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PHOTOGRAPHIC PRINTING APPARATUS

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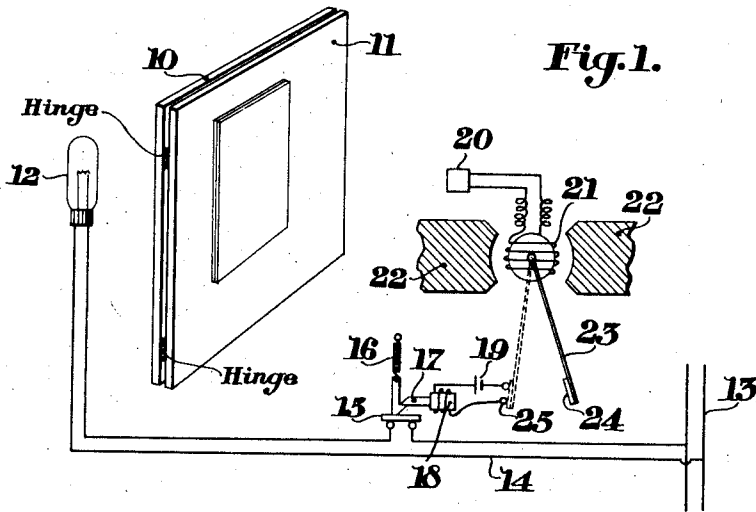
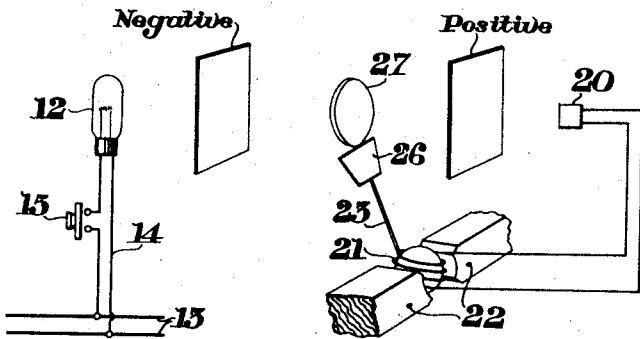


Fig. 2.



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UNITED STATES PATENT OFFICE

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PHOTOGRAPHIC PRINTING APPARATUS

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3 Claims. (Cl. 88—24)

This invention relates to photography and more particularly to apparatus for accurately controlling the printing exposure in accordance with the transparency or density of the negative.

One of the objects of my invention is to provide a device in which the time of exposure of a print is automatically controlled so that uniform results are always obtained. Another object of my invention is to provide apparatus in which a radiation sensitive element responsive to light passing through a negative or a positive and negative in printing position energizes an electro-magnetic coil adapted to move in a magnetic field of constant strength and the time required for the coil to move through a fixed distance governs the exposure time given the negative being printed.

Other objects and advantages of my invention will appear from the following description when read in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

Referring to the drawing Figure 1 illustrates one form which my invention may take in which the radiation sensitive element receives light transmitted through both the negative and the positive. Figure 2 illustrates a modification as adapted to projection printing.

In Figure 1 is represented a preferred form of my printing device including two plates 10 and 11 of glass or other transparent material, one of which plates is movable and serves as a platen to hold the sensitive material such as a sensitized paper for the print and the negative firmly in contact. A lamp 12 for furnishing a printing light is adapted to be connected to a source of supply 13 through circuit 14 and the switch 15. The switch 15 is normally held in open position by the tension of the spring 16 and is adapted to be held in closed position by the armature 17 of the solenoid 18. When the solenoid 18 is energized by the battery 19 as hereinafter described the armature 17 is withdrawn and the switch 15 is opened by the tension of spring 16.

A voltaic element 20 stimulatable by radiation is positioned to receive the rays from the source 12 which pass through the negative and sensitized layer held in printing position by the frames 10 and 11. The output of the element 20 is connected to an electro-magnetic coil 21 adapted to rotate in a magnetic field set up by magnets 22 and the angular rate of rotation of the coil 21 due to the damping action of the magnetic field is proportional to the potential impressed upon it by the element 20. Suitably attached to the coil 21 is a

vane 23 carrying a contact making strip 24 at its end. The strip 24 is adapted to engage with contact 25 in order to energize the solenoid 18 as above described.

The resistance, damping and suspension characteristics of coil 21 are such that the angular rate of rotation of the coil is proportional to the potential difference supplied by the element 20. Hence the time taken for the coil to rotate through a given angle is inversely proportional to the applied potential difference.

To operate my printer the platen is closed to hold the negative and sensitive layer in position and the lamp current turned on with the coil 20 in its initial position as shown in the drawing. The coil then rotates at a rate corresponding to the potential difference generated by the light falling on the sensitive element 20 which of course is determined by the density of the negative being printed. At the end of its rotation the strip 24 on the vane 23 closes the contact 25 to open the printing circuit through the switch 15 as above described.

In Figure 2 my invention is illustrated as applied to a projection printer in which the light passing through the negative is collected by the lens 27 and imaged on the positive as is well known in the art. In this arrangement the printing light is shut off or occluded by a shutter 26 carried by the vane 23 of the electro-magnetic coil 21 actuated to control the time interval as described in connection with Figure 1.

It will be obvious to those skilled in this art that a photoelectric cell or other radiation sensitive element may replace the voltaic element 20 for energizing the coil 21 in accordance with the received radiant energy.

While I have described in detail two ways of practicing my invention to comply with the requirements of the statutes I wish it understood that I do not intend to be limited to the exact arrangements described inasmuch as in view of the disclosure obvious modifications will readily suggest themselves to those familiar with this art without departing from the spirit of my invention or the scope of the claims herein.

What I claim as new and desire to be secured by Letters Patent of the United States is:

1. The combination with a photographic light circuit controlled through a dampened electro-magnetic coil cooperating with a circuit breaker included in said circuit, a radiation sensitive element adapted to receive printing light transmitted through a negative and a sensitized layer in printing position for energizing said electro-magnetic

coil in accordance with the amount of received light and means actuated by said coil for breaking said light circuit when said coil has rotated through a predetermined angle.

- 5 2. In photographic printing apparatus, the combination with a printing light adapted to illuminate a negative and a sensitized layer in printing position, of means for determining the exposure given comprising a voltaic element stimulatable
10 by radiation from the printing light transmitted through said negative and sensitized layer and an electro-magnetic coil adapted upon energization to rotate at an angular speed proportional to the energizing potential and means operable

to discontinue the printing exposure after said coil has moved through a predetermined angle.

3. Photographic printing apparatus of the projection type in which light passing through a negative is imaged on a sensitive layer, a radiation
80 sensitive element positioned to receive light transmitted through said sensitized layer, a shutter adapted upon movement to occlude the light from said sensitized layer and means actuated by said
85 radiation sensitive element for moving said shutter to light occluding position after a time interval proportional to the light received by said radiation sensitive element has elapsed.

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