E. GOUPTEL.

Machine for Ruling Paper.

No. 214,033. Patented April 8, 1879.

Fig. 1.

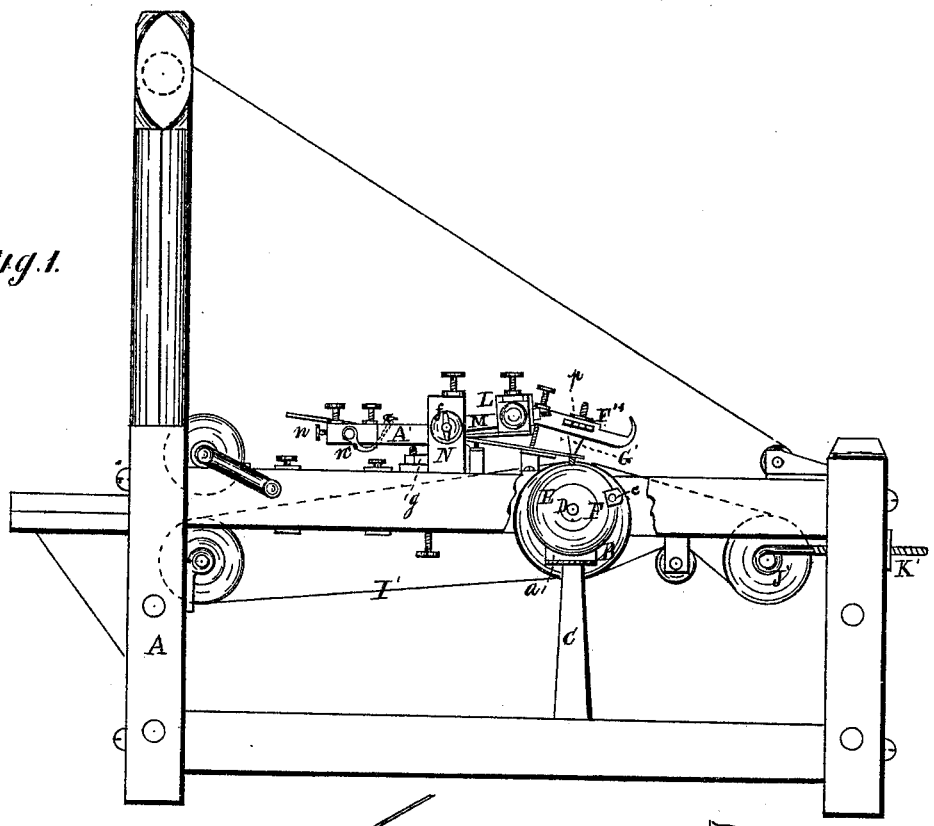
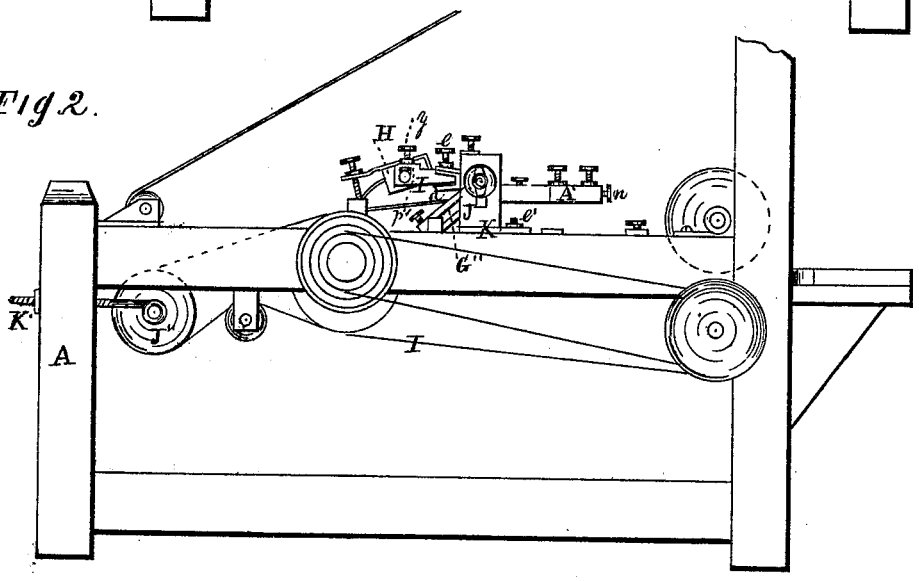


Fig 2.



Witnesses,
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Fig. 3.

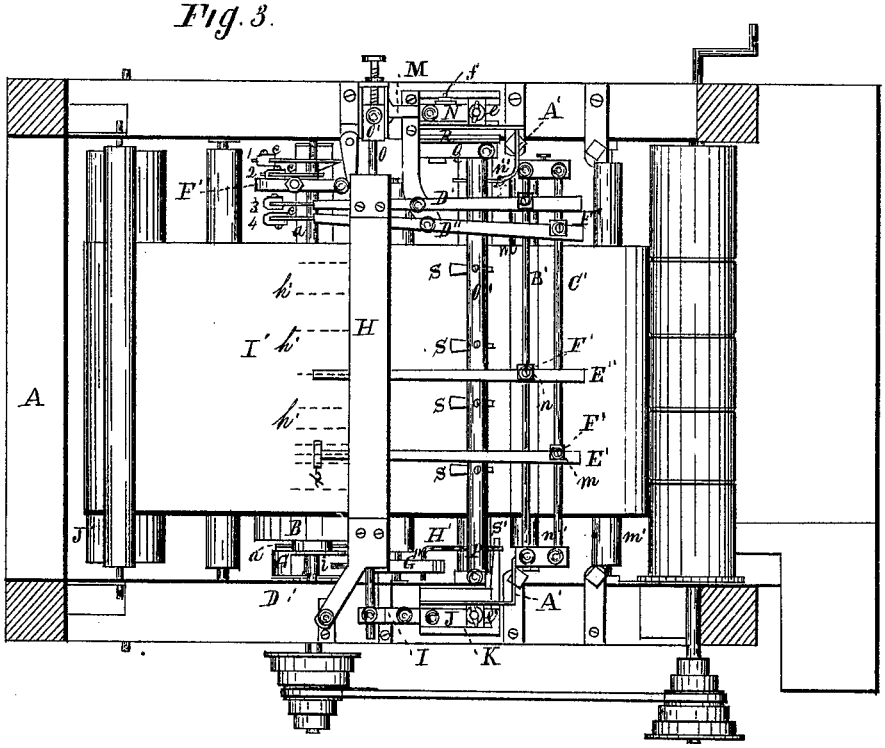


Fig. 4.

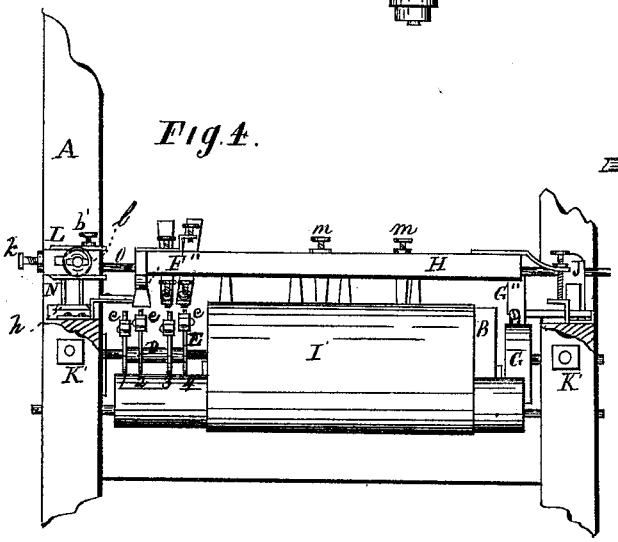


Fig. 5.

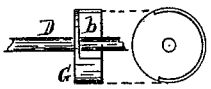


Fig. 6.

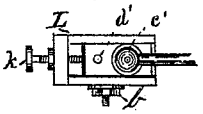


Fig. 7.

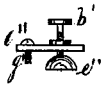
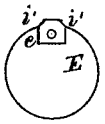


Fig. 8.



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UNITED STATES PATENT OFFICE.

ELMER GOUPTEL, OF CLEVELAND, OHIO.

IMPROVEMENT IN MACHINES FOR RULING PAPER.

Specification forming part of Letters Patent No. **214,033**, dated April 8, 1879; application filed December 2, 1878.

To all whom it may concern:

Be it known that I, ELMER GOUPTEL, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and Improved Machine for Ruling Paper; and I do hereby declare that the following is a full, clear, and complete description thereof, reference being had to the accompanying drawings, making a part of the same.

Figures 1 and 2 are side elevations of the ruling-machine. Fig. 3 is a plan view. Fig. 4 is an end view.

The rest of the figures are detached sections, to which reference will be made.

Like letters of reference refer to like parts in the several views.

This invention relates to certain improvements in the operative devices of a paper-ruling machine, whereby said machine is caused to work with more accuracy and with greater facility than ruling-machines in ordinary use.

Of the several improvements above alluded to the following is a full and complete description, the same being an improvement on a ruling-machine for which a patent was granted to me August 18, 1878.

In a suitably-constructed frame (shown at A in the drawings) is journaled the pen-roller B, having its bearings in the brackets *a a'*, Figs. 1 and 3. One of said brackets, *a'*, is supported by a standard, C. In the bracket *a'* is also journaled one end of the shaft D, carrying the several cams 1 2 3 4, Figs. 1 and 4.

Said cams consist of metal wheels or disks E, Fig. 1. In said figure a section of the frame is shown as broken away that the cams and pen-roller alluded to may be seen.

To the periphery of each of said cams are secured adjustable cam-blocks *c*, Fig. 4, the purpose of which will presently be explained.

On the opposite end of the shaft D, carrying the cams, is secured a cam, G, Figs. 3 and 4, a detached view of which is shown in Fig. 5, in which it will be seen that the peripheral surface of the cam does not extend all the way around, there being a space or gap in said surface, as seen at *b*. Further attention will be called to this cam hereinafter.

The shaft D, carrying the said cams, passes through the pen-roller B and has an independent rotative movement of its own and eccentric to the axis of the pen-roller; hence the cams 1, 2, 3, and 4 and the cam G have not a synchronous revolution with the pen-roller.

Above the pen-roller alluded to is arranged the pen-holder or beam H. One end of said beam is held by, and rotates in, an arm, I, Fig. 2. Said arm is held in the jaws *d*, projecting from the side of a hollow standard, J, and in which it is secured by a set-screw, *e*, that the arm may be adjusted to adapt the beam to the pen-roller, as the pens held by the beam may require.

The hollow standard J is secured to the top of the frame in a bed-plate, K, Fig. 2, provided with a dovetailed groove, in which the foot of the standard is fitted to slide, so that the standard may be adjusted lengthwise of the frame.

The standard is secured in place by a set-screw, *e'*.

The opposite end of the pen-holder or beam is held by, and rotates in, an adjustable box, L, supported by an arm, M, Figs. 1 and 3, projecting from a hollow standard, N, in which the arm may be adjusted in height. Said arm is secured in the standard by a set-screw, *f*.

The hollow standard N, like the hollow standard J, is secured in the top of the frame by a plate provided with a dovetail-shaped groove, in which the foot of the standard is fitted, as seen in Fig. 4, so that it may be adjusted lengthwise the frame. A set-screw, *g*, Fig. 1, secures the standard when adjusted in position.

The pivotal end O of the pen-beam terminates in a ball loosely inclosed in a corresponding socket, forming a ball-and-socket joint. The two parts of the socket are fitted in the box L, above alluded to, so as to slide therein for adjusting the pen-beam transversely, by means of the adjusting-screw *k*, Fig. 4, attached to the socket of the ball-joint. A set-screw holds the socket when adjusted. The ball-and-socket joint is shown in the detached view, Figs. 6 and 7, in which L represents the box. The plate covering the box and socket is removed that the ball *c'* and the lower section, *d'*, of the socket may be seen. To said lower section of the socket is attached the adjust-

ing-screw *k*, above referred to, and also the set-screw *b*, for securing the pivotal socket in place when adjusted. The upper part of the socket consists of a cap, *e''*, adapted to fit the ball, upon which it is screwed down by the set-screw *b'*, to which the cap is attached, as shown in the detached view, Fig. 7. In said figure O'' is the top above alluded to, into which the set-screw *b'* is screwed. Said top is fastened to the lower section of the socket by a screw, *g'*. The purpose of hanging the pen-beam in the manner as above described will hereinafter be made known.

O', Fig. 3, is a gate journaled in suitable bearings in each side of the frame or base of the hollow standards. The bearing of the end P of the gate is a fixture, whereas the opposite end of the gate has its bearing in an adjustable box, Q, secured by a set-screw to the side of a stay, R. Said set-screw passes through a slot in the box, so that the box, together with the end of the gate, may be moved lengthwise the frame. The fingers S of the gate are fitted loosely in the bar of the gate, and retained therein by set-screws to allow of the adjustment of the fingers as they may become worn, or for other purposes.

It will be observed that the ends of the fingers are slightly rounded to prevent them from cutting into the apron or otherwise injuring it, and to allow the fingers to make depressions in the apron between the bands on the roller beneath the apron.

It will also be seen that the fingers stand a little back temporarily, in which position they will hold the paper better than were they at right angles to the plane of the apron. In the arms A', extending from the standards, Figs. 3 and 2, are pivoted the bars B' and C', Fig. 3. To said bars B' and C' are secured respectively short-line-pen-lifting arms D' and D'', and to the bars are secured, respectively, the short-line pen-lifters E', and E''. Said pen-lifters are attached to the bars by clamps F', in which they are secured by set-screws *m*. The clamps are secured, also, to the bars by set-screws. In thus attaching the pen-lifters to the bars by clamps and set-screws, the lifters can be adjusted to the right or left on the bar, and also be raised or lowered as the nature of the work may demand. From that end of the pen-beam H near the cams E, above described, projects an arm, F'', Fig. 1, from which depends a foot, G', to the cams 1 and 2 of the several cams E. The engagement of the foot with the cams vibrates or lifts the pen-beam, thereby lifting the ruling-pens from the paper at such intervals of time as the work may require, and for which the cams have been adjusted, as will presently be shown.

It will be observed that the foot is attached to the arm in an adjustable manner. Thus in the arm is made a slot to receive a jam or stay nut, in which the stem of the foot is screwed as it passes upward through the arm. On the end of the stem projecting above the arm is screwed a stay or jam nut, *p*, which, together with the nut below in the slot, holds the foot securely in place, and by which the foot can be adjusted to the cams without changing the angle of the pen-beam H, which the foot and arm operate, as aforesaid.

The gate O', above alluded to, is operated by the hollow cam G, above described, through the intervention of a lever, G'', pivoted to an arm projecting from the side of the frame, as seen in Figs. 3 and 4. The lower end of said lever terminates in a finger or point, *i*, Fig 3, which rests upon the face of the cam G. The upper end of the lever is bifurcated, as seen in Fig. 2. In the bifurcations is held the end of an arm, H', Fig. 3, turned at right angles to adapt it to the lever. Said arm H' is fixed in the bar of the gate, and operates it as the cam revolves through the intervention of the lever, as aforesaid.

I' is an endless apron, similar to those in ordinary ruling machines, and its arrangement and course in and through the machine over and around rollers are substantially the same; hence a detailed description of the apron and rollers will not be necessary.

It may be proper, however, to state that the rollers *m'* are adjustable for lowering and raising the apron in order that the paper thereon may pass freely to the gate—that is, without binding—from time to time, as it may become necessary. The adjustment of the roller J' is effected by the screw-bolts K', in the ends of which the roller is journaled, as seen in Figs. 1 and 2.

The practical operation of the machine herein described is, in its general operative movements, substantially like ruling-machines in ordinary use. The special operative movements of the machine, as the result of the several improvements above described, will be understood on describing its general operation, which is as follows:

The apron being given the proper tension, by means of the adjusting-screws K', is caused to lie snugly upon the roller S', directly under the gate O'. Said roller is provided with bands, between which the fingers of the gate are arranged, slightly depressing the apron, as and for a purpose described and shown in my patent above referred to. The apron also lies upon the supporting-rollers *m'*, whereby the apron is prevented from sagging. The position of the gate, as shown in the drawings, is such as when the fingers are lifted from the apron to permit the passage of a sheet of unruled paper, which had been retained by them while a preceding sheet was being ruled. The closing of the gate is effected by the hollow cam G, above described. Thus, as above said, the lower end of the bifurcated lever G'' is in contact with the face or periphery of the cam G. During the revolution of the cam the end of the lever rides upon the unbroken surface, and then drops into the brake or notch, out of which it again comes to the surface. During the time the lever is passing over the plane of the cam the lever is lifted, thereby depressing

the bifurcated end, in which is held the arm H′, projecting from the bar of the gate. This operation of the lever depresses the arm H′, thereby partially turning the bar of the gate so far as to bring the fingers S down under the bar to a nearly vertical position, and causing them to press slightly into the apron between the band on the roller below. This position of the fingers prevents the sheet of unruled paper from moving onward with the apron, and is held back during the time the preceding sheet is being ruled. By the time the ruling is done the cam has so far revolved as to bring the notch to the lever, into which the lever drops. A reverse movement or lifting of the gate then takes place by means of the lifting-spring *n*″, Figs. 1 and 3, attached to the opposite end of the gate. This reverse movement throws the fingers of the gate up from the apron, as shown in Fig. 3, allowing the sheet to pass under to the ruling-pens and beam H, taking the place of the preceding one. The moment the sheet has passed from under the gate the gate is again operated by the cam and lever, whereby the fingers are again brought to the position above described, and against which the edge of a following unruled sheet is held and prevented from moving onward with the apron while the preceding sheet is being ruled, and so on continuously. The plane surface of the cam lifts the lower end of the lever, with a corresponding depression of the bifurcated end, which so operates the gate as to bring the finger to a nearly vertical position in time for the purpose above said, and are again lifted from the apron by the spring *n*″, when the end of the lever falls into the notch in the face of the cam.

In ordinary ruling-machines the fingers *s* are so arranged as to incline over the sheet. This causes them to press down upon the edge of the paper, forcing it hard down upon the apron. As the apron is more or less soiled by ink, the paper thus pressed down upon it by the fingers becomes soiled. This trouble is avoided by having the fingers in nearly a vertical position when down, as in this position they will not be inclined over the paper, but away from it, and therefore will not press upon it, but simply hold it from moving onward. Being thus lightly held upon the apron, it is not liable to become soiled or stained by the apron.

The purpose of the short-line-pen lifters E′ and E″ is to spring up at intervals the points of certain pens without disturbing the others, which are continued ruling. For illustration, let it be supposed that several lines of different length are to be ruled at the same time. To this end the pens are to be set projecting from the beam H at different lengths. To the backs of the shorter pens, or such of the pens as are to be lifted, are adjusted the short-line-pen lifters, as shown in Fig. 3, in which the dotted lines *h*′ indicate the pens, under some of which the pen-lifters are adjusted.

This adjustment of the lifters is effected by moving them on the bars B′ C′, to which they are respectively secured by the clamps F′. The short-line-pen lifters are operated by the arms D′ D″, which are respectively secured to the bars holding the pen-lifters. The ends of the said arms respectively rest upon 3 and 4 of the cams E. The blocks *c* of said cams 3 and 4 are so adjusted in relation to the blocks on the cams 1 and 2 for lifting the pen-beam, and consequently the pens collectively projecting therefrom, that they are not on a corresponding radial line—that is to say, all the blocks on all the cams are not in the same radial line; hence, as the cams revolve, the blocks on 3 and 4 of the cams, if adjusted in advance of the blocks on the cams 1 and 2, will lift the arms D′ and D″, and consequently the short-line-pen lifters E′ and E″, before the cams 1 and 2 will lift the pen-beam and all the pens projecting therefrom. From this it will be obvious that, though all the pens may commence to rule at once, they will not all stop ruling at once, for the reason that the short-line-pen lifters E′ and E″ will be actuated by the cams 3 and 4, thereby lifting the points of the pens under which they have been adjusted from the paper before the pens under which no lifters have been placed; hence the lines ruled by them will be shorter than those made by the unlifted pens, which continue to rule a longer line, or until lifted from the paper by the cams 1 and 2, which operate the pen-beam, whereby all the pens are lifted from the paper at once.

It will be obvious that the difference in the time in lifting the points of the pens by the short-line-pen lifters and that when all the pens are lifted by the beam will depend upon the relation of the peripheral distance that the blocks on the cams 3 and 4 hold to those on the cams 1 and 2. This difference of time will accordingly determine the difference in the length of the lines, which may be longer or shorter, and more or less in number, according to the number of short-line-pen lifters used and the peripheral distance of the blocks.

In ordinary ruling-machines long and short lines are not ruled simultaneously. The longer or shorter ones are first ruled, and then the others, as the case may be, requiring as much time for each as is required for ruling both long and short lines when using the short-line-pen lifters, as herein described.

The blocks *c* of the cams in ruling-machines in common use are square-shouldered; hence when the end of the arm or foot for lifting the pen-beam passes over them it drops suddenly from the face of the cam-block.

It is desirable that all the pens commence ruling at the same time, and exactly from a given point or points, or from a head-line, and not distant therefrom. If the machine is running slowly this will be the case when square-shouldered or cornered cam-blocks are used, as the arm or foot will have time to fall directly down from the block, allowing the pen-beam to fall immed'ately and

the pens to strike the paper at the given points or head-line; but should there be any sudden increase of speed in the machine, the arm or foot will not fall directly from the cam-block, but a distance more or less therefrom, as the increase of speed in the machine may be greater or less, thereby causing the pens to strike upon the paper more or less distant from the starting-points or head-line, leaving an unruled space between the end of the lines and the head-line. This often happens when the power used in driving the machine is irregular, owing to the stopping and starting of other machines driven by the same power.

To avoid this trouble is the reason for forming the cam-blocks *c* with an inclined shoulder or plane, as shown at *i* in Fig. 8. The arm or foot for lifting the beam will slide down the incline to the edge of the cam instead of falling from it at once, thereby dropping the pens upon the head-line or starting-points exactly each time, though the movement of the machine may be irregular, for reason aforesaid. Therefore more perfect or exact ruling can be done with the inclined shouldered cam-blocks than without them. Furthermore, the inclined corners of the cam-blocks let the pen-beam down easily, and lift it gently up. Thereby the pens are not dropped so heavily upon the paper, and are, therefore, subject to less strain, and consequently will rule more evenly and exactly than when suddenly actuated by square-shaped cam-blocks.

All the sheets in a ream of paper are alike—that is to say, the sides and ends are all of the same angle, which may be an exact square, or more or less a departure therefrom; but different reams of paper differ as to being square. Therefore, on setting the machine for ruling a certain ream or quantity of paper, care is taken to set the gate and pens to that particular squareness of paper, so that the lines when drawn shall be parallel with the sides of the paper. This adjustment of the machine for one ream of paper will not answer for another ream, nor for the same ream when the sheets are turned over to be ruled on both sides.

To make these several adjustments in ruling-machines now generally used is attended with much time and trouble, to avoid which is the purpose of having the standards N (supporting the arms wherein the pen-beam is journaled, and to which are also secured the arms A′, in which are supported and journaled the bars B′ and C′ of the short-line-pen lifters) so attached to the frame as to be able to move them lengthwise the said frame.

This mobility of the standards permits an adjustment of the pen-beam more or less diagonally across the paper, as the squareness thereof may require that the ruling may be parallel with the sides of the same.

In moving the pen-beam for the purpose specified, the short-line-pen lifters are also moved at the same time, thereby retaining their relation to the pens to which they had previously been adjusted on setting the pen-beam and pens to the paper; hence the adjusting of the pen-beam is accompanied by the adjustment of the short-line-pen lifters preserving their exact relation to each other.

That there may be no cramping of the journals of the pen-beam on making these adjustments is the purpose of the ball-and-socket joint, whereby one end of the beam is secured in the arm M supporting it. This joint permits of the adaptation of the pen-beam to the paper, and at the same time allows a free vibratory movement of the beam. The opposite end of the beam is held in the arm I, secured in the jaws or fingers projecting from the standard, as above described. To prevent the journal at that end of the beam from cramping in its seat on adjusting the beam, the arm I is loosened, so that it may adapt itself to the direction of the beam and journal, and then made fast in the jaw by the set-screw *e*. The upper section, *p′*, of the journal-box in which the journal of the beam is seated is free to move, so that it can be kept close-fitting by the adjusting-screw *y*, Fig. 2, and thereby prevent all undue movement of the beam, that might interfere with the ruling and cause bad work. To this end all the adjusting-screws and set-screws are provided with stay or jam nuts to make them fast and secure, so that no unnecessary looseness shall interrupt the true and exact working of the machine.

In adjusting the pen-beam and the short-line-pen lifters in order to adapt them to the condition of the paper, it is necessary, also, to adjust the gate according to such changes made. That this may be easily and readily done, the end to which the spring *n′* is attached is pivoted in a sliding box or journal-seat, Q, Fig. 3, above referred to. Said box, as above said, is secured to a stay, R, by a set-screw, on loosening which the end of the gate can be moved to adjust it to the direction of the pen-beam, &c. The cross-piece *x* on the end of one of the short-line-pen lifters is to adapt the lifter to several pens instead of using a separate lifter for one pen.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In machines for ruling paper, the cams 1, 2, 3, and 4, consisting of the disks E and adjustable cam-blocks *c*, provided with inclined shoulders or sides *i′*, in combination with the pen-beam H and arms D′ and D″ for operating the short-line-pen lifters E′ E″, substantially in the manner as described, and for the purpose specified.

2. The combination of the pen-beam H and pens, short-line-pen lifters E′ E″, arms D′ D″, and cams for operating said arms, all constructed and arranged to co-operate in the manner substantially as described, and for the purpose set forth.

3. In combination with the pen-beam H, an adjustable journal-seat, consisting of the ball *c′*, movable socket *d′*, adjusting-screw *k*, cap

e'', set-screw b', plate O'', binding set-screw b, and box L, substantially as described, and for the purpose set forth.

4. In paper-ruling machines, the hollow standards J and N, attached to the frame in grooves, in which they are adjustable, and secured therein by set-screws, in combination with the arms M and I, jaws d, supporting the pen-beam, and short-line-pen lifters and their lifting-arms, and arms A' A', substantially in the manner as and for the purpose set forth.

5. In combination with the jaws d and pen-beam, the adjustable arm I, provided with a journal-seat for the journal of said beam, as and for the purpose set forth.

6. In paper-ruling machines, the combination of the hollow cam G, bifurcated lever G'', arm H', gate O', having the ends of the fingers S thereof rounded, adjustable journal-box Q, and lifting-spring n', all constructed and arranged to operate conjointly in the manner as described, and for the purposes specified.

7. In paper-ruling machines, the gate O', having one end thereof adjustable lengthwise the frame of the machine by having said end secured in a horizontal sliding journal-box, Q, whereby it may be adjusted in its transverse relation to the pen-beam, as and for the purpose specified.

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