

No. 682,548.

Patented Sept. 10, 1901.

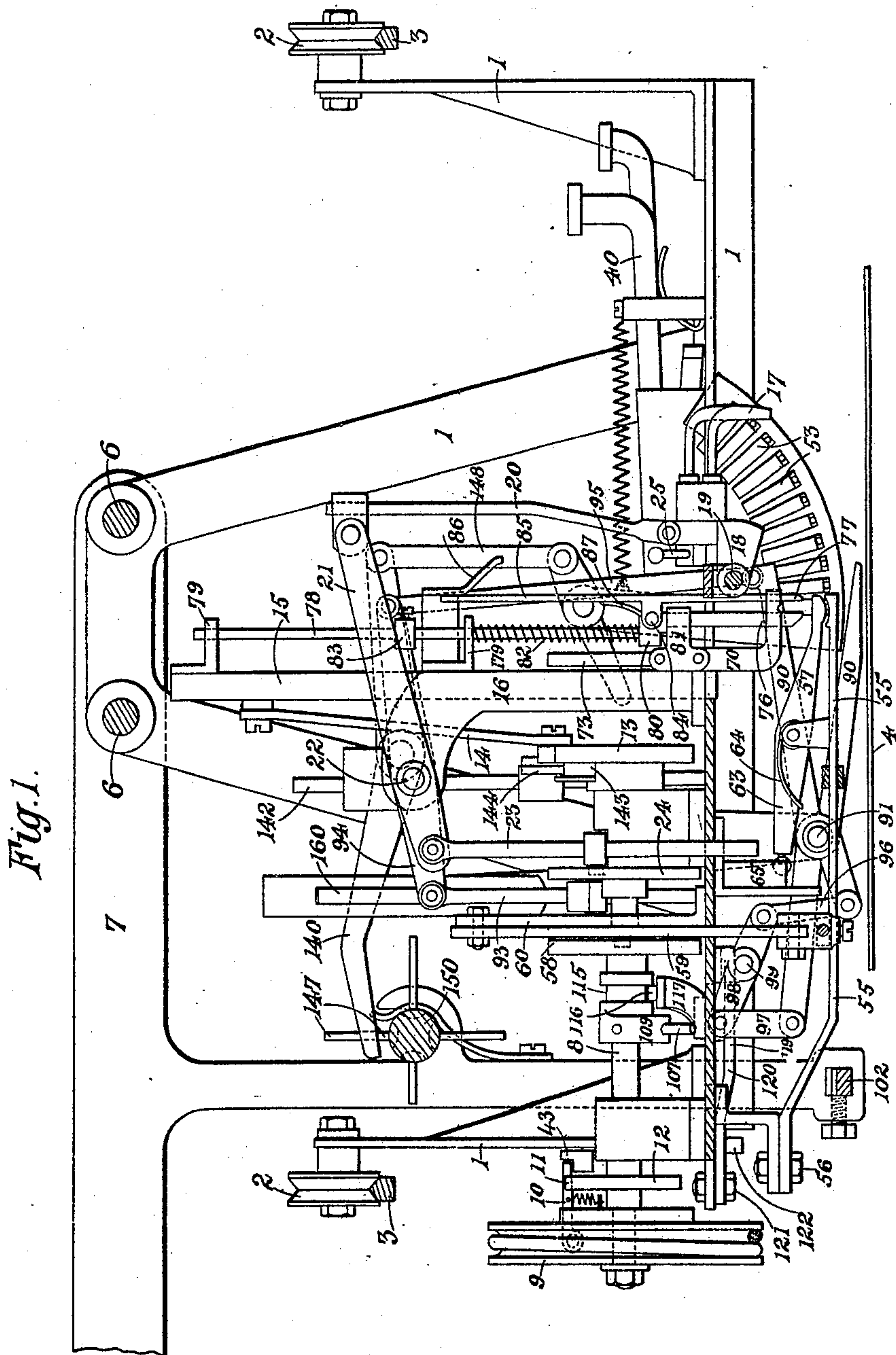
C. HUGHES.

LOOM FOR WEAVING TUFTED FABRICS.

(Application filed Mar. 26, 1901.)

(No Model.)

6 Sheets—Sheet 1.



Witnesses.

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6 Sheets—Sheet 2.

Fig. 2.

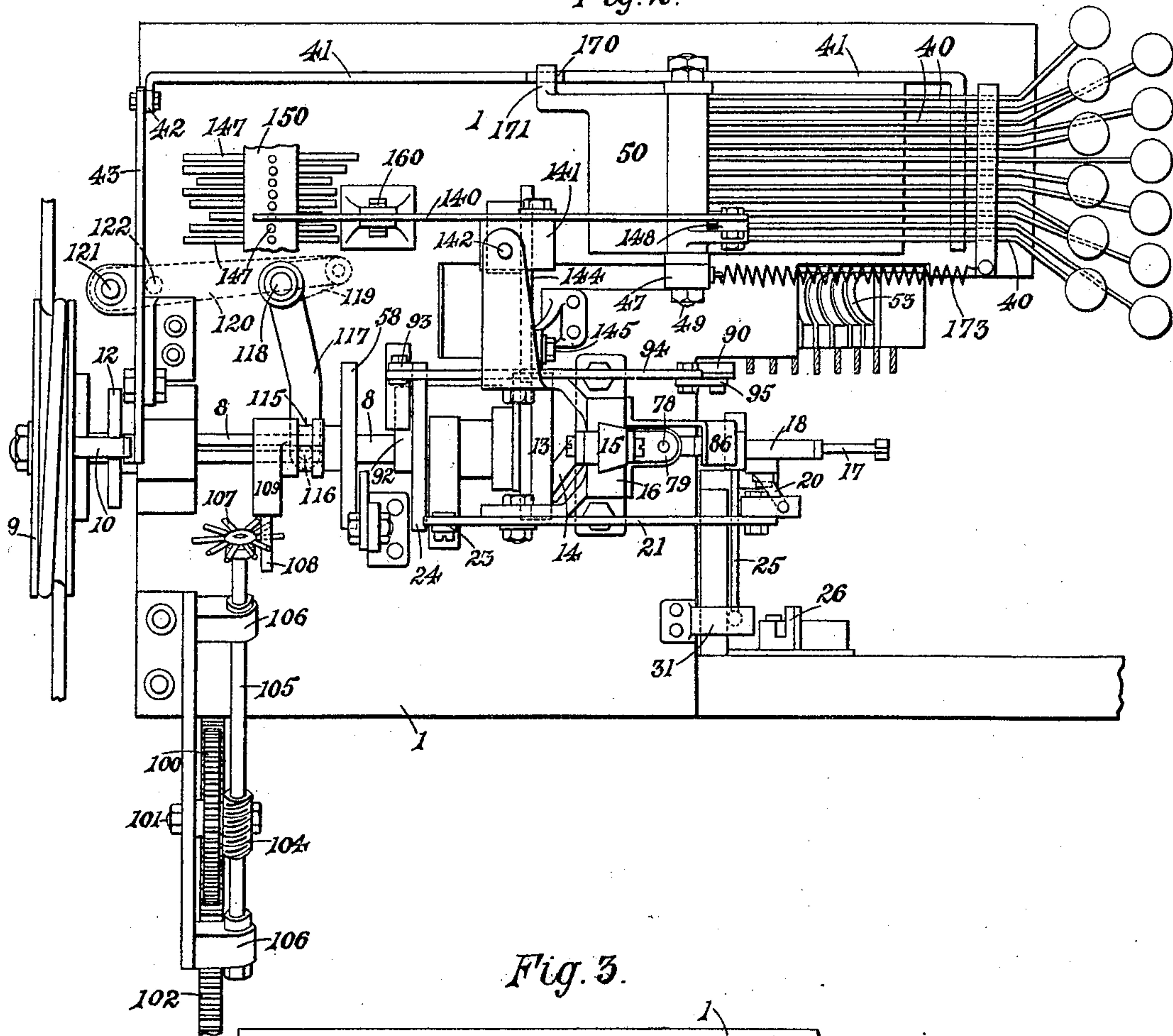
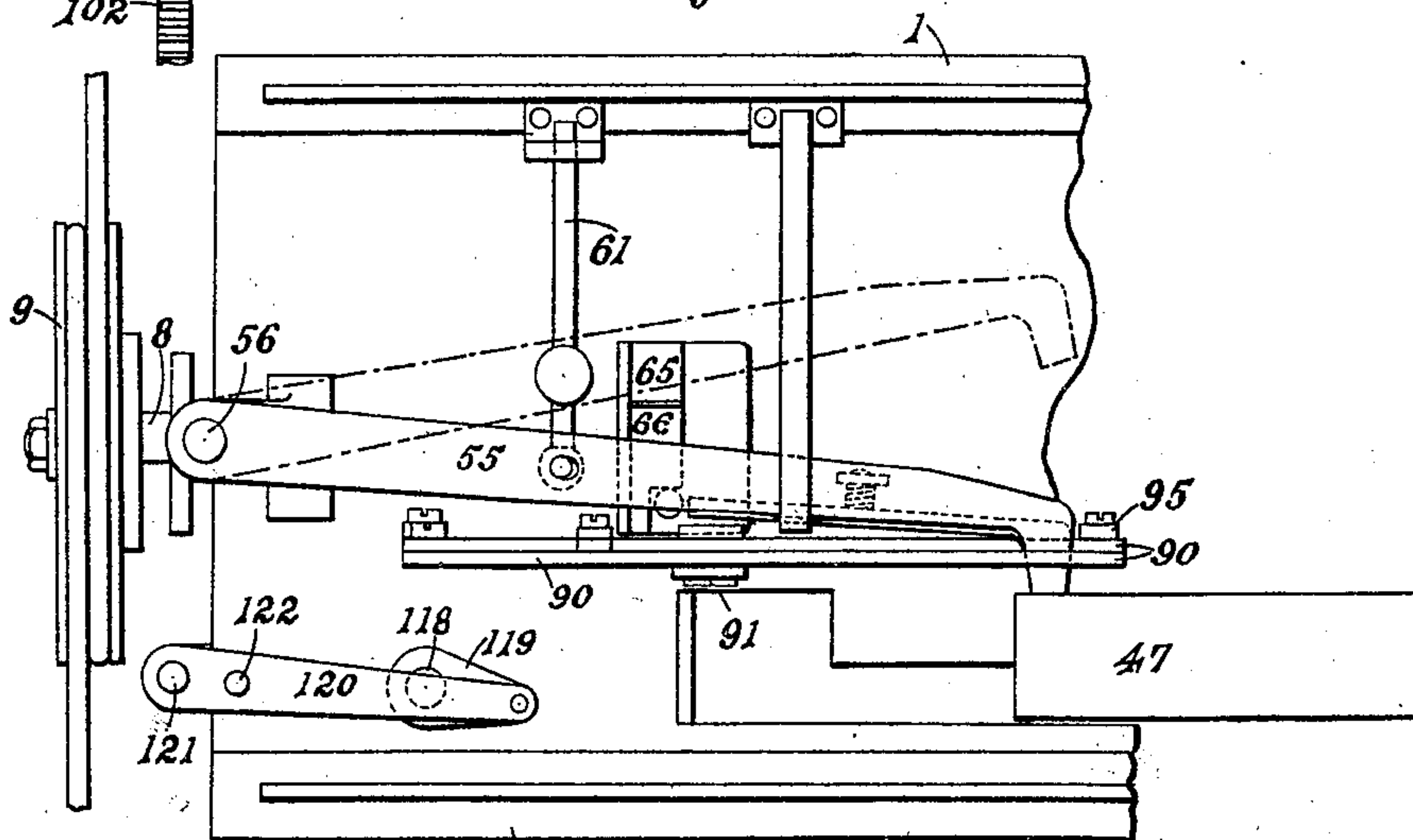


Fig. 3.



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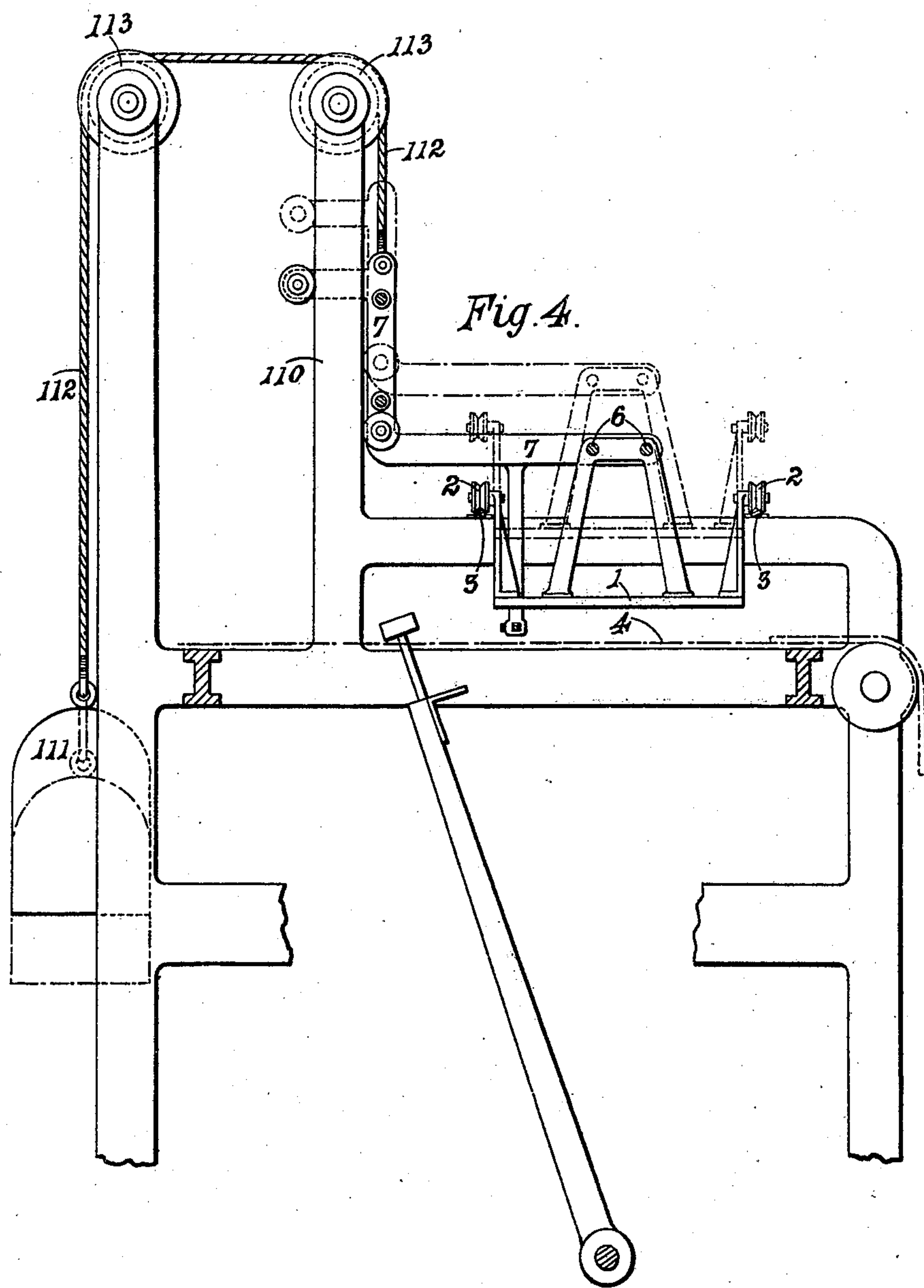
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(Application filed Mar. 26, 1901.)

(No Model.)

6 Sheets—Sheet 3.



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6 Sheets—Sheet 4.

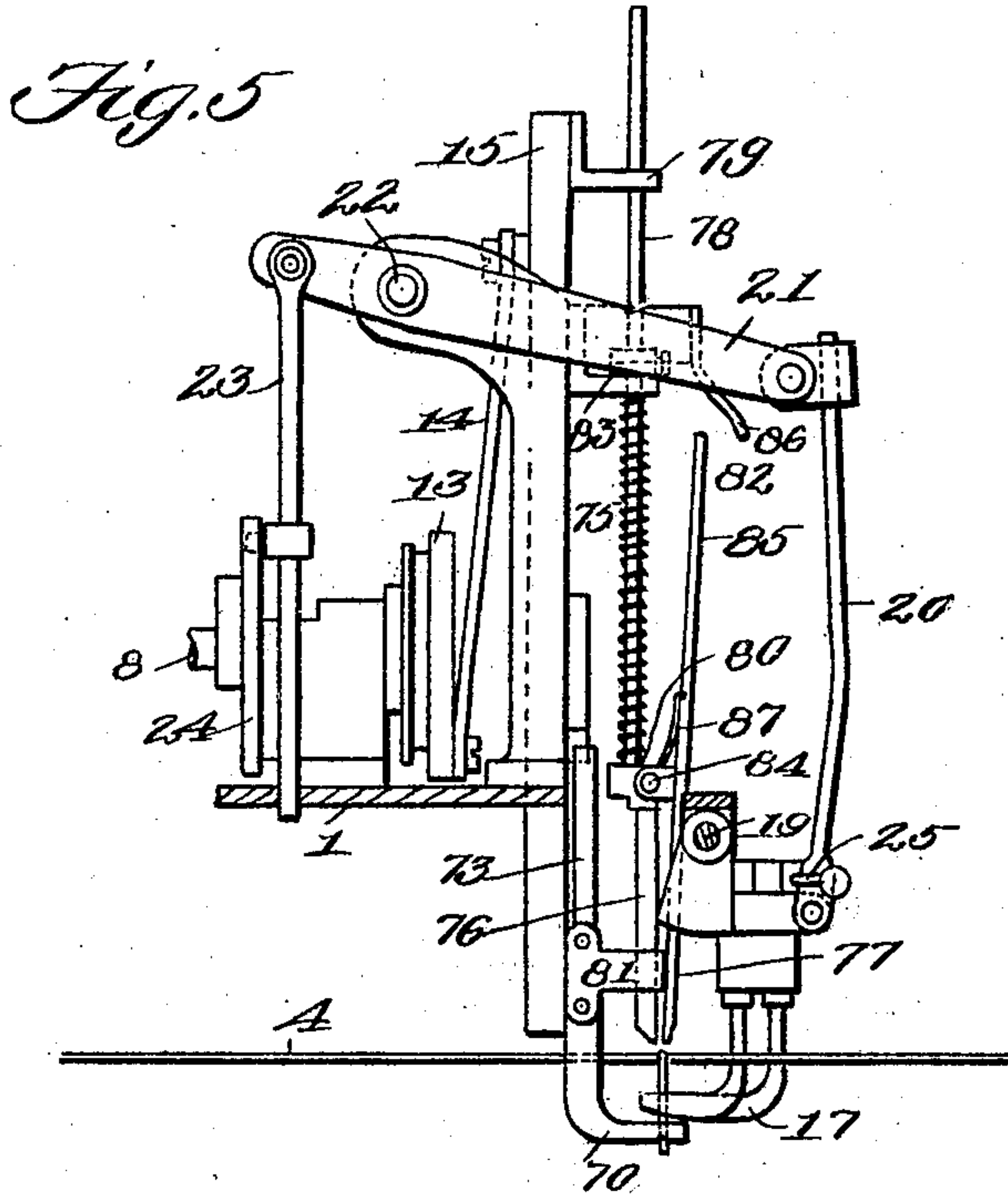
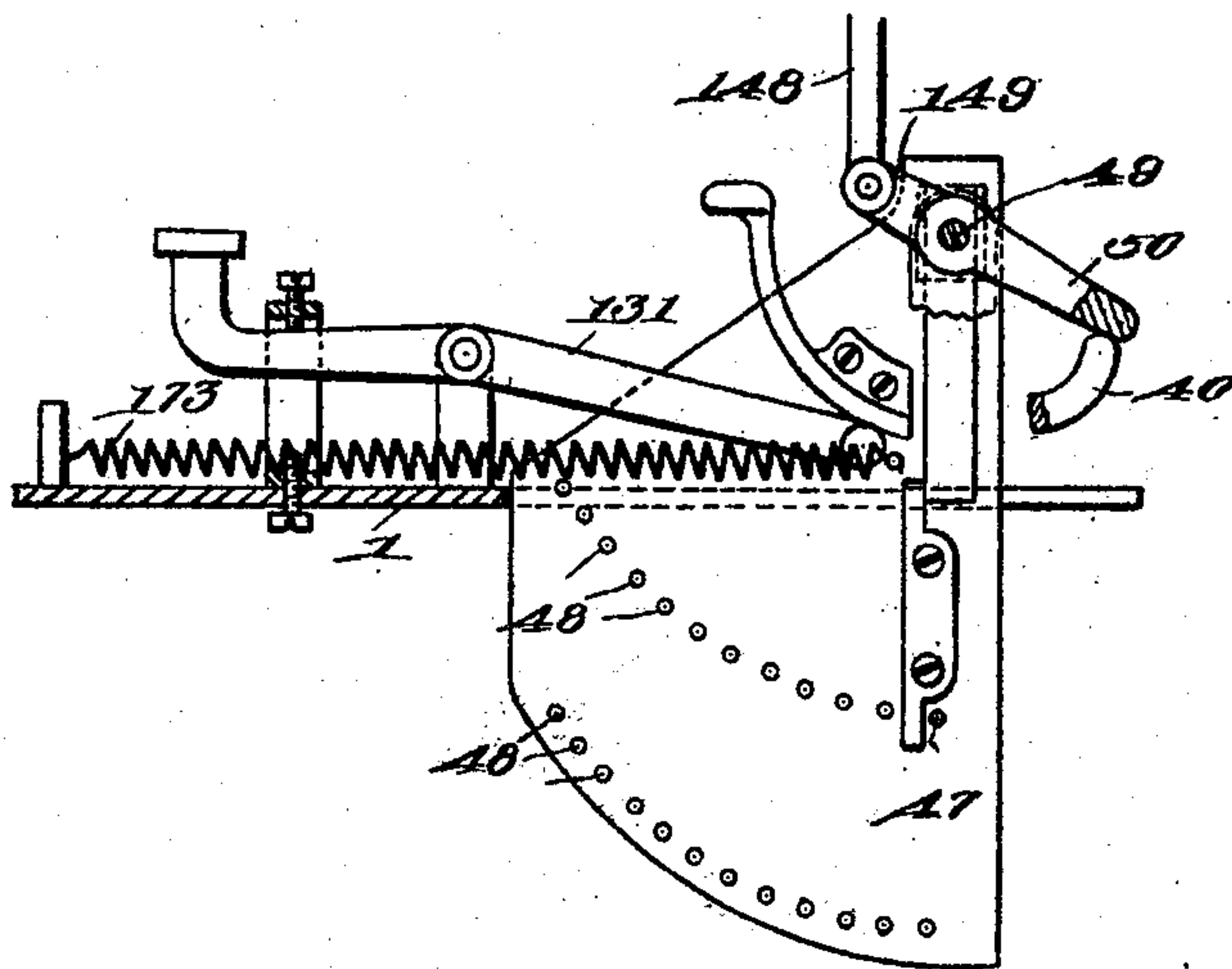


Fig. 18.



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(No Model.)

6 Sheets—Sheet 5.

Fig. 7.

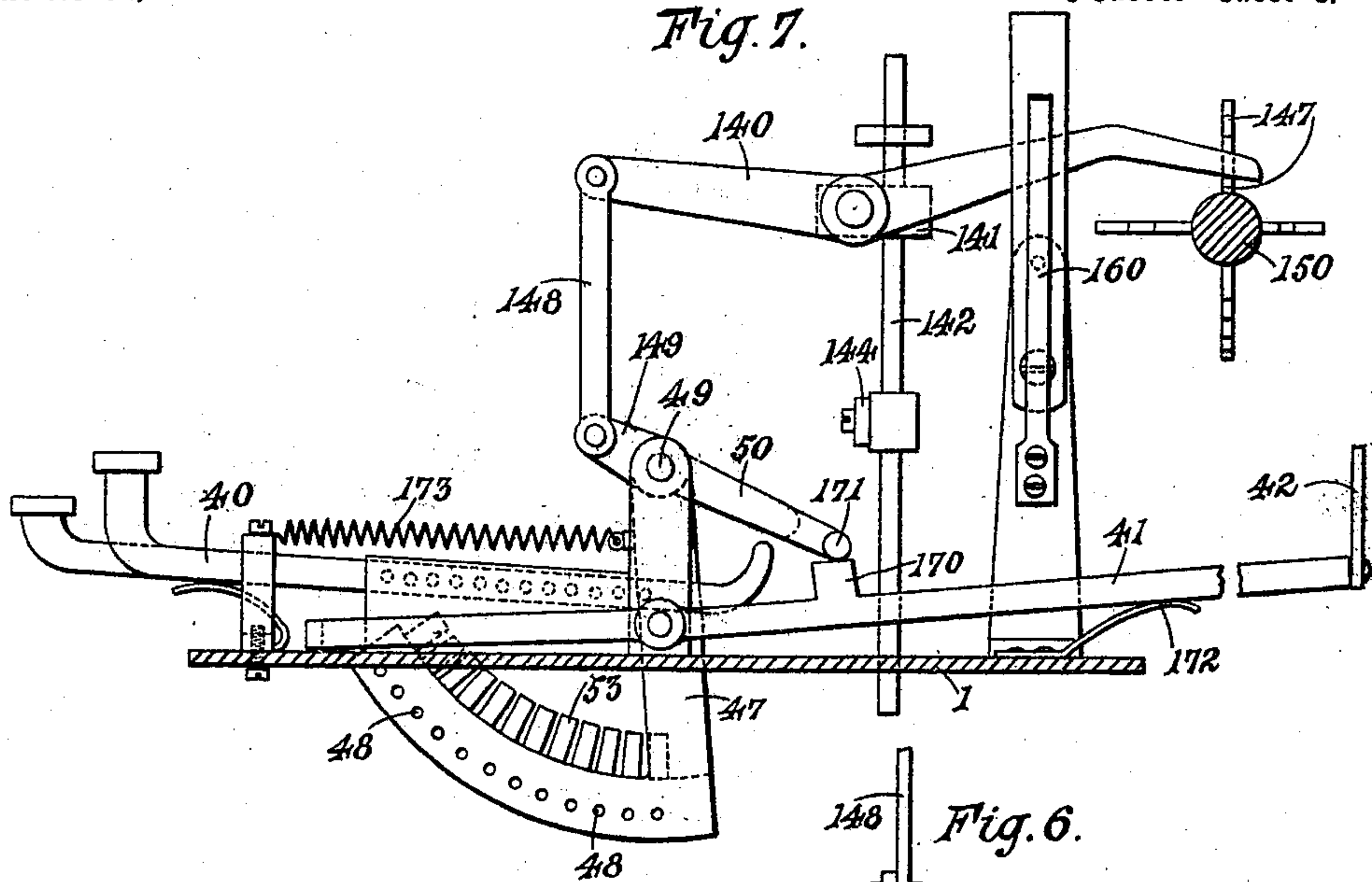


Fig. 6.

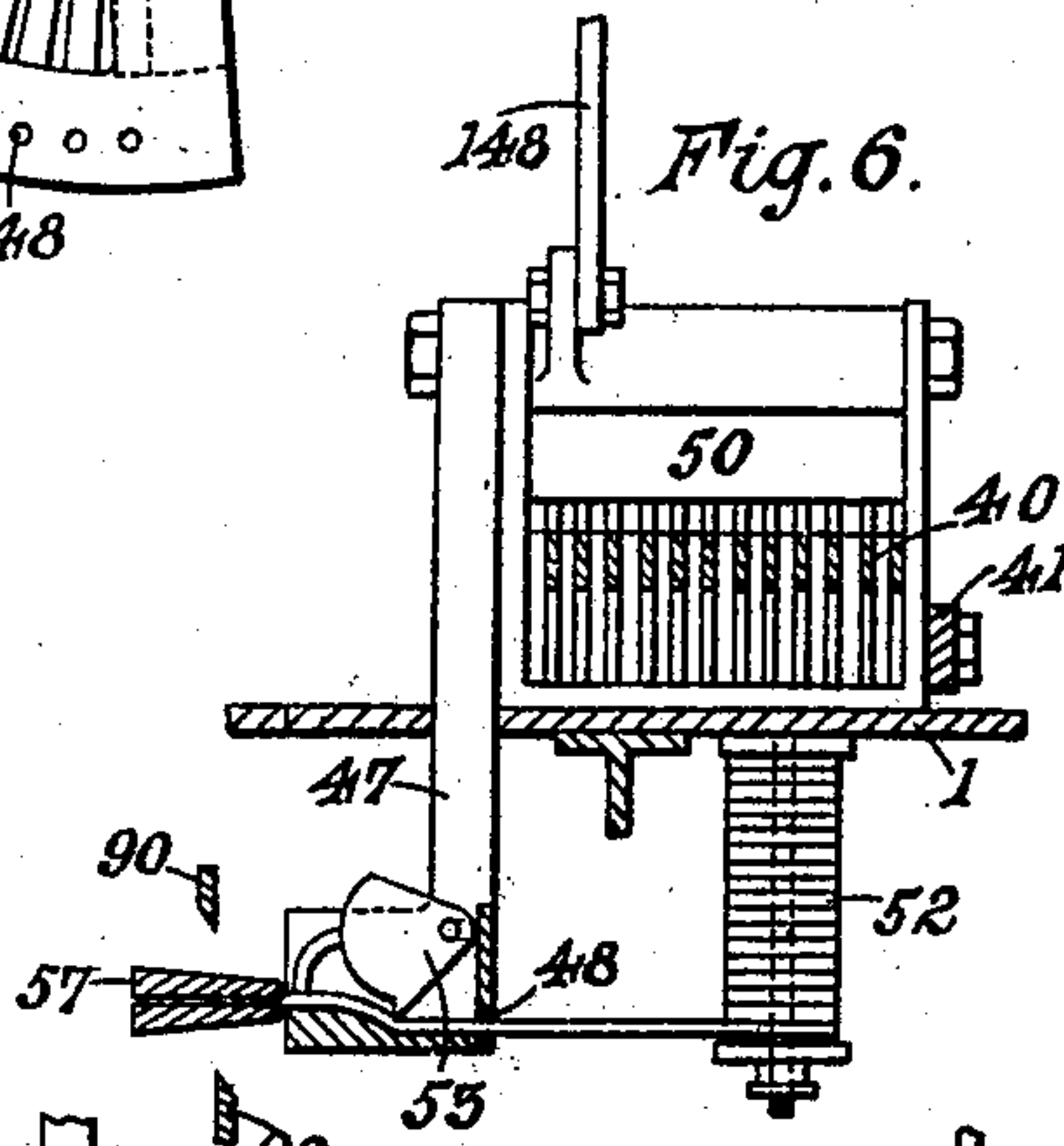


Fig. 16.

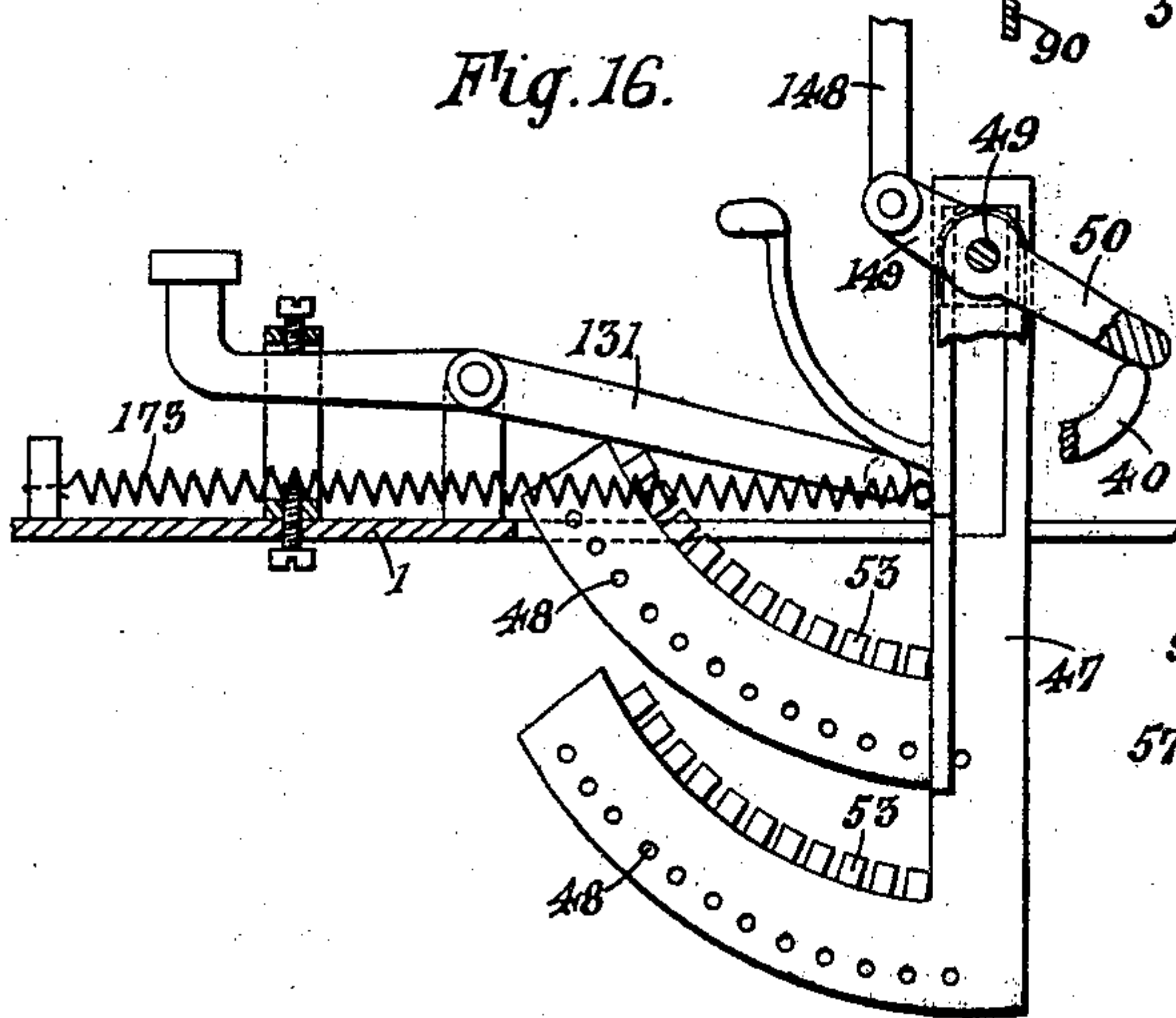
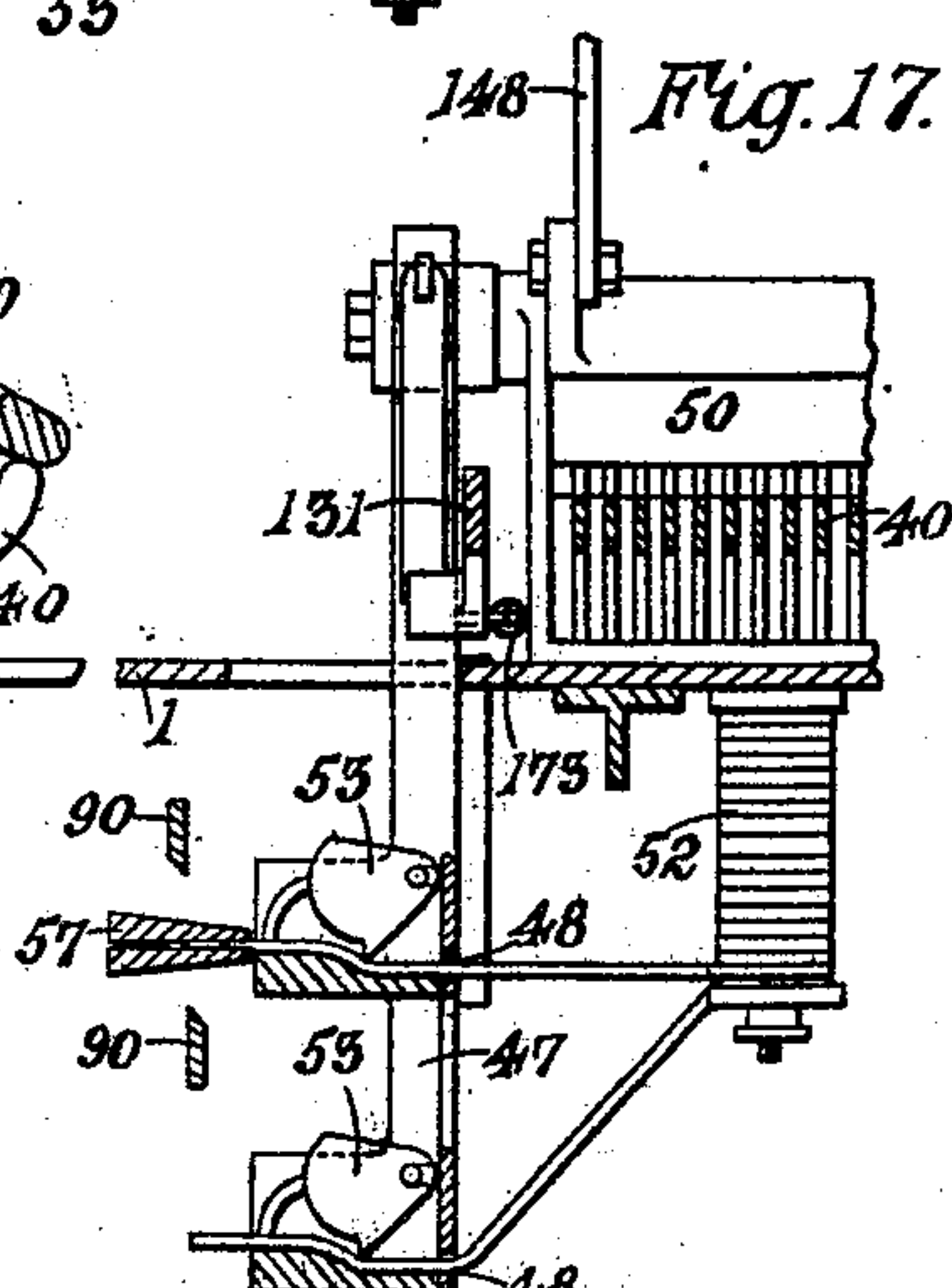


Fig. 17.



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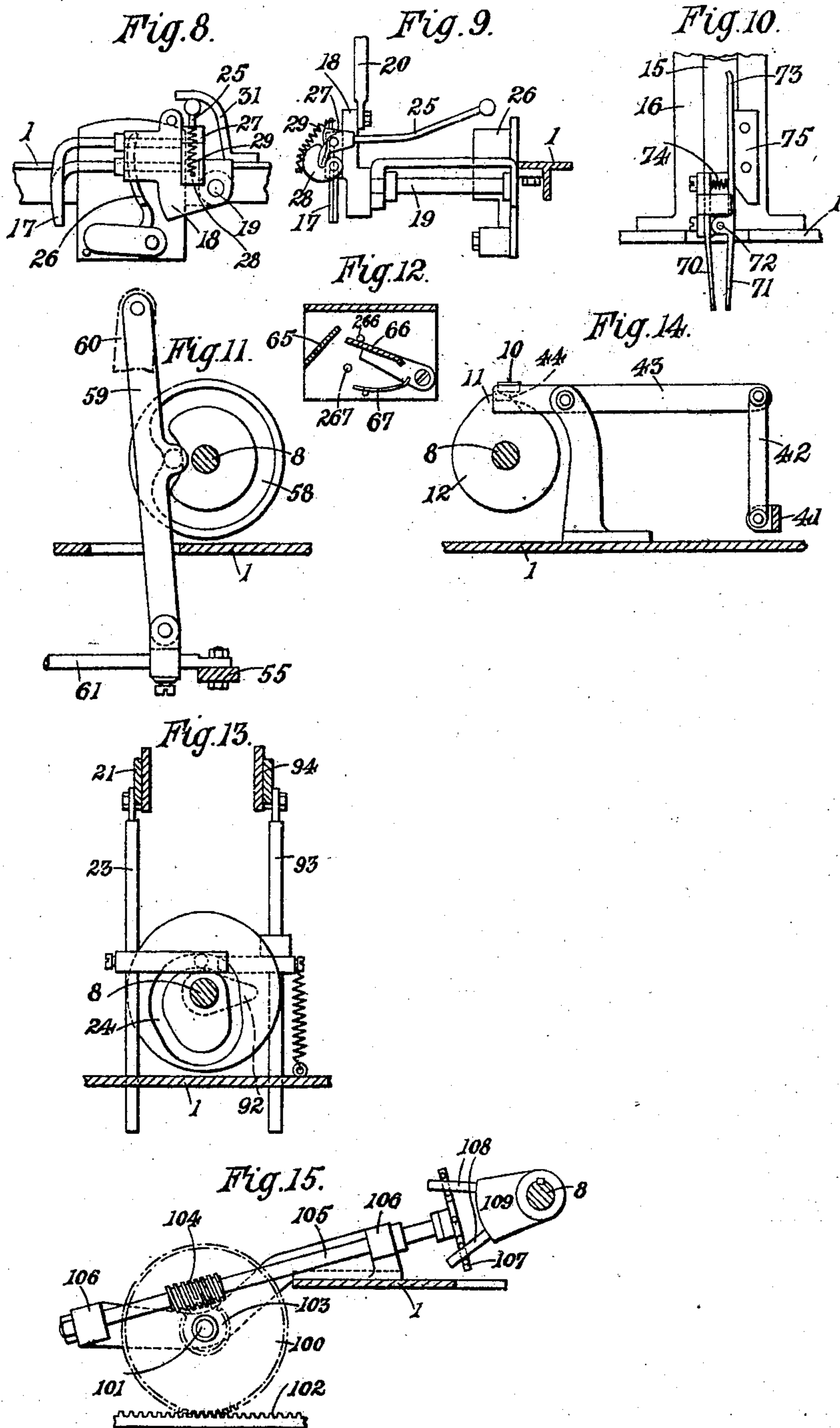
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LOOM FOR WEAVING TUFTED FABRICS.

(Application filed Mar. 26, 1901.)

(No Model.)

6 Sheets—Sheet 6.



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UNITED STATES PATENT OFFICE.

CHARLES HUGHES, OF LONDON, ENGLAND.

LOOM FOR WEAVING TUFTED FABRICS.

SPECIFICATION forming part of Letters Patent No. 682,548, dated September 10, 1901.

Application filed March 26, 1901. Serial No. 52,997. (No model.)

To all whom it may concern:

Be it known that I, CHARLES HUGHES, a subject of the King of Great Britain, residing at London, England; have invented certain new and useful Improvements in Looms for Weaving Tufted Fabrics, of which the following is a specification.

This invention relates to looms for weaving Turkey carpets and like tufted fabrics.

Heretofore a method of manufacturing Turkey carpets has been employed wherein the yarn of the desired colors for forming the successive tufts or knots is fed from bobbins and laid across the threads of the ground chain or warp, and after a piece of yarn of the required length has been cut off the ends of the said piece are pushed through the warp, so as to inclose two or more of the threads thereof, and the said ends are then brought together beneath the warp and drawn up between the said threads, thus forming the knot. The different-colored yarns from the various bobbins are passed through a slide, which is adjusted as required after the formation of each knot for the purpose of properly selecting the yarn of the right color for the next knot, as may be demanded by the pattern. By the present invention the same object is accomplished by novel mechanism, which enables a much larger number of different-colored yarns to be used for producing the pattern. The colors are selected by means of a keyboard controlled by the operator, a clutch mechanism being provided to control the starting and stopping of the feeding and knotting mechanisms and to prevent said mechanisms from working otherwise than in conjunction with the keyboard. The keyboard aforesaid in one arrangement has a key appropriated to each color of yarn used for the tufts or knots and so arranged that the depression of a key operates to select the color of yarn corresponding to that key and brings the same into the position where a length can be drawn out and cut off. The depression of the key also starts the mechanism for cutting off a piece of said yarn and knotting the same into the warp. So long as the key is kept depressed a knot is formed for each revolution of the driving-shaft of the knotting mechanism, and as soon as the key is released the knotting mechanism is automatically stopped.

In another arrangement each key is arranged to control two or more colors. The said improved apparatus enables the loom to work at a greater speed than heretofore, as the changes can be made from one color to another much more rapidly than is the case with the apparatus heretofore employed, and the feeding and knotting mechanisms work more quickly, besides which there is greater ease in working, the operator being able to start and stop and select the proper colors by a single operation of one hand, while leaving the other free.

The invention is illustrated by way of example in the accompanying drawings, wherein—

Figure 1 is a sectional side elevation of the improved apparatus. Fig. 2 is a plan of the same, and Fig. 3 is an under side view of a portion of the apparatus. Fig. 4 is a diagrammatic view showing how the machine is raised to allow of a pick being taken. Fig. 5 is a view of the knotting mechanism, showing the knot partially formed. Figs. 6 and 7 are detail views of the apparatus for selecting the yarns to be used in the knot. Figs. 8 and 9 are detail views in side and rear elevation, respectively, of the knotting-tweezers. Fig. 10 is a front view of the plates for passing the yarns downward through the warp. Fig. 11 is a detail view of the cam and levers for operating the feeding-gripper. Fig. 12 is a detail view of the means for controlling said feeding-gripper. Fig. 13 is a detail of the cams and rods for operating the shears and knotting-tweezers. Fig. 14 is a detail view of the catch and connected parts for stopping and starting the feeding and knotting mechanisms. Fig. 15 is a detail view of the gear for feeding the machine intermittently across the loom. Figs. 16 and 17 are details of a modified form of apparatus for selecting the yarns, and Fig. 18 illustrates a further modified form of segment-wheel hereinafter described.

Like figures of reference denote corresponding parts in the several views.

In carrying out the present invention I provide a frame 1, Fig. 1, supported by rollers 2 2, running on rails 3 3 and arranged to be traversed, after the formation of each knot, a short distance across the loom just above the level of the ground chain or warp 4 by

means hereinafter described. In such movement the frame 1 also slides on rods 6 6, carried by another frame 7, for a purpose that will presently appear. In the frame 1 is mounted a horizontal shaft 8, hereinafter referred to as the "driving-shaft," running parallel with the direction of the warp-threads and serving to convey motion to the various mechanisms which perform the operations of feeding and knotting. On the said shaft is loosely mounted a driving-pulley 9, which is continuously rotated, preferably by a rope, as shown. Said rope takes a complete turn around the pulley 9 and passes over pulleys arranged one at each side of the loom, one of which is the driver. The pulley 9 drives the shaft 8, preferably by means of a spring-controlled catch 10, hinged to the pulley and engaging with a tooth 11, Figs. 1 and 14, of a disk 12, fixed on the shaft 8. Said catch is thrown out of action by a trip-lever, hereinafter described, when the feeding and knotting mechanisms are required to stop.

At the front end of the driving-shaft 8 is an ordinary crank or a crank-disk 13, to which is connected a rod 14 for communicating motion to a vertical bar 15, Figs. 1 and 2, which slides up and down in a guide 16. The lower end of this sliding bar 15 carries a pair of thin plates 70 71, Figs. 1 and 10, whose function is to convey the two ends of the piece of yarn which is to form the knot down through the ground-warp on the outside of two adjacent ground-threads ready to be pulled up between the said two threads by the knotting-tweezers 17, which are arranged just in front of the aforesaid sliding bar 15. The plate 70 is rigidly fixed to the bar 15; but the other plate 71 is pivoted at 72, Fig. 10, and has an upward extension or arm 73, which is pressed by a spring 74 against a stationary stop 75, having an inclined face at its lower end. As the bar 15 completes its downward movement the arm 73 slides down the inclined face of the stop 75, whereupon the spring 74 operates to close the plate 71, and so brings the ends of the yarns together beneath the warp. The bar 15 also controls a pair of nippers 76 77, Figs. 1 and 5, carried by a rod 78, which can slide in guides 79, 179, and 81. The guides 79 and 81 are fixed to the sliding bar 15, while the guide 179 is fixed to the stationary guide 16 of the sliding bar 15. At the lower end of the rod 78 is a block 80, which rests upon the guide 81 during such time as the plates 70 and 71 are above the ground-threads and is pressed thereon by a spring 82, compressed between block 80 and the guide 179. When the bar 15 descends, the nippers 76 77 descend with it until a collar 83 on the rod 78 rests upon the stationary guide 179, whereupon the further downward movement of the bar 15 is continued without the nippers, the lower ends of which remain just above the level of the warp-threads. The nipper-jaw 77 is pivoted at 84, and said jaw has an upward extension

85, which is pressed against a stationary incline 86 by a spring 87. Said incline 86 is shaped to allow the jaw 77 to close and nip the yarn directly the same has been drawn across the warp, as hereinafter described, and the yarn is held by the nippers 76 and 77 while the required length of yarn for making the knot is cut off, and the ends are pushed down through the warp ready to be seized by the tweezers 17, Figs. 1, 5, 8, and 9. The spring 87 is so adjusted that the jaw 77 exerts just sufficient pressure to control the piece of yarn until the ends of the yarn are gripped by said tweezers, and in the upward movement of the tweezers the yarn is pulled out from nippers 76 and 77. The tweezers 17 are carried by a plate 18, which is pivoted at 19 and connected by a link 20 to one end of a lever 21, pivoted at 22. The other end of said lever 21 is connected by a link 23 to a cam 24, Figs. 1, 5, and 13, fixed on the shaft 8, and is actuated by said cam in such a manner as to cause the tweezers to oscillate about their pivot 19. The jaws of the tweezers are mounted with a capability of turning in the plate 18, so that they can open and close. The opening of the tweezer-jaws after the same have passed through the warp is effected by an arm or lever 25, Figs. 1, 8, and 9, which is attached to the stem of one of the jaws and which in the downward movement of the tweezers meets a pivoted inclined plane 26, Figs. 8 and 9, and in sliding over same is thereby moved laterally. The jaws are further controlled by short arms 27 28, Fig. 9, working together, so that when the jaw connected to the arm 25 is turned about its pivot the arm 27 of said jaw presses against the arm 28 of the other jaw, and so turns the second jaw in unison with the first. A spring 29 tends to close the jaws. The descent of the tweezers takes place simultaneously with the descent of the plates 70 71, aforesaid, and immediately they reach their lowest position the actuating arm 25 escapes past the end of the incline 26, thereby releasing the jaws, which are then closed suddenly by the spring 29. In closing, the jaws, as shown in Fig. 5, seize the ends of the piece of yarn which have been conveyed through the warp and drawn together by the plates 70 71, as above described. The tweezers then begin their upward movement and in so doing draw the ends of the yarn up through the warp, and thus form the knot. A fixed incline 31, Fig. 8, operating upon the arm 25, causes the jaws to open as they complete their upward movement, thereby releasing the ends of the yarn. The pivoted incline 26 moves out of the way of the tweezer-arm 25 during the return movement of said arm.

The starting and stopping of the driving-shaft 8 and the selection of the colors to be employed in forming the pattern are controlled by a keyboard containing a number of key-levers 40, Figs. 1 and 2, somewhat similar to those of a type-writer, each key-lever

being appropriated to its own special colored yarn, the color of which may be indicated on the key. The depression of any one of the keys brings to the operative position the particular yarn appropriated to that key, and also at the same time starts the feeding and knotting mechanisms by allowing the catch 10 to engage with the tooth 11 of the disk 12. For this purpose a pivoted lever 41, Fig. 2, is provided, the front end of which projects underneath the key-levers 40 and the rear end of which is connected by a link 42, Fig. 14, to one end of a pivoted lever 43, the other end of which is furnished with an inclined surface 44. At each revolution of the pulley 9 the catch 10, Figs. 1, 2, and 14, rides up said inclined surface 44 and is thereby raised and prevented from engaging with the tooth 11 of the disk 12; but should any of the key-levers 40 be depressed the levers 41 and 43 will be thereby tilted, thus depressing the inclined surface 44 below the path of the catch 10, whereupon said catch 10, not being raised, will engage with the tooth 11 of the disk 12, and so rotate said disk and start the feeding and knotting mechanisms, the clutch remaining engaged so long as the key is depressed. If the key indicating red, for example, is depressed, the red yarn will be brought into the operative position, the feeding and knotting mechanisms will be started, the yarn will be drawn across the warp-threads, a portion will be cut off, and this portion will be knotted in the manner above described, the operations being repeated for every revolution of the driving-shaft so long as the key remains depressed, but stopping as soon as the key is released.

The device for placing the various-colored yarns in position as required comprises a segment-wheel 47, Figs. 6 and 7, having perforations 48 in it, through which the various yarns are threaded. The axis 49 of the said segment-wheel is arranged at right angles to the warp-threads, and the said wheel is arranged so that its weight tends to return it to its initial position when moved therefrom or it is returned by a spring 173. To the axis 49 of the segment-wheel 47 is fixed a wide arm 50, against the under side of which the tail ends of all the key-levers 40 bear. When one of the keys is depressed, the tail end of the key-lever presses against the arm 50 and operates to turn the segment-wheel through a suitable angle. The key-levers 40 are so pivoted (for example, at varying distances from the axis of the segment-wheel or from the arm 50) that the different levers when depressed operate to turn the segment-wheel by different amounts, and thus bring different yarns to the operative position. The bobbins 52, Fig. 6, containing the different-colored yarns, are carried by the frame 1, as shown in Fig. 6, or in any other suitable position, and the same may be furnished with brakes to prevent them from turning too freely. A cam-like pivoted catch 53, Fig. 6, is provided

to prevent the backward movement of each yarn through the segment-wheel after the same has been drawn forward. The catch 70 allows the yarn to be drawn forward freely; but should any backward pull be exerted on the yarn the catch will nip the yarn against the wheel, as indicated in Fig. 6, and resist such backward pull. For drawing the yarn 75 forward a pair of grippers is provided, consisting of an arm 55, Figs. 1 and 3, pivoted at 56, and a jaw 57 pivoted on said arm. The arm 55 is oscillated just above the warp by a cam 58, Figs. 1 and 11, on the driving-shaft 8, operating through a lever 59, pivoted to a bracket 60 and coupled at its lower end to a rod 61, which is connected to the arm 55. The grippers at the proper time seize the protruding end of that yarn which by the movement of the segment-wheel has been brought to the operative position and draws the same across the warp-threads, after which a pair of shears or a knife operates to cut off a portion of such yarn. The jaws of the grippers 85 are controlled by the device shown in Fig. 12, which comprises a fixed incline 65 and a pivoted incline 66, normally kept up against a stop-pin 266 by a spring 67. A stop-pin 267 regulates the distance that the incline 66 can be depressed. The jaw 57 (which is normally kept closed by the spring 64, Fig. 1) of the gripper is opened during the forward movement of the arm 55 by the tail end 63 of said jaw passing underneath the pivoted incline 100 66. Directly the arm 55 reaches the end of its forward movement the tail end 63 is forced upward by the spring 64 past the end of the pivoted incline 66, thus closing the jaws of the gripper upon the protruding yarn already 105 brought into position by the depression of one of the keys. As the arm 55 moves backward the tail end 63 passes along the top side of the pivoted incline 66, depressing same upon the stop-pin 267, the amount of such 110 depression being regulated so as to cause the jaw 57 to be tightly closed upon the yarn which it is drawing across the ground-threads from the segmental wheel 47. As the arm 55 reaches the end of its backward movement 115 the tail end 63 engages with the fixed incline 65 and opens the jaw 57 against the pressure of the spring 64, thus releasing the yarn directly it has been gripped by grippers 76 and 77. The operations are then repeated. 120

The shears 90, Figs. 1 and 3, for cutting off the length of yarn are pivoted at 91 and are actuated by a cam 92, Fig. 13, on the shaft 8 operating through a rod 93, lever 94, and link 95. The rear ends of the shear-blades are 125 coupled by links 96 97, connected to said rear ends of the blades and to opposite ends of a lever 98, pivoted at 99, so that the blades will work in harmony.

The means for moving the frame 1 laterally across the warp through a short distance after the formation of each knot comprises a toothed wheel 100, Figs. 2 and 15, mounted on a spindle 101, carried by the 130

frame 1 and gearing with a rack 102, fixed in the frame 7, Fig. 1. On the said spindle 101 is fixed a worm-wheel 103, with which is geared a worm 104, fixed on a shaft 105, rotatable in bearings 106 in the frame 1. On the end of the shaft 105 is a star-wheel 107, which is turned intermittently by pins 108, projecting from a boss 109 on the driving-shaft 8. The frame 1 is thus moved after the formation of each knot a suitable distance across the warp and a fresh knot is made, the operations being repeated until a row of knots has been completed all across the width of the fabric. When a row of knots is completed, the whole apparatus is raised to allow of a pick being made by the shuttle of the loom in the usual manner. For this purpose the frame 7 may be arranged to travel up and down guides 110, Fig. 4, and be balanced by weights 111, attached to cords 112, passing over guide-pulleys 113. The rods 6 extend the full width of the loom, and the frame 1 can thus travel across the loom on said rods and be raised at any desired time to allow of a pick being taken. The next row of knots is to save time made in the reverse order, for which purpose the worm-shaft 105 must turn in the reverse direction. This may be effected by shifting the boss 109 by hand along the shaft 8 to cause the pins 108 to act on the other side of the star-wheel 107, or the said boss may be shifted automatically as follows—that is to say, the boss may have an annular groove 115, Figs. 1 and 2, in its periphery, with which groove is engaged a pin 116, fixed in an arm 117, carried by a pin 118. To another short arm 119, Figs. 1, 2, and 3, on said pin is coupled a lever 120, pivoted at 121. When the frame reaches the end of its travel, a pin 122 on the lever 120 presses against a fixed stop on the loom and the lever is turned through a suitable angle, thereby sliding the boss 109 along the shaft and reversing the movement of the frame when the key-levers are next depressed.

Figs. 6 and 7 illustrate a segmental wheel for twelve colors of yarn. The number of colors may be increased, if desired, as follows—that is to say, two or more segmental arcs may be connected together on a common arm, Figs. 16 and 17, which arm is slotted and can be raised and lowered by a change key-lever 131, so as to bring any desired arc into the operative position. Each segmental arc is furnished with its own set of colors, and the common arm is oscillated as above described with reference to Figs. 6 and 7. Instead of a common arm having two or more arcs projecting from it a plate may be employed with two or more rows of holes formed in it at different heights, as shown in Fig. 18, so that by raising or lowering the plate any row of holes can be brought to the operative position. In this construction the same key controls two colors and by providing three or more rows of holes it can be made to control

three or more colors. This construction, moreover, allows of the rows of holes being made very close together.

What I claim is—

1. In a loom for weaving Turkey carpets and similar fabrics, the combination of a perforated oscillatory segment through which the differently-colored yarns to be employed for knotting are threaded, feed mechanism for said yarns, a keyboard having a key appropriated to each perforation of the said segment and serving to control the segment so as by depressing a key the yarn corresponding thereto is brought opposite the feed mechanism, and knotting mechanism for knotting the yarns, substantially as described.

2. In a loom for weaving Turkey carpets and similar fabrics, the combination of a perforated oscillatory segment through which the differently-colored yarns to be employed for knotting are threaded, an arm on said segment, a keyboard comprising a series of pivoted key-levers the tail ends of which bear against the arm aforesaid, means whereby the depression of the different keys turns the segment through different amounts, and feeding and knotting mechanisms, substantially as described.

3. In a loom for weaving Turkey carpets and similar fabrics, the combination of a perforated oscillatory segment through which the differently-colored yarns to be employed for knotting are threaded, an arm on said segment, a keyboard comprising a series of pivoted key-levers the tail ends of which bear against the arm aforesaid, said key-levers being pivoted at different distances from the arm so that the depression of the different keys turns the segment through different amounts, and feeding and knotting mechanisms, substantially as described.

4. In a loom for weaving Turkey carpets and similar fabrics, the combination of a perforated oscillatory segment through which the differently-colored yarns to be employed for knotting are threaded, feed mechanism for said yarns, a keyboard having a key appropriated to each perforation of the said segment and serving to control the segment so as by depressing a key the yarn corresponding thereto is brought opposite the feed mechanism, knotting mechanism for knotting the yarns, a pivoted lever arranged in combination with the key-levers so as to be tilted when a key is depressed, means controlled by the said pivoted lever whereby the feeding and knotting mechanisms are started when a key is depressed and stopped when the key is released, substantially as described.

5. In a loom for weaving Turkey carpets and similar fabrics, the combination with the knotting-carriage of means for traversing said carriage across the warp-threads, said means comprising a stationary rack 102, toothed wheel 100 mounted on the carriage and engaging with said rack, a toothed segment 109 on the driving-shaft actuating a star-wheel

107 which drives the wheel 100, and means for sliding the segment 109 along the driving-shaft to gear with the opposite side of the star-wheel, when a row of knots is completed, substantially as described.

6. In a loom for weaving Turkey carpets and similar fabrics, the combination with the knotting-carriage of means for traversing said carriage across the warp-threads, said means comprising a stationary rack 102, toothed wheel 100 mounted on the carriage and engaging with said rack, a toothed segment 109 on the driving-shaft actuating a star-wheel 107 which drives the wheel 100, a lever 117 having a pin-and-slot connection with the segment 109 and pivoted on a pin 118, an arm 119 on said pin, a lever 120 pivoted at 121 to the carriage, and connected to the arm 119, and a pin 122 on said lever 120 which pin 122 meets a stop on the loom-frame at the end of the traverse and thus slides the segment 109 on the driving-shaft, and reverses the movement of the carriage, substantially as described.

7. In a loom for weaving Turkey carpets and similar fabrics, the combination with the sliding carriage which traverses the warp-threads, of feeding and knotting mechanisms comprising grippers 55, 57, nippers 76, 77, side plates 70, 71 and tweezers 17 whereby the yarn is positively controlled throughout the whole operation of knotting, substantially as described.

8. In a loom for weaving Turkey carpets and similar fabrics, the combination with feeding and knotting mechanisms of shears 90 pivoted at 91 and coupled together by links 96, 97, 98, a driving-shaft, and a cam on said driving-shaft for operating said shears, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES HUGHES.

Witnesses:

GEORGE HARRISON,
HENRY W. LYNDEN.