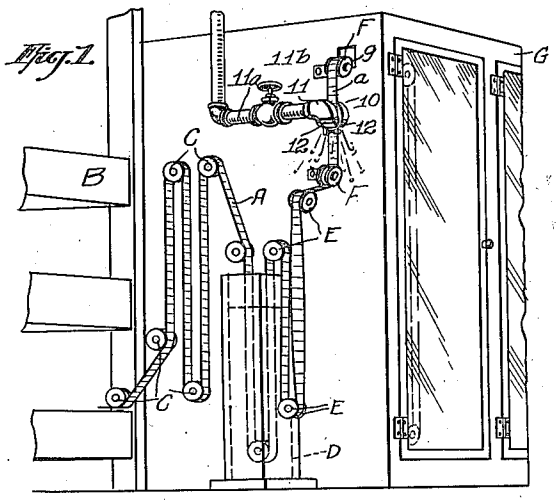
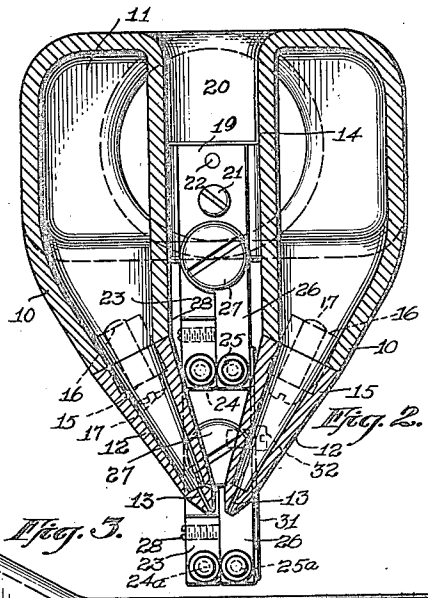
R. C. HUBBARD.

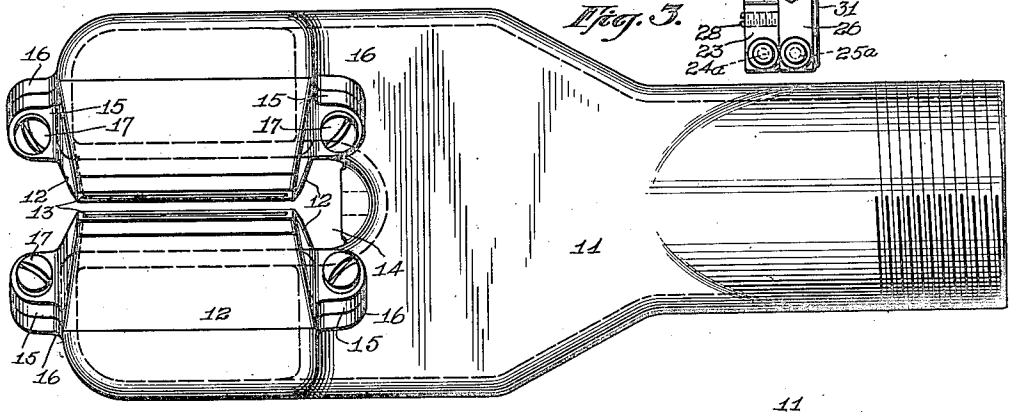
FILM DRYING NOZZLE.

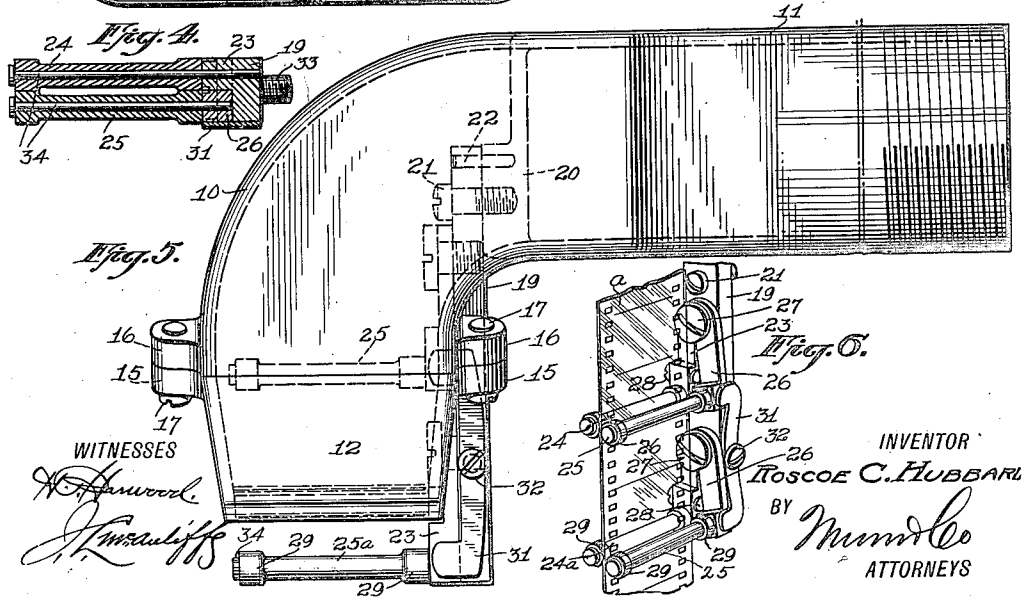
APPLICATION FILED FEB. 9, 1921.

1,407,543. Patented Feb. 21, 1922.









WITNESSES

INVENTOR

ROSCOE C. HUBBARD

BY Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

ROSCOE CONKLING HUBBARD, OF NEW YORK, N. Y.

FILM-DRYING NOZZLE.

1,407,543. Specification of Letters Patent. Patented Feb. 21, 1922.

Application filed February 9, 1921. Serial No. 443,656.

To all whom it may concern:

Be it known that I, ROSCOE C. HUBBARD, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Film-Drying Nozzle, of which the following is a description.

My invention relates to the drying of motion picture films and has for its general object to provide nozzles adapted to deliver jets of air against the film to dislodge water therefrom, the device being more particularly intended for blowing the water from the film immediately before entering the dryer to complete the drying operation.

More specifically, the invention has for its object to provide for subjecting the film to an equal pressure at opposite sides of the film and to provide means for insuring the guiding of the film past the air nozzles without rubbing.

Reference is to be had to the accompanying drawings forming a part of this specification, it being understood that the drawings are merely illustrative of one example of the invention.

Figure 1 is a perspective view of a film-drying apparatus having my improved nozzles disposed adjacent thereto;

Figure 2 is an enlarged transverse vertical section of the nozzles;

Figure 3 is an inverted plan view of the nozzles;

Figure 4 is a section taken longitudinally through a pair of the guiding rollers;

Figure 5 is a side elevation of the nozzles;

Figure 6 is a perspective view of the guiding means.

In carrying out my invention in practice, I provide integral air nozzles 10 communicating in common with the body 11 of the nozzles adapted to connect with any source of supply of air under pressure, there being shown a pipe 11^a connected to said body and having a valve 11^b. In the illustrated form the nozzles are arranged in connection with tanks B conventionally shown and in practice, these may be taken as developing, washing, fixing tanks, etc. From the final tank the film A passes over a suitable arrangement of guide rollers C through a washing tank D and from said tank the film A passes over additional rollers E to upper and lower guide rollers F, F', and is led through an opening *g*, into a dryer G which may be of any approved form.

The nozzles 10 afford a broad passageway 14 therebetween for the vertical moving film portion *a*, said passageway narrowing adjacent to the discharge ends of the convergent tips 12 of the nozzles 10. The tips 12 of the nozzles are convergent and have elongated slots 13 through which the air may escape at opposite sides of the film. For convenience in the manufacture and assemblage of the nozzle parts, the tips 12 advantageously are cast separate, said tips having flange lugs 15 corresponding with the similar lugs 16 on the fixed portion of each nozzle 10, the connection being completed by bolts or screws 17 passing through said flanges. The air is discharged from the convergent nozzles 10 at the slots 13 in the opposite direction from the travel of the film and obliquely against the film portion *a* at opposite sides thereof. The air jets serve to blow most of the moisture from the film leaving very little moisture on the film when it enters the dryer G.

I provide guide rollers for the film above and below the discharge ends of the nozzles 10, the arrangement being a follows: A hanger 19 is secured at its upper end to a member 20 at the juncture of the pair of nozzles 10 with the body 11 of the nozzle, a screw 21 and pin 22 being employed for the purpose in the illustrated example. On the hanger 19 I provide a pair of guide rollers 24, 25 in the passageway 14 above the discharge ends of the nozzles 10 and a similar pair of rollers 24^a, 25^a on said hanger below said convergent ends of the nozzles. The rollers are usually in practice of hard rubber and turn on spindles 34. The spindles 34 of rollers 24 are shown as projecting from fixed blocks 23 secured by their threaded ends 33 to the hanger 19, while the spindle 34 of the companion roller 25 or 25^a of each pair is each secured to a pivoted arm 26 by a screw 27 to said hanger 19. Adjusting screws 28 in the blocks 23 bear against the arms 26 carrying the rollers 25, 25^a and serve to adjust said rollers relatively to the rollers 24, 24^a to afford the proper gripping and guiding action for the film. The said rollers at their ends are made of increased diameter as at 29 so that the film is engaged only adjacent to its perforated edges. The rollers 25, 25^a are pressed in the direction of the rollers 24, 24^a by a spring

31 secured between its ends to hanger 19 by a screw 32, the arms of the spring bearing respectively against the sides of the arms 26, the screws 28 acting as stops to limit the movement of the rollers 25, 25ª toward the rollers 24, 24ª. As the nozzles are disposed between the upper and lower guide rollers the film will be caused to pass straight between the nozzles without rubbing and while the film is completely exposed to the action of the blasts of air issuing against the opposite sides of the film. Both nozzles are in communication equally with the body 11 of the nozzle and the pressure is therefore equal within the nozzles. The two air blasts at opposite sides prevent bending of the film under the air pressure and also the bending tendency is minimized by the oblique angle at which the currents of air strike the film, said angle also making for the effective blowing of the water from the film.

I would state in conclusion that while the illustrated example constitutes a practical embodiment of my invention, I do not limit myself strictly to the mechanical details herein illustrated, since manifestly the same can be considerably varied without departure from the spirit of the invention as defined in the appended claims.

Having thus described my invention, I claim:—

1. A nozzle of the class described, having a pair of guide rollers adjacent to said nozzle, one of said rollers being adjustable toward or from the other, spring means exerting its force on the adjustable roller in a direction toward the other roller, and adjusting means to oppose said spring for positioning the adjustable roller.

2. A device of the class described, including a pair of air nozzles affording a passageway for a film therebetween, film-guiding rollers in fixed positions respectively in front of and in the rear of said nozzles, rollers adjustably mounted adjacent to the first-mentioned rollers, a spring having arms engaging respectively the adjustable rollers tending to move the same toward the fixed rollers, and adjusting means adapted to move the adjustable rollers in opposition to the said spring.

ROSCOE CONKLING HUBBARD.