

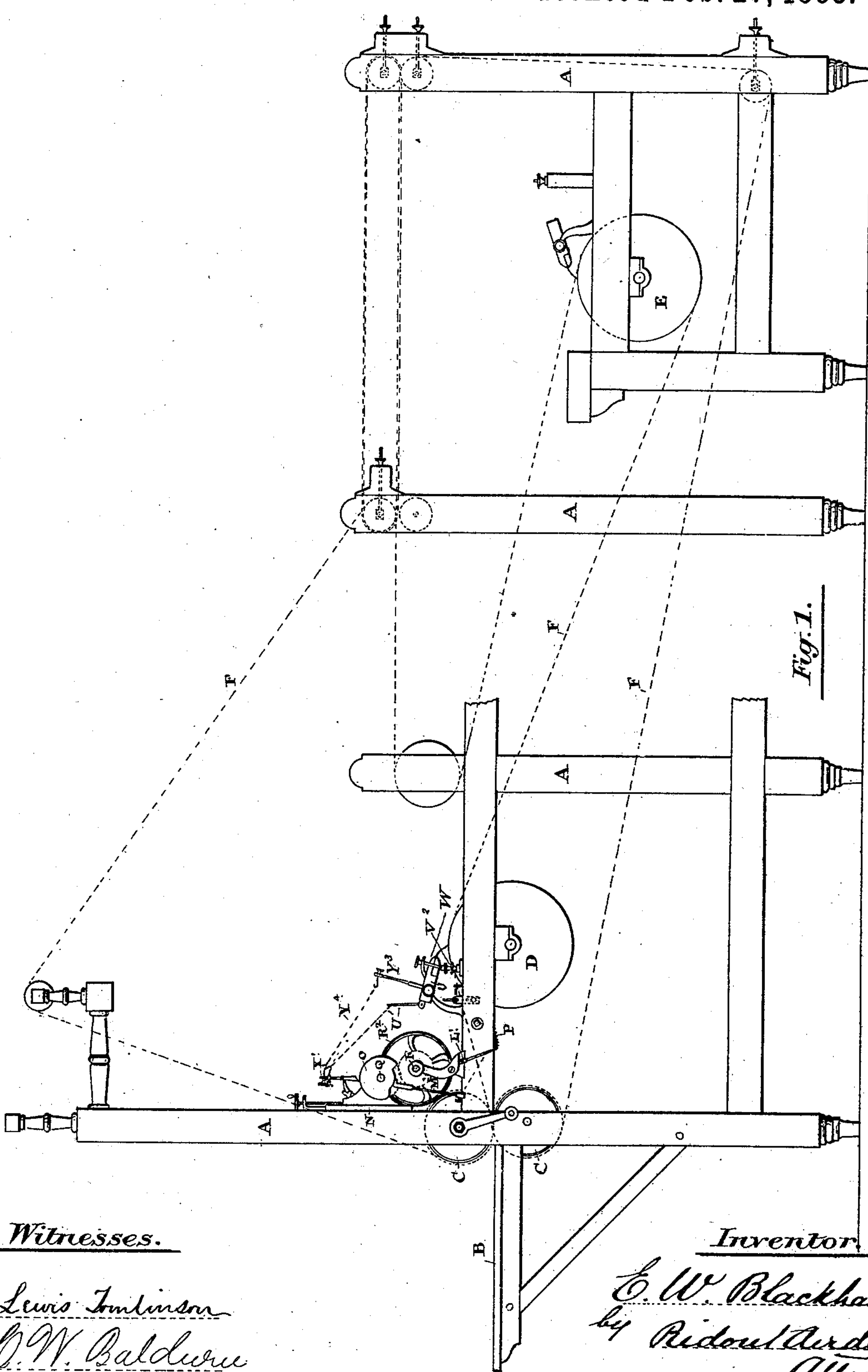
(Model.)

E. W. BLACKHALL.
RULING MACHINE.

4 Sheets—Sheet 1.

No. 273,016.

Patented Feb. 27, 1883.



Witnesses.

Lewis F. Johnson
O. W. Baldwin

Inventor.

E. W. Blackhall
by Richard A. Riddle
Attys.

(Model.)

4 Sheets—Sheet 2.

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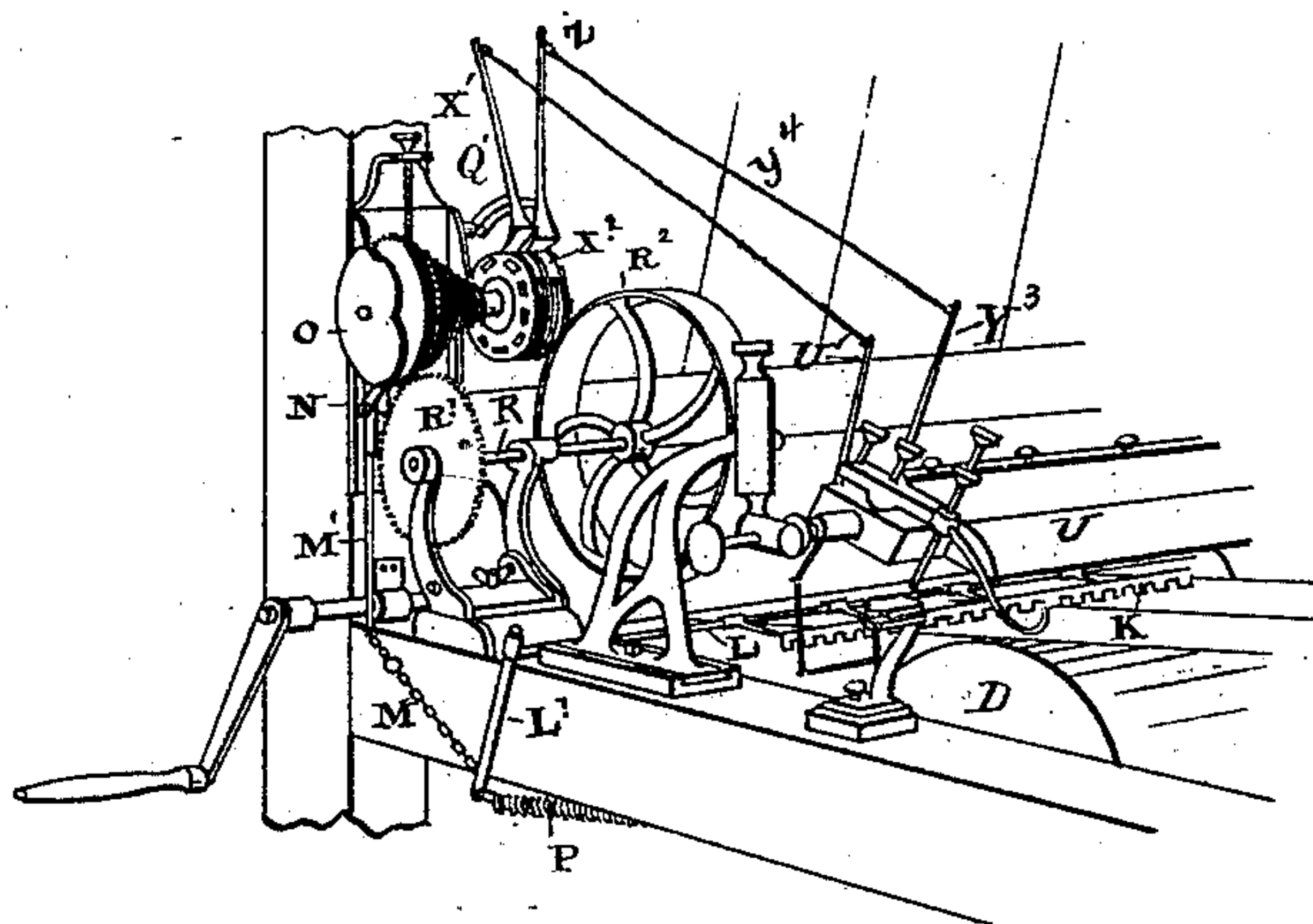


Fig. 2.

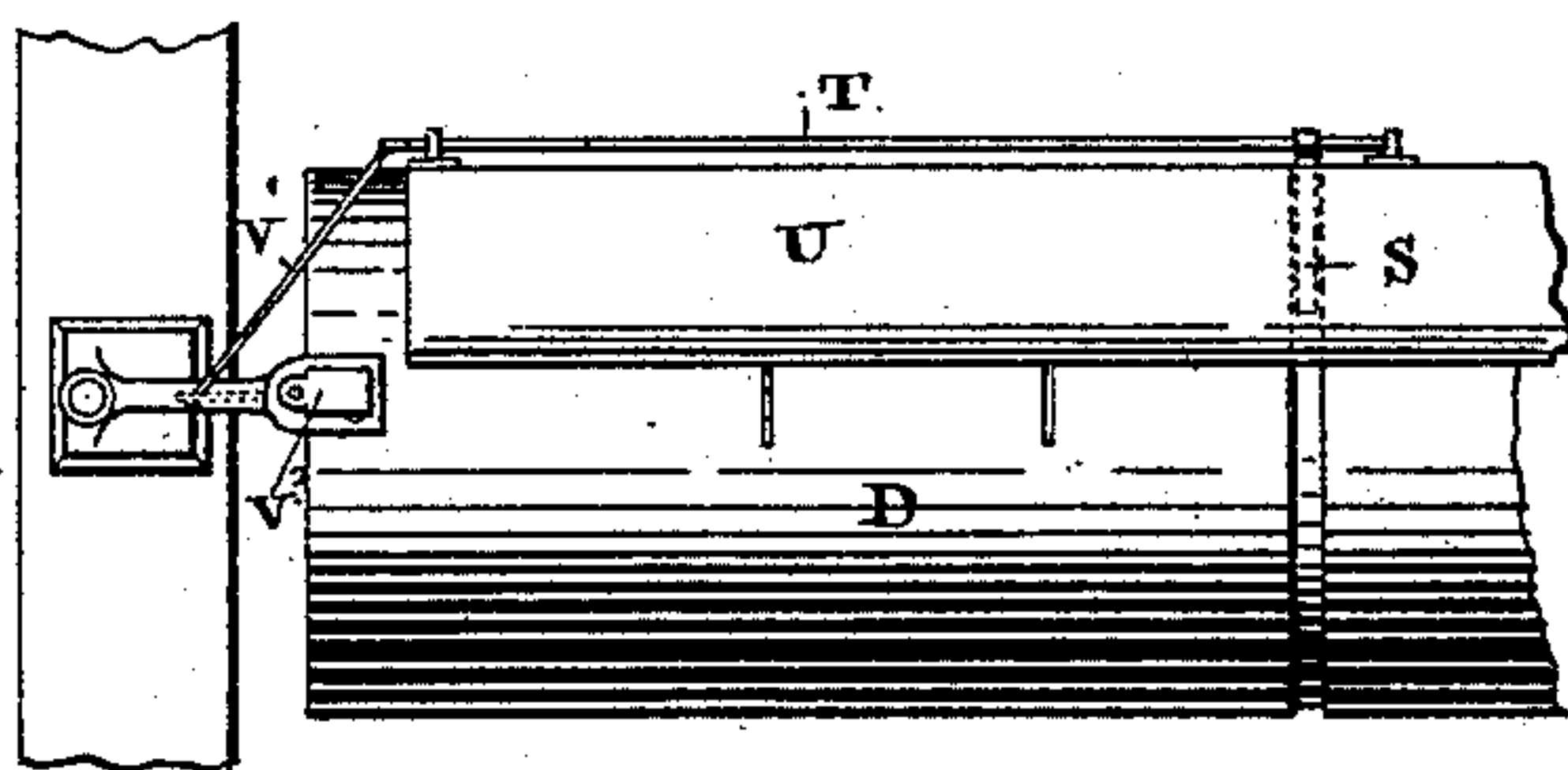


Fig. 3.

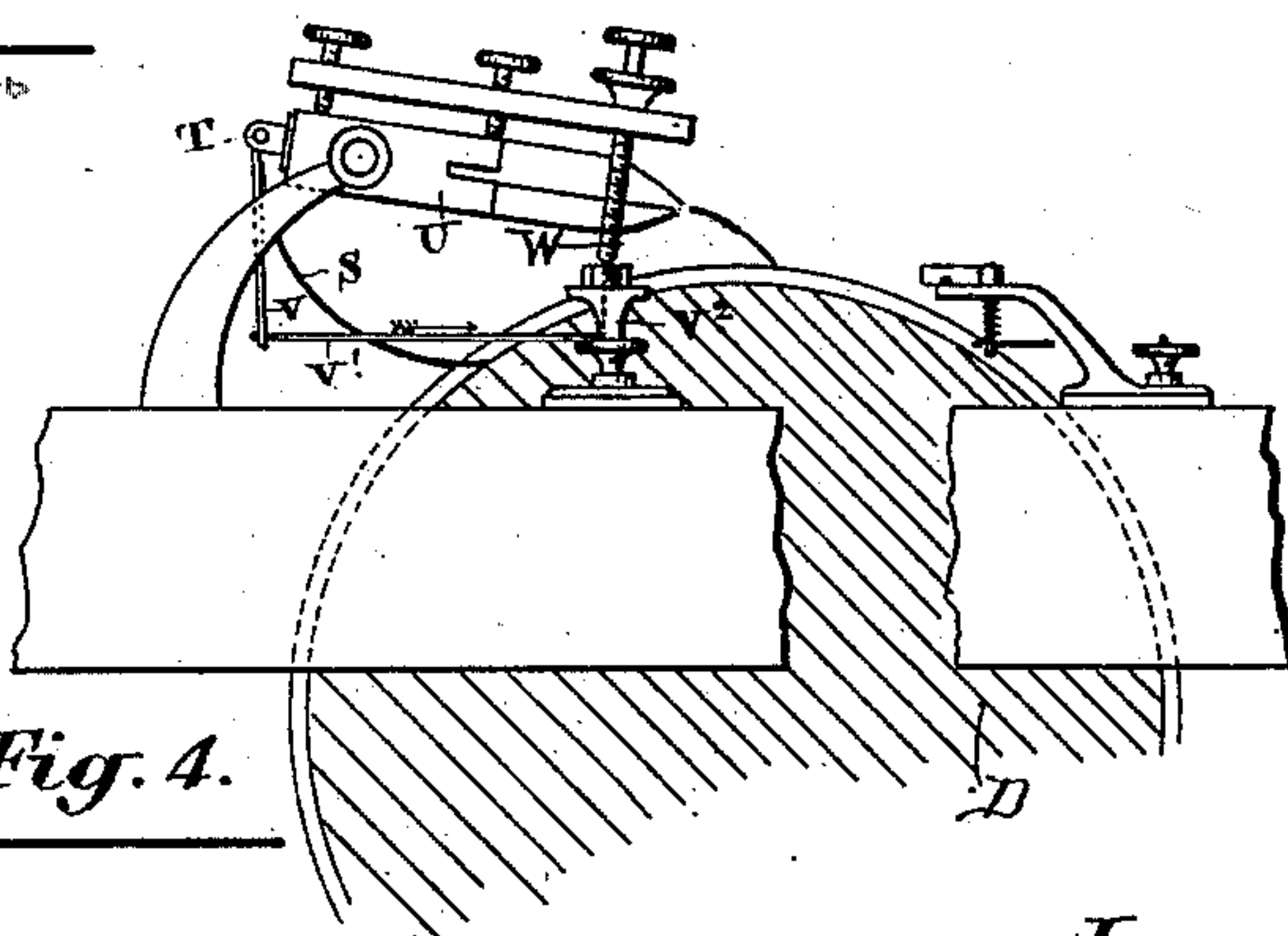


Fig. 4.

Witnesses.

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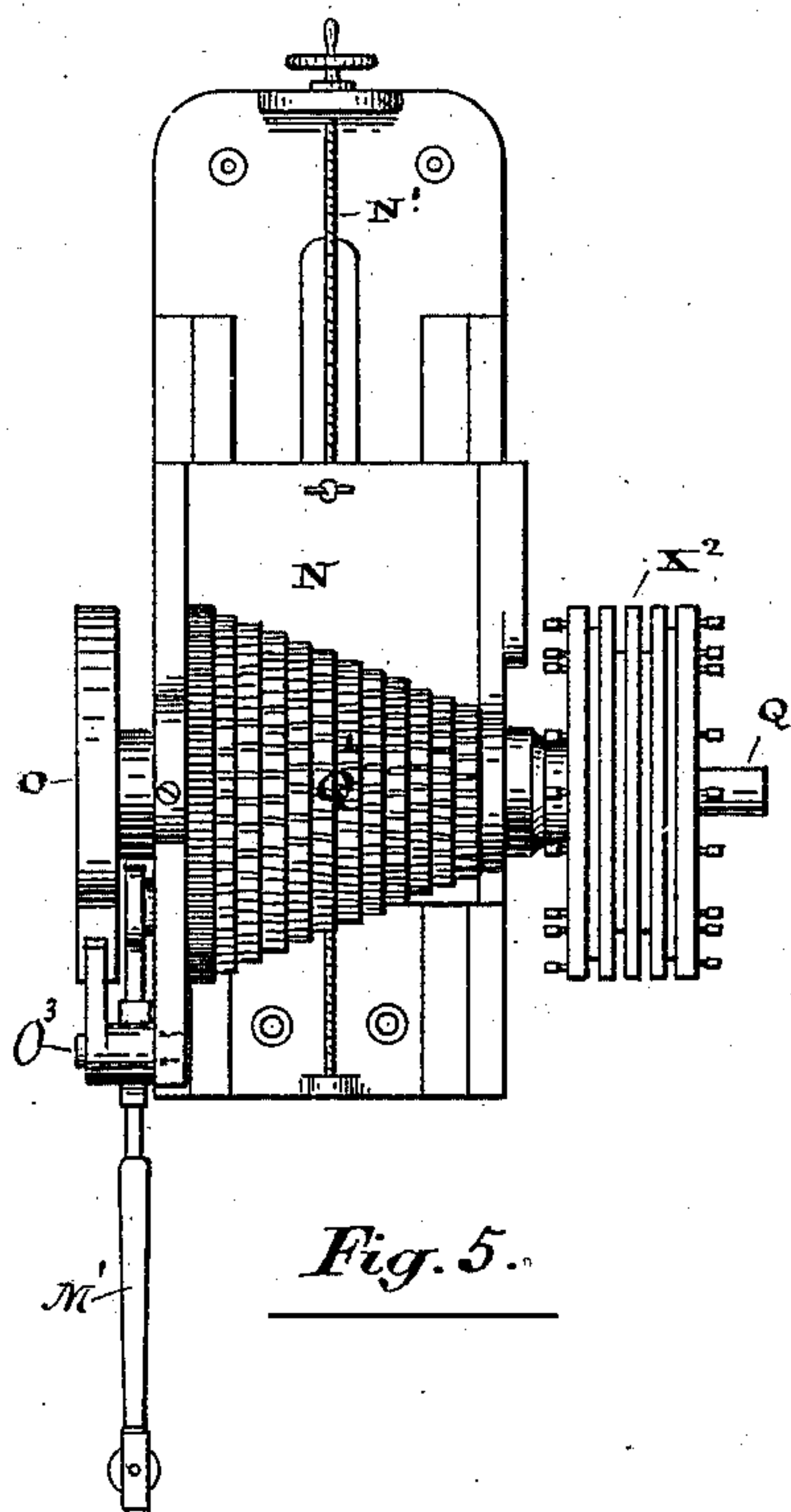


Fig. 5.

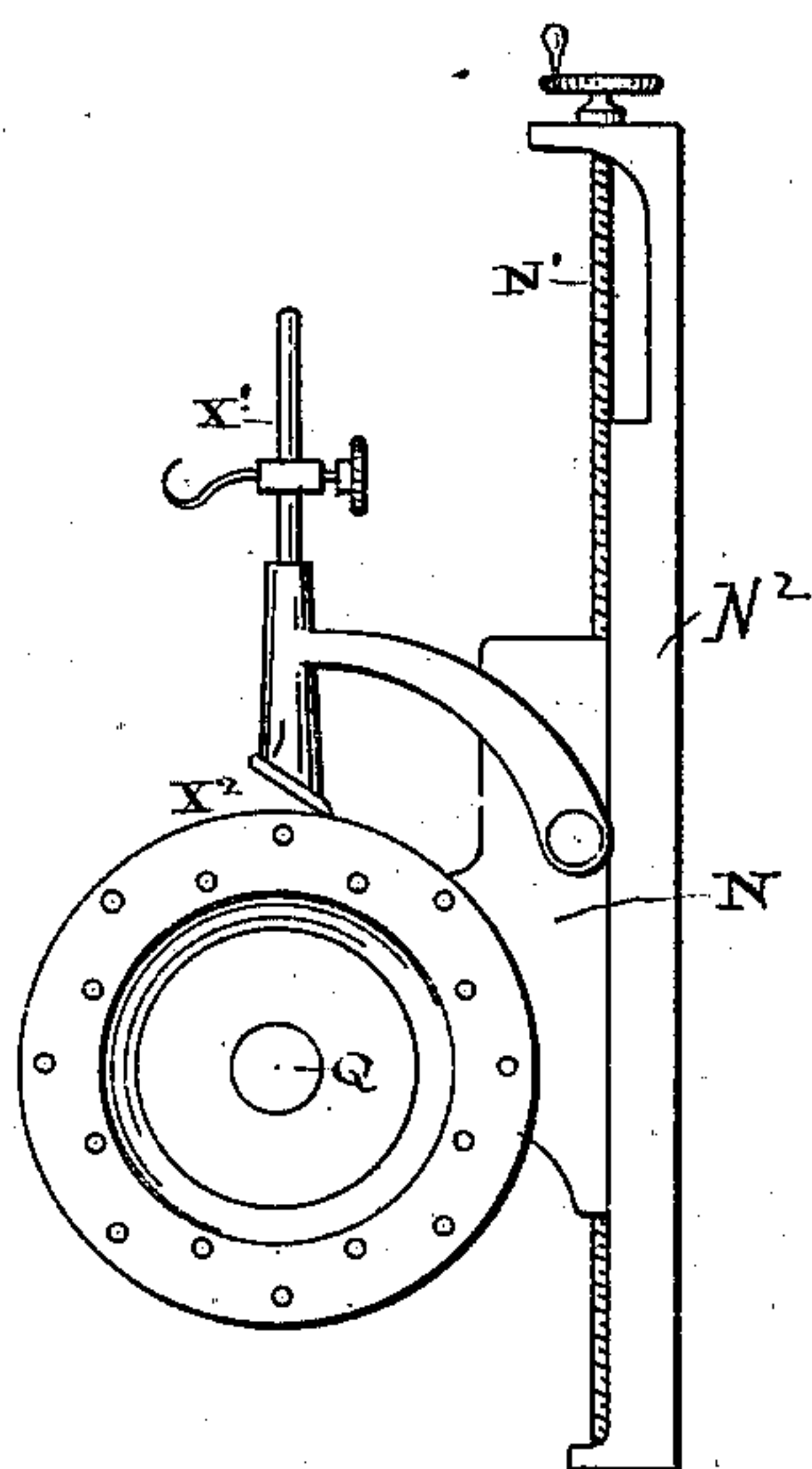


Fig. 6.

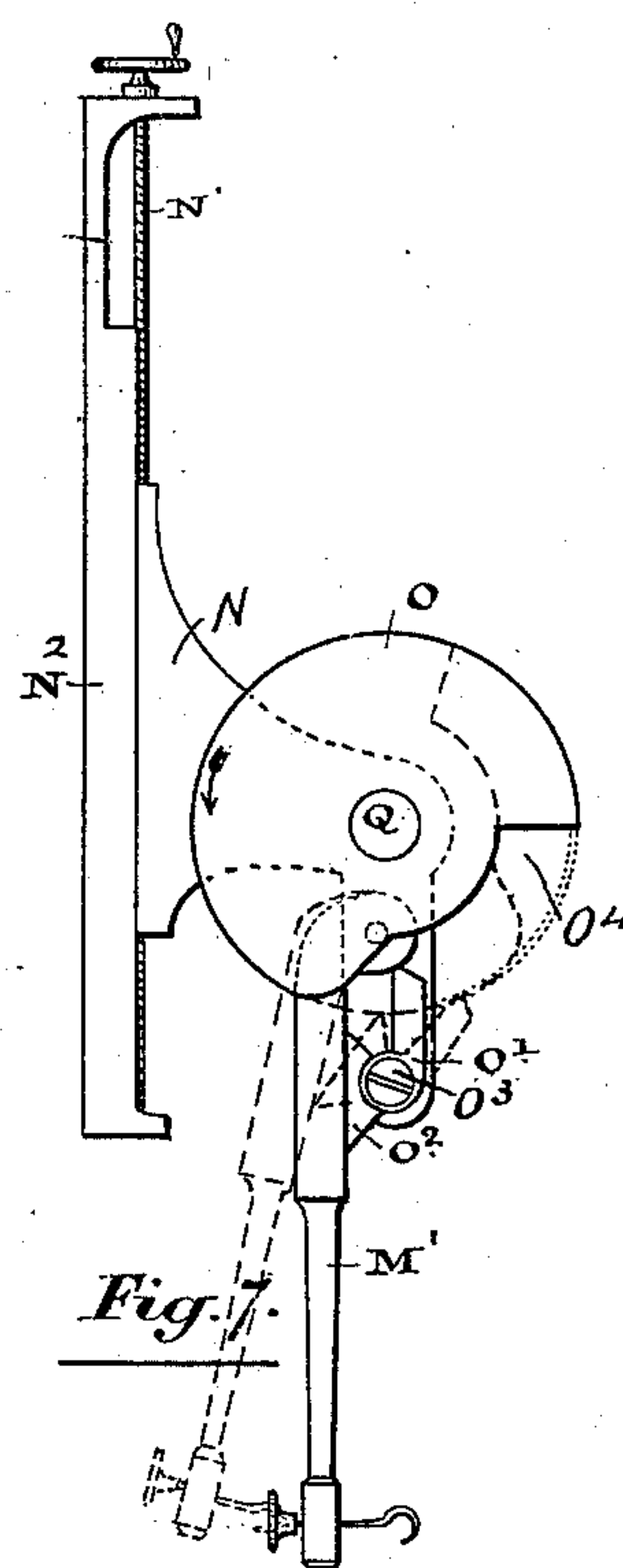


Fig. 7.

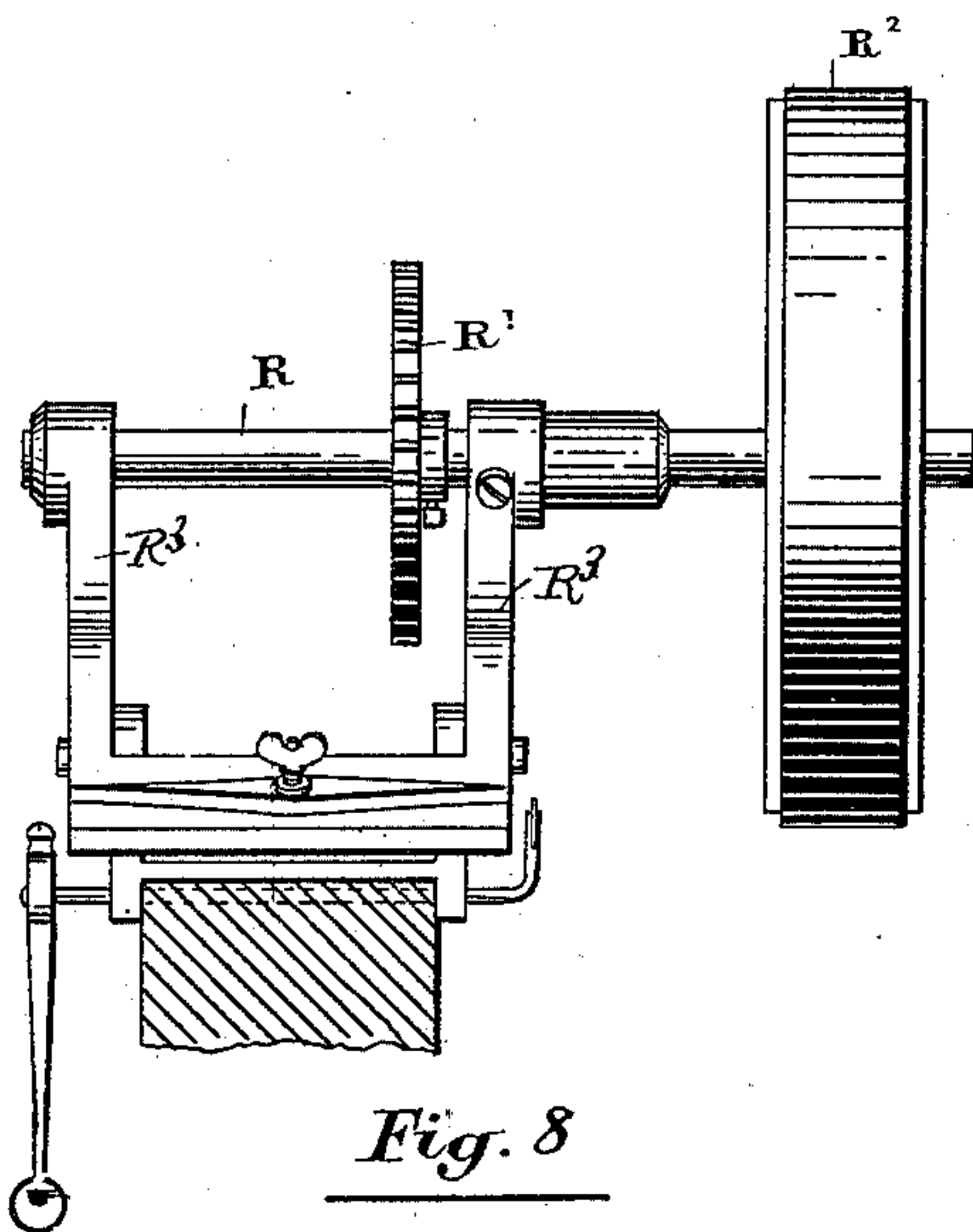


Fig. 8

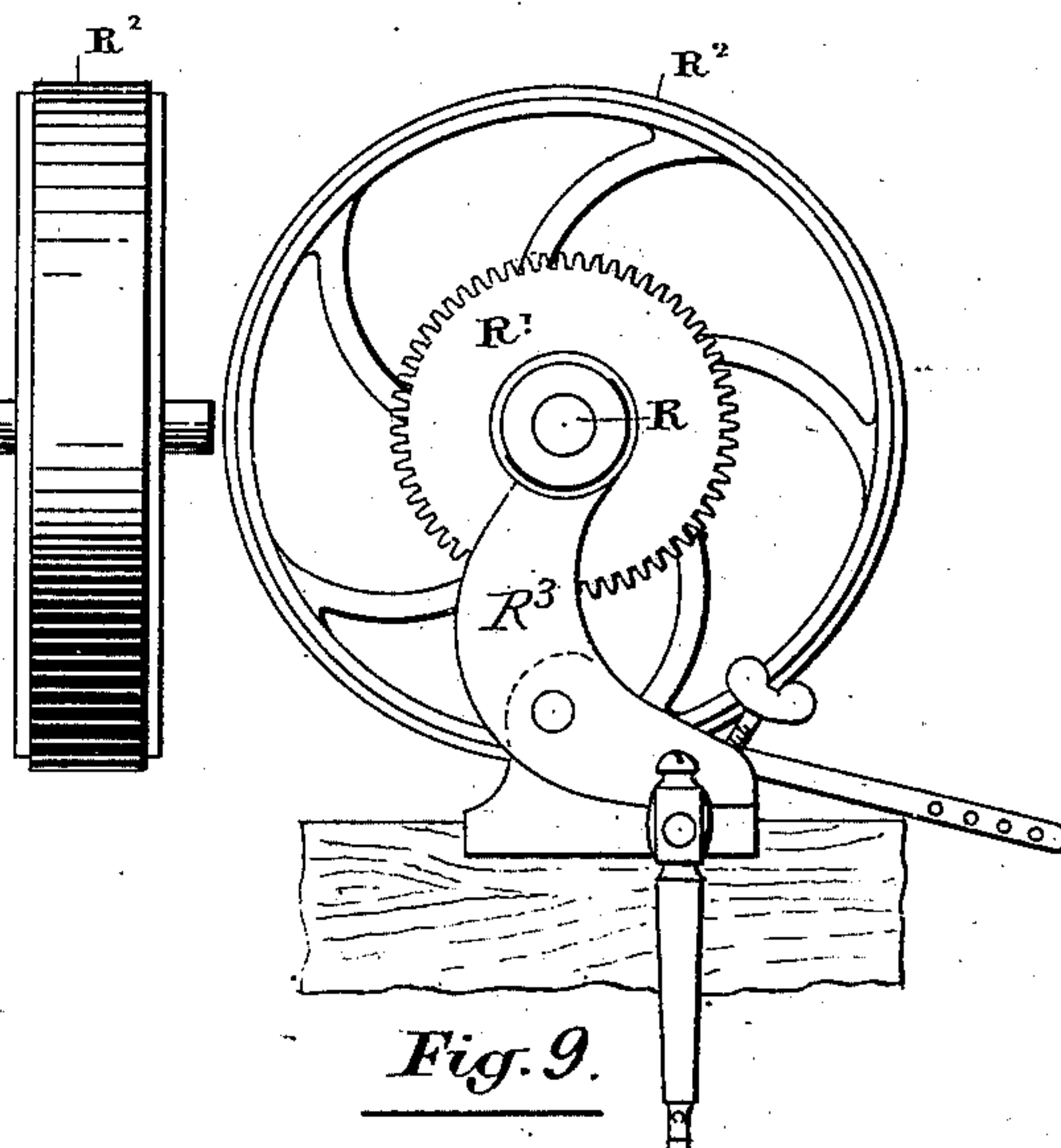


Fig. 9.

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E. W. BLACKHALL.
RULING MACHINE.

No. 273,016.

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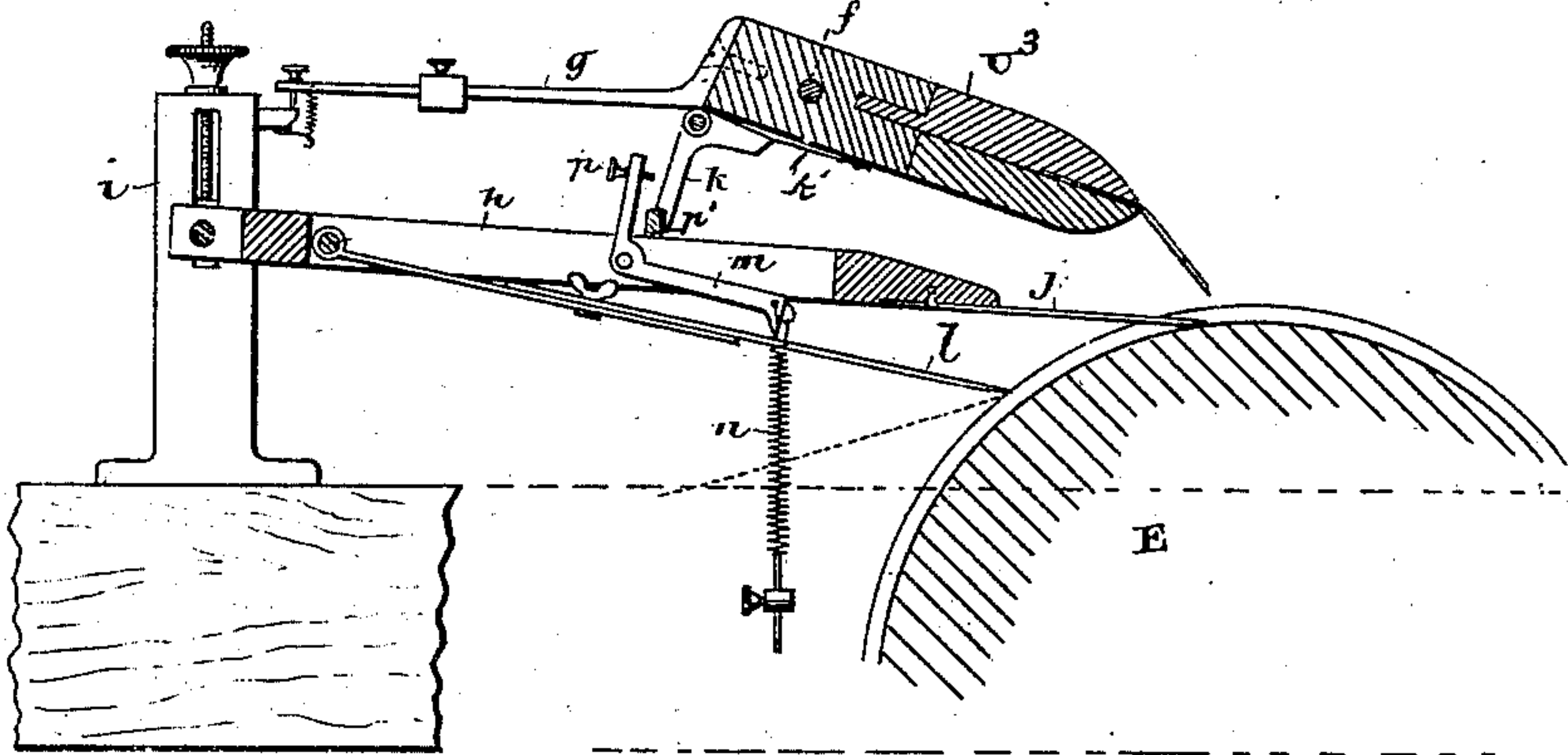


Fig. 10.

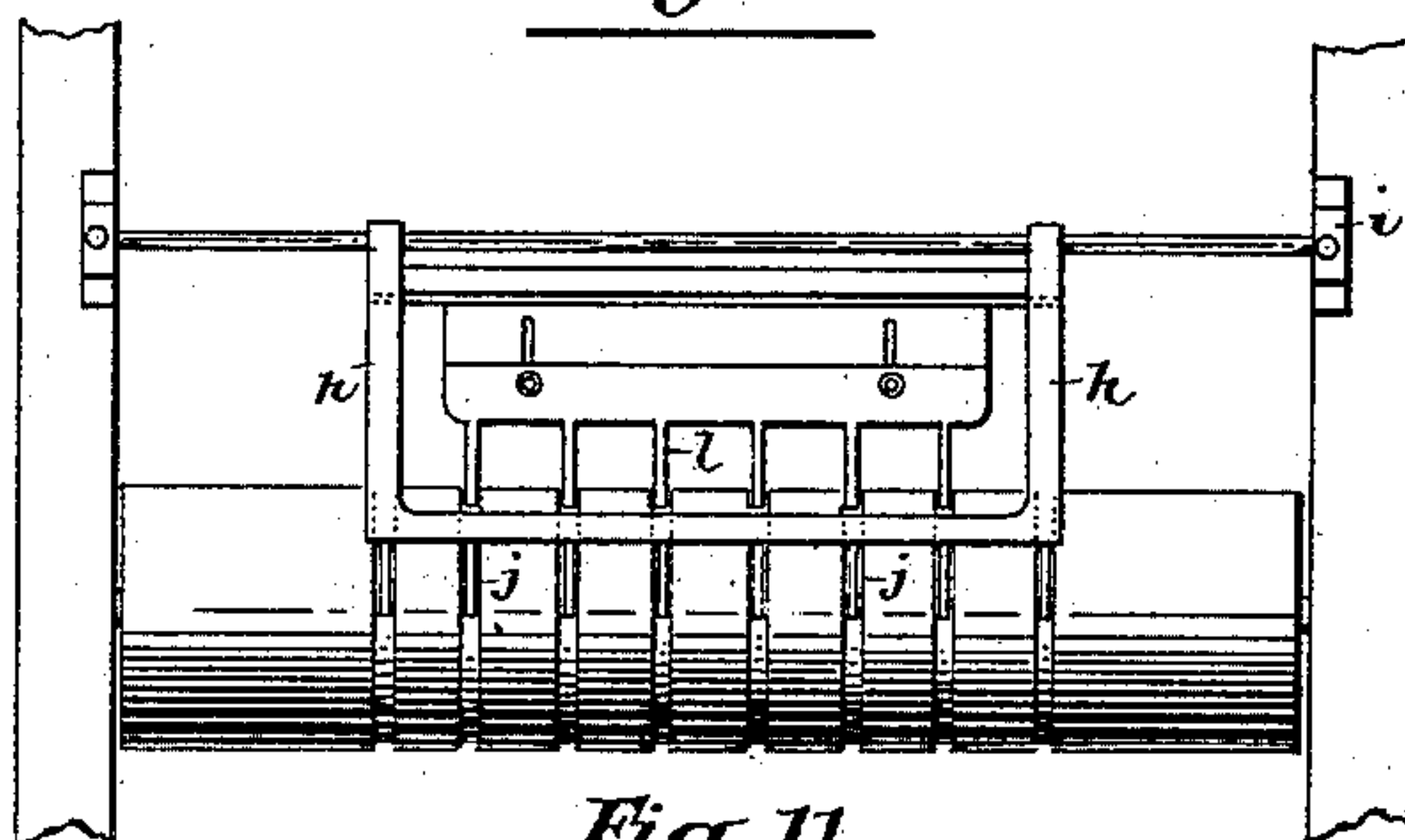


Fig. 11.

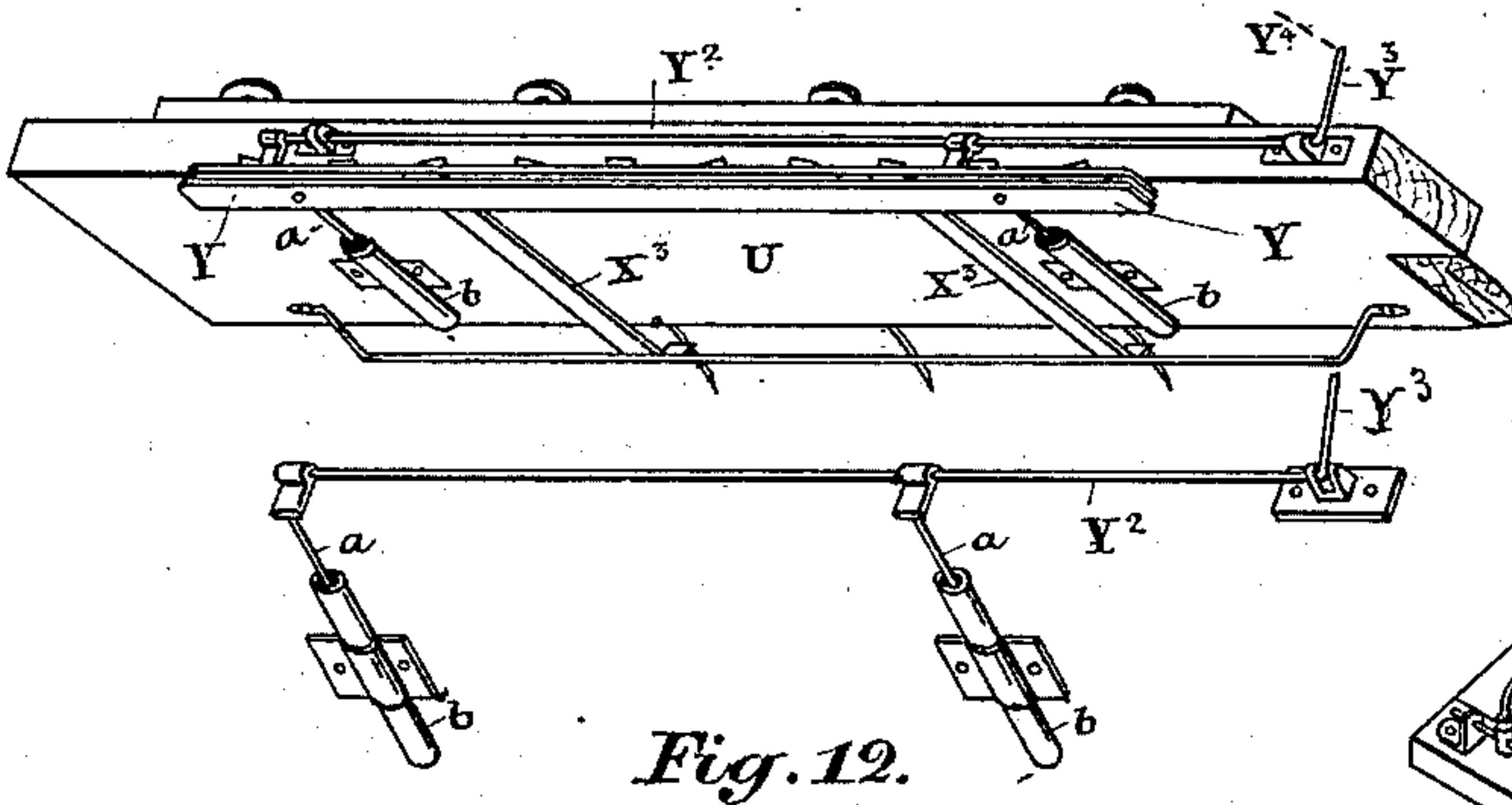


Fig. 12.

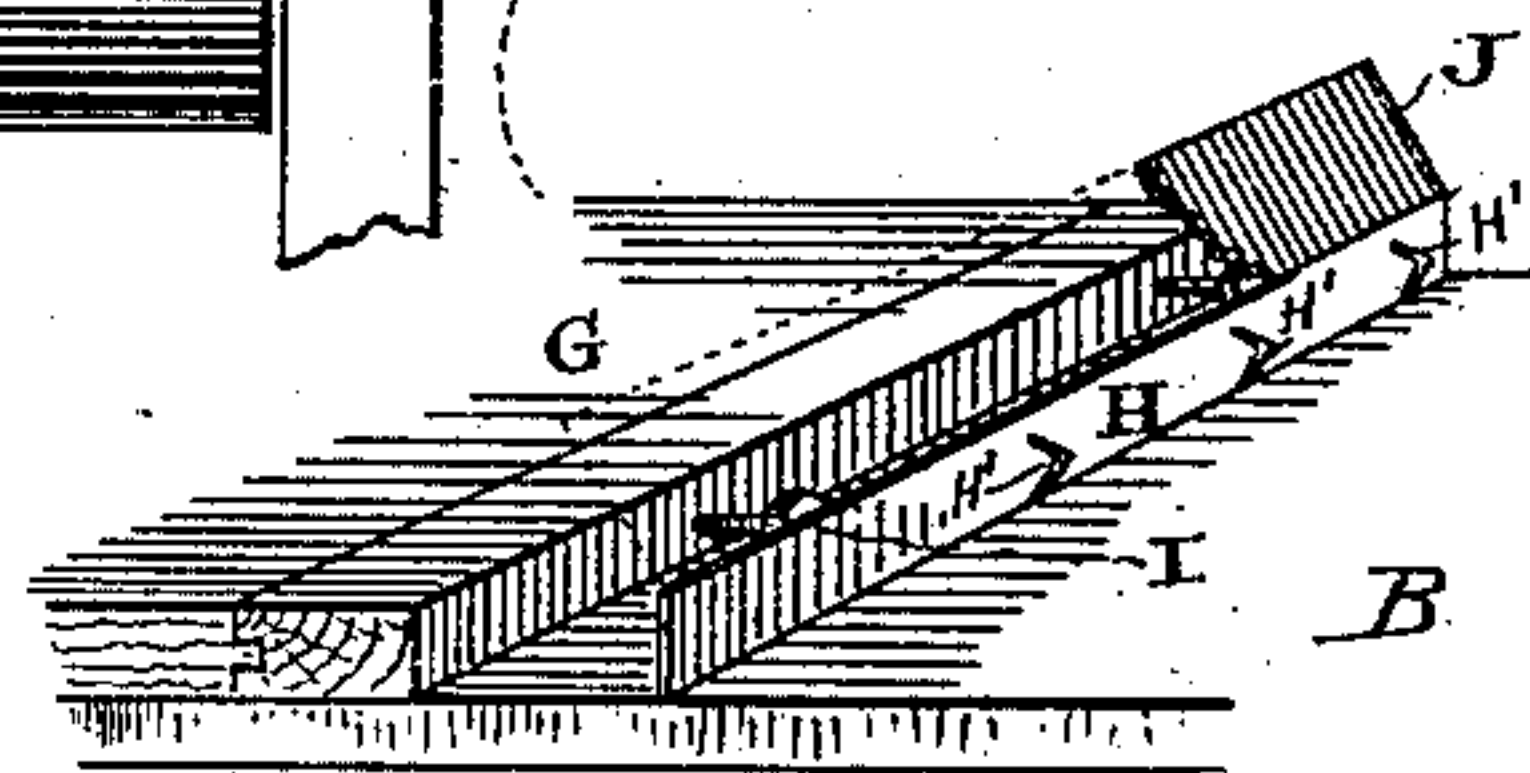


Fig. 14.

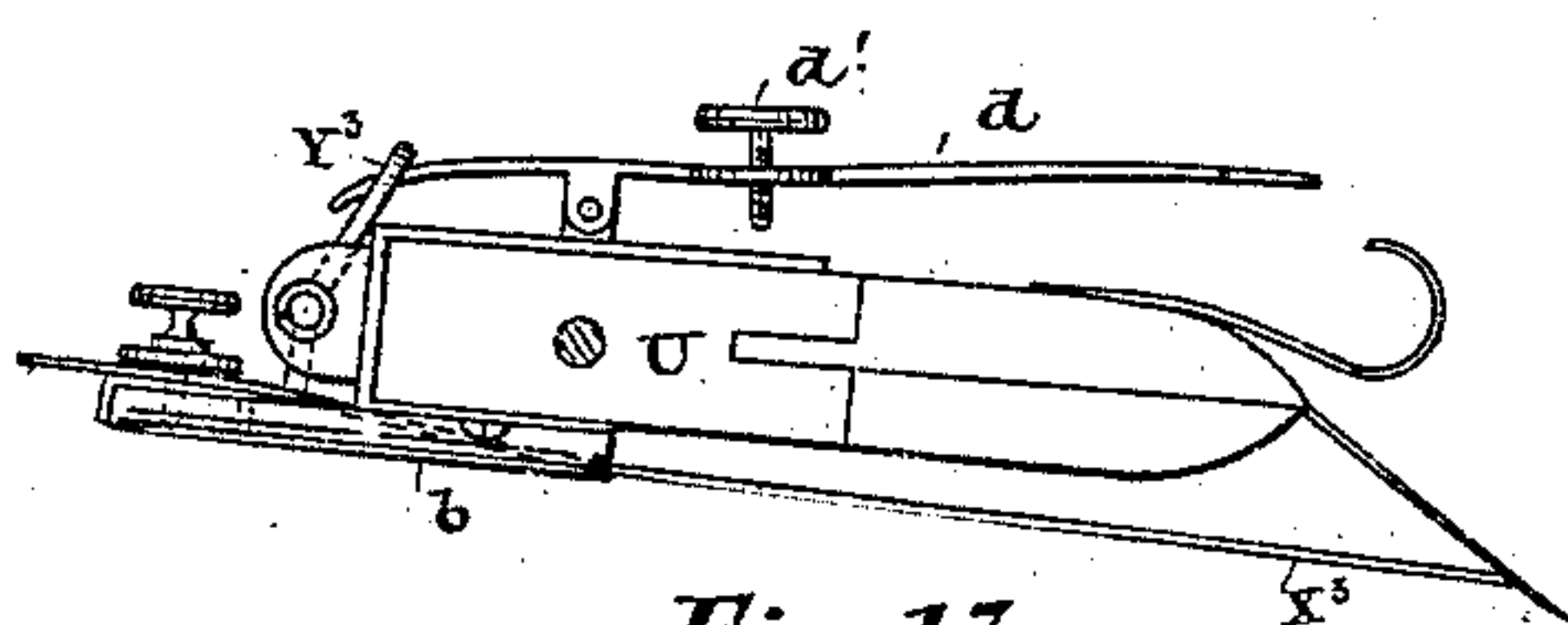


Fig. 13.

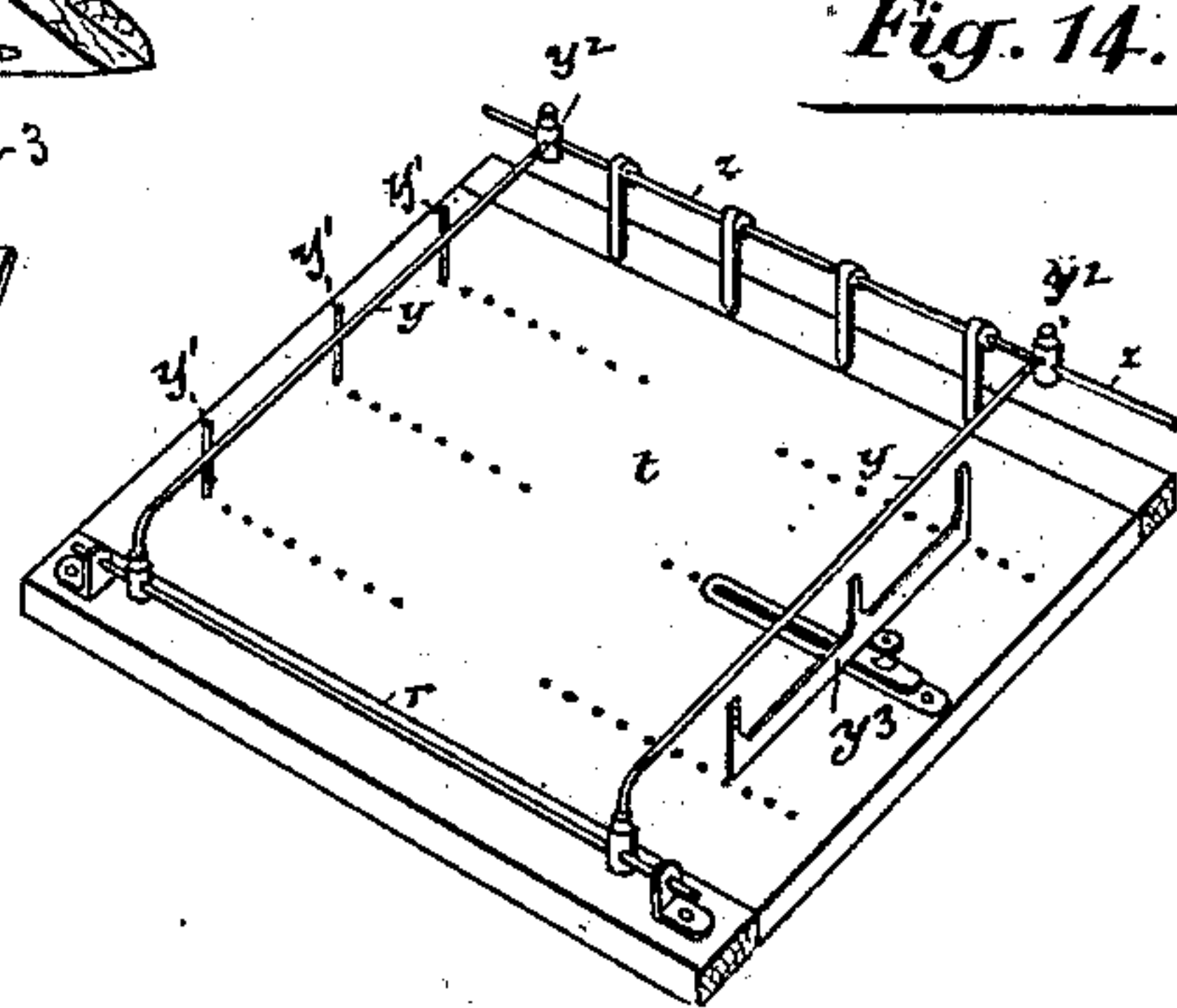


Fig. 15.

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UNITED STATES PATENT OFFICE.

EDWARD W. BLACKHALL, OF TORONTO, ONTARIO, CANADA.

RULING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 273,016, dated February 27, 1883.

Application filed May 20, 1881. (Model.)

To all whom it may concern:

Be it known that I, EDWARD WAKEFIELD BLACKHALL, of the city of Toronto, in the county of York, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Ruling-Machines, of which the following is a specification.

The object of the invention is to produce a ruling-machine capable of accomplishing a large range of work; and it consists in the construction, arrangement, combination, and operation of the various parts, as more fully hereinafter described and claimed.

In the accompanying drawings, in which the various figures are represented on different scales for clearness of illustration, Figure 1 is a side elevation of my machine in outline to show the general arrangement, and with various parts not fully shown to prevent confusion. Fig. 2 is a perspective view of the mechanism for performing intermittent work. Fig. 3 is a detail plan of the pen-roller, showing mechanism for bringing the pens into action. Fig. 4 is an enlarged end view of some of the parts shown in Fig. 3. Figs. 5, 6, 7, 8, and 9 are detail views of the mechanism shown in Fig. 2. Fig. 10 is a detail sectional view of the mechanism for bringing the pens into operation for straight or one head ruling. Fig. 11 is a plan of the same. Fig. 12 is a perspective view of the device for independently raising individual pens. Fig. 13 is another view, showing similar mechanism as applied to a hand-machine. Fig. 14 is a perspective view of the adjustable paper-guide, and Fig. 15 is a perspective detail view of the receiving-box.

In the general outline of my machine, as shown in Fig. 1, A represents a frame of suitable dimensions and construction; B, the feeding-table; C, the feed-rollers; D, the pen-roller; E, the auxiliary pen-roller, and F the conveying-cords.

The frame is preferably so made that that portion carrying the auxiliary pen-roller E may be moved any desired distance from that portion of the frame carrying the pen-roller D, in order that the ink may have ample time to dry before the paper is turned over to be ruled upon the opposite side.

In ruling, the paper is fed upon the feeding-

table B in the usual way; but where inaccurate paper is used, instead of adjusting the entire guide-board and setting it by the eye, as is now done in other machines, I provide an adjustable piece upon the edge of this guide-board, as shown in Fig. 14, in which G is the guide-board; H, an adjusting-piece connected to the same by adjusting-screws I, by which the angle of the adjusting-piece can be readily regulated to feed inaccurate paper without affecting the guide-board proper. A cover, J, is hinged to the adjusting-piece to cover the opening between it and the guide-board.

H' are angular projections, secured to the adjusting-piece for the purpose of keeping the edge of the paper in position on the feeding-table.

The paper is passed to the feeding-rollers, and is carried by the conveying-cords F to the pen-roller D, where it is ruled on one side. Just before reaching the ruling-pens the paper is temporarily arrested by a stop-plate, K, (see Fig. 2,) which extends across the conveyer-cords, and is attached to a rocking rod, L, supported in suitable bearings, and provided at one end with an arm, L', secured to it. The lower end of this arm is connected by a chain, M, to the vertical swinging arm M', pivoted at its upper end to the vertically-sliding frame N, as more clearly shown in Fig. 7. This frame N supports the shaft Q of the cam O, said cam having a portion cut away at O⁴, which cam, as it revolves, operates the arm O' of the dog O², causing said dog to turn on its pivot O³, which pivot passes through a hub on said dog into the lower part of the frame N, and push and hold the arm M' back, as shown in dotted lines, Fig. 7, until the cut-away portion O⁴ of the cam again reaches the dog, when the parts are brought back to their normal position by the spring P, secured at one end to the arm L' and at its other end to the main frame. This latter operation raises the stop-plate K, holds it up long enough to allow the free passage of the sheet of paper, and then lowers it to stop the next sheet, when the same movements are again repeated.

The shaft Q of the cam O has also secured to it a nest of graduated sized gear-wheels, Q', and a cam-head, X², so that all revolve together.

Immediately below and parallel with the shaft Q is a shaft, R, supported in bearings R³ so as to slide laterally, and provided with a spur or gear wheel, R', to engage with either of the gears Q', and with a friction-pulley, R², which rests against and derives a constant rotary movement from the feeding-roller C, which, through the mechanism described, conveys the desired intermittent movement to the stop-plate K.

Where small-sized paper is used it is necessary to move this stop-plate oftener than when the larger sizes of paper are used, and to cause the desired number of movements in accordance with the size of paper the nest of gear-wheels Q' and the vertically-sliding frame N are raised or lowered by the screw N', in order to allow the gear-wheel R' to engage with either of the gear-wheels Q', which is done by moving the shaft to either side until the gear-wheel R' is in the desired position to mesh with one of the wheels Q'. Hence it will be seen that when the gear-wheel R' is engaging with the largest of the gear-wheels Q' the stop-plate K will be moved much slower and less frequently than when the smallest of the gear-wheels Q' is in connection with the gear-wheel R'.

The sliding frame N is supported by a stationary frame, N², which carries the adjusting-screw N'.

Instead of sliding the shaft R in its bearings, the wheel R' may be adjusted laterally on its shaft in order to bring it into the desired position, or the frame R may be arranged to slide.

As the paper is permitted to pass under the stop-plate K it comes in contact with the spring arm or finger S, (see Figs. 3 and 4,) whose lower end rests in a groove cut in the pen-roller D, while its upper end is secured to a pivoted rock-shaft, T, or to a downwardly-projecting arm, V, connected to said rock-shaft and connected by a rod, V', to the supporting-block V². This block is pivoted by means of a side arm to the frame of the machine, and serves to support the drop-screw W of the pen-clamp U. As the paper comes in contact with the spring-arm S it raises it out of the groove level with the face of the pen-roller, and this movement causes the rock-shaft T, arm V, and rod V' to push the pivoted supporting-block V² from under the drop-screw W of the pen-clamp, permitting the latter to drop, and allowing its pens to come in contact with the paper. As soon as the sheet of paper has passed the arm or finger S said arm falls back into the groove, and at the same time the pen-clamp is raised by means of its vertical arm U'. This arm is connected by a cord or wire to an arm, X', pivoted to the sliding frame N (see Fig. 6) and provided with a foot to rest upon properly-arranged cam-blocks secured in the cam-head X², so that the rotation of the said cam-head X² will cause the arm U' to move intermittently.

In certain classes of work it is necessary to independently raise individual pens without moving the others. This I accomplish by means of the mechanism shown in Fig. 12, in which Y represents a clamp-plate connected by arms to the rod Y², which is supported in bearings on the under side of the pen-clamp U, and is provided with an arm, Y³, which is connected—when the device is intended to be worked automatically—by the wire Y⁴, to the pivoted arm Z, which is operated by cam-blocks in the cam-head X² in the same manner as the arm X', before described.

In order to convey the movement to the desired pens, I secure within the clamp-plate Y, at the proper points, fingers X³, whose outer ends extend below the pens it is desired to operate independently.

In order to bring the clamp-plate back to its first position when the arm Z has released its tension on the wire Y⁴, I attach to it two or more spindles, a, (see Fig. 12,) whose opposite ends travel in and press against springs (not shown) in the tubes b, secured to the bottom of the pen-clamp.

When it is desired to operate the clamp-plate Q by hand instead of automatically, as above described, I provide a tilting lever, d, (see Fig. 13,) which operates directly against the arm Y³ and produces the same action as the automatic mechanism. When the hand-lever d is used, a set-screw, d', is provided to limit its stroke. As the paper proceeds, after having passed over the pen-roller D, it is carried by the conveying-cords F under and around the auxiliary pen-roller E, being turned over during its passage. At this point the paper may be ruled with straight unbroken lines or with a head-ruling, according to the style of ruling mechanism placed above the pen-roller E in or about the position represented in Fig. 1.

The mechanism for doing one head ruling is shown in detail in Fig. 10, in which U³ represents the pen-clamp pivotally supported on the spindle f and provided with a tail, g, having an adjustable weight or spring to counterbalance the weight of the pen-clamp and hold the same up, except when forcibly tilted down.

h is a frame pivoted to a bracket, i, and provided with a series of projecting fingers, j, which rest in grooves in the roller E. As the paper passes under the fingers j the frame h is raised and by means of a pin, p', acting against the elbow lever or arm k, which arm k bears against the spring k' and is pivoted to the pen-clamp behind the pivot f of the latter, the rear end of said clamp is caused to rise and its pens to descend and come in contact with the surface of the paper. As soon as the paper has passed, the fingers j fall again into the grooves in the roller, and the weight or spring of the tail g causes the pens to rise into their first position.

When it is desired to leave an unruled space at the end of the paper for a heading or other purpose, I provide extensible fingers l, whose

rear ends are pivoted near the rear end of the frame *h*, while their front adjustable ends rest in the grooves in the roller *E* at a point below the fingers *j*. Upon the fingers *l* rests one end of a bell-crank, *m*, which is also pivoted to the frame *h*, and is provided at its upper end with a set-screw, *p*, said bell-crank being provided with a spring, *n*, to keep its lower end upon the fingers *l*. By this construction when the edge of the passing paper passes below the fingers *l* they are raised out of the grooves in the roller *E*, and in rising also raise the bell-crank *m*, causing the set-screw *p* of the same to withdraw from the pivoted arm *k*, and allowing the spring *k'* of said arm to throw its lower end rearward upon the pin *p'* of the frame *h*. The various parts retain this position until the front edge of the paper passes under the fingers *j*, when it raises said fingers and operates the pen-clamp, as before described; but the moment the rear edge of the paper passes the fingers *l* they drop again into their grooves and allow the spring *n* to operate the bell-crank *m*, so that its set-screw will push the pivoted arm *k* off of the pin *p'* and allow the rear end of the pen-clamp to fall and withdraw the pens from the paper. As the rear edge of the paper passes the fingers *j* the frame *h* falls, the set-screw *p* moves back, and the pivoted arm *k*, forced by the spring *k'*, again resumes its place on the pin *p'*, as represented in Fig. 10. The fingers *l* are made extensible in order to allow of different lengths of unruled space upon the paper.

On reference to Fig. 15 the construction of the improved receiving-box intended to be used in connection with my machine may be seen. In this figure, *r* represents a cross-bar supported in brackets on the board *t*. *y* are adjustable bars, secured at one end to the cross-bar *r*, and at their opposite ends to a bar, *z*, parallel with the bar *r*. The bar *z* is attached to the bars *y* by adjustable clamps *y'*, so that it can be adjusted to or from the bar *r*, according to the size of paper the box is desired to receive. The bars *y* are also adjustable, so that they can be moved to or from each other, as circumstances may require.

Small pins *y'* may be placed along the bars *y*, and so made that they may fit into series of holes in the board *t*; or, instead of these pins, an adjustable plate, *y'*, can be secured to the board, as represented. The bars are all adjusted to receive the particular size of paper being ruled, and as the paper enters the box it is received by the bars *y*, and as it gets clear of the delivery-roller the center of the paper sags down between the bars and drops through upon the board below, the pins *y'* or plate *y'* guiding it properly.

The bar *r* is on the front of the board, where the paper enters the box.

What I claim as my invention is—

1. In a ruling-machine, the guide-board *G*, in combination with the adjustable piece *H*, the adjusting-screws *I*, connecting the piece *H* and the guide-board, the cover *J*, and the feeding-table, substantially as and for the purpose specified.

2. In a ruling-machine, the spindle *Q*, supported in bearings in an adjustable frame and carrying a nest of graduated spur-wheels, *Q'*, in combination with the spindle *R*, supported in suitable bearings and carrying the adjustable gear-wheel *R'* and the friction-pulley *R'*, said friction-wheel deriving its motion from a revolving part of the ruling-machine proper, substantially as and for the purpose specified.

3. In a ruling-machine, the combination, with the adjustable gear-wheel *R'* and suitable devices for rotating the same, of the graduated spur-wheels *Q'*, cam-head *X'*, cam *O*, pivoted arm *X'*, pivoted dog *O'*, rod *M'*, and connections, substantially as described, between the bar *X'* and the pens, and between the rod *M'* and the stop-plate, substantially as and for the purpose specified.

4. In a ruling-machine, the pivoted pen-clamp *U'*, having a tail, *g*, provided with means, substantially as described, to counterbalance the weight of the pen-clamp, in combination with fingers *j*, resting in grooves in the roller and adapted to tilt the pen-clamp, substantially as and for the purpose specified.

5. In a ruling-machine having a pivoted pen-clamp, the extensible fingers *l*, resting in grooves in the pen-roller, in combination with the bell-crank *m*, spring *n*, and the pivoted arm *k*, substantially as and for the purpose specified.

6. In a ruling-machine, the pivoted pen-clamp *U'*, counterbalanced tail *g* of said clamp, grooved roller *E*, fingers *j*, pivoted arm *k*, spring *k'*, and the pin *p'*, in combination with the extensible fingers *l*, bell-crank *m*, spring *n*, screw *p*, and the pivoted frame *h*, substantially as and for the purpose specified.

7. In a receiving-box for ruling-machines, the board *t*, in combination with the bars *r* *z*, the sliding bars *y*, and adjusting devices *y'* *y'*, substantially as and for the purpose specified.

8. In a ruling-machine, the combination of a pivoted pen-clamp with a grooved roller, fingers fitting in the grooves in said roller, and connections, substantially as described, between the fingers and the pen-clamp, whereby the passage of the paper will operate said pen-clamp, as set forth.

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Witnesses:

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