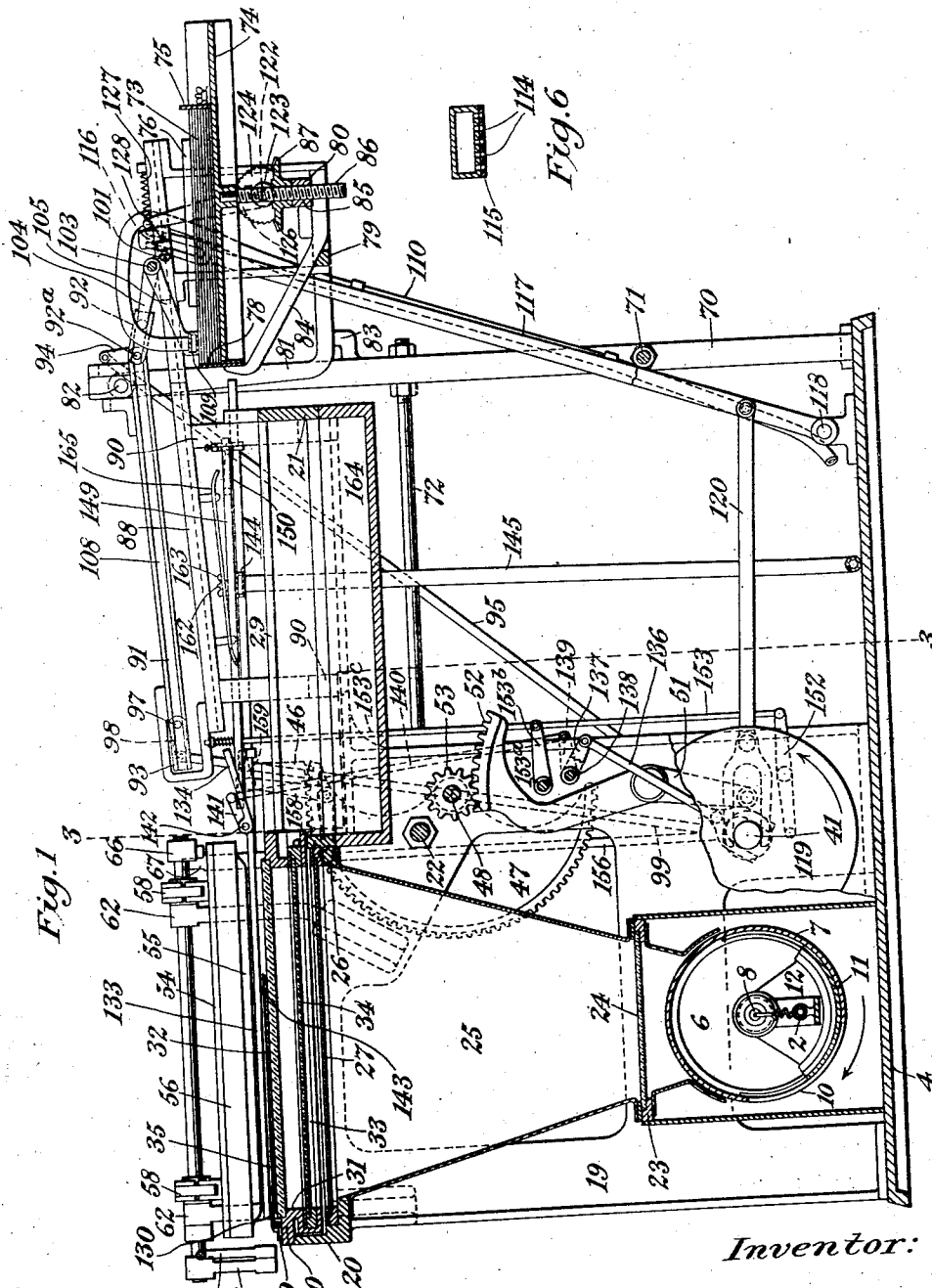


A. W. DREYFOOS.
 PHOTOGRAPHIC PRINTING MACHINE.
 APPLICATION FILED NOV. 13, 1913.

Patented June 9, 1914.

5 SHEETS—SHEET 1.

1,099,694.



Witnesses:

J. W. Fuller Thompson
 Raymond M. Rone

Inventor:

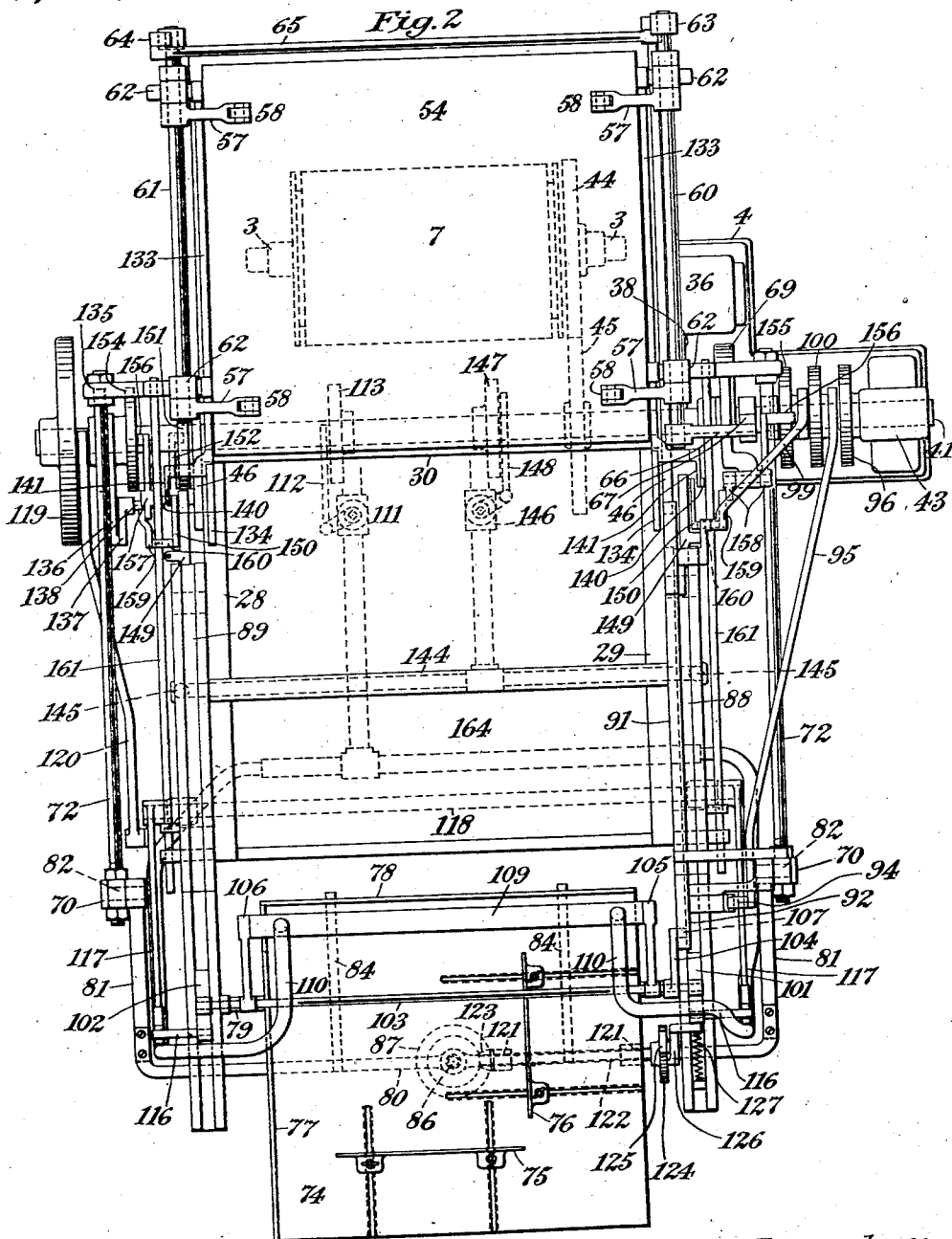
Alexander W. Dreyfoos
 by Luther Dittler for
 Attorney.

A. W. DREYFOOS.
PHOTOGRAPHIC PRINTING MACHINE.
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5 SHEETS—SHEET 2.

1,099,694.



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1,099,694.

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5 SHEETS-SHEET 3.

Fig. 3

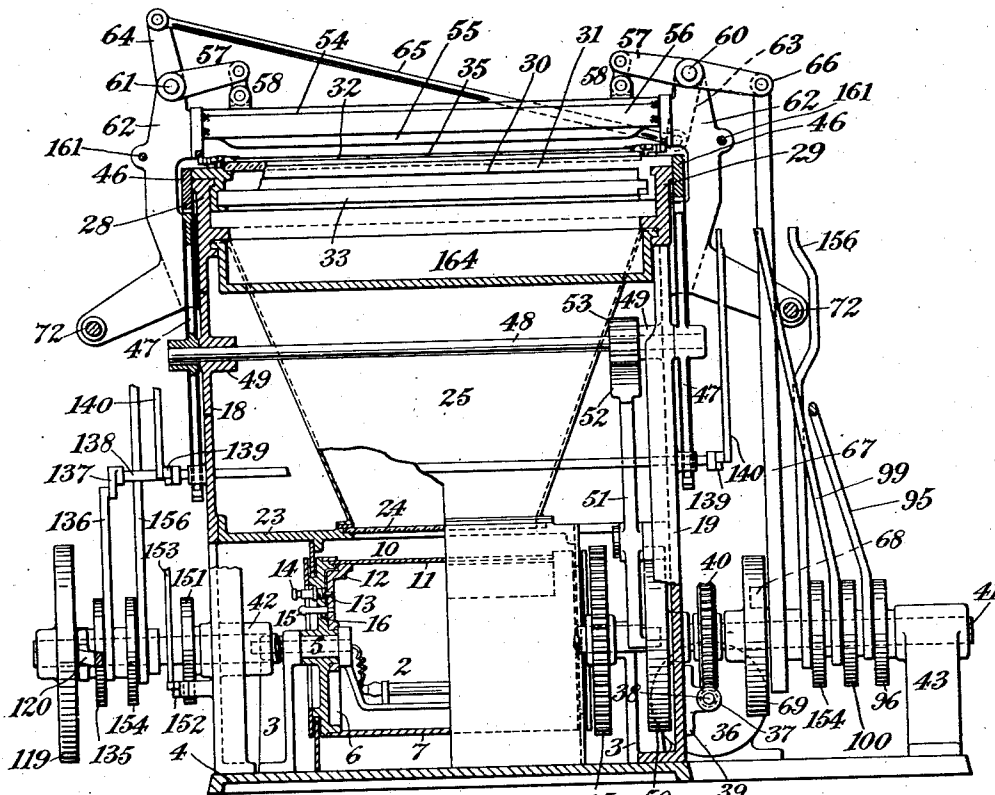
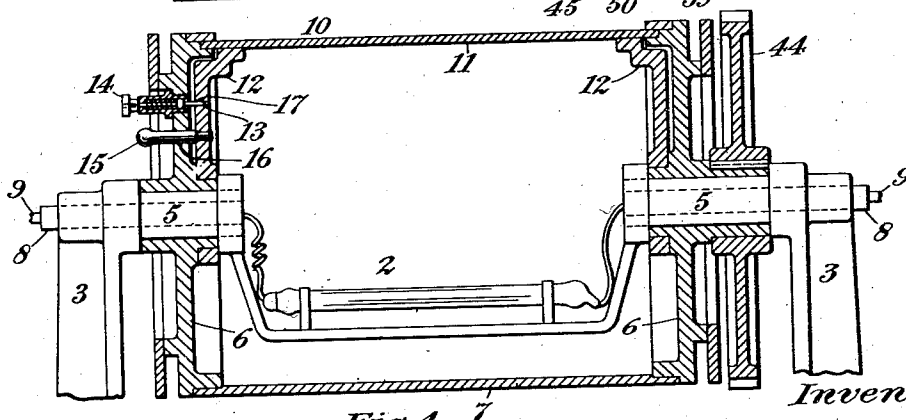


Fig. 4

Witnesses:

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 Raymond M. Coane

by

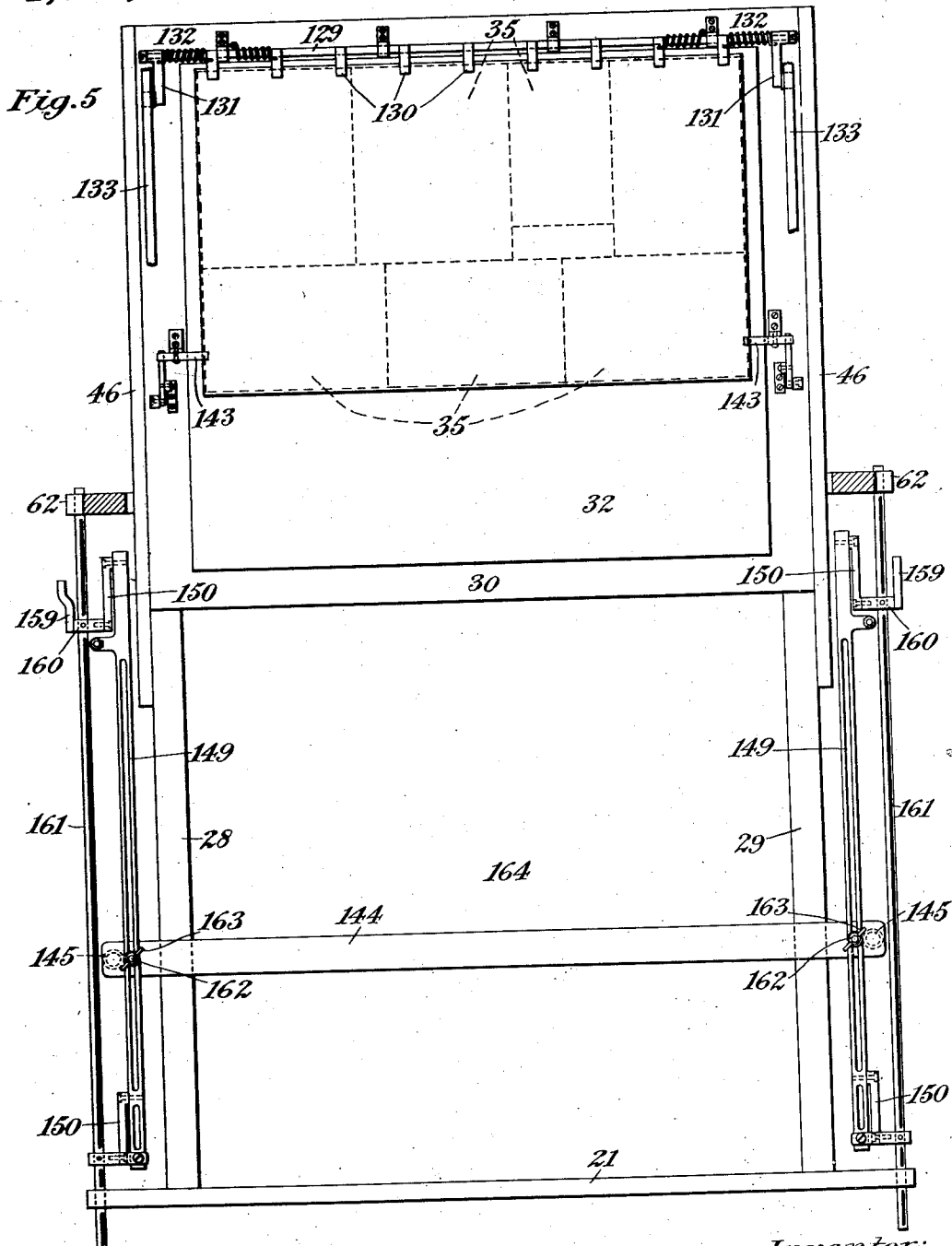
Alexander W. Dreyfoos
 Lester D. Dillenkopf
 Attorney.

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Patented June 9, 1914.

5 SHEETS-SHEET 4.

1,099,694.



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 PHOTOGRAPHIC PRINTING MACHINE.
 APPLICATION FILED NOV. 13, 1913.

Patented June 9, 1914.
 5 SHEETS—SHEET 5.

1,099,694.

Fig. 9

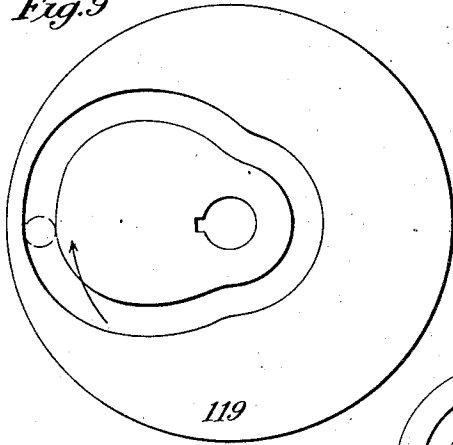


Fig. 7

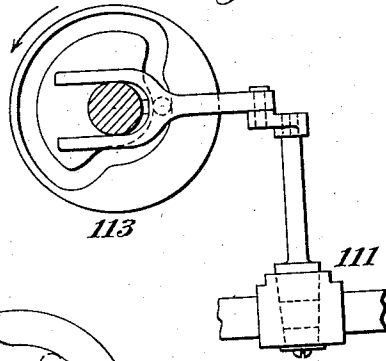


Fig. 10

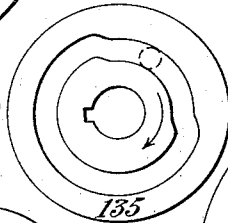


Fig. 12

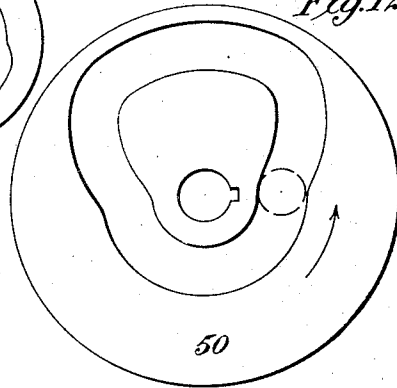


Fig. 8

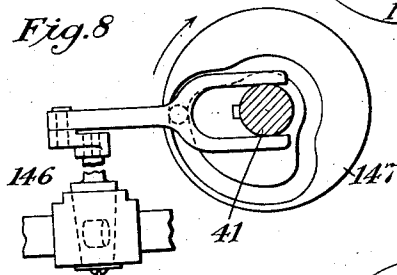


Fig. 13

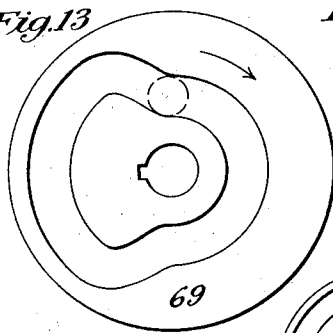


Fig. 11

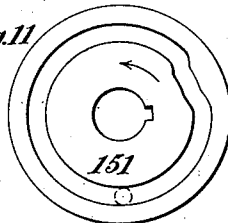


Fig. 16

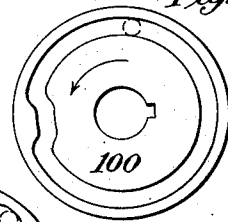


Fig. 14

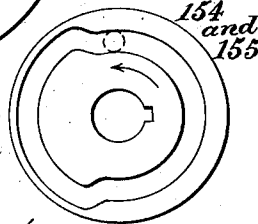
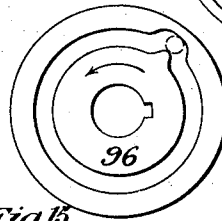


Fig. 15



Inventor:

Witnesses:

J. W. Fuller Thompson
 Rosamond M. Coan.

by

Alexander W. Dreyfoos
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 Attorney.

UNITED STATES PATENT OFFICE.

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TO HENRY OBSTFIELD, OF NEWARK, NEW JERSEY.

PHOTOGRAPHIC-PRINTING MACHINE.

1,099,694.

Specification of Letters Patent.

Patented June 9, 1914.

Application filed November 13, 1913. Serial No. 800,694.

To all whom it may concern:

Be it known that I, ALEXANDER W. DREYFOOS, a citizen of the United States, and a resident of Mount Vernon, in the county of Westchester, State of New York, have invented certain new and useful Improvements in Photographic-Printing Machines, of which the following is a specification.

This invention relates to machines for producing impressions by means of light on sheets of sensitized photographic paper. Its principal object is to provide an improved machine, for automatically producing such photographic prints in large quantities.

Another object is to provide improved means for controlling the application of light in such machines, and still another object is to furnish improved means for holding the sensitized paper while exposures are being made.

In connection with the automatic operation, means are provided for automatically placing sheets of sensitized paper over the negatives, and also means for automatically removing the prints after the exposures.

An important feature of the machine is in mounting the negatives on a platen, which moves to and fro, between the supply of sheets of paper and the source of light, so that the platen and negatives are accessible at the commencement of the platen movement for inspection and adjustment.

A further object is to provide means whereby the negatives can be conveniently shaded, by having under them sheets of semi-transparent material when the exposures to the light are made, and in connection with said shading means, there are means for shifting parts of the feed mechanism, to provide access to said shading devices.

The means I employ for accomplishing these results are illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of my improved photographic printing machine. Fig. 2 is a plan of the same. Fig. 3 is a section on the line 3—3 with certain parts broken away. Fig. 4 is a longitudinal section of the cylinder. Fig. 5 is an enlarged plan of the platen and the mechanism for removing prints. Fig. 6 is an enlarged cross section of the feed bar. Figs. 7 and 8 are details of the valves and their controlling mechanism. Figs. 9 to 16 inclusive are details of the cams.

Like characters refer to like parts in all figures of the drawings.

My improved photographic printing machine comprises the following groups of mechanism: a source of intermittent light and controlling means therefor; a platen for supporting the negatives and mechanism for moving it to and fro; a cushion for holding the photographic paper on the negatives, and operating mechanism for said cushion; a paper feeding mechanism; and mechanism for removing the prints. The intermittent light and its controlling means will first be described, and then the others in the order named, together with their operating mechanisms. The source of light is preferably a mercury vapor electric lamp, such as 2, mounted between pedestals 3, which are secured to the base-plate 4. The pedestals 3 are provided with cylindrical bearings 5, on which are rotatably mounted the cylinder ends 6, of the cylinder 7. Insulating bushings 8 are fitted to the holes in said bearings, and serve to insulate the conductors 9, of the electric lamp 2.

The cylinder 7 is provided with an opening 10, through which the light of the electric lamp can pass upward to the print paper through the negatives at the proper time, and a shutter 11 is provided to vary the effective width of said opening when it is desirable to do so for printing paper of different degrees of sensitiveness. The shutter 11 is provided with two segment-shaped ends 12, which are mounted on hubs on the inner portions of the cylinder ends 6, and the left hand segment has a series of holes 13 in line axially with a spring-plunger 14 fastened to the left hand cylinder end. The left hand shutter end also has a handle 15 fastened to it, and extending through a segmental slot 16 in the left hand cylinder end. The movable pin 17, of the spring plunger 14, normally remains forced into one of the holes 13 of the shutter end, and when it is desired to change the width of the cylinder opening, the pin is pulled back out of the hole, the shutter is moved the proper amount by means of the handle 15, and the plunger pin, on being released from the hand of the operator is forced by its spring into the hole for the required position.

The frame work of the machine consists of two side frames 18 and 19 mounted on the base 4, and connected by a back rail 20, a

front rail 21, a threaded rod 22, and a horizontal frame 23. The horizontal frame 23 is provided with a rectangular piece of ground glass 24, and over this is a funnel 25, fastened below to the said horizontal frame 23, and secured above to the side frames 18 and 19, the back rail 20, and the intermediate rail 26. A plate of ground glass 27, in a suitable frame is carried on ways in the side frames 18 and 19.

On the upper part of each of the side frames 18 and 19 are the platen carrying ways 28 and 29, and on them is mounted the platen 30, consisting of a rectangular metal frame 31, a thick plate glass 32, fastened therein, and a removable frame 33, having a thinner glass 34. The last mentioned frame and glass can be drawn out of the platen, for the purpose of arranging shading papers under the negatives 35, which are carried on top of the thick glass plate 32. The platen is illustrated in Figs. 1, 2 and 3, in the printing position, but means are provided for moving it periodically toward the feeding portion of the machine, and said means will presently be described.

The machine is driven by an electric motor 36, secured to the base 4, and having a worm 37 on its shaft 38, supported by the bearing 39 on the frame 19. The worm 37 meshes with the worm gear 40, and by means of it rotates the cam shaft 41, which is mounted in a bearing 42 in the frame 18, and in a pedestal bearing 43 secured to the base 4. The cylinder 7 is rotated in synchronism with the cam shaft by means of a spur gear 44 secured to the right hand cylinder end, and meshing with the gear 45 on the cam shaft.

The platen 30 is provided with two racks 46, which mesh with gear segments 47 on the shaft 48, journaled in bearings 49 in the frames 18 and 19. A cam 50, on the cam shaft oscillates the lever 51, carrying the gear segment 52, and the latter oscillates the shaft 48 to and fro, by means of the pinion gear 53. The gear segments 47 being oscillated with said shaft 48, give to and fro reciprocating movements to the racks 46 and by means of them to the platen 30, on which the racks are secured.

The cushion 54 for pressing the photographic paper against the negatives has a resilient pad 55 carried by a frame 56. The cushion 54 is joined to forked arms 57, by link connections 58, and the two arms 57 at the right are secured to the shaft 60, while the two on the left are secured to the shaft 61. Said shafts 60 and 61 are journaled in bearings in the brackets 62, bolted to the side frames 18 and 19. Secured to the shaft 60 at the rear end is an arm 63, pointing downward, and secured to the shaft 61, opposite to the arm 63 is an arm 64 pointing upward. A connecting rod 65 joins the arms 63 and 64, so that when the shaft 60 is given

a rocking movement in one direction, the shaft 61 will be rocked an equal amount in the opposite direction, which results in a uniform raising or lowering of all parts of the cushion 54 through the arms 57 and link connections 58. An arm 66 is fastened at the forward end of the shaft 60 and connects with the cam 69 by means of a forked rod 67 and cam roll 68, said cam 69, cam roll 68, rod 67 and arm 66, giving up and down movements to the cushion suspension mechanism and cushion 54, at the proper time.

The paper feeding mechanism of the machine consists of means for holding a pile of sheets of paper, means for taking off sheets one by one from said pile, and for passing them back onto the negatives, where they are held by suitable grippers. Means are also provided for raising the pile of papers, the thickness of one sheet, each time a sheet is taken off by the mechanism. The apparatus for holding the pile of sheets is adapted to be swung upward when the shading papers under the negatives are being changed or adjusted on the lower glass of the platen. The portion of the feeding mechanism for carrying the pile of paper, is held by means of two upright bars 70, mounted on the base 4, connected together by a tie rod 71, and connected to the side frames 18 and 19 by brace rods 72.

The pile of paper 73 is supported on a rectangular plate 74, and held in position on said plate by adjustable gages 75 and 76, and the wall 77 of the plate. The back edge of said plate rests against the wall 78, and is movable up and down against the face of said wall. The frame for supporting the plate 74 and its actuating mechanism, consists of the cross bars 79 and 80, joined to "L" shaped members 81 at the ends, which are pivoted at 82 to the uprights 70, and rest on stops 83 formed on said uprights. The wall 78 is held on supports 84 secured to the cross bars 79 and 80, and its top edge is always level with the top of the pile of paper. At the middle of the bar 80, is a plain vertical hole 85 through which freely passes the screw 86, and directly above is carried a bevel gear 87, with a threaded hub, through which the screw 86 passes, and said screw supports the plate 74 at its upper end.

At each side of the machine, over the forward portions of the side frames are mounted ways 88 and 89 on brackets 90. Over the way 88 is mounted a grooved bar 91, which has movable sections 92 and 93 at the forward and rear ends respectively. The section 92 is secured to the spindle 92^a, which has an arm 94, connected to a rod 95, operated by a cam 96 on the cam shaft 41. The section 93 is secured to a spindle 97, which has an arm 98, connected to a rod 99, operated by a cam 100 also on the cam shaft 41.

The said movable sections 92 and 93 are capable of being oscillated slightly by their respective actuating members. The ways 88 and 89 are fitted with shoes 101 and 102, which are connected by a shaft 103, to which the arms 104, 105 and 106 are secured. The arm 104 carries a roll 107 engaging in the groove 108 in the bar 91 and the arms 105 and 106 carry a rectangular suction tube 109, which is connected to flexible suction pipes 110. Said pipes are joined together by a main, which has a valve 111, controlled by a rod 112 and a cam 113, on the cam shaft 41. The suction tube 109 has a series of perforations 114 in its lower face, and is faced with soft material 115 as shown in section in Fig. 6. The shoes 101 and 102 have pins 116 which engage slotted levers 117, secured to the shaft 118, and oscillated by the cam 119, through the medium of the rod 120. By means of said levers the shoes are given to and fro movements in the ways at the proper time.

On the bar 80, in bearings 121 is mounted the shaft 122, having the bevel gear 123 meshing with the bevel gear 87 on one end and having a ratchet 124 at the other end. The ratchet 124 is operated by a pawl 125 on the arm 126, and actuated by means of a spring 127. A pin on the arm 126 is engaged by the shoe 101 to bring the arm and pawl to its initial position, and a stop screw 128 limits the travel of the arm in its working stroke. As the shoe is moved toward the platen the arm is actuated by the spring 127, and the pile of paper is raised by the rotation of the threaded hub of the bevel gear 87 actuated by the shaft 122, the smaller bevel gear 123 and the ratchet 124. The paper holding devices on the platen consist of a small shaft 129, having grippers 130, and arms 131, and journaled to the back part of the platen 30 next to the thick glass 32. The arms 131 are loosely journaled on the said shaft 129 and are yieldingly connected by coil springs 132. Suitable rolls on said arms 131 bear against guide bars 133 on the brackets 62, and by means of the pressure given to the springs 132, the grippers are enabled to hold down a piece of paper at the back edge of the plate 32. The guide bars 133 have jointed front ends 134, which receive oscillating movements from a cam 135, by means of the rod 136, actuating arm 137, shaft 138, side arms 139, connecting rods 140, top arms 141 and rock shafts 142. When the platen is in its position next to the pile of papers, the cam 135, and the mechanism connected to it is operated to hold a sheet of paper when the edge of said sheet is passed under the grippers, by the lowering of the jointed front ends and by means of these the grippers are raised and the paper is released from the platen on its return movement by

the raising of said jointed ends. Auxiliary grippers 143 are employed to hold down the side portions of the sheets of paper.

The mechanism for removing the prints from the platen consists of a suction tube 144, similar to the tube 109, and connected to flexible pipes 145, that join a main having a valve 146, controlled by the cam 147, through the medium of the rod 148. The suction tube 144 is mounted on a pair of slotted bars 149, carried on links 150, and capable of up and down movement, which is produced by a cam, 151, through a lever 152 and a rod 153. The bars 149 are also capable of to and fro motions in the same direction as the platen, and these motions are obtained by means of the cams 154, 155 rods 156, bell cranks 157, 158 and links 159 connected to collars 160 on sliding rods 161. The links 150 being mounted on the rods 161, to and fro movements are given to said links, together with the bars 149, and the suction tube 144. The suction tube 144 is secured to the slotted bars 149 by studs 162 and thumb nuts 163 so that it can be adjusted for various widths of paper.

Between the overhanging portions of the side frames 18 and 19 next to the paper feeding mechanism, is a drawer 164 for receiving the prints after they have been exposed to the light of the electric lamp 2. Said drawer is removable by slightly raising the paper feeding table, and pulling the drawer out under it.

Paper guides 165 are placed in the path of the unexposed sheets of paper when they are fed into the platen, and serve to keep their rear ends from dragging over the platen and negatives while being put in proper position.

The operation of my improved photograph printing machine is as follows: The light in the room must be all cut off as otherwise the sensitized paper employed will be spoiled. A supply of sheets of sensitized photographic paper cut to the proper size for the negatives is placed on the plate 74, and held by the gages 75 and 76. The apparatus (not shown) for producing suction is then started, and allowed to run long enough to obtain a sufficient suction for operating the suction tubes in the feed mechanism and the print removing mechanism. The motor 36 is now started and with it the machine, and on attaining full speed, they continue to run at that speed until the power is shut off.

The first operation in the cycle of the machine is the lowering of the vacuum tube 109, so as to touch the uppermost sheet in the pile a short distance from its edge, and this is brought about by the downward movement of the movable section 92 of the grooved bar 91, which is operated by the arm 94, on the spindle 93, actuated by the

rod 95 and cam 96 on the cam shaft 41. The suction valve 111 at this time has connected the vacuum apparatus to the tube 109, and the suction causes a sheet of paper to adhere to the lower face of said tube. 5 The tube now rises, together with the section 92, until said section is in alinement with the rest of the bar 91. The tube 109, its shaft arms and shoes, is now moved toward the platen 30, by means of the cam 119, the rod 120, and the slotted levers 117. 10 The platen 30, at this time is in its outermost position next to the feed mechanism with the grippers 130 raised, and the sheet of paper is carried over until its forward edge is within the bite of said grippers. 15 The grippers are now brought down on to the edge of the paper by the lowering of the end sections 134 of the bars 133, and the suction valve 111 shuts off the suction in the tube 109, so as to release the sheet from said tube. The platen 30 is now moved over the light cylinder 7 by means of the cam 50, the arm 51 and gear segment 25 52, the pinion 53, shaft 48, and gear segments 47, working on the racks 46 which are secured to the platen. The cushion 54 is now moved down onto the sheet of paper to press it firmly against the negative, and 30 this accomplished by means of the cams 69, roll 68, forked rod 67 and arm 66 operating the shaft 60, and the shaft 61 by means of the arms 63 and 64 and link 65, said shafts operating the forked arms 57 joined to the cushion by the link connections 58. The 35 cushion is held down while the opening 10 in the light cylinder revolves around, so as to cast light upward from the electric lamp through the glass 24, funnel 25, and glasses 40 27, 34, and 32 and negatives 35 to the sensitized sheet of paper. The amount of exposure of said paper is determined by the cylinder speed and the width given to the opening 10 between the edge of the cylinder 45 7 and the edge of the shutter 11. As soon as light is cut off from the paper, the cushion 54 is raised, the platen moves back to its outermost position, and the grippers 130 are raised, freeing the sheet of paper. The 50 suction tube 144 is now in position over the rear part of the sheet of paper, and is caused to move down until it makes contact with it, by means of the cam 151, lever 152, rod 153, arms 153^b, shaft 153^a, and rods 55 153^c, and the slotted bars 149, carried on the links 150.

Suction is applied to the tube 144 by the opening of the valve 146 through the medium of the rod 148 and cam 147, and the 60 sheet adheres to the lower face of the tube 144, and this is now raised, and moved toward the feed mechanism, a distance sufficient to allow free access to the space under the grippers 130. A new sheet is now fed 65 into the bite of the grippers 130, and the

platen moves to the printing position, while the printed sheet is still held by the suction tube 144. When the said sheet is free of the platen by reason of the platen's own movement, the suction is cut off and said printed 70 sheet falls into the drawer 164.

It will be understood by those skilled in the art that various changes may be made in the construction and arrangement of the parts of the machine herein described without departing from the scope of my invention, and I do not therefore limit myself to any of the details herein illustrated for the purpose of describing the invention except in so far as I may be limited by the appended claims or by the state of the prior art. 80

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

1. In a photographic printing machine the combination of, a source of intermittent 85 light, a platen for supporting a negative, and a mechanism for periodically moving the platen to and fro relative to the source of light.

2. In a photographic printing machine 90 the combination of a source of intermittent light, a platen for supporting a negative, a mechanism for periodically moving the platen to and fro relative to the source of light, and means for automatically placing 95 a sheet of sensitized paper on the negative.

3. In a photographic printing machine, the combination of a source of intermittent light, a platen for supporting a negative, a mechanism for periodically moving the 100 platen to and fro relative to the source of light, a support for a pile of sheets of sensitized paper, means for feeding said support upward, step by step, the thickness of a sheet at each movement, and means for automatically taking the top sheet from the pile 105 and placing it upon the negative.

4. In a photographic printing machine, the combination of a source of intermittent light, a platen for supporting a negative, a 110 mechanism for periodically moving the platen to and fro relative to the source of light, means for automatically placing a sheet of sensitized paper upon the negative, and means operative to remove the printed 115 sheet from the negative upon the return movement of the platen.

5. In a photographic printing machine the combination of a source of intermittent light, a platen for supporting a negative, 120 a mechanism for periodically moving the platen to and fro relative to the source of light, and an automatic paper feeding mechanism including a suction tube operative to engage a sheet of sensitized paper and place 125 it upon the negative.

6. In a photographic printing machine the combination of a source of intermittent light, a platen for supporting a negative, a mechanism for periodically moving the 130

platen to and fro relative to the source of light, an automatic paper feeding mechanism for placing sheets of sensitized paper upon the negative, and means, including a suction tube, automatically operative to remove the printed sheets from the negative upon the return movement of the platen.

7. In a photographic printing machine the combination of a source of intermittent light and controlling means therefor, a platen for supporting a negative, a mechanism for moving the said platen to and fro relative to the source of light, a cushion for holding photographic paper on the negative, a mechanism for operating said cushion, an automatic paper feed mechanism, and a mechanism for automatically removing the prints.

8. In a photographic printing machine the combination of a source of light, a rotary shutter having an adjustable opening, means for rotating the shutter, a platen for supporting a negative, a mechanism for moving the platen to and fro relative to the source of light, a cushion for holding a sheet of photographic paper on the negative, a mechanism operative to lower the cushion upon the paper when the platen is in printing position, a mechanism for automatically placing a sheet of sensitized paper upon the platen prior to the forward movement of the latter and means for automatically removing the printed sheet from the negative upon the return movement of the platen.

9. In a photographic printing machine the combination of the source of intermittent light, a platen for supporting a negative, a mechanism for periodically moving the platen toward and away from the light, a support for a pile of sensitized sheets disposed adjacent to the platen, a movable suction tube operative to lift the top sheet from the pile and place it upon the negative while the platen is in position adjacent to paper support, and means for holding the sheet upon the negative.

10. In a photographic printing machine the combination of a source of intermittent light, a platen for supporting a negative, a mechanism for periodically moving the platen toward and away from the light, a support for a pile of sensitized sheets disposed adjacent to the platen, a movable suction tube operative to lift the top sheet from the pile and place it upon the platen while the latter is in position adjacent to paper

support and a second movable suction tube operative to remove the printed sheet from the negative upon the return movement of the platen.

11. In a photographic printing machine the combination of a source of light, a holder for a supply of sheets of sensitized paper, a movable device for supporting a negative, and means operative to first move said device to a position of rest over the light and then to return it to its initial position adjacent to the paper holder.

12. In a photographic printing machine the combination of a source of light, a holder for a supply of sheets of sensitized paper, a movable device for supporting a negative, means operative to first move said device to a position of rest over the light and then to return it to its initial position adjacent to the paper holder, means for feeding a sensitized sheet from the holder onto the negative, and means for removing the printed sheet from the negative.

13. In a photographic printing machine the combination of a frame, a source of light disposed within the frame, a rotary shutter surrounding the light and having an adjustable opening, a platen slidably mounted on the frame, a paper holder secured to the frame, and a mechanism for sliding the platen to and fro between the light and the paper holder.

14. In a photographic printing machine the combination of a frame, a platen slidably mounted on the frame, an intermittent source of light disposed within the frame in a plane below the platen, a paper holder swingably mounted to the frame, and a mechanism for sliding the platen to and fro between the light and the paper holder.

15. In a photographic printing machine, the combination of a source of light, a device for supporting a negative capable of reciprocating movement and operative to convey the negative to printing position with respect to the light and then to carry it away from the light, and a mechanism for periodically reciprocating the said device.

In witness whereof I have hereunto affixed my signature, in the presence of two subscribing witnesses.

ALEXANDER W. DREYFOOS.

Witnesses:

P. ACQUAVIVA,
S. L. DREYFOOS.