

E. D. AVERELL.
Electric Regulator.

No. 55,594.

Patented June 12, 1866.

Fig. 1.

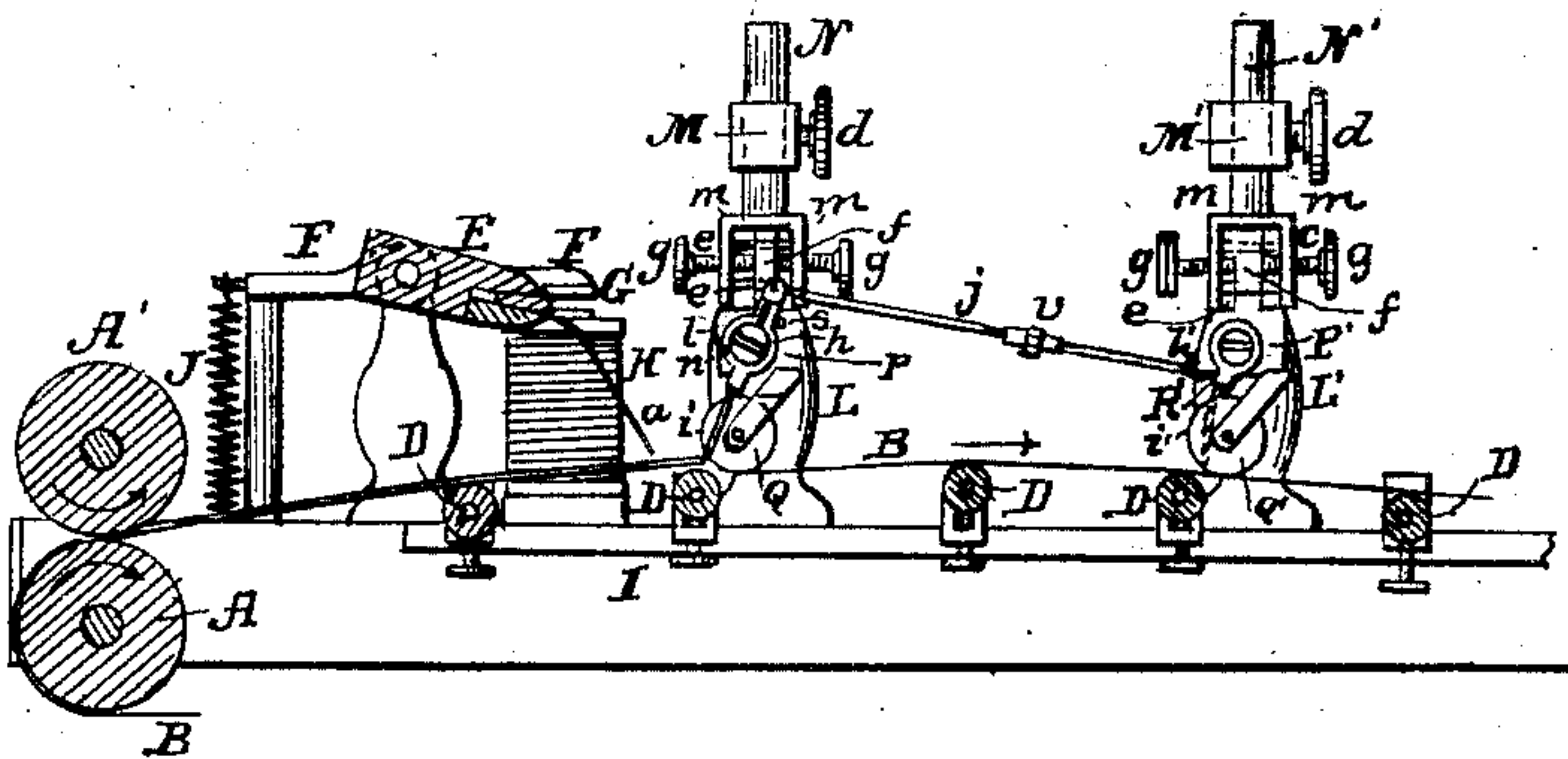


Fig. 2.

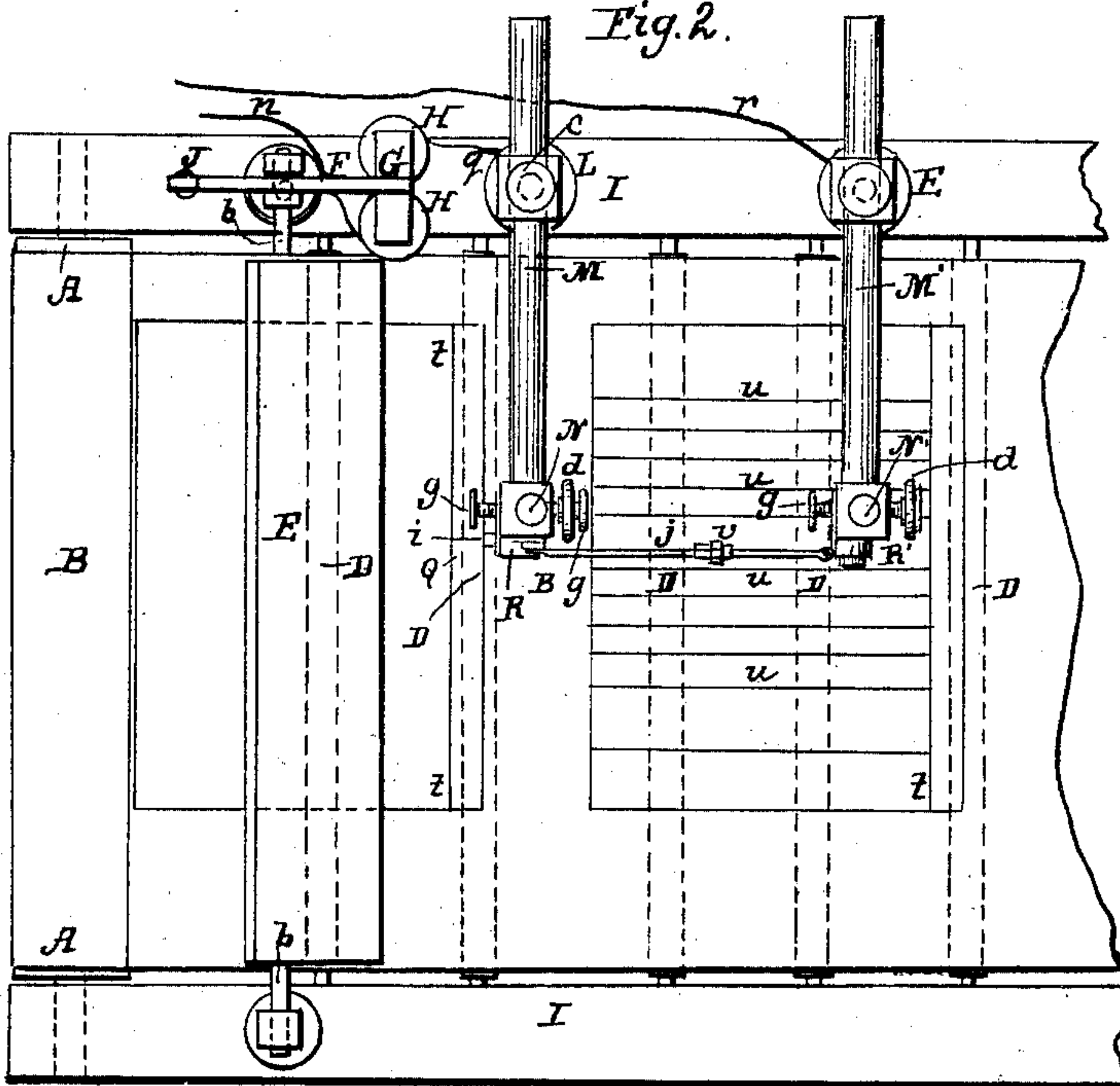


Fig. 5.

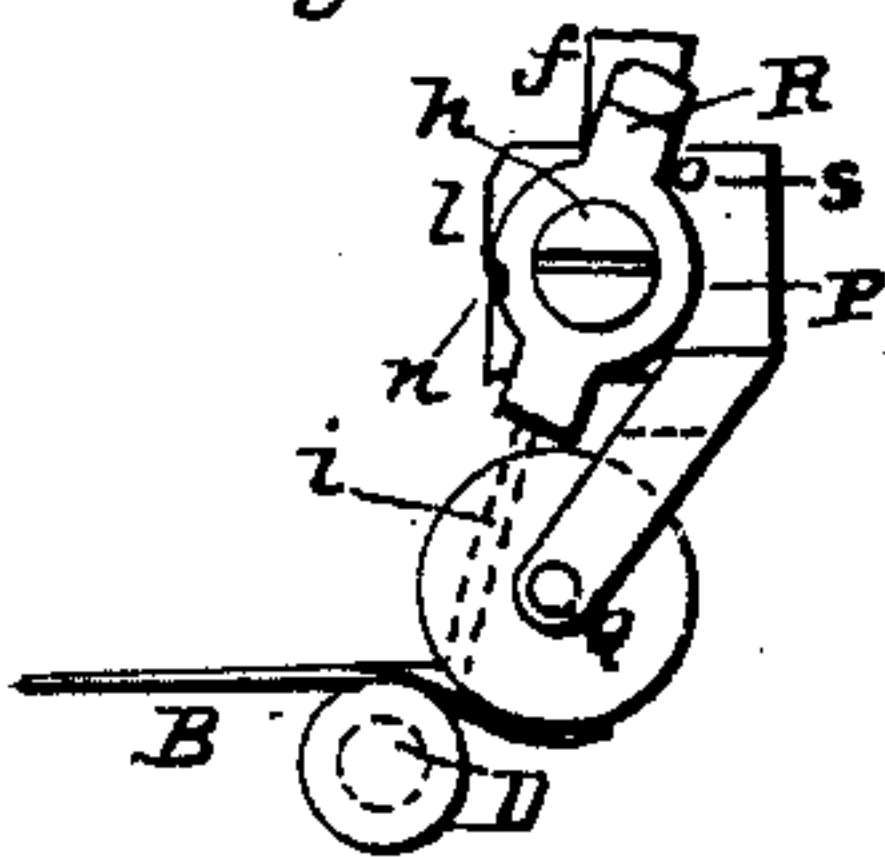
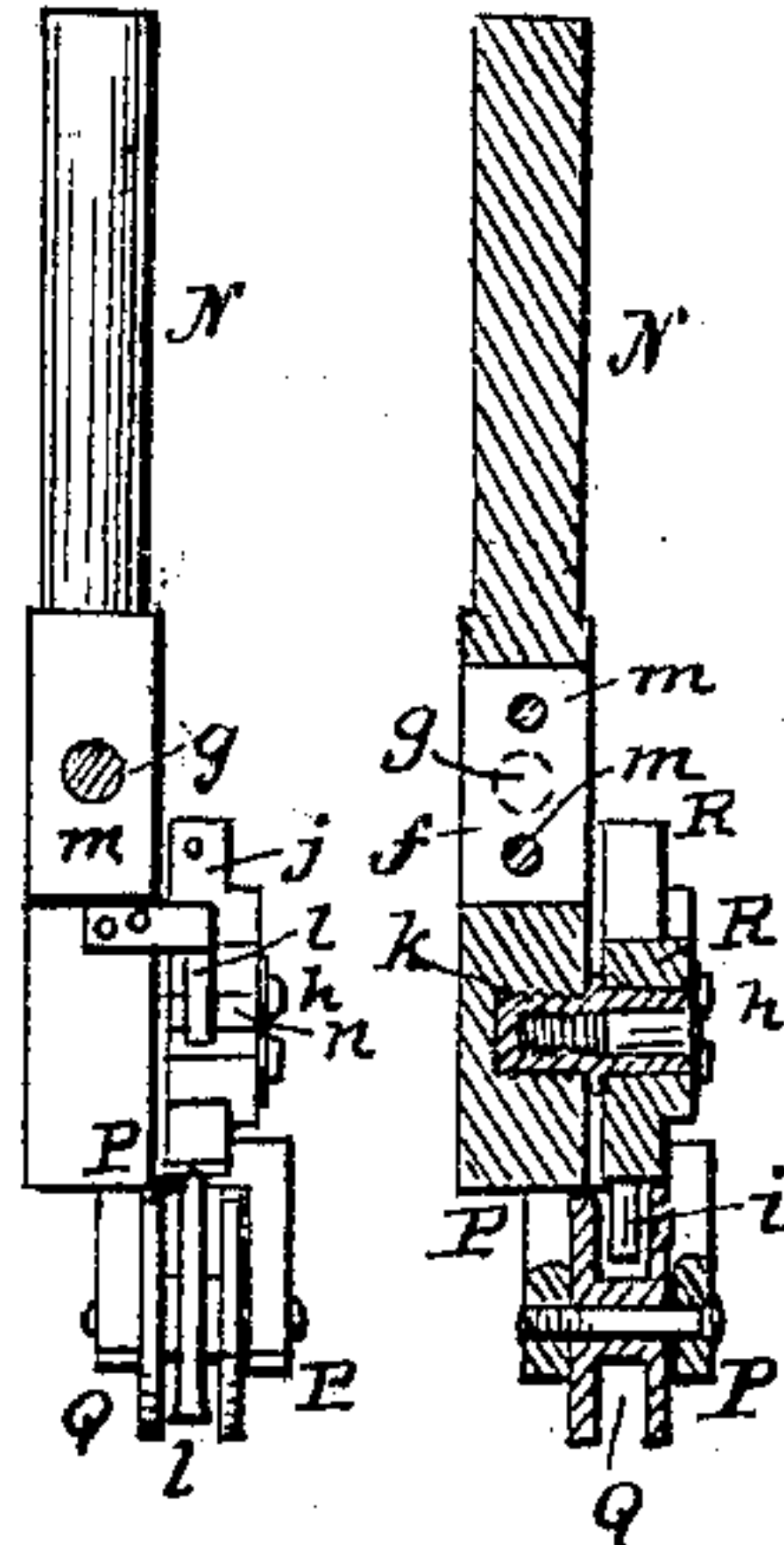


Fig. 3. Fig. 4.



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IMPROVEMENT IN ELECTRO-MAGNETIC ATTACHMENTS TO RULING-MACHINES.

Specification forming part of Letters Patent No. **55,594**, dated June 12, 1866.

To all whom it may concern:

Be it known that I, ELLICOTT D. AVERELL, of the city, county, and State of New York, have invented a new and useful Improvement in Electro-Magnetic Striking Attachments to Paper-Ruling Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 exhibits a vertical longitudinal section of a sufficient portion of a ruling-machine to illustrate the application of the invention, and shows a side view of the electro-magnetic striking attachment. Fig. 2 is a plan of the same. Fig. 3 is a front view of a portion of the electro-magnetic striking attachment on a larger scale than Figs. 1 and 2. Fig. 4 is a vertical section corresponding and parallel with Fig. 3. Fig. 5 is a side view of a portion of the circuit-break.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists in a novel construction of an electro-magnetic striking attachment to ruling-machines, whereby the pens may be made to strike the paper on a head-line or head-lines at any distance from the head of the sheet of paper, to rule down-lines of any desired length, and to strike and rise from the sheet at any number of different points in its length, for the purpose of ruling down-lines of corresponding or various lengths from any number of head-lines by mere adjustments, without the removal or changing of any parts of the attachment.

To enable others skilled in the art to construct, apply, and use my invention, I will proceed to describe it with reference to the drawings.

A is one of the large rollers at the front end of the ruling-machine, for carrying the endless cloth B, and A' is the pressure-roller, applied above the said roller A, to produce the necessary tension on the cloth. D D are the small rollers for the support of the parts on which the paper is ruled during the ruling operation. E is the pen-bar, carrying the pens *a*. These parts of the ruling-machine are similar in their construction and arrangement to the corresponding parts of ruling-machines in common use, and are only represented for the purpose of illustrating the application of my

invention. The parts of the ruling-machine not represented in the drawings are also the same as in other ruling-machines, and it is for that reason that I have not considered it necessary to represent them.

F is a lever secured to the rock-shaft *b* of the pen-bar E, having attached to one arm the armature G of the electro-magnet H, which is firmly secured upon one side of the framing I of the ruling-machine, and having its other arm connected with the framing by means of a spring, J, which exerts a constant tendency to raise the armature G and to pull the bar E in a direction to raise the pens. This spring is, however, not strong enough to overcome the attraction of the magnet upon the armature when the electric current through the magnet is closed, such attraction being sufficient to overcome the force of the spring, and also to draw down the pens upon the paper carried by the cloth B.

L L' are two upright metal posts standing upon one side of the framing I. These posts, if the framing is not of wood or other material which is not a non-conductor of electricity, must be insulated from the said framing in a suitable manner.

M M' are two horizontal arms, of iron or other metal, inserted through suitable holes in the posts L L', and secured therein by set-screws *c c*.

N N' are upright rods, of iron or other metal, inserted through holes in the bars M M', and secured therein by set-screws *d d*. These rods are forked at their lower ends, as shown at *m m* in Fig. 1, and through these forks are permanently inserted horizontal rods *e e*, which pass through transverse holes in the shanks *f f* of two metal foot-pieces, P P', which carry grooved rollers Q Q', of ebony, ivory, or other hard non-conducting material, there being one foot-piece and one roller attached to each of the rods N N'. The foot-pieces are secured firmly within the forks of the rods N N', but are adjustable forward or backward by means of set-screws *g g* in front and behind. The rollers Q Q' rest upon the cloth B, or upon the sheets of paper carried along by and upon it to be ruled, in such manner that they will be caused to rotate by the friction of the cloth or paper passing under them. The paper is represented in Fig. 1 by a single red line and in Fig. 2 in red outline.

To the foot-piece P there is attached, by a

fulcrum-pin, *h*, a small lever, *R*, of the first order, which vibrates in the direction of the movement of the cloth *B* and paper. This lever is insulated from the foot-piece *P* by a sleeve, *k*, of ivory or other insulating material, as shown in Fig. 4, and is made to serve as a circuit-break by the insertion of a piece of ivory, ebony, or other non-conducting material, *n*, into a recess in the front side of its hub, the said piece *n* being so arranged that the vibration of the lever *R* brings it into or out of contact with the point of a light spring, *l*, which is so attached to the foot-piece as always to press lightly on the hub of the lever. The lower arm of the said lever has attached to it a light finger, *i*, which works within the groove of the roller *Q*, and the extremity of which is capable of coming in contact with the cloth *B* or the paper upon it. A stop-pin, *s*, Fig. 1, of insulating material is secured in the foot-piece *P* behind the upper arm of the lever *R*. The upper arm of the said lever is connected by a light metal rod, *j*, with a small lever, *R'*, Fig. 1, of the second order, which is suspended by a fulcrum-pin, *h'*, from the foot-piece *P'*. This lever has attached to it a finger, *i'*, which operates within the groove of the roller *Q'*, in the same manner as the finger *i* operates within the groove of the roller *Q*. The fulcrum-pin *h'* is not insulated from the foot-piece *P'*, as the said pin forms part of the electric circuit, which will presently be explained.

One pole of the galvanic battery is connected by a wire, *p*, with one pole of the electro-magnet *H*, the other pole of which is connected by a wire, *q*, with the metal post *L*. The other pole of the battery is connected by a wire, *r*, with the metal post *L'*. When the lever *R* is in such a position that the spring *l* bears upon its hub above the non-conducting piece *n* of the break the electric circuit is formed through the post *L*, arm *M*, rod *N*, foot-piece *P*, spring *l*, lever *R*, rod *j*, lever *R'*, fulcrum-pin *h'*, foot-piece *P'*, rod *N'*, arm *M'*, and post *L'*, and the magnet attracts the armature *G*, and so draws down the pens *a* into an operative position; but when the lever is moved to a position to bring the piece *n* in contact with the point of the spring *l* the circuit is broken at *n*, and the magnet then exercising no attractive influence upon the armature, the spring *J* raises the pens to an inoperative position, as shown in Fig. 1, in which position they remain while the machine is in motion, except while those portions of the sheets of paper upon which down-lines are to be ruled are passing under the pens.

When the machine is in operation the sheets of paper are fed in upon the cloth *B*, between the rollers *A A'*, in the usual manner, with the head and tail of each sheet so arranged that the head enters first. As the head or top edge of the paper strikes the finger *i*, as shown in Fig. 1, and pushes it back by the continued movement of the sheet with the cloth *B* until the fingers come in contact with the hub of

the roller *Q*, the brake-piece *n* on the lever *R* is thereby moved out of contact with the spring *l*, and the metallic portion of the said lever brought into contact with the said spring, and so made to close the circuit. The magnet then attracts the armature *G*, and causes the pens to strike the sheet and commence ruling the down-lines thereon, and the ruling is continued until the head or top edge of the paper strikes the finger *i'* and pushes it forward so far that the lever *R'*, acting by means of the rod *j* upon the lever *R*, moves the latter lever to a position to bring the break-piece *n* into contact with the spring *l*, and the said lever into contact with the stop-pin *s*, when, the circuit being open, the spring *J* raises the pens from the paper. The pens continue thus raised until the head of the next sheet strikes the finger *i*, and the further continued movement of the sheet produces the closing of the circuit, and so causes the magnet to bring the pens down again to strike that sheet, as before described.

The distance from the head or upper edge at which the pens are made to strike the sheet is regulated by the distance at which the foot-piece *P* is set from the lines of the pens.

The principal adjustment of the foot-piece is made by turning the post *L* on its axis; but a more delicate adjustment to make the pens strike exactly on the transverse head-line *t* (represented in blue color on the sheet in Fig. 2) is effected by means of the screws *g g*, which adjust the foot-piece forward or back toward or from the pens. The length of the down-lines *u u* (shown in blue color in Fig. 2) is regulated by the distance at which the foot-piece *P'* is set from the foot-piece *P*.

The principal adjustment of the foot-piece *P'* is by turning the post *L'* on its axis; but more delicate adjustments for the exact length of the down-lines are made by the set-screws *g g*, applied to the said foot-piece. A further adjustment for the exact length of the down-lines is provided for by an adjustable connecting swivel-nut, *v*, in the rod *j*, which is made in two pieces, to permit the adjustment of the levers *R R'* and their fingers *i i'* relatively to each other. These adjustments may be made so delicate that the pens may rise from the paper exactly at the tail or lower edge of the paper, so as to complete the ruling thereto without the pens running over onto and inking the cloth *B*.

The pens may be made to strike upon and rise from one sheet several times, to rule several series of down-lines, by providing the machine with two or more sets of electro-magnetic striking apparatus, each composed of two posts, *L L'*, arms *M M'*, rods *N N'*, and their several appurtenances, as hereinbefore described, all connected with one galvanic battery.

In order to insure the proper operation of the fingers *i i'* by the edge of the paper, two of the supporting-rollers, which are adjustable backward and forward on the framing of

the machine, are set one just in front of each of the rollers Q Q', and the latter rollers and the fingers i i' are so adjusted, by sliding the rods N N' in the arms M M', as to produce a depression of the cloth B in rear of the said rollers D D, as best shown in Fig. 1. This causes the head or striking edge of the sheet to be elevated above the cloth B, and above the points of the fingers i i', as shown in Fig. 1, so that said edge will first strike the roller, and be thereby conducted to the fingers, and so well supported that it will not fail to have the necessary stiffness to move the fingers.

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

1. The circuit-break consisting of a metallic lever and finger, with a piece, *n*, of non-conducting material in the hub of the lever, and a spring, *l*, or its equivalent, the whole applied and operating substantially as herein specified, in combination with a galvanic battery or other generator of an electric circuit and a ruling-machine.

2. The lever R' and finger i', applied in connection with the lever R and finger i, substantially as and for the purpose herein specified.

3. The rollers Q Q', applied in connection with the levers R R' and fingers i i', and adjustable relatively to the cloth B and rollers D D substantially as and for the purpose herein described.

4. The combination of the posts L L', adjustable about their axes, the arms M M', and the rods N N', carrying the foot-pieces P P', rollers Q Q', circuit-break R, and lever R', substantially as and for the purpose herein specified.

5. The foot-pieces P P', carrying the rollers Q Q', circuit-break R, and lever R', adjustable relatively to the rods N N', or other equivalent supports, by screws *g g*, substantially as and for the purpose herein set forth.

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Witnesses:

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