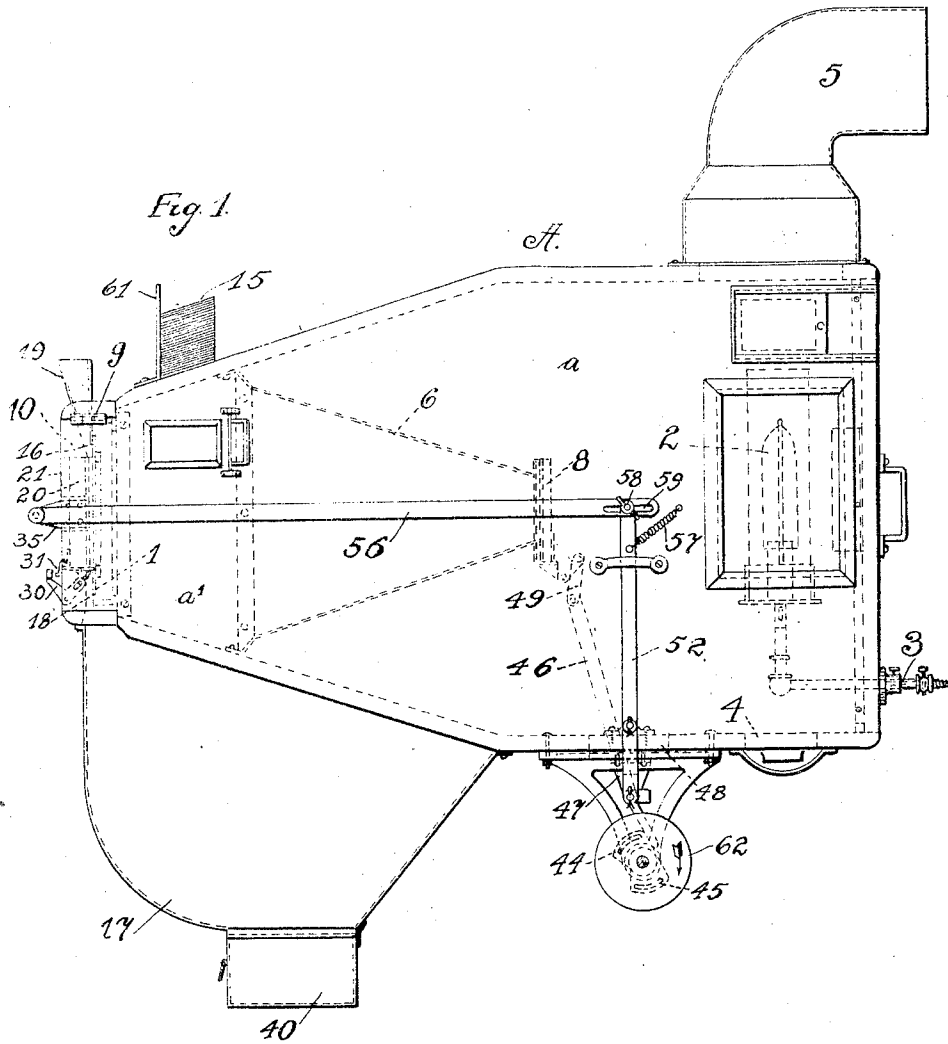


G. KRAIN.
 PHOTOGRAPH PRINTING MACHINE.
 APPLICATION FILED MAR. 25, 1912.

Patented Apr. 22, 1913.

4 SHEETS—SHEET 1.

1,059,473.



WITNESSES

M. H. Biful
H. J. Dorais

INVENTOR

George Krain,
 BY *Wm. E. Baldo,*
 ATTORNEY

G. KRAIN.
 PHOTOGRAPH PRINTING MACHINE.
 APPLICATION FILED MAR. 25, 1912.

1,059,473.

Patented Apr. 22, 1913.

4 SHEETS—SHEET 2.

Fig. 2.

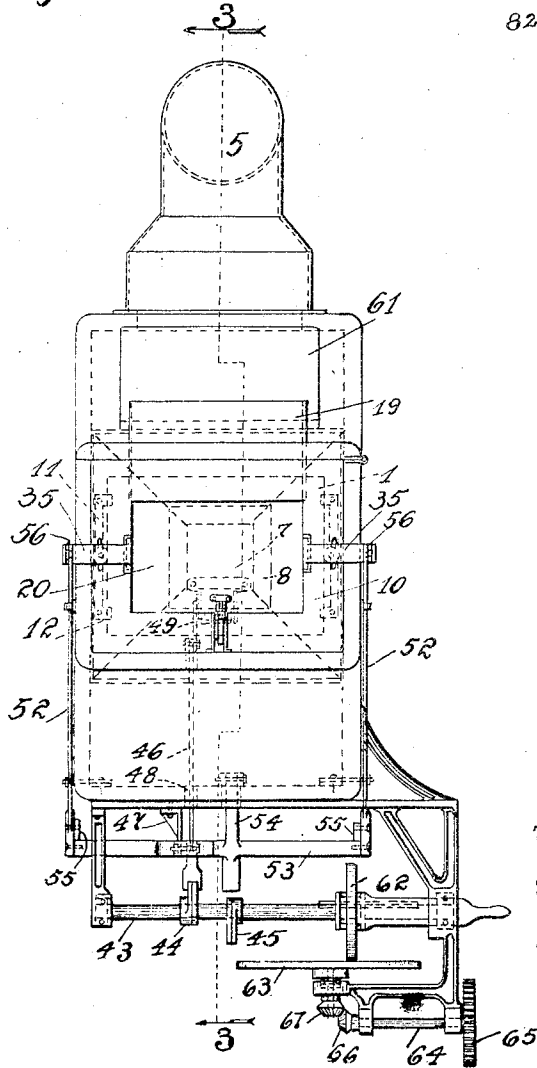


Fig. 16.

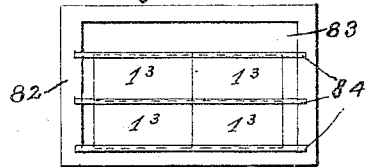
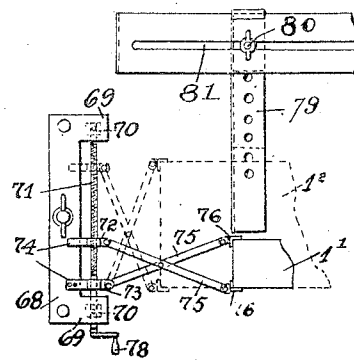


Fig. 15.



WITNESSES

M. H. Biful
 H. J. Dorais

INVENTOR

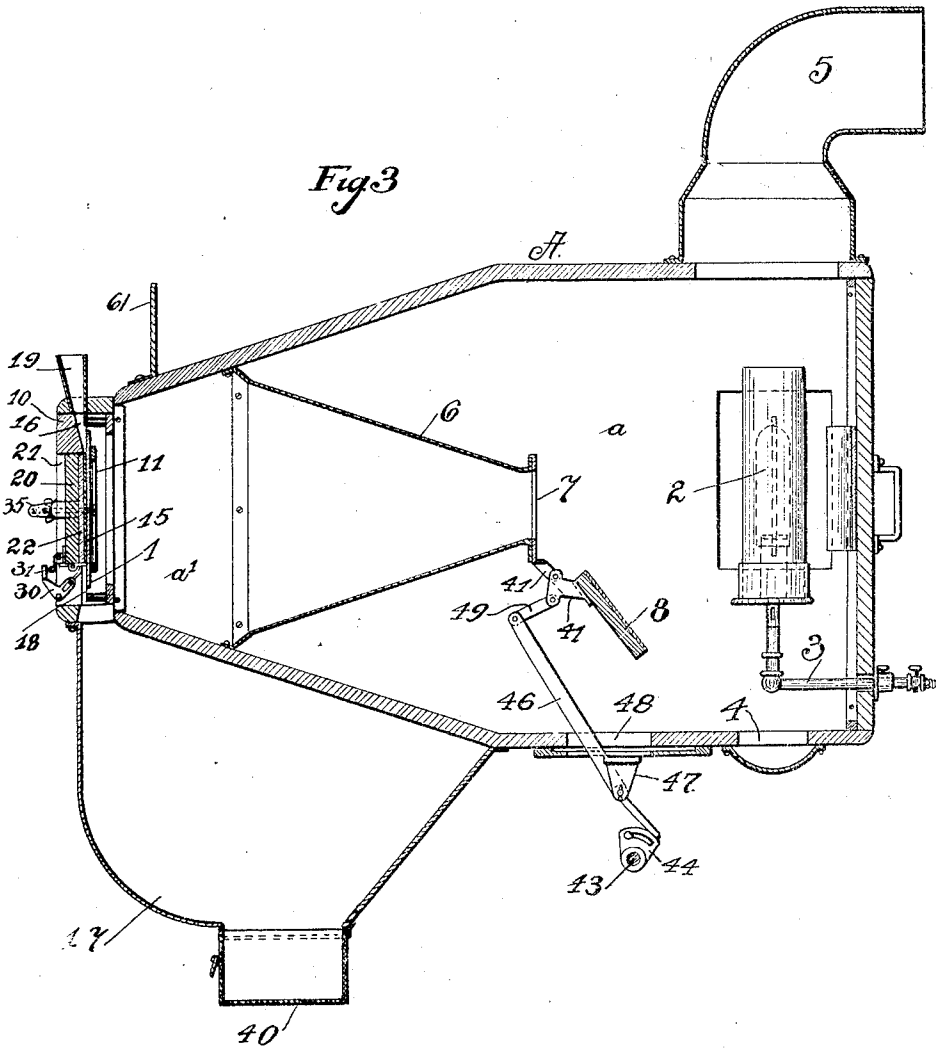
George Krain,
 BY H. E. Waldo,
 ATTORNEY

G. KRAIN.
 PHOTOGRAPH PRINTING MACHINE.
 APPLICATION FILED MAR. 25, 1912.

Patented Apr. 22, 1913.

4 SHEETS—SHEET 3.

1,059,473.



WITNESSES

Mr. H. Bifel
 S. J. Dorais

INVENTOR

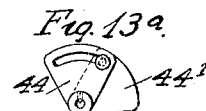
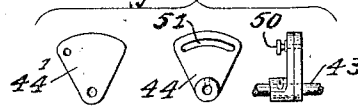
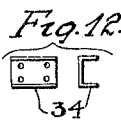
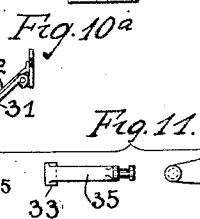
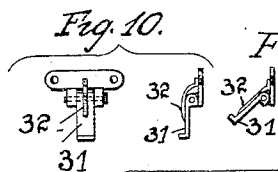
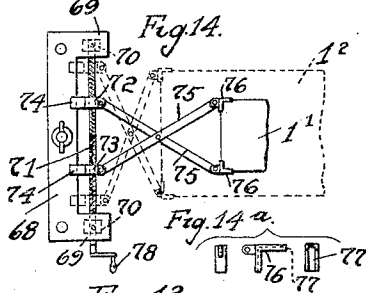
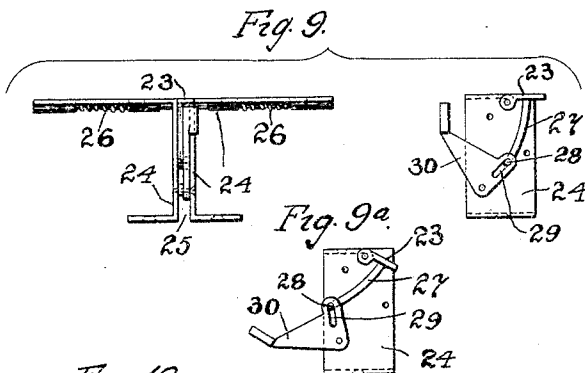
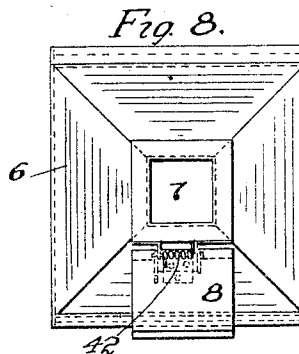
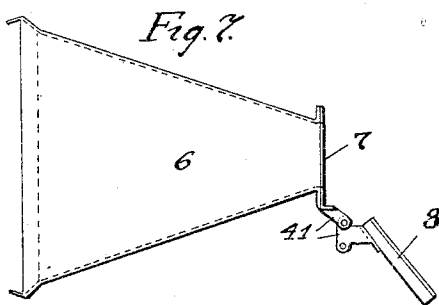
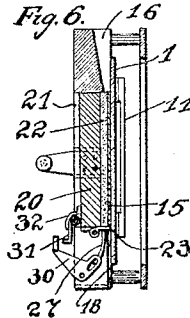
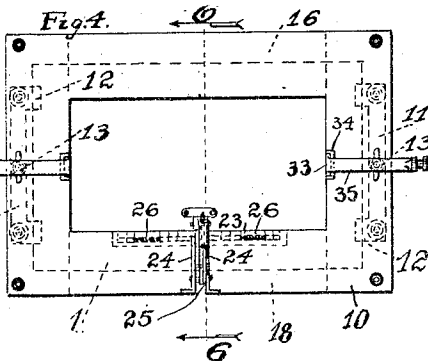
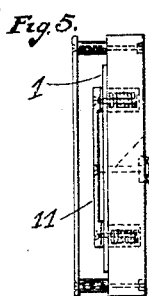
George Krain
 BY Geo. E. Baldo,
 ATTORNEY

G. KRAIN.
 PHOTOGRAPH PRINTING MACHINE.
 APPLICATION FILED MAR. 25, 1912.

1,059,473.

Patented Apr. 22, 1913.

4 SHEETS-SHEET 4.



WITNESSES

M. H. Biful
 S. J. Dorais

INVENTOR
 George Krain
 BY
 Geo. E. Waldo,
 ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE KRAIN, OF CHICAGO, ILLINOIS.

PHOTOGRAPH-PRINTING MACHINE.

1,059,473.

Specification of Letters Patent.

Patented Apr. 22, 1913.

Application filed March 25, 1912. Serial No. 686,040.

To all whom it may concern:

Be it known that I, GEORGE KRAIN, a subject of the Emperor of Germany, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Photograph-Printing Machines, of which the following is a specification.

This invention relates to photography, and more particularly to photograph printing machines.

The object of the invention is to provide a machine for printing photographs which shall be simple in construction, reliable in its operation, and which shall have capacity for printing a large number of photographs, thereby materially reducing the cost of producing photographs in quantities.

To effect the objects of the invention, a photograph printing machine of my invention comprises the various features, combinations of features, and details of construction hereinafter described and claimed.

In the accompanying drawings, in which a photograph printing machine of my invention is fully illustrated, Figure 1 is a side view of a machine of my invention; Fig. 2 is a rear end view thereof; Fig. 3 is a sectional view taken substantially on the line 3-3 of Fig. 2, the driving mechanism being omitted; Fig. 4 is a detached rear view of the frame in which the negative is supported; Fig. 5 is a side view thereof; Fig. 6 is a sectional view on the line 6-6 of Fig. 4. Figs. 7 and 8 are side and front end views of the partition interposed between the light and the negative, together with the shutter for controlling the light opening therethrough; Figs. 9 to 13 inclusive are detached detail views of various parts of my improved machine; and Figs. 14 to 16 inclusive illustrate modifications of certain parts of my improved machine.

Referring now to the drawings, A designates, as a whole, the body-portion of my improved machine, consisting, as shown, of a hollow box or casing rectangular in cross-section, the rear end of which is smaller, vertically, than the front end, and the top and bottom sides of which converge rearwardly, the relation being preferably such that the front and rear ends of said casing will be central with each other.

The negative 1 is adapted to be mounted at the rear end of the casing A, in the manner presently to be described, and the print-

ing is preferably done by means of an artificial light 2 located at the front end of said casing, consisting, as shown, of a gas light embodying a usual mantle, and which is adapted to be connected with a source of gas supply by means of a pipe 3. Air to support combustion is adapted to enter the casing A through a suitable hole or opening therein, as shown, a hole 4 formed in the bottom of said casing directly beneath the light 2, and the burned gases are adapted to escape through a pipe 5, which communicates with a discharge opening formed in the top of said casing directly above said light.

The interior of the casing A is divided into front and rear compartments *a*, *a'* by an opaque partition 6 provided with a central light opening 7, which is controlled by a shutter 8 hinged to the lower side of said light opening, and which is adapted to be opened and closed at intervals by suitable mechanism, as presently described. As shown, the partition 6 is elongated and the sides thereof flare rearward from the light opening 7 therein, the rear edges of said partition being secured to the walls of the casing A so as to form tight joints entirely around said partition.

The rear end of the casing A is open, and formed on the rear end thereof and surrounding said opening is a hollow rearward extension 9, adapted to be removably secured in which is a frame 10 for supporting the negative 1 and certain operative parts of the machine, as presently described. As shown, the top side of said rearward extension 9 is hinged at one end to provide convenient access to parts inclosed therein, and for conveniently inserting the frame 10 into and withdrawing it from said extension 9 when desired, as for the purpose of changing the negative. As shown, said frame 10 is removably secured in the rearward casing extension 9 by means of engaging tongues and grooves formed vertically in proper position on the inner side of the rearward extension 9 and the lateral edges of the frame 10, respectively.

The negative 1 is adapted to be removably secured to the front side of the frame 10 by any suitable means. Simple means for this purpose (see Figs. 1 to 6) consist of clamping bars 11, formed at opposite ends of which are clips 12 which are adapted to extend inwardly over the edges

of the negative 1, and which are adapted to be drawn into strong frictional engagement therewith by means of clamping screws 13 secured in said clamping bars, which extend through the frame 10, and threaded to the projecting ends of which are clamping nuts 14, tightening of which will operate in an obvious manner to draw the clips 12 into frictional engagement with the outer side of the negative 1 and to clamp the same firmly against the inner face of the frame 10, in the manner desired.

Sensitized paper, on which the photograph is to be printed, a sheet of which is shown at 15, is adapted to be inserted into the machine directly behind the negative 1 through a suitable hole or opening 16 formed in the top side of the casing extension 9 and of the frame 10, and is adapted to be discharged therefrom into a magazine 17 secured to the under side of said casing in proper position through openings 18 formed in the lower side of the frame 10 and of the casing extension 9. Also, to facilitate inserting the sensitized sheets 15 into the machine, the opening 18 is preferably flared and is extended upwardly by means of what may be described as a hopper 19 secured therein, the sides of which extend above the top of the casing extension 9. The sensitized sheet 15 is adapted to be pressed firmly against the rear side of the negative 1 by means of a presser plate 20 slidably fitted to an opening 21 formed through the frame 10, so as to be freely movable in said opening toward and from the negative 1, a sheet 22 of felt or the like being preferably secured to the front side of said presser plate which bears against said sensitized paper.

The position of the sensitized sheets 15 in the machine is defined by means of a stop plate 23 hinged to the upper end of brackets 24 secured in a slot or opening 25 formed in the lower side of the frame 10, and which projects forwardly into close proximity with the rear side of the negative 1, so that when said sensitized sheets are dropped through the opening 16, they will fall and rest upon said stop plate. The hinged stop plate 23 is maintained normally in raised, operative position by means of springs 26 applied at the hinge thereof. Said stop plate is adapted to be turned pivotally downward to permit the sensitized sheets 15 to pass same and fall through the opening 18 into the magazine 17 by means of an arm 27 secured to under side of the stop plate 23, a pin 28 secured in the end of which, engages a slot 29 formed in a lever 30 pivoted on the brackets 24, the relation being such that rearward pivotal movement of the upper end of the lever 30 will depress or draw down the free front edge of the stop plate 23.

In the preferable construction shown, the operation of the lever 30 and thus of the stop plate 23 is controlled automatically by movement of the presser plate 20 toward and from the negative 1 in the following manner:—Pivoted to the rear side of said presser plate is a trip finger 31, the lower end of which extends downwardly beyond the upper end of the lever 30 in position to engage the same when the presser plate 20 is moved rearwardly, the relation being such that travel of the presser plate in the operation of the machine will cause the trip finger 31 to ride over the upper end of the lever 30 just before said presser plate reaches the limit of its movement rearward, thereby releasing the same, and permitting it to resume its normal raised position independently of the movement of the presser plate 20, so that said stop plate will be in position to arrest the downward movement of the sensitized plate 15 while the presser plate is still retracted to permit said sensitized sheet to pass down with its lower edge resting on said stop plate 23. The stop finger 31 is made of such length also that, as the presser plate 20 again moves forward into contact with the sensitized sheet 15, said trip finger 31 will snap over the upper end of the lever 30 into position to again engage said lever when said presser plate 20 moves rearwardly, a spring 32 permitting necessary pivotal movement of said trip finger and also operating to throw said finger down after its free end passes said lever 30.

In its movement toward and from the negative 1, the presser plate 20 is supported and guided by means of blocks 33 rigidly secured to the ends of said presser plate, which are slidably fitted to corresponding grooves formed in plates 34 secured in recesses formed in the inner lateral sides of the frame 10. The blocks 33 are extended rearwardly so that they will project beyond the rear end of the casing extension 9 in all positions of the plate 20, and formed thereon, are laterally projecting arms 35 which project outwardly beyond the outer side walls of the casing A of the machine.

The bottom of the magazine 17 is closed by a drawer 40, into which the printed sheets settle as they fall into said magazine from the machine.

The shutter 8 is hinged by means of bracket hinges 41 at a considerable distance below the light opening 7 so that, in opening, a throw will be imparted to said shutter which will carry it bodily away from the light opening. Said shutter is maintained normally closed by a spring 42 applied to the hinge thereof, and is adapted to be opened by suitable means provided for the purpose.

In the preferable construction shown, the

shutter 8, presser plate 20 and stop plate 23 are all shown as operated automatically by suitable means, as follows:—Rotatably mounted in brackets secured to the under side of the casing A is a shaft 43 secured to which are cams 44 and 45, which respectively operate the shutter opening mechanism and the presser plate retracting mechanism. Said shutter opening mechanism comprises a lever 46 pivoted to a bracket 47 on the under side of the casing A and which extends upwardly through an opening 48 in the bottom of the casing A. The upper end of said lever is connected to the shutter 8 at a point closely adjacent to its hinge by a link 49 and its lower end projects into the path of travel of the cam 44, whereby necessary pivotal movement will be imparted to said lever to open the shutter 8 at each revolution of said cam. As soon as said cam passes out of engagement with said lever, said shutter 8 will be closed very quickly by the spring 42 applied thereto. To provide for varying the exposure of the sensitized sheets 15 to the action of the light, said cam 44 is constructed in such manner that its face may be lengthened and shortened. As shown, said cam is made in two separate sections, designated, respectively, 44 and 44', Fig. 13, the section 44 being firmly secured to the shaft 43, and the section 44' being pivoted on said shaft and being adjustably connected to the section 44, said connecting means, consisting, as shown, of a clamping screw 50 which extends through a slot 51 formed in the cam section 44, and is threaded into a hole formed in the cam section 44'. With the described construction, it is obvious that the face of said cam and thus the exposure of the print may be varied within limits ranging from about one-fifth to one-third of a revolution of the cam shaft.

The mechanism for operating the presser plate 20 comprises levers 52 pivoted between their ends to opposite sides of the casing A. The lower ends of said levers 52 are connected by a bar 53 formed on which are arms 54 and 55, of which the upper end of the arm 54 is pivoted to the bottom of the casing A and the arm 55 coöperates with the cam 45 to impart rocking movement to the bar 53 about the pivot of the arm 54, which will, in turn, impart pivotal movement to the levers 52. The upper ends of the levers 52 are connected with the arms 35 on the guide blocks 33 secured to the presser plate 20 by rods 56, the opposite ends of which are pivotally connected to said levers 52 and arms 35, respectively. The levers 52 are adapted to be moved pivotally to advance the presser plate 20 to cause it to bear against the sensitized sheets 15 by springs 57, which connect the upper ends of said levers with a fixed support. Said springs

also determine the pressure which said presser plate 20 will exert on said sheet 15, and thus on the negative 1.

Preferably, and as shown, the cam 45 is made adjustable in substantially the same manner as the cam 44, thus providing for varying the time during which the presser plate will be held in retracted position to afford time corresponding to a greater or less part of a revolution of the shaft 43 in which to insert a sheet 15 into the machine. Thus, when the machine is running fast, said cam will usually be adjusted longer than when the machine is running slower. To provide for conveniently disengaging the rear ends of the rods 56 from the arms 35 on the presser plate 20, the pivot bearings in said rods which engage the bearings on said arms are slotted so that they may be raised out of engagement with said arms and disconnected therefrom. As previously described, the stop plate 23 is depressed automatically by the rearward movement of the presser plate 20, and hence is controlled by the cam 45.

In the operation of the machine, the shutter 8 and the presser plate 20 are operated alternately, this being effected by positioning the cams 44 and 45 at angles of about 180 degrees from each other. To provide for varying the rearward movement of the presser plate relatively to the closing of the shutter 8, the rods 56 are adjustably connected to the levers 52, as by studs 58, rotatably secured in the ends of said levers, and which extend through slots 59 formed lengthwise in the ends of said rods 56, and are adapted to be secured in adjusted positions therein by means of clamping nuts 60 threaded to the ends of said studs outside of said rods, which are adapted to be clamped between said clamping nuts 60 and collars formed on said studs inside of said rods. Obviously, by adjusting the positions of said studs 58 in the slots 59 toward or from the ends of said rods, the angular positions of the levers 52 will be changed so that they will be engaged by the cam 45 at an earlier or later point in its cycle.

The sensitized sheets 15 are fed to the machine by hand, as from a stack of such sheets supported on the top of the casing A, a bracket 61 being secured to said casing to support said sheets.

The cam shaft 43 is preferably driven by means of a usual form of friction drive, comprising a friction wheel 62 splined to said shaft, the face of which runs in contact with a surface of a rotatable disk 63, which is adapted to be driven as from a driving shaft 64 adapted, in turn, to be driven from any suitable source of power, not shown, by means of a gear 65 on said shaft, rotation being imparted to said disk 63 by means of beveled gears 66 and 67, secured to said

driving shaft 64 and to the shaft of the disk 63, respectively. By adjusting the friction wheel 62 toward or from the center of the disk 63, the speed of rotation of the shaft 43 may be varied as desired. Any suitable means may be employed for thus adjusting said friction wheel, and need not be described in detail.

In Figs. 14 and 14^a, 15 and 16, respectively, I have shown three different forms of negative holders adapted for holding negatives 1' smaller than those which this machine is normally designed to print from, and which I will now describe in order.

Referring to Figs. 14 and 14^a, the holder therein shown is adapted for printing negatives 1' centrally on sheets of the same size as the sheets 15. To effect this end, said holder comprises bars 68, which are substantially identical in construction with the clamping bars 11, heretofore described, and are adapted to be secured to the frame 10 in the same manner. Formed on lateral projections 69 on said bars 68 are bearings 70, in which are journaled screws 71, one at each end of the frame 10. The opposite ends of the screws 71 are screw-threaded with screws of the same pitch and opposite lead, one right-handed and the other left, and secured in screw-threaded engagement therewith and positioned symmetrically above and below the transverse center line of the sensitized sheet when in operative position in the machine, are nuts 72 and 73, formed on which are projections 74, slots in which slidably embrace the adjacent edges of the bars 68 and secure said nuts from turning on said screws 71. Pivoted to the outer sides of said nuts are arms 75, which are pivoted to each other between their ends, the relation being such that corresponding sections of said arms on opposite sides of their points of pivoted connection to each other will be of the same length. Pivoted to the outer ends of said arms 75 are caps 76, comprising sections which extend at right angles to each other and are grooved or channeled on their inner sides, as shown at 77, to receive the corners of the negative 1'. An end of the screws 71 is squared to receive a wrench 78, which affords convenient means for turning said screws to adjust the arms 75 and caps 76 to receive negatives 1' of different sizes.

With the described construction, the outer ends of the arms 75, to which the caps 76 are pivoted, will be spread apart by turning said screws 71 in one direction, and will be moved together to cause said caps 76 to grip the corners of the negative by turning said screws in the opposite direction. The negative will be inserted into the holder and the screws 71 tightened while the frame 10 is removed from the machine, the necessary adjustment being made, the screws 71 tight-

ened, and the wrench or crank 78 removed before said frame 10 is placed in the machine. To illustrate the adjustability of the device, in addition to showing it adjusted for holding the negative 1', shown in full lines, I have also, in dotted line, shown said device adjusted for holding a considerably larger negative, designated by the reference numeral 1².

In Fig. 15 of the drawings, I have shown a slight modification of the plate holder shown in Figs. 14, 14^a, to adapt the same for printing on small sheets from small negatives. As the positions of the sheets to be printed in the machine are defined by the stop plate 23, it will, of course, be necessary to vary the positions of the negatives from a fixed lower limit defined by said stop plate. Excepting as hereinafter pointed out, the device shown in said Fig. 15 is substantially the same in construction, and the same reference numerals are used to designate similar parts thereof. To effect the object thereof, said modification consists in utilizing screws 71 having the same lead throughout, threaded to each of which is a single nut 72, to which one of the arms 75 is pivoted, the other of said arms being pivoted to a fixed part of the bars 68 adjacent to their lower ends. In order that the small sensitized sheets may be delivered in proper position between the negative and the presser plate, suitable guides are provided, consisting, as shown (Fig. 15), of plates 79 secured to the front wall of the hopper 19, and which extend down into close proximity to the plate 1', 1², said plates being grooved in their adjacent edges to receive the ends of the sheets to be printed. As shown, said guides 79 are secured to the front wall of the hopper 19 by means of clamping bolts or studs 80 which extend through a slot 81 formed in the hopper wall, thereby making provision for adjusting said guides 79 laterally to receive sheets of paper of different lengths. The lengths of said guides will vary, however, with the width of the negative, different guides being provided for different widths of negatives. While, in said Fig. 15, only one of said guides is shown, it will be understood that another corresponding guide of similar construction will be used at the opposite side of the machine.

In Fig. 16 of the drawings, I have shown still a further modification of my invention to adapt the machine for printing from a number of small negatives at the same time. To effect this end, I employ a skeleton frame 82 of about the size of the full-size negative 1, with which the machine is designed to be used. Secured in the opening 83 in said frame 82 are a plurality, as shown, four negatives 1³. Said negatives are secured in position by means of rods 84, the edges of which are grooved to receive the edges

of said negatives and the ends of which are slotted to embrace the sides of the frame 82 at the sides of the opening 83 therein.

I claim:—

5 1. In a photograph printing machine, the combination of a hollow casing, a light at one end thereof and a negative holding frame at the other, means for securing a negative to said negative holding frame, a
10 presser plate movable toward and from a negative secured to said negative holding frame, a hinged stop for defining the printing position of the sensitized sheets, means for imparting movement to said presser
15 plate, a spring applied to said hinged stop, and means controlled by movement of said presser plate for imparting pivotal movement to said hinged stop against the force of the spring applied thereto, constructed
20 and arranged for releasing said hinged stop before said presser plate reaches the limit of its movement, substantially as described.

2. In a photograph printing machine, the combination of a hollow casing, a light at one end thereof and a negative holding frame at the other, means for securing a negative to said negative holding frame, a
25 presser plate movable toward and from a negative secured to said negative holding frame, a hinged stop for defining the printing position of the sensitized sheets, means for imparting movement to said presser
30 plate, a spring applied to said hinged stop, and means controlled by movement of the presser plate for imparting pivotal movement to said hinged stop against the force of the spring applied thereto, said means comprising a pivoted lever, an arm on said
35 hinged stop, a projection thereon which engages a slot formed in said pivoted lever, and a trip finger pivoted to said presser plate in position to engage the free end of the pivoted lever connected to said hinged stop, substantially as described.

3. In a photograph printing machine, the combination of a hollow casing, a light at one end thereof and a negative holding frame at the other, means for securing a negative to said negative holding frame, a
45 presser plate movable toward and from a negative secured to said negative holding frame, a hinged stop for defining the printing position of the sensitized sheets, means for imparting movement to said presser
50 plate, a spring applied to said hinged stop, and means controlled by movement of the presser plate for imparting pivotal movement to said hinged stop against the force of the spring applied thereto, said means comprising a pivoted lever, an arm on said
55 hinged stop, a projection thereon which engages a slot formed in said pivoted lever, and a trip finger pivoted to said presser plate in position to engage the free end of the pivoted lever connected to said hinged
60 stop, the relation being such that said trip finger will pass out of engagement with said lever before said presser plate reaches the limit of its movement, substantially as described.

4. In a photograph printing machine, the combination of a hollow casing, a light at one end thereof and a negative holding frame at the other, means for securing a negative to said negative holding frame, a
70 presser plate movable toward and from a negative secured to said negative holding frame, a hinged stop for defining the printing position of the sensitized sheets, means for imparting movement to said presser
75 plate, a spring applied to said hinged stop, and means controlled by movement of the presser plate for imparting pivotal movement to said hinged stop against the force of the spring applied thereto, said means comprising a pivoted lever, an arm on said
80 hinged stop, a projection thereon which engages a slot formed in said pivoted lever, and a spring pressed trip finger pivoted to said presser plate in position to engage the free end of the pivoted lever connected to said hinged stop, the relation being such that said trip finger will pass out of engagement with said lever before said presser plate reaches the limit of its movement, substantially as described.

5. In a photograph printing machine, the combination of a hollow casing, a light mounted at one end of said casing, a negative holding frame at the opposite end of
100 said casing, adjustable means for securing a negative thereto, said means comprising bars secured to said frame, screws rotatably mounted in bearings on said bars, pairs of arms pivotally mounted on said bars respectively and pivotally connected to each other, each pair comprising an arm pivoted to a nut threaded to the screw on the bar to which said pairs of arms are pivoted, respectively, and negative engaging means
105 at the outer ends of said arms, substantially as described.

6. In a photograph printing machine, the combination of a hollow casing, a light mounted at one end of said casing, a negative holding frame at the opposite end of
115 said casing, adjustable means for securing a negative thereto, said means comprising bars secured to said frame, screws rotatably mounted in bearings on said bars, said screws comprising upper and lower sections having opposite lead, nuts threaded to both sections of said screws, arms pivoted to each other and to said nuts, and negative engaging means at the outer ends of said arms.

7. In a photograph printing machine of the type described, the combination of the negative holding frame provided with an opening which extends through said frame, a presser plate movably mounted in said
120 125 130

opening, and means for imparting movement thereto, said means comprising a shaft, a cam thereon, pivoted levers, a projection thereon which projects into the path of travel of said cam, rods which connect the upper ends of said levers with rigid projections on said presser plate, and means for adjusting the movement imparted to said presser plate by said cam, substantially as described.

8. In a photographic printing machine of the type described, the combination of the negative holding frame provided with an opening which extends through said frame, a presser plate movably mounted in said opening, and means for imparting movement thereto, said means comprising a shaft, a cam thereon, pivoted levers, a projection thereon which projects into the path of

travel of said cam, rods which connect the upper ends of said levers with rigid projections on said presser plate, means for adjusting the movement imparted to said presser plate by said cam, said means comprising studs rotatably mounted in said levers which extend through slots formed lengthwise in the rods connected to said presser plate, and clamping means for securing said studs in adjusted positions in said slots, substantially as described.

In testimony that I claim the foregoing as my invention, I affix my signature in presence of two subscribing witnesses this 23rd day of March A. D., 1912.

GEORGE KRAIN.

Witnesses:

M. H. BIXEL,

E. M. KLATCHER.