

No. 668,944.

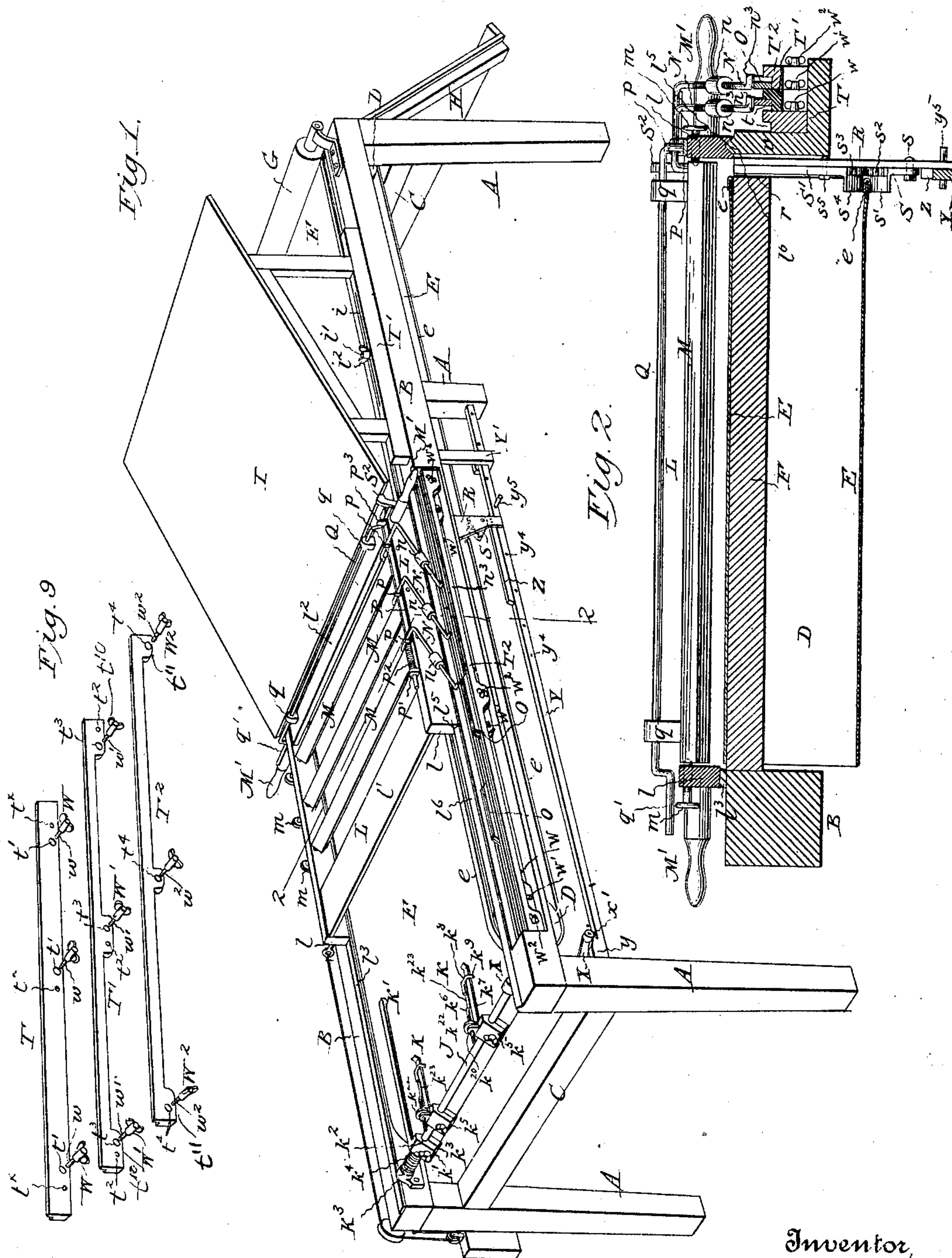
Patented Feb. 26, 1901.

R. WILMANS.
PAPER RULING MACHINE.

(No Model.)

(Application filed Mar. 30, 1900.)

2 Sheets—Sheet 1.



Witnesses
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2 Sheets—Sheet 2.

Fig. 3.

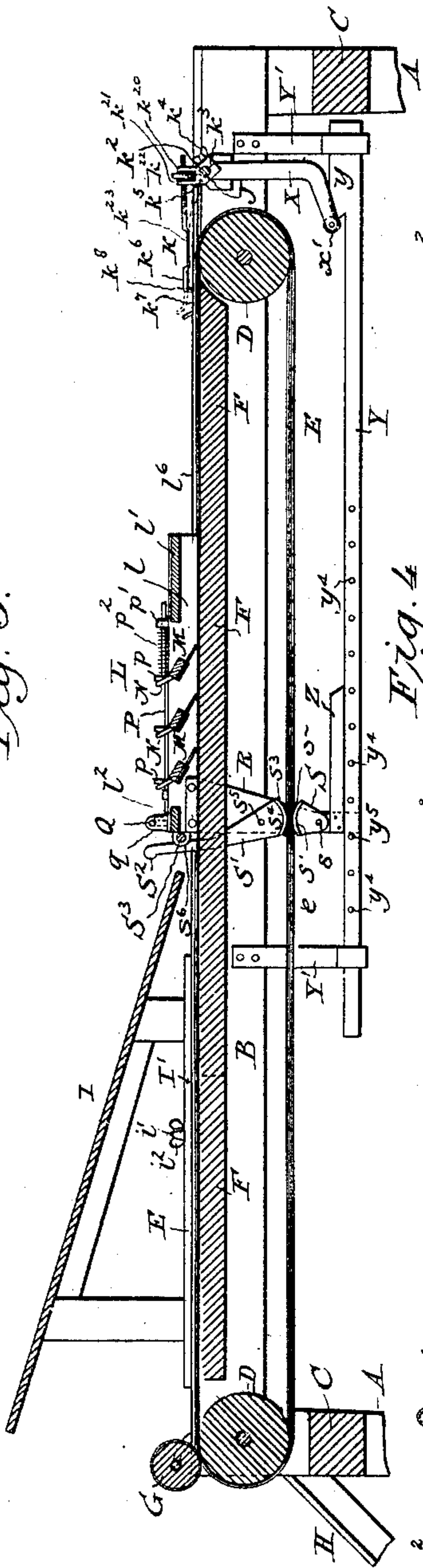


Fig. 4.

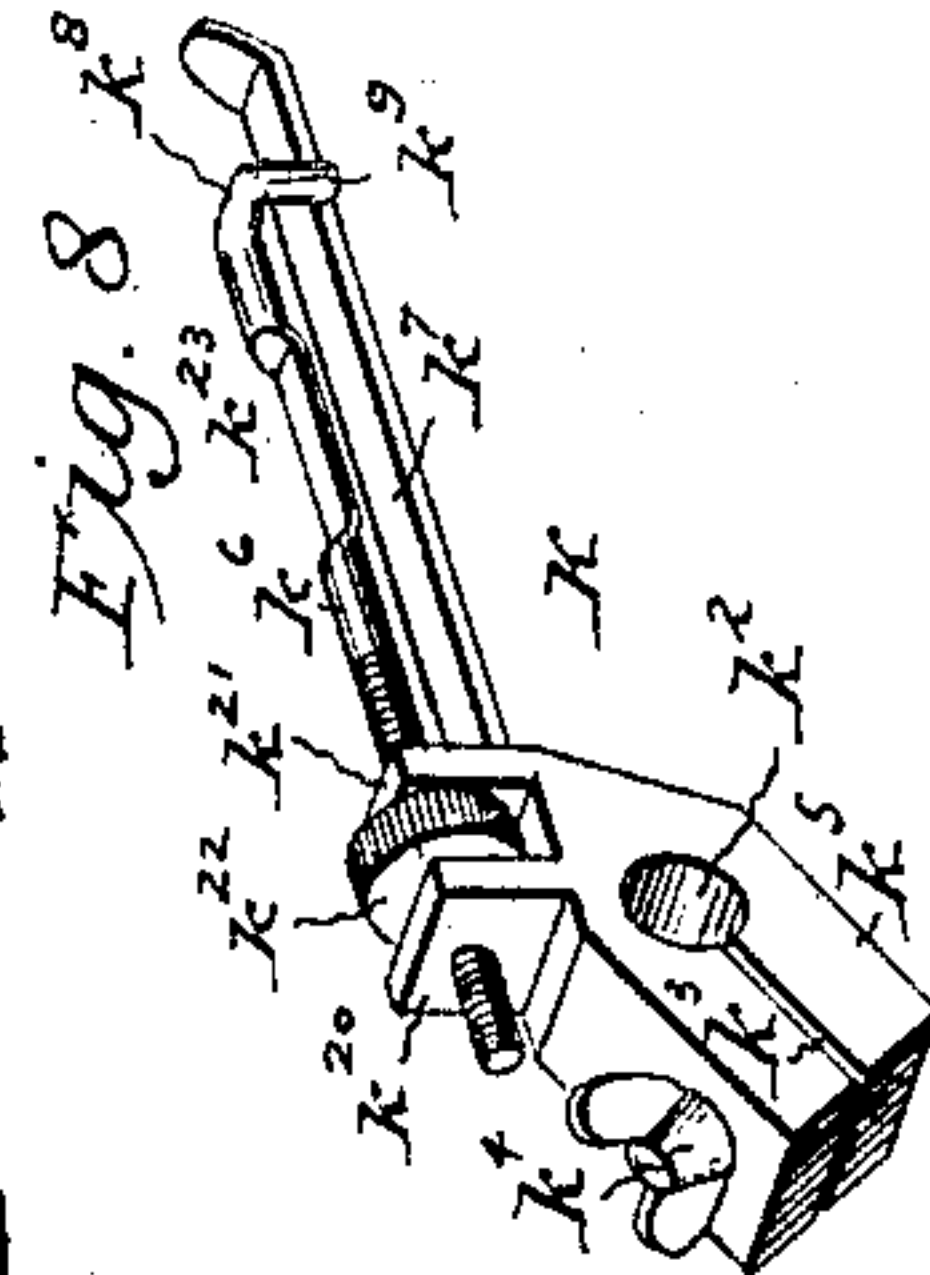
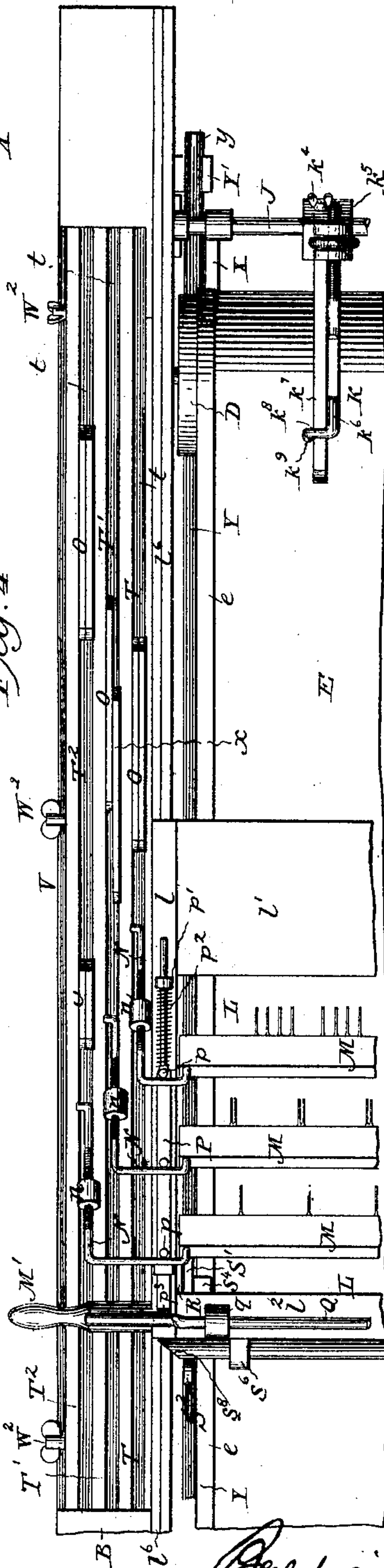


Fig. 7.

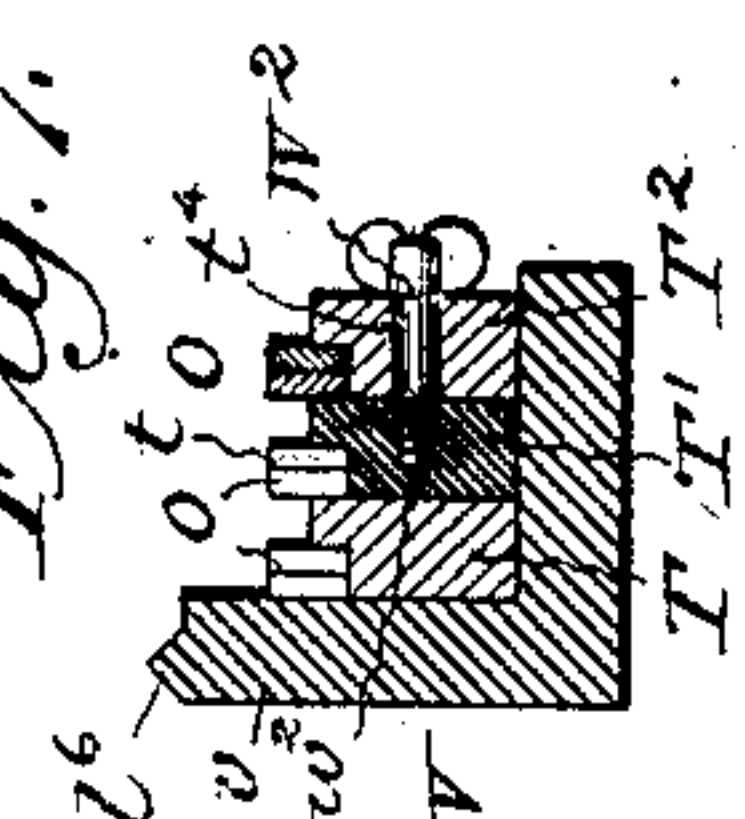


Fig. 6.

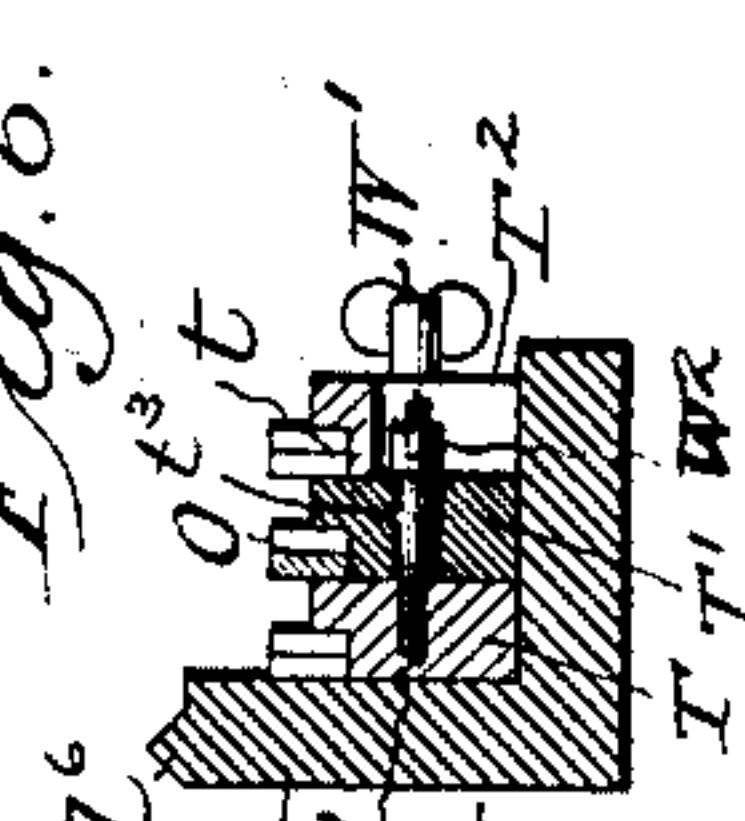
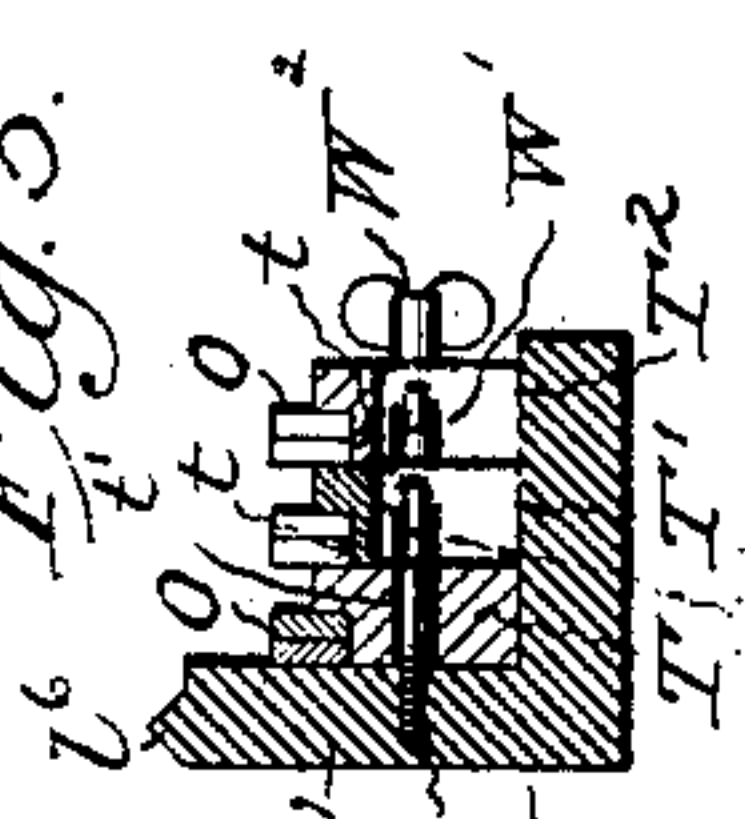


Fig. 5.



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UNITED STATES PATENT OFFICE.

ROBERT WILMANS, OF DALLAS, TEXAS.

PAPER-RULING MACHINE.

SPECIFICATION forming part of Letters Patent No. 668,944, dated February 26, 1901.

Application filed March 30, 1900. Serial No. 10,865. (No model.)

To all whom it may concern:

Be it known that I, ROBERT WILMANS, a citizen of the United States, residing at Dallas, in the county of Dallas and State of Texas, have invented certain new and useful Improvements in Ruling-Machines, of which the following is a specification.

My invention relates to machines for ruling paper in which a series of pens are drawn across sheets of paper carried by a suitable support.

The object of my invention is to provide a simple and efficient machine for this purpose and one which may be easily operated.

In carrying out my invention I depart from the generally-accepted type of machine and provide a machine of a new type involving certain novel organizations of instrumentalities which insure the efficient performance of the operations incident to the process of ruling paper with lines of various kinds. The sheets of paper to be ruled are supported on an endless belt, which is given an intermittent movement to discharge ruled sheets, but which is stationary while the sheets are being ruled. The sheets of paper are fed to the belt while it is at rest and are guided and grasped at their rear ends by guides and grippers, which hold the sheet while the pens are being drawn forward to perform the operation of ruling. While the carriage supporting the pens is being moved rearwardly toward the grippers and guides the belt is moved forward to discharge the ruled sheets. The pen-beams are pivoted in the carriage and are provided with independent striker-arms, which engage striker-rails held in clamps of an improved construction so arranged that some of the rails may be removed or adjusted without disturbing the others. Improved devices are employed for holding the pens down to their work and for holding them elevated while not at work, and means are employed for causing the carrier-belt to move at the will of the attendant or automatically at fixed times. The grippers and guides are automatically withdrawn from the paper after it has been ruled, permitting it to be carried forward and discharged by the carrier-belt, and they are automatically moved during the rearward movement of the pen-carriage to bring them into position to

guide the paper while being fed to the machine and afterward—*i. e.*, when the carriage begins to move forward—to grip the paper and hold it while the pens are in operation. The devices for operating the grippers and guides are adjustable, so as to cause them to operate at any desired time, and the feed-table over which the paper is fed is also adjustable.

The general organization of the machine and details of construction will be hereinafter more fully explained.

In the accompanying drawings, Figure 1 is a perspective view of a paper-ruling machine embodying my improvements. Fig. 2 is a view, on an enlarged scale, showing a transverse section on the line 2 2 of Fig. 1. Fig. 3 shows a longitudinal central section through the machine. Fig. 4 is a view, on an enlarged scale, showing a top plan of a portion of the machine. Figs. 5, 6, and 7 show transverse sections of the striker-rails and their clamping devices. Fig. 8 is a perspective view of the guide and gripper. Fig. 9 is a view, on a reduced scale, showing the clamping-rails that hold the striker-rails in place.

The main frame of the machine may be of any suitable construction so long as it is adapted to support the working parts of the apparatus. Preferably there are four legs or standards *a* at each corner of the machine, on the upper end of which are secured two longitudinal beams *B*, and the frame may be stiffened by cross-pieces *C* at each end. Near each end of the machine is mounted in suitable bearings a roller *D*, over which extends an endless belt *E*, which may be made of cloth or other suitable material and which is preferably reinforced on one edge by a strip of leather *e* for a purpose hereinafter described.

Beneath the top of the belt *E* is arranged a table *F*, which may be secured at its opposite longitudinal edges to the side beams *B*. At the front or discharge end of the machine are mounted in suitable bearings a blotting-roller *G*, of usual construction, and in front of and below the blotting-roller is arranged a discharge-board *H*. An inclined feed-table *I* is supported on the side beams *B* near the front end of the machine. The bottom rails *I'* of the frame supporting the table *I* are preferably slotted, as shown at *i*, and through

these slots extend bolts i' , having thumb-nuts i^2 . By this means the table may be adjusted longitudinally of the machine to facilitate handling sheets of various sizes.

5 At the rear end of the machine I provide devices for guiding and gripping the sheets of paper. A horizontal rock-shaft J is mounted in suitable bearings secured to the rear ends of the side beams B, and on this shaft are
10 clamped the combined guides and grippers K K'. The guide K' is somewhat longer than the others and is adapted to guide one side of the sheet. This guide K' preferably consists of a long narrow strip of metal adapted
15 to bear upon the top of the carrier-belt E, its rear end being provided with an enlarged base k' , having a circular socket k^2 , adapted to embrace the shaft J and being split at k^3 to allow the two jaws of the base to expand
20 and contract to grip the shaft J or to loosen the base thereon. The two jaws of the base are connected by a screw-bolt having an adjusting-nut k^4 . By this means the guide K' may be adjusted longitudinally on the shaft
25 or laterally across the belt and may be also turned axially on the shaft to the desired extent. Each of the combined guides and grippers K is preferably of the form shown in Fig. 8. It has a base k^5 , provided with a circular
30 socket k^2 , adapted to embrace the shaft J and being split at k^3 to allow the two jaws of the base to expand and contract to grip the shaft J or to loosen the base thereon. The two jaws of the base are connected by a
35 screw-bolt having an adjusting-nut k^4 . By this means the combined guide and gripper may be adjusted longitudinally on the shaft or laterally across the belt and may also be turned axially on the shaft to the desired
40 extent. On the front upper end of each base-piece are two lugs k^{20} k^{21} , between which is arranged a circular nut k^{22} . From the base of each combined guide and gripper K project forwardly two arms k^6 k^7 . The arm k^7 is
45 not made elastic, but is in operation somewhat rigid and somewhat longer than the arm k^6 . The arm k^6 at its rear end is circular in cross-section and screw-threaded, as shown. It projects through the nut k^{22} and
50 through unthreaded perforations in the lugs k^{20} k^{21} . The object of this arrangement is to permit the arm k^6 to be adjusted longitudinally relatively to the arm k^7 . The arm k^6 is provided with a reduced portion k^{23} , so as to
55 allow the front end of the arm to yield at the proper time. The arm k^6 is provided at its front end with a laterally-projecting arm k^8 , having a downwardly-projecting end piece k^9 . The front end of the arm k^7 projects under
60 the arm k^8 within the end piece k^9 , and it is adapted to have a slight vertical movement relatively to the arm k^8 . The extreme end of the arm k^7 is preferably turned up at an inclination, as shown. The combined guides
65 and grippers K are so constructed as to guide the paper while being fed into position to be ruled and afterward to grip it and hold it se-

curely while the pen-carriage is being moved forward to perform the operation of ruling.

A spring K^3 , secured to the main frame and
70 to the shaft or to the base-piece k' , tends to move the forward ends of the guides and grippers downward toward the top of the belt E. The shaft is operated to hold the guides and grippers up away from the belt by mech-
75 anism hereinafter described.

The pen-carriage L preferably consists of two longitudinal side pieces l , connected at their rear ends by a cross-piece l' and at their
80 front ends by a cross-piece l^2 . The side pieces l rest upon and move longitudinally of the side beams B. Preferably one of the side pieces l rests upon a plain flat strip l^3 , secured to one of the beams B, while the other side piece l is preferably formed with a longitudi-
85 nal groove l^5 , fitting a V-shaped rail l^6 , secured to the other side beam B. The arrangement is such that the carriage may be moved back and forth in a straight line toward and from
90 the grippers and guides K K'. The carriage supports a series of pen-carrying beams M, of usual construction, adapted to accommodate extension penholders or other such ap-
95 pliances. I have shown three pen-carrying beams; but any desired number may be used. Each of the pen-carrying beams is pivoted to the carriage. At the ends of the beams I preferably employ headed screw-bolts m ,
100 suitably constructed at their inner ends to form a bearing for the ends of the pen-carrying beam, the arrangement being such that the screw-bolts may be withdrawn, if desired, to remove and replace the pen-carrying
105 beams, and the beams may be laterally adjusted when desired. Such bolts may, however, be used at one end only of the beams. The screw-bolts m extend through the longitudinal side pieces l and are provided with
110 heads on their outer ends, by which means the screws may be withdrawn laterally from the beams, and the beams may then be lifted out from the carriage.

Each pen-carrying beam has secured to it a striker-arm N, which is L-shaped, extend-
115 ing over the top of one of the side pieces l and then downwardly in a diagonal direction toward the striker-rails O, hereinafter described. Each striker-arm is provided with an adjustable weight n , by means of which
120 the pressure of the pens on the paper may be varied.

A rod P is arranged on top of one of the side pieces l , beneath the upper or horizontal
125 portions of the striker-arms, and it carries a series of upwardly-projecting lugs p , arranged in rear of the horizontal portions of the striker-arms. The rear end of the rod P extends through a guide-bracket p' , and between this
130 bracket and the next adjacent lug p is arranged a spiral spring p^2 , which tends to move the bar P forward and to thus turn the striker-arms to a position to raise the pens from the paper or from the top of the belt E. The forward end of the rod P is provided with a lug

p^3 , in front of which is arranged the end of an operating-rod Q. This rod extends horizontally across the carriage and is mounted in bearing-brackets q , secured to the rear cross-piece l^2 . At one end the rod Q is provided with a crank-handle q' , while the opposite end is provided with a crank the end of which is arranged in front of the lug p^3 . By means of the rod Q the rod P may be pushed rearward against the pressure of the spring p^2 , so as to withdraw the lugs p from the striker-arms and permit the pens to lower and also permit the striker-arms to engage with the striker-rails and to be operated properly thereby.

It will be observed by an inspection of Fig. 2 that the pivots for the pen-carrying beams are arranged eccentrically, while the striker-arms are secured to the sides of the beams. Therefore when the diagonal portions of the striker-arms are moved up or down a pivotal movement is given to the pen-carrying beams, which will cause them to raise and lower the pens.

Depending from one side piece l of the carriage is a bracket or hanger R, which extends through an opening r in the table F, this opening being of sufficient length to permit the bracket to reciprocate back and forth with the carriage. To this bracket are pivoted two members of a clutch, so arranged as to grasp the carrier-belt during the rearward movement of the carriage, and thus cause the upper portion of the belt to move forward to convey the ruled sheet to the blotting-roller and to the discharge-board H. This clutch preferably consists of a lower member S, which is of a segmental shape, pivoted at s to the lower portion of the bracket R having a curved clutching-surface s' and a segmental series of teeth s^2 , which engage a corresponding series of teeth s^3 on the upper clutch member S' . This upper clutch member is provided with a clutching-surface s^4 , and it is pivoted at s^5 to the bracket R. This member of the clutch is provided with a handle S^2 , projecting to the top of the machine within convenient reach of the attendant on one side of the machine. In order that this lever may be operated from the opposite side of the machine, I provide a lever-operating rod S^3 , which extends horizontally across the machine, being guided in guide-brackets s^6 , secured to the rear cross-piece l^2 . At one end the rod is provided with a handle s^7 , while at its opposite end it is provided with a wedge-shaped portion s^8 , adapted to engage the handle and move it in such manner as to release the clutch. When the carriage moves forward and while the pens are ruling the paper, the clutch does not grip the belt, and consequently does not move it; but when the carriage moves rearward and the pens are elevated the clutch automatically grips the belt and causes the upper portion thereof to move forward. The carriage is moved back and forth by the attendant, who grasps one of the han-

dles M'. The striker-arms N are operated automatically by striker-rails O. These rails are of proper shape and are so located as to hold one or more of the bars elevated to remove the pens from the paper or to permit the pens to drop into contact with the paper to accomplish the desired style of ruling. The lower ends of the striker-arms are preferably provided with lateral projections n^3 to engage the upper surfaces of the striker-rails. The rails may be arranged in pairs, as shown, side by side, and may, if desired, be made to overlap, as indicated at x in Fig. 4. It will be readily understood that by properly locating and arranging the striker-rails the striker-arms may be operated in any desired manner to regulate the length and position of the lines.

The striker-rails are mounted in and held by clamping-rails T T' T². Any desired number of clamping-rails may be employed, corresponding with the number of pen-beams used. The clamping-rails are arranged in a holder V, preferably L-shaped in cross-section, as shown in Figs. 5, 6, and 7. The inner series of striker-rails may be arranged to rest against the vertical portion v of the holder, while the remaining series of striker-rails are clamped between the clamping-rails T T' T². These rails are provided on their upper portions with grooves or sockets t to receive the striker-rails.

By reference to Fig. 9 it will be seen that the inner clamping-rail T is provided with two holes $t^x t'$. The middle clamping-rail T' is formed with a cut-away portion between the feet t^{10} , and these feet are provided with holes $t^2 t^3$. The third or outer clamping-rail T² is provided with feet t^{11} , and these feet are each provided with a hole t^4 . Each clamping-rail T' or T² is provided with a series of feet. The drawings only show two on each rail; but the number of feet will depend upon the length of the rails. The rail T is secured to the vertical portion v of the holder by means of bolts W, which extend loosely through the holes t' and enter screw-threaded sockets in the portion v of the holder. The rail T' is secured to the rail T by means of bolts W', which extend loosely through the holes t^3 in the feet t^{10} of the rail T' and enter the screw-threaded holes t^x in the rail T. The rail T² is secured to the rail T' by means of the bolts W², which extend loosely through the holes t^4 in the feet t^{11} and into the threaded holes t^2 in the feet t^{10} of the rail T'. The holes t' for the bolts W are arranged in such manner that the heads of the bolts will be within the space between the inner ends of the feet t^{10} , so that the heads of the bolts may be manipulated readily—that is to say, the feet t^{10} are arranged outside the bolt-holes t' . The feet t^{11} are somewhat narrower than the feet t^{10} , so that the bolt-holes t^3 are not covered by the feet, and the heads of the bolts W' may be readily manipulated. By this arrangement the clamping-rails may be independently adjusted—that is, they may be

loosened and tightened independently. For instance, by manipulating the bolts W the rail T may be moved relatively to the vertical portion *v* of the holder, so as to either
 5 loosen or tighten the hold of the striker-rails held between the clamping-rail T and the vertical portion *v* of the holder, while the striker-rails held between the clamping-rails T and T' and between the clamping-rails T'
 10 and T² are still held firmly clamped. In like manner by manipulating the screws W' the striker-rails between the clamping-rails T and T' may be loosened without loosening the others, and the same is true of the striker-
 15 rails held between the clamping-rails T' and T²—that is to say, the hold upon these rails may be loosened by manipulating the screws W² without loosening the hold on the other
 20 striker-rails. Thus the several series of striker-rails may be removed or readjusted independently, and any set of striker-rails may be moved or adjusted without interfering with the other sets.

The paper guiding and gripping devices
 25 are operated automatically at proper times. The shaft K has secured to it an arm X, which extends downwardly from the shaft and is bent forwardly, its lower forward end being provided with an antifriction-roller *x'*. At
 30 times this roller rests on the enlarged end *y* of a shifter-bar Y. This bar is arranged horizontally, being supported at opposite ends in guides Y', secured to one of the side beams B and depending therefrom. The bar is
 35 formed with a series of holes *y*⁴, in any one of which may be arranged a transverse peg *y*⁵, which, however, is always arranged in front of the lower end of the bracket R. To the bracket R, above the bar Y, is secured an
 40 arm Z, which is adapted to at times move under and lift the roller *x'*; and thus turn the shaft K. The spring K³ tends to move the shaft K in such position as to hold the guides and grippers K K' down in engagement with
 45 the sheet of paper or with the top of the carrier-belt E. When the pen-carrying carriage starts forward, the roller *x'* is immediately removed from engagement with the arm *z* and lowers nearly to the top surface of the
 50 shifter-bar Y. When the carriage L has moved to near the end of its forward movement, the lower end of the bracket R strikes against the peg *y*⁵, and thus moves the shifter-bar Y forward, causing the enlargement *y* to
 55 engage and raise the roller *x'*, and thus turn the shaft K in such manner as to remove the guides and grippers K K' away from the carrier-belt and to hold them in an elevated position for a time. While the pen-carrying
 60 carriage is being moved rearward, the guides and grippers are held elevated for a time; but near the extremity of the rearward movement of the carriage the arm Z abuts against the end of the enlargement *y* and moves the
 65 shifter-rail Y rearward, thus removing the enlargement *y* from beneath the roller *x'* and causing this roller to ride upon the surface

of the arm Z. This is so arranged that the guide K' may be allowed to lower and rest upon the top of the belt E, and in like man- 70
 ner the ends *k*⁹ of the guides *k*⁶ are allowed to come in contact with the top of the belt, while the ends of the gripper-arms *k*⁷ are held a short distance above the top of the belt. At this time a sheet of paper may be fed in and 75
 adjusted in the guides to the proper position. The arm Z is of just sufficient length to hold the guides and grippers in the position just described only while the pen-carrying carriage is at rest in its extreme rearward position. It 80
 withdraws and causes the lowering of the grippers immediately upon commencement of forward movement of the pen-carrying carriage. On the commencement of the forward movement of the pen-carrying carriage the roller 85
x' drops from the rear end of the arm Z, allowing the shaft K to turn a slight distance, so as to permit the gripper-arms *k*⁷ to lower and grasp the sheet of paper which has been adjusted in the guides. Then the carriage is 90
 moved forward and the sheet of paper is held securely while the ruling is being performed. After the sheet has been ruled and the carriage approaches the limit of its forward movement the bracket R strikes the peg *y*⁵. This 95
 causes the shifter-bar Y to be moved forward and the roller *x'* is made to engage the enlargement *y* of the bar Y. This causes the grippers and guides K K' to be elevated, so that during the next rearward movement of 100
 the carriage the clutch mechanism may grasp the under side of the belt and cause the upper portion of the belt to move forward to remove and discharge the ruled sheet. It will thus be seen that the attendant can operate 105
 the machine with facility and rapidity. He need only feed in the sheets of paper at proper times, release the pen-carrying beams, and move the pen-carrying carriage back and forth, the remaining operations being per- 110
 formed automatically by mechanism hereinbefore described. The pen-carrying beams may be nicely adjusted to apply the proper pressure, they may be quickly and readily removed and replaced when desired, and any 115
 of the striker-rails may be removed or adjusted with great facility without disturbing the others.

The carriage may be moved rearward, if desired, by springs or weights, as indicated. 120

While I have illustrated and described a completely-organized machine carrying out my invention, it is obvious that some parts of the mechanism may be used without the others. Some parts of the mechanism are 125
 novel irrespective of their combination with other parts and may be used in different organizations. The details of construction may be varied without departing from the novel features of my invention, the details of construction of a completely-operative machine 130
 being shown and described merely to show the best way now known to me of carrying out my invention.

I claim as my invention—

1. A paper-ruling machine comprising a pen-carrying carriage, a carrier-belt, devices for moving the pen-carrying carriage over the belt while the latter is at rest to rule the paper, and devices for moving the belt in a direction parallel with that in which the carriage moves during the reverse movement of the carriage while the pens are withdrawn to discharge the paper.

2. A paper-ruling machine, comprising a pen-carrying carriage, a carrier-belt, devices for moving the pen-carrying carriage over the belt while the latter is at rest, and a clutch moved coincidently with the carriage, and which is inactive while the carriage is moving to rule the paper, but which is operated during the reverse movement of the carriage to move the belt to discharge the ruled sheets.

3. A paper-ruling machine, comprising a pen-carrying carriage, a carrier-belt, devices for moving the pen-carrying carriage over the belt while the latter is at rest to rule the paper, clutch mechanism moved coincidently with the carriage comprising the upper and lower members adapted to engage the belt during the backward movement of the pen-carrying carriage to move the belt to discharge the ruled sheets.

4. A paper-ruling machine comprising a pen-carrying carriage, an endless carrier-belt, devices for moving the pen-carrying carriage over the belt to rule the paper while the belt is at rest, clutch mechanism operated by the carriage to move the belt on the reversed movement of the carriage after the paper is ruled, and mechanism operated at the will of the attendant to release or apply the clutch.

5. A pen-carrying carriage provided with a series of pivoted pen-carrying beams, and a series of striker-arms attached to the beams which have horizontal portions and diagonal downwardly-extending portions adapted to engage striker-rails.

6. A pen-carrying carriage, provided with a series of pen-carrying beams, striker-arms attached to the beams, a rod extending under portions of the striker-arms, lugs projecting from the rod in rear of the arms, a spring for moving the rod in one direction, and devices for moving the rod in an opposite direction.

7. A pen-carrying carriage provided with a series of pen-carrying beams, and provided also with striker-arms having adjustable weights to vary the pressure on the pens, and devices for moving the arms to hold the pens elevated.

8. The combination of the pen-carrying carriage, guides on which it moves, paper guides and grippers, and an adjustable feed-table for feeding sheets of paper to the grippers.

9. The combination with means for supporting a sheet of paper while being ruled, of a guide for the side of the paper, consisting of a spring-metal strip having an enlarged

base formed with a clamping-socket, and provided with a tightening-bolt.

10. The combination with means for supporting a sheet of paper while being ruled, of a combined gripper and guide consisting of a base-piece, an arm provided at its end with a laterally-projecting arm having a downwardly-projecting end, and another arm projecting from the base-piece and extending under the laterally-projecting end of the first-mentioned arm.

11. The combination with means for supporting the sheet of paper while being ruled, of a rock-shaft and the combined guides and grippers attached thereto, each comprising a base-piece adjustable on and secured to the rock-shaft, and two arms, one of which is provided with a laterally-projecting end forming a guide, and the other of which projects beneath the guide.

12. The combination of means for supporting a sheet of paper while being ruled, and combined guides and grippers, each comprising a base, an arm projecting from the base, and another arm having a yielding portion and adjustable longitudinally relatively to the first-mentioned arm.

13. The combination of means for supporting a sheet of paper while being ruled, a reciprocating carriage, grippers located at the end of the path in which the carriage moves, and means operated by the carriage for releasing the grippers after the paper is ruled.

14. The combination of a reciprocating carriage, a belt for supporting a sheet of paper while being ruled, means operated by the carriage for moving the belt in a plane parallel with that in which the carriage moves, grippers for holding the paper on the belt while it is being ruled and means operated by the carriage for releasing the grippers to permit the ruled paper to be discharged by the belt.

15. The combination of an endless carrier-belt, grippers for holding a sheet of paper while being ruled, a pen-carrying carriage, connections between the carriage and the belt for moving the latter coincidently and in the same direction with the carriage, means operated by the carriage for holding the grippers in engagement with the sheet of paper during the ruling process, and for holding the carrier-belt stationary at that time, and devices operated by the reverse movement of the carriage to release the grippers and move the belt to discharge the ruled sheet.

16. The combination of the endless carrier-belt, the combined grippers and guides, the rock-shaft on which they are mounted, a pen-carrying carriage, devices operated by the carriage for moving the carrier-belt during the reverse movement of the carriage after the paper is ruled, a shifter-rail provided with an enlargement connected with the rock-shaft for holding the grippers and guides elevated while the pen-carrying carriage is traveling rearward, and an arm moved coincidently

with the carriage for changing the rock-shaft to a different position, causing the guides to lower, but holding up the grippers for the sheet to be fed into position, and means for
5 withdrawing said arm to permit the grippers to drop and hold the paper while being ruled.

17. In a paper-ruling machine, the combination with the pen-carrying beams and the
10 striker-arms, of striker-rails and clamps therefor, independently adjustable for the purpose specified.

18. In a paper-ruling machine, the combination with a pen-carrying carriage, and

striker-arms, of striker-rails, and a series of clamping-rails provided with devices for in- 15
dependently tightening and loosening them.

19. The combination of a holder, a series of striker-rails, a series of clamping-rails, and a series of tightening-screws of different lengths for loosening and tightening the clamping- 20
rails independently.

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Witnesses:

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W. A. RAY.