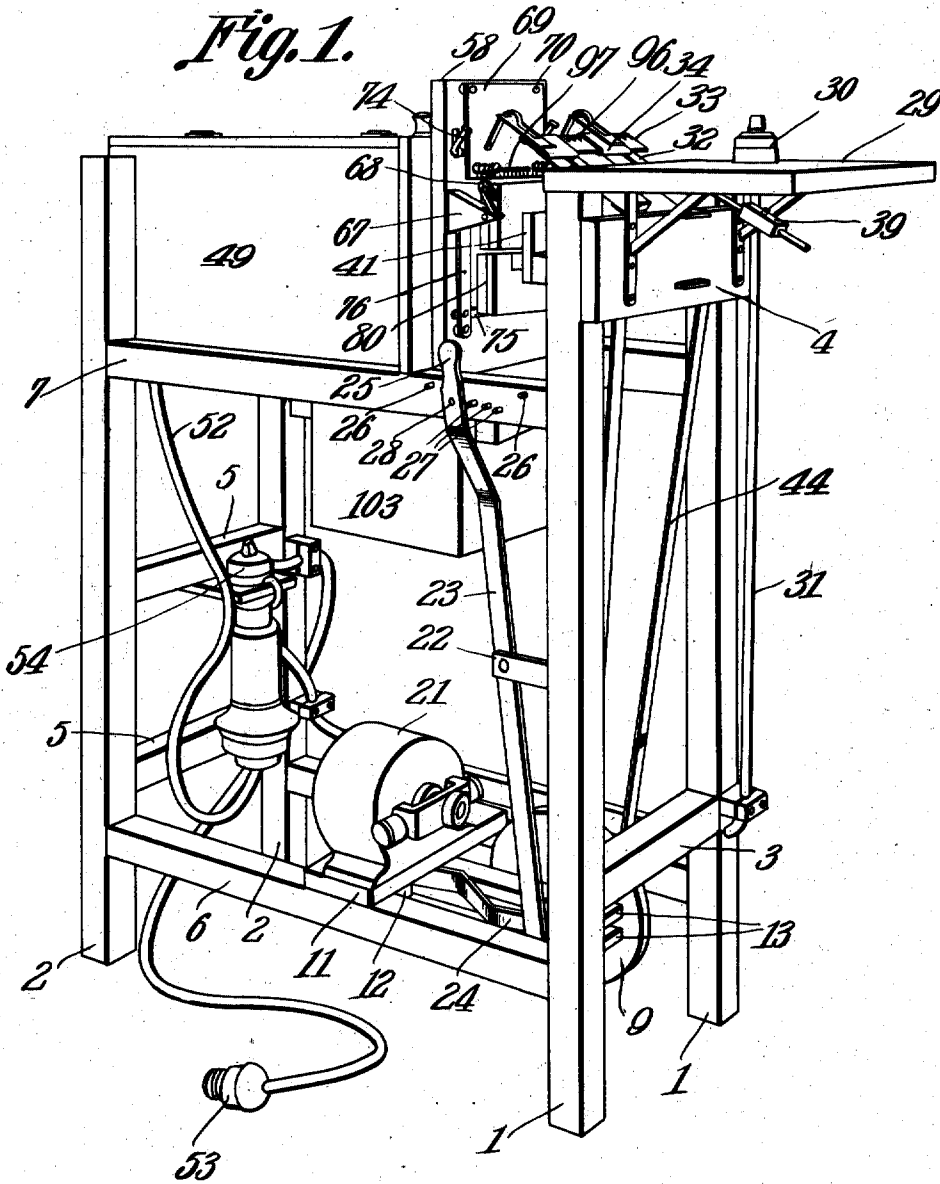


G. M. DYE.
 AUTOMATIC PHOTOPRINTING MACHINE.
 APPLICATION FILED AUG. 9, 1910.

1,001,373.

Patented Aug. 22, 1911.

4 SHEETS—SHEET 1.



Glen M. Dye

Witnesses

J. M. Dye
H. S. Chapman

Inventor,

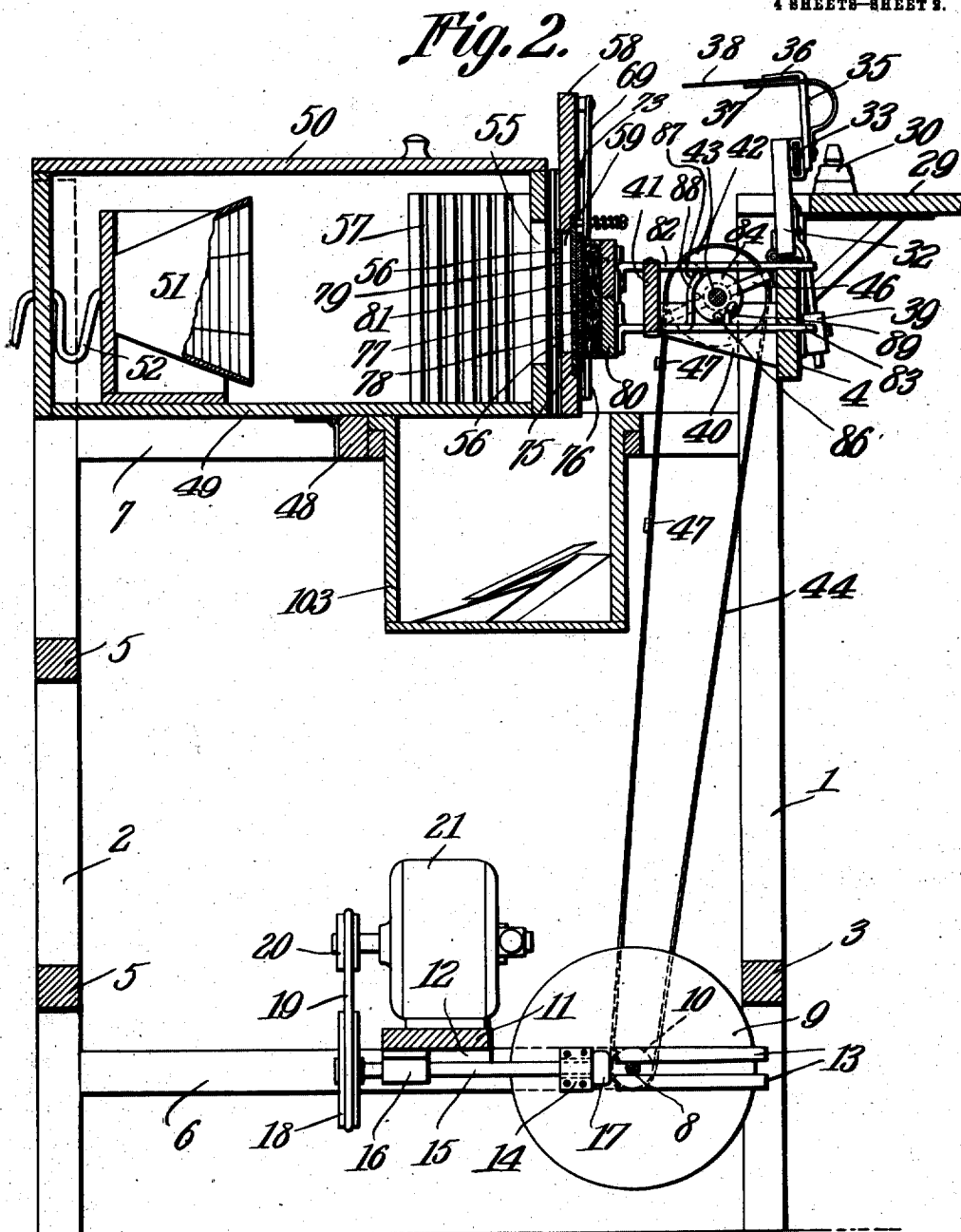
by *C. A. Snow & Co.*
 Attorneys.

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4 SHEETS—SHEET 2.



Witnesses

J. J. Gordin
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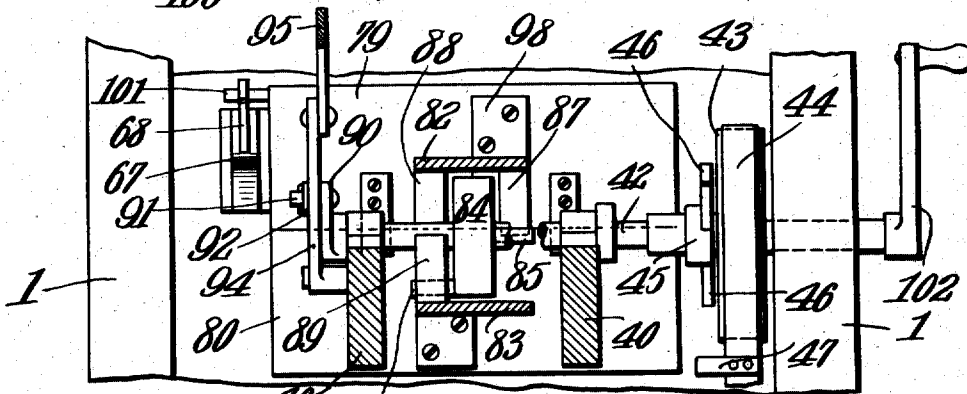
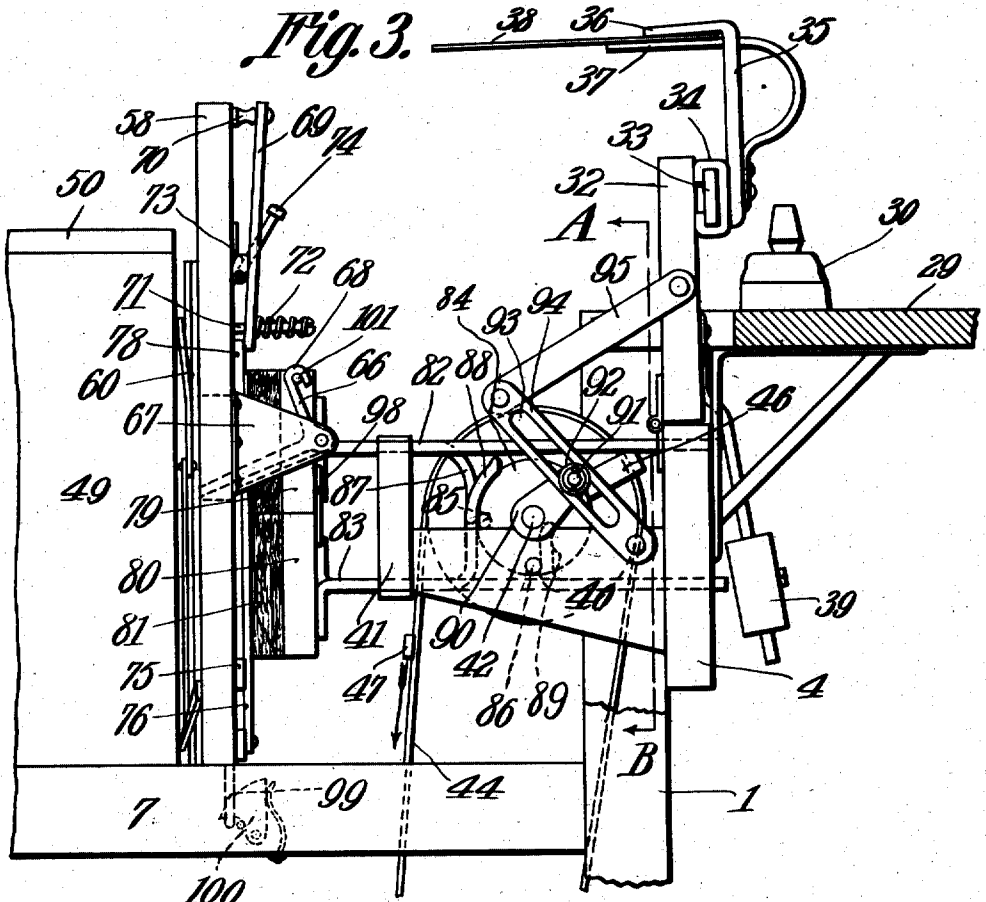
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4 SHEETS—SHEET 3.



Witnesses
J. J. Chapman
H. J. Chapman

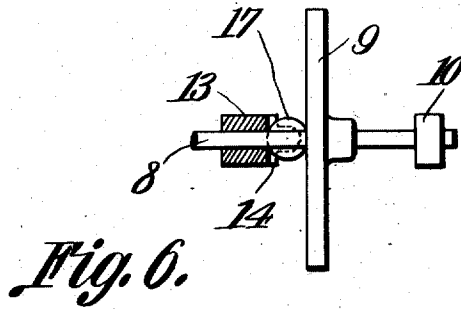
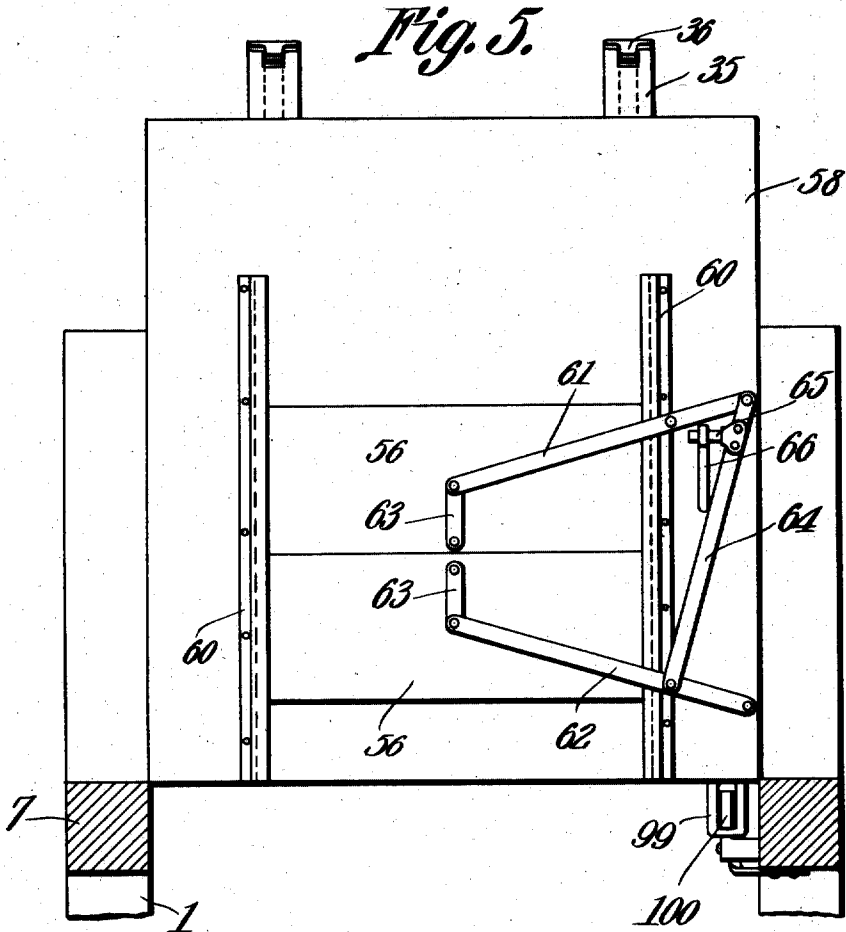
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

GLEN M. DYE, OF LAMAR, COLORADO.

AUTOMATIC PHOTOPRINTING-MACHINE.

1,001,373.

Specification of Letters Patent. Patented Aug. 22, 1911.

Application filed August 9, 1910. Serial No. 576,341.

To all whom it may concern:

Be it known that I, GLEN M. DYE, a citizen of the United States, residing at Lamar, in the county of Prowers and State of Colorado, have invented a new and useful Automatic Photoprinting-Machine, of which the following is a specification.

This invention has reference to improvements in automatic photoprinting machines and its object is to provide a machine which will accurately time each exposure to insure uniformity of prints, which will secure speed in making quantities of prints of the same subject and which will provide other advantages in the printing of pictures from negatives, the only attention required by the machine being the placing of the paper to be exposed in a holder, one sheet at a time.

The present invention provides means whereby the time of exposure may be regulated within wide limits to any desired degree.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of this specification, in which drawings:

Figure 1 is a perspective view of the photoprinting machine showing the paper holding devices in an intermediate position. Fig. 2 is a vertical central section through the structure of Fig. 1 but on a somewhat larger scale. Fig. 3 is an end view with some parts broken away and in section of the paper feeding and clamping devices and adjacent parts. Fig. 4 is a section on the line A—B of Fig. 3, both figures being on a larger scale than that of Fig. 2. Fig. 5 is an elevation of the shutter mechanism as viewed from the side remote from the negative carrying members of the device. Fig. 6 is a detail view of a portion of the speed regulating mechanism.

Referring to the drawings there is shown a frame composed of four upright posts 1—1 and 2—2 the posts 1 being joined near the lower ends by a cross piece 3 and near the upper ends by a board 4 while the posts 2 are joined at intermediate points by cross pieces 5. The pairs of posts 1 and 2 are joined together near the bottoms by side members 6 and near the tops by like side members 7. The frame thus shown and de-

scribed may be made of wood of suitable size or may be made of metal and while the arrangement of parts is adapted for the structures to be supported by the frame, it will be understood that the particular arrangement pointed out may be departed from while still retaining all the salient features of the invention.

Mounted in suitable bearings in the side members 6 near the posts 1 is a shaft 8 upon which is mounted a friction disk 9 and a pulley 10.

Resting on and movable along the connecting pieces 6 is a carriage 11 having depending guides 12 engaging the inner faces of the members 6 so that the carriage 11 when moved is constrained to move in the direction of the length of the connecting members 6. Fast to the under side of the carriage are spaced strips 13 in straddling relation to the shaft 8 and these strips carry a bearing block 14 for another shaft 15 extending through another bearing 16 on the carriage 11. The shaft 15 at the end adjacent to the shaft 8 carries a friction wheel 17 in engagement with the friction disk 9 and at the other end carries a pulley 18 connected by a belt 19 to another pulley 20 on the armature shaft of an electric motor 21 in turn mounted on the carriage 11.

Fast on one of the posts or legs 1 is a bracket 22 to which is pivoted a lever 23 having the lower end connected by a link 24 to the carriage 11 while the upper end is formed into a handle 25 within convenient reach of an operator. The lever 23 is movable to the desired extent between stop pins 26 on an adjacent one of the connecting pieces 7 and a series of pins 27 adapted to a perforation 28 in the handle end of the lever 23 constitute a convenient means for holding the lever 23 in adjusted positions.

By a proper manipulation of the lever 23 the carriage 11 may be moved in the direction of the length of the shaft 15 carrying the latter with it so that the friction wheel 17 is moved toward or from the axis of the disk 9 in accordance with the adjustment of the lever 23. Assuming the motor 21 to be running then motion is imparted through the belt 19 to the shaft 15 and by the latter to the friction wheel 17 which, being in engagement with the friction disk

9 will impart rotative movement to the latter at a speed depending upon the distance of the friction wheel 17 from the axis of rotation of the disk 9, which axis of rotation coincides with the longitudinal axis of the shaft 8 and the speed of rotation of the shaft 8 will depend upon the position of the friction wheel 17 on the disk 9. While the variation of speed in the shaft 8 will depend upon the adjustment of the lever 23, the pins 27 will give sufficient range for ordinary purposes, but the differences in speed may be graded finer by providing a greater number of pins 27 within a given distance or the pins 27 may be omitted and some other means provided for holding the lever 23 if needed so that as many variations in speed as desired may be had.

On top the posts or legs 1 is a shelf 29 for the convenience of the operator and on this shelf at one side is a switch 30 which may be of the ordinary snap switch type and from this switch there leads a conducting cord 31 to the motor 21 so that the motor may be started or stopped at the will of the operator by a proper manipulation of the switch 30.

Hinged to the top of the board 4 are two spaced arms 32 connected at the ends remote from the hinges by a cross piece 33, which may be of the under-cut type so as to be embraced by clips 34, each carrying an arm 35 terminating in an angle finger 36. Each arm 35 also carries a spring finger 37 extending through the arm 35 adjacent to the finger 36 in coöperative relation to the latter. The spring finger 37 normally tends toward the finger 36 but may be moved away therefrom by a suitably applied force so that a sheet of paper indicated at 38 may be introduced between the fingers 36 and 37 and will be held between these fingers by the elastic pressure of the finger 37. The photoprinting machine of the present invention is designed more particularly for use with the so-called gas-light or developing papers and the sheet 38 is assumed to be a sheet of such sensitive paper. Either one of the arms 32 carries a counter weight 39, or any other suitable means for the same purpose may be employed.

The board 4 carries spaced brackets 40 connected at the outer ends by a strip 41 for a purpose which will presently appear. Journalled on the brackets 40 is a shaft 42 extending at the ends beyond these brackets. The shaft 42 has mounted thereon a pulley 43 capable of turning freely on the shaft, except under conditions to be described and this pulley 43 receives a belt 44 extending around the pulley 10 on the shaft 8, so that when the shaft 8 is rotated the pulley 43 participates in such rotation.

Mounted on the shaft 42 adjacent to the pulley 43 and secured to this shaft so as to

rotate therewith is a hub 45 with diametrically opposite radial arms 46 closely adjacent to the pulley 43 and extending a short distance beyond the periphery of this pulley. Fast on the belt 44 at appropriate points are stop members or blocks 47 so positioned as to engage the arms 46 in succession, one of the blocks engaging an arm 46 and imparting to the shaft 42 a semi-rotation and then the second block engages the other arm 46 and completes the rotative movement of the shaft 42. Since the belt 44 is quite long and the stops or blocks 47 are separated a distance equal to half the circumference of the pulley 43 a considerable period of time elapses between the rotative movements imparted to the shaft 42 and this period of time may be varied at will by controlling the speed of rotation of the shaft 8 through the regulating friction drive 9 and 17.

At an appropriate point in the length of the connecting bars or strips 7, there is secured a cross piece 48 to which is hinged a box 49 so that this box may be brought into an approximately horizontal position or may be turned about the hinge until it assumes an approximately vertical position. The box 49 is provided with a cover 50 whereby access to the interior of the box is permitted. At one end the box carries an electric lamp of suitable candle and actinic power inclosed in a reflector 51. The kind of lamp used forms no part of the present invention, but it is preferred to employ a Nernst lamp fed by current through a flexible conductor 52 leading ultimately to a plug 53 adapted to any terminal socket of usual character. The conductor 52 may include a switch 54, shown as an ordinary snap switch, so that the lamp may be energized or the current may be cut off therefrom at will without the necessity of removing the plug 53 from its socket or controlling the current from the socket. The same conductor 53 may be branched off to the motor 21 and connected by the conductor 31 to the switch 30, the lamp and motor thus being independently controllable but fed from the same source.

The end of the box 49 toward which the reflector 51 is directed is formed with an opening 55 normally closed by shutters 56, and within the same end of the box are provided a series of grooves 57 for vignetting or other light controlling means. In front of the shutters 56 the box 49 carries a board 58 provided with an opening 59 through it matching the opening 55 in the corresponding end of the box 49. The board 58 is spaced a short distance from the corresponding end of the box 49 and the shutters 56 are lodged in this space, being guided by parallel separated strips 60 fast on the board 8. Each shutter is under the control of a

lever 61, 62 respectively, the lever 61 being of the first order and controlling one of the shutters, being connected thereto by a link 63, and the lever 62 being of the third order and also being connected to the corresponding shutter by a link 63. The shorter arms of the two levers are connected together by a link 64 and this link has fast thereto a pin 65 engaged by one end of an angle lever 66 extending through the board 58 to the other side thereof and there supported in a bracket 67 fast on the board 58. The shorter arm of the lever 66 is bent into a hook 68 for a purpose which will presently appear.

On the outer face of the board 58 there is provided negative holding means comprising a plate 69 held in spaced relation to the corresponding face of the board 58 by pins 70 at the end of the plate 69 remote from the end engaging the negative while at the negative engaging end the plate is traversed by headed pins 71 each surrounded by a spring 72 tending to force the corresponding end or edge of the plate toward the board 58. Under-riding the plate 69 are cams 73 on the ends of short shafts controlled by manipulating handles 74. The showing of the cams in the drawing is more or less indicative and it will be understood that other forms of manipulating means for the plate 69 whereby it may be moved against the action of the springs 72 may be provided. The other end of the negative is controlled by a bar 75 movable behind guide strips 76 on the outer face of the board 58 on opposite sides of the opening 59 therethrough. The outer face of the board 58 may be rabbeted about the opening 59 so as to receive a plate 77 of plain glass. In the drawings a negative is indicated at 78.

The presser board by means of which the paper is held against the negative is made up of two members 79 80 respectively, each faced by a soft pad 81 preferably of heavy felt as is customary in structures of this kind. The presser board member 79 is carried by a bar 82 extending through a suitable passage in the strip 41 and also through a suitable guide passage in the board 4, the bar being long enough for the purpose. The presser board member 80 is carried by another bar 83 similar to the bar 82 and mounted in like manner in the strip 41 and board 4. The presser board members 79 and 80 may therefore be moved toward and from the negative held by the board 58 so that paper placed against the negative may be clamped tightly thereagainst or on moving the presser board members away from the paper the latter may be released.

Intermediate of the bars 82 and 83 the shaft 42 carries a drum or roller 84 from opposite sides of which project pins 85, 86 respectively. In the path of the pin 85 the

bar 82 carries a finger 87. In the path of the pin 86, the bar 83 carries fingers 88, 89, the finger 88 being of such length and so curved as to remain in engagement with the pin 86 during a considerable portion of the rotative movement of the drum 84 for a purpose which will presently appear.

The end of the shaft 42 remote from that carrying the pulley 43 projects beyond the adjacent bracket 40 and there carries a crank arm 90 having at its free end a laterally projecting pin 91 on which is journaled a roller 92 moving in a longitudinal slot 93 in an arm or link 94 pivoted at one end to the adjacent bracket 40 and at the other end connected by a link 95 to one of the arms 32.

The clips 34 carried by the bar 33 are adjustable lengthwise of the bar 33 and in order to adjust one or both of the arms 35 with relation to the negative from which the prints are to be made when in position on the board 58, the bar 33 is graduated as indicated at 96, Fig. 1, and the negative holding plate 69 is also likewise graduated as indicated at 97, Fig. 1.

The presser board member 79 has along the edge adjacent to the member 80 a plate 98 in overlapping relation to the presser board member 80.

In order to hold the box 49 in the operative position it is provided with a loop 99 in the path of which is a latch member 100 on one of the side strips 7.

The presser board member 79 is provided with a pin 101 normally engaging in the hook 68 of the lever 66.

The shaft 42 on the end beyond the pulley 43 carries a crank handle 102 by means of which the shaft 42 may be turned irrespective of the belt 44 and blocks 47.

Let it be assumed that the parts are in the position shown in Fig. 3 with a sheet 38 of sensitized paper gripped between the fingers 36 and 37, it being understood that the device is in a room where the light is wholly or practically non-actinic so far as the sensitive surface of the paper is concerned, and also let it be assumed that the motor is running and consequently the belt 44 is traveling at a certain predetermined speed. Ultimately the first block 47 in order is brought into engagement with one of the radial arms 46 and a rotative movement is imparted to the shaft 42. This results in the pin 86 moving the bar 83 by engagement of the finger 89 thereon and the presser board section 80 is withdrawn from engagement with the negative 78 or with paper pressed thereagainst. The retractive movement of the presser board section 80 is participated in by the presser board section 79 because of the overlapping plate 98 and if paper be already present against the negative it is released and falls by gravity into a drawer 103 supported in the frame

work in position to receive such paper sheet. Simultaneous with the movement of the presser board sections 79 and 80 away from the negative the crank pin 91 on the roller 5 92 moves along the slot 93 and causes a movement of the arm 94 on its pivot support in a direction to act through the link 10 95 to turn the arms 32 on their hinge supports in a direction to bring the paper 38 toward the negative, the parts being pro- 15 portioned for this purpose. The paper is moved into position with respect to the negative while the presser board sections 79 and 80 are in the withdrawn or retracted 20 position. Since the shaft 42 is given one complete rotation by the action of the two successive blocks 47, the arms 32 are ultimately returned to the upright position 25 shown in Fig. 3. The time relation of the parts is such that as soon as the paper sheet 38 is in place against the negative the pin 86 comes into engagement with the finger 88 and forces the presser board section 80 against the lower edge of the paper so 30 as to grip the same just prior to the return movement of the arm 32 and as these arms move back to the initial position the paper which is only lightly gripped between the 35 fingers 36 and 37 and therefore easily drawn therefrom is pulled away from the fingers and left in front of the negative. As soon as the fingers 36 and 37 are out of the way the pin 85 comes into contact with the finger 87 and the presser board section 79 is 40 moved to engaging position with the paper thus firmly clamping it to the film surface of the negative. The movement of the presser board section 79 toward the negative causes the opening of the shutters 56 45 by the pin 101 engaging the short arm of the lever 66 thus rocking this lever in a direction to act on the link 64 in a manner to move both levers 61 and 62 so that their long ends recede one from the other and the shutter members 56 are moved away one 50 from the other so as to expose the openings 59 to the passage of light from the lamp contained within the reflector 51. As this lamp is assumed to be burning and giving out actinic light, this light will act through the negative on the paper in the usual manner. Since the shaft 42 comes to rest as soon as the second block 47 has moved from 55 engagement with the respective arm 46 and as this takes place when the two presser board members 79 and 80 are in pressing engagement with the paper against the negative, the exposure of the paper to the light continues until the blocks, by the progressive movement of the belt 44, are again 60 brought into engagement successively with the arms 46 and the action just described is repeated. The time of quiescence of the arms 32 is ample for an operator to place a 65 second sheet of paper 38 between the fingers

36 and 37 ready for the next movement of these arms to carry the paper into operative relation to the negative. The machine is entirely automatic in operation except for the necessity of placing the sensitive paper 70 between the fingers 36, 37 during the time of exposure of the sheet of paper clamped by the presser board sections 79 and 80. As soon as the blocks 47 again become active 75 to the arms 46 the sensitive sheet 38 of paper begins its movement toward the negative and simultaneously therewith the pin 86 engages and acts upon the finger 89 to move the presser board section 80 away 80 from the negative carrying with it the presser board section 79, this movement resulting in the quick closing of the shutter members 56 and the exposed paper, being released by the presser board, falls by gravity into the drawer 103 as the next sheet 85 38 is placed in position to be clamped in the manner already described and exposed to the light as was the first sheet. The time of exposure may be set to a nicety by adjustment of the lever 23 so that the motion 90 of the armature 21 is transmitted through the friction transmission gear to the belt 44 and the latter is caused to travel at the required speed to provide for the quiescent 95 state of the apparatus for a time equivalent to the desired exposure, which time having been once ascertained, will be the same for all subsequent sensitive sheets and all such sheets will receive the same exposure to light and will therefore develop to like 100 extents. When another negative is placed in the apparatus the proper time of exposure is ascertained by trial and then as many prints as desired may be made with the assurance that the exposure will be the same 105 in all of them.

It is to be noted that the motor and the lamp are in the same circuit. This is important because it insures absolute uniformity of prints irrespective of any 110 variations in the strength of the electric current. Continual changes in the strength of current are common in every commercial circuit and it has been found that any 115 printing device making no provision for automatic compensation for these changes cannot produce uniform prints except under occasional favorable conditions. With the present structure, however, if the light 120 increases or decreases in brilliancy, the motor runs correspondingly faster or slower, thus automatically adjusting the speed to the light and equalizing the exposures.

When it is desirable to use negatives of smaller size than the full size for which the machine is designed, or when it is desirable 125 to print from some chosen portion of a negative other than the full surface then the parts may be readily set into proper relation 130 by the scales 96 and 97.

What is claimed is:—

1. In a photoprinting machine, a negative holder, a paper carrier movable into and out of operative relation to the negative holder, 5 a slidable presser board including separate sections independently movable into operative relation to the negative holder and simultaneously movable out of operative relation to said holder, and actuating means 10 for the paper carrier and presser board for operating them in predetermined timed relation.

2. In a photoprinting machine, a negative holder, a paper carrier movable into and out 15 of operative relation to the negative holder, a presser board made up of separate sections slidable along parallel lines into and out of operative relation to the negative holder, and actuating means for the paper carrier 20 and the presser board sections for operating them in predetermined timed relation.

3. In a photoprinting machine, paper holding and clamping means a continuously running belt and means cooperating with 25 the belt for operating the paper holder and clamp intermittently.

4. In a photoprinting machine a paper holder and a clamping means for the paper, a constant speed actuating belt therefor 30 means cooperating with the belt for acting upon said holder and clamping means intermittently and means for varying the time of activity of the actuating means at will.

5. In a photoprinting machine, a hinged 35 paper holder provided with means for gripping a sheet of paper, a rotatable member and connections between the same and the paper holder for causing a complete to and fro movement of the paper holder at each 40 rotation of the rotatable member, an endless drive element, and means thereon for imparting intermittent rotative movement to the rotatable member.

6. In a photoprinting machine, a hinged 45 paper holder provided with means for gripping a sheet of paper, a rotatable member and connections between the same and the paper holder for causing a complete to and fro movement of the paper holder at each 50 rotation of the rotatable member, and means for imparting intermittent rotative movement to the rotatable member comprising an electric motor, an endless element actuated thereby, and cooperating means upon said 55 element and rotatable member, for imparting rotative movement to the rotatable member in alternation with periods of rest.

7. In a photoprinting machine, a hinged paper carrier, a crank shaft and connections 60 between the same and the paper carrier for imparting a rocking movement to the paper carrier at each rotative movement of the shaft, a pulley loose on the shaft, arms on the shaft in operative relation to the pulley, 65 a constantly running belt for actuating the

pulley and stop members on the belt movable into engagement with the arms on the shaft

8. In a photoprinting machine, a hinged paper carrier, a crank shaft and connections 70 between the same and the paper carrier for imparting a rocking movement to the paper carrier at each rotative movement of the shaft, a pulley loose on the shaft, arms on the shaft in operative relation to the pulley, 75 a constantly running belt for actuating the pulley and stop members on the belt movable into engagement with the arms on the shaft, the stop members being spaced on 80 the belt to engage the arms in immediate sequence.

9. In a photoprinting machine, a presser board comprising two sections slidable independently in one direction and together 85 in the other direction, and means for causing the movements of the presser board sections.

10. In a photoprinting machine, a presser board comprised of two sections movable 90 independently toward active position and together away therefrom, slidable bars each carrying a presser board section, fingers carried by the slidable bars, and a rotatable member with pins thereon spaced to engage 95 the fingers in predetermined order.

11. In a photoprinting machine a presser board composed of two sections slidable 100 independently toward active position, a shutter for admitting light to and excluding light from the sensitive surface being acted on, and connections between one of the presser board sections and said shutter for actuating the latter.

12. In a photoprinting machine, a movable paper carrier, a slidable sectional 105 presser board for the paper, actuating means for the paper carrier and presser board timed to move paper into the path of one presser board section, to shift said section 110 against the paper, to return the carrier, and to finally shift the other section against the paper, a driving means for said actuating means comprising an electric motor, a carriage on which the motor is mounted, 115 and an adjustable friction drive gear between the motor and the actuating means for the shutter and presser board adjustable by movement of the motor supporting carriage.

13. In a photoprinting machine, a movable paper carrier, a presser board consisting 120 of two sections movable independently toward active position and together away therefrom, slidable bars each carrying a presser finger carried by the slidable bars, 125 and a rotatable member with pins thereon spaced to engage the fingers in predetermined order, and also in timed relation to the movement of the paper carrier.

14. In a photoprinting machine, a presser 130

