Sept. 14, 1926. 1,599,507

R. ABRAHAMSON

EXPOSURE TIMING DEVICE

Filed Jan. 12, 1922 2 Sheets-Sheet 1

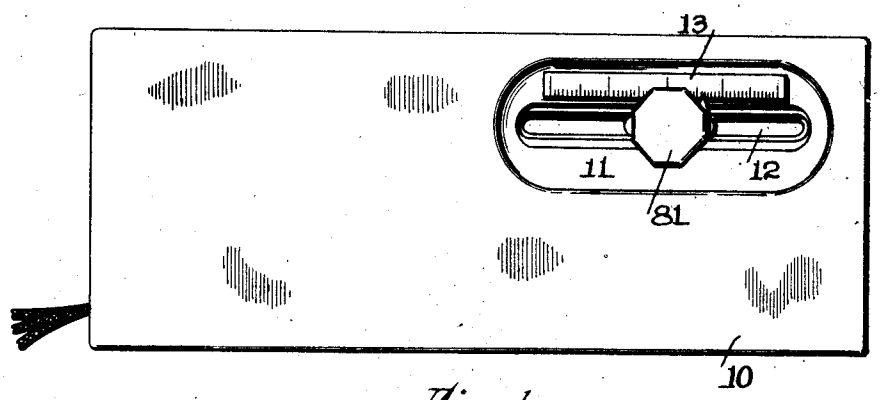


Fig. 1

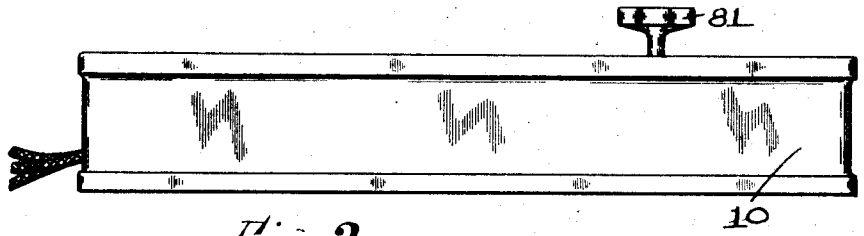


Fig. 2

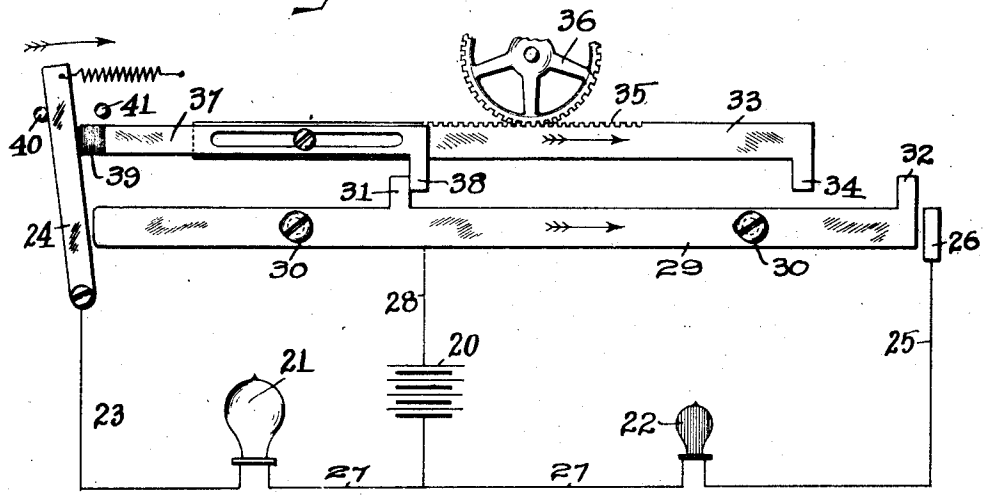


Fig. 3

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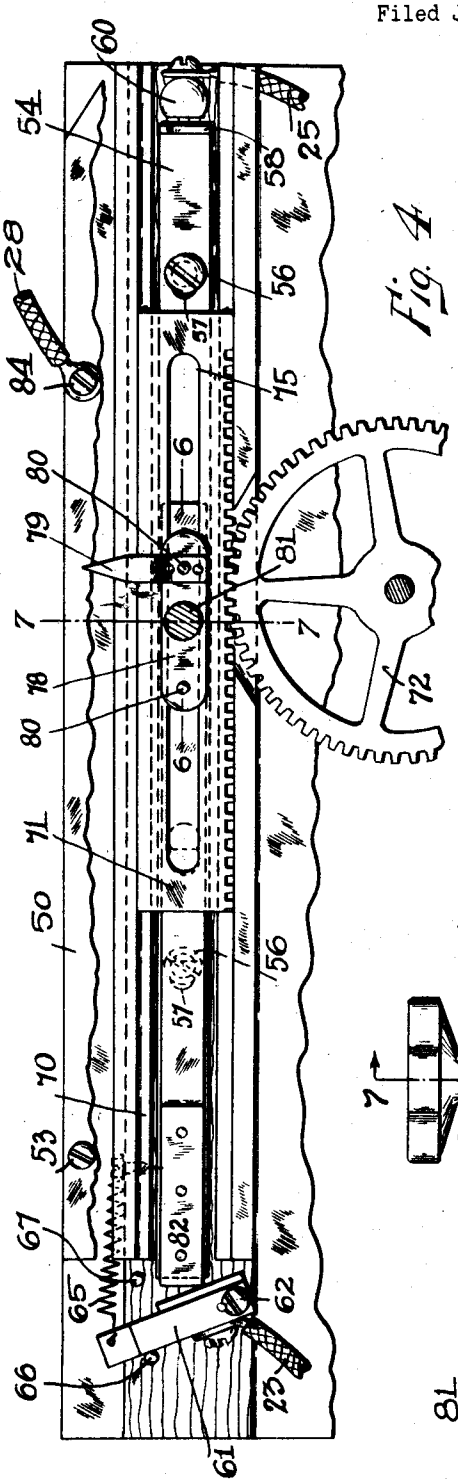


Fig. 4

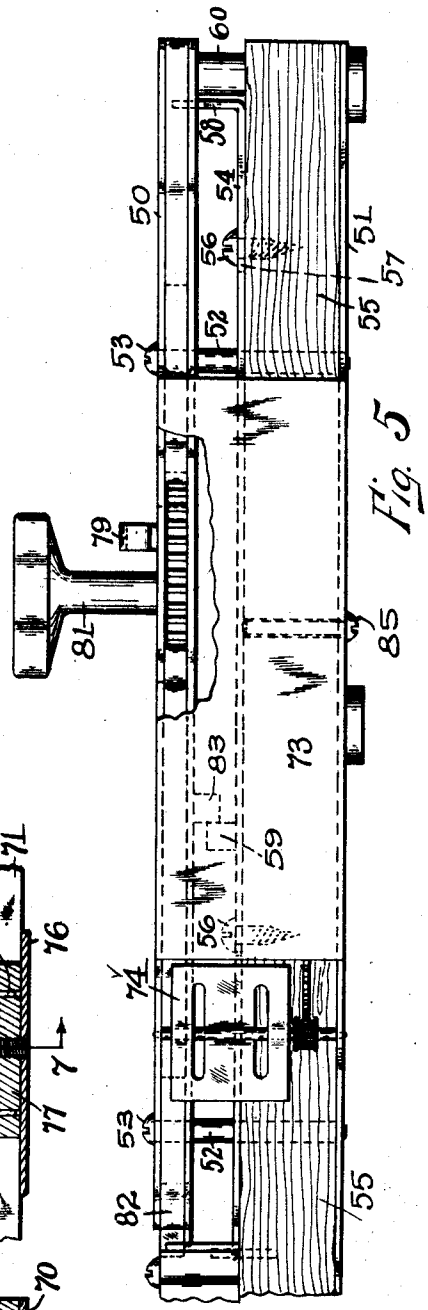


Fig. 5

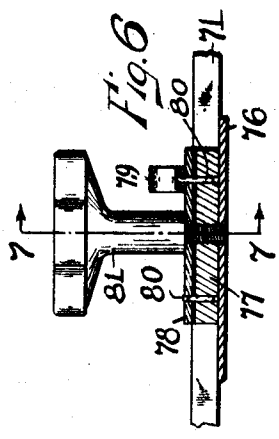


Fig. 6

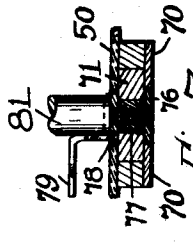


Fig. 7

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Patented Sept. 14, 1926. 1,599,507

UNITED STATES PATENT OFFICE.

ROBERT ABRAHAMSON, OF GARDNER, MASSACHUSETTS.

EXPOSURE-TIMING DEVICE.

Application filed January 12, 1922. Serial No. 528,858.

This invention relates to a device for automatically controlling the time of exposure in a machine for printing photographs or for making blue prints or other similar reproductions.

It is the object of my invention to provide improved mechanism of this type by which an exposure of predetermined and definite length may be secured, together with means by which the predetermined length or time of exposure may be varied as required.

With this general object in view, an important feature of my invention relates to the provision of means by which the machine both closes and opens the light circuit, thus absolutely defining the time of exposure to the printing light. The machine also preferably restores the red or orange light, as the printing light is shut off.

Other features of my invention relate to improved devices for adjusting the time of exposure and to certain arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of my invention is shown in the drawing in which—

Fig. 1 is a plan view of my improved timing device;

Fig. 2 is a side elevation thereof;

Fig. 3 is a diagrammatic view indicating the light circuits and illustrating the method of operation;

Fig. 4 is a plan view of the mechanism with the casing removed;

Fig. 5 is a side elevation of the mechanism;

Fig. 6 is a detail sectional elevation taken along the line 6—6 in Fig. 4, and

Fig. 7 is a transverse sectional elevation taken along the line 7—7 in Figs. 4 and 6.

Referring to the drawings, I have shown my improved timing device as provided with a casing 10 having a depressed portion 11 and a longitudinally extending slot 12. A scale 13 is mounted in the depressed portion 11 adjacent the slot 12 and may be graduated in minutes or desired fractional parts thereof.

The general arrangement and operation of my timing device is illustrated in diagrammatic form in Fig. 3 in which is shown a battery 20, a white or printing light 21, a red or orange light 22, a wire 23 connecting the light 21 to a swinging contact 24, a wire 25 connecting the light 22 to a fixed contact 26, wires 27 connecting the battery or other source of electricity to the lights 21 and 22 and a common return wire 28 connecting the battery to a sliding contact member 29. The member 29 is frictionally held in position by screws 30 and is provided with projections 31 and 32. A bar 33 is mounted to slide adjacent the member 29 and is provided with a projection 34 adapted to engage the projection 32 on the member 29. The bar 33 is provided with rack teeth 35 engaged by a gear 36 which is rotated at constant speed by a motor (not shown) when the device is in operation. A plate 37 is adjustably secured to the sliding bar 33 and is provided at one end with a projection 38 adapted to engage the projection 31 and at the opposite end with a non-conducting portion 39 positioned to engage the swinging contact 24.

The operation of the mechanism is as follows: The plate 37 is adjusted on the bar 33 for the desired length or time of exposure, which time depends upon the relative positions of the projections 34 and 38, assuming a constant motor speed. The bar 33 is then pushed to the left to the position shown in Fig. 3, swinging the contact 24 back against a stop pin 40 and moving the contact member 29 away from the contact 26 but not moving the member 29 far enough to engage the contact 24. Both light circuits are then open.

The bar 33 is then released and the motor mechanism acts through the gear 36 to move the bar 33 at a regulated rate toward the right. This movement first releases the swinging contact 24, permitting the same to engage the member 29 and complete the circuit through the white or printing light 21. This circuit remains closed until the bar 33 has moved far enough to cause the projection 34 to engage the projection 32. The member 29 is then moved to the right, separating it from the swinging contact 24 which is limited in its movement by a second stop pin 41. The printing circuit is thus broken but continued movement of the bar 33 and member 29 to the right will cause engagement with the fixed contact 26, closing the circuit through the dim light 22, which may be used to illuminate the interior of the printing machine while fresh printing paper is being inserted.

Having described the diagrammatic representation and operation of my improved machine, I will now describe one embodiment of my invention as shown in Figs. 4 to 7. The mechanism is mounted on an inner frame comprising upper and lower brass plates 50 and 51 spaced apart by posts 52 and secured by screws 53. The sliding contact member 54 is preferably mounted on a wood block 55 and is secured thereto by screws 56 extending through short slots 57 (Fig. 4) in the member 54. One end of the member 54 is upturned to provide a projection 58, and a stud 59 is secured to the member 54 at an intermediate point thereof.

A fixed contact 60 is secured on one end of the wood block 55 and a swinging contact 61 is pivoted at 62 on said block, these contacts being connected by the wires 23 and 25 to the light circuits as indicated in Fig. 3. A spring 65 is connected to move the contact 61 from the stop pin 66 toward the stop pin 67 whenever such movement is permitted.

Guide-ways 70 (Figs. 4 and 7) are secured to the under side of the plate 50 and a rack bar 71 is mounted to slide in said guide-ways. A gear 72 engages the rack bar and is driven by a spring motor mechanism indicated generally by a reference numeral 73 in Fig. 5. This motor mechanism includes a governor or speed controller 74 geared to the motor and causing the same to move the rack bar at a predetermined uniform rate of travel.

The rack bar is provided with a slot 75 extending substantially the whole length thereof. A plate 76 is mounted beneath the rack bar 71 and is slidably secured in the slot 75 by a guiding block 77 (Fig. 6) extending upward through the slot and a short upper plate 78 covering the slot at its upper side.

An index 79 is secured to the plate 78 and co-operates with the graduated scale 13 shown in Fig. 1. The plate 78 is loosely mounted on pins 80 (Fig. 6) secured in the block 77 and the plates 76 and 78 may be forced together to securely grip the rack bar 75 by means of a clamping screw 81 extending freely through the plate 78 and threaded in the plate 76 and block 77. By loosening this clamping screw the plate 76 may be adjusted relative to the rack bar 75 as desired.

A section 82 (Fig. 4) of insulating material is secured to one end of the plate 76 in position to engage the swinging contact 61 and a stud 83 (Fig. 5) is fixed in the plate 76 in position to engage the stud 59 on the contact member 54.

The common return wire 28 may be secured to any convenient part of the metal of the mechanism, as by a screw 84 (Fig. 4). The electrical connection is completed through the post 52 to the plate 51 and thence through a screw 85 engaging the under side of the sliding contact member 54. The screw 85 is made of such length as to engage the member 54 and bend it slightly upwardly, thus insuring a good contact between the parts and also providing the necessary friction to prevent displacement thereof. The operation of the device has already been fully described in detail.

The time of exposure may be varied by adjusting the plate 76 by means of the clamping screw 81. This varies the distance between the projection 83 on the plate 76 and the end of the rack bar 75 which engages the upturned portion 58 of the contact member 54. The screw 81 also serves as a handle for moving the parts to the left, preliminary to a printing exposure. This movement winds the spring motor an amount equal to the rotation of the motor in returning the rack bar to its normal position.

When the end of the rack bar engages the part 58 and forces it against the fixed contact 60 further movement of the rack bar is prevented and the motor stops. The motor is thus wound sufficiently for each operation thereof by the action of setting the machine for operation and it requires no other attention. It is a matter of great practical importance that the printing circuit is not established until after the handle 81 has been released and the motor has started to move the rack bar along its guide-ways. With this arrangement, the printing period cannot be increased by holding the handle 81 in its left hand position, as both the making and the breaking of the circuit is determined by the movement of the rack bar and the time interval is determined solely by the speed of the motor and the adjustment of the plate 76 relative to the rack bar.

Having thus described my invention, it will be evident that changes and modifications can be made therein by those skilled in the art within the spirit and scope of my invention as set forth in the claims, and I do not wish to be otherwise limited to the details herein disclosed but what I claim is:—

1. An exposure timing device having, in combination, a fixed contact, a movable contact, a contact member movably mounted between said contacts, said member being frictionally positioned, means to cause said member and contacts to be successively engaged, and an actuating device for said means, said means comprising a sliding bar formed in two pieces relatively adjustable longitudinally.

2. An exposure timing device having, in combination, a fixed contact, a movable con-

tact, a contact member movably mounted between said contacts, said member being frictionally positioned, means to cause said member and contacts to be successively engaged, and an actuating device for said means, said means comprising a sliding bar formed in two pieces relatively adjustable longitudinally and the portion engaging the movable contact being a non-conductor of electricity.

3. An exposure timing device having, in combination, a contact member, a support on which said member is movably mounted and frictionally held, a movable contact engaged by said member at one end of its path of travel, timing means engaging said contact member and said movable contact as the device is set for operation, and an actuator to move said timing means to successively disengage the timing means from said contact member and from said movable contact and to thereafter re-engage said timing means with said contact member to separate the same from said movable contact.

4. An exposure timing device having, in combination, a sliding contact member, a support on which said member is frictionally secured for limited longitudinal movement, a fixed contact device at one end of the path of travel of said bar, a movable contact device at the other end of its travel, a timing bar adjustable as to length, said timing bar being positioned to engage said movable contact at one end of its path of travel and to engage said contact member at both ends of its travel, and a speed regulated motor to move said timing bar.

5. An exposure timing device having, in combination, a sliding contact member with separated projections thereon, a movable contact, a slotted bar adapted to engage one projection on said contact member, a plate adjustably secured to said slotted bar and adapted to engage the second projection on said contact member, and means to move said bar and plate to cause successive engagement of said projections and resultant limited movement of said contact member in opposite directions, whereby a circuit through said movable contact and contact member is made and broken.

In testimony whereof I have hereunto affixed my signature.

ROBERT ABRAHAMSON.