

G. W. FERGUSON.
 AUTOMATIC PHOTOGRAPHIC PRINTING MACHINE.
 APPLICATION FILED NOV. 29, 1910.

1,000,247.

Patented Aug. 8, 1911.
 2 SHEETS—SHEET 1.

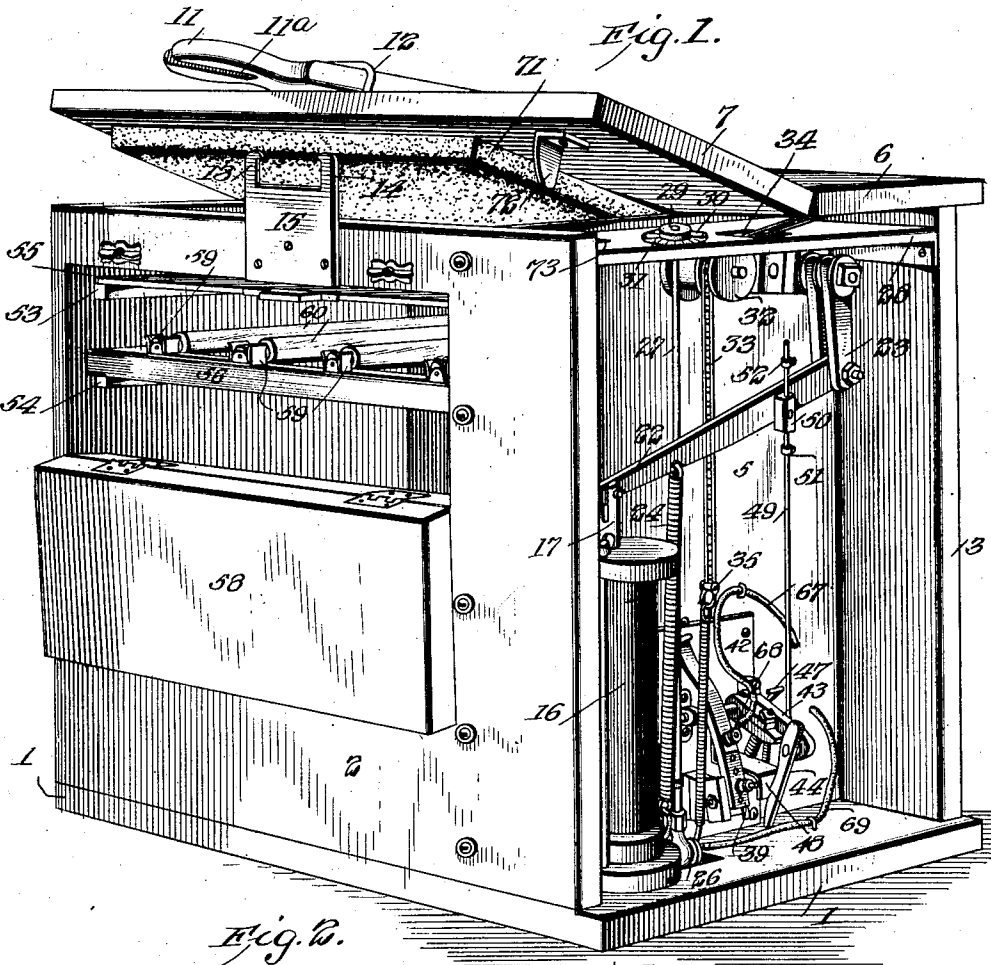
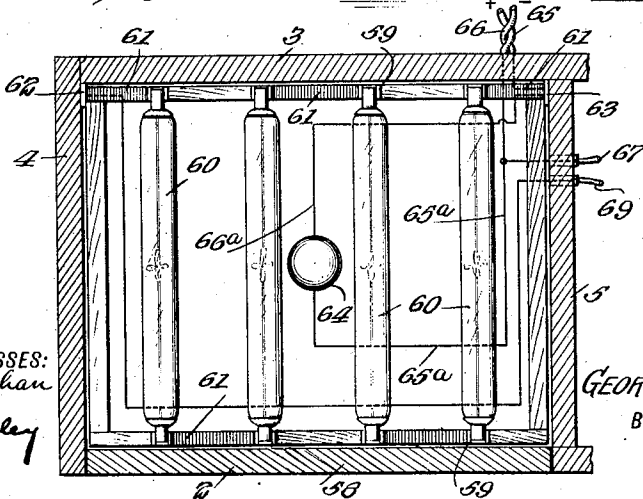


Fig. 2.



WITNESSES:
E. J. Callaghan
L. J. Stanley

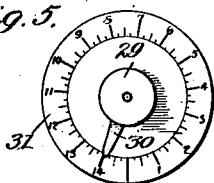
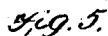
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APPLICATION FILED NOV. 29, 1910.

2 SHEETS--SHEET 2.

Fig. 3.

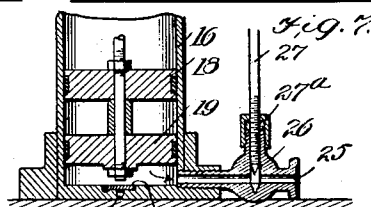
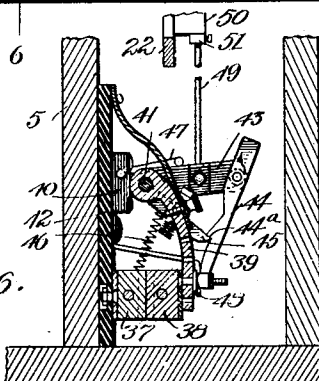
Fig. 4.



WITNESSES:

F. C. Barry Fig. 6.

H. F. Stanley



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UNITED STATES PATENT OFFICE.

GEORGE W. FERGUSON, OF SPRINGFIELD, MISSOURI.

AUTOMATIC PHOTOGRAPHIC-PRINTING MACHINE.

1,000,247.

Specification of Letters Patent.

Patented Aug. 8, 1911.

Application filed November 29, 1910. Serial No. 594,753.

To all whom it may concern:

Be it known that I, GEORGE W. FERGUSON, a citizen of the United States, and a resident of Springfield, in the county of Greene and State of Missouri, have made certain new and useful Improvements in Automatic Photographic-Printing Machines, of which the following is a specification.

My invention relates to improvements in automatic photographic printing machines, and it consists in the combinations, constructions and arrangements herein described and claimed.

An object of my invention is to provide an improved device over that disclosed in my prior Patent # 957,665 of May 10, 1910. In the patent referred to, I disclose means for timing an exposure, the said means including electric light circuits and devices whereby these circuits were cut on or cut off.

The object of the present invention is to provide improved devices for timing the exposure. These improved devices include a novel means for switching on and off the circuits, and also novel means for controlling the same.

A further object of my invention is to provide a removable lamp holder which may be quickly removed from the device so as to replace the lamps in case any of them should become broken, and as quickly replaced, the replacement of the lamp holder serving to again bring the lamps into circuit.

Other objects and advantages will appear in the following specification and the novel features of the device will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming part of this application in which—

Figure 1 is a perspective view showing one embodiment of my invention, the end of the casing being removed for the sake of clearness, Fig. 2 is a section through the casing just above the tier of lamps, Fig. 3 is a view of the device from one end, the end of the casing being removed, Fig. 4 is a section along the line 4—4 of Fig. 3, looking in the direction of the arrows, Fig. 5 is a plan view of the dial for the timing mechanism, Fig. 6 is a section along the line 6—6 of Fig. 3, and Fig. 7 is a detail section showing the needle valve.

In carrying out my invention I provide a main box or casing consisting of the bottom 1, the front and rear sides 2 and 3, respectively, and ends similar to the end 4,

shown in Fig. 2, the end opposite 4 being of the same form as the end 4, and being removed for the sake of clearness in both Figs. 1 and 3. Within the casing is a partition 5 on one side of which a portion of the timing mechanism is secured.

Hinged to the rear side 3 is a cover which consists of a back portion 6 to which is hinged a front portion 7. The purpose of this double cover will be explained later. A lever or a handle 8 is hinged to the back portion 6 of the cover at 9 and is normally kept away therefrom by a spring 10, as shown in Fig. 3. The front portion of the lever 8 is split as shown at 11 to provide spring catches. These spring catches work in a guide loop 12 and are arranged to engage the locking catches 13 and 14 on the plate 15 which is secured to the upper edge of the side 2.

At one end of the casing just outside of the partition 5 is an air cylinder 16 which is provided with a plunger 17. This plunger extends into the casing and is secured to the double pistons 18 and 19. At the bottom of the plunger is an air inlet 20, which is covered by a butterfly valve 21. The upper end of the piston rod is pivotally connected to a lever 22 which is pivoted at one end to swinging arms 23 secured to the partition 5. The lever 22 is held normally in the downward position shown in Fig. 1, by means of a spring 24.

Communicating with the bottom of the cylinder 16 is an outlet passage 25, which is provided with a needle valve 26 at the end of a rod 27. This rod 27 projects upwardly and passes through a partition 28, terminating in a head 29 having a pointer 30. Upon the partition 28 is a dial 31 (see Fig. 5) which is calibrated to indicate the time of exposure. In the present instance the dial is calibrated up to fifteen minutes, but it will be understood that in actual practice a dial calibrated up to any reasonable time might be used. The rod 27 is threaded at 27^a, and it will be apparent that when it is turned the valve 26 will move to cut off or to open up the passage 25.

At the top of the casing is secured a pulley 32 (see Fig. 3) over which a sprocket chain 33 passes through an opening 34 in the partition 28, one end of this sprocket chain being secured to the rear portion 6 of the cover. The other end of the chain bears a head 35 which is arranged to engage the lever 22 when the cover is swung back-

wardly in the position shown in Fig. 3, but which is pulled normally downward in the position shown in Fig. 1 by means of a spring 36 to which it is secured.

5 The switching device, I consider one of the main features of my invention, since it positively makes and breaks the circuit through the lamps and thus the exposure may be gaged with absolute accuracy. Referring now particularly to Figs. 3, 4 and 5, I have shown therein a pair of contacts 37 and 38. The former is mounted upon an insulating plate 42 and the latter is carried upon the end of a swinging arm 39 which is rigidly secured to a rock shaft 41 which is pivotally mounted in brackets 40 secured to the partition 5 (see Figs. 4 and 5). Upon the rock shaft 41 is loosely mounted a swinging arm 43 (see Figs. 4 and 5) and at the end of this swinging arm is pivotally mounted a trigger 44, provided with a shoulder 44^a. This shoulder is arranged to engage the end of an arm 45 rigidly secured to the rock shaft 41. The arm 43 is normally held in a downward position by means of a spring 46 which pulls downwardly on an L-shaped arm 47 pivotally mounted in the bracket 40. A V-shaped stop member 48 is secured to the plate 42 to limit the movement of the contact 38 (see Fig. 4.) Pivotally secured to the swinging arm 43 is a link 49 which passes upwardly through a lug 50 (see Fig. 1) on the lever 22. The link 49 is provided with adjustable collars 51 and 52.

Referring now particularly to Figs. 1 and 2, it will be seen that I have provided upper and lower cleats 53 and 54, respectively. The upper cleats 53 support a plate of glass 55 and the lower cleats support a removable frame 56. In some cases I prefer to have other cleats to support glass plates similar to that shown at 55. These additional plates may be ground glass. The plate 55 and the tray 56 are removable through the opening 57. The latter opening is provided with a hinged closure 58. The tray 56 is provided with a series of holders 59, see Fig. 1, these holders consisting of brass pieces bent upwardly so as to provide spring clips for the sides of the Tungsten lamps 60. The end springs of the holding members 59 are arranged to form contacts that engage the end contacts of the lamps. These lamps are arranged in series by connecting the spring holding members 59 at opposite ends of alternate lamps by means of conducting strips 61. Secured to the end 4 of the casing is a contact 62. A similar contact 63 is secured to the partition 5 and when the frame 56 is in the position shown in Fig. 2, the conducting strips 61 engage the contacts 62 and 63. Below the lamps 60 I place a lamp 64 which is nonactinic, being preferably a ruby lamp. This lamp is connected

with the lead wire 65 by means of the conductor 65^a, see Fig. 2. The wire 66^a leads from the other side of the lamp to the contact 63 on the partition 5. This contact also connects with the lead wire 66. A branch wire 67 leads from the wire 65^a, passes through the partition 5 and connects with the contact 38 at the screw 68. Another wire or conductor 69 is connected to the contact 37, passes through the partition 5 over to the contact 62 on the interior of the end member 4.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. In Fig. 1, I have shown the normal position of the device. Now when it is desired to print from a negative, the handle 11^a is grasped and the cover is swung backwardly into the position shown in Fig. 3. As it is swung backwardly, the chain 33 is pulled through the opening 34 against the tension of the spring 36 and the head 35 engages the lever 22 and pulls it upwardly against the tension of the spring 24. The pistons 18 and 19 are therefore pulled upwardly and air is drawn into the cylinder 16 through the passage 20, the valve 21 lifting to allow the entrance of the air. When the end 22^a of the lever has cleared the spring 70, the latter springs under the lever thus keeping the lever in a raised position. A negative is now placed on the plate 55, the sensitive paper is adjusted and the operator brings the cover downwardly upon the sensitive paper, the rear portion 6 of the cover engaging the paper and holding it in position. The operator now lets loose of the paper. At the same time that the lever 22 is raised, the link 49 pulls upwardly on the arm 43 and causes the trigger 44 to ride over the end of the arm 45. The arm 45 therefore is in a position to close the spring contacts whenever the link 49 is released. The operator now presses together the two parts of the handle 11^a and forces the cover portion 7 downwardly. The latter, it will be noticed is provided with a felt or other resilient pad 71 which engages the paper to hold it in place. It also is provided with a cam member 72 which enters the opening 73, see Fig. 6, and engages the spring 70 camming it out of the way of the lever. The latter is now free to descend and is only held by means of the air in the cylinder 16. The regulation of the time of the descent of the lever is accomplished by means of the needle valve 26 which may be set to allow the air to escape from the cylinder 16 in any given time by means of the dial and pointer 30. The lever now descends thereby permitting the link 49 to descend. The arm 43 is pressed downwardly by means of the spring 46 and arm 47 and therefore the arm 45 through the medium of the trigger 44 is swung down-

wardly thus bringing the contact 38 into engagement with the contact 37. During all this time the red lamp 64 has been lighted but the actinic lamps 60 have not been.

5 Now, however, when the contact 38 engages the contact 37 a circuit is established through the wires 67, contact 38, contact 39, wire 69 through the lamps and back to the lead wire by means of contacts 62 and 63. As the
10 lever continues in its downward movement, the lug 50 comes in contact with the collar 51. This forces the arm 43 downwardly and cams the shoulder 44^a of the trigger off from the arm 45. The spring 39 bearing
15 the contact 38 immediately causes the latter to fly outwardly in the position shown in Figs. 1 and 4 and the circuit through the actinic lamp 60 is broken. Now on releasing the handle the cover may be again swung
20 back and the print may be removed. The mere act of swinging the cover back again sets the lever 22 in position for timing another print.

It will be seen that I have provided a
25 device which positively cuts on and off the current of the actinic lamps. The time at which this is done may be accurately gaged by means of the dial so that all of a number of prints will be printed with the same intensity. It will thus be seen that a large
30 number of prints can be made within a very short time without the danger of some being over-printed and others under-printed. The removable lamp tray permits the ready replacement of any lamp which is broken and the spring holders for the lamp serve as
35 terminals so that it is only necessary to immediately insert a lamp and push the tray into position when the apparatus is again
40 in readiness for exposure.

I am aware that other devices based on the same general principles might be made but I consider as my own all such modifications as fairly fall within the spirit and
45 scope of the invention.

I claim:—

1. In a photographic printing device, a casing provided with contacts, a tray slidably carried by said casing having contacts
50 arranged to be engaged by the contacts on the casing, a series of electric lamps carried by said tray, a hinged cover for said casing, and means for supplying current to said lamps arranged to be operated by said cover
55 when the tray is in its normal position within said casing.

2. In a photographic printing device, a casing provided with contacts, a tray slidably carried by said casing having contacts
60 arranged to be engaged by the contacts on the casing, a series of electric lamps carried by said tray, a hinged cover for said casing, means for supplying current to said lamps

arranged to be operated by said cover when the tray is in its normal position within said casing, said means including an electric switch, and a timing device for positively opening and closing said electric switch.

3. In a photographic printing device, a casing provided with contacts, a tray slidably carried by said casing and having contacts arranged to engage the contacts of the casing, said tray being provided with a series of spring contacts, a series of lamps carried by said spring contacts, the terminals of the lamps being in engagement with said spring contacts, a hinged cover for said casing, and means for supplying current to said lamps arranged to be operated
80 by said cover.

4. In a photographic printing device, a casing, a cover hinged thereto, a partition having an opening, a flexible member secured to said cover and passing through said opening, a spring secured to one end of said flexible member, a cylinder, a piston therein, a lever pivotally secured to said piston at one end and having a pivotal connection with the frame at the other end, and means carried by the flexible connection for
85 operating the lever.

5. In a photographic printing device, a casing, electric lights carried thereby, a hinged cover for said casing, a cylinder within the casing provided with an opening for the escape of air, a piston within said cylinder, a lever pivoted at one end to said cylinder and at the other end to the casing, an electric switch, an adjustable arm connecting said lever with said switch for operating the latter, a flexible connection secured to said cover, and means carried by said flexible connection for engaging the lever when the cover is raised.

6. In a photographic printing device, a cylinder having an opening, means for regulating the size of the opening, a piston within said cylinder, a lever pivotally connected at one end with said piston and at the other end with the casing, an electric switch, an arm connected with said switch and arranged to be engaged by said lever for operating the switch, a flexible member secured to said cover, a spring secured to one end of said flexible connection, means carried by said flexible connection for engaging the lever, a stop member carried by the casing for holding the lever in a locked position, and means carried by the cover for engaging the stop member and releasing
115 the lever.

GEORGE W. FERGUSON.

Witnesses:

L. A. STANLEY,
SOLON C. KEMON.