

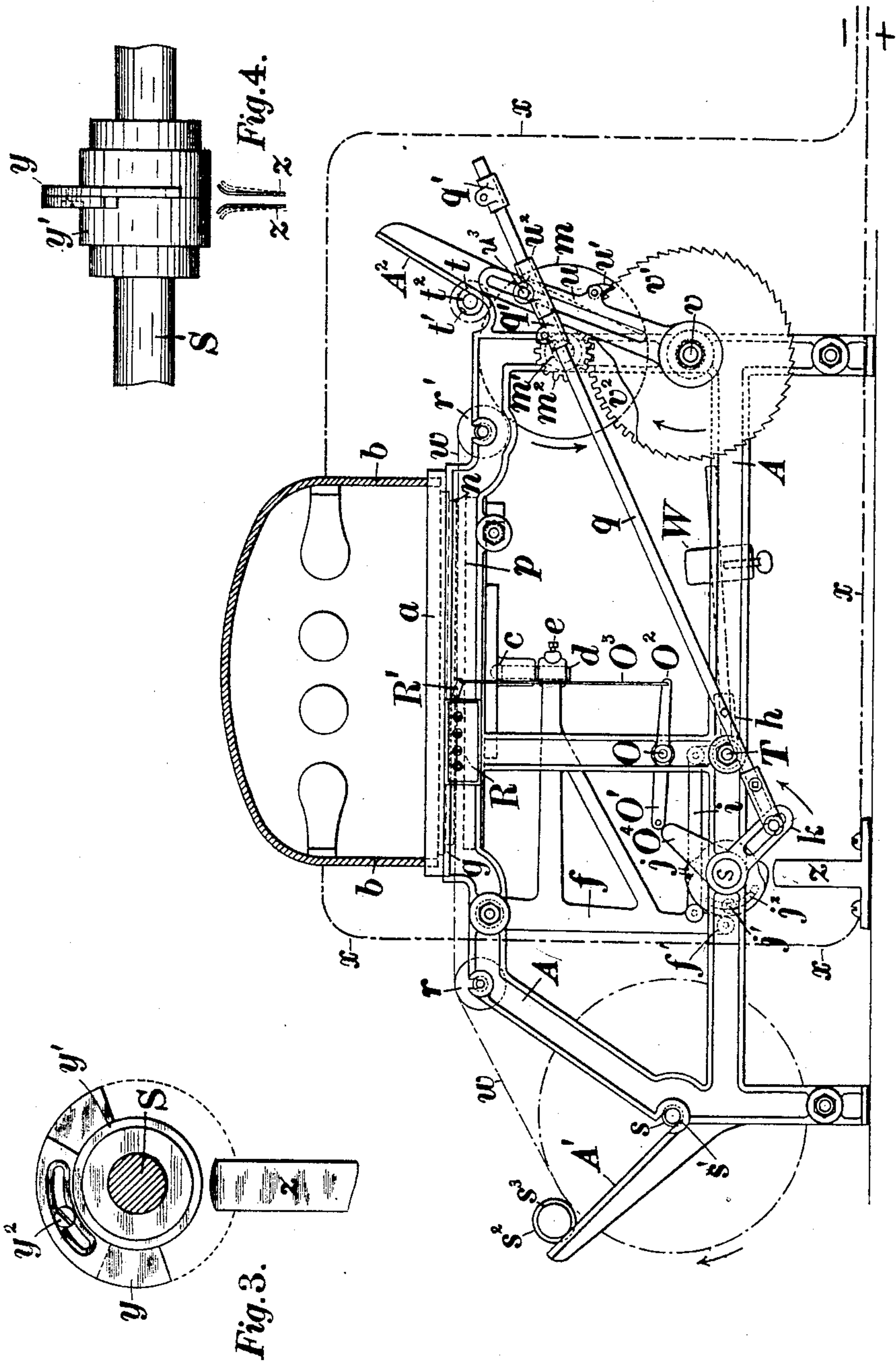
(No Model.)

2 Sheets—Sheet 1.

J. URIE, Jr.  
PHOTOGRAPHIC PRINTING MACHINE.

No. 478,663.

Patented July 12, 1892.



Attest.  
*Henry J. Miller*  
*Edward D. Kinsey*

Inventor.  
*John Uri Jura*

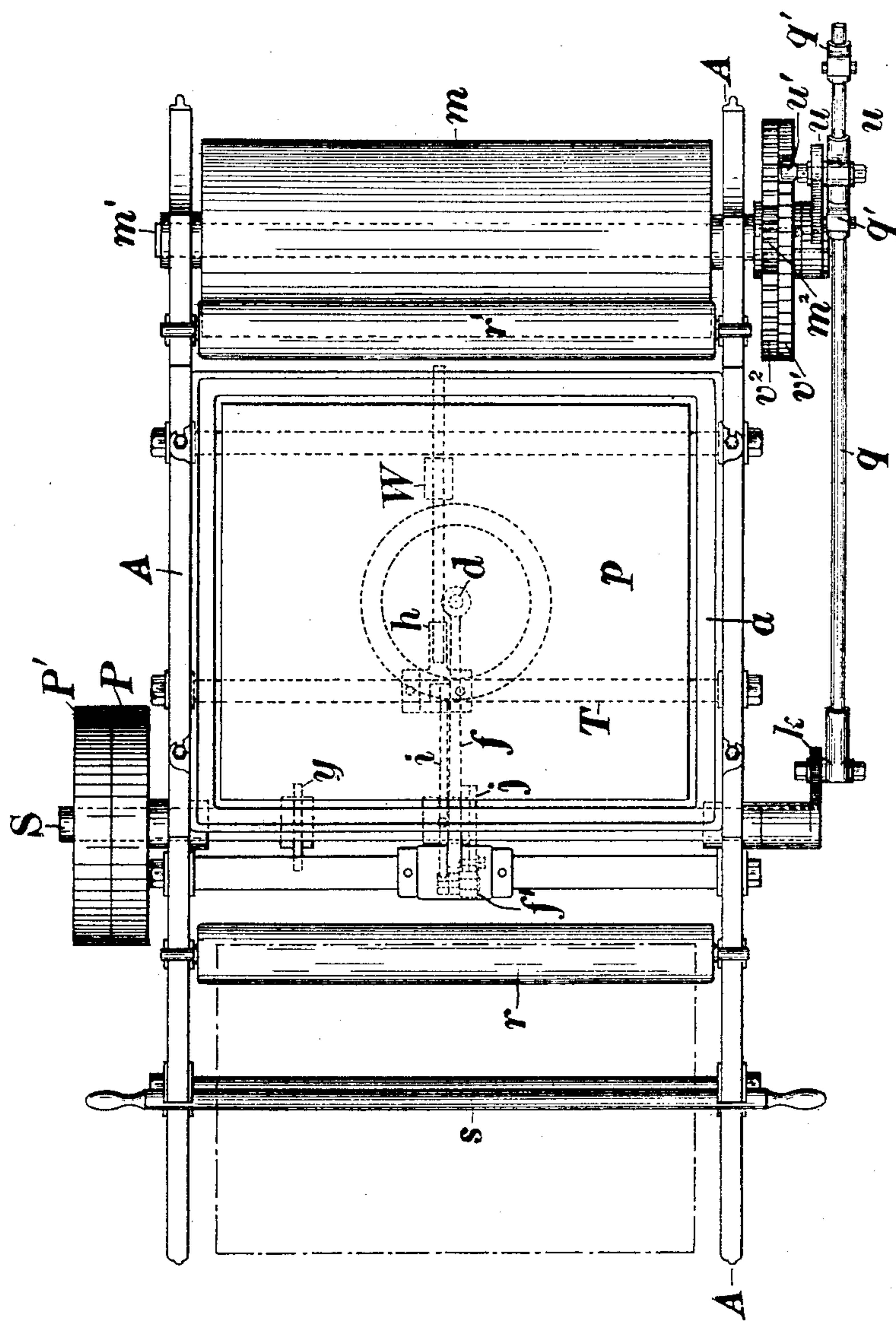
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 Edward J. Kinsey

Inventor.  
John Lee Jun



# UNITED STATES PATENT OFFICE.

JOHN URIE, JR., OF JERSEY CITY, NEW JERSEY.

## PHOTOGRAPHIC-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 478,663, dated July 12, 1892.

Application filed July 17, 1891. Serial No. 399,819. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN URIE, Jr., a subject of the Queen of Great Britain, residing at Jersey City, Hudson county, New Jersey, have invented certain new and useful Improvements in Photographic-Printing Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to a machine for making many successive prints from a single negative upon a continuous web of sensitized paper; and comprises a printing-frame for holding the negative, a supply-roll for the sensitized paper, a take-up roll for the same, and means for actuating the said members intermittently.

The invention consists partly in a special construction of the take-up roll and means for actuating it, partly in a special mechanism for operating a platen to press the sensitized paper against the negative during the printing operation, and partly in means for controlling the light employed in the printing operation.

In the annexed drawings, Figure 1 is a side elevation of the machine, and Fig. 2 a plan of the same with a box containing the lighting apparatus and the web of sensitized paper removed. Fig. 3 is a side view, and Fig. 4 an edge view, of an electric switch for controlling the light.

A is the main frame of the machine, having the main shaft S journaled therein and provided with the fast and loose pulleys P and P' to receive the power required to drive the machine.

a is a rectangular printing-frame, having the glass plate g secured within the same, to which latter is secured along its edges the negative plate n by cement or other suitable means.

A box b, having a row of incandescent lamps upon each of its four sides, is fitted within the printing-frame, the glass plate g serving at its bottom and permitting the light therefrom to pass through the negative n to the web w of sensitized paper where exposed thereto under the frame. A platen p, which would in practice be covered with a suitable pad of soft material, is applied under the web w to press the same upward against the film

side of the negative. This platen is mounted, by means of a ball-and-socket connection c, upon a stud d, held adjustable vertically by means of the set-screw e in a socket in the laterally-projecting arm of a bell-crank f, pivoted upon the tie-rod T of the frame A. The platen p is pressed normally upward by means of the weight W upon the laterally-projecting arm of the bell-crank h, the upwardly-projecting arm of which is connected by the link i with the depending arm of the bell-crank f, the tension thus produced upon the link i causing a corresponding upward pressure of the lateral arm of the bell-crank f. The flexible joint formed by the ball-and-socket connection c permits the platen to adjust itself against the negative and interposed web w, and thus distributes equally the upward pressure applied by the bell-crank.

The main shaft S is provided adjacent to the depending arm of the bell-crank f with an adjustable cam j, having segmental faces engaging the end of the said depending arm or an anti-friction roller f' upon the same. The cam j is formed of two similar flat plates having concentric slots j' and bolts j<sup>2</sup> to clamp the plates together. The end of the depending arm or its anti-friction roller is made of sufficient width to bear against either or both of said parts of the divided cam, and the circular adjustment of the latter upon each other operates to vary the operative face of the cam presented, and to thus correspondingly vary the period the platen remains depressed by means of the action of the said cam upon the bell-crank f.

The supply-roller is mounted in open sockets s' in the frame of the machine and is provided, as shown in dotted lines in Fig. 1, with a roll of sensitized paper in readiness for the printing operation. In order to prevent the unrolling of the paper too rapidly, a brake-roller is applied thereto. This brake-roller consists of a heavy cylinder s<sup>2</sup> of metal of the same width as the supply-roller, having hubs s<sup>3</sup> at both ends of nearly the same diameter as the body of the roller, the hubs resting against the inclined ways A' of the frame A, while the body of the roller is pressed by gravity against the top of the roll of sensitized paper. The friction of the roller with the paper



operates to rotate the same when the former is drawn toward the printing-frame  $a$ , and the friction of the hubs  $s^3$  upon the ways  $A'$  offers the requisite resistance to such movement.

The take-up roll  $t$  consists in a heavy cylinder like the brake-roller  $s^2$ , having a longitudinal notch  $t'$ , into which the end of the web  $w$  is wedged to secure it thereto, and the said roll  $t$  is sustained by the measuring-roll  $m$  in conjunction with the inclined ways  $A^2$ , engaging hubs  $t^2$  at either end of the same.

The measuring-roll  $m$  is mounted in suitable bearings upon the frame  $A$  and operates when actuated by the ratchet device connected therewith to draw the web  $w$  of sensitized paper from the supply-roll  $s$ , over the guide-roller  $r$ , under the printing-frame  $a$ , over the guide-roller  $r'$ , and around the said measuring-roll, as indicated in dotted lines in Fig. 1, and to rotate the take-up roll  $t$  by its friction therewith, thus winding upon the latter the web drawn from the supply-roll  $s$ . It will be observed that as the roll of paper increases upon the roll  $t$  the latter recedes upwardly from the measuring-roll along the way  $A^2$ ; but as the outer face of the said way is made radial with relation to the measuring-roll  $m$  its weight acts upon the said roll at the same point regardless of the size the roll attains. The converse of this is true with regard to the action of the brake-roller  $s^2$ , for as the paper is drawn from the supply-roller and the size of the roll diminishes the weight of the roller continues to act in the same radial line and for the above reason.

In order to rotate the measuring-roll intermittently and uniformly for each cycle of the machine, the shaft  $m'$  of the measuring-roll is provided with a spur-wheel  $m^2$ , and a stud  $v$  is applied to the frame  $A$  adjacent thereto and provided with the loose ratchet and spur wheels  $v'$  and  $v^2$ , respectively, secured rigidly together and the latter meshing with the gear  $m^2$ . A slotted arm  $u$  is also pivoted upon the stud  $v$  and provided with the pawl  $u'$  to engage the ratchet-wheel  $v'$ . A slotted crank  $k$  is applied to the main shaft  $S$  and connected by means of the sleeve  $u^2$  to the arm  $u$  by the rod  $q$ , having collars  $q'$  secured adjustably thereon on either side of the sleeve  $u^2$ .

The sleeve  $u^2$  is secured adjustable radially upon the arm  $u$  by means of a bolt  $u^3$ , passing through a hub upon the same and the slot in the arm, and the rod  $q$  is secured adjustably to the crank  $k$  in the same manner. It is obvious that the rotation of the crank  $k$  operates to reciprocate the rod  $q$  so as to cause a similar motion in the pawl-arm  $u$ , the distance between the collars  $q'$  determining the fraction of a cycle of the machine in which the pawl-arm acts with a given radial adjustment of the rod  $q$ . It is also evident that the reciprocation of the said pawl-arm operates to rotate the measuring-roll  $m$  through a given arc for each forward stroke of the same, which latter in its turn rotates the roll  $t$  sufficiently

to take up that portion of the web drawn from the supply-roll by the measuring-roll, the character and extent of the motion of such members being determined by the various adjustments of the ratchet device already referred to.

The switching device for controlling the electric lamps in the box  $b$  consists in two adjacent but electrically independent spring-contacts  $z$ , interposed in the electric circuit supplying the lamps, the same having opposed flat faces in close proximity and being mounted in any convenient position near the main or power shaft  $S$ . A segmental plate  $y$ , divided into two flat sections having suitable hubs  $y'$  and clamped together by the screw  $y^2$ , is fixed upon the power-shaft adjacent to the said spring-contacts and suitably insulated therefrom. This contact-plate is rotated by the said shaft between the said spring-contacts  $z$  to establish electrical connection intermittently between the same, thus making and extinguishing the light in the box  $b$  at the required periods in the cycle of the machine. By forming the plate  $y$  in two sections, as above described, the latter may be readily adjusted circumferentially upon each other in order to lengthen or shorten the connection established between the spring-contacts  $z$ . In Fig. 1 the contact-plate  $y$  is omitted to avoid confusion with the other segmental plates  $j$  upon the same shaft; but the construction and operation of the switching device are fully illustrated in Figs. 3 and 4.

In Fig. 1 I have shown attached to the frame of the machine a registering device  $R$  of well-known construction, which is actuated by a vibrating lever  $R'$ , the same being commonly employed in registering the strokes of various reciprocating mechanisms. To actuate such device I mount a rock-shaft  $O$  upon the frame  $A$  above the tie-rod  $T$ , and upon its inner and outer ends I secure the laterally-projecting arms  $O'$  and  $O^2$ , respectively, extending in opposite directions, the arm  $O'$  projecting toward the shaft  $S$ . Upon the said shaft is fixed the dog  $O^4$  in a line with the end of the inner arm  $O'$ , each rotation of the shaft thereby causing the reciprocation of the rock-shaft  $O$  and the corresponding actuation of the register  $R$  by means of the link  $O^3$ , connecting the arm  $O^2$  with the lever  $R'$ . The figure illustrates the machine just after the completion of the printing operation, the ratchet device making its forward stroke to actuate the measuring-roll  $m$ . The further rotation of the shaft  $S$  first causes the registry of the completion of a cycle of the machine and then finishes the feeding operation, the cushion-platen  $p$  having previously been withdrawn to permit the forward movement of the web  $w$ . At the end of the forward stroke of the crank  $k$ , the cam  $j$  releases the depending arm of the bell-crank  $f$ , which, through the action of the counterbalance-weight  $W$ , presses the cushion-platen upward against the negative  $n$ . The segmental con-



tact plate *y* now operates to establish the current through the incandescent lamps in the box *b*, which causes the exposure of the negative and that portion of the web *w* under the printing-frame to its action. After the required period of exposure the current is broken in a similar manner, the cam *j* withdraws the cushion-platen *p* by engagement with the bell-crank *f*, and the crank *k* again actuates the measuring-roll *m*, during which movement the registering device *R* is made to record another completed cycle of the machine.

I have referred to my machine herein as being adapted to print successively from a "single negative," by which expression I mean a negative, whether upon an integral glass-plate or composed of several smaller sections, from which a print may be made in a single operation.

In order to print from several independent negatives, it is first necessary to combine them in a single one by securing each rigidly to the printing-frame, and it is in this sense that I have used the term "single negative" herein.

Having thus set forth my invention, what I claim herein, and desire to secure by Letters Patent, is—

1. In a photographic-printing machine for making successive prints from a single negative upon a continuous web of sensitized paper, the combination, with the supply-roll, the printing-frame, and the power-shaft, of a measuring-roll, and means for rotating the same intermittently through a given arc, ways extending upwardly from the said measuring-roll, and a take-up roll supported by the said measuring-roll in conjunction with the said ways, as and for the purpose set forth.

2. In a photographic-printing machine for making successive prints from a single negative upon a continuous web of sensitized paper, the combination, with the supply-roll, the printing-frame, and the power-shaft, of a measuring-roll, and means for rotating the same intermittently through a given arc, upwardly-inclined ways extending radially from the said measuring-roll, and a take-up roll supported by the said measuring-roll in conjunction with the said inclined ways, as and for the purpose set forth.

3. In a photographic-printing machine for making successive prints from a single negative upon a continuous web of sensitized paper, the combination, with the supply-roll, the printing-frame, and the power-shaft, of a measuring-roll, and means for rotating the same intermittently through a given arc, upwardly-inclined ways extending radially from the said measuring-roll, and a take-up roll consisting of the straight cylinder *t*, sustained upon the said measuring-roll, and the hubs *h* at each end thereof, bearing against the said inclined ways, substantially as and for the purpose set forth.

4. In a photographic-printing machine for making successive prints from a single nega-

tive upon a continuous web of sensitized paper, the combination, with the main frame, the printing-frame mounted thereon and provided with the negative, and the power-shaft, of a cushion-platen secured by means of a flexible joint upon one arm of a bell-crank pivoted upon the main frame, means applied to the bell-crank for pressing the platen normally upward, and means connected with the other arm of the bell-crank and with the power-shaft for reciprocating the bell-crank at intervals to retract the cushion-platen, substantially as herein shown and described.

5. In a photographic-printing machine for making successive prints from a single negative upon a continuous web of sensitized paper, the combination, with the main frame, the printing-frame mounted thereon and provided with the negative, and the power-shaft, of a cushion-platen supported upon the lateral arm of a bell-crank pivoted upon the main frame, and a divided cam upon the power-shaft adjacent to the depending arm of the bell-crank, the said cam consisting of two similar flat plates having projecting hubs thereon and secured together by a clamp-bolt and adapted for circular adjustment upon each other, the whole arranged and operated as and for the purpose set forth.

6. In a photographic-printing machine for making successive prints from a single negative upon a continuous web of sensitized paper, the combination, with the main frame, the printing-frame mounted thereon and provided with the negative, and the power-shaft, of a cushion-platen supported upon the lateral arm of a bell-crank, pivoted upon the main frame and a divided cam constructed as described, fixed upon the power-shaft adjacent to the depending arm of the said bell-crank of an anti-friction roller applied to the said depending arm and adapted to engage the said cam, as and for the purpose set forth.

7. In a photographic-printing machine, the combination, with the main frame, the printing-frame mounted thereon and provided with the negative, and the power-shaft, of a cushion-platen supported upon the lateral arm of a bell-crank, pivoted upon the main frame, an adjustable cam fixed upon the power-shaft adjacent to the depending arm of the bell-crank for moving the said arm in one direction, and means for applying a yielding pressure to the said arm in opposition to the cam, as and for the purpose set forth.

8. In a photographic-printing machine, the combination, with the main frame, the printing-frame mounted thereon and provided with the negative, and the power-shaft, of a cushion-platen supported upon the lateral arm of a bell-crank, pivoted upon the main frame, an adjustable cam, constructed as described, fixed upon the power-shaft adjacent to the depending arm of the said bell-crank, a second bell-crank having a laterally-projecting arm provided with a counterbalance-weight *W*, and a link connecting the upwardly-project-



ing arm of latter to the depending arm of the bell-crank sustaining the platen, the whole arranged and operated substantially as herein set forth.

5 9. In a photographic-printing machine, the combination, with the printing-frame provided with the negative, a box applied thereto containing incandescent electric lamps and  
10 open on the side adjacent to the printing-frame, and the power-shaft of the machine, of two adjacent spring-contacts having flat faces opposed to each other located in the electric  
15 circuits supplying the said incandescent lamps, and a segmental plate mounted upon the power-shaft adjacent to the said opposed  
spring-contacts and rotated between the same  
20 to establish electrical connection intermittingly between the same, thereby alternately making and breaking the circuit through the  
said electric lamps, substantially as and for the purpose set forth.

10. In a photographic-printing machine, the combination, with the printing-frame provided with the negative, a box applied thereto  
25 containing incandescent electric lamps and

open on the side adjacent to the printing-frame, and the power-shaft of the machine, of the adjacent spring-contacts having flat faces opposed to each other located in the electric  
30 circuits supplying the said incandescent lamps, and a segmental plate divided into two flat sections adjustable upon each other and provided with a clamp-screw for securing them  
together, as described, the said plate being  
35 mounted upon the power-shaft adjacent to the said opposed spring-contacts and rotated between the same to establish electrical connections intermittingly between the same and  
thereby alternately making and breaking the  
40 circuit through the said electric lamps, the whole arranged and operated as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN URIE, JUN.

Witnesses:

HENRY J. MILLER,

EDWARD F. KINSEY.

It is hereby certified that in Letters Patent No. 478,663, granted July 12, 1892, upon the application of John Urie, Jr., of Jersey City, New Jersey, for an improvement in "Photographic Printing Machines," errors appear in the printed specification requiring correction, as follows: On page 1, in lines 18 and 19, the clause "construction of the take-up roll and means for actuating it" should read *construction for and means for actuating the take-up roll*; in line 45, the word "at" should read *as*; in line 53, "ball-ad-socket" should read *ball-and-socket*; on page 3, in line 104, the comma after the word "bell-crank" should be stricken out and inserted after the word "frame"; in line 105, the comma after the word "described" should be stricken out; in line 107, a comma should be inserted after the word "bell-crank"; and in lines 116 and 128, the commas after the words "bell-crank" should be stricken out; and on page 4, lines 37-38, the word "connections" should read *connection*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 9th day of August, A. D. 1892.

[SEAL.]

CYRUS BUSSEY,  
*Assistant Secretary of the Interior.*

Countersigned:

N. L. FROTHINGHAM,  
*Acting Commissioner of Patents.*