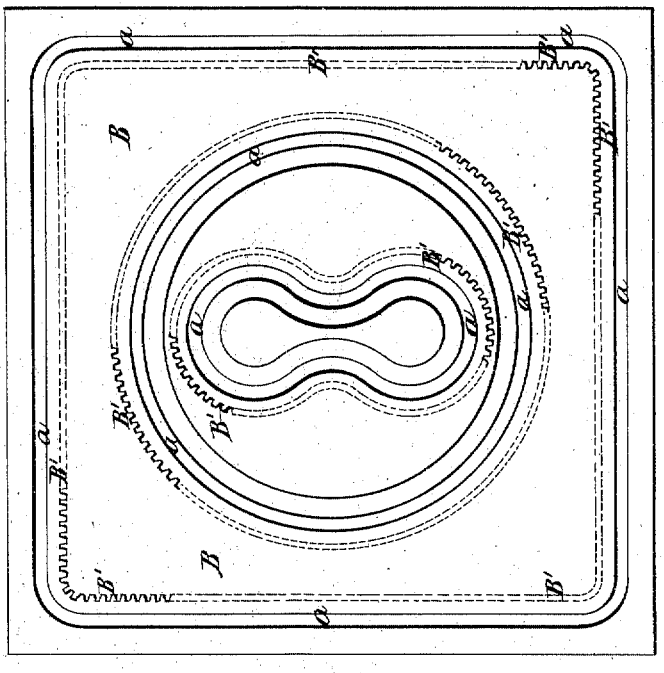
Fig. 4



Witnesses:-
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(No Model.) 7 Sheets—Sheet 4.

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MECHANICAL MOVEMENT.

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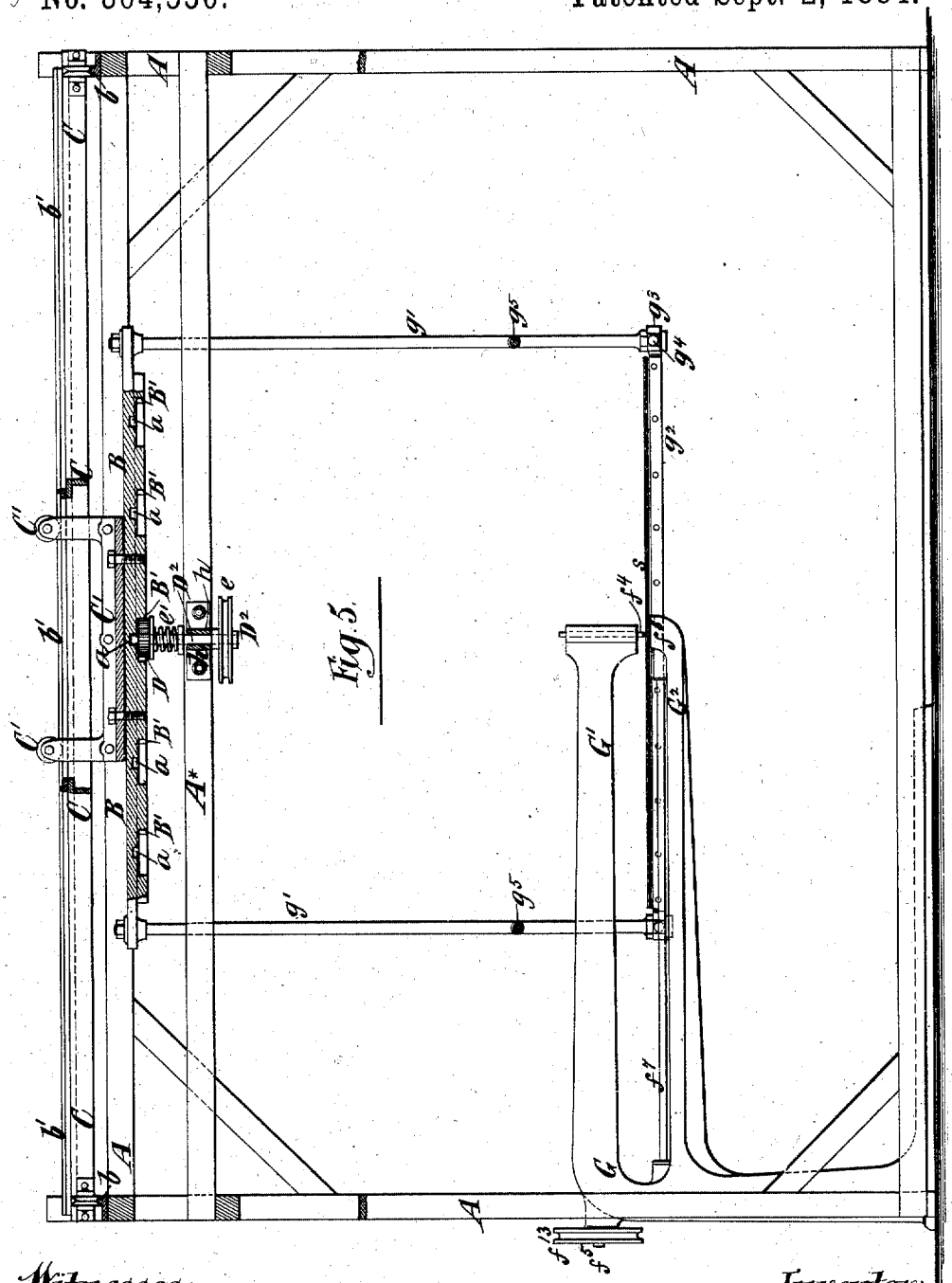

Fig. 5.

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(No Model.) 7 Sheets—Sheet 5.

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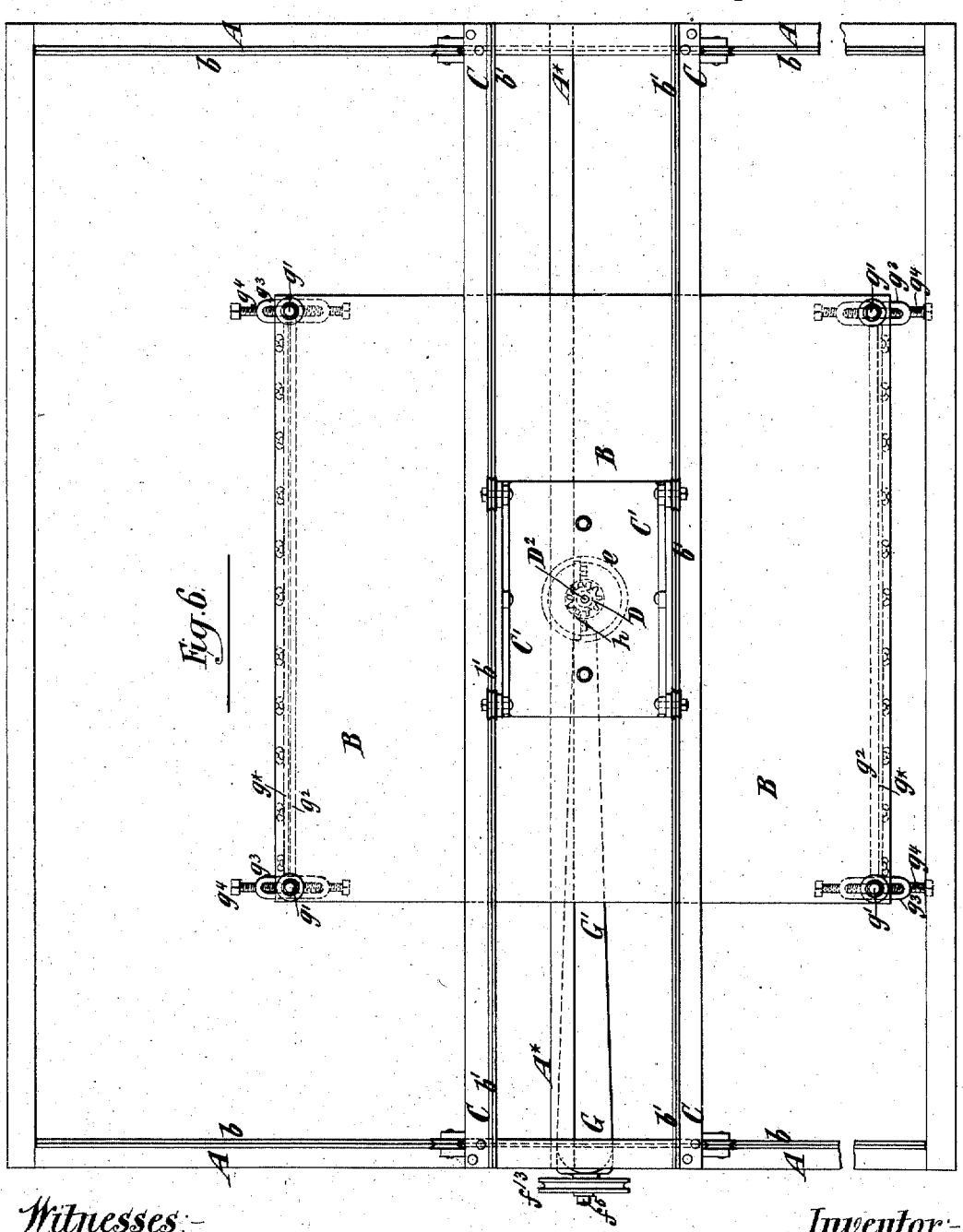

Fig. 6.

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(No Model.)

7 Sheets—Sheet 6.

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MECHANICAL MOVEMENT.

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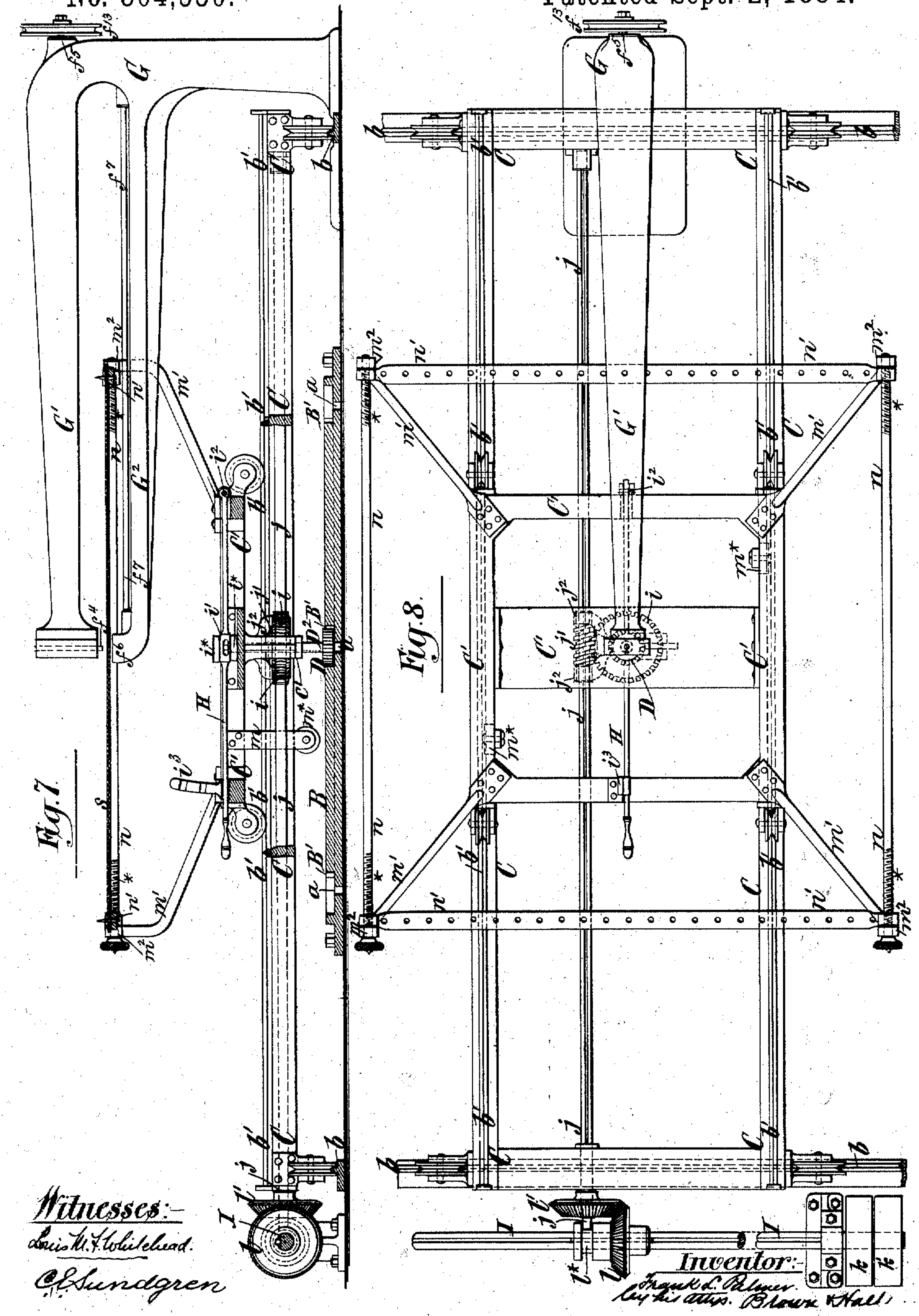

Witnesses:-
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(No Model.) 7 Sheets—Sheet 7.

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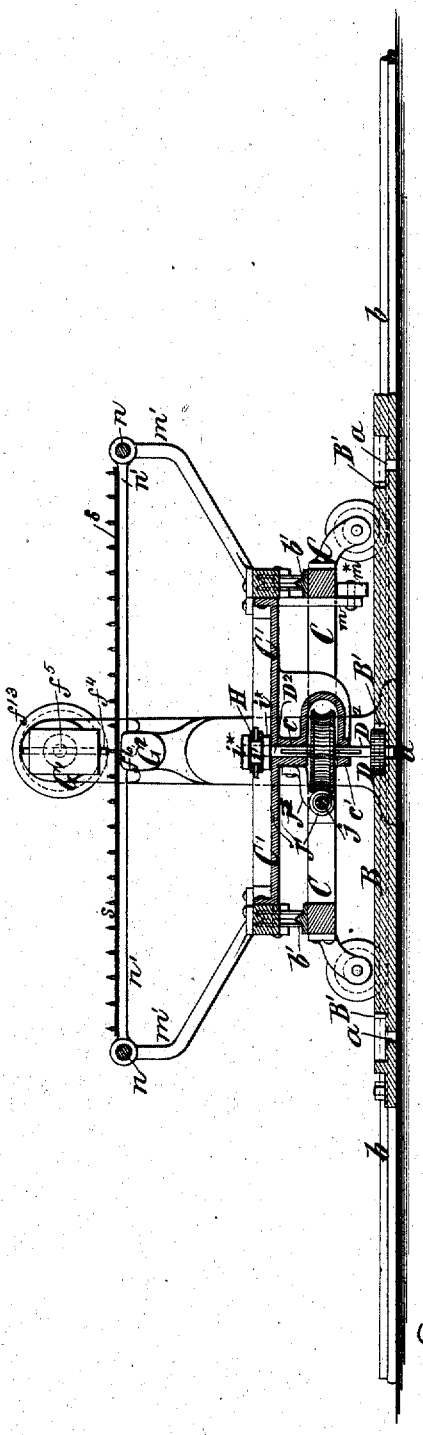
MECHANICAL MOVEMENT.

No. 304,550. Patented Sept. 2, 1884.

Fig. 9.



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. 304,550, dated September 2, 1884.

Application filed June 21, 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 the change in relative position between an implement or tool—such, for example, as a molding or other cutter or cutting-tool, or the needle of a sewing-machine—and the article to be operated on by the implement or tool—such, for example, as a piece of wood or other material to be molded or cut, or a piece of fabric to be sewed, quilted, or embroidered.

The advantages of my invention are more apparent when such change in relative position between the implement or tool and the article to be operated on is to be universal or in any desired direction along lines either straight or curved. The necessary elements of my mechanical 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 desired change in relative position is to be produced, and a positively-operating engaging device—such as a positively-rotated pinion or wheel—which acts upon the said rack or track, one of said parts being capable of bodily movement in directions transverse to each other, whereby provision is afforded for producing changes at uniform speed in the relative position of the rack or track and engaging device by the action of the engaging device on the rack or track. To provide for the bodily movement of the rack or track or the engaging device, I employ two carriages movable in directions transverse to each other, and one mounted upon the other, and as both carriages are left free and have no definite or positive movement imparted to them, the part or element of the mechanical movement supported by them is capable of universal movement.

The invention is fully hereinafter described; and it consists in combinations of parts which are set forth in the claims.

In the accompanying drawings, Figure 1 represents a sectional elevation of a machine for quilting fabrics in which the movement of the fabric under the needle of a stationary sewing-machine is produced by my new mechanical movement, the pattern rack or track being stationary and the engaging device movable. Fig. 2 is a plan of such machine, the pattern rack or track being removed. Fig. 3 is a detail view illustrating a portion of a pattern-track and an engaging device of modified form. Fig. 4 is a plan of a pattern rack or track which may be employed. Fig. 5 is a sectional elevation of a similar machine, in which the engaging device occupies a fixed position and produces the movement of a pattern rack or track. Fig. 6 is a plan of the machine shown in Fig. 5. Figs. 7 and 8 are respectively a sectional elevation and plan of another machine, in which the positively-operating engaging device is movable along a pattern rack or track; and Fig. 9 is a transverse vertical section of the machine shown in Figs. 7 and 8.

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

Referring first to Figs. 1, 2, and 4, A designates a suitable frame-work of any desired construction, and at the top of which is placed a frame, A′, to which is secured a pattern board or plate, B. This pattern board or plate B is represented in inverted plan view in Fig. 4, and upon it is formed or secured a pattern rack or track, B′—that is, a rack or track arranged in pattern form. This track or rack in pattern form constitutes one element of my movement.

Extending parallel with the track or rack B′, and at a uniform distance therefrom, is a groove, *a*, which constitutes a guide, and the purpose of which will be hereinafter explained.

C designates a wheeled carriage which runs upon track-rails *b* on the top of the frame A, and upon the lower or first carriage C is mounted a second or upper wheeled carriage, C′, which is movable along rails *b′* on the carriage C in directions transverse to the line of movement of the carriage C. The carriages C C′, neither of them have any definite or positive movement, but each is left entirely free, so that its speed or direction of movement may be changed at any point without interfering with the movement of the other. Either carriage may be stopped entirely and the movement of the other continued, and the speed of either of them may be increased or

diminished inversely as the speed of the other is increased or diminished. In this example of my invention the positively-operating device, which constitutes the second element of my new mechanical movement is carried by the second carriage, C', and, by its engagement with and action upon the pattern rack or track B', is made to travel along the same. This engaging device must be of such a nature that the positive operation, which it has of itself, produces its movement along the pattern rack or track at a uniform speed, no matter what direction or what changes in direction are pursued.

The engaging device which is shown in this example of my invention consists of a small toothed wheel or pinion, D, which is carried on a shaft or upright non-rotary spindle, D', fitted to a bearing, *e*, in the carriage C'. As here shown, the turning of the shaft or spindle D' is prevented by a screw, *d*, entering a groove therein. The pinion or wheel D has secured to it or formed with it a pulley, *e*, and the upper end of the shaft D' enters the groove or guide *a*, and so holds the pinion in engagement with the track or rack B'. The shaft D' and pinion D are held up by a spring, *e'*, arranged between the upper carriage, C', and a collar, e^2, on the shaft, and when it is desired to free the pinion from the pattern rack or track and the end of the shaft from the guide or groove *a* all that is necessary is to pull said shaft downward against the action of the spring.

In lieu of the toothed pattern-rack B' here shown and the rotary pinion D, I may employ a smooth pattern-track, B'*, as shown in Fig. 3, and a smooth wheel, D*, engaging therewith. The wheel D* may be faced or covered with rubber to increase its frictional engagement with the smooth pattern-track B'*. The pinion D has a positive rotary motion, and the means for rotating it must be of such a nature that the rotary motion will be imparted to it wherever it moves, by reason of its engagement with the pattern rack or track. The means here shown for this purpose consist of an endless belt or band, E, encircling the pulley *e*, and also passed one or more turns around a driving-pulley, F, on the upper end of an upright shaft, F'. The belt or band is kept taut, and slack is taken up by a weighted pulley, *f*, which is movable up and down a guide-rod, *f'*, and which is hung in a depending loop of the belt or band E. The belt or band is deflected from a horizontal to a vertical run, and vice versa, by pulleys or idlers f^2, around which it passes, and when the engaging device is moved from side to side of the machine the belt or band will be deflected around and over an idler-pulley, f^3, or more than one idler, as may be necessary.

G designates a stationary sewing-machine the upper arm, G', of which carries a needle-bar, f^4, which is worked by the usual operating-shaft, f^5. The lower arm, G^2, of the sewing-machine has at the end the usual work plate or bed, f^6, in which a shuttle, looper, or other stitch-forming device is operated by a shaft, f^7, which receives its necessary motion by any usual or suitable means from the machine-operating shaft f^5. A driving-belt may be applied to fast and loose pulleys f^9 f^8 on a shaft, f^{10}, and by a belt, f^{11}, and pulleys f^{12} f^{13} rotary motion is imparted from the shaft f^{10} to the operating-shaft f^5. By means of bevel-pinions f^{14} rotary motion is imparted from the shaft f^{10} to the upright shaft F'.

On the non-rotary shaft or spindle D' is a hub or sleeve, *g*, from which extend downwardly-diverging arms or hangers *g'*, and to the lower ends of said arms or hangers is attached a fabric-frame. As here shown, the frame consists of bars g^2, to which opposite edges of a fabric, *s*, may be secured by clamping-strips g^* or other suitable means, and after thus securing the opposite edges of the fabric *s* the two bars g^2 may be moved apart to put tension on the fabric. As here shown, the bars g^2 are provided at the ends with yokes g^3, and by means of screws g^4 may be adjusted toward and from each other.

From the above description it will be understood that by reason of the rotation of the pinion D at a uniform speed and its engagement with the rack or track B', the non-rotary shaft D' will be moved at a uniform speed and in a direction corresponding to the pattern of the rack or track. The fabric-frame, being suspended and carried by the non-rotary shaft or spindle D', will be similarly moved, and the course of the fabric *s* under the needle of the sewing-machine G will conform to the contour of the rack or track, and the speed of movement of the fabric will be uniform.

I will now describe the machine shown in Figs. 5 and 6, which in many respects is similar to the one already described. Two carriages, C and C', are mounted upon a frame-work, A, and are movable along tracks or rails *b b'* in directions transverse to each other, as before described. These carriages are also capable of free movement. The second carriage, C', unlike the one before described, is not arranged above the first carriage, C, although supported and movable thereon, but is suspended below the said first carriage. The pattern board or plate B, having secured to or formed upon it the rack or track in pattern-form B', is in this example of my invention secured fast to the second carriage and is movable therewith. The positively-operating engaging device or pinion D is here fixed on a shaft, D^2, which also carries a pulley, *e*, and the upper end of which engages with the guide or groove *a*, extending adjacent to and parallel with the pattern rack or track B', as before described. The shaft D^2 is mounted in a fixed bearing, *h*, which is secured to a cross-piece, A*, of the frame-work, and hence its rotation is an easy matter, a driving-belt being taken from any suitably-arranged outside shaft to the pulley *e*. The shaft D^2 and pinion D are held up by a spring, *e'*, below the pinion,

and when it is desired to disengage the pinion and shaft from the rack and groove B' *a* all that is necessary is to pull down the said shaft. The arms or hangers *g'* are pendent from the pattern board or plate B, and with their lower ends are connected bars g^2, which may be adjusted as before described, and to which opposite edges of a fabric, *s*, may be secured by clamping-bars g^*, or in any other suitable way. The opposite hangers, *g'*, may be braced and connected by cross-rods g^5. The upper and lower arm, G' G^2, of the sewing-machine G receive the fabric *s* between them, and the needle-bar f^4 operates in conjunction with a shuttle, looper, or stitch forming device in the bed or work plate f^6. The operating-shaft f^5 of the machine is provided with a pulley, f^{13}, for a driving-belt, and the shaft f^7 receives motion from the shaft f^5 in the usual way. The positively-rotated pinion D imparts movement at a uniform speed to the pattern B B' in a line or lines corresponding to the contour of the pattern rack or track B', and the fabric *s* is moved under the needle of the sewing-machine in the same line or lines and at the same uniform speed.

The machine shown in Figs. 7, 8, and 9 is very similar to that shown in Figs. 1 and 2, and differs from the latter principally in the arrangement of parts and in the mechanism for rotating the pinion which constitutes one element of the movement.

C C' designate the two-wheeled carriages, which are movable in directions transverse to each other, as before described. The carriage C is movable on rails *b*, secured to the floor or other support, and the carriage C' is movable upon rails *b'* on the carriage C. The pattern-board or plate B, having upon it the rack or track in the pattern-form B' and the groove or guide *a*, is stationary, and is secured to the floor or other support. The pinion D, which constitutes the positively-operating engaging device, is secured upon a shaft, D^2, the end of which enters the guide or groove *a*, and constitutes a pin or tracker-pin, and said shaft is fitted to rotate in upper and lower bearings, *c c'*, which are made a part of the carriage C'.

To the shaft D^2 is fitted a worm-wheel, *i*, which is held against longitudinal movement between the bearings *c c'*, and is locked to the shaft D^2 by a spline or feather and groove, as shown in Fig. 9, so as to turn therewith. To the upper end of the shaft D^2 is fitted a loose collar, *i'*, between the fast collars i^* and by means of a lever, H, fulcrumed at i^2, and capable of engaging with a catch, i^3. The shaft D^2 may be raised to disengage it and the pinion D from the guide and pattern-rack *a* B', and may be held in an elevated position.

In the carriage C is journaled a longitudinal shaft, *j*, grooved, as shown in Fig. 8, and carrying a screw or worm, *j'*, which is capable of sliding lengthwise upon it, and is locked to turn with it by means of a spline or feather fitting its groove. The worm or screw *j'* gears into and drives the worm-wheel *i*, and is journaled in bearings j^2, forming a part of the carriage C'. When the carriage C' moves along the carriage C, the worm or screw moves with it, and in whatever position the carriage C' may be on the carriage C, the worm *j'* receives rotary motion from the shaft *j*, and transmits it properly to the worm-wheel *i* and pinion-shaft D^2.

At the end of the machine and mounted in fixed bearings is a driving-shaft, I, which is arranged parallel to the line of movement of the carriage C, and this shaft is to be rotated continuously by a driving-belt passing around fast and loose pulleys *k k'*. (Shown in Fig. 8.) The shaft I is groove longitudinally, and upon it is a bevel-wheel, *l*, locked to turn with it by a feather or spline fitting said groove, and also capable of sliding lengthwise of the shaft.

On the end of the shaft *j* is a similar bevel-wheel, *l'*, gearing into and receiving motion from the wheel *l*, and said wheels are kept in proper engagement by the end of the shaft *j* entering a circumferential groove, l^*, in the hub of the wheel *l*. As the carriage C runs on the rails *b*, the wheel *l* is carried along with it, and the shaft *j* receives uniform rotary motion, whatever be the position of the carriage C.

In order to prevent the carriage C' from canting on the carriage C, I have represented hangers *m* depending therefrom, and carrying rollers m^*, which bear on the under side of the carriage C. As here shown, the carriage C' is provided with arms or standards *m'*, diverging upward from its corners, and in the upper ends of said standards or arms are bearings m^2, wherein are arranged parallel shafts *n n*. The shafts are held against longitudinal movement, and are provided with right and left hand screw-threads *, fitting nuts in opposite ends of cross bars or rails, *n' n'*.

In the rails *n'* are needles or pins, and after opposite edges of a fabric, *s*, have been impaled on them the rails may be spread apart by turning the shafts *n n* to put tension on or stretch the fabric. The upper and lower arms, G' G^2 of the stationary sewing-machine G receive the fabric *s* between them, and the needle-bar f^4, which is reciprocated by the operating-shaft f^5, operates in conjunction with a shuttle or looper in the bed or work-plate f^6. The operating-shaft f^5 may be rotated by a belt driving onto the pulley f^{13}, and the shaft f^7 of the shuttle or looper is to be actuated from the shaft f^5 by any suitable and well-known means. The positive rotation imparted to the pinion D causes the movement of the latter at uniform speed along lines corresponding to the contour of the pattern-rack or track B', and the fabric *s* also receives a corresponding movement at uniform speed under the needle of the sewing-machine.

In the plan view, Fig. 8, I have not shown the pattern B B', in order not to complicate the drawings, but it will be understood that

the contour of the pattern rack or track B' may be made to conform to the design or pattern to be produced on the fabric. A pattern similar to that shown in Fig. 4 may be used in any one of the three machines here shown, and such a pattern illustrates my invention. The sectional views of the pattern shown in Figs. 1 and 5 do not exactly correspond with Fig. 4; but the form or design of pattern shown is not necessarily to be used, and is an arbitrary illustration of the invention.

In my application for Letters Patent, filed November 23, 1883, and of which the serial number is 112,555, I have shown and described a machine for sewing or quilting fabrics, in which the movement of the fabric relatively to the needle of the sewing-machine is produced or controlled by a pattern mechanism, comprising the mechanical movement which I now seek to cover, broadly. As shown in said application, the pattern rack or track is stationary, and the positively-rotated pinion which engages therewith is supported upon carriages movable in directions transverse to each other.

In my application for Letters Patent filed June 12, 1884, and of which the serial number is 134,623, I have shown, described, and claimed a mechanical movement consisting of a body capable of movement in directions transverse to each other, and bearing upon its surface a pattern rack or track and a positively-operating engaging device, consisting of a pinion engaging with and acting upon the rack or track and occupying a fixed position. In my present application I do not claim, specifically such mechanical movement; but,

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 a positively-operating engaging device acting upon said rack or track, one of said parts being capable of bodily movement in directions transverse to each 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 said rack or track, substantially as herein described.

2. The combination, with a rack or track in pattern form and a positively-operating engaging device acting thereon, of carriages supporting one of said parts, movable in directions transverse to each other, and one mounted upon the other, whereby provision is afforded for producing changes at uniform speed in the relative position of said parts by the action of the said positively-operating engaging device upon the rack or track, substantially as herein described.

3. The combination of a rack or track in pattern form and a positively-operating engaging device acting thereon, one of said parts being capable of bodily movement in directions transverse to each other, whereby the changes in relative position of said parts are effected at uniform speed by the action of the said engaging device upon the rack or track, a guide extending adjacent thereto and parallel with said rack or track, and a pin or tracker connected with the engaging device and engaging with said guide, substantially as herein described.

4. The combination of a rack or track in pattern form and a positively-rotating wheel acting upon said rack or track, one of said parts being capable of bodily movement in directions transverse to each other, whereby changes in the relative position of said parts at uniform speed may be produced by the action of said wheel upon the pattern rack or track, substantially as herein described.

5. The combination of a toothed rack in pattern form and a positively-rotating spur-pinion engaging therewith, one of said parts being capable of bodily movement in directions transverse to each other, whereby changes in the relative position of said parts may be produced at uniform speed by the action of the rotating pinion on the pattern rack or track, substantially as herein described.

6. The combination, with a rack or track in pattern form and a positively-operating engaging device acting upon the rack or track and capable of bodily movement relatively thereto, of movable supports for said engaging device, whereby provision is afforded for the movement of the said engaging device along the rack or track by its engagement therewith, substantially as herein described.

7. The combination, with a rack or track in pattern form and a positively-operating engaging device acting thereon and capable of bodily movement relatively thereto, of carriages supporting said device, movable in directions transverse to each other, and one mounted upon the other, whereby provision is afforded for the movement of said engaging device along the rack or track by its engagement therewith, substantially as herein described.

8. The combination, with a rack or track in pattern form and a positively-operating engaging device acting thereon, of two carriages movable in directions transverse to each other, and one mounted upon the other, the upper or second carriage serving to support the said engaging device, a driving-shaft arranged parallel with the line of movement of the first or lower carriage, a counter-shaft journaled in said first carriage, and sliding gearing connecting it with said driving-shaft, and a gear carried by said second carriage, capable of sliding on the counter-shaft, and through which motion is imparted to said engaging device, substantially as herein described.

9. The combination, with a rack or track in pattern form, of a positively-rotated wheel engaging with and capable of movement along the rack or track by its rotation, and movable supports for said wheel, whereby provision is afforded for its movement in directions

transverse to each other, substantially as herein described.

10. The combination, with a rack or track in pattern form, of a positively-rotating wheel engaging with and capable of moving along said rack or track by its engagement therewith, and carriages for supporting said wheel movable in directions transverse to each other, and one mounted upon the other, substantially as herein described.

11. The combination, with a rack or track in pattern form, of a positively-rotating wheel engaging with and capable of movement along said rack or track, a guide arranged adjacent to and parallel with said rack or track, and a pin or tracker movable with the said wheel and along said guide, and movable supports for said wheel, which provide for its movement in directions transverse to each other, substantially as herein described.

12. The combination, with a toothed rack in pattern form, of a positively-rotating pinion engaging with said rack or track and movable in directions transverse to each other, whereby provision is afforded for the movement of said pinion along the pattern rack or track at uniform speed, by reason of its engagement therewith, substantially as herein described.

13. The combination, with a rack or track in pattern form, of a positively-rotating wheel engaging with and movable along said pattern rack or track, and capable of axial movement to disengage it from said rack or track, and movable supports for said wheel, which afford provision for its bodily movement in directions transverse to each other, substantially as herein described.

FRANK L. PALMER.

Witnesses:
C. HALL,
FREDK. HAYNES.

Correction in Letters Patent No. 304,550.

It is hereby certified that in Letters Patent No. 304,550, granted September 2, 1884, upon the application of Frank L. Palmer, of New London, Connecticut, for an improvement in "Mechanical Movements," errors appear in the printed specification requiring correction, as follows: In line 58, page, 3, the period after the reference letter "i" should be stricken out and a comma inserted in place thereof, and the word "The" following should read *the*, making the sentence continuous; and that the Letters Patent should be read with these corrections therein to make the same conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 16th day of September, A. D. 1884.

[SEAL.]

M. L. JOSLYN,
Acting Secretary of the Interior.

Countersigned:

R. G. DYRENFORTH,
Acting Commissioner of Patents.