

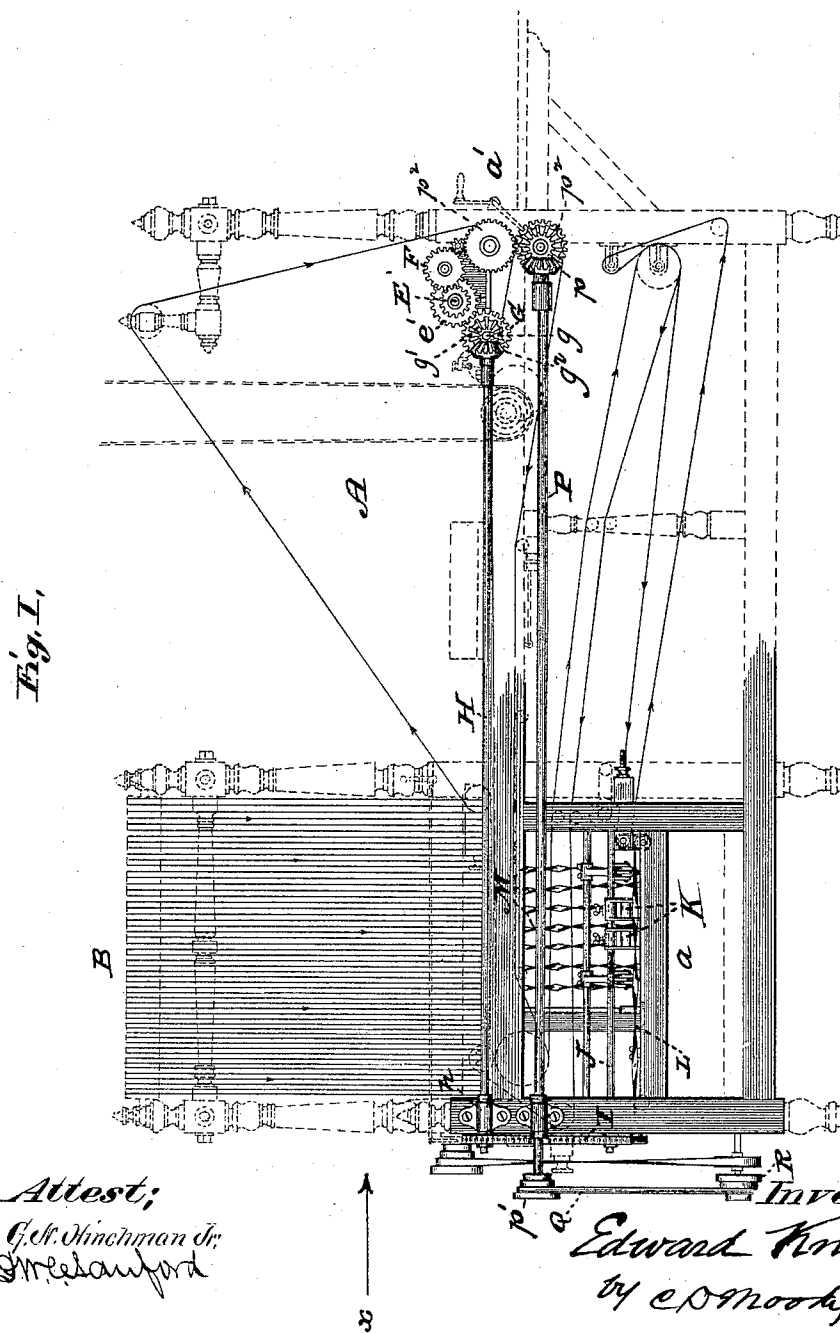
(No Model.)

6 Sheets—Sheet 1.

E. KNAPP.
RULING MACHINE.

No. 430,583.

Patented June 17, 1890.



Attest;
C. H. Hinckman Jr.
Greensboro

Edward Knapp
by *C. D. Mooky* atty

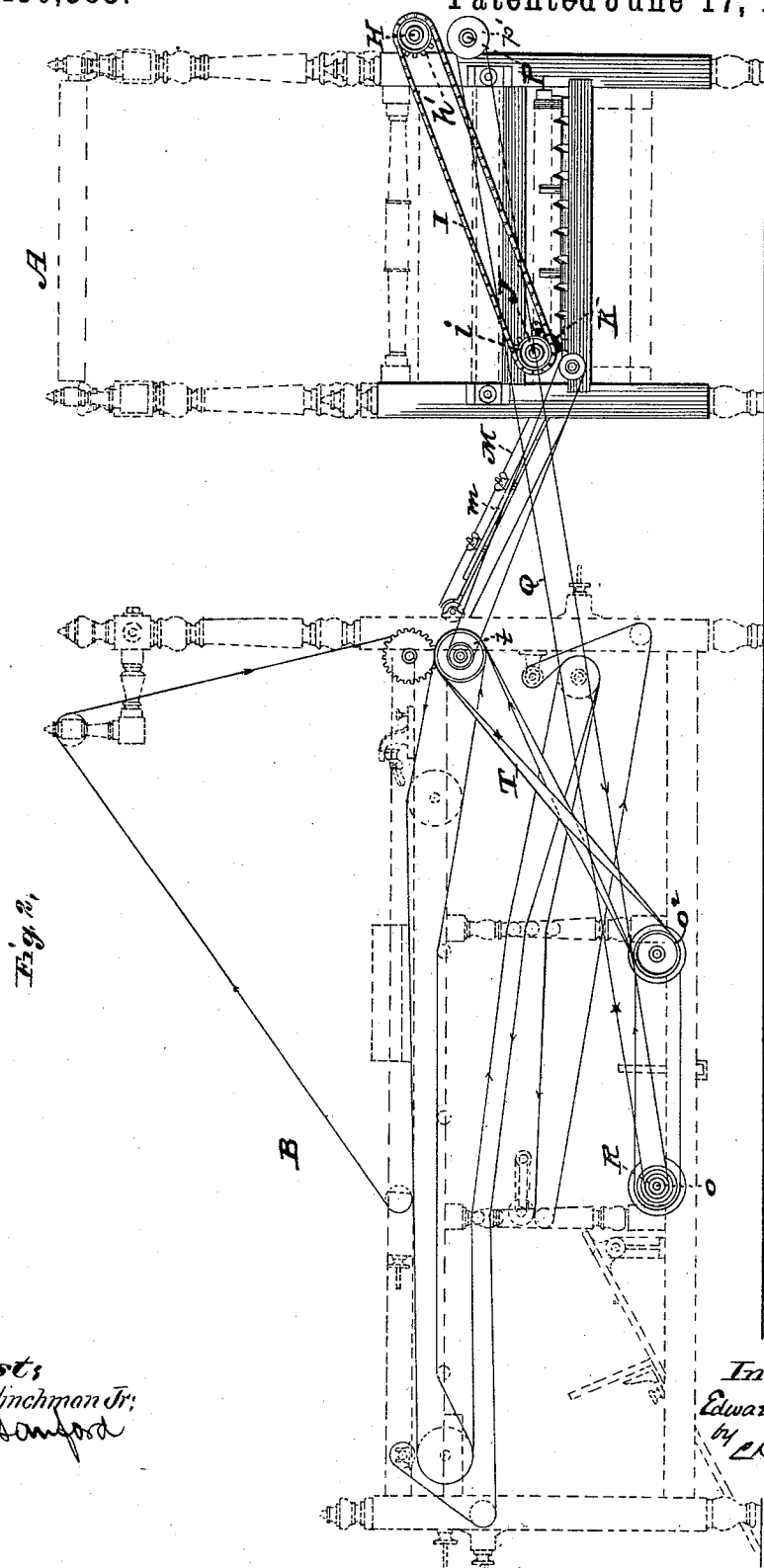
(No Model.)

6 Sheets—Sheet 2.

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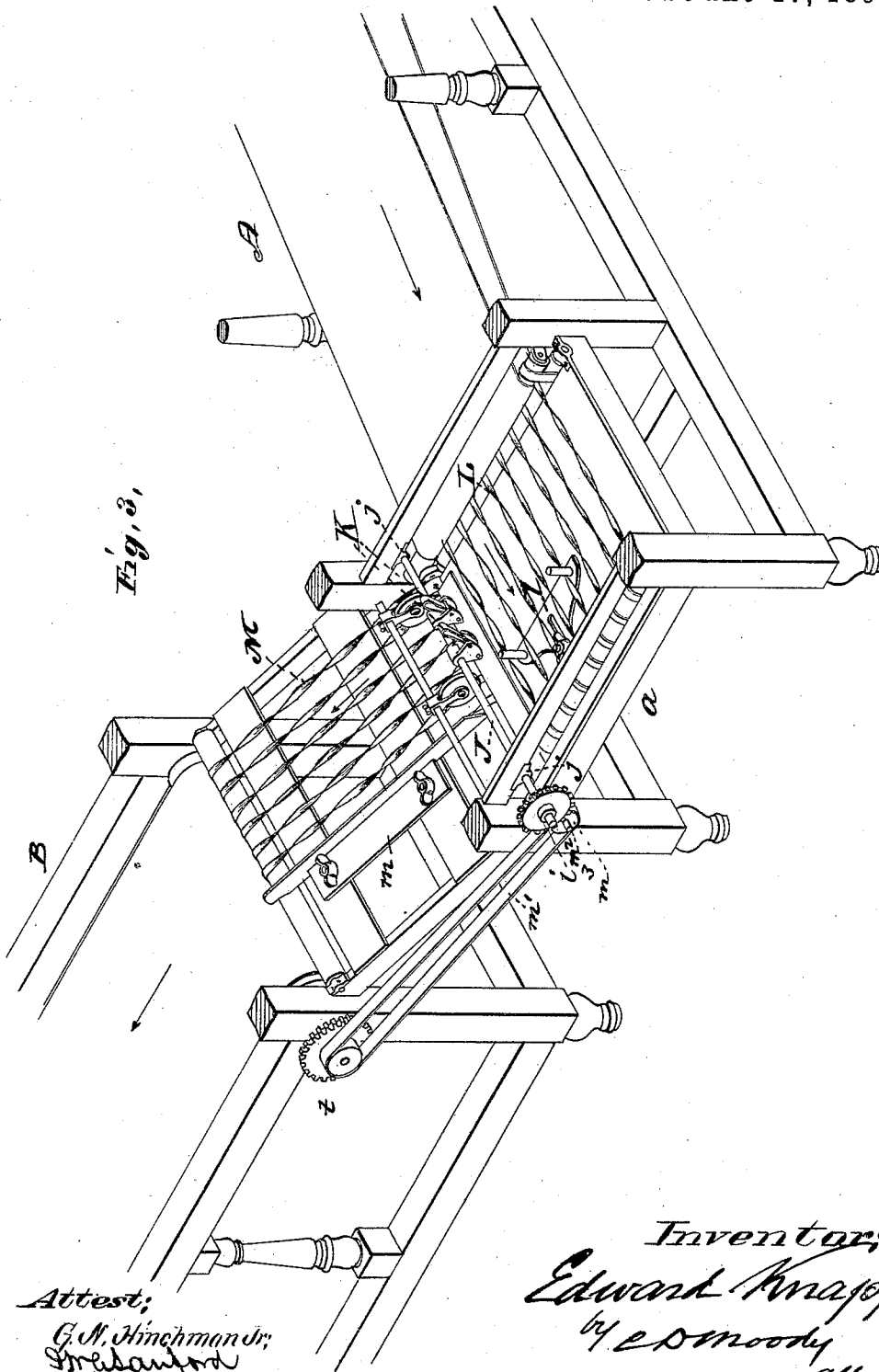
(No Model.)

6 Sheets—Sheet 3.

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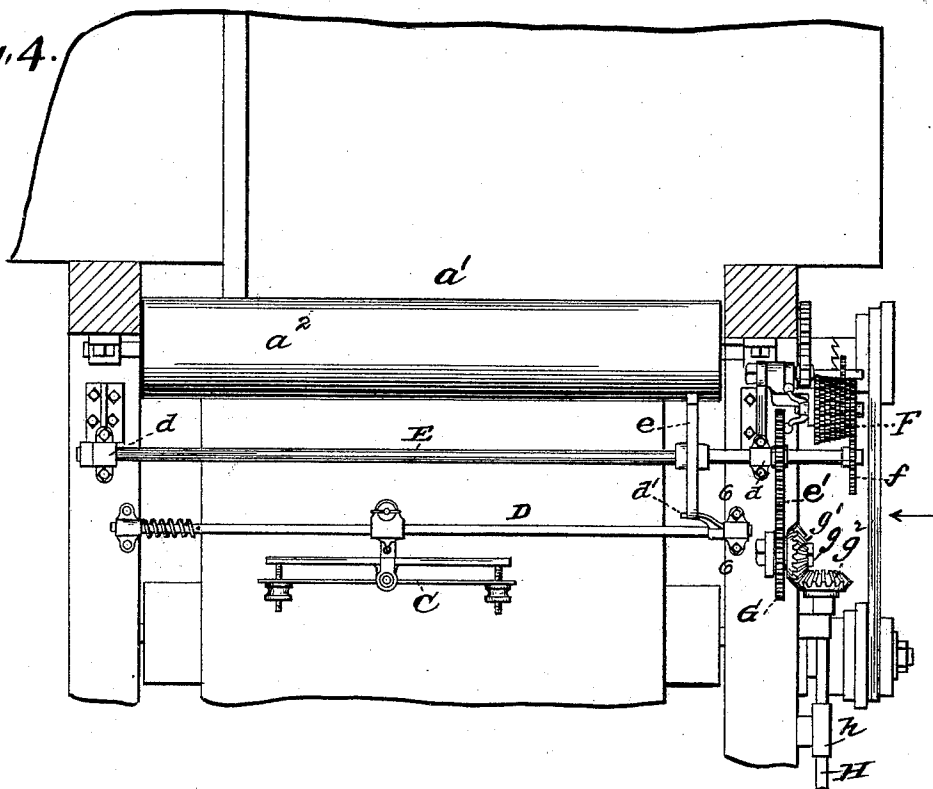
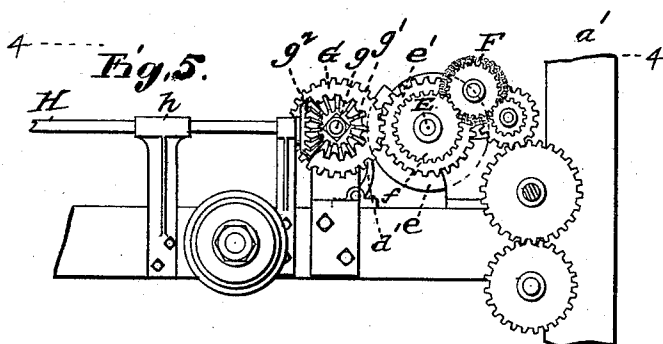
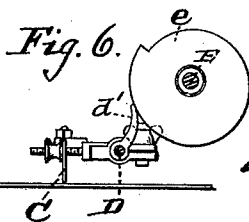
6 Sheets—Sheet 4.

E. KNAPP.
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Fig. 4.



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6 Sheets—Sheet 5.

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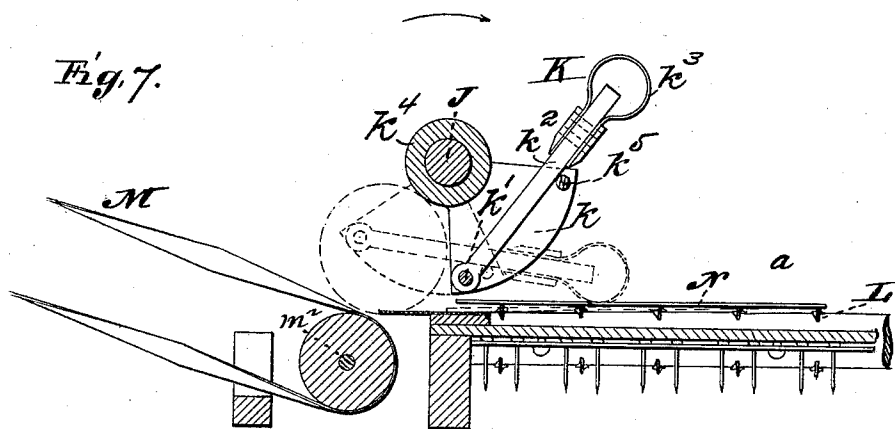
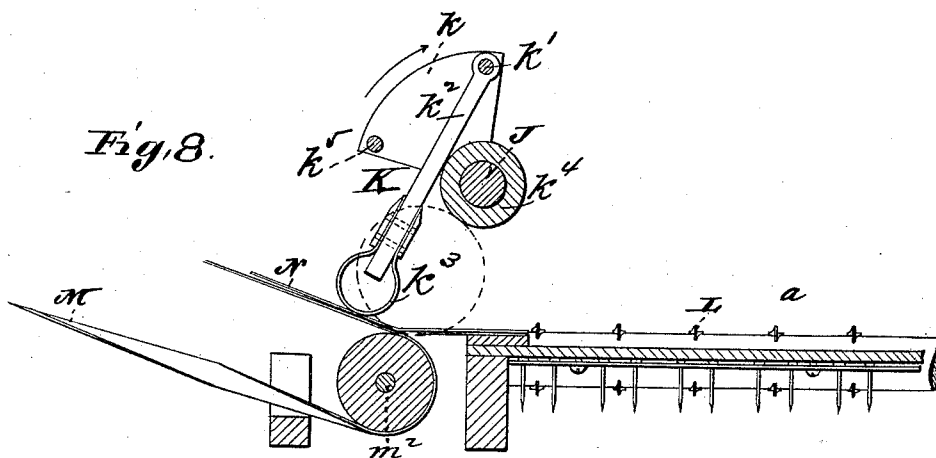
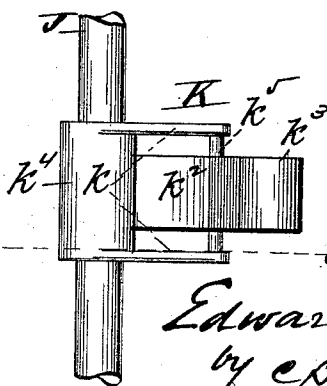


Fig. 9.



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(No Model.)

6 Sheets—Sheet 6.

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Fig. 10.

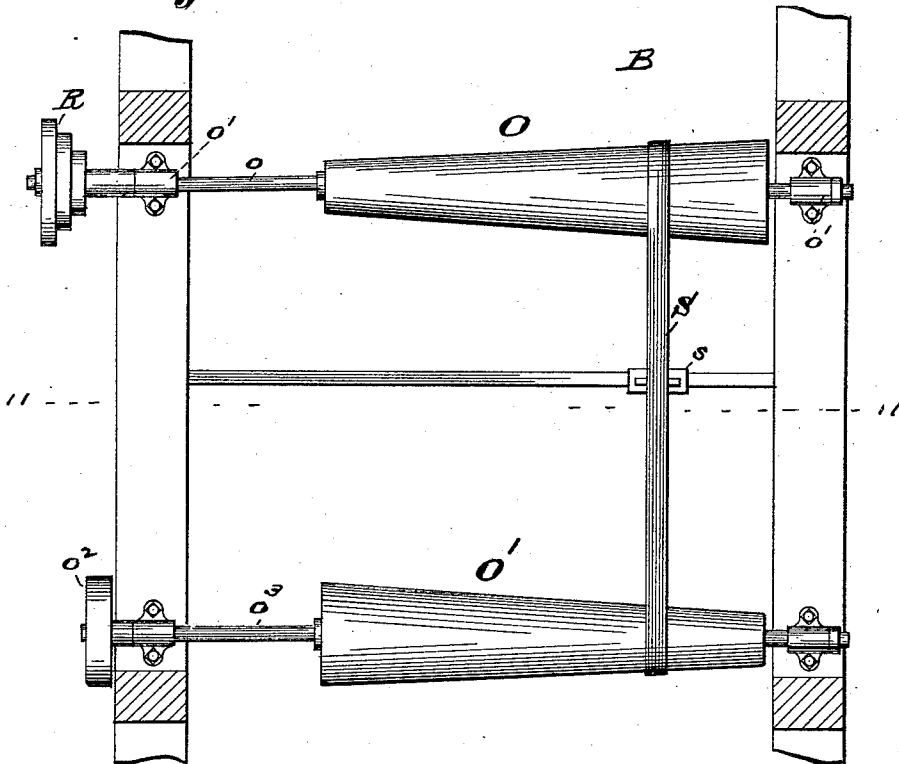


Fig. 11.

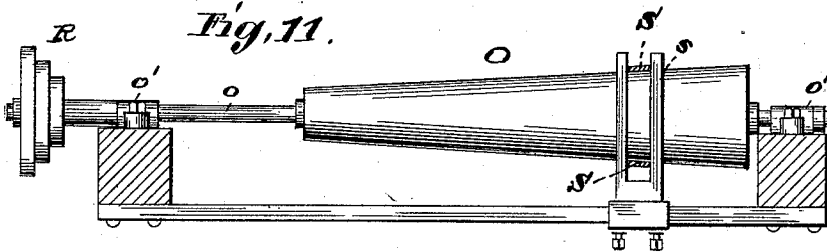
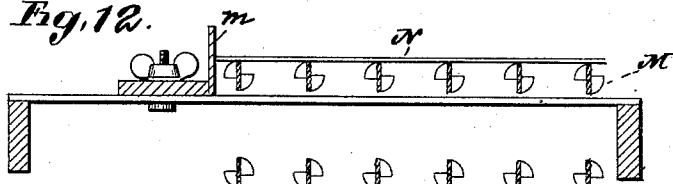


Fig. 12.



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UNITED STATES PATENT OFFICE.

EDWARD KNAPP, OF ST. LOUIS, MISSOURI, ASSIGNOR OF TWO-THIRDS TO
GEORGE D. BARNARD & COMPANY, OF EAST ST. LOUIS, ILLINOIS.

RULING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 430,583, dated June 17, 1890.

Application filed July 15, 1889. Serial No. 317,610. (No model.)

To all whom it may concern:

Be it known that I, EDWARD KNAPP, of St. Louis, Missouri, have made a new and useful Improvement in Ruling-Machines, of which the following is a full, clear, and exact description.

By means of the present improvement a sheet of paper can be ruled horizontally and vertically at a single operation and by means of appliances, substantially as hereinafter described and claimed, aided by the annexed drawings, making part of this specification and exhibiting the most desirable mode of carrying out the improvement, and in which—

Figure 1 is a view showing that part of the machine to which the sheet is delivered in side elevation and the remaining portion in end elevation. Those parts of the construction with which the improvement is more directly connected are shown in full lines, and the other parts are indicated by broken lines. Fig. 2 is a side elevation looking in the direction of the arrow *x*, Fig. 1. The improved part of the construction is in full and the remaining part in dotted lines. Fig. 3 is a view in perspective showing the mechanism for transferring the sheet from that part of the machine where the horizontal ruling is done to that part of the machine where the vertical ruling is done; Fig. 4, a horizontal section on the line 4 4 of Fig. 5, showing in plan the gate mechanism at the receiving end of the machine; Fig. 5, a side elevation of the parts of Fig. 4, looking in the direction of the arrow of the last-named figure; Fig. 6, a section on the line 6 6 of Fig. 4, showing the means used in operating the gate-shaft; Fig. 7, a vertical section on the line 7 8 of Fig. 9, showing the dog used in transferring the sheet from the horizontal-ruling part of the machine to the vertical-ruling part, the dog not being in contact with the sheet; Fig. 8, a similar section, the dog being about to be lifted from off the sheet, which has been transferred far enough onto the tapes of the vertical-ruling part of the machine to be carried along by them; Fig. 9, a plan of the dog in its position shown in Fig. 7; Fig. 10, a horizontal section taken in the lower part of the vertical-ruling part of the machine, and showing in plan the mechanism for regulating the

rate at which the sheet moves in that part of the machine; Fig. 11, a vertical cross-section on the line 11 11 of Fig. 10, and Fig. 12 a vertical cross-section of the tapes used at the delivery end of the horizontal-ruling part of the machine.

The views are not all upon the same scale.

The same letters of reference denote the same parts.

Saving as it is modified or supplemented by the present improvement, the ruling-machine under consideration is of the customary form. Considered generally, the improved machine consists of two parts, the part A, Figs. 1, 2, and 3, by means of which one portion of the ruling—say the horizontal-line ruling—is effected, and the part B, Figs. 1, 2, and 3, by means of which the other portion of the ruling—say the vertical-line ruling—is effected. Each of these parts bears a general resemblance to the customary ruling-machine, and is provided with the usual means by which the sheets to be ruled are taken into the machine, moved along therein, ruled, and discharged from the machine, substantially as in the customary ruling-machine; but said means are modified, and each machine part is furnished with appliances not found in the ordinary ruling-machine, thereby to enable the present machine, as a single construction, to receive a blank sheet of paper, rule it horizontally and vertically, and then discharge it, all at one continuous operation and without requiring to be manipulated by an attendant during its passage through the machine.

The following description will be confined mainly to those features of the construction which are immediately connected with the improvement: The part B, as indicated in Fig. 3, is arranged at right angles to the part A at the delivery end *a* thereof, and suitable means, presently described, serve to unite the parts A B and to transmit the partially-ruled sheet from the part A to the part B. The blank sheets of paper to be ruled are delivered successively into the part A at the receiving end *a'* thereof. After passing the rolls *a''*, Fig. 4, they encounter the gate C, Fig. 4. This gate is described fully in Letters Patent No. 329,458, granted me and

George D. Barnard November 3, 1885, and it is the most desirable means for regulating the time when a sheet is to pass along to be ruled, and for controlling the distance the sheets shall be spaced apart, and the extent to which they shall lap upon each other successively. At the appointed time the gate rises and allows the incoming sheet to pass in the ordinary manner. The gate is operated by means of the rock-shaft D, as follows:

E, Figs. 1, 4, 5, and 6, represents a shaft journaled in bearings d d in the end a' of the machine part A, and carrying a cam e , which in its rotation encounters an arm d' upon the shaft D, and thereby effects the rocking of the shaft D, and the consequent opening and closing of the gate. The shaft E is driven from the gear F, Figs. 4 and 5, which engages with a gear f upon the shaft E.

As thus far described the construction is of the usual character and operated in the usual manner; but as it is essential to the present operation for the sheets of paper to leave the part A at the same rate at which they enter it, the gate mechanism just described is connected with the mechanism at the end a of the part A for discharging the sheets, so that the two mechanisms shall work evenly together, and as fast as one sheet passes the gate another sheet, which has previously passed the gate, been ruled horizontally, and has arrived at the end a of the part A, shall be delivered from the part A. The most desirable mode of thus connecting the gate and regulating the delivery of the sheets is as follows: The shaft E is provided with a gear e' , which engages with a gear G upon a shaft g , Figs. 1, 4, and 5, and which is also provided with a bevel-gear g' . This last-named gear engages with a bevel-gear g^2 upon a shaft H, Figs. 1, 4, 5, and 2, which is journaled in bearings h upon the part A, and extends to beyond the end a of the part A, where it is provided with a sprocket-wheel h' , Fig. 2. A chain I leads from the wheel h' to a sprocket-wheel i upon a shaft J, Figs. 2 and 3. This last-named shaft is arranged longitudinally in the part A—that is, parallel with the shaft H—and is journaled in bearings j in the end a of the part A. It carries and operates the device or devices for discharging the sheets from the part A. These devices may be termed “dogs” K, Figs. 1, 2, 3, 7, 8, and 9, their function being to bear upon and so nip the sheets as to enable them to shift the sheets so that they shall be discharged from the part A. The sheets, after passing the gate C, are, and with the usual means therefor, ruled and transported to the end a of the part A. At that point the sheets are delivered onto mechanism which coacts with the dogs K, to the end that the sheets shall be separately discharged from the part A, for as the sheets arrive at the end a they are, as a rule, lapping successively upon each other, and as the dogs K move the sheets sidewise in shifting them from the part A there is a

liability, as each sheet is transferred by the dogs, that the sheet next in rear will be dragged more or less with it, and thus become disarranged in the machine. To prevent this the sheets as they reach the end a are delivered onto the twisted tapes L, Fig. 3. These tapes are twisted and moved to cause the sheets to be shifted in the opposite direction from that of the part B, and as a sheet is being drawn by the dogs the sheet next in rear is being urged by the tapes L in the opposite direction sufficiently to prevent its being influenced by the sheet the dogs are acting upon. The sheets in this way pass along in the part A until they encounter a suitable stop l , Fig. 3, in which position they are successively acted upon by the dogs K, and thereby transferred from the part A onto a set of tapes M, Figs. 1, 3, 7, 8, and 12, which I consider the best means for delivering the sheets onto the part B of the machine. Now to enable the sheets to be discharged from the part A in the manner described, the gearing, shafting, and belting used to transmit the movement of the shaft E to the shaft J are suitably constructed to cause the dogs K to operate and transfer a sheet onto the tapes M every time the gate C allows a sheet to pass it. I desire not to be restricted to the special means here shown for thus transferring the sheets, but I prefer them. Two dogs K are preferably used, rather than a single one, as thereby the sheets are moved to better advantage. The dog is not attached directly to the shaft J, but to an arm k , which in turn is fastened to and carried around with the shaft J. The dog is pivoted to the arm at k' , Figs. 7 and 8, and the dog itself consists of an arm k^2 , whose inner end is pivoted to the arm k , and whose outer end is provided with an elastic or yielding pad k^3 , and which may be formed from a strip of rubber bent and folded and having its ends secured to the arm k^2 , substantially as shown. The dog is carried around with the shaft J and arm k in their rotation, and in such a manner that the pad shall not simply touch the sheet N, Figs. 7 and 8, but shall remain in contact with it during a considerable portion of the revolution of the shaft J and arm k , and thereby be made to exert a prolonged pull upon the sheet, commencing when the sheet is upon the tapes L and continuing until the sheet has been advanced far enough onto the tapes M to be carried along by them, substantially as is indicated by the two positions of the dog and sheet shown, respectively, in Figs. 7 and 8. As the dog leaves the sheet the middle portion of its arm k^2 comes against and is supported by the shaft J, or rather, in the present instance, by the hub k^4 of the arm k , and this support continues until the dog has been carried over the shaft and its pad is pointing upward, whereupon the dog turns upon its pivot k' , and its pad end falls toward the tapes L; but to prevent the pad from dropping too soon the arm k is provided

with a bar k^5 , Figs. 7, 8, and 9, which serves to uphold the pad end of the dog until the shaft J and arm k are carried still farther around, and the dog is in a substantially horizontal position. The pad now comes gently into contact with the sheet and acts to draw it along as the shaft J and arm k continue to rotate and to deliver the sheet onto the tapes M. The arm k is preferably a double arm, and, in side elevation, of a quadrantal form, substantially as is shown. The tapes M are twisted for the purpose of aligning the sheet, say, to the guide or stop m , Figs. 3 and 12, and they serve to transfer the sheet into the machine, part B, where and by means of the customary appliances, which need not be further described, it is ruled vertically and borne along through the part B.

The sheets N must be worked through the part B as rapidly at least as they come from the part A, as otherwise the machine would become clogged; but the sheets N are generally longer one way than the other, and in consequence the rate at which the sheets are moved through the part B is adapted to be hastened or retarded, as may be necessary. This is accomplished, preferably, by means of the cone-pulleys O O', Figs. 2, 10, and 11. By means of the shaft P, Figs. 1 and 2, having the bevel-gear p at one end and the pulley p' at the other end, and the gears p^2 , the motion of the gear F is communicated to the belt Q, Figs. 1 and 2, and thence to the pulley R, Figs. 1, 2, 10, and 11, which is fastened to the shaft o . This last-named shaft is journaled in the machine, part B at $o' o'$, and carries the cone-pulley O, which in this manner is driven from the gear F. The belt S, Figs. 10 and 11, communicates the motion of the cone-pulley O', and its motion in turn is communicated through the pulley o^2 , which is upon the shaft o^3 of the cone-pulley O', and belt T and pulley t , Fig. 2, to the customary mechanism employed in the part B for moving the sheets coming from the tapes M. By means of the shifter s , Figs. 10 and 11, the belt S can be shifted on the cone-pulley O O', and the motion of the pulley o^2 and belt T thereby increased or lessened, as may be desired, and the sheets in the part B moved at the required rate. From the pulley t a belt m' , Fig. 3, leads to a pulley m^3 upon the shaft m^2 of the tapes M, and those tapes are thereby driven.

I claim—

1. The combination of the shaft J, the arm

k , attached to and revolving with said shaft and having the bar k^5 , and the arm k^2 pivoted to said arm k , and at its outer end provided with the elastic pad, substantially as described.

2. In a ruling-machine, the combination of the part A, having at its delivery end the twisted tapes L, the part B at right angles to the part A and provided with the twisted tapes M, the frame of which connects the two parts, the rotary shaft J, and the dogs K, attached to said shaft and rotating therewith, substantially as specified.

3. In a ruling-machine, the combination of the part A, provided at its delivery end with the twisted tapes L and stop l , the part B at right angles to the part A and provided with the twisted tapes M, the guide m on the frame of said tapes, the shaft J, mounted in bearings secured to the part A, adjacent to the part B, and the dogs K, secured to said shaft and rotating therewith, substantially as specified.

4. In a ruling-machine, the combination, with the shaft J, arms k , mounted thereon, dogs K, mounted on said arms, and the sprocket-wheel i on the end of said shaft, of the shaft H, having the sprocket-wheel h' on the end adjacent to the shaft J, and the other end connected by gearing to the driving gear-wheel, and the chain connecting the sprocket-wheels i and h' , substantially as specified.

5. In a ruling-machine composed of the parts A and B, arranged at right angles to each other, the combination of the longitudinal shaft P, journaled on the part A and connected by gearing at its front end to the driving gear-wheel, the pulley p' on the rear end of said shaft, the oppositely-tapered conical pulleys O O', journaled in the frame of the part B, the belts S, connecting said conical pulleys, the pulley R on the extended end of the shaft of the pulley O, the belt connecting the pulleys p' and R, the pulley o^2 on the extended end of the shaft of the pulley O', the pulley t , the belt connecting the pulleys o^2 and t , the belt-shifter with the tape-shaft m^2 , journaled in the part A, the pulley m^3 on the extended end of the shaft, and the belt m' , connecting the pulleys m^3 and t , substantially as specified.

Witness my hand this 3d day of July, 1889.
EDWARD KNAPP.

Witnesses:

C. D. MOODY,
D. W. A. SANFORD.