

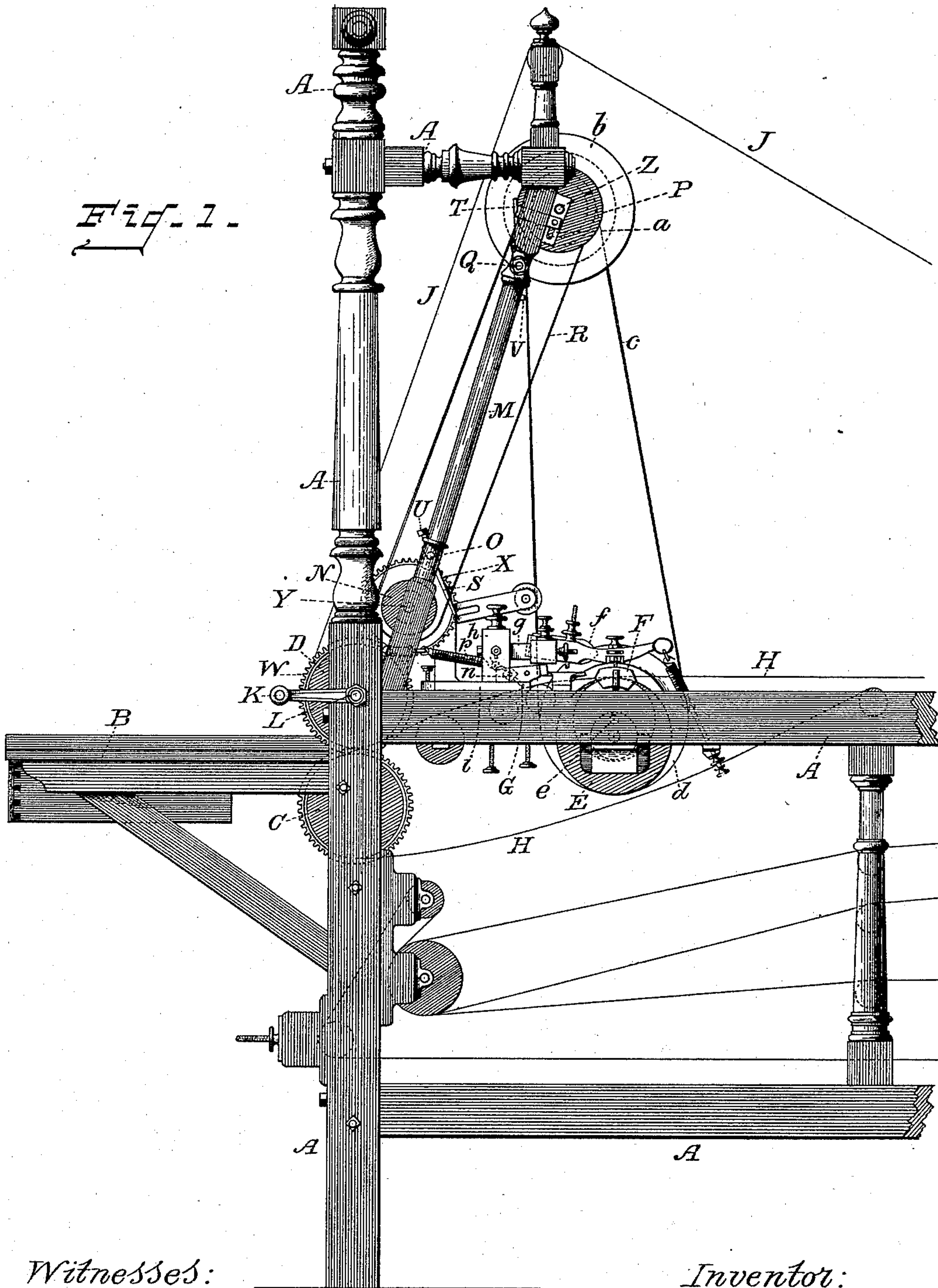
(No Model.)

4 Sheets—Sheet 1.

W. BYRNE.
RULING MACHINE.

No. 442,101.

Patented Dec. 9, 1890.



Witnesses: _____
 Anne Louise Rathbun
 Patrick Hickey

Inventor:
William Byrne,
By Frank R. Rathbun.
Attorney.

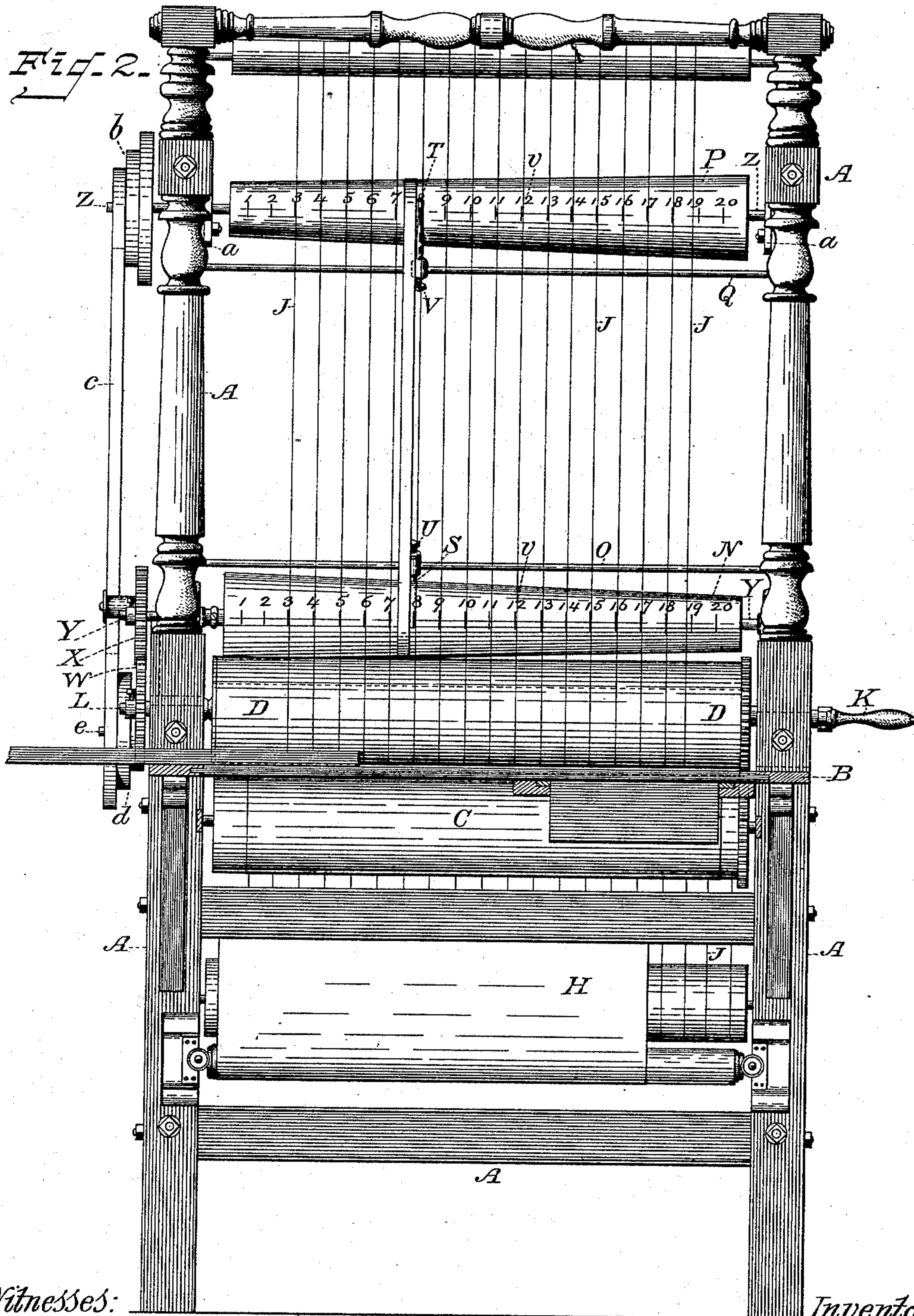
(No Model.)

4 Sheets—Sheet 2

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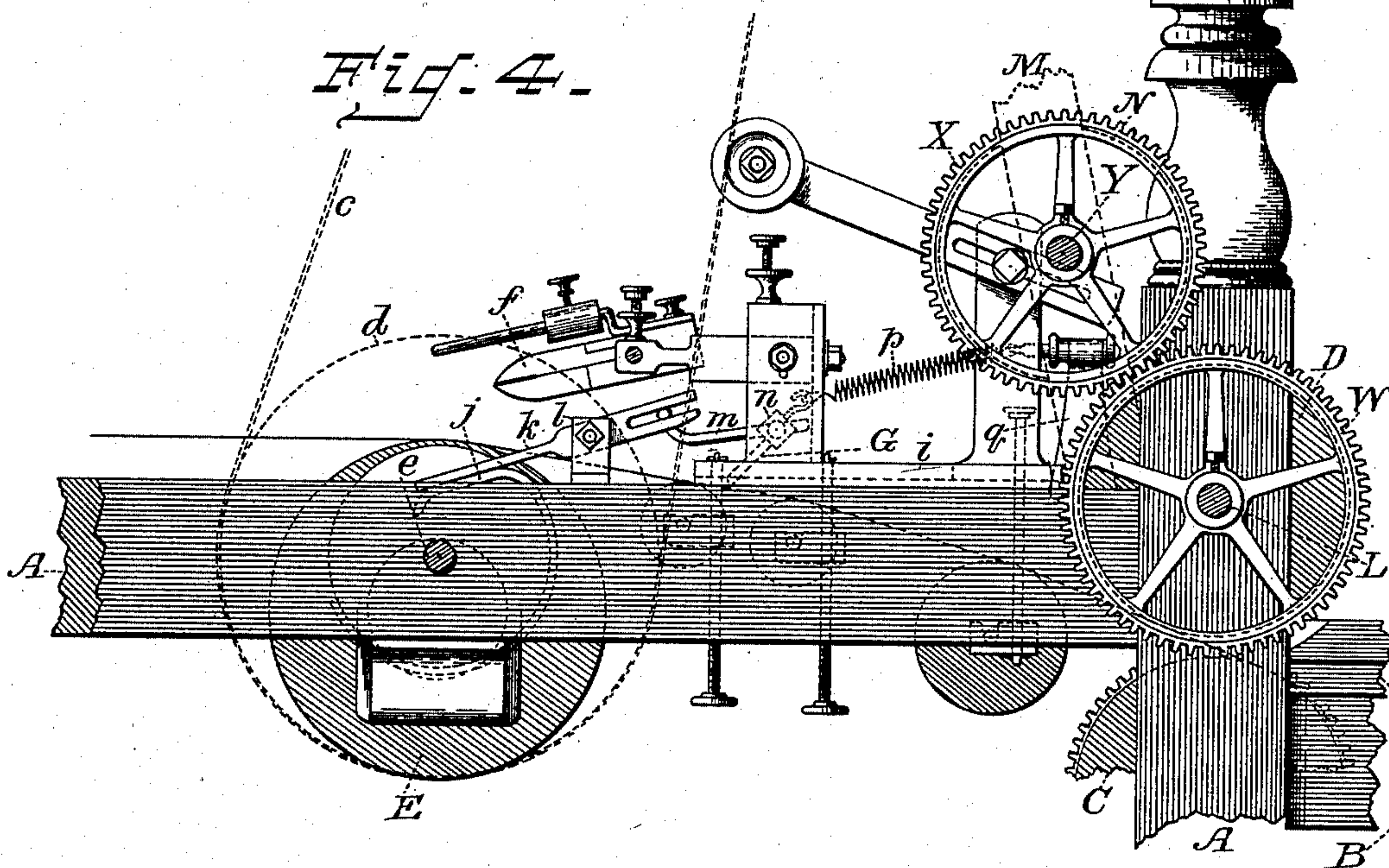
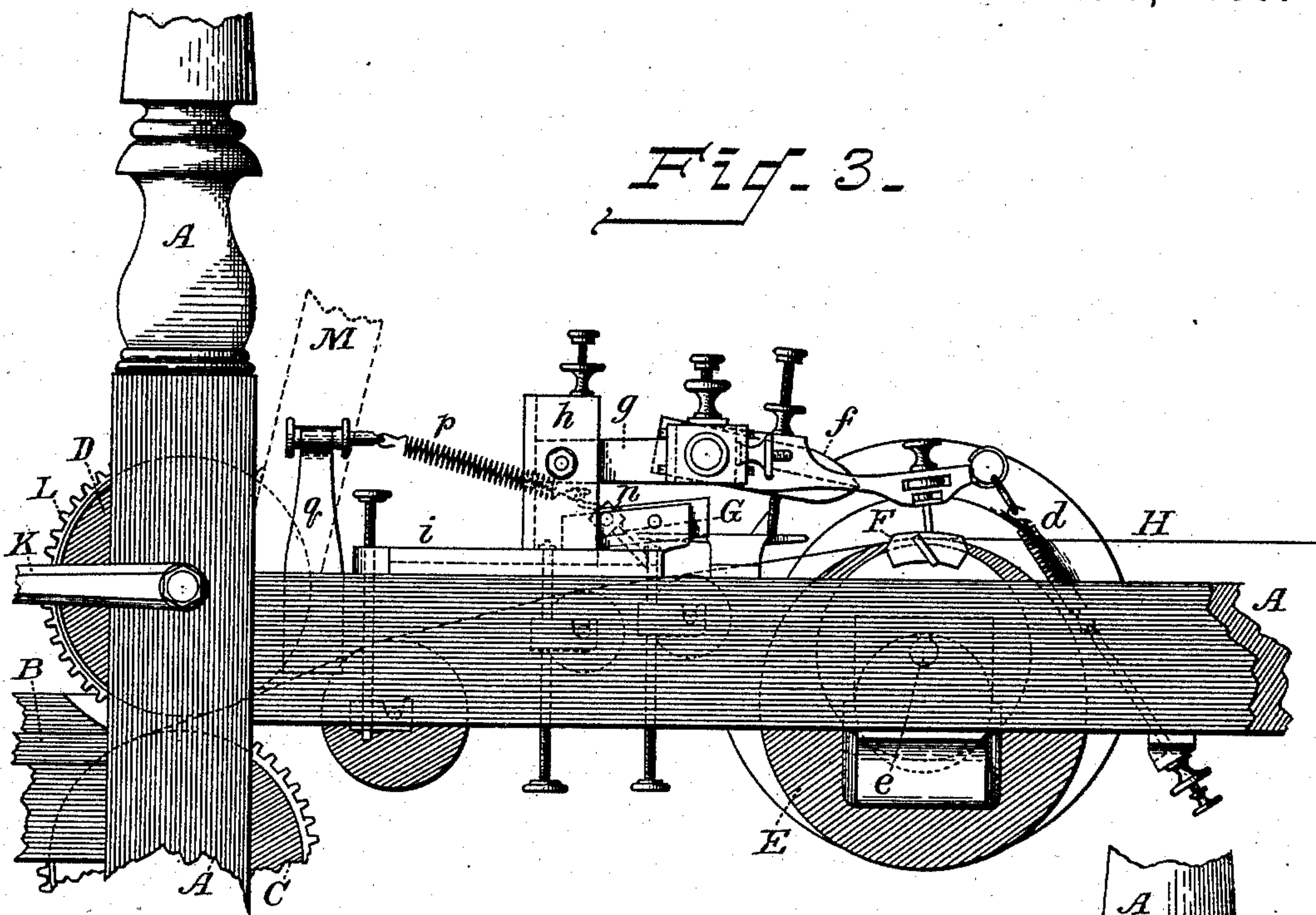
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4 Sheets—Sheet 3.

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4 Sheets—Sheet 4.

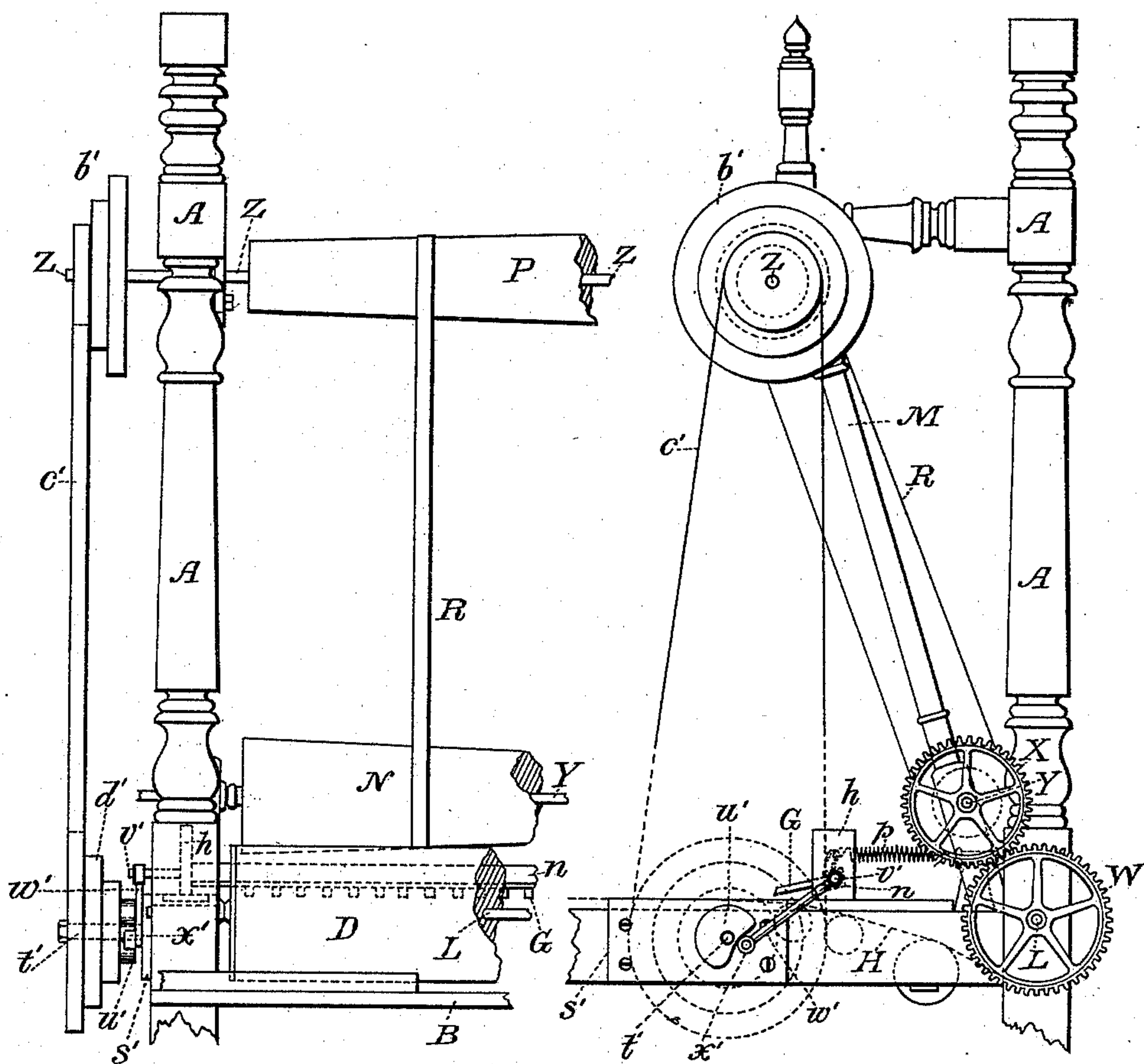
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Fig. 5.

Fig. 6.



Witnesses:
Anna Louise Rathbun
Patrick Hickey

Inventor:
William Byrne,
By Frank R. Rathbun.
Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM BYRNE, OF AUBURN, NEW YORK, ASSIGNOR OF ONE-HALF TO
AMANDA SANFORD HICKEY, OF SAME PLACE.

RULING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 442,101, dated December 9, 1890.

Application filed November 18, 1889. Serial No. 330,788. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BYRNE, a citizen of the United States, residing at the city of Auburn, in the county of Cayuga and State of New York, have invented new and useful Improvements in Ruling-Machines, of which the following is a specification.

The objects of my invention are, first, to provide devices in ruling-machines whereby the lapper-gate may be operated and caused to dwell in the process for any desired length of time and the striker caused to perform its normal functions at any desired rate of speed without the intervention of a train of gears of different-regulated sizes, such as are commonly used for the purpose, and, second, to afford ready and convenient means whereby any desired lapping of the sheets of paper may be readily attained and as positively assured by means of indicating-figures upon the mechanism, thus saving time and inconvenient changing of the parts.

A third object of my improvement is to provide means for actuating the lapper-gate, in the manner already described, in a ruling-machine having no striker attachment thereon.

I attain these objects by means of the mechanism illustrated in the accompanying set of drawings on four sheets, in which—

Figure 1 is a front side elevation of that part of a ruling-machine on which my improvement is carried, the same being drawn to a scale of one and one-half inches to one foot. Fig. 2 is an end elevation of Fig. 1, taken from the feed-table end thereof, and also drawn to a scale of one and one-half inches to one foot. Fig. 3 is a front side elevation of the several mechanical connections appertaining to the lapper-gate and striker, the same being drawn to a scale of three inches to one foot. Fig. 4 is a rear side elevation of a portion of Fig. 3, drawn to a like scale. Fig. 5 is a partial end view of a ruling-machine having no striker, with my improvement arranged to actuate the lapper-gate thereon; and Fig. 6 is a partial rear side elevation of Fig. 5, both being drawn to a scale of one and one-half inches to one foot.

Similar letters refer to similar parts throughout the several views.

In the drawings, A is the frame-work of that part of the ruling-machine to which the paper is fed and to which is attached my improvement.

B is the feed-table.

C is the lower feed-roller.

D is the upper feed-roller.

E is the pen-roller.

F is the striker.

G is the lapper-gate.

H is the conveyer-apron, and J J, &c., are the conveyer-cords.

Motion is imparted to the several parts of the mechanism by means of the hand-crank K, which is fastened on the front end of the shaft L of the upper feed-roller D.

On either side of the ruling-machine and connecting the topmost part of the frame-work A with the mid portion thereof are provided the braces M, which substantially form a portion of the whole frame-work and serve especially to carry the lower cone-drum N and the guide-rod O, adjacent thereto, and the upper cone-drum P and the guide-rod Q, adjacent thereto, the offices of which said cone-drums and guide-rods will be presently defined. The cone-drums N and P are connected by a belt R, and the guide-rods O and Q are provided, respectively, with the guide-fingers S and T, which are held in any desired place thereon by means of the set-screws U and V.

The rear end of the shaft L of the upper feed-roller D is provided with a gear-wheel W, which engages with a gear-wheel X, which is fastened on the rear end of the shaft Y of the lower cone-drum N, by which arrangement motion is conveyed to the said lower cone-drum N.

The upper cone-drum P is provided with a shaft Z, which has adjustable bearings provided near either end thereof upon the braces M. The rear end of the shaft Z of the upper cone-drum P has fastened thereon the cone-pulley b, which is connected by means of a belt c with a cone-pulley d, placed in a reversed position thereto on the rear end of the

shaft *e* of the striker F. The shaft *e* of the striker F passes through the pen-roller E, which is a hollow cylinder, and has bearings, in which it is free to rotate, fastened at either side of the frame-work A and independent of the bearings of the shaft of the pen-roller E, after the ordinary manner of construction. On the forward end of the shaft *e* and between the frame-work A and the end of the pen-roller E is fastened the striker F, which is so constructed as to admit of being fastened thereon, by means of thumb-screws, cam-pieces of different degrees of length to meet the requirements of the occasion. As this feature in a ruling-machine is well-known, I do not deem it necessary to enter into its detail. The striker F actuates the pen-clamp *f* up and down, the said pen-clamp *f* having free bearings at either end in horizontal bars *g*, which are fastened to a vertical and movable stand *h*, which is provided for the purpose on the casting *i*, which is properly fastened in position on the frame-work A, as clearly indicated in Figs. 3 and 4. On the rearward end of the shaft *e* and between the frame-work A and the rear end of the pen-roller E is fastened a cam *j*, (see Fig. 4,) which actuates as it is rotated the lever *k*. The said lever *k* is pivoted near its central part to a stand *l*, which is properly fastened on the frame-work A, and from thence is extended into a slotted end, in which engages the cranked end of the arm *m*, which has its other end fastened to the cross-bar *n* of the lapper-gate G for the purpose of communicating motion thereto. The lapper-gate G is composed of a series of fingers attached to the cross-bar *n* throughout its length, which serve when they are brought to bear downwardly upon the conveyer-apron H to arrest the flow of the sheets being operated upon successively. A spiral spring *p*, one end of which is attached to a projecting hook on the forward end of the cross-bar *n* and the other end to an upright piece *q*, fastened to the forward part of the frame-work A, serves by its recoil to keep the lapper-gate G raised from the conveyer-apron H, that it may allow of the unobstructed flow of the sheets being passed. It will thus be seen that the sheets are prevented from being conveyed to the pen-roller E only at such times as the cam *j* causes the lever *k* to operate the arm *m* of the cross-bar *n*, and consequently cause the lapper-gate G to bear downwardly on the conveyer-apron H, and thus obstruct the successive flowing of the sheets for such period as necessary to form the desired lap or heading of each sheet. The width of the lap of the sheets as they are carried by the conveyer-apron H to the pen-roller E becomes, it will be seen, a matter of fact dependent on the difference in the rate of revolution between the cam *j* and the feed-rollers C and D. Thus the quicker the revolution of the cam *j* over that of the feed-rollers C and D the less obstruction is given by the lapper-gate G to

the sheets, and consequently the greater lap or heading to each is the resultant. The nearer uniform, however, the speed becomes between the cam *j* and the feed-rollers C and D the narrower are the said laps or headings of the sheets. A varied range of lapping may thus be given and successfully operated by the use of the cone-drums N and P alone and simple pulleys for the transmission of power. This range, it will be seen, is greatly augmented by the use of the cone-pulleys *b* and *d* for the transmission of power. As the said cone-pulleys have three different diameters, for the convenience of the operator I provide on one or both of the cone-drums N and P three readings to meet the three different ranges of speed given by them over and above the range of speed afforded by the cone-drums N and P alone. One of these readings is shown at V on each of the cone-drums N P. The said indexes may be classified as "large," "medium," and "small," and correspond with a reference-table on which the several ranges and the subdivisions of each are given as found by actual experiment and to which the operator refers for the required lap of the sheets of paper. It thus only becomes a matter of the change of the belt *c* to the desired range of the cone-pulleys *b* and *d* and the proper adjustment of the belt R to the required subdivision of said range on the cone-drums N and P, the said belt R being held in its required place by means of the guide-fingers S and T on the guide-rods O and Q, as already described.

In a ruling-machine having no striker attachment I arrange the several parts for producing the identical results as follows: The positions of the cone-drums N and P remain the same as shown in Figs. 5 and 6. The shaft Z of the cone-drum P is sufficiently extended to admit of the fastening thereon, outside of the rear side of the frame-work A, of the cone-pulley *b'*. (See Figs. 5 and 6.) In suitable position on the rear side of the frame-work A is secured the plate *s'*, which has furnished on it the stud-pin *t'*. On the stud-pin *t'* of the plate *s'* is placed the cam *u'*, which is made fast to the cone-pulley *d'*, which is also placed on the stud-pin *t'* in a reverse position to but in line with the cone-pulley *b'* of the shaft Z of the cone-drum P. The cone-drums N and P are connected by the belt R, as already described, and the cone-pulleys *b'* and *d'* are connected by the belt *c'*. The pivot end *v'* of the bar *n* of the lapper-gate G is extended rearwardly through the stand *h* sufficiently for the fastening thereon in line with the cam *u'* of the arm *w'*, which is provided at its lower end with a roller *x'*, which bears against the cam *u'* of the cone-pulley *d'*, both of which latter are free to rotate on the stud-pin *t'* of the plate *s'*, already described. The lapper-gate G is kept in a raised position from the surface of the conveyer-apron H by means of the recoil of the spring *p*, already described.

From the above description of the several parts of my improvement, whether they be arranged and combined in a ruling-machine with or without a striking attachment, it will be observed that a great and varied range of the lapping of the sheets of paper is afforded. As already mentioned, this has usually been accomplished by a series of intermediate gears of differently-numbered teeth, so disposed and changed, especially in a machine having a striker attachment between the gear on the end of the shaft of the upper feed-roller and a gear on the end of the shaft of the striker as to give the desired results in the lapping of the sheets. This has been at the expense not only of time and labor in effecting the desired changes, but at the expense of power for driving the several parts.

When unruled spaces are desired on the sheets of paper of different degrees of width, they are formed, as heretofore, by different arrangements in the length and number of the striker-pieces clamped on the striker without interference with the operative functions of the lapper-gate.

The sheets of paper are fed from the feeding-table to the feed-rollers indiscriminately, but with a degree of lap greater than that required in order to insure proper lapping by the lapper-gate. It will thus be apparent that the process of a uniform lapping, spacing, and ruling of sheets is an uninterrupted series of automatic performance assured in its results by the several parts of mechanism and their arrangement which I have described.

Having thus described my improvements and their operation, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a ruling-machine, the lower cone-drum N and the upper cone-drum P, arranged in a reverse position to each other and connected by the belt R, each of the said cone-drums provided with a series of readings, in combination with the cone-pulley *b*, arranged on the shaft *z* of the upper cone-drum P, and the cone-pulley *d*, arranged in a reverse position on the shaft *e* of the striker F, substantially constructed and arranged as and for the purpose herein described and specified.

2. In a ruling-machine, the lower cone-

drum N, provided with a series of readings and connected with the reversed upper cone-drum P, also provided with a series of readings, by the belt R, and the cone-pulley *b*, arranged on the shaft Z of the upper cone-drum P and connected by the belt *c* with the cone-pulley *d*, arranged on the shaft *e* of the striker F in reverse position, in combination with the cam *j* of the shaft *e* of the striker F, for actuating and timing the lapper-gate G, substantially in the manner and for the purpose herein described and specified.

3. In a ruling-machine, the lower cone-drum N, the reversed upper cone-drum P, each provided with readings and connected by the belt R, and the cone-pulley *b'*, arranged on the end of the shaft Z of the upper cone-drum P, in combination with the reverse cone-pulley *d'*, and the cam *u'*, rotating on the stud *t'* of the plate *s'*, for actuating and timing the lapper-gate G, substantially in the manner and for the purpose herein described and set forth.

4. In a ruling-machine, the reversed cone-drums N and P, provided with readings and connected by the belt R, and the cone-pulley *b'* of the shaft of the cone-drum P, connected by the belt *c'* with the cone-pulley *d'*, having the cam *u'* and rotating on the stud-pin *t'* of the plate *s'*, in combination with the arm *w'* of the bar *n* of the lapper-gate G, substantially constructed and arranged in the manner herein described and specified.

5. In a ruling-machine, the reversed cone-drums N and P, provided with readings and connected by the belt R and driven by means of gearing between the feed-roller D and the cone-drum N, in combination with the reversed cone-pulleys *b* and *d* and the cam *j*, said reversed cone-pulleys *b* and *d* being connected by the belt *c*, the whole arranged and combined for joint operation in the manner herein described, and for the purpose specified and set forth.

In testimony whereof I have hereunto set my hand this 13th day of November, A. D. 1889.

WILLIAM BYRNE.

In presence of—

H. J. KNAPP,

FRED P. CHESEBRO.