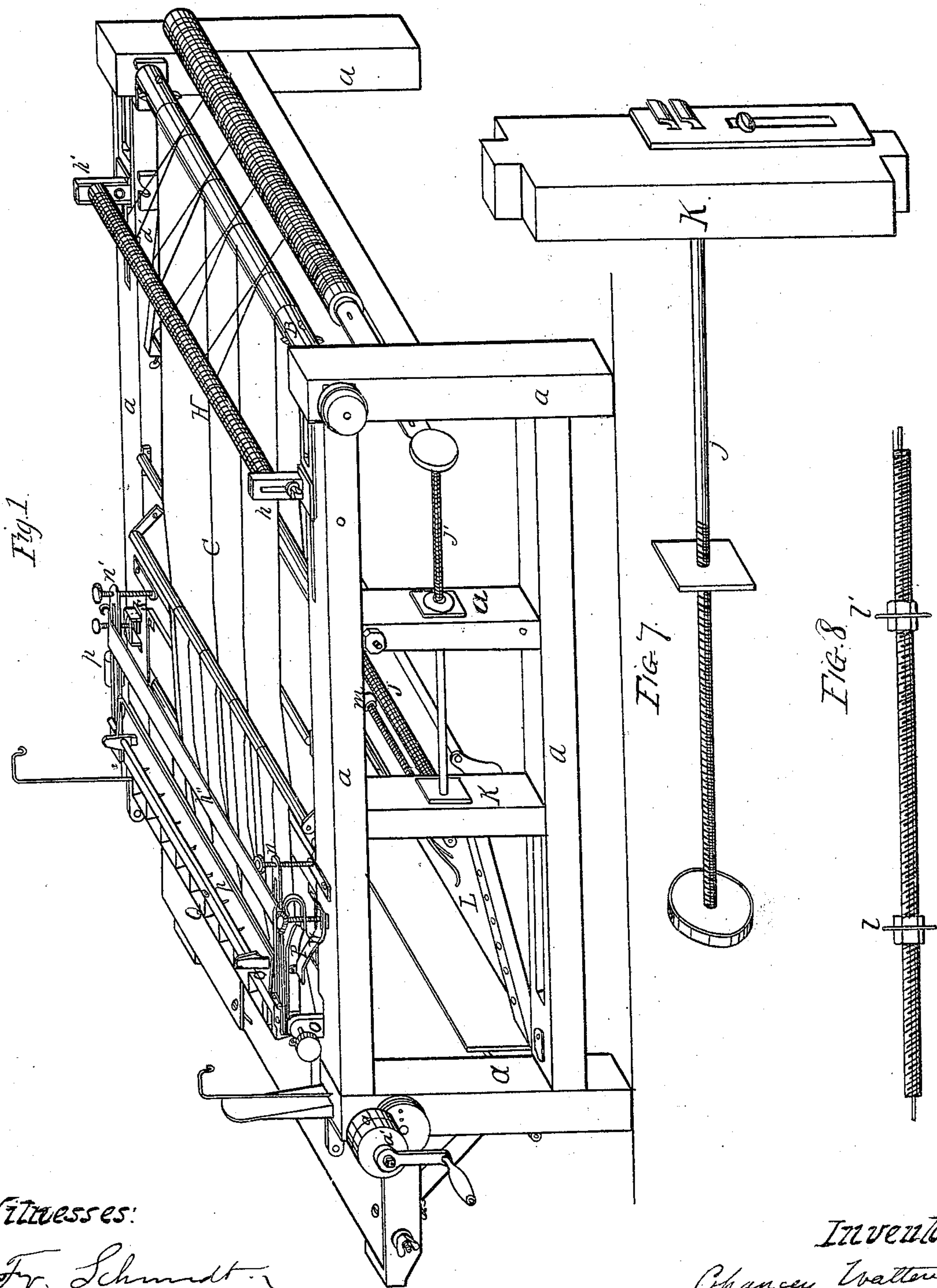


*C. Walton. Sheet 1. 2 Sheets.*  
*Ruling Mach.*

*N<sup>o</sup> 44,243. Patented, Sept. 13, 1864.*



*Witnesses:*

*Fr. Schmidt*  
*Henry Schmidt*

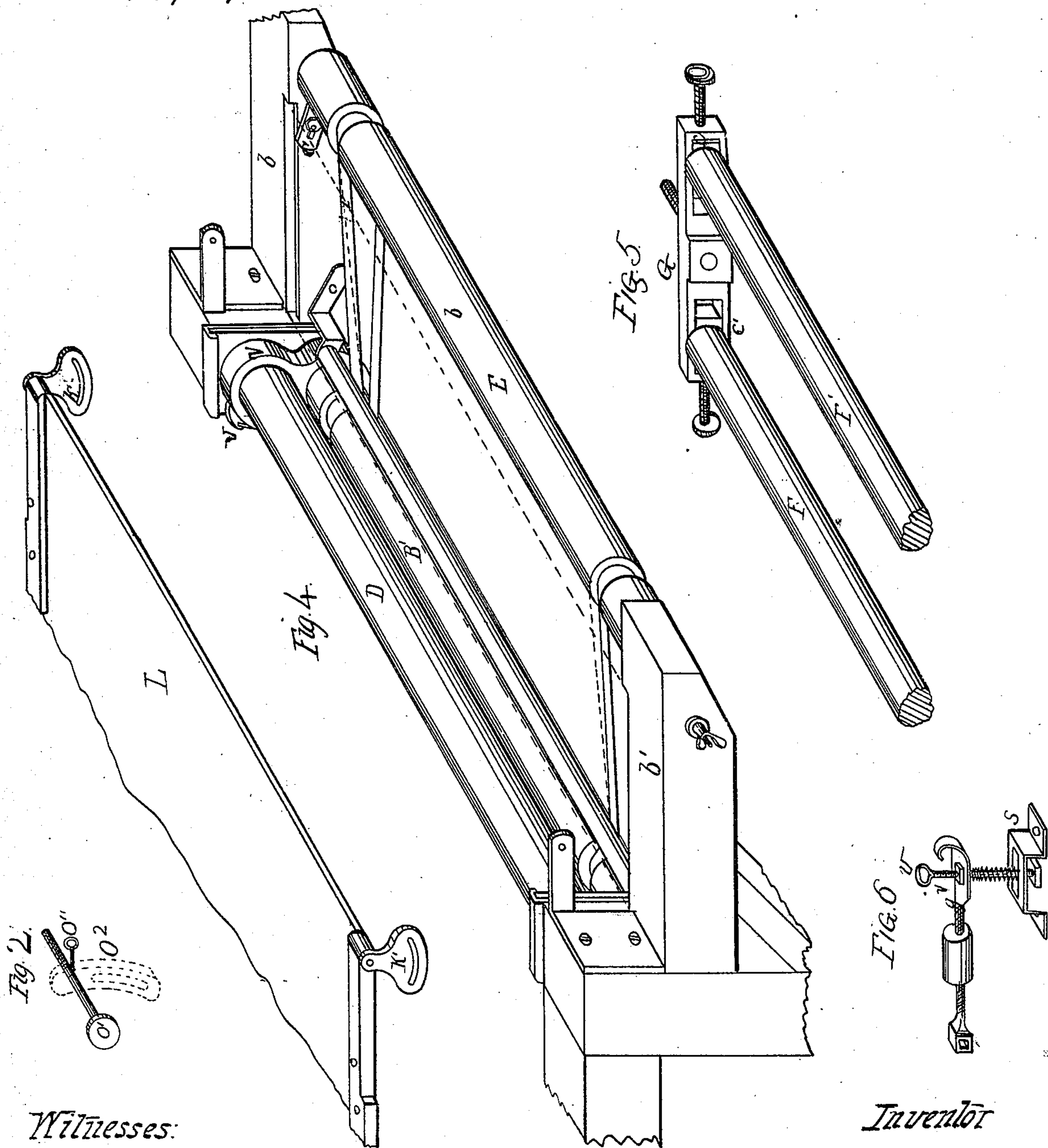
*Inventor*

*Chancey Walton*  
*By Baldwin Son*

*C. Walton. Sheet 2. 2 Sheets*  
*Ruling Mach.*

*No 44,243.*

*Patented Sept. 13, 1864.*



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# UNITED STATES PATENT OFFICE.

CHAUNCEY WALTON, OF WASHINGTON, DISTRICT OF COLUMBIA.

## RULING-MACHINE.

Specification forming part of Letters Patent No. 44,243, dated September 13, 1864.

*To all whom it may concern:*

Be it known that I, CHAUNCEY WALTON, of the city of Washington, in the District of Columbia, have invented a new and useful Improvement in Paper-Ruling Machines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view of a ruling-machine to which my improvement is attached. Fig. 2 is a detached view of one of the bearings of the pen-beam. Fig. 3 is a view of the front of the drop-box and its attachment. Fig. 4 is a detached view of front end of the machine. Fig. 5 is a view of one end of the stretching-rollers for the carrying-cloth. Fig. 6 is a detached view of the balance attachment to the pen-beam. Fig. 7 is a detached view of the standard and screw on one end of the machine for increasing the length of traverse of the ruled paper, and Fig. 8 is a detached view of the roller to direct the ruled paper into the drop-box.

The same letters refer to like parts in all the figures of the drawings.

The known ruling-machines are all defective in many particulars. They occupy too much space for the limited quantity of work they are capable of yielding in a given time, and they are limited in their capability of drying the work as produced at all seasons, nor do they provide properly against hygrometric changes in the atmosphere of the ruling-room, and they are, moreover, not capable of producing with economy a sufficient variety of work automatically. Now, it is the object of my invention to remedy these defects by enabling the machine to do a large quantity of work in a given time, to vary the character of the work by producing longitudinal rulings and spaces in any degree or numbers desired on the same sheet, and to keep the paper and aprons of the machine at all times dry, and render the tension of the cloth cords and aprons always uniform; and to this end my invention consists; first, in varying the bearings for the cloth cylinders and rendering these cylinders changeable to keep the paper longer on the machine, and in heating them to deliver the paper dry to the drop-box under all

atmospheric changes; second, in passing the cloth between heated cylinders supported in an independent frame turning within the main frame to keep the cloth uniformly dry and control its tension, and to enable the same cloth to be used when the carrying-cylinders are changed from one bearing to another in the main frame; third, in the employment of fine non-corrosive wire for guiding, relieving, and carrying the paper, and thereby render them uniformly equal in tension and independent of hygrometrical changes; fourth, in adjusting the rollers for the carrying tapes or aprons, so that while of uniform length they shall be capable of delivering the paper properly after a greater or less distance of traverse; fifth, in hinging the rear end of the drop-box to movable standards in the frame by adjustable supports, to let it advance or recede to receive the paper after a longer or shorter traverse and at any angle desired; sixth, in the employment of adjustable disks on the guide-rod over the rear of the drop-box to depress the paper without blotting; seventh, in the employment of an auxiliary extension pen-clamp, in combination with the pen-beam for the purpose of automatically ruling varying sets of lines in varying lengths at the same time; eighth, in the employment of a spring-support on both ends of the pen-rest to depress uniformly or evenly across the paper longer or shorter pens, or pens at different angles to rule longer or shorter lines at pleasure or with more or less space between them longitudinally; ninth, in balancing the fountain by a positive detent on the adjusting-screw that regulates the distance of vertical movement of the pens; tenth, in combining the front carrying cloth roll with the driving roller by elastic belts, so that while the roller is adjustable the belts will yield a uniform tension, and thus work independent guide rolls for the carrying-cords, also adjustable in swinging brackets; eleventh, in supporting the pen beam or rest in slotted curved supports to vary its position on the frame, and combining therewith a screw end support that will keep the pen stationary in position or permit it a slight longitudinal vibration to vary the position of the ruled lines, as described; twelfth, in boxing the gearing to prevent catching or soiling the paper, and combining



therewith a pawl resistance to prevent the movement of the cloth and cords in the wrong direction.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A suitable frame, A, supports at its front and rear ends in proper bearings the cloth-rollers B and B', which have pins projecting from both ends in the form of teeth, that may match in the links of a chain or in the openings in a belt running around them, to equalize their motion and serve to keep the cloth C uniformly in the center of the rollers and always straight. Motion may be communicated to the endless cloth C from either roller and the driving-power applied at either end; but I prefer to impart the proper motion to the roller B' in front of the frame from a finely-grooved roller, D, Fig. 4, the journal of which may carry a fast and loose pulley, *a* and *a'*, or a crank-arm when ruling by hand. Between the frame A and the roller D, and on its journal, is secured a cog-gear that matches into a gear on the roller B', both journals of the roller D being secured in proper boxes attached permanently to the frame A, all as arranged in the most approved ruling-machines. Now that the work may be properly dried in passing through the machine, I employ metallic hollow rollers and heat them by any of the usual methods of heating—by hot air, steam, or cores—to that degree required by the hydrometric condition of the atmosphere of the ruling-room; but even then under some conditions the paper is not retained a sufficient length of time in the machines of ordinary size to deliver the work in perfect condition to the drop-box, and to remedy this and retain the paper as long as necessary I give it a greater traverse through the machine by the use of an auxiliary roller, E, placed at the extreme end of the projecting arms *b* and *b'* of the frame, to which the roller is attached by swinging slotted brackets *c*, Fig. 4, that allow it both longitudinal and vertical adjustment. When this roller is used, the roller B is moved forward in the frame to the bearings, of which one is shown at *d*, Fig. 1, when a longer cloth may be used.

To control the tension of the cloth, whether using a short or long one, and keep it dry under all conditions of work or of hydrometric changes of the atmosphere of the ruling-room, I employ an independent frame, one end of which is shown in Fig. 5. This frame consists of two end pieces, one of which, G, is shown in Fig. 5, slotted at each end to receive shifting bearings for two metal hollow rollers, as at *e* and *e'*. The rollers F and F' are supported by and rotate in the bearings *e* and *e'*, and the frame is pivoted in the center of the end pieces or studs, which are attached to the main frame, so as to permit the roller-frame to turn upon its bearings. When the roller-frame is placed in position, one roller will be above the lower half of the cloth and the other

roller below it; or, in other words, the cloth will pass between the rollers, and when the frame is turned toward a vertical position it is obvious that the cloth will be shortened by the curvature between the rollers, and this may extend so far as even to double the under side of the cloth upon the rollers without presenting any obstruction to its free rotation, and thus any variation in the length of the cloth will be under the control of the roller-frame and the tension will always be uniform; and, as the roller F and F' can be readily heated to any desired degree, it is obvious that the cloth and paper can be kept uniformly dry, as well as that a longer or shorter cloth may be used with equal uniformity of results.

To guard against unequal lengths of relieving-threads and render the tension of these uniform, I use fine wire instead of fibrous threads, and conduct them over the cloth and roller B and around between the rollers F and F' to around a finely-grooved roller hung in swinging brackets attached to the front of the frame beneath the table, and between the grooved driving-roller D and the roller B'. The wire may be non-corrosive, if desired, and will not strain nor expand unequally, and the tension can be adjusted with absolute certainty and ease by a simple movement of the small grooved roller.

To enable a single set of carrying wires, tapes, or threads, or a single carrying-apron to be used, whether retaining the paper a longer or shorter period for drying in the machine, I place a grooved supporting-roller, H, in slotted adjustable brackets *h* and *h'*, and support these on slotted bases that are fastened by set-screws to the main frame, and a second grooved carrying-roller, J, I attach by fixed bearings to the sliding standards, of which one is shown at K. Now, when it is designed to retain the paper but the usual time in the machine the rollers H and J occupy the relative positions shown in the drawings, but when the paper is to be subject to a longer traverse through the machine the slotted brackets *h* and *h'* and the roller H are reversed on the main frame, and the roller will then rest next the rear standards, and the roller J is advanced the distance forward necessary to give the carrying wires or apron the proper tension, and thus while the wires or aprons are unaltered in length they will give the paper a traverse long enough to deliver it dry to the drop-box and greatly increases the productive capability of the machine within any given time, and at the same time receive a perfect tension in the wires or apron.

To use the same drop-box L to receive the ruled paper when it is to be delivered at any point within the discretion of the operator, I attach it at its rear end by slotted hinges *k* and *k'* to the sliding posts, of which one is shown at K in the drawings, thus when the traverse of the paper is long the box will be moved forward by the screws *j* and *j'* to the distance required, and by the movement of the slotted



brackets it can be raised or lowered and fastened in position to receive the paper at any angle desired, and the front of the box may pass beyond the frame to accommodate long paper.

To secure the regular delivery of the paper to the drop-box wherever situated or at whatever angle, I employ a roller, as shown in Fig. 8, which has a screw cut on its whole length, on which are placed three metal disks, *l* and *l'*, adjusted by nuts on each side of each disk to hold them in place. This roller is hung in swinging slotted brackets, and so that the disks shall rest on the carrying-roller *J*, as at *m* in Fig. 1, from which it derives its motion. Now, as the disks are thin and can be truly adjusted with precision, it is manifest that they can be made to run always in the spaces between the ruled lines, and thus avoid all blotting or blur when the paper shall be delivered into the drop-box before the ink is properly dry.

To rule automatically two or more sets of lines commencing at a fixed distance apart, I employ one or more auxiliary extension pen-clamps, one being shown in the drawings at *h''*, which is united to the main pen-beam by slotted arms *n* and *n'* by set screws, which permit the auxiliary clamp to be adjusted to any desired distance from the pen-clamp of the pen-beam. It is obvious that by this arrangement the paper can be automatically ruled with two sets of lines by passing it once through the machine, whereas to rule an equal number or set of lines on the known ruling-machines now in use it will be necessary to pass the paper through the machine twice, and thus I largely economize the labor of attendance and double the amount of work of the machine by my improvement.

In many descriptions of work it is required that the paper shall be ruled with lines of different lengths, and with longitudinal spaces of different lengths between the lines, and such work is now only done by passing the paper more or less frequently through the machine; but this I effect by introducing a spring at each end of the clamp and employing pens of different lengths or in placing these pens at varying angles to the clamp.

In Fig. 1 of the drawings, *O* represents the pen-beam, and *P* the pen-clamp, of the known ruling-machine. The beam is so pivoted in proper bearings as to have the fountain *Q* balanced by the adjustable weight *p*. This weight is shown in Fig. 6 as moving on a screw constituting the rod *q*, one end of which fits with a square mortise on the end of one—the left-hand journal of the pen-beam. The opposite end of the rod *q* is flattened to receive a screw-thread, into which a screw, *r*, is inserted that passes beneath a raised bracket, *s*, slotted to permit a longitudinal movement of the screw *r* therein. A spiral spring surrounds the screw, and a nut beneath the bracket permits

the screw a limited amount of vertical motion without permitting it to rise out of the slot in the bracket. On the opposite or right-hand end of the pen-beam I attach a rest, *t*, to which a pendent arm, *u*, is attached, and this arm constitutes a flattened spring. The rest and spring are connected by a set-screw which can hold them farther apart or nearer together according to the work required; or the screw may be raised out of control with the spring when the position of the beam will be governed by the spring alone, and then when the beam is depressed by pressing on the pen-rest the clamp will sink with perfect uniformity from one side to the other, for the spiral spring on the screw *r* will keep the left end of the clamp always in place with the right end, and thus the pens will rule equal lines over the whole width of the clamp; but when it is desired to vary the length of the lines and the length of the spaces which separate them longitudinally, it is only necessary to place shorter alternate pens between those for ruling the longer lines within the clamps, or varying the angles of depression of the pens of the same length in the alternate series and number required, and under either condition the depression of the pen rests on the right side of the machine, while the longer pens, or those at a more acute angle are ruling, will bring the shorter or more obtusely placed pens to bear on the paper, and thus accomplish at once passing the paper through the machine a variety of work that will require to be passed many times through the known machine, with greatly increased liability to produce imperfect work.

In the use of a fountain in which the quantity, and of course the weight, of the ink is constantly changing, an extremely nice adjustment of the balance between the fountain, beam, and clamp is necessary, and this I effect by the screw *r* and the nut under the bracket *s*, for while the weight *p* on the screw-rod *q* will serve as a balance to a limited extent when the fountain is only partially filled, when it is quite full the weight would not operate with uniformity, and then the tightening or loosening of the screw *r* on its nut beneath the bracket will regulate the balance with nearly absolute precision, while the slot in the bracket allows the screw all the longitudinal movement required in any change of position of the pen beam, and at the same time the nut under the bracket renders it impossible to tilt the fountain and spill the ink or inks it may carry, because the rise of the screw will be prevented by the bracket.

In giving the longest traverse to the paper it becomes necessary to pass the endless cloth *C* around the front roller, *E*, and to relieve the cloth from the rotation of the front roller by its friction, I employ elastic bands *1* and *1'*, (shown in Fig. 4,) from which the table is removed, and thus while the roller is vertically



adjustable in its slotted bearings the motion will always be uniform and the tension on the roller only such as required to assist the cloth in giving it a free, light, and equal relation in its bearing at whatever elevation it may be used.

In many descriptions of work it becomes necessary to give a slight longitudinal motion to the pen-beam, and yet this must always be steady. To effect this vibration, I fit the journals of the pen-beam in close bearings in curved slotted brackets  $O^2$  in Figs. 1 and 2 being one. The journal of the left end of the pen-beam is a little longer than its bearings are thick, and that on the right side of the pen-beam.

Fig. 2 is a screw,  $O'$ , which fits firmly into the end of the beam, and is slotted within the journal to receive a tightening-screw,  $o''$ . Now, when it becomes expedient to give a longitudinal movement of the beam to change the position of all the pens in the clamp, the tightening-screw  $o''$  is withdrawn from the slot, and then the screw  $O$  can be retracted the required distance, and as it is fast in the pen-beam the latter must, of course, move with it, and the changed position of the pens will necessarily take place. The slotted bearings are fastened by clamp-screws to the frame, and when the pen-beam is to be changed to suit a long from a short traverse of the paper in the machine the clamping-screws may be released and the curved slotted supporter  $O^2$  will then vibrate the required distance, and the screws being tightened, the new portion of the beam will be secure and rigid.

It is of much importance to prevent the paper in its passage through the machine from becoming soiled, or have its position changed by a reverse motion of the driving-wheel, which often occurs in the hand-work or the known ruling-machines. To effect both these purposes I inclose the gearing in a close shield-box,  $V$ , Fig. 4, which prevents the escape of the grease upon the paper, and keeps the paper from entering between the wheels, and I attach to one side of the shield  $V$  a pawl,  $v$ , (seen in Fig. 4,) which is always engaged with the teeth of the driving-gear on the finely-grooved cylinder  $D$ . Now, while the gear-wheel is imparting a forward motion to the cloth-roller the pawl  $v$  will slide over its teeth without obstructing the motion of the machine; but when, from carelessness or accident, it is attempted to turn the cylinder  $D$ , either by its driving-pulley or crank-arm, in the wrong direction the pawl drops against the face of the teeth of the gear-wheel and immediately stops the machine, so that no displacement of the paper under the pens or on the cloth can possibly take place. When necessary to turn the machine in a reverse direction, the pawl may be raised out of its connection.

Having thus described the principles and operation of my invention, what I claim there-

in as new, and desire to secure by Letters Patent, is—

1. The combination of two or more cloth cylinders with two or more sets of shifting adjustable beams and the main frame, to give the paper a longer or shorter traverse in the same frame and deliver it dry to the drop-box, substantially in the manner described.

2. The combination of the heated roller-frame with the main frame and the endless cloth, substantially in the manner described, for the purpose of using cloths of varying lengths in the same machine, under a uniform tension, and keeping the cloth dry under all hygrometric conditions of the atmosphere of the ruling-room.

3. The combination of fine wire, whether non-corrosive or otherwise, with the apron, and with fine grooved rollers, substantially in the manner described, to secure a nearly uniform tension under all changes of moisture and temperature in the atmosphere of the ruling-room.

4. In so combining the carrying-roller  $H$  with the carrying-roller  $J$  and the carrying-wires that the same wires may be used to give a greater or less traverse of the paper through the machine, when arranged and operating substantially in the manner described.

5. The combination of the drop-box, its hinged supports, and the sliding standards, for the purpose of changing its position in the frame to any length of traverse of the paper, and to receive the same at any angle of delivery desired, when arranged substantially as described.

6. The combination of the longitudinally-movable disks with the screw-roller and the carrying-roller  $J$ , substantially in the manner described, to press the paper into the box without blotting, and while the ruled lines are yet moist.

7. The combination of one or more auxiliary extension pen-clamps with the pen-beam, substantially in the manner described, for the purpose of automatically ruling lines of varying lengths at the same time and upon the same sheet or sheets of paper.

8. The combination of a pen-clamp carrying a spring at each end with pens of different lengths, or with pens placed at different angles to the paper, substantially in the manner described, for the purpose set forth.

9. The combination of a pen-beam with a fountain, and with the mechanism for balancing the beam, when arranged and operating substantially as and for the purpose described.

10. The combination of the front carrying cloth roller with the roller  $B$  and with the cloth, when so arranged and operating that the cloth and roller  $B$  shall each contribute to drive the front roller and render its tension uniform at whatever position it may be in its bearings.

11. The combination of the curved slotted bearings O with the pen-beam, substantially in the manner described, so that the position of the beam shall be adaptable to any length of traverse through the machine, and at the same time permit in all positions a longitudinal vibration of the beam at the will of the operator.

12. The combination of the driving-gear,

the box for the same, and a self-acting pawl, arranged and operating substantially in the manner and for the purpose described.

In testimony whereof I have subscribed my name.

CHAUNCEY WALTON.

Witnesses:

JOHN S. HOLLINGSHEAD,  
J. M. HANSON.