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COATING LIQUID APPLICATOR

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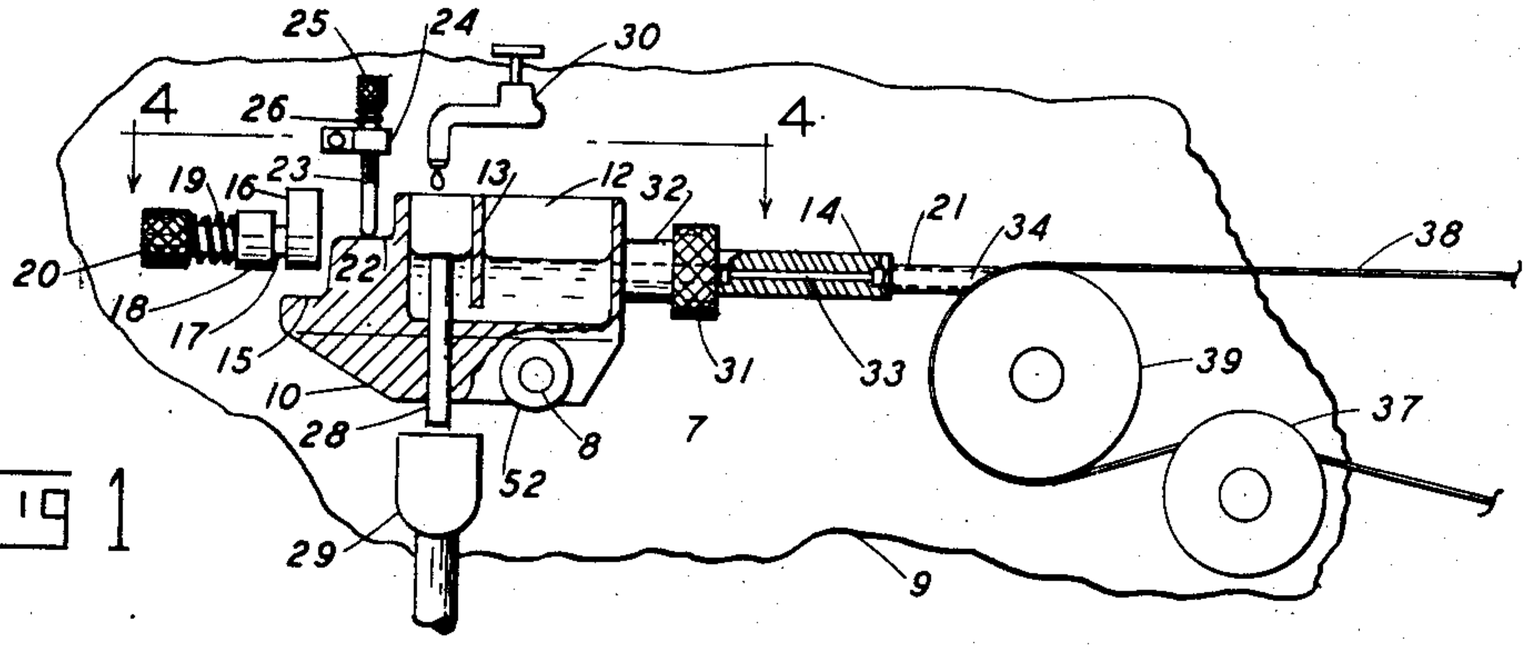
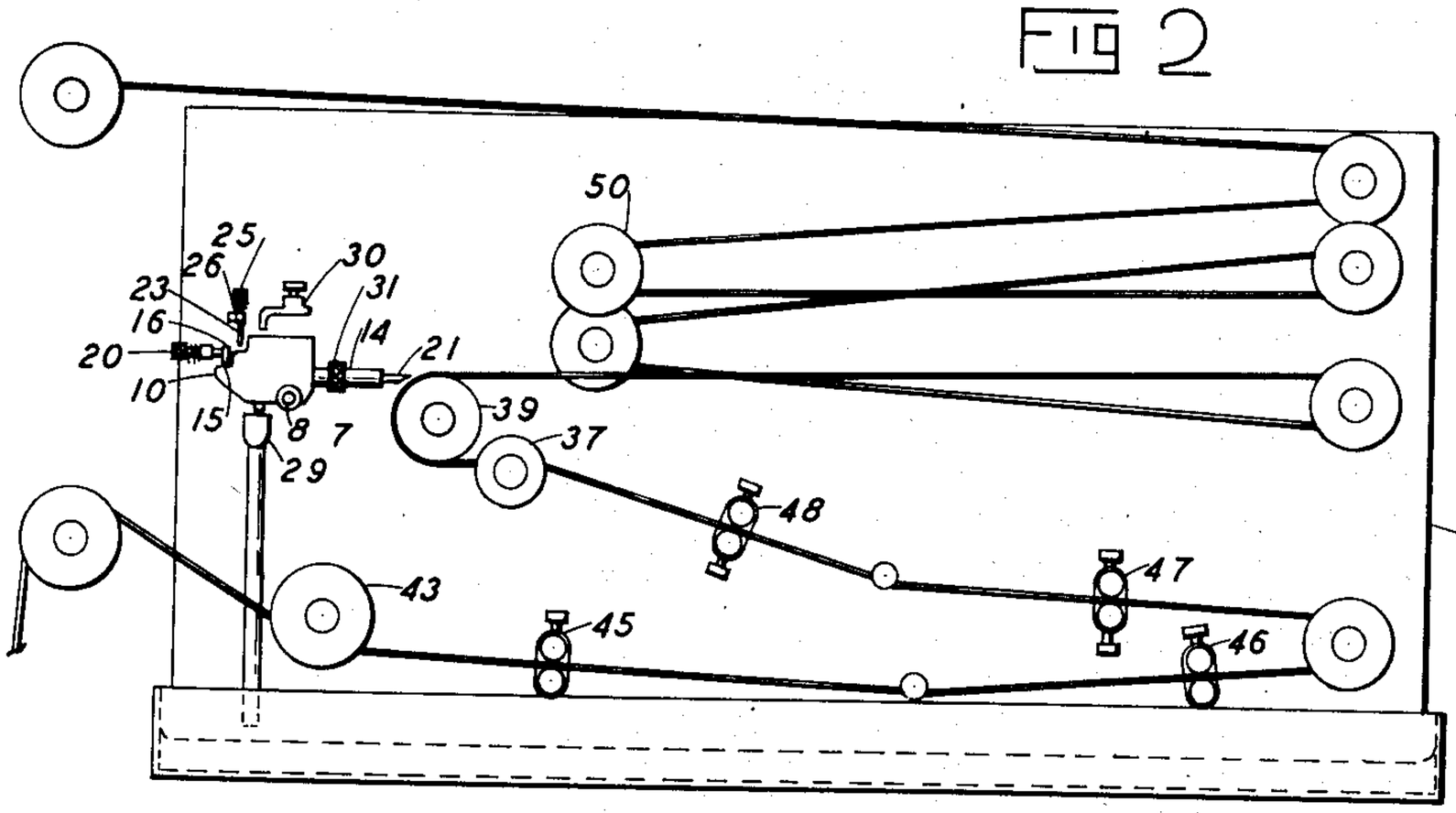


FIG 1

FIG 2



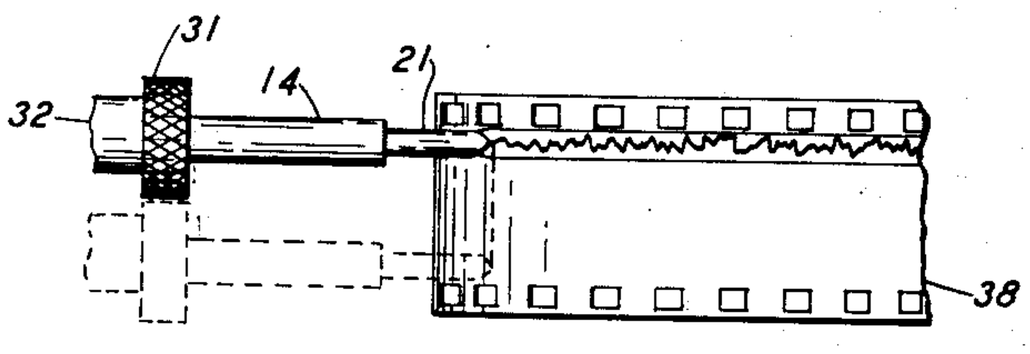


FIG 3

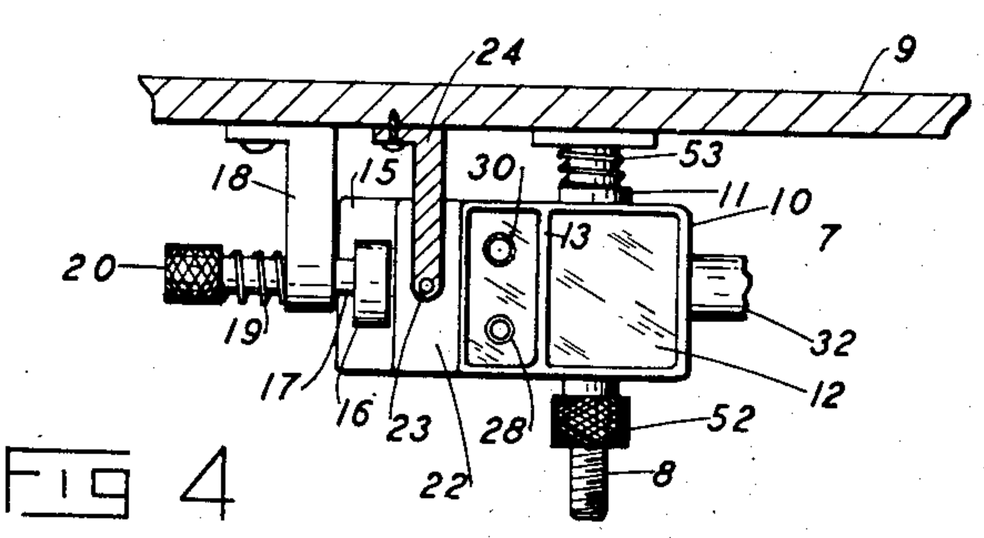


FIG 4

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COATING LIQUID APPLICATOR

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7 Claims. (Cl. 118—401)

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This invention relates to coating apparatus, and more particularly to an applicator for coating a narrow strip on a moving web.

In various industrial operations or processes, the need arises to coat or treat web material at only a selected area with liquids such as solvents, re-agents, lacquers, or emulsions. In such operations, it is of paramount importance to maintain well-defined boundaries of the coated strip, an even application of the coating substance, and retain these characteristics throughout the coating of the entire length of the web.

The object of this invention is to provide a coating liquid applicator which fulfills the above requirements and incorporates additional useful features and improvements.

A particular feature of this invention is that the coating applicator is of extremely simple construction, easily adjustable for coating a narrow strip on the web material and requires no further attention during its operation.

Another feature of this invention is that the applicator is self-adjusting as to variations in the thickness of the web material.

Other objects and features will be apparent from the following description of the invention, pointed out in particularity in the appended claims and taken in connection with the accompanying drawings in which:

Figure 1 is a side elevational view of the coating applicator partially in cross section;

Figure 2 is a general layout of a coating arrangement utilizing the applicator;

Figure 3 is a top view of the pen portion of the applicator over a motion picture film representing the web material; and

Figure 4 is a top view taken along lines 4—4 of Figure 1.

The coating applicator, in accordance with the invention, can have a variety of industrial uses. As an example, one of its most advantageous uses has been selected in connection with the description thereof which is found in a processing phase of motion picture film, namely the treating of the sound track.

Motion picture sound film projection equipment in use today is primarily designed for black and white film, i. e., film with a metallic silver image. The photoelectric sound track scanning systems are also based on a silver image and utilize a highly red sensitive photocell. With the introduction of color film, the sound record, or track, became a neutral colored dye image which is the normal result of the color film processing procedure. The neutral color dye image is relatively transparent at the red end of the spectrum, and, therefore, creates very little photoelectric response with a resultant low sound output. It has been found impractical to promote the changing of existing equipment for use with a photocell having characteristics suited to a dye sound track image. To correct this condition, many methods have been developed to treat the sound track with a toning liquid usually an alkali sulfide solution. This is known in the art as sulfide toning and produces a sound output just slightly lower than a silver track in the normal sound film audio range.

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The improved apparatus to be described comprises a coating liquid hopper in which the coating solution is maintained at a constant level. The hopper is tiltably supported into operating position with adjustment limiting the extent of tilt, while maintaining the tiltability in the opposite or inoperative position. An extended tubular member of special construction forms the outlet for the hopper having an orifice which by the operative tilt is brought into engagement with the surface of the moving web. Adjustment is provided transverse to the tilting positions for changing the location of the strip to be coated on the web and a simple reverse tilt provides for placing the applicator into inoperative position.

Referring to the drawings, in Figure 1, the coating applicator 7 is shown pivotally mounted on a stud 8 extending from a support or wall 9 on which the various components of the coating apparatus are also mounted. The applicator 7 is in two parts, a hopper 10 having a liquid compartment 12 divided by a partition 13; and an extended tubular pen member 14. The bottom of the hopper 10 has a sleeve portion 11 (seen in Figure 4) which rotates on the stud 8. On the left side of the hopper a first ledge 15 is provided for the cam 16 of an eccentric adjustment bolt 17 which turns in a bracket 18 affixed to the wall 9. A loading spring 19 maintains frictional engagement with the knurled knob 20 so as to hold the cam in the desired position upon manual adjustment of the knob. A second ledge 22 cooperates with a vertically extending adjustment screw 23 in a bracket 24 affixed to the wall 9. The adjustment screw 23 has also a knurled knob 25 and a tensioning spring 26. The purpose of these two adjustments will be explained later.

The first portion of the divided compartment 12 has an overflow outlet 28 which communicates with a suitable waste liquid conduit 29. The coating liquid is fed into this portion by any suitable means, shown here by the faucet 30.

The tubular pen portion 14 is detachably mounted by means of a collar 31 on the liquid outlet nozzle 32 of the applicator which communicates with the larger portion of the hopper compartment. The tubular pen member 14 has a narrowed channel portion 33 much smaller in cross section than the channel in the nozzle 32 and the channel in the remaining part of the member terminating at the orifice 34. This narrowed portion determines the desired rate of coating. In certain applications, as will be explained, it is desirable that the cross section of channel portion 33 be of capillary size. The configuration of the orifice determines largely the width of the strip to be coated.

The moving web 38 is fed from a guide spool 37 over a backing roller 39 over which the orifice 34 of the pen member 14 is tangentially disposed.

Referring to Figure 2, the coating arrangement shown includes the support 9 on which are mounted the various spools over which the film is fed. As the film enters over a guide spool 43, it is conducted past several air jets 45, 46, 47 and 48 to remove excessive moisture, after which it reaches the guide spool 37 to pass over the backing roller 39. In this figure, for the sake of illustration, the applicator 7 is shown in its inoperative position with the cam 16 engaging the ledge 15 so that the hopper 10 is tilted away from the film surface. The pen member 14 is thereby raised and out of operative engagement with the film. The orifice 34 of the member 14, as seen here, follows the general contour of the backing roller 39. The film leaving the roller 39 passes over several spools 50, so as to provide the required time for the chemical reaction of the coating.

Referring to Figures 3 and 4, the position of the pen member 14 and the extension 21 is seen overlying the sound track of the film 38. The location of the pen member 14 over the track can be adjusted by means of the cross feed adjustment comprising the knurled nut 52 engaging the sleeve 11 and riding over the threaded portion of the stud 8. A biasing spring 53 between the support 9 and the sleeve 11 maintains the adjusted position of the applicator.

The operation of the coating applicator is rather simple. The hopper 10 is tilted by means of the adjusting screw 23 into position to place the orifice 34 of the pen extension 21 over the roller 39. The distance between the curved edge of the orifice 34 and the film 38 is extremely small, so that the pen member 14 practically rests over the film surface without actually touching it. In practical operations, this adjustment will vary in accordance with the viscosity of the applied liquid and the material to be treated. Generally speaking, the pen member 14 is adjusted to ride on the surface of the material to be coated as close as possible without actually exerting pressure. The roller 39 is preferably so placed that the operative tilt of the applicator be in a substantially level position for sound track treatment of motion picture film.

The pressure required for the liquid is extremely low for treating solutions so that the difference of liquid level between the compartment 12 and the channel 33 is very small. In practice, this level may measure in the neighborhood of a few millimeters. In other applications, depending on the viscosity of the liquid, the size of the orifice as well as the liquid level may be varied to obtain the best results.

The pen portion 14 is also detachable, and pens of various sizes and cross sections may be provided for proper coating of different materials, or to operate at various coating speeds. The dimension of the narrowed portion 33 of the liquid channel may vary in the different pens. Liquids of low viscosity and high dispersion require a capillary reduction at 33 for best operation.

The divided liquid compartment 12 assures an even, steady liquid level in the larger compartment without turbulence or air bubbles, while, in the small compartment, the liquid will be agitated by the inflow and overflow. The freedom of movement of the applicator in the reverse tilt position is an important feature, for it allows self-adjustment when a film splice, representing a change in the thickness of the material, passes under the pen portion. In film processing operations, such splices are of a temporary nature, made by clips, and any force exerted by the applicator pen would tend to disengage the temporarily joined lengths, or delay the return of the pen to normal operating position and feed.

I claim:

1. In an apparatus for coating a narrow strip on a moving web, a gravity flow liquid applicator comprising a coating liquid hopper, means for maintaining said liquid in said hopper at a constant level, an outlet from said hopper including an extended tubular member having a flow orifice, means for supporting said hopper tiltably into operating position in the direction of liquid flow and into inoperative position in the opposite direction therefrom, means for adjustably limiting the tilt in the first-mentioned direction in accordance with the placement of said member upon said web, means for effecting the tilting of said hopper into inoperative position and means for positioning said hopper in the direction transverse to said tilting position, thereby determining the location of said coating strip upon said web.

2. In an apparatus for coating a narrow strip on a moving web, a gravity flow liquid applicator comprising a coating liquid hopper in which means are provided for maintaining the coating liquid level substantially constant, an outlet from said hopper including a tubular member having an extended flow orifice, a sleeve rotatable and slidable over a stud tiltably supporting said hopper into operating position in the direction of liquid flow and into inoperative position in the opposite direction therefrom, adjustable stop means cooperating with said hopper for limiting the tilt in the first-mentioned direction, and eccentric stop means cooperating with said hopper for effecting the tilting in the inoperative position and means for adjustably positioning said sleeve in the direction transverse to said tilting positions, thereby determining the location of said coating strip upon said web.

3. In an apparatus for coating a narrow strip on a moving web, a gravity flow liquid applicator comprising a coating liquid hopper in which means are provided for maintaining the coating liquid level substantially constant, an outlet from said hopper including a tubular member having an extended flow orifice, a sleeve rotatable and slidable over a stud having a threaded portion tiltably supporting said hopper into operating position in the direction of liquid flow and into inoperative position in the opposite direction therefrom, adjustable stop means cooperating with said hopper for limiting the tilt in the first-

mentioned direction, and eccentric stop means cooperating with said hopper for effecting the tilting in the inoperative position, and a collar engaging said threaded portion and said hopper for adjusting the sliding position thereof over said stud, thereby determining the location of said coating strip upon said web.

4. In an apparatus for coating a narrow strip on a web moving over a roller, a gravity flow applicator comprising a coating liquid hopper in which means are provided for maintaining the coating liquid level substantially constant, an outlet from said hopper including a tubular pen member having an extended flow orifice, shaped to follow the peripheral contours of said roller and having a width corresponding to the strip to be coated, a channel in said member having a portion of narrowed cross section communicating with said hopper, and means for tiltably mounting said hopper, thereby positioning said member with said orifice in close proximity to the web surface.

5. In an apparatus for coating a narrow strip on a web moving over a roller, a gravity flow applicator comprising a coating liquid hopper in which means are provided for maintaining the coating liquid level substantially constant, an outlet from said hopper including a tubular pen member having an extended flow orifice, shaped to follow the peripheral contours of said roller and having a width corresponding to the strip to be coated, a channel in said member having a portion of capillary cross section communicating with said hopper, and means for tiltably mounting said hopper, thereby positioning said member with said orifice in close proximity to the web surface.

6. In an apparatus for coating a narrow strip on a web moving over a roller, a gravity flow constant level liquid applicator comprising a coating liquid hopper having a divided liquid compartment the two portions of which communicate near the bottom, means for feeding liquid

in the first portion and an overflow therefor, whereby said liquid is maintained at a substantially constant level and an outlet from said second portion including a tubular pen member having an extended flow orifice shaped to follow the peripheral contours of said roller and having a width corresponding to the strip to be coated, and means for tiltably mounting said hopper, thereby positioning said member with said orifice in close proximity to the web surface.

7. In an apparatus for coating a narrow strip on a moving web, a gravity flow constant level liquid applicator comprising a coating liquid hopper having a divided liquid compartment, the two portions of which communicate near the bottom, means for feeding liquid in the first portion and an overflow therefor, whereby said liquid is maintained at a substantially constant level, an outlet from said second portion including an extended tubular member having a flow orifice, means for tiltably supporting said hopper into operating position in the direction of liquid flow and into inoperative position in the opposite direction therefrom, means for adjustably limiting the tilt in the first-mentioned direction in accordance with the placement of said member upon said web while maintaining tiltability of said applicator in the direction away from said web, whereby said applicator is self-adjusting to variations in thickness of the web material.

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