

No. 675,663.

Patented June 4, 1901.

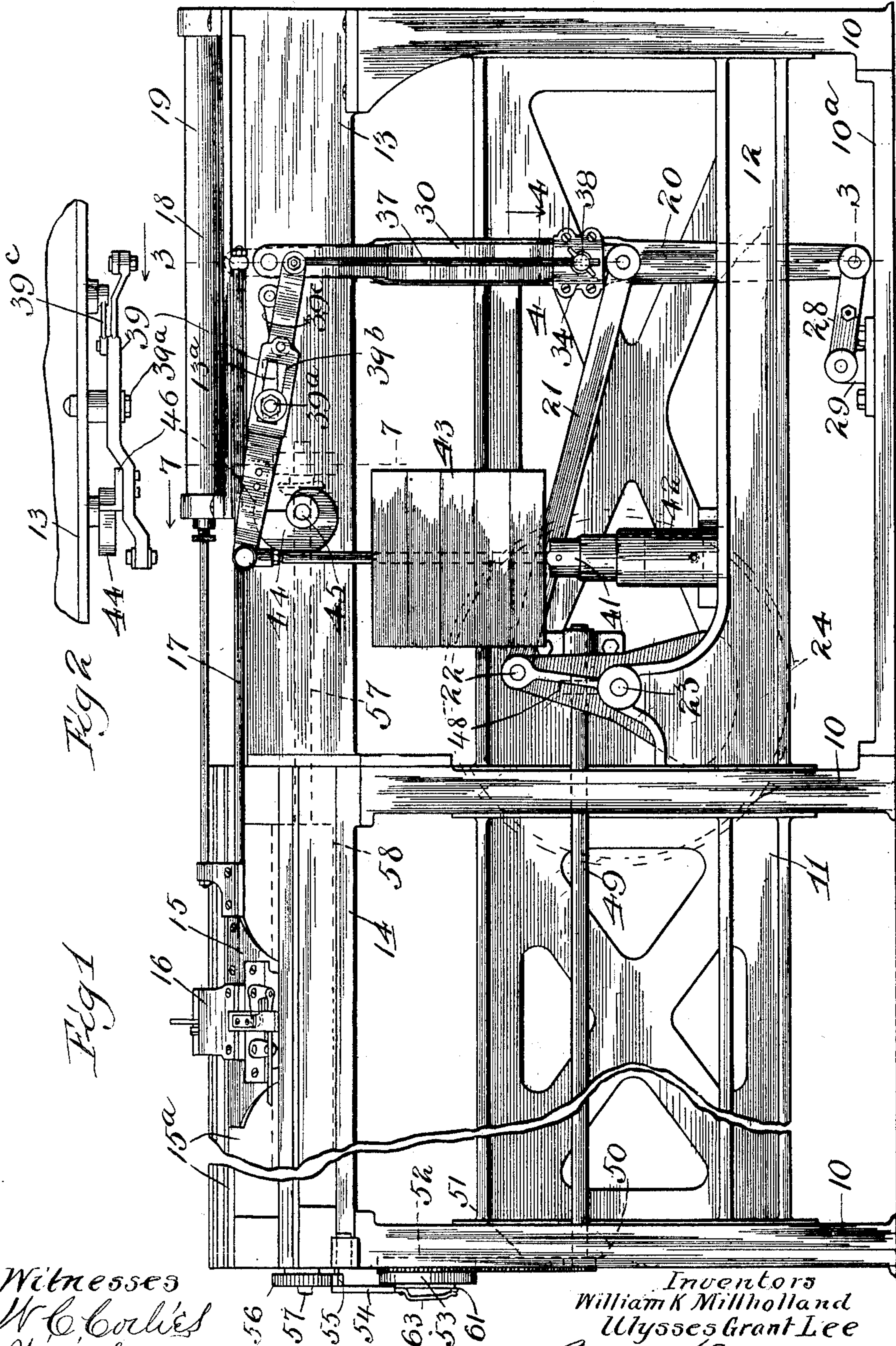
W. K. MILLHOLLAND & U. G. LEE.

KNITTING MACHINE.

(Application filed Dec. 16, 1899.)

(No Model.)

5 Sheets—Sheet 1.



Witnesses
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Wm. Geiger

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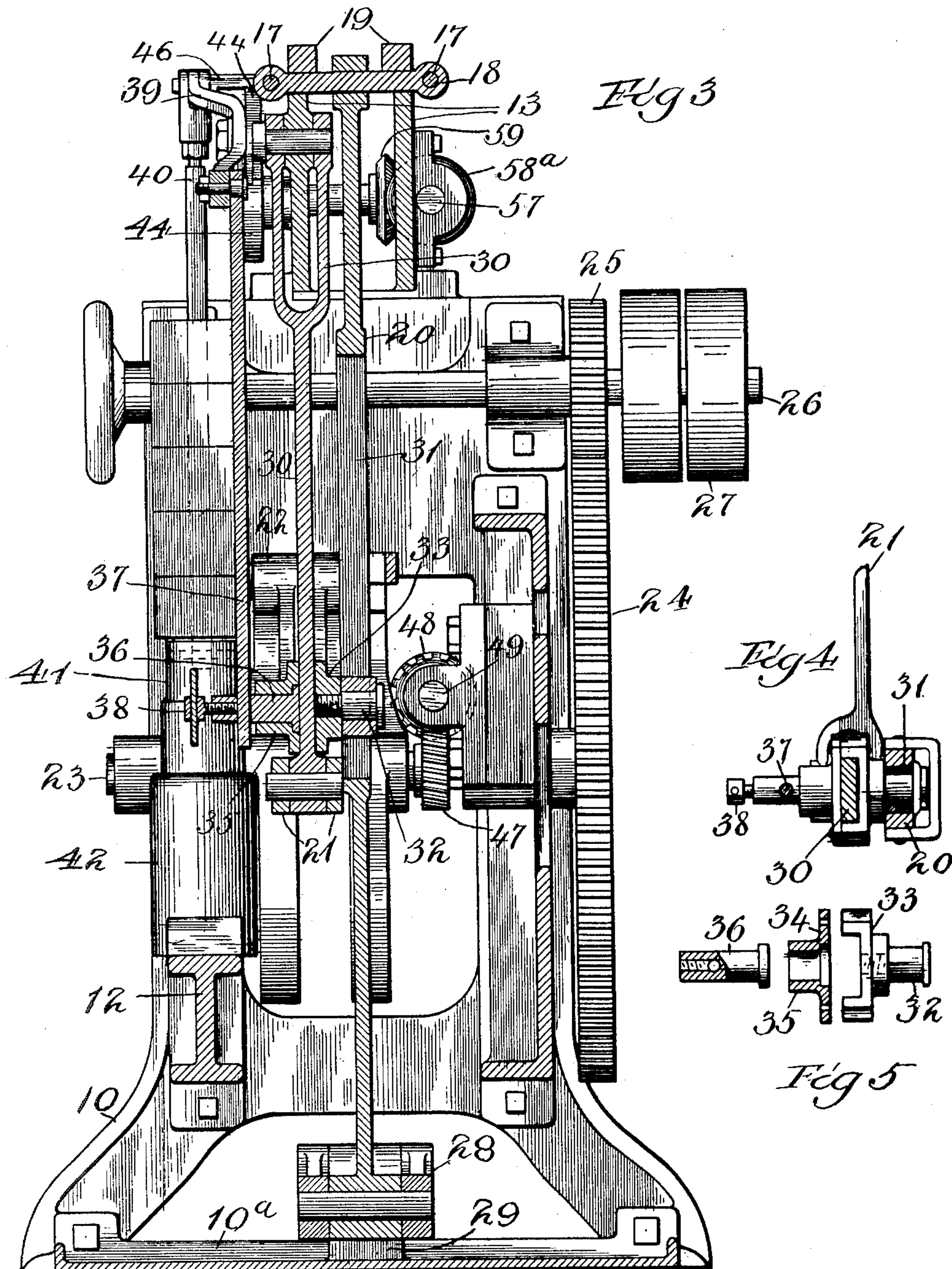
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Witnesses
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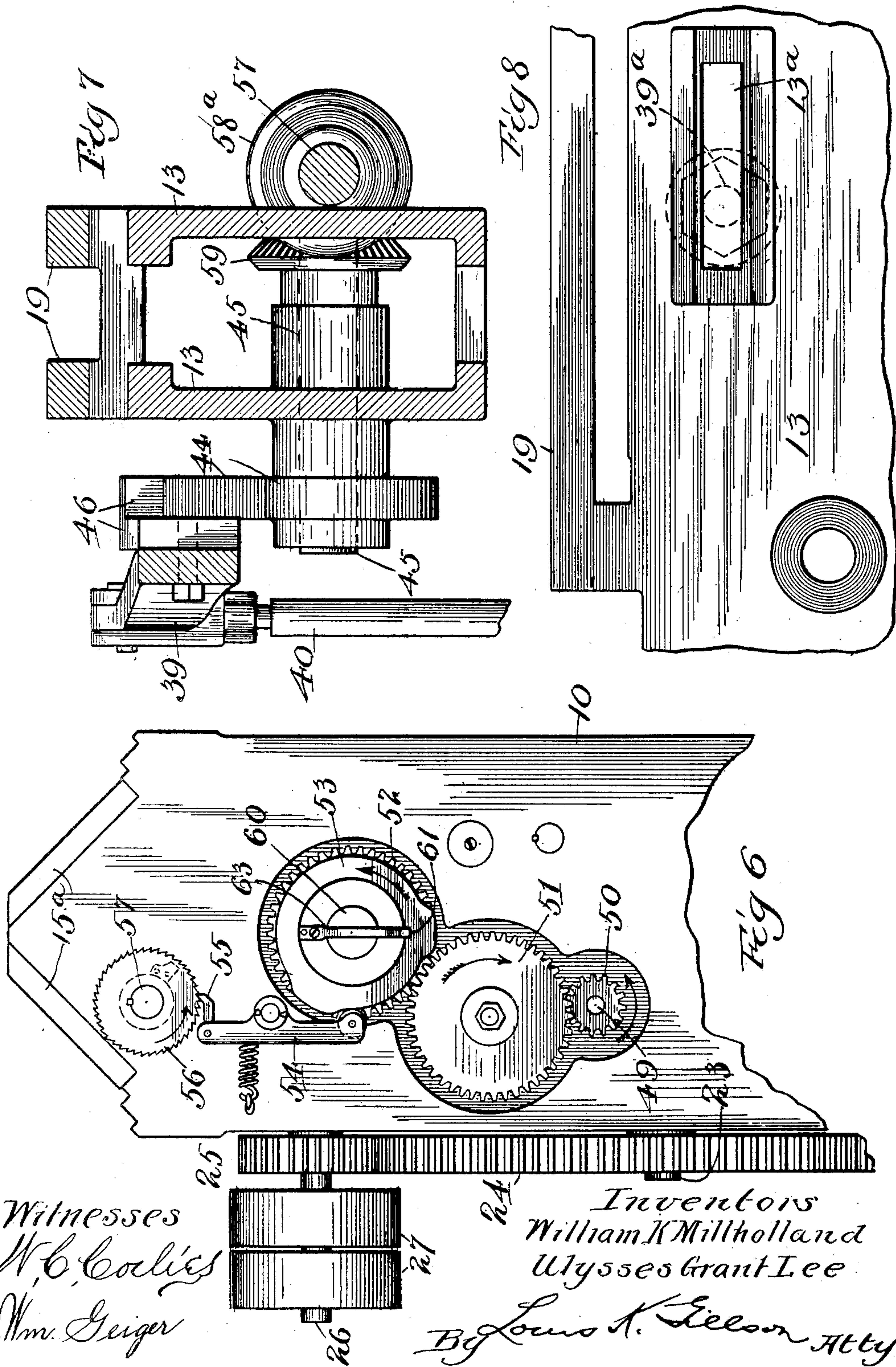
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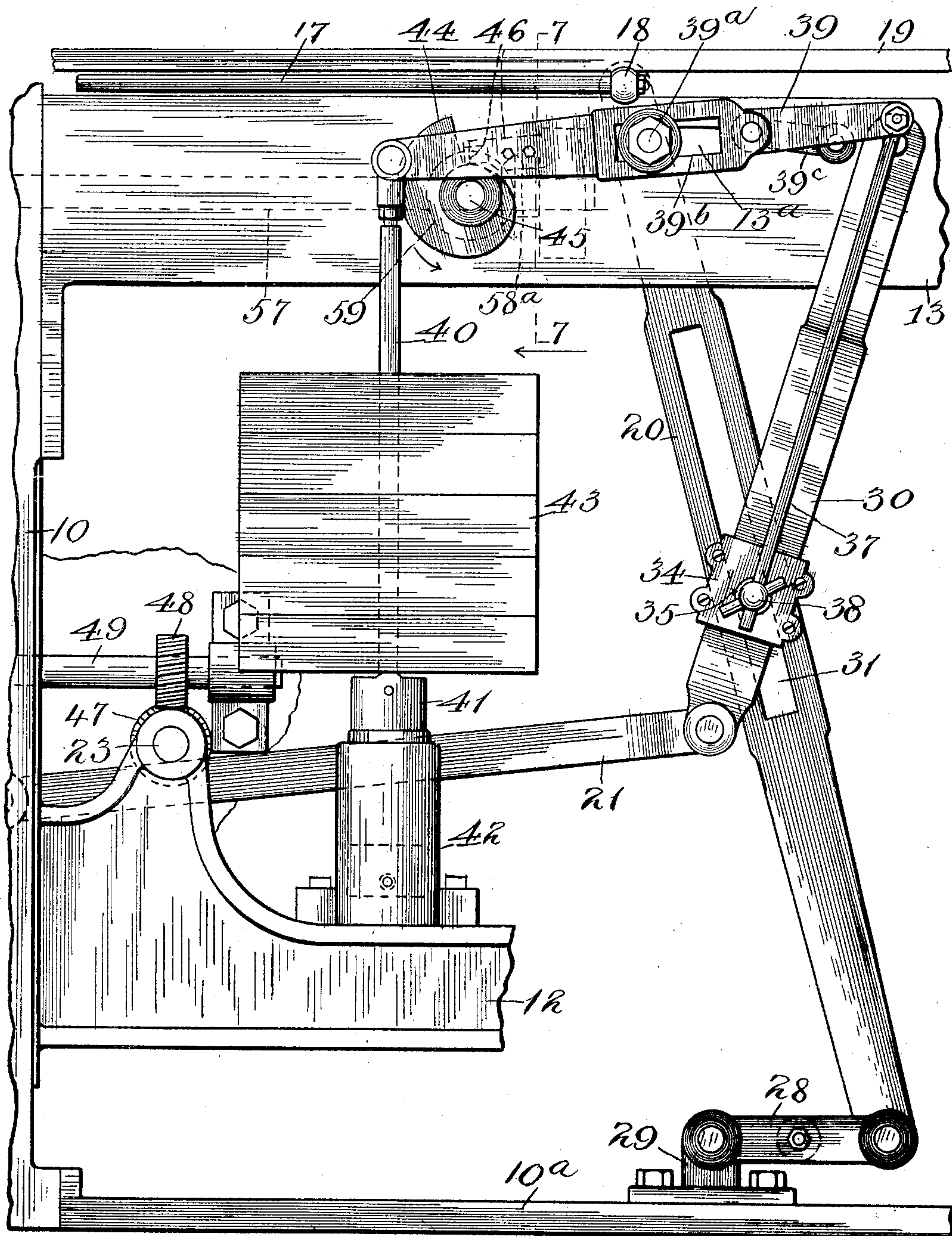
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Fig. 9.

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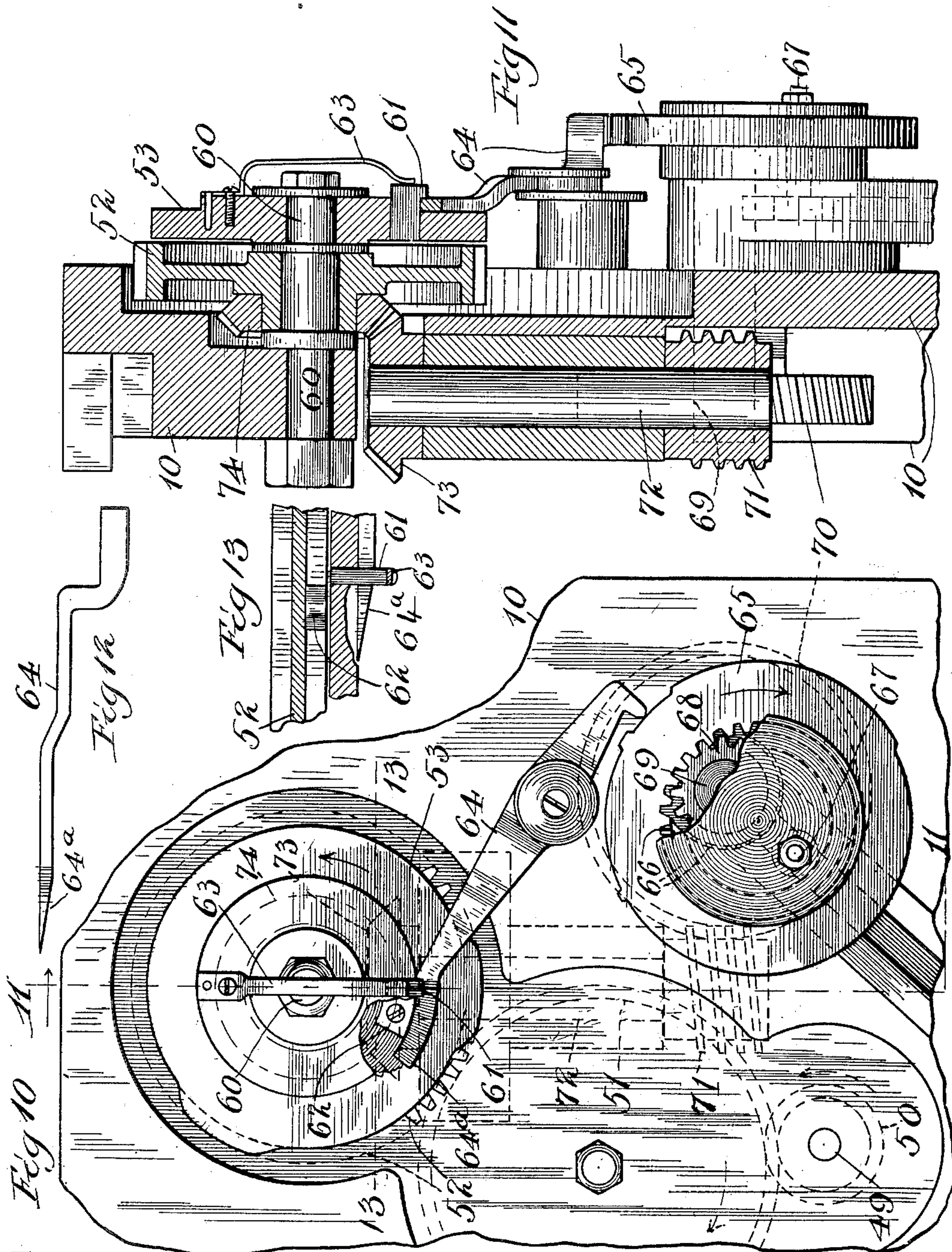
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5 Sheets—Sheet 5.



Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM K. MILLHOLLAND AND ULYSSES G. LEE, OF CHICAGO, ILLINOIS,
ASSIGNORS TO THE GEORGE D. WHITCOMB COMPANY, OF SAME PLACE.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 675,663, dated June 4, 1901.

Application filed December 16, 1899. Serial No. 740,504. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM K. MILLHOLLAND and ULYSSES GRANT LEE, citizens of the United States, and residents of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Knitting-Machines, of which the following is a specification and which are illustrated in the accompanying drawings, forming a part thereof.

This invention relates to automatic mechanism for varying the stroke of a reciprocating carriage in knitting-machines, so as to adapt it for use in connection with fashioning, in which the article being manufactured is made of varying widths, its object being to provide means for adapting the range of movement of the carriage to the width of the work, so as to avoid the paying out of yarn in excess of the requirements of the needles in action. This object is attained by the mechanism hereinafter fully described and which is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the machine. Fig. 2 is a detail plan. Fig. 3 is a transverse vertical section on the line 3 3 of Fig. 1. Fig. 4 is a detail section on the line 4 4 of Fig. 1. Fig. 5 is a detail, partly in section and partly in elevation, of certain parts of the machine. Fig. 6 is a detail end elevation of the machine, some of the parts being removed. Fig. 7 is a detail section on the line 7 7 of Fig. 1. Fig. 8 is a detail elevation. Fig. 9 is a detail side elevation of the machine, showing the parts in a different position from that of Fig. 1. Fig. 10 is a detail end elevation. Fig. 11 is a detail section on the line 11 11 of Fig. 10. Fig. 12 is a detail of one of the parts; and Fig. 13 is a detail section, some of the parts being broken away, taken on the line 13 13 of Fig. 10.

We have shown in the drawings a straight-knitting machine adapted to use two banks of needles, but have omitted such parts of it as are not necessary to a proper illustration of the present invention. While the drawings are substantially correct as to proportions, the same scale has not been followed in the several figures.

The machine is carried by a frame, of which 10 10 are uprights, 10^a a floor-plate, 11 12 lower

side rails, and 13 14 upper side rails. At 15 16 are shown a cam-carriage and yarn-carrier, both adapted to reciprocate over the needle-plates 15^a and driven by means of rods 17 17, fixed to a cross-bar 18, running upon ways formed at the tops of the side rails 13 and below fixed guide-bars 19. A swinging lever 20 is pivoted to the cross-bar 18 and is fulcrumed at the base of the machine. Inasmuch as the cross-bar 18 moves in a right line, it is necessary that the fulcrum of the lever 20 be movable, and to that end the lever is pivoted to a link 28, which in turn is pivoted to a floor-hanger 29, rising from the floor-plate 10^a. The lever 20 is actuated by means of a pitman 21, driven by a crank 22, carried by a shaft 23. Upon this shaft there is mounted a gear-wheel 24, driven by a pinion 25, mounted upon a shaft 26, which carries the pulleys 27, to which the power-transmitting belt (not shown) is applied.

In order to vary the throw of the lever 20, so as to vary the range of movement of the carriage 15, the point of application of power to this lever is shifted, and in securing this result we employ an arm 30, which swings from the rail 13 and to the lower end of which the pitman 21 is pivoted, the arm 30 and lever 20 being connected by means of a movable pivot-block. This block is composed of a plate 33, recessed in one face to slidably receive the arm 30 and being provided with a pivot-pin 32, projecting from its opposite face, which pin projects through and runs in a slot 31 in the lever 20, and the plate 34, secured to the apertured face of the plate 33 and provided with an outwardly-projecting boss 35, centrally apertured to receive a pivot-pin 36, the inner end of the aperture being counterbored to accommodate the head of the pin. The pin 36 is transversely apertured to receive a rod 37, which is fixed in its relation thereto by means of a binding-screw 38 entering through the end of the pin, so as to bear against the rod. The rod 37 projects upwardly and is pivotally attached to one end of a rock-lever 39, pivoted to the rail 13. The opposite end of the lever 39 is supported by a spiral cam 44 and is weighted, being provided with a pendent rod 40, carrying a weight 43, and provided with a piston 41, which plays

in a dash-pot cylinder 42. The cam 44 is mounted upon a shaft 45, journaled in the rails 13, and the contact with this cam of the lever 39 is by means of an arm 46, projecting laterally from the lever.

It will be seen that when the arm 46 is resting upon the shorter diameter of the cam 44 the remoter end of the lever 39 is raised, and the pivot-block connecting the arm 30 and the lever 20 is thereby elevated, thus by removing the point of application of power to the latter lever to a maximum distance from its fulcrum lessening the angle of its movement, the pivot-block being by the same action carried to a minimum distance from the center of oscillation of the arm 30, decreasing the range of movement of the block, the angular movement of the arm being without variation. As the cam 44 rotates the weighted end of the lever 39 is gradually raised, and hence the pivotal connection of the arm 30 and lever 20 is correspondingly lowered, thereby gradually increasing the range of movement of the carriage 15.

By adjusting the position of the pivot-block with reference to the rod 37 by means of the binding-screw 38 the limits of the movement of the carriage may be determined. By shifting the fulcrum-pin 39^a of the lever 39 the range of automatic movement of the pivot 32 is determined. To provide for this shifting of the fulcrum-pin 39^a, the latter is set through a longitudinal slot 13^a in the rail 13, and the lever 39 is provided with a longitudinal slot for its reception, as shown at 39^b. The longitudinal movement of the lever 39 may be prevented by any desired means. There is shown for this purpose a link 39^c, pivotally connected with the lever and with the rail 13.

For the purpose of transmitting motion to the cam 44 a spiral 47 is fixed upon the shaft 23 and intermeshes with the spiral gear 48, carried by a shaft 49, suitably journaled longitudinally as to the frame of the machine and carrying at its farther end a pinion 50, intermeshing with a gear-wheel 51, which in turn drives a gear-wheel 52, with which is mounted a cam-wheel 53. A spring-controlled rocker-arm 54 bears against the face of the cam 53 and carries a pawl 55, which cooperates with a ratchet-wheel 56, mounted upon a shaft 57, which shaft also carries one of the pattern-cylinders 58. (Shown by dotted lines in Fig. 1.) Upon the shaft 57 there is mounted a miter-gear 58^a, intermeshing with a similar gear 59, carried by the shaft 45. By this means the movement of the cam 44 may be timed as desired with the pattern-cylinder, so that the range of movement of the carriage 15 will be suitably varied with the variations in the fashioning of the pattern. It is obvious that this adaptation of the cam to the pattern-cylinder may be indefinitely varied by mechanically constructing a machine to produce the effects which may be desired, the form of the cam also be-

ing varied as may be desired to secure the results sought for.

While we have shown a preferred means for fixing the extreme limit of stroke of the carriage—viz., the adjustability upon the rod 37 of the pivot-block connecting the lever 20 and the arm 30—of automatically varying the range of travel of the carriage within such extremelimits—viz., the cam 44, the weighted lever 39, the rod 37, the arm 30, the lever 20, and the slidable pivot-block connecting the arm and lever—and means for varying the range of action of this automatic mechanism—viz., the adjustable pivot 39^a of the lever 39—we recognize that the details of construction may be worked out in various ways, and we do not therefore desire to be limited to the specific forms herein shown.

An improved feature of the invention is the timing of the stroke-adjusting mechanism with the pattern-cylinder. As it rarely happens that articles are made in which the fashioning consists in a gradual and uniform widening, it becomes as necessary to provide for the intermittent action of the stroke-varying mechanism as to provide for the intermittent action of the pattern-cylinder, and it is equally important that they should be timed to act together. It will be seen that the gear-wheel 52 is given a constant and uniform motion, so that it is necessary to provide means for disconnecting the cam-wheel 53 from it in order to provide for the intermittent action of the pattern-cylinder and stroke-shifting mechanism. The gear-wheel 52 and cam-wheel 53 are both mounted loosely upon a shaft 60, set through the end of the frame of the machine. A longitudinally-movable pin 61 is set axially through the disk face of the cam 53, so that when in one position it may be engaged by a block 62, fixed upon the disk face of the gear-wheel 52, thus locking the gear-wheel and cam-wheel together. The pin 61 is normally held in this position by means of a leaf-spring 63 bearing upon its outer end. It is withdrawn from this position by means of a rocker-arm 64, one end of which, 64^a, is wedge-shaped and bears against the disk face of the cam-wheel 53, so that as the latter rotates its end will be inserted under the head of the pin 61, thus lifting the pin in opposition to the spring 63 out of engagement with the block 62 and stopping the cam-wheel. The farther end of the rock-lever 64 rides upon a pattern-wheel 65, having elevated and depressed portions upon its periphery, so that when in the course of its rotation the elevated portion comes in contact with the end of the arm 64 the latter is raised, thereby throwing its farther end out of engagement with the pin 61 and allowing the latter to return to its normal position for engagement with the block 62. The cam-wheel 53 will therefore be rotated so long as the farther end of the arm 64 remains upon the elevated portion of the pattern-wheel,

thereby at regular intervals actuating the pattern-cylinder 58 and the stroke-adjusting cam 44.

The details of the pattern-wheel 65 are not shown in this case, as they are made the subject of claims in a pending application. Generally described, the pattern-wheel is annular in form and provided with internal gear-teeth which ride upon the periphery of a crescent-shaped block 66, bolted at 67 to the frame of the machine, its gear-teeth meshing with the teeth of a pinion 68, mounted upon a shaft 69, set through the end of the frame of the machine and carrying on its inner end a gear-wheel 70, which is driven by a worm 71, fixed on a shaft 72, suitably journaled in a bracket secured to the inner face of the end of the frame and carrying a miter-gear 73, intermeshing with a miter-gear 74, fixed upon the hub of the gear 52.

The machine herein shown and described is of that type which is adapted for continuous action, garments or articles being fabricated in succession without stopping the machine, and the stroke-varying mechanism described and claimed is adapted to adjust the stroke of the cam-carriage to the variations in width of the fabric as the latter is fashioned.

As shown, the machine is especially organized for the fabrication of such articles as undershirt-sleeves, which are fashioned by widening in the course of their fabrication, and at the commencement of each article the carriage has its minimum length of stroke, the length being increased until its maximum is reached as the article is completed, when there is an abrupt change of stroke back to the minimum length. This stroke-varying mechanism therefore performs a regular cycle, the length of the stroke being increased step by step until the maximum is reached and then decreased by a single step to the minimum. It is obvious that the steps taken are due to the conformation of the cam 44 and may be varied by changes in its form.

The cycle of the stroke-varying mechanism is lengthened or shortened by shifting the pivot 39^a, as hereinbefore described. As shown, this variation in the cycle is secured by a manual adjustment, though any means for accomplishing this result will come, broadly, within the scope of our invention.

We are aware of the Patent No. 568,190, granted September 22, 1896, to Challands, Pare and Smith, which shows mechanism for varying the stroke of the cam-carriage. The machine forming the subject of this patent, however, is not continuously acting and is incapable of permanent changes in the cycle of its stroke-adjusting mechanism.

We claim as our invention—

1. In a knitting-machine, in combination, a reciprocating cam-carriage, a crank for driving the carriage, means for varying the stroke of the carriage step by step, and means

for changing such stroke back to its original length in a single step.

2. In a knitting-machine, in combination, a reciprocating cam-carriage, a crank for driving the carriage, means for varying the stroke of the carriage step by step, and automatic means for changing such stroke back to its original length in a single step.

3. In a continuously-acting knitting-machine, in combination, a reciprocating cam-carriage, means for actuating the carriage, means for automatically varying its stroke, and means for changing the range of action or cycle of such automatic stroke-varying means.

4. In a knitting-machine, in combination, a reciprocating carriage, a lever for imparting motion to the carriage, a crank, a swinging arm, a pitman connecting the crank and arm, a pivot connecting the arm and lever and being adapted for movement longitudinally as to each, and means for automatically shifting the position of the pivot.

5. In a continuously-acting knitting-machine, in combination, a reciprocating cam-carriage, means for actuating the carriage, means for automatically varying its stroke, and means for manually changing the range of action or cycle of such automatic stroke-varying means.

6. In a continuously-acting knitting-machine, in combination, a reciprocating carriage, a lever for imparting motion to the carriage, means for applying power to the lever, means for automatically shifting the point of application of power to the lever relatively as to its fulcrum, and means for manually changing the range of action or cycle of such automatic shifting means.

7. In a knitting-machine, in combination, a reciprocating carriage, a lever for imparting motion to the carriage, a crank, a swinging arm, a pitman connecting the crank and arm, a pivot connecting the arm and lever and being adapted for movement longitudinally as to each, means for automatically shifting the position of the pivot, and means for manually changing the range of movement of such automatic shifting means.

8. In a knitting-machine, in combination, a reciprocating carriage, means for actuating the carriage, means for changing the limits of the stroke of the carriage, means for varying its stroke within such limits, and means for varying the range of action of such stroke-varying means.

9. In a knitting-machine, in combination, a reciprocating carriage, means for actuating the carriage, means for manually changing the limits of the stroke of the carriage, means for automatically varying its stroke within such limits, and means for varying the range of action of such automatic means.

10. In a knitting-machine, in combination, a reciprocating carriage, a swinging lever for driving the carriage, a swinging arm, a pivot-block uniting and slidable upon the arm and

lever, a power-driven crank, a pitman connecting the crank and arm, a weighted rock-lever, a rod connecting the rock-lever and the pivot-block, a cam for moving the rock-lever
5 in opposition to its weight, and means for actuating the cam.

11. In a knitting-machine, in combination, a reciprocating carriage, a swinging lever for driving the carriage, a swinging arm, a pivot-
10 block uniting and slidable upon the arm and lever, a power-driven crank, a pitman connecting the crank and arm, a weighted rock-lever, a rod connecting the rock-lever and the pivot-block, a cam for moving the rock-lever
15 in opposition to its weight, a pattern-cylinder, a shaft for carrying the cylinder, and connection between such shaft and the cam whereby one of such parts is driven by the other.

12. In a knitting-machine, in combination,
20 a reciprocating carriage, a lever for imparting motion to the carriage, a crank, a swinging arm, a pitman connecting the crank and arm, a pivot connecting the arm and lever and being adapted for movement longitudi-
25 nally as to each, means for automatically shifting the position of the pivot, means for manually changing the range of movement of such automatic shifting means, a rotatable

pattern-cylinder, and mechanism timed to move with the pattern-cylinder for control- 30
ling the automatic stroke-shifting means.

13. In a knitting-machine, in combination, a reciprocating cam-carriage, means for driving the carriage, a pattern-cylinder, means for driving the pattern-cylinder, means for 35
automatically varying the stroke of the carriage, and means for simultaneously throwing the means for driving the pattern-cylinder and for varying the carriage-stroke into
40 and out of action.

14. In a knitting-machine, in combination, a reciprocating carriage and means for driving the same, mechanism for varying the stroke of the carriage, a shaft for actuating the stroke-varying mechanism, a pattern-cyl- 45
inder fixed upon the shaft, ratchet and pawl for driving the shaft, a cam for actuating the pawl, means for driving the cam, a clutch for connecting the cam with its driving means, and a pattern-wheel for releasing the clutch. 50

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