Jan. 10, 1939. P. C. HAAR 2,143,692

AUTOMATIC PHOTOGRAPHIC PRINTING APPARATUS

Filed Aug. 5, 1935 2 Sheets-Sheet 1

Fig. 1.

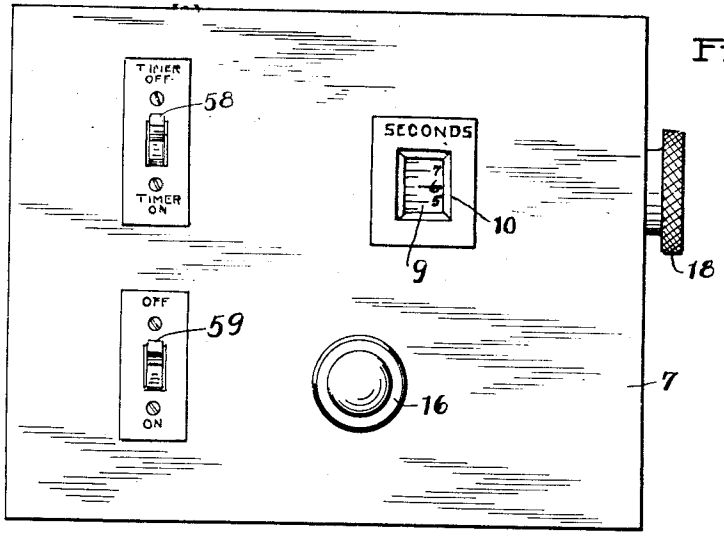


Fig. 2.

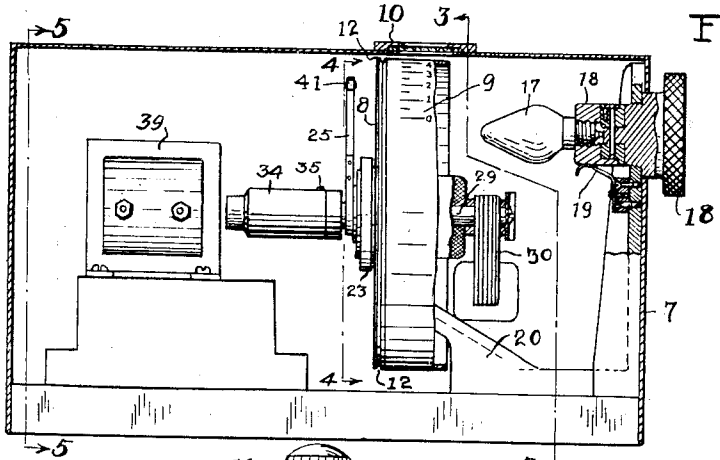


Fig. 4.

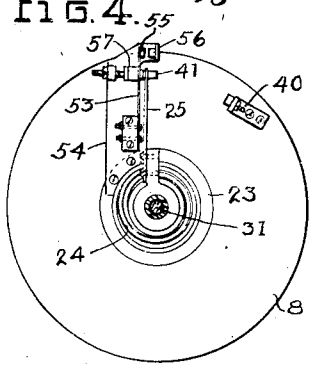
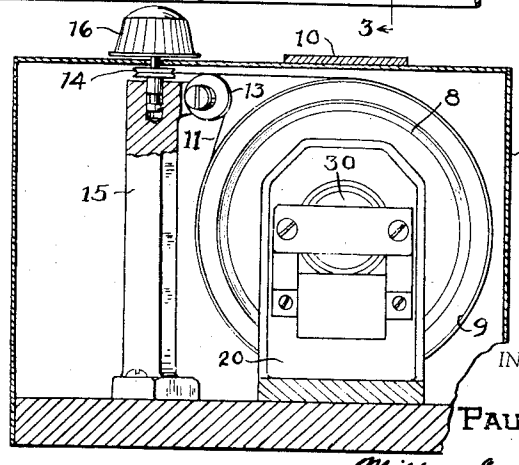


Fig. 3.



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FIG. 5.

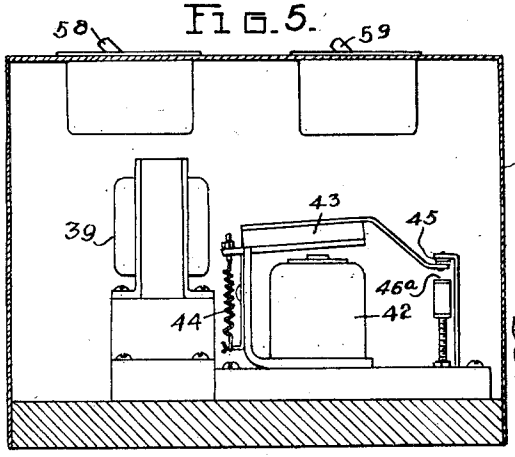


FIG. 6.

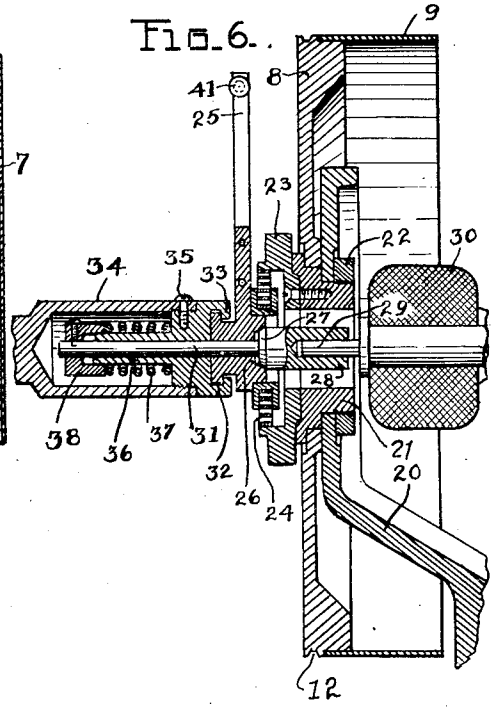
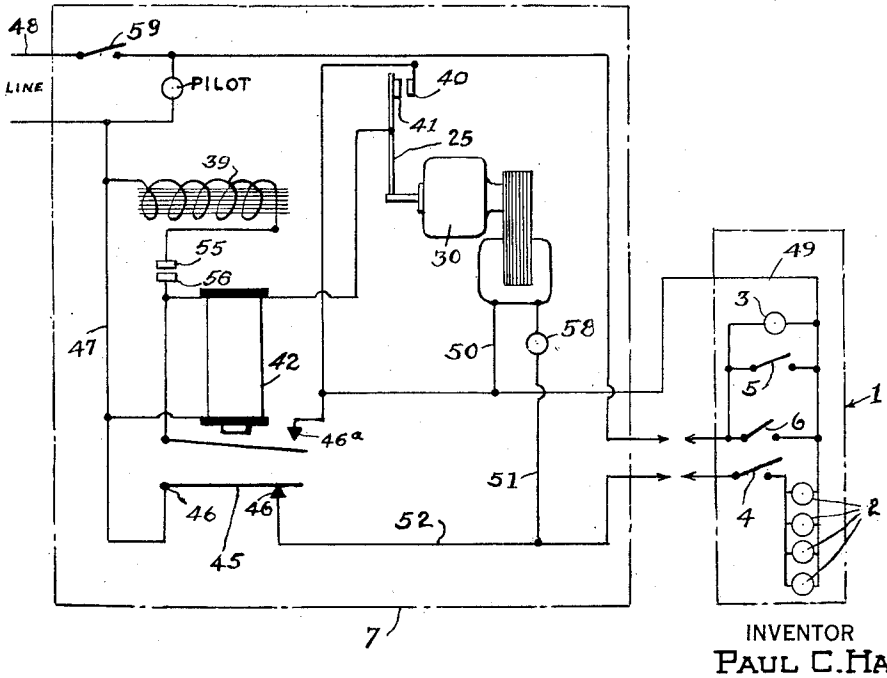


FIG. 7.



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AUTOMATIC PHOTOGRAPHIC PRINTING APPARATUS

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Application August 5, 1935, Serial No. 34,657

10 Claims. (Cl. 161—26)

This invention relates to an improved automatic photographic printing apparatus.

There have been numerous attempts to produce a device of this same general nature but so far as I am aware, they have been of a comparatively complicated nature and hence expensive and also requiring a great deal of attention.

Therefore, the object of the present invention is to devise an apparatus of this nature that is comparatively simple and not unduly costly to manufacture and that is dependable in its operation and is not apt to get out of order.

A further object consists in devising such an apparatus in which the automatic control means may be recognized as a virtually self-contained unit which is peculiarly well adapted for the purpose intended and which can be conveniently combined with the conventional form of printing apparatus having a light control switch opened and closed by operation of the cover of the printing apparatus.

Other objects will appear from the following description and claims when considered together with the accompanying drawings.

Fig. 1 is a top plan view of my improved control apparatus enclosed within a casing;

Fig. 2 is a vertical longitudinal section thereof;

Figs. 3 and 4 are taken on lines 3—3 and 4—4, respectively, of Fig. 2;

Fig. 5 is taken on line 5—5 of Fig. 2;

Fig. 6 is an enlarged detail view of a part of Fig. 2; and

Fig. 7 is an electric diagram of the control system of the automatic timing means in combination with the printing apparatus.

It is to be understood that the present disclosure is merely for purposes of illustration and that various other modifications may be made without departing from the spirit of the present invention as herein set forth and claimed.

The conventional form of printing apparatus is illustrated only schematically and its casing is here indicated by reference numeral 1, the white electric lamps enclosed therein by numeral 2, the red lamp by reference numeral 3, electric switches for the white lamps by reference numerals 4 and 5, and the cover-controlled switch by reference numeral 6. The arrangement of these lamps and switches is the same as in the well-known conventional type of printing apparatus referred to. The switch 6, as will be readily understood by those who are familiar with such apparatus, is automatically closed and opened by the closing and opening of the cover of the printing apparatus. By closing switch 5, the operator can have the benefit of lamps 2 whenever it might be necessary to see, at times when the printing device is idle. That is, switch 5 can replace switch 6 when working upon the frame for instance. As explained, there is no novelty in the printing device itself. In the type of printing device here employed, the resistance of the red lamp is greater than that of the lamps 2. In fact, the resistance of lamp 3 is higher than that of the motor or relay. The electric wiring for the lamps of the printing apparatus is entirely enclosed within the casing 1 except for the connections to electric wiring of the automatic control system now to be described. The wiring connections between the printing apparatus and the control device therefor, may be either permanent or readily connectible and disconnectible. Accordingly, the casing 1 may be formed separately from the casing of the control system or enclosed therein and as part thereof.

The automatic control system is enclosed within the cabinet or casing 7 and comprises a rotatably adjustable drum 8 upon the outer surface of which there is provided a dial 9 representing seconds of time for the exposure to be made. This dial 9 is visible through a window 10 in the casing 7.

The drum 8 is mounted for rotatable adjustment about a horizontal axis, as will be later explained, and can be adjusted by means of an endless belt 11 which engages in the groove 12 in the drum 8. This belt 11 extends about the idle pulley 13 and also the pulley 14 which is mounted in the upright support 15 and which is adapted to be manipulated by the knob 16 connected thereto. The shaft of the knob 16 extends through the wall of the casing 7 so that the knob 16 is accessible from the outside thereof.

The dial 9 may be translucent and may be illuminated by the electric lamp 17 which is removably mounted in the socket 18 which in turn can be readily inserted in an opening in the casing 7 and removably held in such position by the spring finger 19. The opening in the casing 7 is provided with a suitable seat for engagement by the correspondingly formed portion on the socket 18.

The means for supporting the drum 8 and the other parts associated therewith comprises the stationary bracket 20 and the hollow hub 21 which is clamped in the central opening thereof by the nut 22. The hub 21 is formed with suitable shoulders so as to engage the bracket 20 and to afford an annular space for the adjustable

drum 8 which is arranged between the flange of the hub 21 and the bracket 20.

A ring member 23 is screwed to the hub 21 and has anchored thereto the outer end of a spiral clock spring 24, the inner end of which is secured within an annular channel member attached to the radially disposed contact arm 25. The arm 25 is provided wtih a clutch face 26 concentrically of its axis of rotatable mounting, the clutch face 26 being adapted for engagement with the companion clutch face 27 on the hub 28 of the shaft 29 of the electric motor 30 which is also enclosed within the casing 7. The motor 30 is adapted to rotate the arm 25 when the clutch faces 26 and 27 are in engagement.

The arm 25 with its clutch face 26 is adapted for lateral movement along the shaft 31 which is an extension of the hub 28, the shaft 31 extending through the center of the clutch members 26 and 27 and the arm 25. The arm 25 has an outwardly radially extending spaced flange 32 which provides an annular groove about the hub portion of the arm 25, this groove receiving the inwardly extending annular flange 33 on the end of the barrel member 34 which is formed of separable parts so as to permit assembly and disassembly of the parts enclosed therewithin. These parts are screwed together, as indicated in the drawings, and locked together by the screw 35. The inner part of the barrel 34 has a concentrically arranged sleeve 36 surrounding the shaft 31 and adapted for sliding movement therealong for effecting movement of the arm 25. Surrounding the sleeve 36 is a spiral spring 37 which has its one end bearing against the closed end of the barrel 34 and its other end against an abutment 38 fixed upon the end of the shaft 31.

From the above it will be seen that the arm 25 is adapted to be rotated by the motor when the clutch portions are engaged and can be moved out of rotatable engagement by the adjustment of the same along the shaft 31, whereupon the clock spring 24 will return the arm 25 to its original position. Then when the force which moves the arm 25 towards the left (as viewed in the drawings) is discontinued, the spring 37 will cause the arm 25 to move back towards the right into clutched engagement.

The means for moving the barrel 34 and the arm 25 towards the left (as viewed in the drawings), consists of an electro-magnet 39, which has an air gap with respect to the barrel 34 for operation thereof. The magnet is automatically energized after a predetermined period of time for which the drum 8 has been set. The drum 8 has an electric contact 40 which is adapted to be engaged by the companion electric contact 41 on the end of arm 25. The electric circuits are also so arranged that upon engagement of the contacts 40 and 41, the motor 30 will also be stopped automatically, and at the same time the circuit through the lamps 2 of the printing apparatus will be broken through the instrumentality of other electrical means and connections, as will hereinafter be more fully explained.

Forming part of the electric control system, above briefly referred to, there is also a relay 42, the armature 43 of which is normally held in raised position by a spring 44 so as to cause the armature contact arm 45 to bridge the contacts 46. When the relay is energized, the movement of armature 43 will cause the arm 45 to bridge the contacts 46a, thereby changing the circuit for a purpose to be explained.

Referring now especially to the diagram in Fig. 7, and with the parts in the position therein indicated, it will be observed that upon closing the switch 6 by closing the cover of the printing apparatus, as above explained, there will be established a circuit from the main line 48, through switch 6, lamps 2 and also through wire 49 and wire 50 to the motor 30, thence through wire 51, wire 52, contact arm 45 and contacts 46 and out through wire 47 to the main line.

Then, assuming that the drum 8 has been set for the period of exposure desired, the motor will be set into operation at the same time that the lamps are lighted for the exposure, and the motor will rotate the arm 25 which is normally in operative clutch connection therewith. The relay and electro-magnet are at this time both idle, as will be seen from the diagram (Fig. 7), to be further explained.

During the operation just referred to, the contact 40, having been set, remains stationary and the contact 41 alone moves towards contact 40.

It should be here explained that the arm 25, when it is caused by spring 24 to occupy idle position, engages the spring arm 53 which is mounted upon the bracket 54 which in turn is mounted upon the stationary insulation ring member 23. Such engagement of the arm 53 causes the contact 55 carried thereby to be disengaged from the companion contact 56 which is mounted upon the bracket 54. An adjustable abutment 57 on the bracket 54 serves to determine and limit the degree of spacing movement of the contact spring arm 53. As soon as the arm 25 is moved away from such idle position, the contact 55 engages contact 56. The contacts 55—56 are known as the magnet cut-out contacts.

Operation of the motor having been initiated, the magnet cut-out contacts are thereby closed, and the circuit is thus set for operation also through the relay and magnet windings but the circuit being now closed only through lamp 2 and motor 30, that is, through line 47, these windings are not yet energized and the motor alone operates at the initiation of the operation.

But as soon as contact 40 is engaged by contact 41, the current instead of passing from wire 49 through the motor, passes through the closed contacts 40—41, and thence through the relay and magnet which are then energized and become effective. As a result, the armature 45 opens contacts 46 and closes contacts 46a and the lamps 2 are extinguished, the current now passing around only the other side of the printing apparatus through wire 49. In this connection, attention is again called to the matter of resistance of lamps 2 and 3, as stated on page 2 above.

Energization of the magnet causes the clutch to be disengaged and the clock spring 24 then causes the arm 25 to return to initial position. The relay and magnet, once having been energized, remain energized and the armature 45 continues to close contacts 46a and the magnet holds the clutch open, even after the contacts 40—41 are opened, as will be clear from the wiring diagram in Fig. 7. When the arm 25 has been returned to initial position so as to open contacts 55—56, the circuit through the magnet 39 is then broken and the arm 25 is permitted to be moved by spring 37 into initial clutched position. But the circuit through the relay is not yet opened and thus no current will now pass through the motor and lamps, their circuit being now shunted by wire 49 until the switch 6 is opened by raising the cover whereupon the armature is per-

mitted to open the contacts 46a and to close the contacts 46. The motor and lights are then ready to be energized upon again closing the cover switch 6. Successive exposures may be made for the same duration or the dial may be changed between exposures.

Suitable switches are provided in the electric control system, these switches having buttons mounted upon the casing for convenient access. Switch button 58 is for placing the automatic timing control device in connection with the printing apparatus, or for disconnecting the same therefrom, so as to permit the printing apparatus to be employed alone. The switch button 59 is for turning the current off or on in the entire combined system including the printing apparatus and the automatic timing device.

The practical advantages flowing from this invention will be obvious to those who are skilled in the art to which it relates.

What I claim is:

1. In apparatus of the class described, the combination of a photographic printing device of the type having electric light means and a closure-operated switch therefor adapted to be automatically controlled by the application of the closure therefor, an adjustable electric timing device, and operative means of connection between the printing device and timing device whereby the closing of the printing device will initiate operation of the timing device, said operative means of connection including automatically actuated electric means in circuit with the light means of the printing device, for terminating the period of light in the printing device by shunting the current in accordance with the period for which the timing device has been set.

2. In apparatus of the class described, the combination of a photographic printing device of the type having electric light means and a closure-operated switch adapted to be automatically controlled by the application of the closure therefor, an adjustable exclusively electric timing device, and operative means of connection between the printing device and timing device whereby the closing of the printing device will initiate operation of the timing device, said operative means of connection including automatically actuated electric means in circuit with the light means of the printing device, for terminating the period of light in the printing device by shunting the current while the closure is still closed in accordance with the period for which the timing device has been set.

3. In apparatus of the class described, the combination of a photographic printing device of the type having electric light means and a closure-operated switch therefor adapted to be automatically controlled by the application of the closure therefor, and a timing device having an adjustable electric contact and a companion movable electric contact, electric motive means for operating said movable contact, and electric control means having operative means of connection with said motive means and the light means of the printing device whereby said motive means will be started by closing the printing device, and whereby the light means and motor will be de-energized after a predetermined time for which the adjustable contact has been set and prior to removal of the closure.

4. In apparatus of the class described, the combination of a photographic printing device of the type having electric light means and a closure-operated switch therefor adapted to be automatically controlled by the application of the closure therefor, and a timing device having an adjustable electric contact and a companion movable electric contact, electric motive means for operating said movable contact, and electric control means having operative means of connection with said motive means and the light means of the printing device whereby said motive means will be started by closing the printing device, and whereby the light means will be de-energized and the contact means will be rendered inoperative after a predetermined time for which the adjustable contact has been set and prior to removal of the closure.

5. In apparatus of the class described, the combination of a photographic printing device of the type having electric light means and a closure-operated switch therefor adapted to be automatically controlled by the application of the closure therefor, and a timing device having an adjustable electric contact and a companion movable electric contact, electric motive means for operating said movable contact, and electric control means having operative means of connection with said motive means and the light means of the printing device whereby said motive means will be started by closing the printing device, and whereby the light means will be de-energized and the movable contact will be moved out of the path of the adjustable contact after a predetermined time for which the adjustable contact has been set.

6. In apparatus of the class described, the combination of a photographic printing device of the type having electric light means and a closure-operated switch therefor adapted to be automatically controlled by the application of the closure therefor, and a timing device having an adjustable electric contact and a companion movable electric contact, electric motive means for operating said movable contact, means for automatically returning said movable contact to initial position when released from the influence of said motive means, and electric control means having operative means of connection with said motive means and the light means of the printing device whereby said motive means will be started by closing the printing device, and whereby the light means will be de-energized and the contact means will be released from the influence of said motive means after a predetermined time for which the adjustable contact has been set and independently of the position of the closure.

7. In apparatus of the class described, the combination of a photographic printing device of the type having electric light means and a closure-operated switch therefor adapted to be automatically controlled by the application of the closure therefor, and a timing device having an adjustable electric contact and a companion rotatable electric contact, electric motive means for operating said rotatable contact, spring means for automatically returning said rotatable contact to initial position when released from the influence of said motive means, and electric control means having operative means of connection with said motive means and the light means of the printing device whereby said motive means will be started by closing of the printing device, and whereby the light means will be de-energized and the contact means will be released from the influence of said motive means after a predetermined time for which the ad-

justable contact has been set and independently of the position of the closure.

8. In apparatus of the class described, the combination of a photographic printing device of the type having electric light means and a closure-operated switch therefor adapted to be automatically controlled by the application of the closure therefor, and a timing device having an adjustable electric contact and a companion rotatable electric contact, electric motive means for operating said rotatable contact, spring means for automatically returning said rotatable contact to initial position when released from the influence of said motive means, and electric control means having operative means of connection with said motive means and the light means of the printing device whereby said motive means will be started by closing of the printing device, and whereby the light means will be de-energized and the contact means will be released from the influence of said motive means after a predetermined time for which the adjustable contact has been set, said electric control means including a relay for breaking the circuit through the light means and a solenoid for releasing the contact means from the influence of the motive means.

9. In apparatus of the class described, the combination of a photographic printing device of the type having electric light means and a closure-operated switch therefor adapted to be automatically controlled by the application of the closure therefor, and a timing device having an adjustable electric contact and a companion rotatable electric contact, electric motive means for operating said rotatable contact, a clutch connection between said rotatable contact and said motive means, a solenoid for opening said clutch, spring means for automatically returning said rotatable contact to initial position when said clutch connection is released, and a relay for controlling the operation of the motive means, said solenoid and relay being controlled in their energization by said contact means, whereby the light will be extinguished, the motive means will be stopped, the rotatable contact will be released from the motive means and returned to initial position.

10. In apparatus of the class described, the combination of a photographic printing device of the type having electric light means and a closure-operated switch therefor adapted to be automatically controlled by the application of the closure therefor, and a timing device having an adjustable electric contact and a companion rotatable electric contact, electric motive means for operating said rotatable contact, a clutch connection between said rotatable contact and said motive means, a solenoid for opening said clutch by withdrawing said contact, spring means for automatically returning said rotatable contact to initial position when said clutch connection is released, and a relay for controlling the operation of the motive means, said solenoid and relay being controlled in their energization by said contact means, whereby the light will be extinguished, the motive means will be stopped, the rotatable contact will be released from the motive means and returned to initial position, and auxiliary electric contact means for holding the circuit closed through the solenoid so as to hold the rotatable contact in withdrawn position until it has been fully returned to initial position.

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