

Nov. 6, 1923.

G. L. CHANIER ET AL

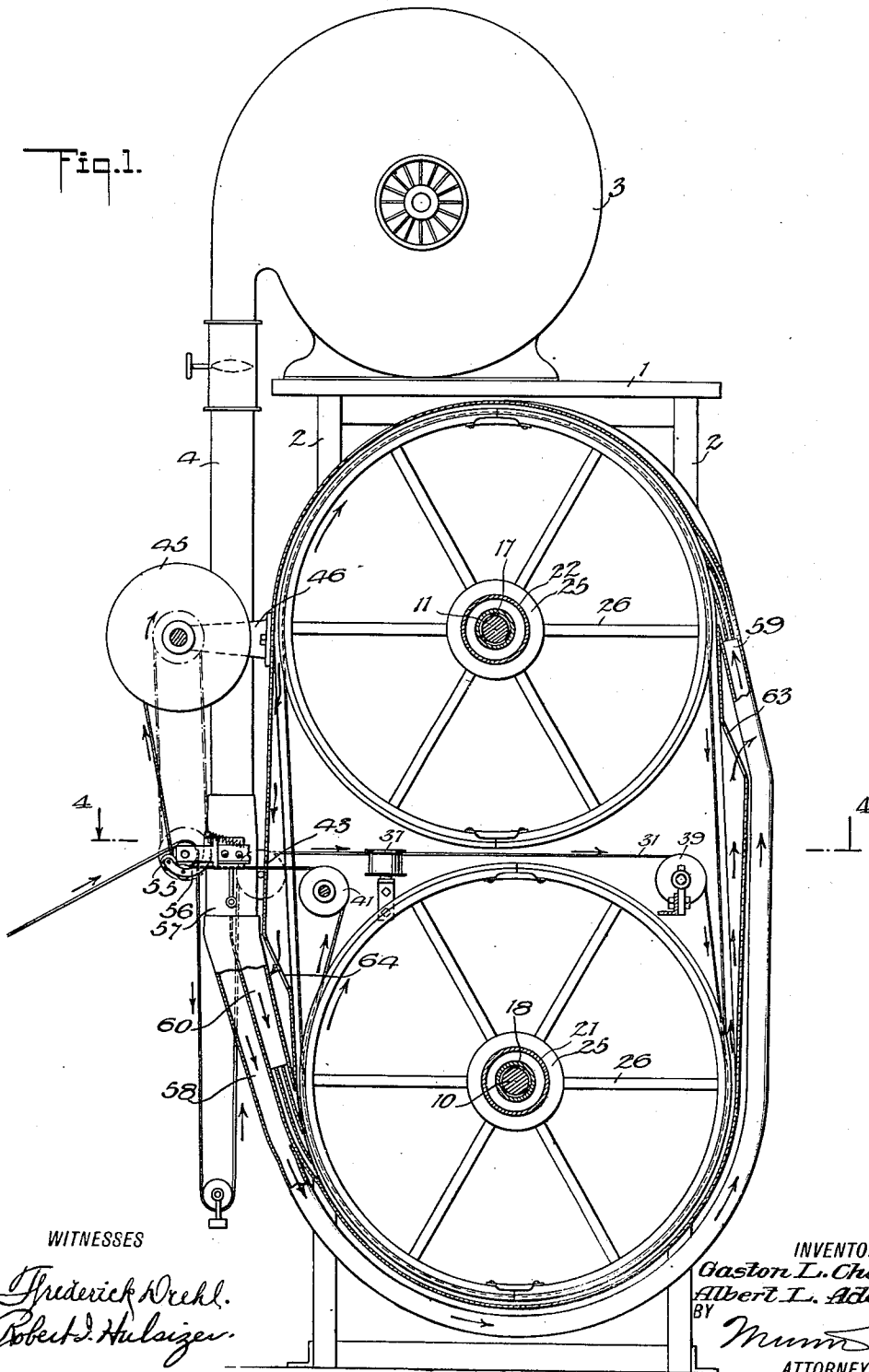
1,473,542

FILM DRYING APPARATUS

Filed June 28 1922

4 Sheets-Sheet 1

Fig. 1.



WITNESSES

*Frederick Wehl.*  
*Robert D. Hulsizer.*

INVENTOR

*Gaston L. Chanier*

*Albert L. Adatte*

BY

*Mum Co*

ATTORNEYS

Nov. 6, 1923.

1,473,542

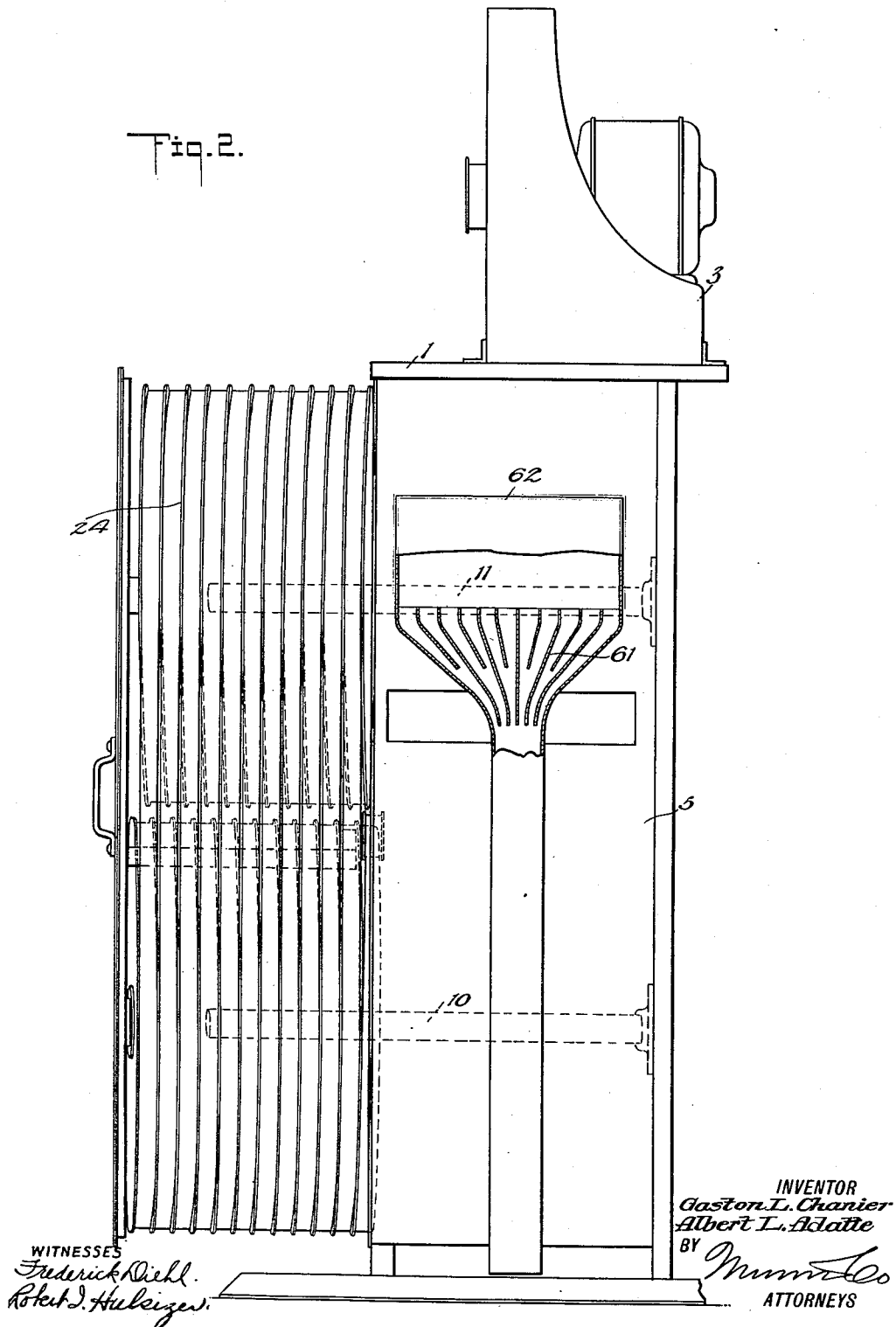
G. L. CHANIER ET AL

FILM DRYING APPARATUS

Filed June 28, 1922

4 Sheets-Sheet 2

Fig. 2.



Nov. 6, 1923.

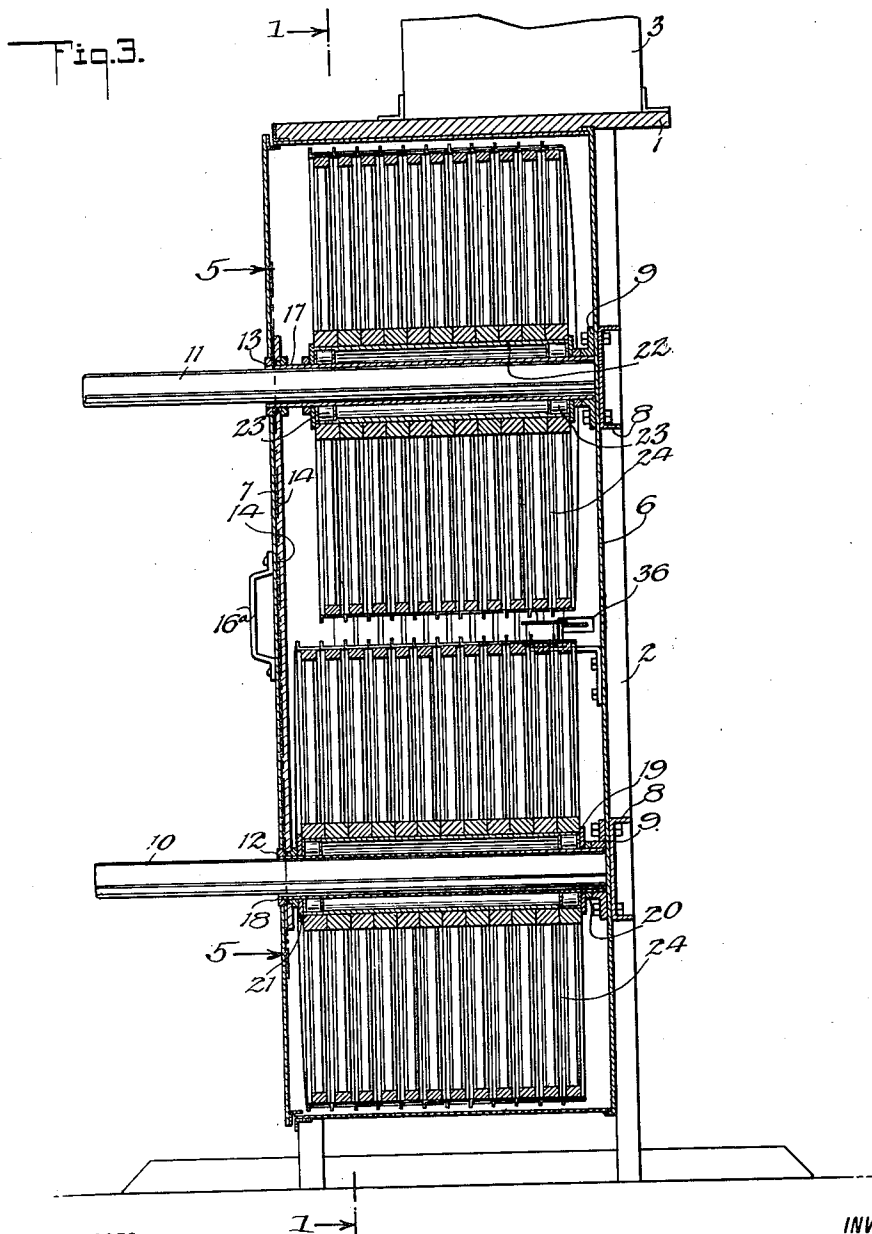
1,473,542

G. L. CHANIER ET AL

FILM DRYING APPARATUS

Filed June 28, 1922

4 Sheets-Sheet 3



WITNESSES

*Frederick Diehl.*  
*Robert J. Hulsizer.*

INVENTOR  
*Gaston L. Chanier*  
*Albert L. Adatte*  
BY *Munn Co.*  
ATTORNEYS

Nov. 6, 1923.

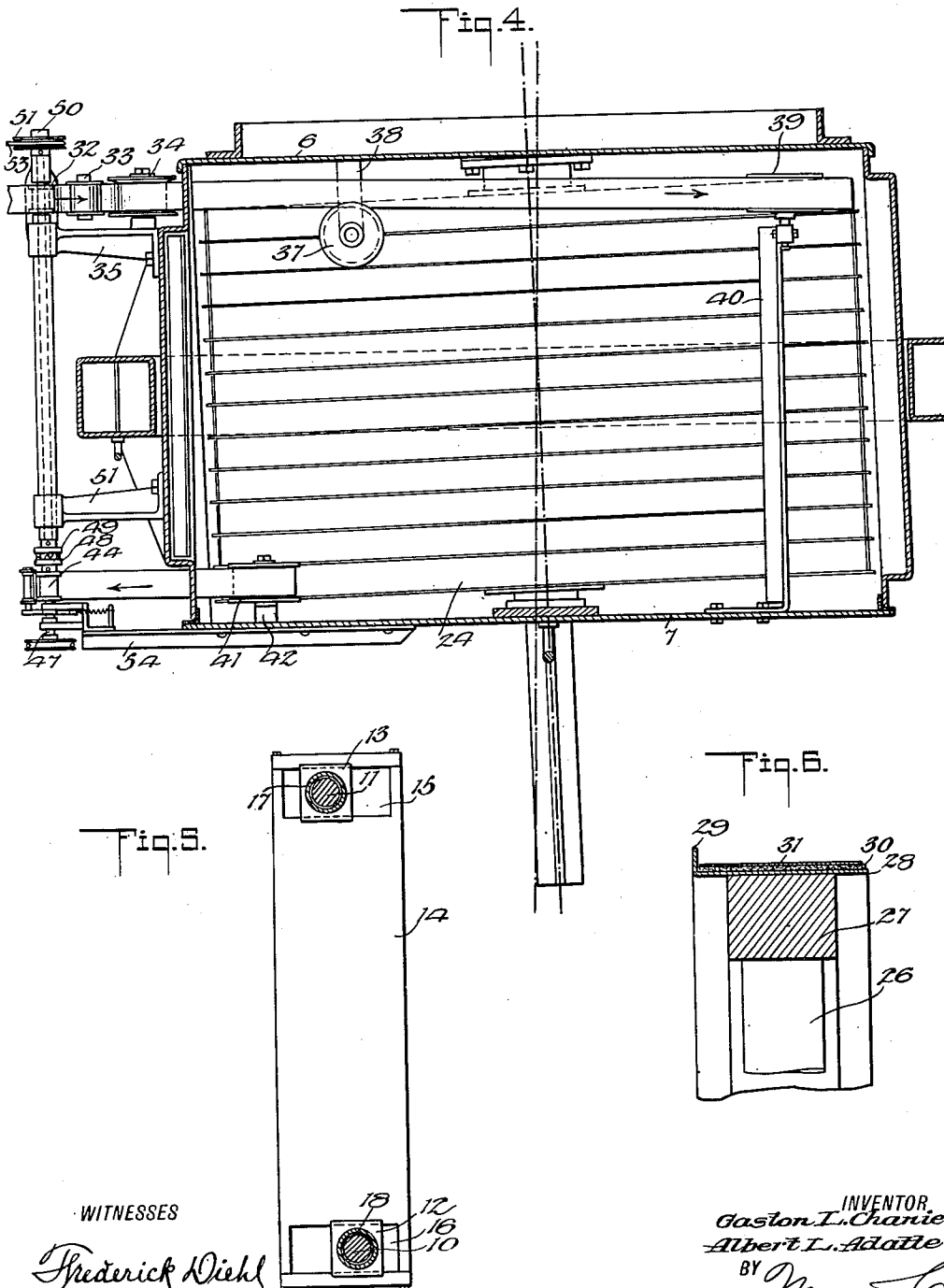
G. L. CHANIER ET AL

1,473,542

FILM DRYING APPARATUS

Filed June 28, 1922

4 Sheets-Sheet 4



WITNESSES

Frederick Diehl  
Robert L. Hulsizer.

INVENTOR  
Gaston L. Chanier  
Albert L. Adatte  
BY *Mum Co.*  
ATTORNEYS

## UNITED STATES PATENT OFFICE.

GASTON L. CHANIER, OF SHORT HILLS, AND ALBERT L. ADATTE, OF PLAINFIELD, NEW JERSEY, ASSIGNORS TO PATHE EXCHANGE, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

## FILM-DRYING APPARATUS.

Application filed June 28, 1922. Serial No. 571,354.

*To all whom it may concern:*

Be it known that we, GASTON L. CHANIER, a citizen of the United States, and a resident of Short Hills, in the county of Essex and State of New Jersey, and ALBERT L. ADATTE, a citizen of Switzerland, and a resident of Plainfield, in the county of Union and State of New Jersey, have invented a new and Improved Film-Drying Apparatus, of which the following is a full, clear, and exact description.

This invention relates to apparatus for drying films or strips of material, preferably in a continuous manner, and an object of the invention resides in the provision of means whereby any length or strip of material, such as motion picture film, can in a simple manner be run through this apparatus and be efficiently dried in a considerably shorter time than has hitherto customarily been required.

Another object resides in the provision of means whereby at any time during the operation the film may be inspected, or if the film should break or snarl within the device it can be readily repaired.

A further object resides in the specific apparatus whereby the drying medium, such as air, can be most efficiently applied to the film.

A still further object resides in the arrangement of the drums on which the film is dried so that the film is fed from one drum to another without any liability of the edges of the film being torn or worn by contact with the metal of the drum.

Another object resides in the particular construction and arrangement of parts which are hereinafter described and claimed and shown in the accompanying drawings.

The invention is illustrated in the drawings, of which—

Figure 1 is a section taken on the line 1—1 of Fig. 3 and represents a transverse vertical section.

Fig. 2 is a side elevation showing the drum supporting the film pulled out so that the film can be inspected.

Fig. 3 is a vertical longitudinal section taken through the machine.

Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 1.

Fig. 5 is a section taken on the line 5—5 of Fig. 3.

Fig. 6 is an enlarged sectional detail view of the rim of one of the drum wheels.

The form of the invention shown in the drawings is a preferred form, although it is understood that modifications in the construction and arrangement of the parts and in the character of the materials used may be adopted without departing from the spirit of the invention.

In developing the idea of this invention, the problem was presented of reducing the time during which motion picture film and similar material are required to be subjected to a drying operation in order to thoroughly dry the emulsion on the film. It was intended to be able to run the films continuously during some periods in proximity to a drying medium, such as a blast of air, so that when the film came out of the apparatus it would be thoroughly dried. The invention as it has developed, therefore, comprises generally a means containing, preferably, two drums on the peripheral surface of which are arranged a plurality of flanges, the space between the flanges forming narrow channels. The diameters of the drums and the flanges are such that along a considerable portion of their circumferential length they lie very closely to the enclosing casing so that the above mentioned channels are closed by the casing. With these channels, at one end thereof, a nozzle is associated, and this nozzle is connected to a suitable source of fluid pressure, such as a motor-operated air fan, which forces air at high speed through the nozzle into the plurality of channels above mentioned. Each of the drums is provided with a similar arrangement of channels and nozzles connected with the fluid source of pressure. The drums are suitably rotated at a desired speed and film is threaded continuously around the drums in the channels; and as the material passes through the channel portions it is subjected to an intimate application of air which passes therethrough at high velocity, and, because of the smallness of the channel, in very intimate association with the surface of the material.

Another objection which had to be overcome was that with drums having rectangular flanges not spirally arranged on the surfaces of the drums it was difficult to feed film from one drum to another in a spiral

fashion without causing the film to be so twisted that it would tend to bind or rub against the flanges of the drums at certain points. To overcome this, our invention in general includes the disposition of the axes of the drums one with respect to another at a slight angle so that the material extends from one channel on one drum to another channel on the other drum without binding at the edges of the flanges.

A further difficulty which has been overcome is the difficulty of being able at any time to pull out the drums to inspect the film or to give it attention if it becomes torn or snarled. To overcome this difficulty, we have provided the drums slidably mounted on their respective shafts and means whereby, although the shafts are inclined with respect to each other, a sliding movement can be had by merely pulling on a single handle connected to the closing plate for one end of the casing.

As shown in the drawings, the invention includes a platform 1 suitably supported on legs or pedestals 2, on which platform a motor driven fan 3 is mounted and connects with a suitable pipe or conduit 4. Beneath this platform 1 is disposed a casing having side walls 5, preferably of sheet metal, and end plates 6 and 7, the end plate 6 being fixed and suitably braced between the up-rights or pedestals 2 by suitable plates 8. The other end plate 7 is movable in a manner hereinafter to be described. On the inner face of the plate 6, forming one end of the casing, and particularly adjacent the channel members 8, we dispose flanged bearing plates 9. In these bearing plates are supported shafts 10 and 11 which, as shown in Fig. 4 particularly, are inclined to each other at a slight angle, for a reason hereinafter to be explained. The front ends of the shafts bear in bushings 12 and 13 suitably supported in the front plate 7. These bushings are in the form of square blocks, as shown particularly in Fig. 5, and are mounted on a plate 14 disposed back of the plate 7 and connected thereto in any desired manner. This plate is provided with a pair of slots 15 and 16 in which the bushings 12 and 13 slide laterally. A handle such as 16<sup>a</sup> is connected to the front plate, and as the front plate is pulled out the plate 14 is moved therewith and the bushings 12 and 13 as well. The capacity for lateral movement of the bushings 12 and 13 in the slots 15 and 16 allow for a slight angular relation of the shafts 10 and 11. The bearing blocks or bushings 12 and 13 embrace sleeves 17 and 18 surrounding each shaft and extend rearwardly along said shafts to a point adjacent the bearing blocks 9. Around the sleeves adjacent the flange plates 9 we dispose spacing rings or washers 19 and 20; 20 spacing the drum on each shaft from the flanged

plates, and 19 adapted to confine the various wheels on the drum in a manner herein-after explained. Similarly, at the front end of each drum, we provide a spacing ring 21 which tends to hold the parts of the drum on to the drum hub 22. These hubs are hollow and between them and the sleeves 17 and 18 are disposed roller bearings 23.

On the hubs 22 the drums are formed by disposing on the hubs a plurality of wheels or pulleys 24. These are best illustrated in Fig. 1, and have ring-shaped hubs 25, spokes 26 and an inner felly 27, preferably of wood. Around this felly we dispose a metallic plate 28 which forms an outer rim having a flange 29 at one side thereof. On the outer surface of this plate 28 we dispose a layer, preferably, of some fibrous material such as felt to receive and cushion the film 31 which passes thereover. On each of the slidable sleeves 17 and 18 a plurality of these wheels or pulleys 24 are disposed side by side to form a drum the peripheral surface of which is formed with a plurality of passages the bottoms of which are the layers of felt 30 and the sides of which are formed by the flanges 29. The manner in which this assemblage of wheels on the sleeves forms the drum can be best observed by noting Figures 2, 3 and 4.

It can be readily perceived that in passing the film around the drums from one to the other, it is necessary to advance the film after each lap in a spiral manner. It also can be perceived that if the film were to advance in its passage between the two drums it would of necessity rub against the edge of the flange it was leaving and against the edge of the flange of the channel into which it was being introduced. We avoid this difficulty, which causes rapid deterioration of the film, by disposing the shafts with their axes at an angle to each other, so that as the film passes around in the channel of the drum, when it leaves said channel it is in line substantially to proceed directly and vertically to the channel into which it is to be introduced on the other drum without any such rubbing action as above mentioned.

In tracing the passage of the film into and out of the apparatus, particular reference may be had to Fig. 4 in which the film 31 is led from any reel or other apparatus over a small sprocket pulley 32, thence under a tension pulley 33, and then over an idler pulley 34. These pulleys are supported from a bracket frame 35 attached to the side wall of the casing. The film then passes through a suitable aperture 36 in the casing, seen in Fig. 3, one of its edges being guided by an idler pulley 37 supported within the casing from a bracket 38 attached to the rear plate 6. It then extends over an idler pulley 39 mounted on an arm 40 connected

to the front plate 7 and movable therewith, thence the film passes into the first groove or channel on the lower drum, passing around beneath the drum in this channel, and thence upwardly to the opposite channel on the upper drum. It then passes around the pairs of drums until it leaves the lower drum, passing over an idler pulley 41 supported from a bracket 42 connected to the front plate 7, as shown in Fig. 4. After leaving the pulley 41 it passes through a slot 43 in the casing, as seen in Fig. 1, thence under a sprocket pulley 44 and then upward to a reel 45. The reel is mounted on any suitable bracket frame 46 attached to the side of the casing.

The sprocket pulley 44, however, is mounted on a shaft 47 and is associated with a clutch member 48 with which a co-acting clutch member 49 engages. This member 49 is mounted on a shaft 50 supported on the bracket frames 35 and 51 on the side walls of the casing, and driven by a pulley 52 over which a belt 53 extends and leads to any suitable source of power. The sprocket pulley 44 and the shaft 47 are supported on a channel plate 54 connected to the front plate 7 and movable therewith.

It will, therefore, be observed that when the handle 16<sup>a</sup> is grasped and pulled out the plate 7 moves outwardly, moving therewith the sleeves 17 and 18 and both drums, which are mounted on the sleeves. Since the ends of the shafts 10 and 11 bear in the bushing blocks 12 and 13 the sliding angular relation of these shafts will not prevent drums from being pulled out in this manner. When the drums are pulled out, as shown in Fig. 2, the film and the parts within the casing can be carefully examined and inspected and, if necessary, repaired. When the drums are pulled out, it will be noted that the pulleys 39 and 41 move therewith, as well as the sprocket pulley 44 and its co-operating parts. The film in extending between the pulley 41 outward of the casing passes through the slot 43, the end of which slot extends through the front end of the casing, so that the film can move out of this slot as the drums are removed. As soon as the drums begin to move out of the casing, the clutch members 48 and 49 disengage stopping the rotation of the sprocket pulley 44. It will, furthermore, be noted that at the rear of the casing the film, in extending between the pulley 34 and the idler pulley 37, is kept in a straight line, to prevent snarling and tangling, although the pulley 39 can withdraw from the casing with the front plate 7, in which event the film 31 will tend to lie flat against the surface of the pulley 37, which may be more clearly understood from a consideration of Fig. 1. It will also be observed that as the drums are moved out of the casing that portion of the film extend-

ing from pulley 41 to the sprocket pulley 44 will also move out of the slot 43. The film being flexible will not, however, be disengaged from the sprocket pulley 44 because it is held thereagainst by tension rollers 55 mounted on a spring-pressed arm 56 which bears against the film and holds it in contact with the sprocket pulley 44.

With regard to the feed of air to the channel passages on the drums, it will be noted in Fig. 2 particularly, as well as in Fig. 1, that at the lower end of the pipe or conduit 4 a head or coupling is provided, designated by the numeral 57. From this coupling a pipe 58 extends around beneath the lower drum and up on the other side of the casing to a nozzle 59, a similar nozzle 60 being located near the lower end of pipe 4 adjacent the lower drum. These nozzles are identical in structure and are provided with a plurality of baffle plates 61 to uniformly distribute the air current over the entire surface of the nozzle, which in width, as indicated at 62, is sufficient to span the width of each drum, so that air is fed through all the channel passages as the drums rotate in proximity to the casing. After the air has passed around the drums through the channel passages, it passes out through exhaust openings 63 and 64, which are made sufficiently large not to create a back pressure. The air is naturally forced out of these openings rather than circulated around within the casing by reason of the fact that the layers of film lying close together form a sort of enclosure with the outer walls 5 of the casing, through which enclosure the air naturally tends to pass.

With regard to the rotation of the drums, this rotation is effected by the engagement of the film by the sprocket wheels 32 and 44, each of the pulleys or wheels 24 forming the drums being free to rotate independently of each other so that the drums are moved around slowly due to the pulling on the film. Of course, it is understood that the drums can be positively driven, if desired.

What we claim is:

1. A device for drying film material, which includes a pair of drums having peripheral channels or passages thereon to receive a film and associated adjacent each other, the axes of the drums being inclined at an angle with respect to each other to permit a film to pass from a channel on one drum to a succeeding channel on another drum whereby a continuous strip of film may be passed around the drums without binding.

2. A film drying device which includes a pair of drums over which the film is passed, the axes of said drums being disposed in parallel planes but at different angles in said planes.

3. A device for drying film, which com-

prises a pair of drums each having a plurality of separate circumferential passages on its periphery to receive film, the axes of the drums being angularly disposed whereby the film in leaving a passage on one drum can be led into a succeeding passage on the other drum without binding or twisting.

4. A device for drying film, which includes a drum having a circumferential passage or channel in which the film is received and a casing within which the drum is located, said casing lying closely adjacent the face of the drum to form with the channel a substantially closed chamber through which a drying medium may be passed in intimate association with the film to be dried.

5. A device for drying film, which includes a drum having a circumferential passage or channel in which the film is received and a casing within which the drum is located, said casing lying closely adjacent the face of the drum to form with the channel a substantially closed chamber through which a drying medium may be passed in intimate association with the film to be dried, and means for introducing a drying medium to said enclosed chamber.

6. A device for drying film, which includes a drum formed of a plurality of pulleys or wheels, each pulley or wheel including a flanged metallic rim, said pulleys disposed adjacent each other to form the drum, and the flanges on the pulleys forming channels or passages to receive the film.

7. A device for drying film, which includes a drum formed of a plurality of pulleys or wheels, each pulley or wheel including a flanged metallic rim, said pulleys disposed adjacent each other to form the drum, the flanges on the pulleys forming channels or passages to receive the film, and a casing a portion of which lies closely adjacent the outer edges of the drum along a portion thereof to form substantially enclosed chambers through which a drying medium is forced.

8. A film drying device, which includes a pair of drums having circumferential channels therein, means whereby a continuous film can be wound around the drums without binding, a casing the walls of which lie adjacent the faces of the drums throughout a portion of their circumferential length to form passages, means for feeding a drying medium to said passages, and means whereby the drums can be pulled out of the casing without disconnecting the film in order to inspect or repair the same.

9. A film drying apparatus, which includes a casing having front and rear end plates, the front plate being movable, the rear plate being fixed, drum supporting shafts, mounted on said rear plate in parallel planes but at an angle to each other, slidable bearing blocks supporting the front end of each

shaft, the front plate having slots in which said bearing blocks are adapted to slide, drums supported on said shaft, and means connecting the drums with the front plate whereby when the front plate is pulled out the drums will slide along the shafts and out of the casing so that the material on the drums can be inspected.

10. A film drying apparatus, which includes a casing, a drum within said casing, around which drum a film extending into said casing is adapted to be passed, and a fixed guide pulley within said casing adapted to maintain a portion of the film within the casing in a substantially fixed path when the drum is moved within the casing to prevent the film from binding or snarling.

11. A film drying machine, which includes a casing, a drum within said casing having a plurality of passages on its surface in which the film is to be received, the circumferential face of the drum adapted along a portion of its length to lie closely adjacent the casing, and a nozzle disposed in said casing adjacent and across the passages on the face of the drum to feed a drying medium thereto.

12. A film drying machine, which includes a casing, a drum within said casing having a plurality of passages on its surface in which the film is to be received, the circumferential face of the drum adapted along a portion of its length to lie closely adjacent the casing, a nozzle disposed in said casing adjacent and across the passages on the face of the drum to feed a drying medium thereto, and a plurality of baffle or distributor plates within the nozzle to uniformly distribute the drying medium across the face of the drum.

13. A film drying apparatus, which includes a casing, a shaft fixed to and within said casing, a movable plate enclosing one face of said casing, a sleeve surrounding said shaft, a bearing block connected to said sleeve, said blocks sliding in a slot in said plate, a drum hub surrounding said sleeve, roller bearings between the hub and the sleeve, and means causing the movement of the drum with the sleeve when the closing plate is moved away from the casing.

14. A film drying apparatus, which includes a hub and a plurality of pulleys mounted on said hub, each of said pulleys having a rim with a flange on one edge thereof, said flanges on said pulleys, when the pulleys are disposed adjacent each other on a common support to form a frame, forming passages between each other in which a film or other strip of material may be received.

15. A film drying apparatus, which includes a hub and a plurality of pulleys mounted on said hub, each of said pulleys having a rim with a flange on one edge thereof, said

flanges on said pulleys, when the pulleys are disposed adjacent each other on a common support to form a frame, forming passages between each other in which a film or other  
5 strip of material may be received, and a layer of fibrous or cushioning material disposed on the outer surface of said rim.

16. A film drying apparatus, which includes a pulley having a flat metallic rim with a radially projecting flange along one 10 edge, and a layer of cushioning material, such as felt, on the outer surface of the rim.

GASTON L. CHANIER.  
ALBERT L. ADATTE.