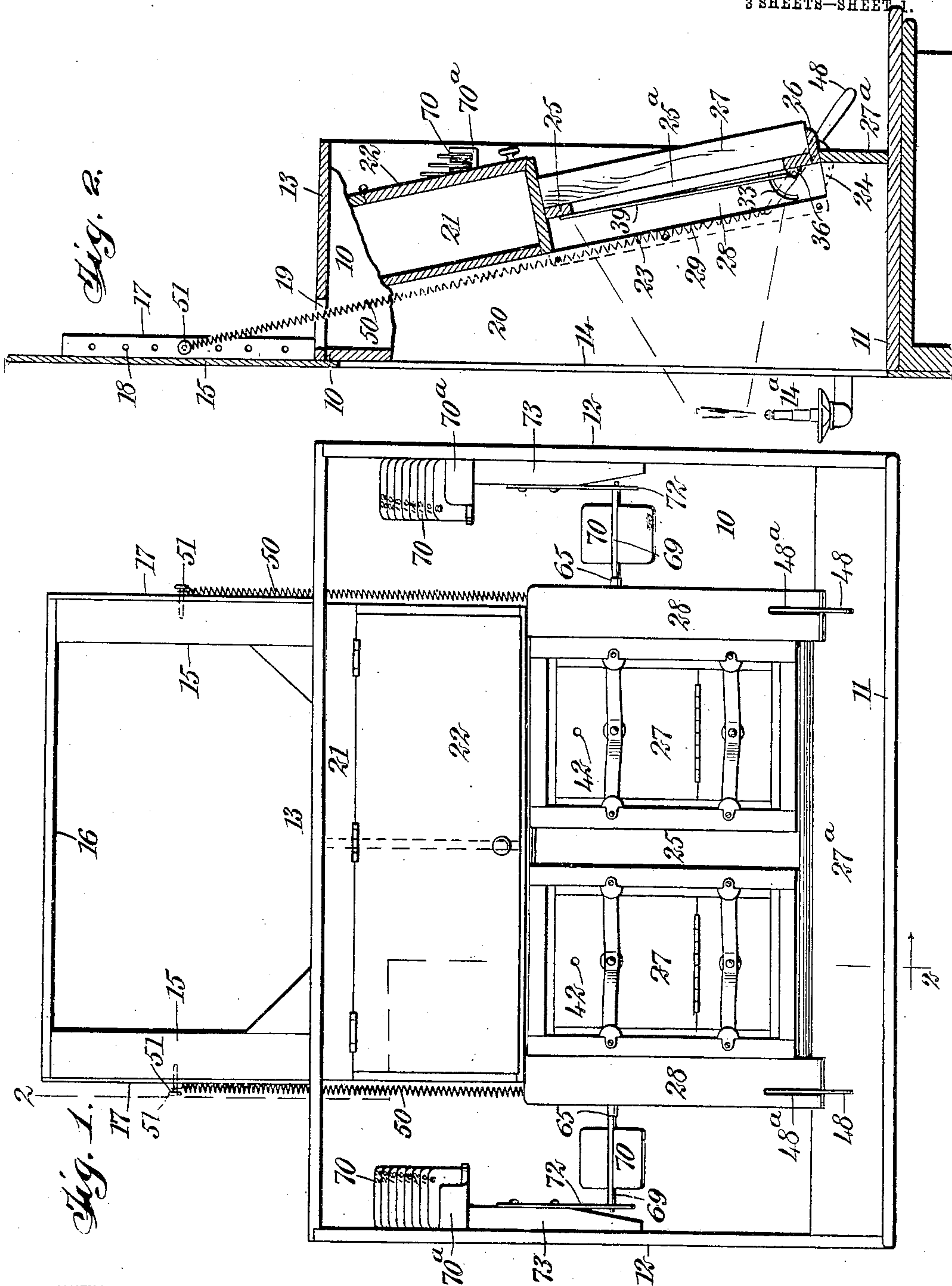


E. N. KERR.
 PHOTOGRAPHIC PAPER PRINTING MACHINE.
 APPLICATION FILED APR. 16, 1907.

920,582.

Patented May 4, 1909.

3 SHEETS—SHEET 1.



WITNESSES

L. G. ...
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INVENTOR

Ernest N. Kerr

BY

Mum...

ATTORNEYS

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Fig. 3.

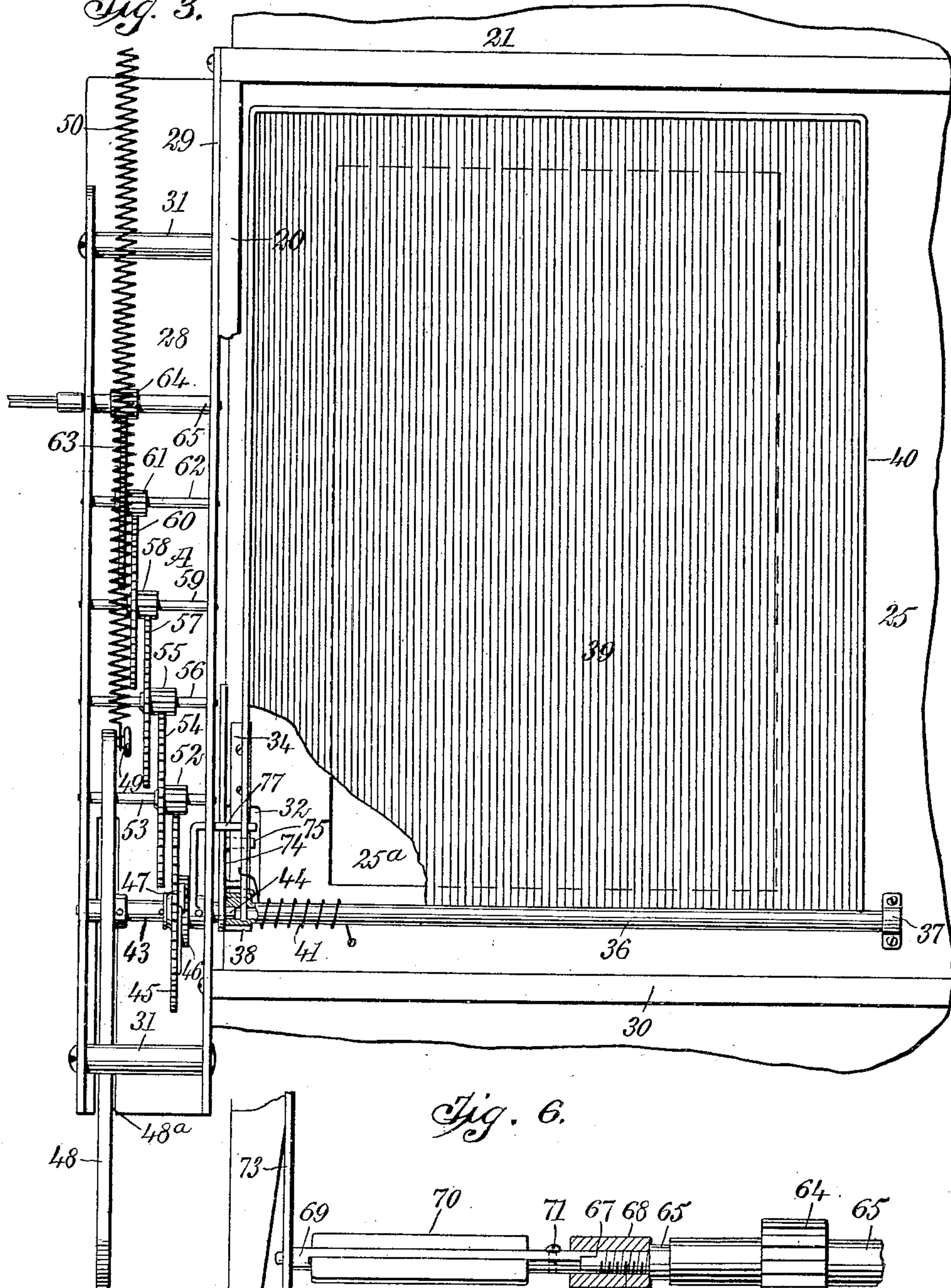
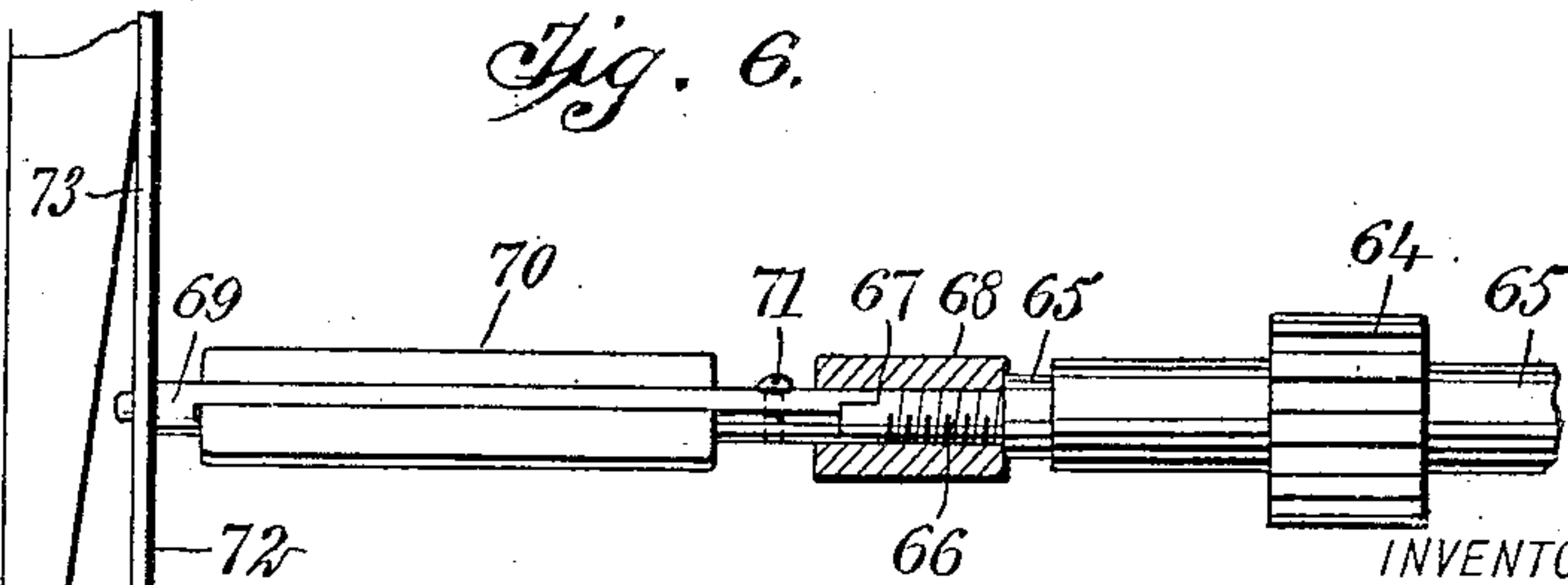


Fig. 6.



WITNESSES

L. E. Hardy
W. A. Ketch

INVENTOR

Ernest N. Kerr
 BY *M. M. Co.*
 ATTORNEYS

UNITED STATES PATENT OFFICE.

ERNEST NORMAN KERR, OF ROCK ISLAND, ILLINOIS.

PHOTOGRAPHIC-PAPER-PRINTING MACHINE.

No. 920,582.

Specification of Letters Patent.

Patented May 4, 1909.

Application filed April 16, 1907. Serial No. 368,521.

To all whom it may concern:

Be it known that I, ERNEST NORMAN KERR, a citizen of the United States, and a resident of Rock Island, in the county of Rock Island and State of Illinois, have invented a new and useful Improvement in Photographic-Paper-Printing Machines, of which the following is a full, clear, and exact description.

The purpose of the invention is to provide an exceedingly simple and reliable construction of machine for printing photographic paper, especially designed for use in connection with the so-called gas-light paper, wherein the time of exposure is under the complete control of the operator and may be made to vary as desired from a second or seconds to a minute or many minutes.

It is also a purpose of the invention to provide a shutter that is mechanically set and which will automatically close at a predetermined period of time.

It is also a purpose of the invention to construct a machine of the type described, having a wide range of speeds that can be changed without trouble or loss of time.

The invention consists in the novel construction and combination of the several parts as will be hereinafter fully set forth and pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a rear elevation of the improved machine; Fig. 2 is a vertical section taken practically on the line 2—2 of Fig. 1; Fig. 3 is an enlarged front elevation of one portion of the mechanism adapted to receive a printing frame showing the shutter closed and parts broken away, also illustrating the controlling mechanism for the shutter; Fig. 4 is an enlarged vertical section taken through the lower portion of that part of the main frame adapted to receive and support a printing frame, the lower portion of the shutter being in closed position and the direct controlling means for the shutter being shown in elevation; Fig. 5 is a view similar to that shown in Fig. 4, but illustrates the shutter in set or open position; and Fig. 6 is an enlarged detail view of the fan-control for the clock-work employed for releasing the shutter at a predetermined period of time.

A box frame is provided that consists of a

bottom 11, a front board 10, side pieces 12 and a top piece 13. This frame may be of any desired size and is provided with an opening 14 in the front board 10 extending practically from top to bottom through which light is admitted to the interior of the frame from a gas flame 14^a, as is shown in Fig. 2, or the equivalent of the same. Uprights 15 extend from the top board 13, one at each side of its center, usually connected by a cross bar 16, either hollow or solid, and from the outer longitudinal edges of the uprights 15 metal plates 17 extend rearward at right angles to the said uprights, as is shown in Fig. 2, and each of said plates 17 is provided with a series of apertures 18. Adjacent to each of the uprights 15 an opening 19 is made in the top board 13 of the frame for a purpose to be hereinafter mentioned, and a partition 20 is located at each side of the center of the said frame extending from the rear face of its front board 10 rearwardly, being wider at the bottom than at the top, and the said partitions also extend from top to bottom of the said frame. One of the partitions is broken away in Fig. 2 and both appear in edge view in Fig. 1.

The partitions 20 are practically in alignment with the outer edges of the uprights 15 and said partitions at their upper portions support between them a cabinet 21 provided with a suitable door 22, which cabinet is adapted to contain paper, negatives or other material necessary in making exposures, and the said cabinet is given a downward and a rearward inclination, as is best shown in Fig. 2. Below the cabinet 21 each partition 20 is provided with a downwardly and rearwardly inclined longitudinal edge 23 commencing from the rear bottom portion of the cabinet and extending to a point adjacent to the bottom 11, where the said partitions are widened and are given a slightly upward inclination, shown at 24 in Fig. 2.

Just to the rear of the partitions 20, at that portion of the partitions that is below the cabinet 21, an exposure board 25 is located. This exposure board is likewise given a downward and rearward inclination, also shown best in Fig. 2, and the said exposure board 25 is provided with an upwardly and rearwardly extending rail 26 at its bottom portion, and the said board is generally provided with two exposure openings 25^a, although I do not confine myself to any particular number of

such openings. The lower portion of the exposure board is supported by a transverse plate or board 27^a that engages with the rail 26 and with the bottom of the main frame, as is shown in Fig. 2.

The printing frames 27 containing the negatives and the paper to be printed are placed upon the rear face of the exposure board over the openings 25^a therein. A casing 28, substantially U-shaped in cross section, is located at each outer side edge of the exposure board 25, and the open portion of these casings 28 face to the front. The inner side members of the casings 28 are secured in any suitable or approved manner to the inclined edges 23 of the partitions 20, as is shown at 29 in Figs. 2 and 3. The lower end portions of the casings 28 are connected at the front of the exposure board usually by a tie rod 30, and the members of each casing 28 are braced by transverse studs 31, as is illustrated in Fig. 3.

A recess 32 is produced in the front face of the exposure board 25 at its lower corner, as is shown in Figs. 3, 4 and 5, and a segmental slot 33 is produced in the inner member of each casing 28, extending from the upper wall of the recesses 32 downwardly and forwardly, as is best illustrated in Figs. 4 and 5. A vertically located spring 34 crosses each recess 32, the springs being secured at their upper ends to the front face of the exposure board 25, as is particularly shown in Figs. 4 and 5, and the lower end of each spring is provided with a forwardly extending foot 35.

Below each exposure opening 25^a a shaft 36 is located at the outer face of the exposure board 25. The inner end of each shaft 36 is mounted to turn in a bearing 37 secured to the outer face of the exposure board, as is illustrated in Fig. 3. These shafts are tubular, particularly at their inner ends, and at the outer end of each shaft 36, a spiral stop 38 is located on the said shafts, as is best shown in Figs. 4 and 5. Each shaft 36 is adapted to carry a screen 39, and each screen 39 is secured to the skeleton frame 40 which may be made of wire of suitable gage, or the equivalent thereof, and the side members of the said frame at their lower ends are made to enter the shafts 36 or are otherwise secured thereto. These shutters are of sufficient dimensions to entirely cover the exposure openings 25^a, as is also shown in Fig. 3, and a spring 41 is coiled around each shaft 36, being secured at one end to the outer face of the exposure board 25 and at the opposite end the said spring is attached to or has bearing against the forward surface of the outer side member of a shutter frame, as is shown in Fig. 3. The shutters should be made of a transparent material of yellow color, so that the operator can see to place the negative in the frame, and the back of each plate holder is provided with a small hole 42 so that the

operator can see at once if the shutter is closed after exposure, by the color of the light.

A clock-work A is located within each casing 28. The main shaft 43 of the clock-work of each casing is the lower shaft, and these shafts are provided with reduced inner ends 44 that turn in the outer ends of the shutter shafts 36 and serve to support the said outer ends of the said shutter shafts. A gear 45 is secured to each main shaft 43 together with a ratchet wheel 46, the gears 45 being provided with pawls for engagement with the ratchet wheels 46, the pawls slipping over the ratchet wheels as the shutter is opened. A lever handle 48 is secured between its ends on each main shaft 43 operating at its lower portion through a slot 48^a in the said casing, as is shown in Figs. 1 and 3, and the upper end of each lever handle 48 is provided with a knob or projection 49, and one end of a spring 50 is secured to each knob or projection 49, the said springs being provided with buttons 51 at their upper ends and these buttons are made to enter any one of the apertures 18 of the upper plates 17 attached to the uprights 15 so as to increase or decrease the tension on the handle levers 48. The gears 45 of the main shafts 43 engage with pinions 52 located on spindles 53, and on said spindles 53 gears 54 are secured that mesh with pinions 55 on a second spindle 56, which latter spindles are also provided with gears 57. These gears in their turn mesh with pinions 58 upon other and parallel spindles 59, on which spindles gears 60 are secured that mesh with pinions 61 on another parallel spindle 62, which latter spindles are provided with gears 63, and these gears 63 mesh with pinions 64, on what I term regulating spindles 65. All of the gearing above enumerated including the handle levers 48 is located in the casings 28, as is clearly shown in Fig. 3, each shutter being provided with its individual gearing.

I do not limit myself to the specific number of gears just described, as their number will be changed according to conditions of light. If a very fast light is available or the negatives are thin, a less number of gears than described would be used to the best advantage.

The regulating spindle 65, as is shown in Fig. 6, extends out beyond the outer member of the casing 28 in which it is located, as is shown in Fig. 3, and the outer end of the regulating spindle 65 is provided with a thread 66 and with a recess 67 in its outer end, and a sleeve 68 is screwed upon the outer threaded portion of the regulating spindle 65 and this sleeve is adapted to receive the inner end of a wing carrier 69 in the form of a shaft, that is split from its inner end to a point near its outer end and the inner end of the split or wing shaft 69 is pro-

vided with a tongue that fits in the recess 67 of the regulating spindle 65. A number of split shafts it will be understood may be provided for each train of gearing, and each split shaft is adapted to receive between its members a wing 70, and according to the dimensions of these wings will the gearing operate to close the shutter after it is opened in a second's time, two seconds or more, in a minute's time, or in two or more minutes. The members at the split end of the shaft 69 are drawn together by a bolt 71 after the introduction of a wing. These wings are arranged in series and the wings of the series are so constructed that they will make a difference of about two seconds each in speed, and the number of seconds in which the wings 70 will permit a shutter to close is by preference plainly marked upon the wings, and these wings are usually placed in sets on brackets 70^a located within the main frame of the machine, as is shown in Fig. 1.

I do not limit myself to the speed limit of the wings 70, since there may be a greater or less difference between them than stated, and the tension of the springs 50 can be changed to meet the difference. It is not necessary to provide a great many wings, but still it is advisable to provide enough to meet requirements.

The outer ends of the split or wing shafts 69 are made to enter spring bearings 72 that are secured to cleats 73 or their equivalents, attached to the inner side faces of the main frame, as is shown in Figs. 1 and 6.

A trip arm 74 is loosely mounted upon the inner end portion of each main spindle 43 of each clock mechanism. The formation of these arms is best shown in Figs. 4 and 5, wherein it will be observed that at the rear edge of an arm 74, an angular projection 75 extends to and engages with the rear face of the spring 34. The object of this projection 75, which is practically a lug, is to keep the arm 74 in a proper position for action as is shown in Figs. 4 and 5, and the trip arm 74 is further provided with a second lug 76 adjacent its lower end and located on its rear edge, and this latter lug 76 engages with the front face of the spring 34. When a shutter is lowered, as is shown in Fig. 5, the foot 35 of the spring 34 belonging to that shutter will engage with the stop 38 carried by the shaft 36 of the shutter, as is illustrated in Fig. 5, and the shutter will remain in its set or open position until the trip arm 74 belonging to that shutter is forced rearward, whereupon the lug 76 will disengage the foot of the spring 34 from the stop lug 38 of the shutter, and the main spring 41 of the shutter will immediately act to close the same over the exposure opening 25 to which it belongs.

A crank arm 77 is secured to the main spindle 43 of the clock work contained in each casing 28, and the horizontal or upper

member of the crank arm 77 passes through the segmental slot 33 in the inner wall of the casing in which the train of clock work is located, and this horizontal member of the crank arm 77 engages with the inner face of the outer side member of the curtain frame 40. Thus in operation when a handle lever 48 is carried to the upper position shown in Fig. 5, the main spindle 43 to which it is attached is rocked in its bearings, and the horizontal member of the crank arm 77 belonging to that spindle will be carried downward and forward, and since it is in engagement with the screen frame 40, it will carry the curtain down to the set or open position illustrated in Fig. 5, and immediately the foot of the spring 34 will engage with the stop lug 38 and hold the shutter set, as has been stated. Prior to this operation the wings 70 are introduced into the split portions of their respective wing shafts 69, so as to regulate the time at which the shutter shall close. The motive power is the spring 50, and this spring having been placed in tension when the handle lever was carried upward commences to act immediately to operate the main spindle 43, and it through the ratchet 46 turns the gear 45, and in this manner motion is communicated to the entire train of gearing, including the gearing of the regulating shaft 65 rotating the fan 70 which regulates the speed. As the gearing operates, the crank 77 is carried upward and at the proper time the horizontal member of the said crank arm will engage with the trip arm 74 and force it rearward and it in its turn will force the spring 34 rearward, releasing the shutter, whereupon the main spring 41 will immediately close the latter.

I desire it to be understood that under some circumstances the wings 70 need not be used, the difference in speed being regulated by the adjustment of the springs 50 connected with the clock mechanism; and that the wings 70 may be made of cardboard, wood, celluloid, thin metal, or like material adapted to the purpose.

Having thus described my invention, I claim as new and desire to secure by Letters Patent,—

1. In a photographic printing machine, an exposure board having openings therein adapted to be covered by a plate holder, a tension-controlled shutter pivotally mounted on said board, and adapted for movement to and from the said opening, a clock work mechanism, a depressing arm in engagement with the shutter adapted when carried downward to set the shutter, the said arm being carried by a shaft of the said clock work mechanism, a locking device for the shutter to hold the same in set position, and a loosely mounted trip arm for the locking device in the path of the depressing arm and operated by the latter when it ascends.

2. In a photographic printing machine, an exposure board having openings therein adapted to be covered by a plate holder, a tension-controlled shutter pivotally mounted on said board, and adapted for movement to and from the said opening, a clock work mechanism, a depressing arm in engagement with the shutter adapted when carried downward to set the shutter, the said arm being in operative connection with the said clock work mechanism, a locking device for the shutter to hold the same in set position, and a trip for the locking device in the path of the depressing arm when the latter ascends, interchangeable regulating fans for the clock mechanism to regulate the time for tripping the lock and freeing the shutter.

3. In a photographic printing machine, a pivoted and spring actuated shutter, a clock work mechanism for setting the shutter, a spindle split from its inner end in direction of its outer end and coupled to a shaft of the clock work mechanism, fans adapted to be introduced between the split portions of the spindle, and means for locking the fans in place on the said spindle.

4. In a photographic printing machine, a pivoted and spring actuated shutter, a clock work mechanism for setting the shutter, a spindle coupled with a shaft of the clock work mechanism, a fan wing, and means for detachably securing the wing to the spindle.

5. In a photographic printing machine, a pivoted and spring actuated shutter, a train of gearing connected with the pivot of the shutter, a member carried by the train of gearing, and a spring having one end secured to the said member and its other end adjustably secured to the fixed support.

6. In a photographic printing machine, a pivoted and spring actuated shutter, a train of gearing connected with the pivot of the shutter, a lever secured between its ends to one shaft of the train of gearing, and a spring having one end secured to one end of the lever and its other end to a fixed support.

7. In a photographic printing machine, a pivoted and spring actuated shutter, a clock work mechanism operatively connected with the pivot of the shutter, a depressing arm for the shutter carried by the clock work mechanism, a member engaging the pivot of the shutter to hold it open, and a trip for the said member, said trip being in the path of and operated by the depressing arm.

8. In a photographic printing machine, a pivoted and spring actuated shutter, a clock work mechanism operatively connected with the pivot of the shutter, a depressing arm for the shutter carried by the clock work mechanism, a stop on the pivot of the shutter, a spring engaging the stop to hold the shutter open, and a trip arm in the path of the depressing arm and operated thereby to disengage the spring from the stop.

9. In a photographic printing machine, the combination with an exposure board having an exposure opening therein, a shaft mounted on the board below the said opening, a shutter secured to the said shaft adapted for movement to and from the opening, a spring normally acting on the shutter to hold the same closed, a clock work mechanism, means for setting the same, a crank arm secured to the said clock work mechanism and being in engagement with the rear portion of the shutter, which arm when the clock work mechanism is set carries the shutter to set position, a stop located on the said shutter shaft, a spring latch arranged for engagement with the said stop when the shutter is set, and a trip arm adapted to have releasing engagement with the said latch, the said trip arm being carried to releasing position by the said crank arm of the clock work mechanism when said arm is at the limit of its upward movement.

10. In a photographic printing machine, the combination with an exposure board having an exposure opening therein, a shaft mounted on the board below the said opening, a shutter secured to the said shaft adapted for movement to and from the opening, a spring normally acting on the shutter to hold the same closed, a clock work mechanism, means for setting the same, a crank arm secured to the said clock work mechanism and in engagement with the rear portion of the shutter, which arm when the clock work mechanism is set carries the shutter to set position, a stop located on the said shutter shaft, a spring latch arranged for engagement with the said stop when the shutter is set, and a trip arm adapted to have releasing engagement with the said latch, the said trip arm being carried to releasing position by the said crank arm of the clock work mechanism when said arm is at the limit of its upward movement, and interchangeable fans adapted to be connected with the clock mechanism whereby to regulate the time when the said crank arm shall engage the said trip arm to release the said shutter.

11. In a photographic printing machine, a spring actuated shaft having a spiral stop at one end, a shutter carried by the shaft, a clock work mechanism operatively connected with the shutter shaft, an angular depressing arm for the shutter carried by the clock work mechanism, a spring having a foot at its free end for engaging the said stop, and a trip arm carried by the clock work mechanism and adapted to be engaged by the depressing arm, the trip arm being provided with spaced lugs for engaging opposing faces of the spring.

12. In a photographic printing machine, a pivoted and spring actuated shutter, a train of gearing for setting the shutter, and a lever rigidly secured upon one shaft of the gearing, and a spring connected with said lever and

adapted to be put under tension thereby, to operate the gearing.

13. In a photographic printing machine, a pivoted and spring pressed shutter, a clock
5 work mechanism, and an arm on a shaft of the said mechanism and having its free end in engagement with the shutter to carry it to setting position.

14. In a photographic printing machine, a
10 pivoted and spring pressed shutter, a clock work mechanism connected with the pivot of the shutter, a depressing arm on a shaft of the said mechanism for engaging the shutter to carry it to setting position, a stop on the

pivot of the shutter, a spring engaging the
stop, and a trip arm loosely mounted on the
shaft of the mechanism carrying the depress-
ing arm and provided with a lug for engaging
the spring to disengage it from the stop, said
trip arm being operated by the depressing
arm. 15 20

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ERNEST NORMAN KERR.

Witnesses:

J. M. CRAMPTON,
P. H. WELLS.