

(No Model.)

3 Sheets—Sheet 1.

J. C. BROOKS.
SWIVEL LOOM.

No. 471,665.

Patented Mar. 29, 1892.

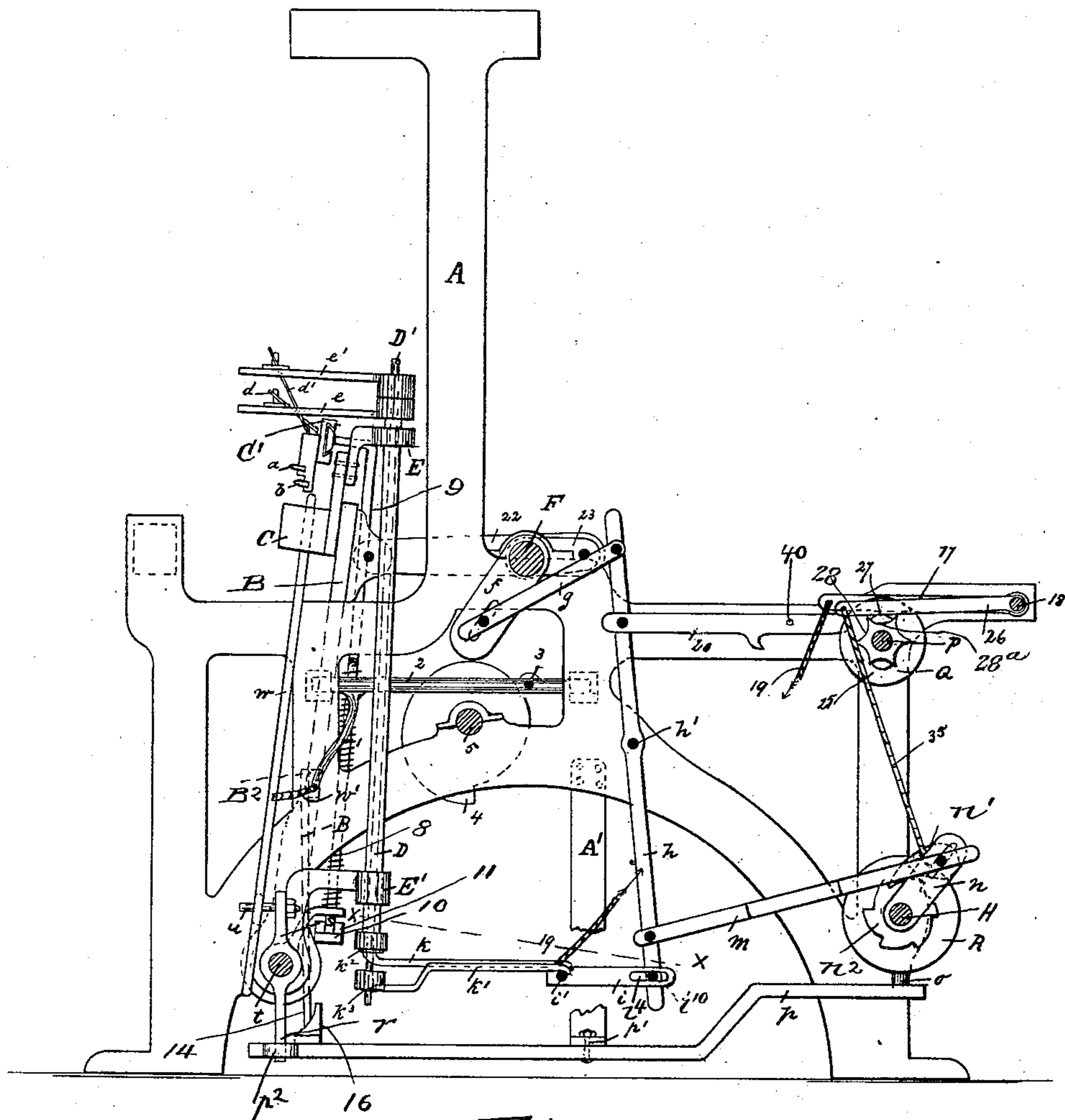


Fig. 1.

WITNESSES:

Wm. D. Mott
E. L. Sherman

INVENTOR:

John C. Brooks

BY *Gartner & Co.*

ATTORNEYS

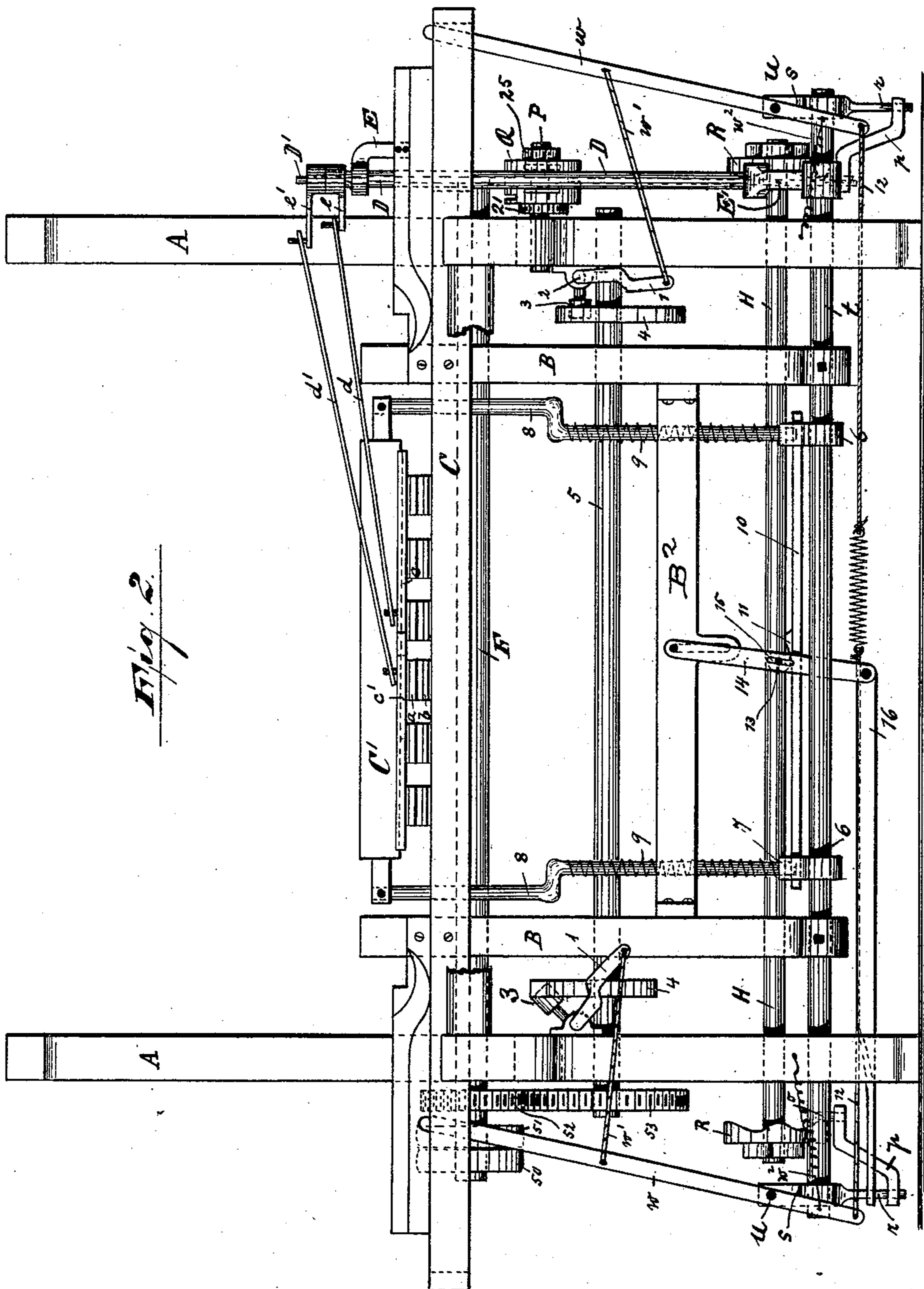
(No Model.)

3 Sheets—Sheet 2.

J. C. BROOKS.
SWIVEL LOOM.

No. 471,665.

Patented Mar. 29, 1892.



WITNESSES:

Wm. D. Zell
Walter Thompson.

INVENTOR :

John C. Brooks
BY
Gartner & Co.
ATTORNEYS

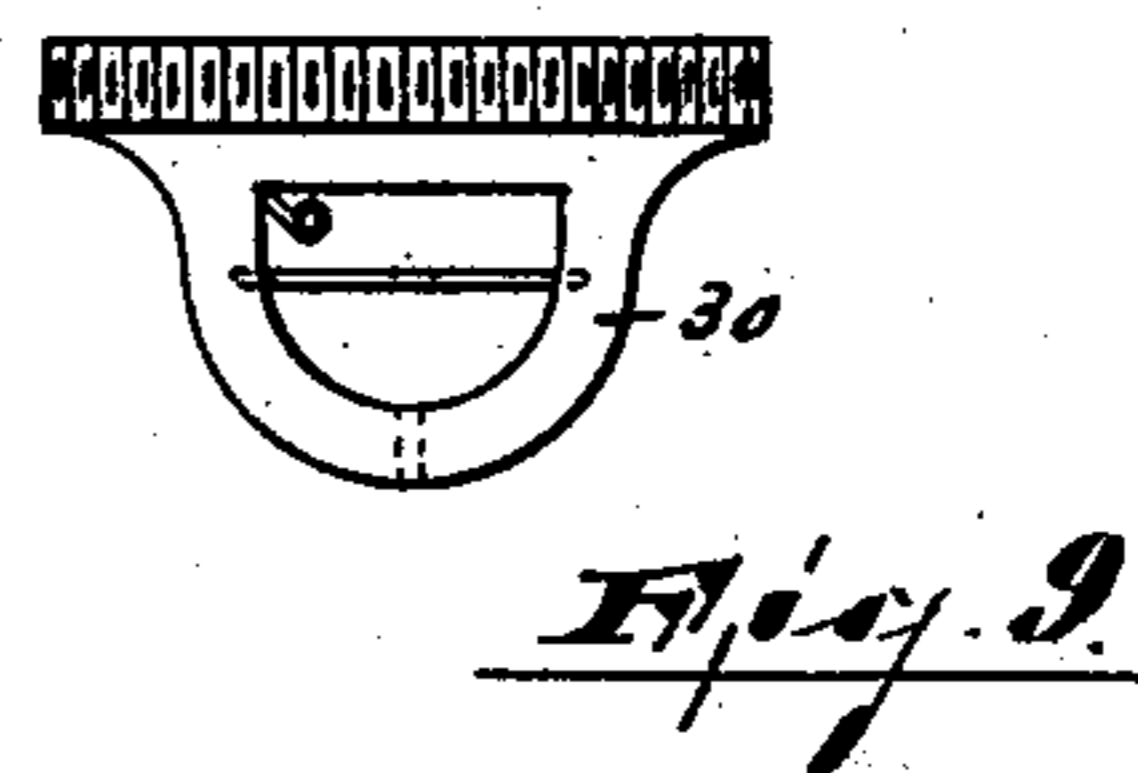
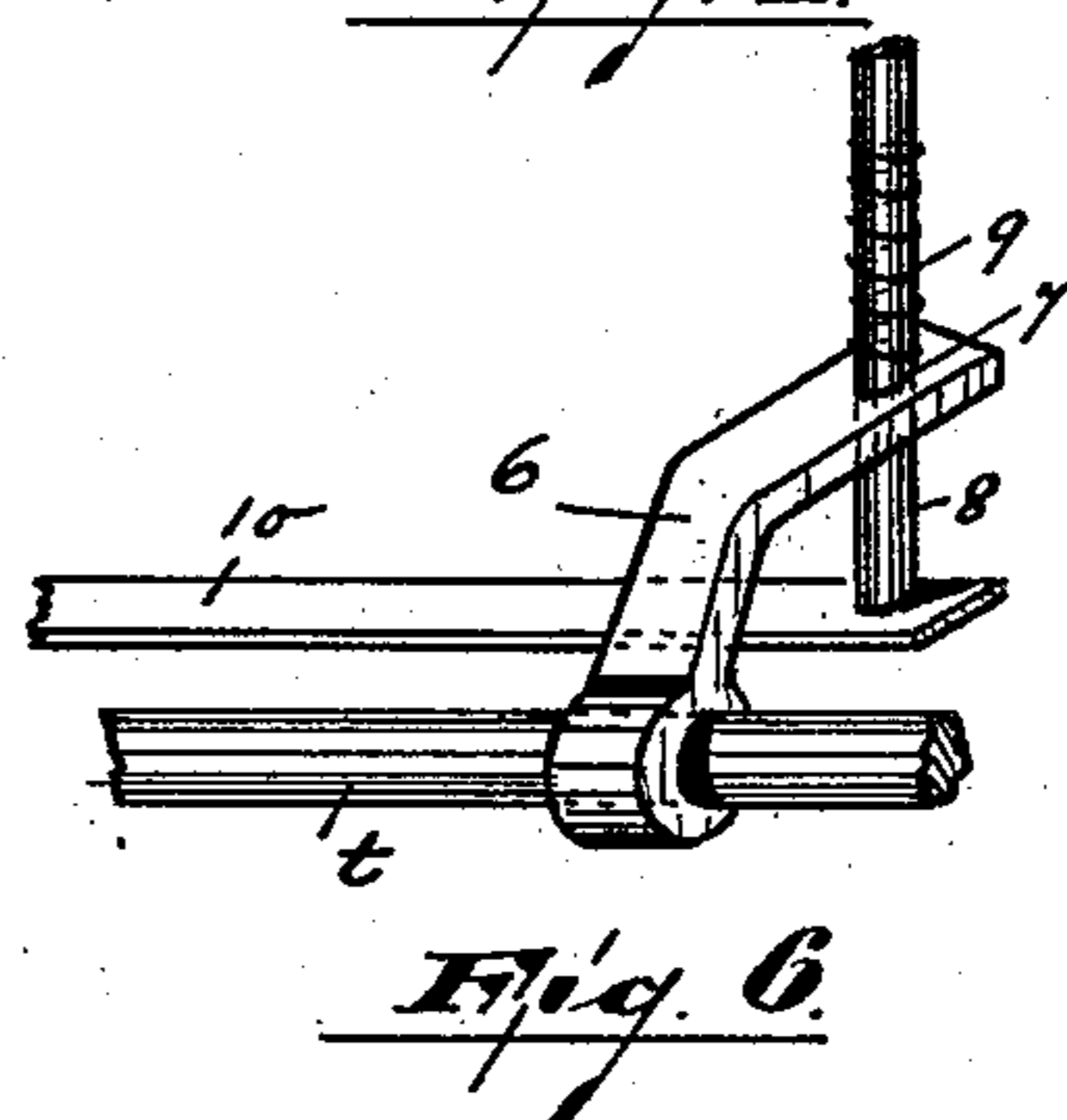
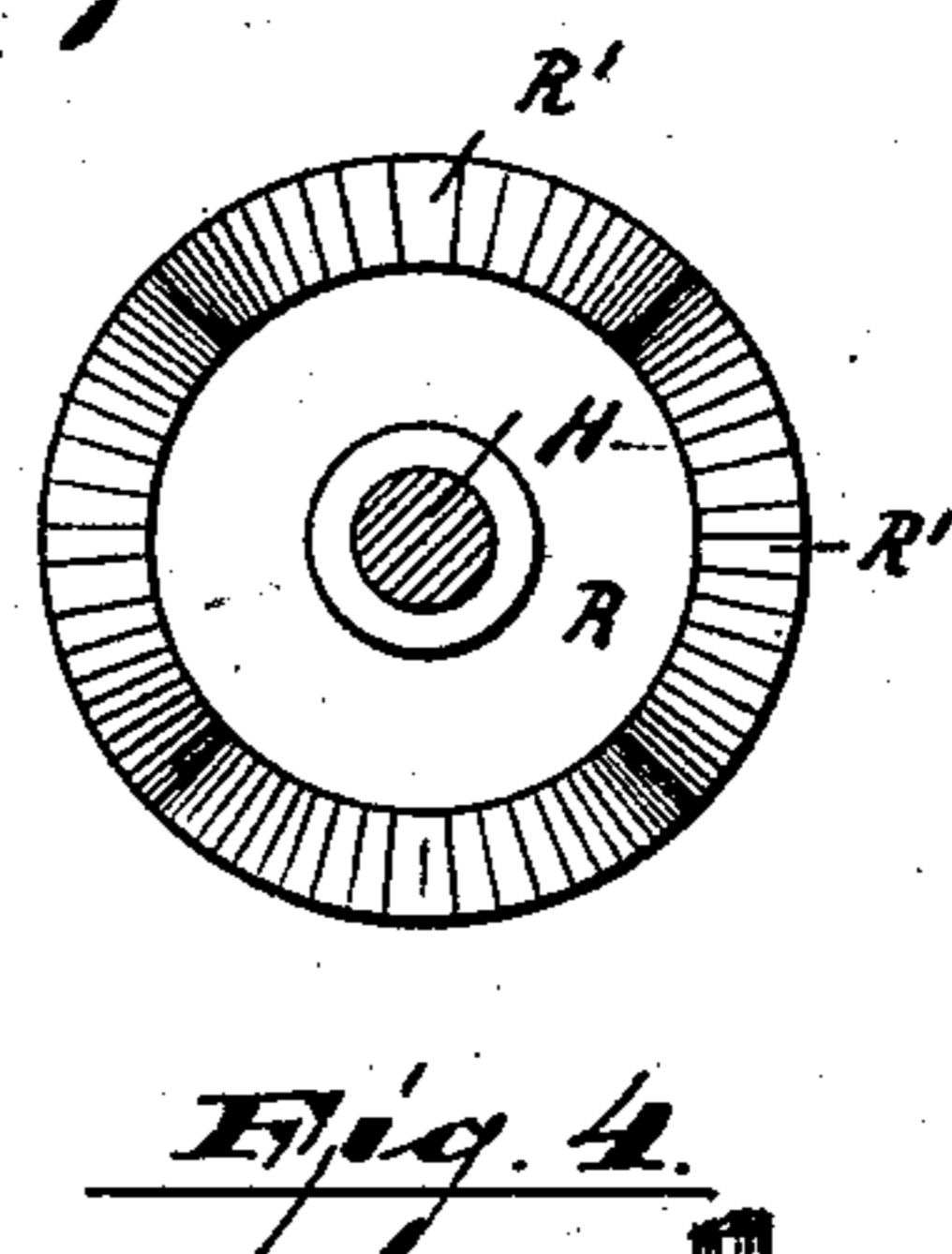
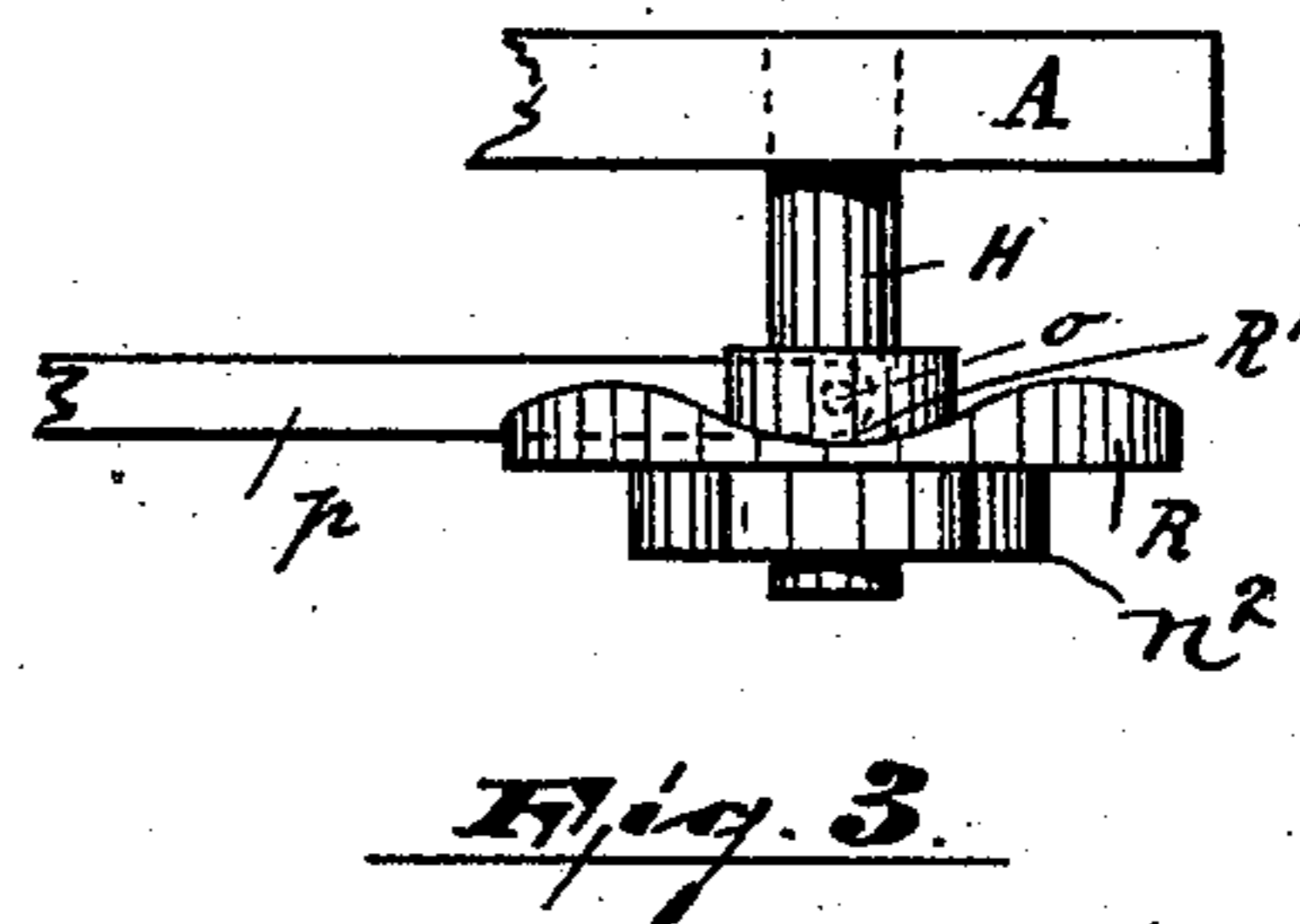
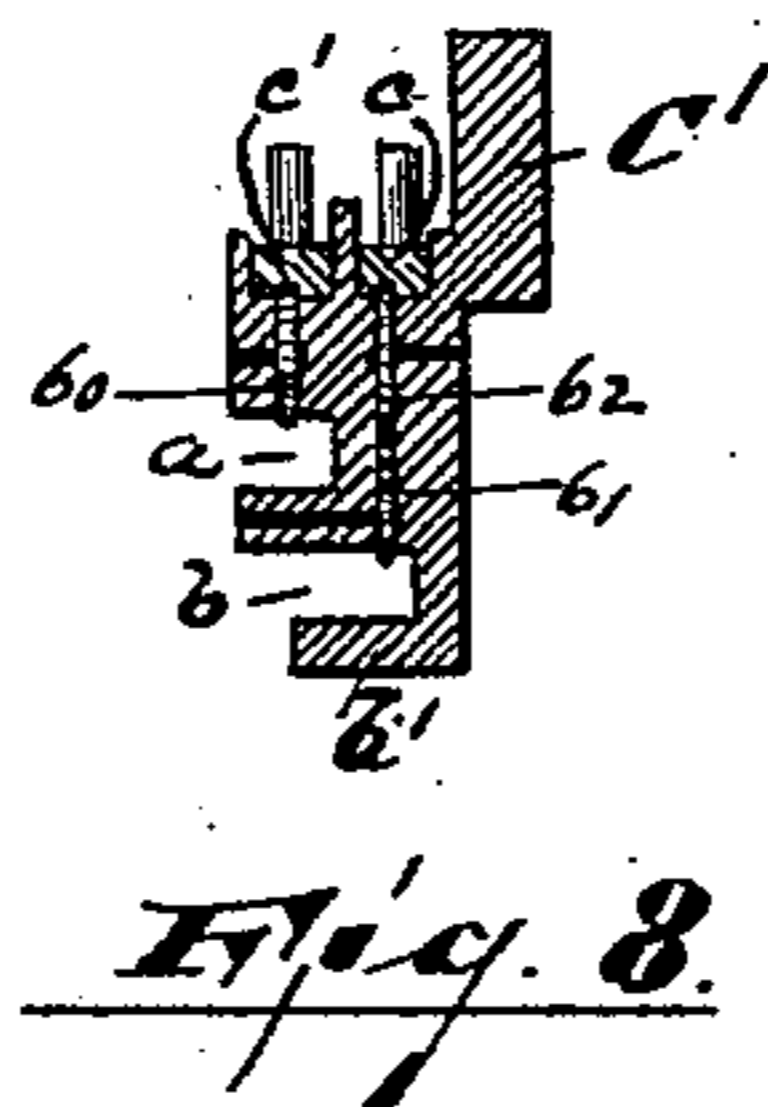
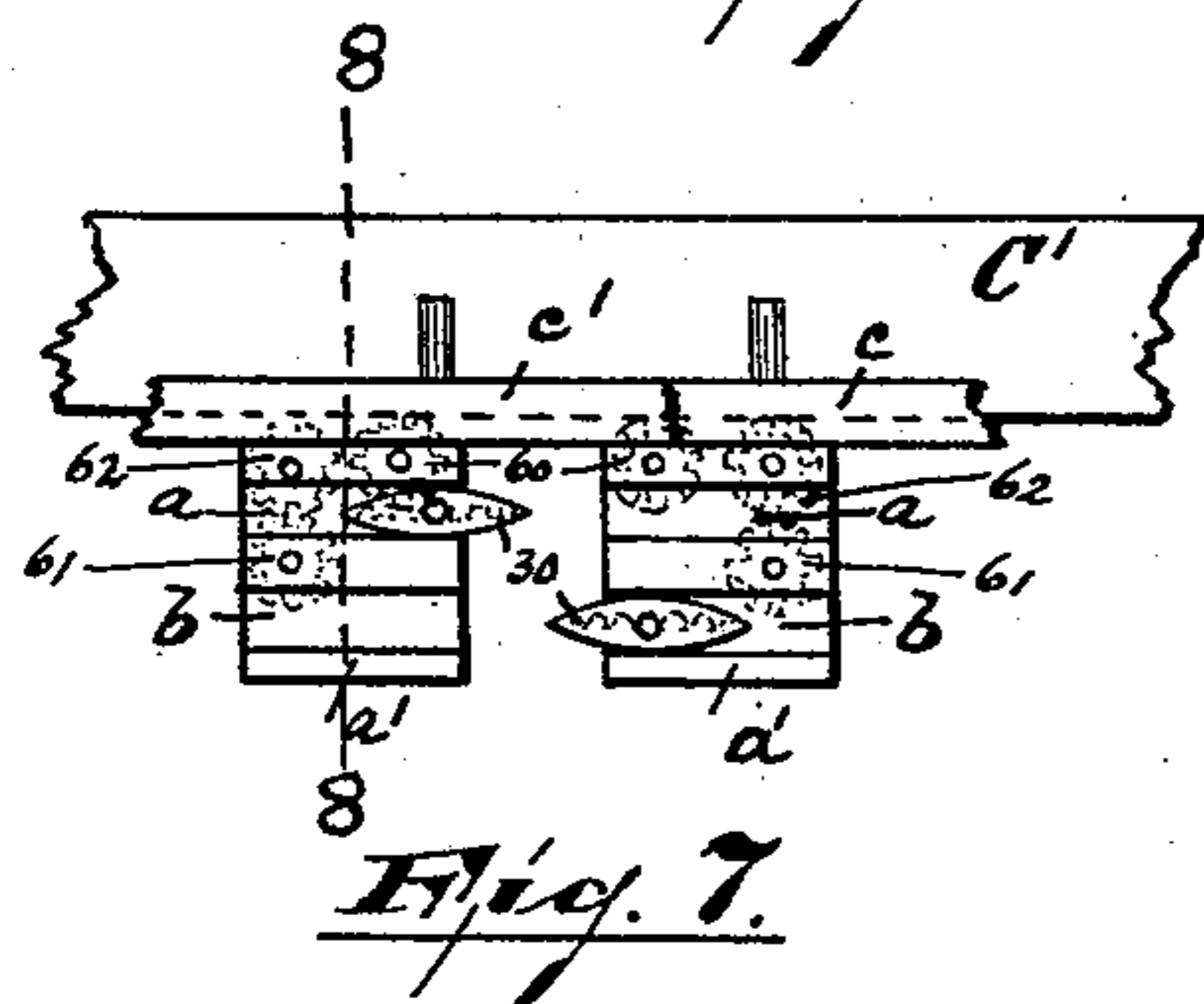
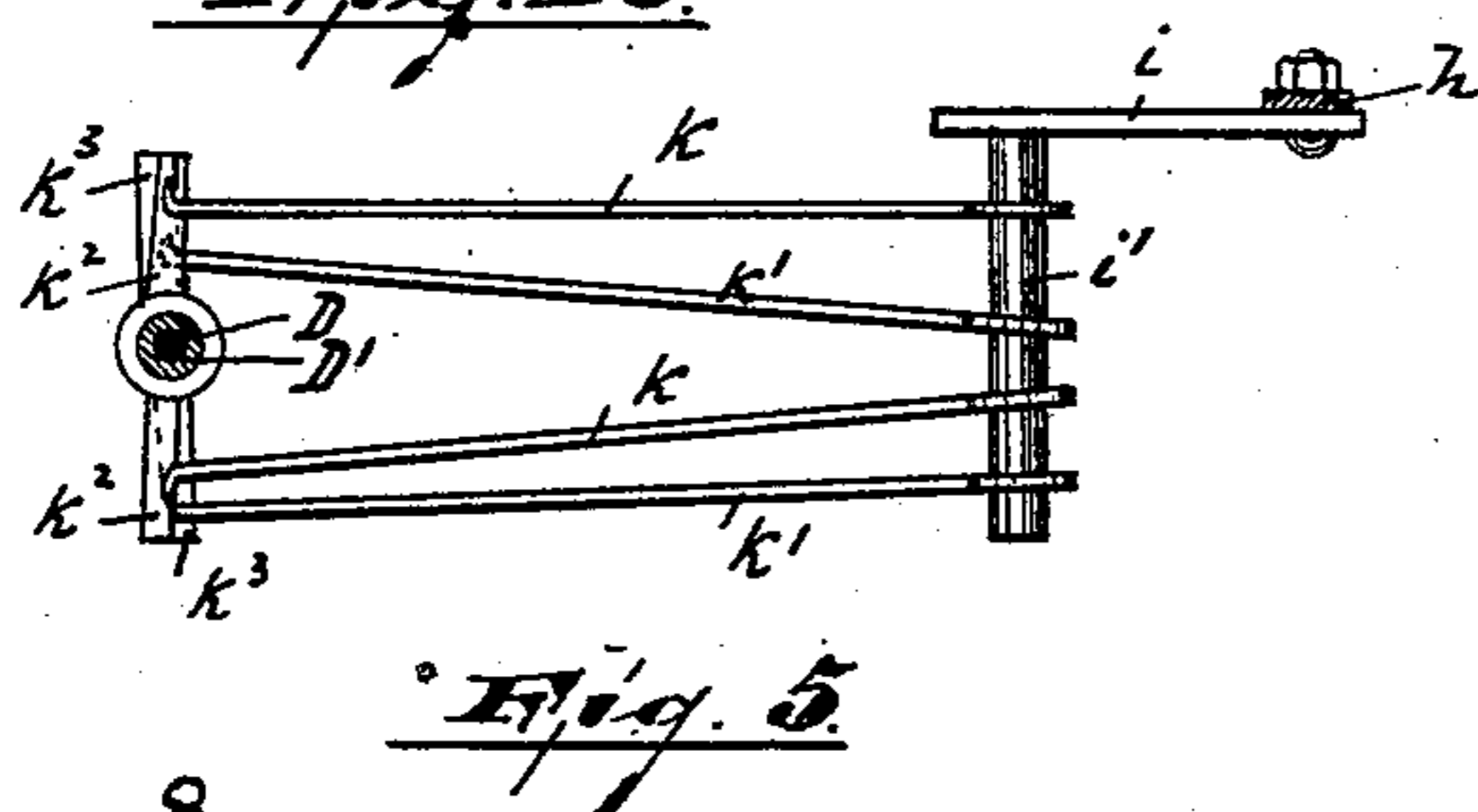
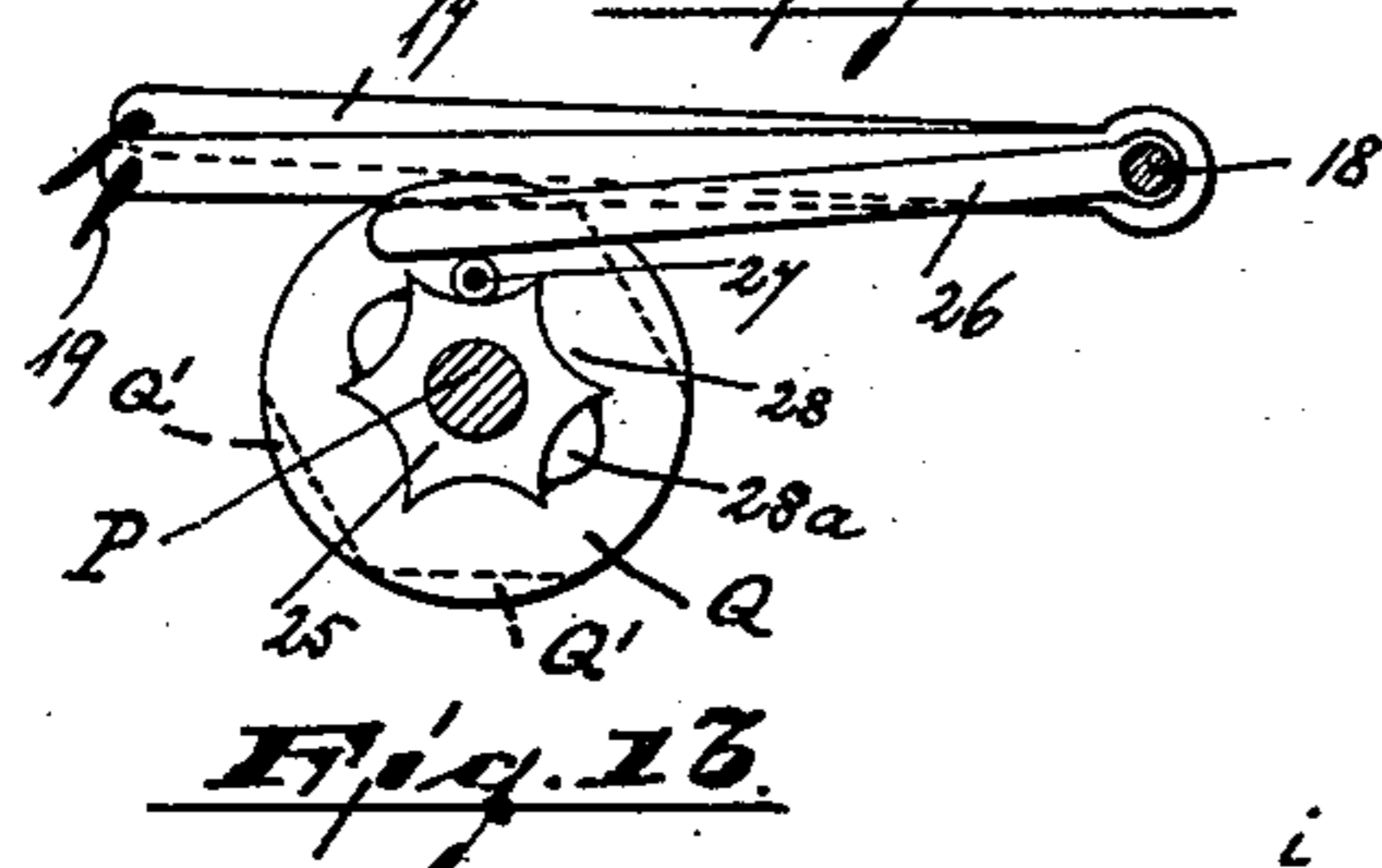
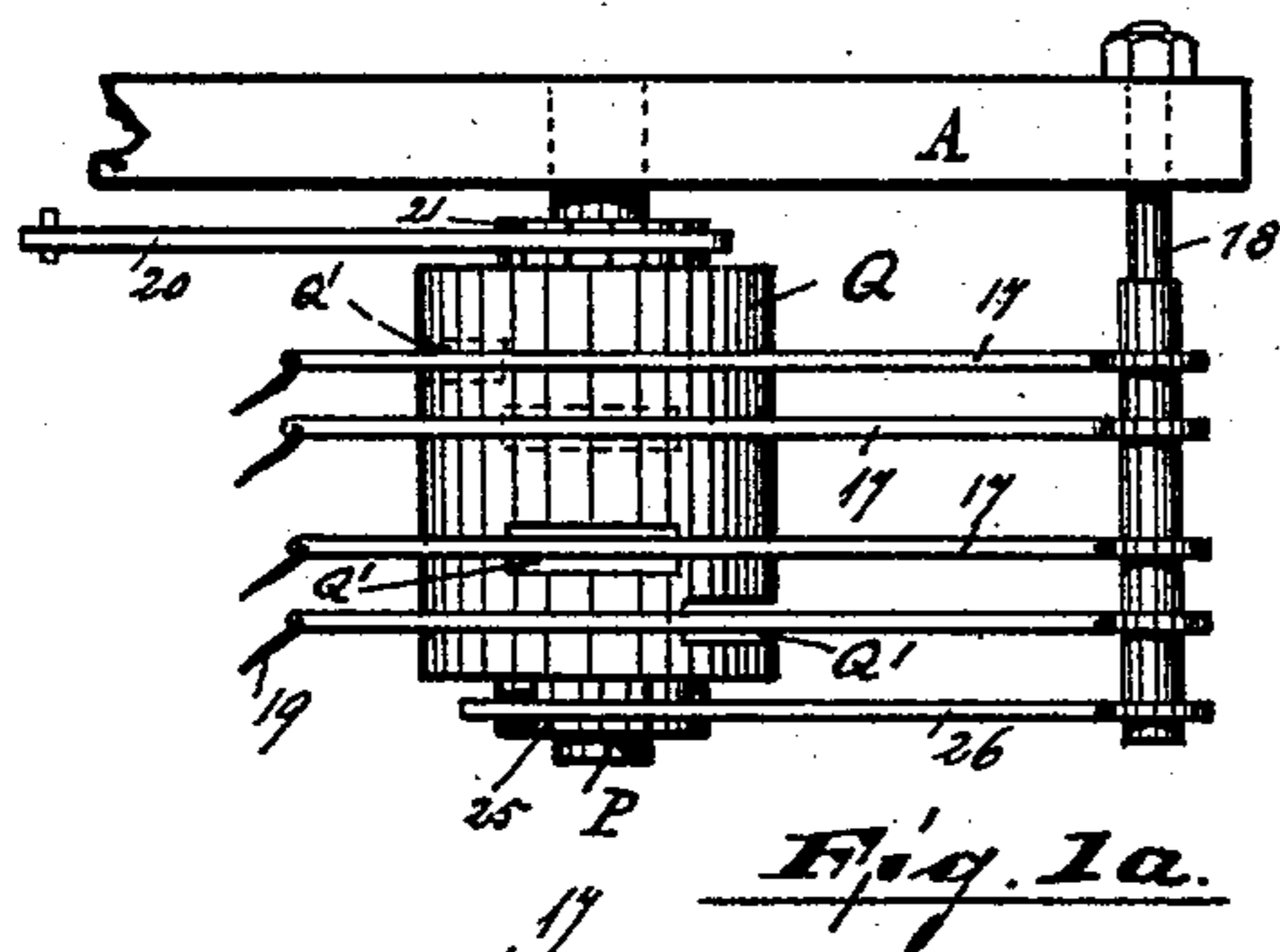
(No Model.)

3 Sheets—Sheet 3.

J. C. BROOKS
SWIVEL LOOM.

No. 471,665.

Patented Mar. 29, 1892.



WITNESSES:

Wm. D. Bell
Walter Thompson.

INVENTOR:

John C. Brooks

BY
Partner & Co.
ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN C. BROOKS, OF PATERSON, NEW JERSEY, ASSIGNOR OF ONE-HALF TO
BENJAMIN EASTWOOD, OF SAME PLACE.

SWIVEL-LOOM.

SPECIFICATION forming part of Letters Patent No. 471,665, dated March 29, 1892.

Application filed November 19, 1890. Serial No. 371,926. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. BROOKS, a citizen of the United States, residing at Paterson, Passaic county, and State of New Jersey, have
5 invented certain new and useful Improvements in Swivel-Looms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it
10 appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The object of this invention is to furnish a
15 double-swivel-shuttle mechanism in a loom adapted to simultaneously weave two colors in the figures of the fabric; also, reliable and simple means for raising and lowering the same, and also to provide means for alternately operating the swivel-shuttles in con-
20 junction with the fly-shuttle.

The invention consists in the novel and peculiar arrangements of mechanism for operating two or more swivel-shuttles alternately in
25 connection with the fly-shuttle mechanism, means for raising and lowering the swivel-shuttle rack and controlling the operation of the fly-shuttle mechanism, and the combination and arrangement of the various parts, as
30 will be hereinafter more fully described, and finally embodied in the claims.

Referring to the accompanying drawings, in which like letters and numerals of reference indicate corresponding parts in each of these
35 several views, Figure 1 is an end view of a loom embodying my improvement. Fig. 2 is a front view thereof, showing the various operating mechanism, the reed and reed-cap being omitted and the breast-beam partly broken
40 away. Figs. 1^a and 1^b are detail views of a mechanism for controlling the swivel-shuttles. Figs. 3 and 4 are detail views of one of the cam-wheels controlling the movements of the picker-sticks and the swivel-shuttle-raising
45 mechanism. Fig. 5 is a sectional view on line *xx* of Fig. 1. Fig. 6 is a detail perspective view showing a portion of the swivel-shuttle-bar-elevating mechanism. Fig. 7 is a detail front elevation of a portion of the swivel-
50 shuttle frame in which the swivel-shuttles work. Fig. 8 is a vertical section on the line

8 8 of Fig. 7, and Fig. 9 is a detail plan view of one of the swivel-shuttles.

In said drawings, A represents the loom-frame.

B B are the lay-swords; C, the lay on which is the shuttle-race, over which the fly-shuttles are thrown by picker-sticks *w*.

C' is the swivel-shuttle-supporting bar carrying the swivel-shuttle boxes *a'*, having parallel grooves *ab*, in which the swivel-shuttles
30 are operated by pinions 60 61 62. These pinions are operated by sliding racks *c c'*, connected by rods *d d'* with crank-arms *e e'*, the arm *e* being rigidly secured to a hollow
65 shuttle-driving rod D and the arm *e'* to the shuttle-driving rod D', which is arranged inside of the tubular driving-rod D.

F is the main driving-shaft, with crank-arm *f* rigidly secured thereto. This crank-arm *f*
70 is pivotally connected by a rod *g* with a vertical lever *h*, fulcrumed at *h'* to the frame A. Upon one end of the driving-shaft are arranged fixed and loose pulleys 50 and 51 and also a fixed gear-wheel 52, meshing into
75 a gear-wheel 53, secured on the cam-shaft 5. This shaft 5 extends across the machine and carries cams 4 4, as shown in Fig. 2.

To the lower end of lever *h* is secured, by means of a bolt *i*¹⁰, an arm *i*, provided with a slot *i*¹¹ for the purpose of changing the throw
80 of the swivel-shuttles. This arm *i* is also provided at its free end with a pin *i'*, which latter operates the hooked arms *k k'*, secured to cross arms *k*² *k*³, attached to swivel-shuttle-
85 driving rods D and D', respectively, as shown in Figs. 1 and 5, and adapted to oscillate said driving-rods in their bearings E E', the upper one being secured to lay C and the lower one being supported on the lay rock-shaft *t*. To
90 the lever *h* is also pivoted a rod *m*, connecting said lever with an arm *n*, pivoted on shaft H and carrying a pawl *n'*, whereby cam-shaft H is rotated intermittently by means of the ratchet-wheel *n*², as shown in Fig. 1. On this
95 cam-shaft H is secured a side cam-wheel R, having four cam depressions R', as shown in Figs. 3 and 4. In contact with said cam is a pin *o*, secured to the rear end of a lever *p*, pivoted at *p'* to a bracket A' on the frame A
100 and adapted to oscillate said lever *p* on its pivot, the other end of this lever *p* being pro-

vided with an elongated slot p^2 , in which works a pin r on the lower end of an oscillating and reciprocating lever s , adapted to slide longitudinally on the lay rock-shaft t . Upon the upper end of the lever s is secured a pin u , upon which is fulcrumed the picker-stick w , extending upward, and its upper end adapted to reciprocate in a vertical slot in the lay C , as shown in Figs. 1 and 2.

Another set of mechanism like that just described is arranged at the other side of the loom, as shown in Fig. 2.

The picker-stick w is operated through a leather-strap connection w' by a crank-arm 1, rigidly secured to a rock-shaft 2. On this shaft 2 is secured a pin, on which revolves a small wheel 3, resting on the outer periphery of cam 4 on shaft 5, as shown in Figs. 1 and 2. The lower end of the picker-stick w is connected by a leather strap 12, having an intermediate spiral spring, with the corresponding picker-stick on the other end of the machine. The return motion of the picker-sticks is caused by the said spring. The elevations of the cams R hold the picker-sticks out in their normal position, and when the cams are rotated, so that the pins o rest in the depressions in the said cams, the springs w^2 slide the levers s (on which the picker-sticks are mounted) inward, from which it will be apparent that this shifting of the fulcrum of the picker-stick slackens the connection w' , so that the fly-shuttle is not picked at the time the swivel-shuttles are thrown. The lay C receives its oscillating movement from the main driving-shaft F , through crank-connections 22 and 23, one of which is shown in Fig. 1.

Upon the lay rock-shaft t are arranged two rocker-arms 6, one of which is shown in detail in Fig. 6. These rocker-arms have an opening 7, through which passes a vertical rod 8, attached to the swivel-shuttle bar C' , which is held in its normal raised position by springs 9. The lower ends of these rods 8 are connected by a cross-bar 10, having in its center a cam 11, Fig. 2, upon which slides or moves a small wheel 13, rotating upon a pin secured to lever 14 and adapted to be adjusted in a slot 15 in said lever. This lever 14 is pivoted at its upper end to the cross-brace B^2 of the lay-swords $B B$, and its lower end is connected by a connecting-rod 16 to pin r of the lever s at the left-hand side of the loom and operated by the reciprocating motion of said lever produced through oscillating motion of lever p , operated by cam-wheel R . By this connection the lever 14 receives an oscillating motion and presses (when rod 16 is moved to the right) the cross-bar 10 downward by the roller 13 riding on the cam, and by this movement causes the swivel-shuttle bar C' to be lowered, and by the action of the springs 9 9 (when rod 16 is moved to the left) to be raised.

Upon the rear portion of the machine is arranged a shaft or stud P , on which is a cam-

cylinder Q , having on its outer periphery four grooves Q' , in which rest alternately one end of lever-arms 17, the other end of said arms being loosely pivoted to a shaft or stud 18 on frame A . The periphery of the said cam-cylinder is divided into six equal spaces, in the first, second, fourth, and fifth of which are the grooves Q' , while the third and sixth of such spaces are not grooved. The free ends of said levers are connected by cords or wires 19 with the hooked end levers $k k'$. When one of the levers 17 drops in one of the grooves Q' of cam-cylinder Q , the corresponding hooked end lever k or k' engages with pin i' of arm i , thereby operating its respective driving-rod D or D' .

The pattern-drum Q receives its motion from the main driving-shaft F through a pawl 20 and ratchet 21, as shown in Figs. 1 and 1^a. This pawl 20 is connected by a wire 40 with the Jacquard mechanism. (Not shown in the drawings.) On the front of the drum Q is rigidly secured thereto a cam-wheel 25, provided on its outer periphery with four depressions 28, arranged to correspond with the four grooves Q' of cam-cylinder Q , and also provided with two cam projections 28^a, arranged opposite each other and adapted to raise a lever 26 by means of a small wheel 27, pivoted to the said lever, which latter is pivotally secured to shaft 18, and is connected at its free end by cord 35 with the pawl n' on lever n . The said cam-wheel 25 being also divided into six equal spaces, its four depressions 28 register with the four grooves of the cylinder Q and its two cam projections correspond with the two ungrooved portions of the said cylinder. When the lever 26 rests with its wheel 27 in one of the four depressions 28 of wheel 25, one of the levers 17 rests in the corresponding groove Q' of cam-cylinder Q . By means of said wheel 25 and its lever 26 (dropping with its wheel 27 in one of the depressions 28 of wheel 25) the pattern-drum Q is prevented from being turned more than one-sixth of a revolution; but whenever the said pattern-drum has made one-half revolution (and none of the levers 17 rest in their respective grooves) the lever 26, with its wheel 27, is raised by the projection 28^a of wheel 25, and thereby and by its cord connection 35 raises the pawl n' and prevents the cam-wheel R from being further rotated.

As will be seen from Fig. 7 of the drawings, the swivel-shuttles are arranged in the shuttle-boxes one above the other, and are respectively operated by the rods D' and D , these two rods being operated from the main driving-shaft by means of the hooked levers controlled by the pattern-drum Q .

With my improved double-swivel shuttle-loom two different movements may be effected—the plain or fly shuttle movement and the swivel and plain-weaving movement combined.

When the loom is adjusted for plain weaving, the pawl 20, pivoted to rod h , is raised

on its pivot (through its wire connection) by the Jacquard mechanism, so that the pattern-drum Q is not revolved by the said pawl. As the main driving-shaft F revolves the crank connections *f g* cause the rod *h* to reciprocate, and thereby transmit its motion through connections *m n* and pawl *n'* to cam-carrying shaft H. The cam-wheel R, which is firmly secured to the said shaft H, causes the lever *p* to oscillate on the pivots *p'*, and to reciprocate the levers *s*, to each of which a picker-stick *w* is pivotally secured. When the levers *s* are moved outward on rocker-shaft *t* by levers *p* and cams R, the upper end of the picker-sticks *w*, which latter are pivoted at *u* to the said levers, is thrown inward by the action of cams 4 4 on shaft 5 and the connections *w'*. Thereby the fly-shuttle is thrown across the loom, as in ordinary weaving. The cam-wheels 4 4 on shaft 5 are so arranged that they will operate first the picker-stick on one side and then the picker-stick on the other side, and so on. By these movements the body of the fabrics is produced. I will now proceed to describe the operation whereby by the action of the swivel-shuttles the figures or patterns are woven in the fabric. For this purpose the pawl 20 is lowered by the Jacquard and brought in contact with ratchet-wheel 21, causing the pattern-drum Q to revolve.

The horizontal movement of the swivel-shuttles is produced through connection *d d'* and *ee'*, whereby the arms *ee'* are alternately oscillated with their respective rods D and D', the latter receiving their motion from the main driving-shaft F through connections *f, g, h*, and *i*, pin *i'*, and hooked end levers *k k'*, pivotally secured to cross-arms *k² k³*, firmly secured to their respective rods D and D'. As already specified, the said levers *k k'* are connected by wires 19 to one end of levers 17, pivoted at 18, and operated by the movement of drum Q, only one of said levers 17 resting at one time in one of the four grooves Q' in said drum. The other three are resting on the outer periphery of said drum, thereby raising the hooked end levers and bringing the latter out of contact with oscillating pin *i'*.

The up-and-down movement of the swivel-rack C' is produced by the oscillating motion of lever 14 depressing the connecting-bar 10, (by passing over the cam 11 arranged thereon,) and by the spiral springs 9 9, (which are compressed by this down motion.) This lowering and raising device is so arranged that almost simultaneously with the downward movement of the swivel-bar C' the swivel-shuttles are driven alternately longitudinally across the loom, the lower one from right to left and the upper one from left to right, or vice versa, thereby weaving the figure or pattern in the fabric. During one revolution of cam-wheel R the swivel-shuttles are lowered four times, and each of said swivel-shuttles is thrown twice across the loom. By one revolution of the cam-shaft 5 the fly-shuttle is thrown twice across the loom.

The co-operations of the fly and swivel shuttles are as follows, reference being had to Fig. 2: The right-hand picker-stick *w* throws the fly-shuttle from right to left through the shuttle-race, making plain weaving. The swivel-shuttles are now lowered and are moved alternately in opposite directions and weave part of the figure and are then raised. Then the left-hand picker-stick throws the fly-shuttle through the race from left to right, making plain weaving. The two swivel-shuttles are now again lowered and moved alternately in opposite directions and weave part of the figure and are then again raised. This operation is repeated until the loom is changed or adjusted for plain weaving by raising the pawl 20, as heretofore described.

The co-operative movements of fly and swivel shuttles are controlled by pattern-drum Q, wheel 25, and their respective levers, as follows: When the pattern-drum Q has been turned one-sixth of its revolution and all the levers 17 are resting on the outer periphery of drum Q, (none in their respective grooves,) the cam projection 28^a of wheel 25 raises the lever 26, with its wheel 27, and thereby (by cord connection 35) the pawl *n'*, thus preventing the further rotation of cam-wheel R. This is the movement in which the fly-shuttle is thrown through the race. With the next move of drum Q (one-sixth of its revolution) one of the levers 17 engages its corresponding groove, thereby allowing its respective hooked end lever to be engaged and operated by the oscillating pin *i'*. The lever 26, with its wheel 27, rests in one of the depressions 28 of wheel 25. This is the moment the swivel-shuttle makes one pick. The next move of drum Q (one-sixth of its revolution) produces a similar result. (Second pick.) With the next move of the pattern-drum the lever 26 is again raised by the second cam projection 28^a of wheel 25, the pawl *n'* is disengaged from its ratchet, and the cam-wheel R is stopped in its rotation. During that time the fly-shuttle is thrown back through the race. The next two moves necessary to complete one revolution of the pattern-drum produce the third and fourth picks in a manner similar as heretofore described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a loom, the combination, with the lay, the lay-swords and lay rock-shaft, and the swivel-shuttle-supporting bar C', supported by the said lay and rock-shaft, of the main driving-shaft F, cranks 23, connections 22 between said cranks and the lay, crank *f*, pivoted lever *h*, a connection *g* between said crank *f* and lever *h*, an arm *i*, having a pin *i'* secured to the lower end of said lever *h*, the swivel-shuttle-actuating racks and pinions carried by the bar C', the vertical driving-rods D D', having crank-arms at their upper ends and

cross-arms at their lower ends, rods $d d'$, connecting said crank-arms with the swivel-shuttle-actuating racks, hooked end levers $k k'$, pivoted to the said cross-arms and adapted to engage the vibrating pin i' , and means for controlling the engagement of the said hooked end levers with the said pin, all said parts being arranged and adapted to operate substantially as described, and for the purposes set forth.

2. In a loom, the combination, with the lay, the lay-swords and lay rock-shaft, and the swivel-shuttle-supporting bar C' , supported by the said lay and rock-shaft, of the main driving-shaft F , cranks 23, connections 22 between said cranks and the lay, crank f , pivoted lever h , a connection g between said crank f and lever h , an arm i , having a pin i' secured to the lower end of said lever h , the swivel-shuttle-actuating racks and pinions carried by the bar C' , the vertical driving-rods $D D'$, having crank-arms at their upper ends and cross-arms at their lower ends, rods $d d'$, connecting said crank-arms with the swivel-shuttle-actuating racks, hooked end levers $k k'$, pivoted to the said cross-arms and adapted to engage the vibrating pin i' , pivoted levers 17, cords or wires 19, connecting said levers 17 with the said hooked end levers, a drum Q , provided with grooves Q' and adapted to control said levers 17, a ratchet-wheel 21, secured to said drum, and a pawl-lever 20, pivoted to oscillating lever h and adapted to operate said drum, all said parts being arranged and adapted to operate substantially as described, and for the purposes set forth.

3. In a loom, the combination, with the frame, the lay, the lay-swords, and the lay rock-shaft, of the main driving-shaft F , crank f , pivoted lever h , a connection g between said crank f and lever h , a cam-shaft H , a ratchet-wheel secured to said cam-shaft, lever n , with pawl n' , rod m , connecting said lever n with the lower end of lever h , cam-wheels R , firmly secured to said cam-shaft, levers p , pivoted to the frame and adapted to be oscillated by said cam-wheels, levers s , supported by the lay rock-shaft and to be reciprocated thereon by the said levers p , and picker-sticks pivotally secured to the upper portion of said levers s , all said parts being adapted and arranged to operate substantially as described, and for the purposes set forth.

4. In a loom, the combination, with the

frame, the lay, the lay-swords, and the lay rock-shaft, of the main driving-shaft F , crank f , pivoted lever h , a connection g between said crank f and lever h , a cam-shaft H , a ratchet-wheel secured to said cam-shaft, lever n , carrying pawl n' , rod m , connecting said lever n with the lower end of lever h , cam-wheels R , firmly secured to said cam-shaft, levers p , pivoted to the frame and adapted to be oscillated by said cam-wheels, levers s , supported by the rock-shaft and to be reciprocated thereon by the said levers p , picker-sticks pivotally secured to the upper portion of said levers s , a shaft 5, operated from the main driving-shaft by gear-wheels, cam-wheels 4, secured to said cam-shaft 5, levers 1, operated by said cam-wheels 4, and connections w' between said levers and the picker-sticks, all said parts being arranged and adapted to operate substantially as described, and for the purposes set forth.

5. In a loom, the combination, with the frame, the lay, the lay-swords, and lay rock-shaft, of the main driving-shaft F , crank f , pivoted lever h , a connection g between said crank f and lever h , a cam-shaft H , a ratchet-wheel secured to said cam-shaft, lever n , carrying pawl n' , rod m , connecting the lower end of said lever h with the lever n , cam-wheels R , firmly secured to said cam-shaft, levers p , pivoted to the frame and adapted to be oscillated by said cam-wheels, the swivel-shuttle-supporting bar C' , supported by the rock-shaft, rods 8, serving as such supports, a bar 10, connecting the lower portions of said rods 8, a cam projection 11, arranged on said bar, a pivoted lever 14, carrying roller 13, a rod 16, connecting the lower end of said lever 14 with one of the levers p and adapted to oscillate said lever 14, and thereby controlling the downward motion of the bar C' , and spiral springs 9, arranged on and surrounding said rods 8 and adapted to control the upward motion of said bar C' , all said parts being arranged and adapted to operate substantially as described, and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 4th day of November, 1890.

JOHN C. BROOKS.

Witnesses:

JAMES EASTWOOD,
E. L. SHERMAN.