

June 22, 1965

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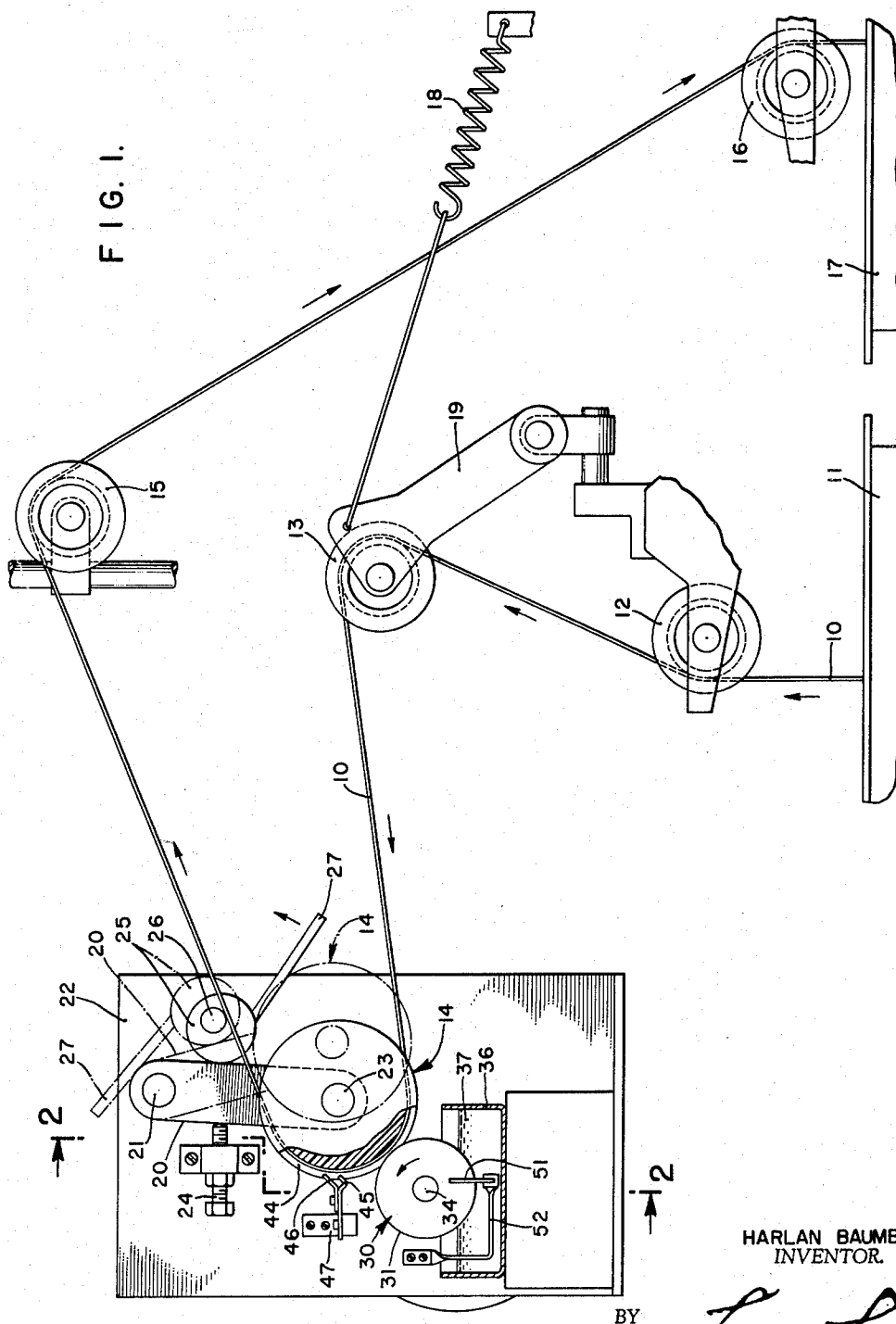
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GEL APPLICATOR DEVICE FOR CHEMICAL PROCESSING
OF PHOTOGRAPHIC FILM STRIPS

Filed Jan. 10, 1961

2 Sheets-Sheet 1

FIG. 1.



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2 Sheets-Sheet 2

FIG. 2.

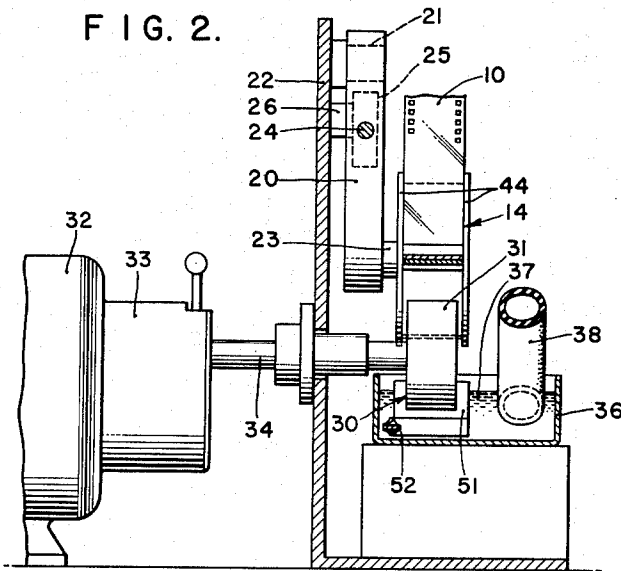


FIG. 4.

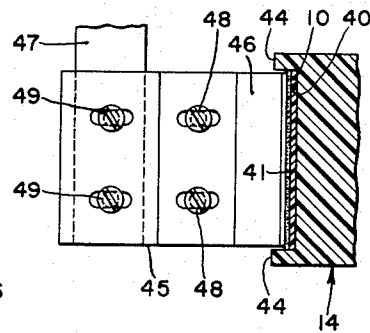
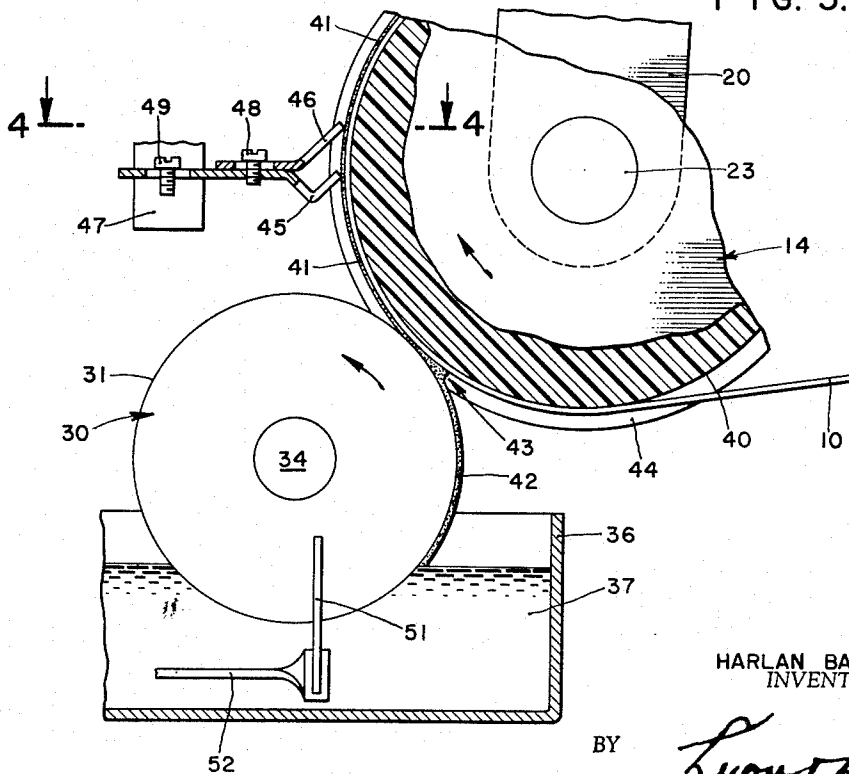


FIG. 3.



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GEL APPLICATOR DEVICE FOR CHEMICAL PROCESSING OF PHOTOGRAPHIC FILM STRIPS

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9 Claims. (Cl. 95—89)

This invention relates to apparatus useful in the chemical processing of photographic film strips and is particularly directed to an applicator device for coating a film strip with gel material.

In my copending application Serial No. 81,854 filed January 10, 1961, entitled Method of Using Gel Coatings for Chemical Processing of Photographic Film Strips, I have disclosed a method of chemically treating motion picture film during the processing thereof, which method employs relatively thick, gel-like substances applied as a coating to the film. That method eliminates the conventional steps of passing the film strip through liquid baths of the desired chemical composition. The method avoids the requirement of continuous analyses for maintaining proper chemical concentrations, and instead employs gel material which is used once and then discarded. An important advantage of this method in connection with the processing of color film is that the thickness of the layer of gel coating material provides a convenient and effective means for controlling the color density.

The present invention relates to apparatus of novel form for carrying out that method.

The principal object of this invention is to provide an applicator device for uniformly coating a moving film strip with gel material, together with means for regulating the thickness of the applied coating.

Other and more detailed objects and advantages of the present invention will appear hereinafter.

In the drawings:

FIGURE 1 is a side elevation, partly broken away, showing a preferred embodiment of this invention.

FIGURE 2 is a sectional elevation taken substantially on the lines 2—2 of FIGURE 1.

FIGURE 3 is a fragmentary elevation, partly in section, showing a portion of FIGURE 1 on an enlarged scale, and

FIGURE 4 is a sectional plan view taken substantially on the lines 4—4 as shown in FIGURE 3.

Referring to the drawings, the motion picture film strip 10 emerges from chamber 11 and is trained over pulleys 12, 13, 14, 15 and 16 before entering the chamber 17. A spring 18 acting on pulley arm 19 prevents accumulation of slack in the film strip 10.

In accordance with my invention, I mount the pulley 14 on the end of a swinging arm 20. This swinging arm is pivotally mounted at 21 on a stationary frame 22. A shaft 23 at the swinging end of the arm 20 rotatably supports the pulley 14. A threaded element 24 provides an adjustable stop for limiting the swinging movement of the arm 20 in one direction. An eccentric 25 pivotally mounted on stationary pin 26 contacts the swinging arm 20 and may be moved by means of the handle 27 to bring the arm 20 into engagement with the stop 24.

An applicator wheel 30 having a smooth periphery 31 is mounted to turn about an axis parallel to the axis of the pulley 14. An electric motor 32 operating through a variable speed drive 33 turns the shaft 34 fixed to the applicator wheel 30.

The lower portion of the applicator wheel 30 projects into an open top container 36 having therein a pool 37 of thixotropic gel material. The chemical composition of this gel material depends upon the process requirements

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of the film 10. For example, the material may be used as a developer at one stage in the processing steps, or it may be used for a bleaching operation in processing color film. The liquid level within the container 36 is maintained by means of a supply tube 38 leading from a source (not shown).

The applicator wheel 30 is very nearly tangent to the cylindrical surface 40 of the pulley 14; there is only sufficient space between these parts to allow for the thickness of the film strip 10 and the thickness of the applied coating 41 of gel material. The gel material is carried in a layer 42 on the periphery of the applicator wheel 30 as it rises out of the pool 37, and this material is carried into the bight 43 between the cylindrical surfaces 31 and 40. As best shown in FIGURE 2, the applicator wheel 30 is positioned between the side flanges 44 of the pulley 14.

The layer 41 of gel-like coating applied to the outer surface of the film strip 10 is trowelled or smoothed by the doctor blades 45 and 46 which are adjustably mounted on the stationary support 47. These doctor blades serve to control the thickness of the coating 41 within very close tolerances. This is an important consideration because the thickness of the coating is a major factor in the control of the rate of chemical reaction of the gel material with the chemical constituents of the film strip 10. The doctor blade 46 may be locked in individual adjustment by means of the set screws 48, and both doctor blades 45 and 46 may be secured in adjusted position by means of the threaded elements 49. The position of the adjustable stop 24 serves as a coarse adjustment for regulating the thickness of the coating 41 and the adjustable doctor blades 45 and 46 provide the fine adjustment.

A U-shaped scraper 51 is mounted within the container 36 by means of a bracket 52 and this scraper serves to prevent accumulation of gel material on the side faces of the applicator wheel 30.

In operation, the film strip 10 moves continuously out of the chamber 11 and into the chamber 17. The film strip has an arc of contact with pulley 14 which is greater than 90°. The applicator wheel 30 and the doctor blades 45 and 46 closely approach the film strip 10 between the ends of this arc of contact. The applicator wheel 30 is driven by means of the rotary shaft 34 and causes the gel material adhering to its periphery 31 to be drawn from the pool 37 into the bight 43 between the pulley 14 and the applicator wheel 30. The continuously moving film strip 10 causes the pulley 14 to turn and this carries the layer 41 of gel material past the doctor blades 45 and 46. These doctor blades control the thickness of the deposited layer within very close limits. The film strip 10 having the gel coating 41 of uniform thickness then passes around the pulleys 15 and 16 and into the holding chamber 17. The coated film strip remains within the chamber 17 for the required processing time and emerges on pulleys (not shown). The coating of gel material is subsequently washed off the film by conventional means.

Should it be desired to interrupt the coating process at any time without interfering with the continuously traveling film strip 10, the handle 27 on the eccentric 25 is turned from the full-line position to the phantom-line position shown in FIGURE 1, thereby permitting the pulley 14 and arm 20 to swing away from the applicator wheel 30. This interrupts the delivery of gel material to the surface of the film strip 10. The coating operation may be resumed by returning the handle 27 to the full-line position, thereby causing the eccentric 25 to crowd the swinging arm 20 into contact with the adjustable stop 24.

In some installations, it may be desirable to leave a side band of the film strip uncoated in order to allow space for one or more sound tracks.

Having fully described by invention, it is to be understood that I am not to be limited to the details herein set forth, but that my invention is of the full scope of the appended claims.

I claim:

1. An applicator device for coating a moving film strip with gel material, comprising in combination: a pulley around which a moving film strip may pass, said pulley having end flanges, an open top container for thixotropic gel material, a power-driven applicator wheel having a lower portion projecting into the container and an upper portion projecting between the flanges of said pulley and cooperating with the surface and flanges of said pulley to define a bight, said applicator wheel being adapted to carry gel material upon its periphery into contact with a surface of the film strip to form a continuous coating upon said surface of the film strip, and stationary blade means positioned adjacent said pulley adapted to contact said gel material adhering to said film strip for regulating the thickness of said coating.

2. An applicator device for coating a moving film strip with gel material, comprising in combination: a pulley around which a moving film strip may pass, said pulley having end flanges, an open top container for thixotropic gel material, a power-driven applicator wheel having a lower portion projecting into the container and having an upper portion projecting between the flanges of said pulley and cooperating with the surface and flanges of said pulley to define a bight, said applicator wheel being adapted to carry gel material upon its periphery into contact with a surface of the film strip to form a continuous coating upon said surface of the film strip, blade means positioned adjacent said pulley adapted to contact said gel materials adhering to said film strip for regulating the thickness of said coating, and adjustable means for effecting relative movement of the pulley toward and away from said applicator wheel.

3. An applicator device for coating a moving film strip with gel material, comprising in combination: a pulley around which a moving film strip may pass in an arc, said pulley having end flanges, an open top container for thixotropic gel material, a power-driven applicator wheel having a lower portion projecting into the container and an upper portion projecting between said flanges and cooperating with the surface and flanges of said pulley to define a bight, said applicator being adapted to carry gel material upon its periphery into contact with a surface of the film strip at a location between the ends of said arc to form a continuous coating upon said surface of the film strip, and at least one stationary blade positioned adjacent said pulley at a location between the ends of said arc, said blade extending laterally of the film strip and adapted to contact said gel material adhering to said film strip for regulating the thickness of said coating.

4. An applicator device for coating a moving film strip with gel material, comprising in combination: a pulley around which a moving film strip may pass in an arc, said pulley having end flanges, an open top container for thixotropic gel material, a power-driven applicator wheel having a lower portion projecting into the container and an upper portion projecting between said flanges and cooperating with the surface and flanges of said pulley to define a bight, said applicator being adapted to carry gel material upon its periphery into contact with a surface of the film strip at a location between the ends of said arc to form a continuous coating upon said surface of the film strip, and a pair of stationary parallel blades each adjustably mounted and positioned adjacent said pulley at a location between the ends of said arc, said blades extending laterally of the film strip and adapted to contact said gel material adhering to said film strip for regulating the thickness of said coating.

5. An applicator device for coating a moving film strip with gel material, comprising in combination: a pulley around which a moving film strip may pass in an arc, said

pulley having end flanges, means providing a pool of thixotropic gel material, a power-driven applicator wheel having a lower portion projecting into the pool and an upper portion extending between said flanges and cooperating with the flanges and surface of said pulley to define a bight, said applicator being adapted to carry gel material upon its periphery into contact with a surface of the film strip at a location between the ends of said arc to form a continuous coating upon said surface of the film strip, and stationary blade means positioned adjacent said pulley at a location between the ends of said arc adapted to contact said gel material adhering to said film strip and to regulate the thickness of said coating.

6. An applicator device for coating a moving film strip with gel material, comprising in combination: an arm having a swinging end, a pulley around which a moving film strip may pass, said pulley having end flanges, the pulley being mounted on the swinging end of the arm, an open top container for thixotropic gel material, a power-driven applicator wheel having a lower portion projecting into the container and an upper portion projecting between said flanges and cooperating with the surface and flanges of said pulley to define a bight, said applicator being adapted to carry gel material upon its periphery into contact with a surface of the film strip to form a continuous coating upon said surface of the film strip, stationary blade means positioned adjacent said pulley adapted to contact said gel material adhering to said film strip for regulating the thickness of said coating, and means for swinging said arm to vary the distance between the pulley and the applicator wheel.

7. An applicator device for coating a moving film strip with gel material comprising, in combination: a pulley having a cylindrical surface and having end flanges, an open top container for thixotropic gel material, a power-driven applicator wheel having a lower portion projected into the container and having another portion projecting between the flanges of the pulley and cooperating with said cylindrical surface of the pulley to define a bight, the film strip passing through the bight in contact with said cylindrical surface of the pulley, the applicator wheel being adapted to carry gel material upon its periphery into contact with the film strip to form a continuous coating upon said film strip, the applicator wheel having side faces, scraper means cooperating with said applicator wheel to prevent an accumulation of gel material on said side faces, and stationary means adapted to contact said gel material adhering to the film strip for regulating the thickness of the gel coating.

8. An applicator device for coating a moving film strip with gel material comprising, in combination: a pulley having end flanges, means for supplying thixotropic gel material, a power-driven applicator wheel having a first portion projecting into said means for supplying thixotropic gel material and having another portion projecting between the flanges of said pulley and cooperating with the surface and flanges of said pulley to define a bight, the film strip passing through the bight, and the applicator wheel being adapted to carry gel material upon its periphery into contact with said film strip to form a continuous coating thereon and blade means positioned adjacent said pulley adapted to contact said gel materials adhering to said film strip for regulating the thickness of said coating.

9. An applicator device for coating a moving film strip with a gel material comprising, in combination: a pulley around which a moving film strip may pass in an arc, said pulley having end flanges, means for supplying a thixotropic gel material, a power-driven applicator wheel having a first portion projecting into said means for supplying thixotropic gel material and having another portion projecting between said flanges and cooperating with the surface of said pulley to define a bight, the film strip passing through the bight, the applicator wheel being adapted to carry gel material upon its periphery into contact with a surface of the film strip at a location between the ends

of said arc to form a continuous coating upon said surface of the film strip, and a pair of parallel blades mounted and positioned adjacent to said pulley at a location between the ends of said arc, said blades extending laterally of the film strip and adapted to contact said gel material adhering to said film strip for regulating the thickness of said coating.

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10 NORTON ANSHER, *Primary Examiner.*EVON C. BLUNK, L. W. VARNER, EMIL G. ANDERSON, *Examiners.*