L. GAUMONT.

APPARATUS FOR DRYING PHOTOGRAPHIC FILMS.

APPLICATION FILED JULY 22, 1915.

1,209,696.

Patented Dec. 26, 1916.

2 SHEETS—SHEET 1.

Fig. 2.

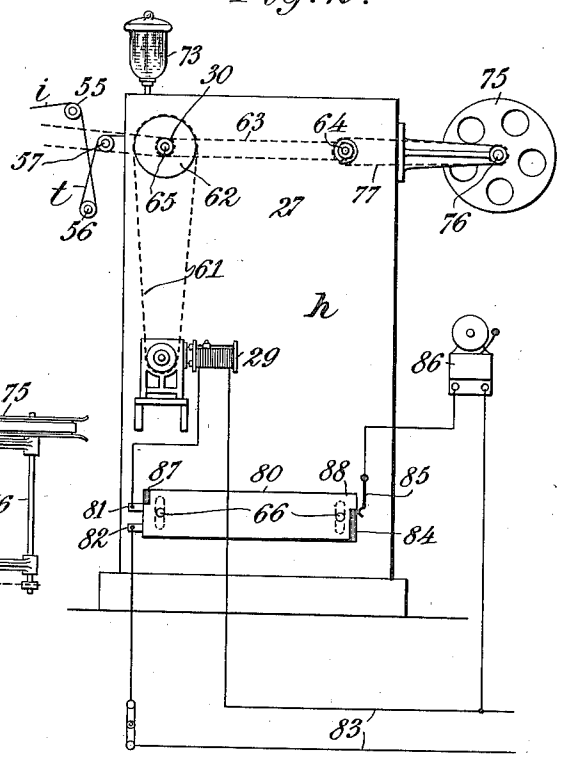


Fig. 1.

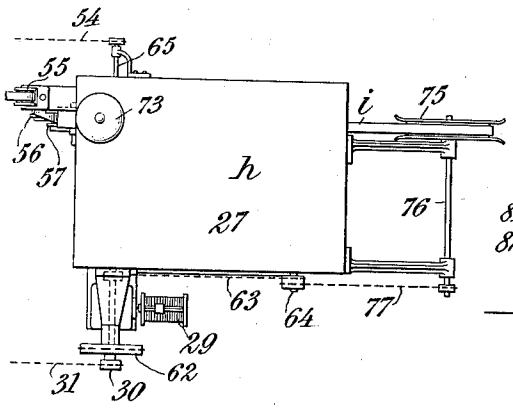


Fig. 5.

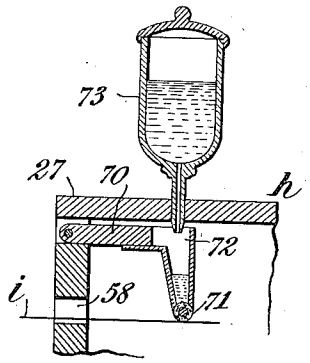
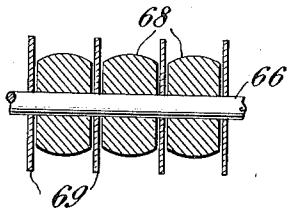


Fig. 6.



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2 SHEETS—SHEET 2.

Fig. 4.

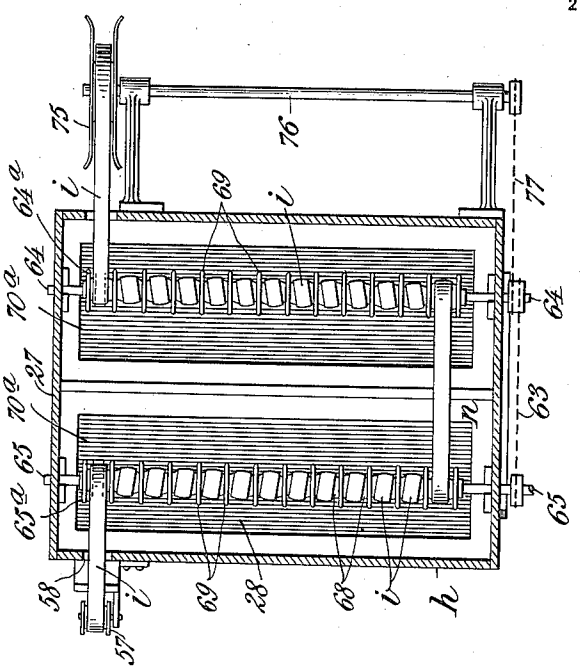
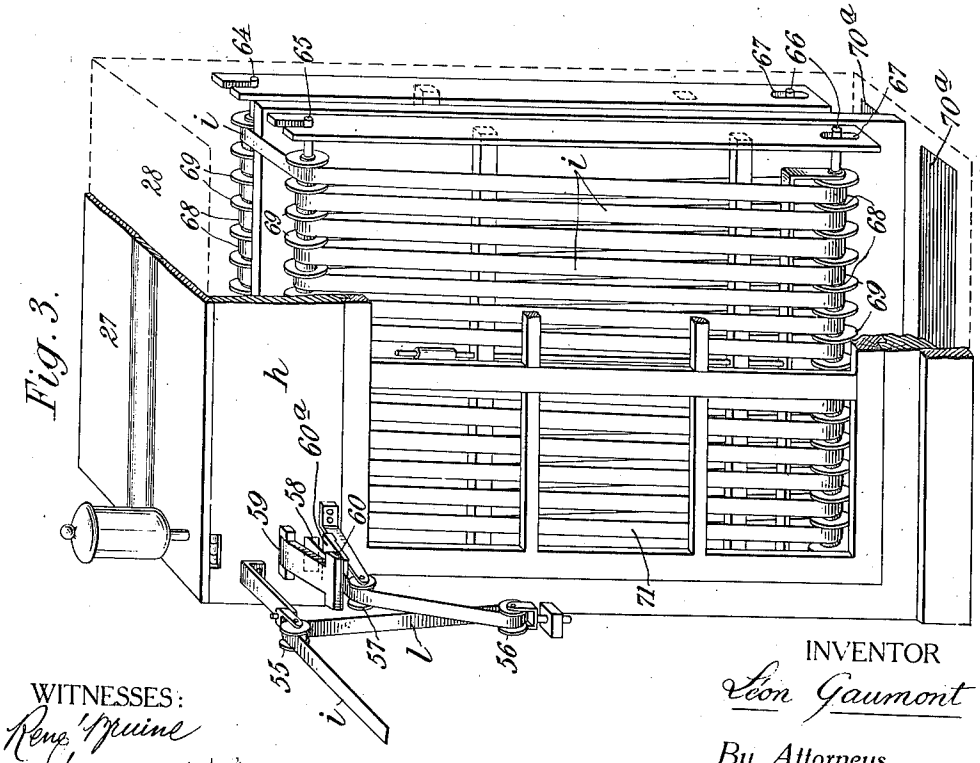


Fig. 3.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR DRYING PHOTOGRAPHIC FILMS.

1,209,696. Specification of Letters Patent. Patented Dec. 26, 1916.

Original application filed February 17, 1909, Serial No. 478,454. Divided and this application filed July 22, 1915. Serial No. 41,371.

To all whom it may concern:

Be it known that I, LÉON GAUMONT, a citizen of the Republic of France, residing in Paris, France, have invented certain new and useful Improvements in Apparatus for Drying Photographic Films, of which the following is a specification.

This invention relates to devices for drying films, more particularly photographic films which are made in the form of elongated strips or bands to adapt them for employment in moving picture machines, and the like, and aims to provide improvements therein.

The present application is a division of United States application, Serial No. 478,454, filed February 17, 1909.

By the present invention is provided a drier which is automatic in operation, and is especially adapted for working in conjunction with other apparatus for working upon or treating the film.

In the invention means are provided for compensating for variations in the length of the film, such as shrinking; means are provided for automatically stopping the operation of the device upon breaking of the film; and provision is made for transporting the film without mutilating or contacting with the prepared surface thereof.

The invention further comprises certain features of construction, combinations and arrangements of parts whereby certain important advantages and conveniences are attained, and the apparatus is rendered simpler, less expensive, and otherwise better adapted and more convenient for use, all as will be hereinafter more fully set forth.

An embodiment of the invention is illustrated in the accompanying drawings.

In said drawings, Figure 1 is a top plan view of the apparatus. Fig. 2 is a side elevation of the apparatus. Fig. 3 is a perspective of the apparatus, with parts broken away and in section to show the interior construction. Fig. 4 is a horizontal sectional view, the section being taken near the top of the apparatus. Figs. 5 and 6 respectively illustrate a detail of the moistening device and a detail of the rollers over which the film passes.

In said drawings, *i* designates the film. The film *i* which may come from an apparatus wherein it has undergone treatment, such as developing, fixing and washing, may first pass over a grooved sheave or guide roller 55 swiveled upon an arm protruding from the casing 27 of the drier *h*, and is then formed into a pendent loop *l* by means of a loosely held spool or roller 56, the opposite end of said loop *l* being passed over a sheave or roller 57 supported upon an arm of the casing 27 immediately in line with an aperture 58, through which the film is passed into engagement with the film-driving and supporting means contained in the chamber 28 in said casing 27, the film being engaged between the roller 57 and the aperture 58 by a rubber or wiper 60 supported by a pivoted arm 59 and serving to remove from the upper surface of the film any excess of fluid which may adhere thereto. A similar wiper 60^a upon the arm which carries the roller 57 has engagement with the under surface of the film for a similar purpose.

Within the chamber 28 is a shaft 65 which extends transversely through the upper part of the chamber and carries a toothed feed roller 65^a to receive and drive the film entering the chamber at the aperture 58. Alongside the feed roller 65^a upon the shaft 65 is a plurality of carrying or supporting rollers in the form of alternately arranged spools and thin metal disks 68 and 69, as shown in Figs. 3, 4 and 6, said spools and disks being capable of free rotary movement, so as to carry the several runs of the film or print with as little friction as possible. These spools or rollers 68 preferably have their surfaces formed spherically so as to accommodate the spiral course of the film without imposing undue strain thereon. The casing 27 of the drier *h* also preferably has its chamber 28 divided by a central vertical partition into two compartments which are in communication at the upper part of the casing, and 64 represents a shaft parallel with the shaft 65, being driven in unison with shaft 65 by suitable gearing, as indicated at 63. The upper surfaces of the rolls 68 are preferably at such a height that the film passes over the upper edge of the partition. At the lower parts of the compartments are shafts 66, parallel with shafts 64

and 65, and having their ends engaged in vertical slots 67, 67 suitably formed in the casing, which slots permit a certain extent of vertical movement of said shafts 66.

The shafts 64 and 66 are provided with film-carrying rollers or sheaves, which are herein shown as formed of spools 68 and disks 69 similarly to the corresponding parts upon the shaft 65, and the film after passage over the driving roller 65^a is threaded back and forth between and around the carrying sheaves or rollers upon the upper and lower shafts 65 and 66 until it arrives at the side of the casing 27 opposite to the aperture 58, where said film is carried rearwardly in the upper part of the casing, as shown at *n* in Fig. 4, over the carrying spool or roller at the adjacent end of the shaft 64, being carried thence back and forth in the rear compartment of the drier between and around the film-carrying sheaves or spools upon the rear shafts 64 and 65, as shown in Fig. 4, until upon arriving at the side of the casing 27, at which the driving roller 65^a is located, it is passed around a similar toothed driving roller 64^a upon the shaft 64, being thence passed out through an aperture at the rear part of the casing 27, as shown in Figs. 1 and 4, and wound upon a reel 75 mounted under spring tension upon a shaft 76. The shaft 76 has a driving connection 77 with shaft 64, whereby the reel may be actuated for winding the dry film thereon.

At the bottom of the casing 27 apertures 70^a are provided, through which a current of suitably dried and warmed air may be introduced, and passed through the compartments of the casing for drying the films therein. The front of the casing preferably has a closed door 71 through which the conditions of the films and carrying means may be observed from time to time, and this door may be opened to afford access to the casing.

Within the upper part of the chamber 28 the film is adapted to contact with a moistening device comprising a pivoted arm 70 (Fig. 5), one end of which has a pendent carrier 72, the lower end of which has a sponge or other fibrous wiper 71 adapted for light contact upon the gelatin or prepared surface of the film or print for moistening the same with a liquid adapted to prevent cracking of such surface during drying of the film. Such liquid is supplied in a regulated manner from a cup or receptacle 73 above the casing *h*.

In passing over the rollers 55, 56 and 57, and over the various rollers 68 upon the shafts 64, 65, and 66, the prepared or gelatin surface of the film is outermost, thereby not coming in contact with the rollers, and not thereby liable to be mutilated.

The shaft 65 (and the shafts entrained therewith) are preferably driven by an electric motor 29 mounted upon or adjacent the drier. The motor is herein shown as operatively connected with a sprocket wheel 30 upon the shaft 65.

In assembling the parts for use, the film is threaded through the supporting means within the drier under sufficient tension to uphold the vertically movable lower shafts 66, 66 at levels above the lower ends of the slots 67, 67, and at one side of the casing 27 said shafts are projected through vertical slotted apertures in the casing 27, as shown in dotted lines in Fig. 2, the protruding ends of such shafts 66 carrying a metallic controlling plate or member 80, one end of which is adapted when the shafts are retained in elevated position by the action of the film or band *i*, as above-described, for contact with the spaced brushes or contact members 81 and 82 inserted in a supply conductor 83 for the motor 29 in such manner as to establish electrical communication between said spaced brushes and permit the motor 29 to be operated for continuously driving the film through the apparatus.

The opposite end of the contact member 80 has an insulating block or plate 84 which, when the shafts 66 are held in elevated position by the tension of the film is maintained in contact with a contact brush or member 85 which forms one terminal of a normally open alarm or signal circuit 88, which includes a bell or other alarm or signal device 86, and has its opposite terminal connected with the other supply conductor 89 for the motor 29. By this construction it will be seen that in case the film should break, during its course through the apparatus, the shafts 66, 66 being released from the tension exerted by such film or print, will be permitted to fall, carrying with them the contact member 80, the downward movement of which will operate to withdraw the contact brush 85 from engagement with the insulating block 84 into electrical communication with the end of said member 80, whereby the signal or alarm circuit 88 is closed through said member 80 to supply conductor 83, and the bell 86 or equivalent alarm or signal device is actuated to give warning to the attendant so that the broken film or print may be removed from the apparatus.

During the downward movement of the member 80, an insulating block or piece 87 is inserted in contact with the brush 81 in the supply conductor 83 of motor 29, whereby it will be seen that as soon as the film or print is broken and said member 80 falls, the electric circuit through the motor 29 is interrupted so as to prevent further feeding of the film or print through the apparatus until such time as the necessary repairs shall have been attended to by the attendant. It will be evident that this alarm or signal mechanism is capable of considerable modi-

fication, and may be dispensed with altogether, if desired. Where the film or print is fed from an electric motor, however, the arrangement herein shown is capable of convenient and effective use.

In the use of the improved apparatus, a flexible tape or strip of cloth or the like will first be threaded through the apparatus along the course to be followed by the film or print being treated, and one end of such film or print being connected to the end of said tape or strip, the motor 29 will be set in operation so as to continuously drive the film or print through the drier (and other apparatus when joined) at such a speed as will dry said film or print, it being understood that by varying the speed at which the said film is driven, many variations may be attained in the finished product without requiring any intermediate handling or any particular attention upon the part of the operator.

During the use of the apparatus the prints or films are joined or connected end to end for passage through the apparatus so as to permit the same to be driven in a substantially continuous manner, and if it is desired to terminate the use of the apparatus for any reason, as for example, at the end of the work-day, a cloth strip or tape will be attached to the end of the last film or print to be treated so that as soon as the latter shall have passed through the apparatus, the motor may be stopped, leaving said cloth strip or tape in position for drawing the films or prints through the apparatus when the same is again placed in operation.

The employment of the driving rollers 65^a and 64^a arranged for driving engagement with the prints or films serves to distribute the force necessary for feeding the same through the apparatus at such intervals along the length of the film or print as will usually effectively avoid breakage or damage thereof, and the arrangement of the several driving and carrying wheels or sheaves is such that the gelatin surfaces of the films or prints are exposed, during their passage around and over the said wheels or sheaves, at the outer surfaces of the films or prints and are thereby prevented from such contact with the operative parts as might injure or destroy the photographic impressions.

The loops *l* produced at intervals in the length of the film or print during its passage through the apparatus, afford sufficient slack of the film or print at points conveniently situated with relation to the driving devices as will compensate for any ordinary irregularities in the speed imparted by the several driving devices and thereby avoid such tension upon the film or print as might tend to rupture it. The said loops may advantageously be crossed or skewed as indicated at *l* in Figs. 1 and 3, to permit the loose roller or weight 56 to run in contact with the back surface of the film or print opposite to the gelatin surface so as to avoid the liability of damage to the photographic images from contact of the roller or weight upon such gelatin surface.

Modifications may be made in the construction illustrated and described without departing from the spirit of the invention.

What I claim is:—

1. A drying device for photographic films or prints comprising means for passing the photographic film or print through said drying device, and means within the drier to supply moisture to the film passing therethrough.

2. A drying device for photographic films or prints comprising means for passing the photographic film or print through said drying device, and means within the drier to supply moisture to the prepared face of the film passing therethrough.

3. A drying device for photographic films or prints comprising means for passing the photographic film or print through said drying device, and means to supply moisture to the prepared face of the film passing therethrough.

4. A drying device for photographic films or prints comprising means for passing a film or print through the drying device, and means within the drier movable relatively to the film or print to be dried to supply moisture thereto.

5. An apparatus of the character described, including a drying device, means for passing photographic prints or films therethrough, and means within the drier to supply moisture to the prints or films passing therethrough.

6. An apparatus of the character described, including a drying device, means for passing photographic prints or films therethrough, and means within the drying device to supply moisture to the films or prints passing therethrough; and a source of liquid supply for the moisture-supplying means exterior of the drying device.

7. An apparatus of the character described, including a drying device, means for passing photographic prints or films therethrough, means within the drying device to supply moisture to the films or prints passing therethrough, and regulable means for supplying liquid to the moisture-supplying means.

8. An apparatus of the character described, including a drying device, means for passing photographic films or prints therethrough, a carrier adapted to contact by gravity with the films or prints and adapted to discharge moisture thereon, and means for supplying liquid to the carrier.

9. A drying device for photographic films or prints, comprising means for wip-

ing a film, means for moistening the film, and means for passing the film through the drier.

10. A drying device for photographic films or prints, comprising means for passing the film or print through the drier, driving means, and means operated by the breaking of the film for automatically interrupting the action of said driving means.

11. A drying device for photographic films or prints, comprising means for passing the film or print through the drier, driving means, and means operated by the breaking of the film for automatically interrupting the action of said driving means, said means for passing the film through the drier comprising a shaft supported by loops in the film, and said means for interrupting the action of the driving means being actuated by said shaft.

12. A drying device for photographic films or prints, comprising means for passing the film or print through the drier in the form of a plurality of loops, said means comprising upper and lower shafts, said lower shaft being supported by the loops in the film.

13. A drying device for photographic films or prints, comprising means for passing the film or print through the drying device, said means comprising rollers having spherical contours.

14. A drying device for photographic films or prints, comprising a chamber having a partition therein, and means for passing the film through the drying device on both sides of said partition, said chamber having openings for the discharge of a current of drying air on each side of said partition.

15. A drying device for photographic films or prints having driving perforations therein, comprising means for passing the film or print through the drying device, said means comprising toothed rollers for engaging perforations in and driving the film.

16. A drying device for photographic films or prints, comprising means in the drier for carrying forward the film or print, and means for supporting said film in a loop between said means and the point where the film is initially fed to the drying device.

17. A drying device for photographic films or prints, comprising means in the drier for carrying forward the film or print and means for supporting said film in a loop between said means and the point where the film is initially fed to the drying device, said means for supporting the film in the loop comprising a freely moving weighting roll.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

LÉON GAUMONT.

Witnesses:
CHAS. P. PRESSLY,
GABRIEL BELLIARD.