J. E. THORNTON.

APPARATUS FOR PRODUCING PHOTOGRAPHIC PICTURES.

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1,223,447. Patented Apr. 24, 1917.

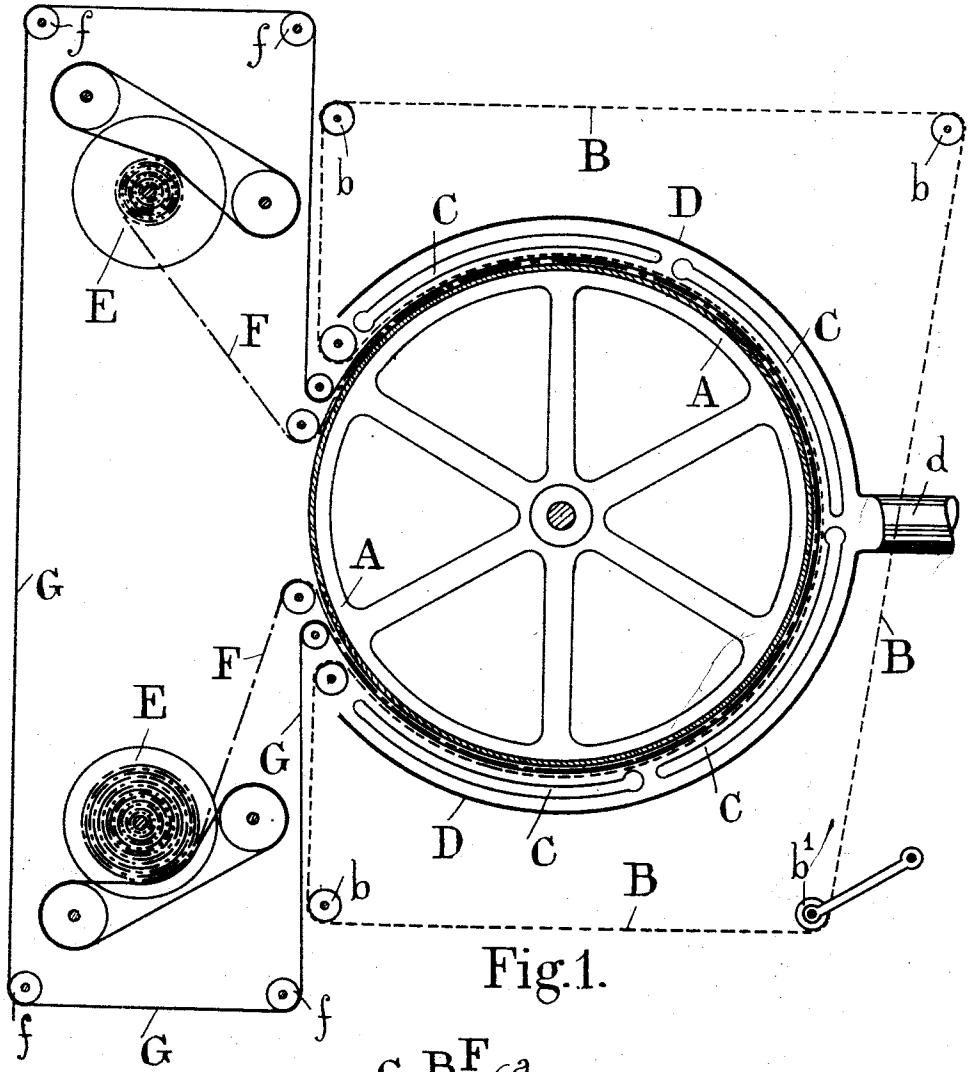


Fig. 1.

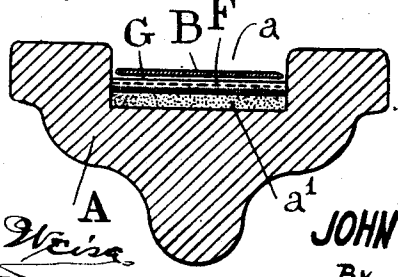


Fig. 2.

WITNESSES.

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APPARATUS FOR PRODUCING PHOTOGRAPHIC PICTURES.

1,223,447. Specification of Letters Patent. Patented Apr. 24, 1917.

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To all whom it may concern:

Be it known that I, JOHN EDWARD THORNTON, a British subject, residing at Rochester, New York, United States of America, have invented certain new and useful Improvements in Apparatus for Producing Photographic Pictures, of which the following is a specification.

The invention relates to apparatus for printing long strips of films such as are employed for cinematograph or motion pictures.

It is designed to provide such a machine as will print a long strip or tape with a series of pictures from a negative at a sufficiently rapid rate to be commercially useful where the sensitive surface is of very slow printing value such as when sensitized without silver salts.

Hitherto these cinematograph pictures have been produced by means of rapid emulsions containing silver salts, one picture at an impression, and none of the machines generally used for such purposes would be commercially useful for material sensitized without silver, as they could never turn out enough to pay, on account of the long exposure necessary for every picture.

Machines for photographic copying or printing have been made with a rotary translucent cylinder, an endless flexible translucent blanket to carry negatives and a ring of incandescent electric lamps both in the interior and around the exterior of the cylinder but such machines are not capable of printing cinematograph films without burning or destroying the celluloid film.

The invention consists essentially of a printing machine constructed with a drum preferably with a peripheral groove to guide the film, an elastic pad around the periphery of the groove on which the print-strip rests, a translucent pressure band encircling the drum and within the groove and lamps of high actinic and low heating power such as mercury vapor lamps placed lengthwise around the periphery producing a continuous narrow streak of light whereby a long length of a sensitized film strip may be exposed in contact with an equal length of negative strip, the two strips moving simultaneously forward under the printing lamps, and being kept in perfect contact and accurate register during the entire period of such contact.

The invention will be fully described with reference to the accompanying drawings.

Figure 1 is a sectional elevation of printing machine. Fig. 2 is a transverse section of printing drum.

The machine is constructed with a narrow drum A. of large diameter (say from 7 to 20 feet in diameter) mounted to rotate in suitable bearings upon a frame (not shown) and driven by an electric or other motor.

The periphery of the drum which may be 3″ to 4″ wide is preferably formed with a groove *a* around the periphery of which is placed a pad or cushion *a′* of any suitable yielding material such as velvet or plush, a pneumatic tube, a rubber strip with or without pegs, or a pad supported by springs.

Around the drum A to enter the groove *a* is passed a band B of transparent material—preferably endless and with opaque edges—such as celluloid, cellulose acetate, gelatin, combination of such, or the like. The band B passes around about three-fourths of the drum's circumference, then leaves it, and is passed back over guide rolls *b*. It is kept in constant tension by a weighted tension roller *b′* or equivalent mechanism. The width of this band is such that it exactly fits in the groove in the drum, and owing to its state of tension, maintains pressure contact with the pad or cushion *a′* at the bottom of the groove.

Around the periphery of the drum A a series of powerful lights C of high actinic power and very low heating power are placed, the lamps I prefer being Cooper-Hewitt mercury vapor tubes, which are placed end to end lengthwise so that the drum A is encircled, for about three-fourths of its circumference, by a streak of light about the same width as the film to be printed.

Outside these again may be placed, if desired, a casing D to inclose the entire apparatus and through the peripherical chamber thus formed may be passed a strong current of cool air, obtained by forcing the air in from a pressure fan, or drawing it through by an exhaust fan through a pipe *d*.

Suitable spools and reels E are provided for the sensitive film F from one of which it is unrolled and on to the other it is rewound when printed.

The negative film G may be mounted in a similar way but I prefer to join the ends

to form an endless band. This is then passed over idle rolls *f* so that it may rotate and repeat continuously while the sensitive strip F moves constantly forward.

The drum A is preferably open in the center as shown with spokes.

In operation, when the machine is started the sensitive strip F and the negative film G are placed face to face and led around the periphery of the drum between the pad or cushion *a'* on the periphery and the transparent pressure band B. The pressure of the band B holding the films F and G tightly against the cushion *a'* maintains them in perfect contact as they are carried forward the sensitive strip being printed by the light passing through the negative, the two films entering and leaving the machine at that point where there are neither lights nor pressure belt.

A machine of this construction, having a drum of ten to 20 feet diameter, will turn out a large quantity of film per hour, without attention.

What I claim as my invention and desire to protect by Letters Patent is:—

1. In an apparatus of the class described, the combination with a rotating member having a peripheral groove, a cushion within the groove for supporting a sensitized film, a negative film encircling the member, and transparent device encircling the negative film, of an elongated source of light partially encircling the device.

2. In an apparatus of the class described, the combination with a rotating member, an endless friction member encircling the rotating member, a guide for a sensitized film encircling the member, a negative film, a transparent device engaging the negative film, and means for preventing lateral movement of film, an elongated source of light partially encircling the device, and means for removing the heat of the light.

3. In an apparatus of the class described, the combination with a rotating member, an endless friction member encircling the member, a guide for a sensitized film encircling the member, a negative film, a transparent device engaging the negative film, and means carried by the drum for preventing lateral movement of film, an elongated source of light partially encircling the device, there being a flue for removing the heat of the light.

4. In an apparatus of the class described, the combination with a rotating member adapted to carry a sensitized strip, a developed photographic strip encircling the member, a pressure band partially encircling the member, and means for imparting tension to the band.

5. In an apparatus of the class described, the combination with a rotating member adapted to carry a sensitized strip, a developed photographic strip encircling the member, a transparent pressure band partially encircling the member, and means for imparting tension to the band.

6. In an apparatus of the class described, the combination with a rotating member adapted to carry a sensitized strip, a developed photographic strip encircling the member, an endless pressure band partially encircling the member, and means for imparting tension to the band.

7. In an apparatus of the class described, the combination with a rotating member adapted to carry a sensitized strip, a developed photographic strip encircling the member, an endless transparent pressure band partially encircling the member, and means for imparting tension to the band.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN EDWARD THORNTON.

Witnesses:

J. OWDEN O'BRIEN,

GEO. H. O'BRIEN.