

APPLICATION FILED APR. 12, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



J. J. Chapman

by

C. Knowles.
Attorneys

Attorneys

4 SHEETS—SHEET 2.

Attorneys

O. C. COURTRIGHT & A. D. MIKA.

PHOTO PRINTING MACHINE.

APPLICATION FILED APR. 12, 1910.

Patented Jan. 28, 1913.

4 SHEETS—SHEET 3.

1,051,691.

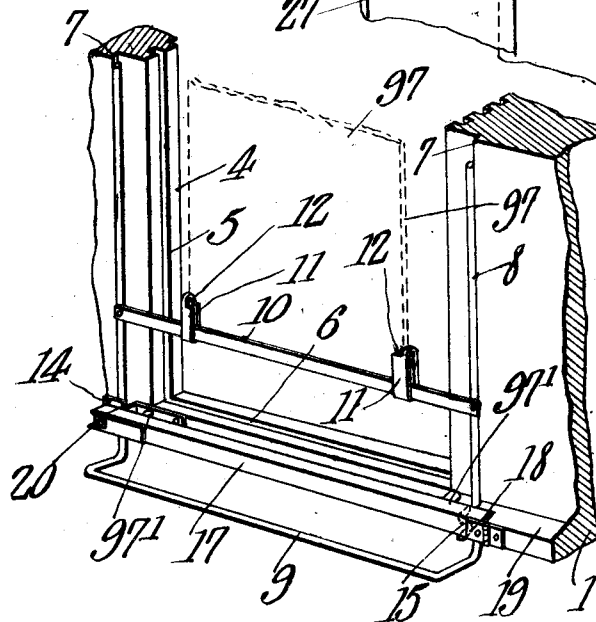
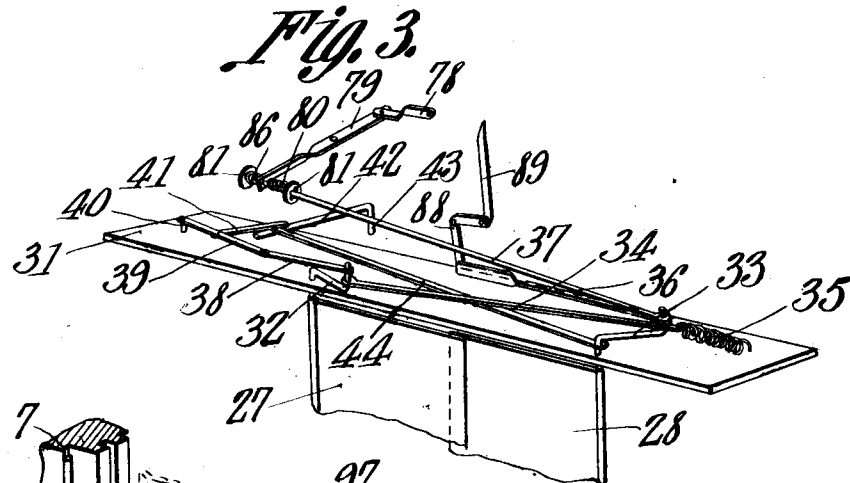
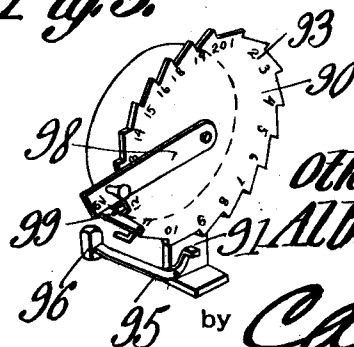


Fig. 5.



Witnesses
J. P. B. B. B.
H. J. Chapman

Otho C. Courtright
and
Albert D. Mika,
Inventors
by *C. Snow & Co.*
Attorneys

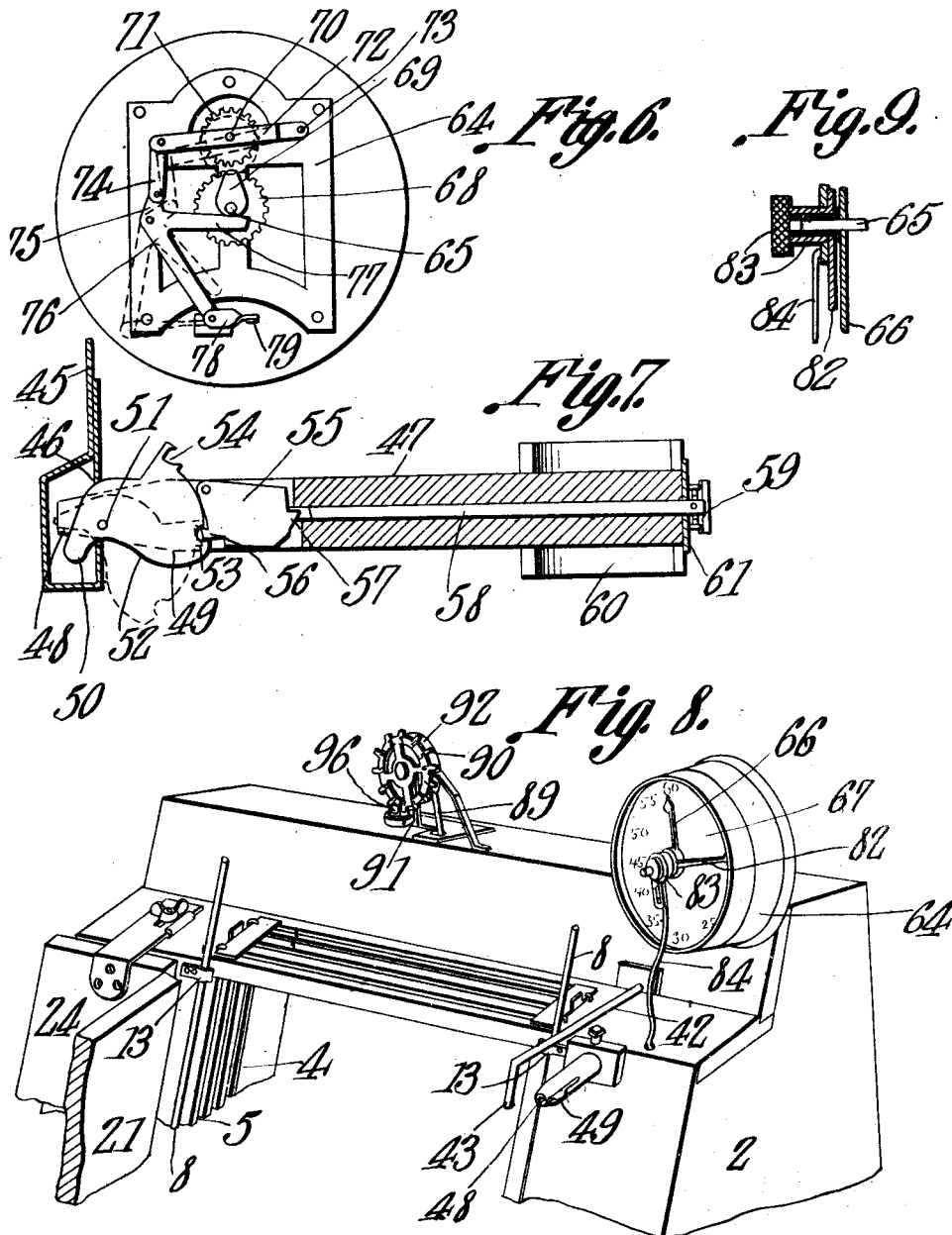
O. C. COURTRIGHT & A. D. MIKA.
PHOTO PRINTING MACHINE.

APPLICATION FILED APR. 12, 1910

Patented Jan. 28, 1913

4 SHEETS—SHEET 4.

1,051,691.



Otho C. Courtright and
Albert D. Mika,
Inventors

Witnesses
J. J. Chapman
F. J. Chapman

by *Cashmore*
Attorneys

UNITED STATES PATENT OFFICE.

OTHO C. COURTRIGHT AND ALBERT D. MIKA, OF FORT MADISON, IOWA; SAID MIKA
ASSIGNOR TO SAID COURTRIGHT.

PHOTO PRINTING-MACHINE.

1,051,691.

Specification of Letters Patent.

Patented Jan. 28, 1913.

Application filed April 12, 1910. Serial No. 555,061.

To all whom it may concern:

Be it known that we, OTHO C. COURTRIGHT and ALBERT D. MIKA, citizens of the United States, residing at Fort Madison, in the county of Lee and State of Iowa, have invented a new and useful Photo Printing-Machine, of which the following is a specification.

This invention has reference to improvements in photo-printing machines and its object is to provide a machine which shall be entirely automatic in all operations except the placing of the negative in position and the placing of the paper thereon, the present invention providing for accurate timing of the printing, the automatic removal of the exposed paper and means for notifying the operator when a predetermined number of prints have been made.

The present invention relates to the general type of photo printing machines shown in Letters Patent No. 815,267, granted to us on March 13, 1906, and Letters Patent No. 929,195, granted to us on July 27, 1909, and in the commercial type of machine some of the features disclosed in said Letters Patent are retained.

With the structure of the present invention the operator has but to initially place the negative in position, the adjustment of the negative being greatly facilitated by features of the present invention, and then the paper upon which the print is to be made is adjusted to the negative, provision being made for access of non-actinic light to the light receiving side of the negative so that the operator may place the paper in the particular position desired, whether the paper be in the form of a continuous strip or in individual pieces. Finally the operator moves the presser board into contact with the paper and then by means of an attachment to the presser board the latter is locked in the closed position and by this act shutters used to exclude actinic light are opened so that the actinic light reaches and passes through the negative and acts on the paper. At the same time a timepiece previously properly adjusted starts into operation and at the expiration of the predetermined time the light excluding shutters or doors are closed and the presser board is released and by means of a suitable spring is moved away from the negative thus releas-

ing the paper which drops by gravity and is guided into a suitable receptacle from which actinic light is excluded.

The mechanism for closing the doors and latching the presser board at the same time actuates a counter wheel or mechanism and arrests the movement of the timing side of the time mechanism returning it to zero position ready for another operation.

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

Figure 1 is an elevation of the photo printing machine as viewed from the operator's side, the presser board being in the closed position. Fig. 2 is a section on the line A—B of Fig. 1. Fig. 3 is a perspective view of the door or shutter operating mechanism and coacting parts separated from the rest of the machine. Fig. 4 is a perspective view of the negative holding members and immediate adjacent parts. Fig. 5 is a perspective view of a modification of the counting mechanism on a larger scale than shown in Fig. 1. Fig. 6 is a face view of the timing mechanism with the dial removed. Fig. 7 is an enlarged longitudinal section of the latch mechanism for holding the presser board in the closed position. Fig. 8 is a perspective view of a portion of the machine as viewed from above. Fig. 9 is a section through portions of the hands of the time piece, and showing one arrangement of parts whereby one of the hands may be insulated from the rest of the clock work.

Referring to the drawings there is shown a frame comprising a base member 1 which in operation is usually maintained in a horizontal position, and this base member carries side members 2 having one edge perpendicular to the base member and the other edge slanting thereto. The perpendicular portion of the frame of the machine is designed to fit an opening where actinic light may be obtained such as a suitable opening in a dark room where ordinary daylight may enter or an inclosure for an artificial light producing photo active rays.

The side of the frame work or box of the machine toward the operator is made slanting and is defined in part by a partition 3,

such slanting position being more convenient to the operator than would a straight up and down or a flat, that is a horizontal, position.

5 The operator's side of the box or casing carries a casing 4 extending from the operator's side of the box toward the light receiving side and of a size equal to the size or larger than the size of the largest negative to be used.

10 The casing 4 may be provided with grooves 5 and top and bottom slots for the reception of masks or vignetting frames and a sufficient number of these grooves may be provided to assure different effects.

15 The sides of the casing 4 adjacent to the interior edge are each rabbeted as shown at 7 and in these rabbeted portions are lodged the two legs 8 of a U-shaped frame 9 extending below the casing with its yoke portion out-turned forming a convenient handle for manipulation. The legs 8 of the yoke 9 are joined by a cross strip 10 on which are mounted clips 11 capable of moving longitudinally of the strip in frictional engagement therewith while their facing edges are provided with seats 12 adapted to receive and support a negative by the lower corners. The clips 11 may be moved toward 30 or from each other to receive negatives of different widths while the frame 9 may be moved up and down so that the upper end of the negative may rest against the inner edge of the top member of the frame 4 while 35 the lower corners are supported by the clips 11.

One of the legs 8 of the frame 9 is held in place by elastic clips 13 while the other is held by fixed clips 14, and a latch member 40 15 at one end of one of the legs 8 co-acts with an elastic clip 13 at the other end and permits this particular leg being disconnected from the frame 4 so that the entire frame 9 may be turned about the other leg 45 as an axis and moved out of the way when so desired. To permit this and to also lock a guide chute 16 to the structure in line with the visible face of the negative, is a hinged bar 17 secured by a hinge 18 at one 50 end to a ledge 19 on the inclined face of the structure while the other end of this bar is normally engaged by a catch 20 holding this bar normally in position.

Hinged to one side of the frame 4 is a 55 presser board 21 having a member 22 hinged thereto so that the two parts 21, 22 of the presser board will close the negative end of the frame 4 when so desired. A spring 23 on the hinge side of the presser board 21, 60 22 serves to open the presser board in a direction away from the negative when the presser board is not held to said negative. The presser board is hinged to an adjustable strip 24 movable to and from the corresponding face of the box of the structure

in the manner shown in Letters Patent 929,195 and therefore need not be particularly described herein.

The chute 16 leads through the bottom member 1 and discharges into a drawer or 70 compartment 25 in such manner that when a print has been properly exposed and the presser board 21, 22 has been released the print will fall by gravity from the negative and slide down through the conduit 16 to 75 the drawer 25 into which it may be guided by a light shield 26 so that actinic light may not find its way into the drawer 25. Since, as will hereinafter appear, the operation of the machine is almost entirely automatic, the drawer 25 is provided so that 80 the prints need not be touched after exposure but will find lodgment in the drawer or receptacle 25 to be removed after the printing operation has been completed.

85 The end of the box 4 remote from that carrying the negative is provided with doors 27, 28 which may have panels of orange or ruby paper so that sufficient light will traverse them to enable the operator to properly place paper upon a negative held by the 90 clips 11 but such light will have no actinic effect upon the sensitive surface of the paper.

The edge members of the doors remote from the meeting edges of the doors may be 95 continued to constitute hinge pins 29 seated at the lower ends in a bearing plate 30 and at the upper ends extending through another bearing plate 31 and beyond the same formed into crank extensions 32, 33 respectively. These crank extensions 32, 33 are so 100 related to the planes of the respective doors that when the doors are in the closed position the crank member 32 extends at an angle to the plane of the door in a direction 105 toward the light source while the crank 33 extends at an angle to the plane of the door 28 in a direction toward the negative side of the door. The upturned ends of the cranks 32, 33 are joined by a link 34 so that the 110 cranks must turn together but in directions to cause the doors to open simultaneously and to close in like manner.

The doors are maintained normally in the closed position by a spring 35 connected at 115 one end to the upturned end of the crank 33 and at the other end to a fixed portion of the structure. Also pivotally connected to the upturned end of the crank member 33 are two links 36, 37 to which reference will hereinafter be made. 120

Pivotally connected to the upturned end of the crank member 32 is a link 38 having its other end pivotally connected to the free end of a link 39 which has its end remote 125 from the point connected to the link 38 pivotally supported on a fixed pivot 40 fast on the plate 31.

The link 39 is connected by another link 41 to one end of a rod 42 extending through 130

the upper portion of the partition defining the operator's side of the machine and beyond the casing 4 and having a downturned end 43 close to the edge of the presser board section 22 when the presser board is closed down on a negative. The same pivot which connects the link 41 to the rod 42 also connects another link 44 thereto while the remoter end of this link 44 is pivoted to a relatively fixed point on the plate 31, the extension 29 of the door 28 where passing through the plate 29 constituting a convenient pivot support for the said end of the link 44, this link 44 thus being a long link so that the rod 42 may move in a substantially straight line, the arc of curvature of the free end of the link 44 where connected to the rod 42 being so small as to be immaterial. The two links 38 and 39 constitute a toggle connection actuated by the rod 42 and link 41 and causing the crank 32 to turn on its pivot support in a direction to open the door 27 when the rod 42 is pushed toward the light receiving side of the structure. The turning of the crank 32 results in the turning of the crank 33 in a direction to cause the opening of the door 28. When the rod 42 is released the spring 35 will turn the parts to the normal position, closing the doors 27 and 28, the parts being so adjusted that the door 28 will close first, although this particular arrangement is immaterial to the working of the structure.

Hinged to the section 22 of the presser board is a latch member 45 in position to engage the down-turned end 43 of the rod 42 when this latch member 45 is moved toward the operator's side of the structure. The free end of the latch member 45 is provided with a perforation 46 adapted to a coacting latch member best shown in Fig. 7.

Extending through the casing to one side of the negative opening and in the path of the latch member 45 is a stem 47 formed at the end toward the operator into a frust-cone 48 adapted to readily enter the passage 46 in the latch member 45. The end 48 of the stem 47 is split diametrically and longitudinally to form a housing for a lock member 49 having a locking nose 50 on one side of a pivot 51 supporting the said lock member while the other end thereof is rounded and formed with a cam edge 52 remote from the nose 50 with locking slots or recesses 53 and 54 in spaced relation one to the other. Within the longitudinal slot formed in the member 48 is a pivoted dog 55 formed with a tooth 56 adapted to enter either recess 53 or 54.

The dog 55 at a point remote from the tooth 56 is provided with another tooth 57 in the path of one end of a rod 58 movable longitudinally of the stem 47 and extending to the other end of said stem where this rod is attached to one end of a spring

pressed armature lever 59 under the control of an electro-magnet 60 which may be supported by a bracket 61 carried by the stem 47 or may be supported in any other manner. The magnet 60 and the stem 47 where not projecting through the casing, may be housed in a compartment 62 at one side of the structure. This same compartment 62 may house a battery 63, or the battery may be located at any other desired point.

Mounted on the casing within easy reach and view of the operator is a timepiece 64 which may in the main consist of an ordinary clock movement suitably modified for the purposes of the present invention.

The clock movement is provided with a hand arbor 65 carrying a hand 66 in front of a dial plate 67 which latter may have a circular series of numbers representing a definite time, say one minute. The hand arbor 65 carries a gear wheel 68 and a cam 69. The clock movement is provided with another arbor 70 carrying a gear wheel 71 and the end of the arbor 70 carrying the gear wheel 71 is capable of sufficient movement to cause the gear wheel 71 to move into and out of mesh with the gear wheel 68 and since the teeth of these gear wheels may be made quite short, the movement of the arbor 70 need be but comparatively slight.

The arbor 70 traverses a lever 72 at an intermediate point thereof while one end of the lever is pivoted to the frame of the clock movement as indicated at 73 and the other end of the lever is connected to a link 74 which in turn is pivotally connected to the short arm 75 of a lever 76 pivotally mounted on the frame of the clock movement. The lever 76 has an additional arm 77 adapted to engage the cam 69 when the gear wheels 71 and 68 are moved out of mesh. The cam 69 is fast on the arbor 65 so that when the lever 76 is moved in a direction to bring the arm 77 into engagement with the cam 69 the latter will be actuated so as to bring the hand 66 to a predetermined zero position. The free end of the long arm of the lever 76 is connected by a link 78 to one end of a lever 79 pivoted in the frame of the clock movement or at some other fixed point and extending over the plate 31 where it is traversed by the link or rod 37 before referred to. To ease the movement of the lever 79 it may be flanked on opposite sides where traversed by the rod 70 by springs 80 held to the rod or link 37 by fixed washers 81.

Mounted on the arbor 65 or over the same on the usual glass protecting plate is a hand 82 provided with an accessible manipulating button 83 so that this hand 82 may be moved to any desired position with reference to the indications on the dial plate 67.

The hand 82 is coupled by a conductor 84

to one side of the battery 63 and the other side of this battery is coupled by a conductor 85 to the magnet 60, and the other side of the magnet is connected by a conductor 86 to the metallic parts of the clock 64. Assuming the hand 82 to be mounted on the usual glass front of the clock, it will be insulated from the metallic parts of the clock and therefore under ordinary circumstances there is no complete circuit through the magnet 60. However the hand 82 may carry a brush 87 so that when the hand 66 is moving it will ultimately engage the brush 87 and thereby complete the circuit.

The link 36 shown in Fig. 3 is connected to a bell crank lever 88 which in turn is connected to a pawl 89 extending through and above the top of the casing into operative relation to a ratchet wheel 90 mounted on a standard 91 erected on the casing. This standard also carries a bell 92. The ratchet wheel 90 is provided with an appropriate number of teeth about its periphery and also with a circular series of numbers indicated at 93. The ratchet wheel also carries a pin 94 in the path of which is one end of a lever 95 carrying a hammer 96 at the other end so that on rotating the wheel 93 the pin 94 will ultimately come into engagement with the lever 95 and give an impulse to the hammer 96 to strike the bell 92.

Let it be assumed that with an apparatus such as disclosed, it is desirable to produce a number of prints from a negative, a further assumption being that these prints are to be produced from separate sheets of sensitive paper.

The negative, indicated at 97 in Fig. 4, is placed on the clips 11 and grasped by the corners in the notches 11, these being then properly shaped to prevent disengagement of this part of the negative. The upper edge of the negative may rest against the upper member of the frame 4. Since the presser board 21, 22 is normally in the open position because of the action of the spring 23, the paper may be readily placed and positioned on the negative, sufficient light passing through the shutters 27, 28 for this purpose, such light however being non-actinic. Now the presser board is brought against the paper by being moved about its hinges in opposition to the action of the spring 23 and is there held by the hand of the operator while the latch member 45 is moved onto the end 48 of the stem 47, this latch member then engaging the downturned end 43 of the rod 42. Suitable pressure applied to the latch member 45 will cause it to move along the end 48 of the stem 46 until it engages the cam shoulder 52 and pressing against the latter will cause the movement of the latch member 49 about its pivot 51 until the nose 50 has caught behind that portion of the latch member

traversed by the passage 46. The movement of the latch member 49 is sufficient to cause engagement of the tooth 56 in the recess 53, the tooth 57 then engaging in the corresponding end of the spring controlled rod 58 thus locking the several parts in engaged position. The movement of the latch member 45 necessary to secure it in the manner described has caused a movement of the rod 42 in a direction to cause the opening of the doors or shutters 27, 28 in the manner already described.

The openings of the doors or shutters 27, 28 has caused an actuation of the rod or link 37 due to the movement of the crank 33 and this in turn causes a movement of the lever 79 which is transmitted through the link 78 to the long end of the lever 76, this movement being toward the left as viewed in Fig. 6 thus causing a movement of the arm 77 away from the cam 69 and a movement of the short arm 75 of the lever 76 in a direction which transmitted through the link 74 causes a movement of the lever 70 to bring the gear wheel 71 into mesh with the gear wheel 68. The gear wheel 71 is continuously driven by the clock movement which is assumed to be in operation and as soon as the gear wheel 71 is in mesh with the gear wheel 68 then movement is transmitted to the gear wheel 68 and by it to the arbor 65 and cam 69, the hand 66 participating in this movement, and the direction of the movement being clockwise so that the hand 68 which is normally in the zero position begins movement in a clockwise direction at a predetermined definite speed. Prior however to the operations described the hand 82 has been moved to a predetermined position representing the number of time units it is desirable should elapse during the exposure of the paper to actinic light.

In the particular position of the parts shown in Fig. 1 it is assumed that the circular series of members on the dial 68 represent seconds of time and the manually movable hand 87 is shown at a position representing about twelve seconds. Therefore as soon as twelve seconds have elapsed then the hand 66 has been brought into contact with the brush 87 and there is established a circuit from the battery 63 through the conductor 84 to the hand 82 thence by way of the brush 87 to the hand 66 and by way of the metallic parts of the clock movement to the conductor 86 thence through the magnet 60 and by the conductor 85 back to the battery 63. This causes an energization of the magnet 60 and the attraction of the armature lever 59 in a direction to withdraw the rod 68 from engaging relation to the tooth 57 of the dog 55. Now the tendency of the spring 23 acting through the presser board sections 21, 22 on the latch member

43 will cause the turning of the latch member 49 on its pivot 51 in a direction to bring the member 50 out of engaging relation to the latch member 45 and the presser board being thereby released will fly open under the action of the spring 23, the latch member 49 gravitating to the inactive position, or being simply moved thereto by the opening tendency of the presser board. This relieves the end 43 of the rod 42 from the pressure of the latch member 45 and the spring 35 at once becomes active to cause the closing of the doors or shutters 27 and 28. This also results in a movement of the rod 37 in a direction to actuate the lever 79 to a position contrary to which it was originally actuated by the rod 37 and this movement is transmitted through the link 78 to the lever 76 which at once through the link 74 causes a movement of the lever 72 in a direction to operate the gear wheels 71 and 68 thereby stopping further movement of the hand 66 in the progressive direction. The return of the lever 76 to its normal position has brought the arm 77 into engagement with the cam 69 which participated in the rotative movement of the arbor 65 and this arm will at once tend to return the cam 66 to its initial or zero position thus carrying the hand 66 to the zero position on the clock dial.

The movement of the crank 33 on the opening of the door or shutter 28 caused a movement of the pawl 89 through the link 36 and bell crank lever 88, in a direction to withdraw it from an engaged tooth of the ratchet wheel 93 to engaging relation to the next tooth in order and when the parts returned to the normal position under the action of the spring 35, the pawl 89 was moved in the active direction causing a rotative movement of the ratchet wheel 90 to the extent of one step and this action takes place each time the presser board 21, 22 is closed down onto the paper and subsequently released.

Counting the position of the pin 94 on the ratchet wheel 90 as a zero position and the numbers 93 progressing therefrom, the wheel 90 may be turned so that the pin 94 is separated from the lever 95 by a number equal to the number of exposures desired, then at each exposure the wheel 90 is moved progressively one point and when the number of exposures have been completed the bell 92 is struck by the hammer 96 and an audible signal is given to the operator that the number of prints desired have been completed.

Each time the presser board is released from engagement with a print the latter is free to fall along the negative and ultimately passes into the chute 16 by which it is conveyed to the receptacle 25 and when all the prints desired have been made then

the receptacle may be withdrawn from the printing structure and the prints may be stored or developed as may be desired.

It will be seen from the foregoing that the operation is entirely automatic on both the time and counting sides and after having once set the machine for operation the operator has but to position the paper and close the presser board and the latch member 45 into position, the machine taking care of all subsequent operations.

It will be understood that the showing of the drawings is not to be taken as the only embodiment of the invention since various changes may be made in the structure illustrated while still retaining all the salient features of the invention.

Instead of having the negative engage the top member of the frame 4 a plain or clear glass plate may be applied to the frame 4 engaging the sides or the sides and the top of the same and resting on pins 97' at the bottom of the frame back of the bar 17.

Instead of having the pin 94 in fixed relation to the ratchet wheel 90, the ratchet wheel may be provided with an arm 98 movable about its axis with relation to the wheel, this arm being provided with a dog 99 and carrying the pin 94. On moving the arm 98 in one direction the dog 99 will ride over the teeth of the ratchet wheel and then on moving the arm 90 in the other direction the dog will lock to the adjacent tooth and the pin 94 be so positioned as to engage the striker of the bell in the same manner as described with reference to the showing of Fig. 1. With this arrangement instead of moving the ratchet wheel to carry the pin a sufficient distance from the striking position, the pin itself is carried and the same result is accomplished.

It will be understood of course that any type of battery may be used and that the magnet 60 may be a single coil magnet or a horse-shoe electro magnet as may be found desirable with different sizes of machines.

What is claimed is:—

1. In a photo printing machine, a negative holder comprising a frame provided with a cross bar transverse to the negative receiving space and provided with negative holding clips adjustable along the cross bar at will, said frame being adjustable in a direction transverse to the length of the cross bar and movable about an axis longitudinal to one side of the frame.

2. In a photo printing machine, normally closed means adapted to be opened to expose sensitized material, a presser board, a latch member carried by the presser board, operating mechanism for the normally closed means having a member in the path of the latch member responsive to the movement of the latter to the latched position for opening the normally closed means, another

latch member for holding the first named latch member in the latched position, and electro-magnetic means for releasing the latch.

5 3. In a photo printing machine, normally closed means adapted to be opened to expose sensitized material, a presser board, a latch member carried by the presser board, operating mechanism for the normally
10 closed means having a member in the path of the latch member responsive to the movement of the latter to the latched position for opening the normally closed means, another latch member for holding the first
15 named latch member in the latched position, electro magnetic means for releasing the latch, and a time mechanism for causing the energization of the electro magnetic means at the expiration of a predetermined time
20 limit.

4. In a photo-printing machine, a timing mechanism, means for excluding light, spring-controlled mechanism for holding said means normally closed, normally open
25 means for holding sensitized sheets, means operated by said holding means when closed for opening the light excluding means, a

receptacle, means under the control of the timing mechanism for releasing the holding means to free the sensitized sheet and to release the light excluding means, and means
30 for directing the released sensitized sheet into the receptacle.

5. In a photo-printing machine, a frame open at the front and back thereof, a structure mounted for swinging movement upon
35 the frame, a negative carrying element slidably mounted on said structure, means for locking the structure against movement relative to the frame, means for pressing sensitive material upon the negative, a lock for
40 said means, a receptacle, means for automatically opening the pressing means when unlocked to release the sensitive material, and means for directing the sensitive material
45 by gravity into the receptacle.

In testimony that we claim the foregoing as our own, we have hereto affixed our signatures in the presence of two witnesses.

OTHO C. COURTRIGHT.
ALBERT D. MIKA.

Witnesses:

J. S. HAMILTON,
D. M. YOUNG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."