June 5, 1962 W. F. DAVIS 3,037,451

MEANS FOR DISPENSING AND APPORTIONING FLUIDS

Filed July 15, 1959 2 Sheets-Sheet 1

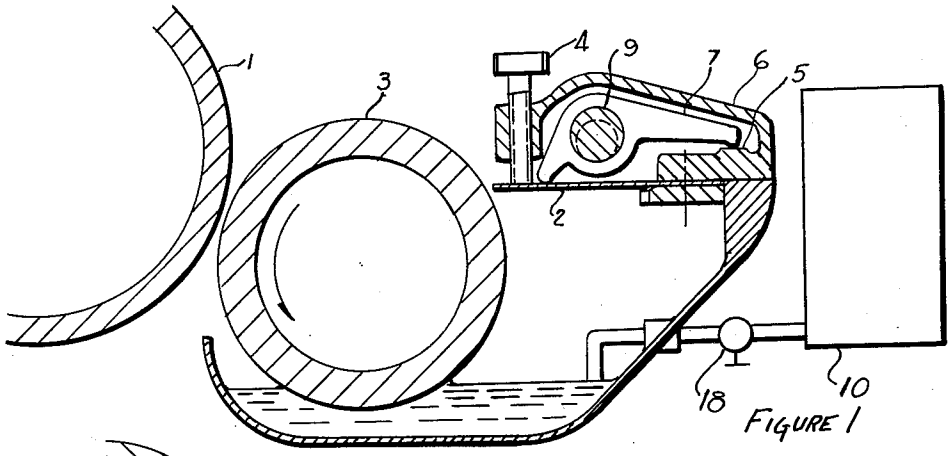


FIGURE 1

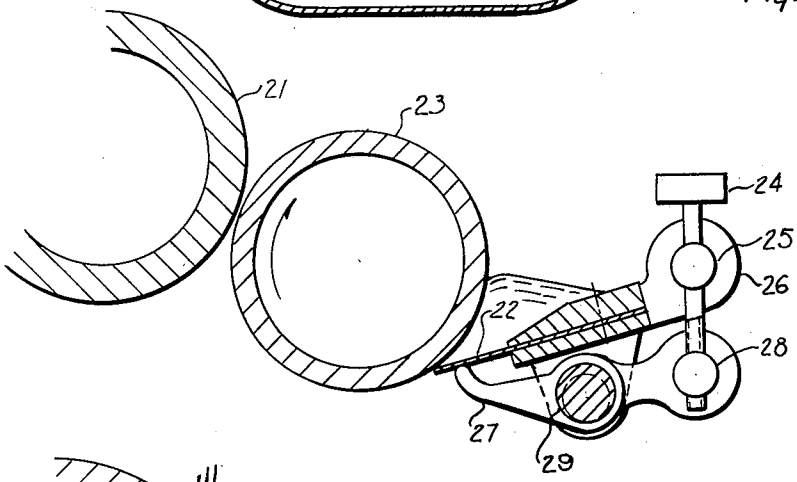


FIGURE 2

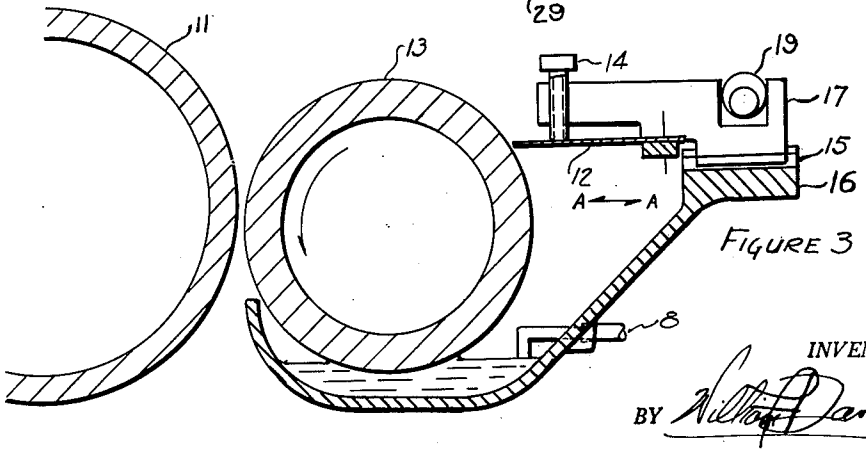


FIGURE 3

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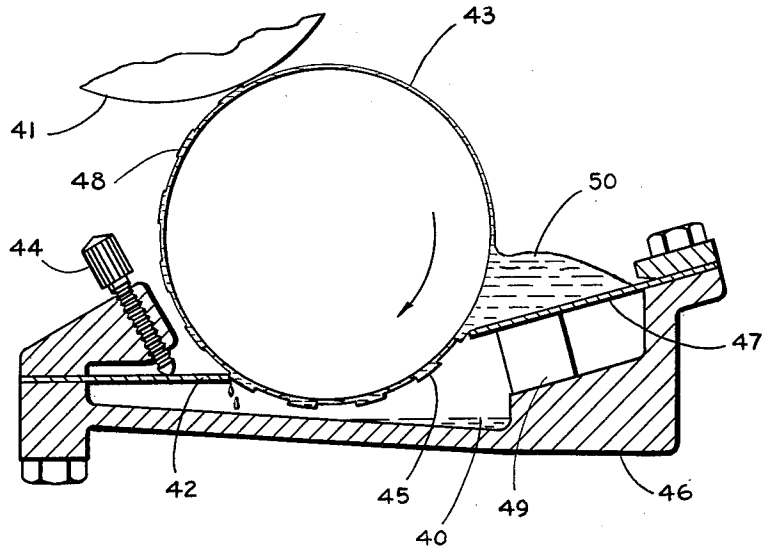


FIGURE 4

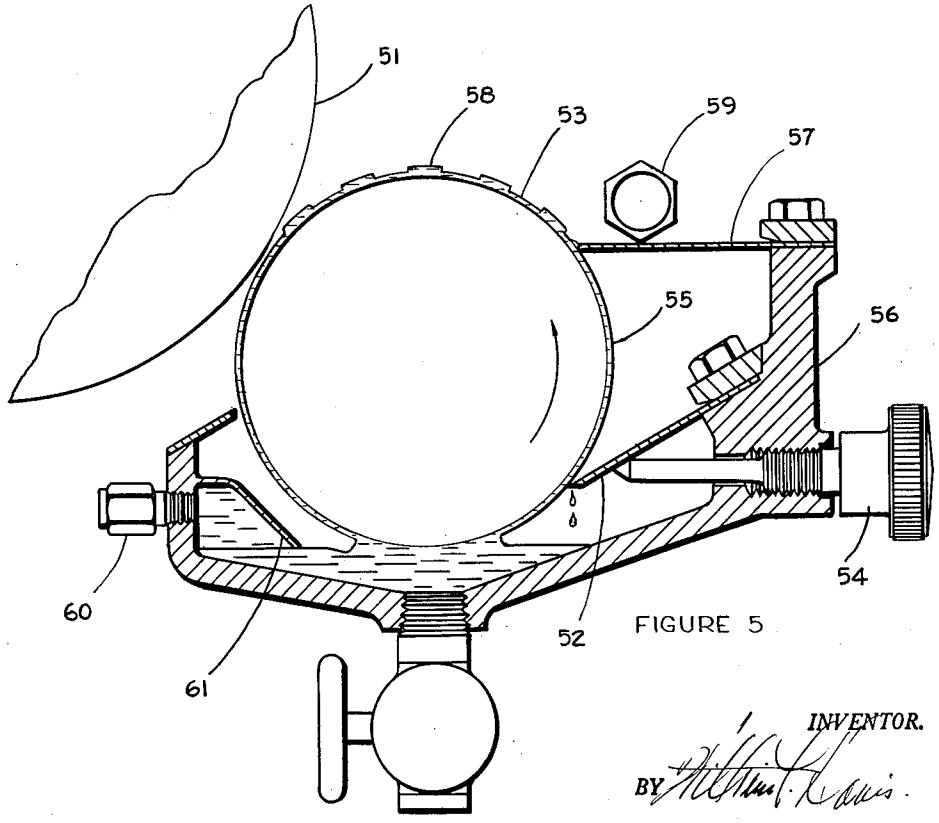


FIGURE 5

INVENTOR.

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3,037,451

MEANS FOR DISPENSING AND APPORTIONING FLUIDS

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10 Claims. (Cl. 101—350)

The present invention relates to new and useful improvements in the machinery for the apportioning and dispensing of fluids. More particularly, the invention is concerned with fluid dispensing as applied to the inking mechanism of printing presses and similar machines.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by the instrumentalities and combinations pointed out in the appended claims.

The invention consists in novel parts, constructions, arrangements, combinations and improvements herein described and disclosed.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate the embodiments of the invention, and together with the description, serve to explain the principles of the invention.

The present invention has for its object the provision of a novel method of apportioning and dispensing fluid, such as ink, and the machinery to accomplish this improved method of apportioning and dispensing of fluid.

The prime object of the present invention is to provide a means to efficiently dispense fluids, such as ink, without the need of peripherally relieved pick-up rollers or ductor devices.

A second object of the present invention is to provide a means of dispensing the fluid in cooperation with an easily adjusted regulating doctor blade, functioning upon a relatively thick fluid film. A further object of the invention is to provide a doctor blade mechanism which is not susceptible to clogging with lint and other foreign matter which may contaminate the fluid supply.

Other objects and advantages of the invention will be obvious to those skilled in the art.

Referring to the drawings:

FIGURE 1 is a schematic presentation of the present invention depicting its application to an overshot fluid fountain supply configuration.

FIGURE 2 is a diagrammatic presentation of the present invention as applied to an undershot fountain system.

FIGURE 3 is a diagrammatic presentation of the present invention in an alternate construction.

FIGURE 4 is a schematic presentation of the present invention depicting the use of two doctoring blades to apportion and dispense the fluid.

FIGURE 5 is an alternate schematic depicting the present invention adapted to an overshot type of fountain.

While the invention is susceptible of various modifications and alternate constructions and uses, I have depicted in the drawings and disclosed in detail herein preferred embodiments of the invention. It is understood, however, that the broader aspects of the invention are not limited to the specific mechanism shown and described but departures may be made therefrom within the spirit and scope of the accompanying claims without sacrificing its concomitant benefits and advantages. Therefore, I do not intend to limit the invention by the aforementioned drawings and description but intend to cover all modifications and alternate constructions falling within the spirit and scope of the invention as expressed in the appended claims.

In the following the invention will be disclosed as applied to a printing press inking system and therefore the terminology will conform to that employed in ink feeding mechanisms.

In acordance with the illustrative embodiment shown in FIGURE 1 a fountain or fluid supply roll **3** is rotated at slow speed, but at a constant ratio of speed to the fluid taking drum **1**, in a trough containing ink. As depicted, a doctor blade **2** is provided to meter the ink film. The doctor blade **2** is provided with a plurality of adjusting means **4** along its length to regulate the ink film thickness to the requirements of the form being printed. The working edge of the doctor blade **2** may be deflected toward the periphery of the ink supply roll **3** by the adjusting screws **4** or by the lever **7**. The ink taking drum **1** is positioned with its axis parallel to the fluid supply roll **3** and with its periphery approximately 0.005 inch from the periphery of the fountain roll **3**. It is therefore possible to transfer only the ink film thickness which is in excess of 0.005 inch from the fountain roll **3** to the ink taking drum **1**. While this configuration will effectively feed ink in the laterally modulated quantities which are proportional to the form's requirements; the total volume of ink feed will be in excess of the amount needed by the form unless the transferred ink film thickness is extremely fine. It has been found possible to increase the ink film thickness to practical values by employing the lever **7** in FIGURE 1 to cyclically deflect the doctor blade **2** and thereby reduce the film thickness to less than 0.005 inch. That is, I have discovered that the doctor blade can be employed to both modulate the ink film to the lateral requirements of the form and to modulate the ink film to the precise volumetric requirements when transferring thick ink films. In FIGURE 1, I have provided an eccentric **9** which is rotatably mounted in the fountain end walls and driven at a rate proportional to the press' operating speed. The ecentric **9** causes the lever **7** to be displaced, thereby deflecting the doctor blade **2** toward the ink supply roll **3** and reducing the film thickness cyclically to less than the space separating the supply roll **3** from the ink taking drum **1**. This cyclic movement or pulsing of the working edge of the doctor blade **2** has been found to have further beneficial effects, namely; the ink in the supply sump eventually becomes contaminated with paper dust and lint, said foreign matter conventionally lodges and bridges itself under the doctor blade resulting in non-uniform inking and regulation, now, in the configuration of the present invention this foreign matter does not gain the opportunity to lodge and bridge since the cyclic excursion of the blade **2** continually crush and deteriorate such action. Further, the foreign matter, instead of accumulating in the ink fountain, is continually and progressively returned to the ink motion from whence it came. In conjunction with this discovery I have provided an ink supply sump which contains a minimum of ink required for inking and provided atmospheric level control means to feed the ink from plug-in supply tanks **10**. Each tank is provided with a shut off valve **18** to facilitate removal from the fountain roll ink sump. These plug-in units, heretofore unknown in press inking systems, now facilitate the rapid and easy change of ink color, since the amount of fluid in the ink sump is not the supply volume but a minimum quantity of adequately provide the fountain roll **3** with ink for regulation purposes. Heretofore the ink sump had to contain a supply of fluid for the needs of the press runs. This new concept of ink supply and its dispensement preserves the bulk of the ink clean, free from foreign matter and ready for rapid color change.

In FIGURE 2 the above disclosed method of ink, or fluid, feeding has been applied to an undershot fountain design. The ink taking drum **21** receives ink from the supply roll **23**. Doctor blade **22** which regulates the

ink feed also forms the bottom of the fountain sump. Accessible placement of regulating screws has long been a problem on this type of fountain. In the present invention the basic feeding of the ink is controlled by the mechanism shown and the adjusting means is located for maximum accessibility. The blade **22** is modulated to the form's requirements by the screws **24** which are rotatable in the pivotal pin **25** and threaded in the wrist pin **28**. Said adjustment of screw **24** pivots each of the respective levers **27** on the eccentric shaft **29** resulting in the lateral deflection of blade **22** in accordance with the setting of the plurality of adjusting screws **24** and associated components. The blade is further caused to flex toward and away from the fountain supply roll **23** by the rotation of the eccentric **29** which is rotatably mounted in frame **26** and driven at a rate proportional to the press's operating rate. The configuration shown in FIGURE 2 has been found advantageous in the agitation of ink of relatively high viscosity and improving the feeding of these ink. As can be seen from study of FIGURES 1 and 2 the configuration of the undershot fountain retains the lateral modulation of the ink film down through the cut-off of the transfer of ink from roll **23** to drum **21** while the arrangement in FIGURE 1 removes the lateral modulation of the film and then effects the cyclic cut-off.

This has been pointed out since each control method is better suited for different inks and associated ink motions. In FIGURE 3 an alternate method of controlling the cycle cut-off is shown. The fluid is picked up from the minimum level sump and metered to the requirements of the form by the blade **12** which may be adjusted by the screws **14**. The fluid film is then transferred from the roll **13** to the drum **11** as in the above cases. The cut-off is effected by oscillating the frame **17** in the ways **15** by the motion derived from the eccentric **19** which is driven at a speed proportional to the press' or machine's operating speed. The motion in the direction of the arrows AA thereby effect the cut-off. This configuration is suitable for applications wherein the doctor blade is made of a material which is not suitable to a high flex life.

In all the above detailed description and in the drawings the driving oscillator means has been shown as an eccentric; this however, is not to be construed as the only oscillator. In a good many cases it has been found that a cam driving element has been better suited to obtaining unequal period of cut-off and feeding of ink.

It is evident that this new method of feeding of ink or fluid films has overcome the limitation of working with ink films of 0.001 to 0.002 thickness and the need for such devices as peripheral relieved rollers or drums or ductor type mechanisms. The fluid is modulated to the lateral requirements of the form and apportioned on the surface of the supply roll in quantities required by the circumferential characteristics of the form. The present invention further precludes the need for fountain roll and fluid sump cleaning devices to remove paper lint, dust and other foreign matter, by maintaining the bulk of the ink supply separate from the area of contamination and further by eliminating the accumulation of the foreign matter in the sump and under the regulating blade by providing means for it to be redistributed to its source.

It is clear that the newly discovered means of apportioning circumferential quantities of fluid on the fountain roll for transfer and acceptance by the fluid taking drum may be performed in two stages by two (2) regulating blades. The fluid adhering to the roll's surface may be first regulated by one blade, say to circumferentially apportion the fluid and then further regulated by a second control or doctor blade to laterally modulate the fluid.

Referring to the drawings, in the illustrative embodiment of FIGURE 4 the principles of the present invention are depicted in a configuration comprising two doctor blades. The first blade **47** cooperates with the

supply roll **43** to form a trough for the ink or fluid supply **50**. Blade **47** is cyclically oscillated, by a suitable means **49**, and is thereby displaced toward and away from the periphery of the roll **43**. This motion of the blade **47** with the rotation of the roll **43** produces a variation in the fluid film's thickness ensuing from the fluid supply. As illustrated, the film is modulated circumferentially to produce spaced quantities of fluid of greater film thickness than the interjacent film thickness. These quantities of fluid **45** are transported, by the roll's **43** rotation to the second blade **42**. Blade **42** may be adjusted by the screws **44** to laterally modulate the thickness of the film **45** to the lateral requirements of the form to be printed. The excess fluid drains to the sump at **40** for recovery.

The fluid taking drum **41** is spaced approximately 0.005 inch from the fluid supply roll **43**. Now, the fluid film which has not been dispensed in thickness greater than 0.005 by the blade **47** simply passes thru the space separating the drum **41** from the roll **43**; however, the fluid which has been dispensed in greater thickness as at **45** and which after further modulation for the lateral requirement of the process exceeds 0.005 inch in thickness, as at **48**, of necessity is transferred to the fluid taking drum **41** and consumed in the operation of the machine.

It is therefore, quite clear that the fluid has been apportioned by the first blade for dispensement or transfer to the ink motion (when applied to a printing press ink mechanism) and the oscillation of the blade provides the foredescribed benefits and advantages as well as other benefits obvious to those skilled in the art. It is also clear the second blade apportions the fluid to the lateral requirements of the process.

Referring to the illustrative disclosure of FIGURE 5, which depicts an overshot fluid fountain arrangement in contrast to the foredescribed undershot configuration of FIGURE 4; the fluid in this instance is first laterally modulated for the needs of the form to be reproduced by the blade **52**. This blade is controlled by the screws **54**. As shown, the excess fluid returns directly to the ink sump which is maintained at a constant level by the hooded entry **61** of the foredescribed system depicted schematically in FIGURE 1. The fluid film **55** on the periphery of the roll **53** is subsequently circumferentially modulated by the blade **57** for transfer to the fluid taking drum **51** similar to the illustrated and disclosed technique of the present invention, in the foregoing paragraphs. In this particular arrangement the driving means to oscillate the blade **57** is a hexagonal member **59** which is rotatably mounted and driven. The laterally and circumferentially modulated portion of fluid **58** is thus ready for transfer to the drum **51** by the simple rotation of the drum **51** and the roll **53**.

It is further clear, that oil motion feeds and similar applications of the present invention (as in coating) may simply employ the oscillating of the regulating blades since lateral control is seldom needed in these machines.

What I claim is:

1. A fluid dispensing and apportioning means comprising, in combination, a fluid taking drum rotatably mounted and driven; a fluid supply roll rotatably mounted and driven at a slow speed which is a constant ratio of speed to said fluid taking drum; said fluid supply roll disposed parallel to said fluid taking drum and positioned with a small space separating the peripheries of said roll and said drum; a fluid trough containing fluid to be dispensed; said fluid supply roll disposed to said fluid trough to maintain a portion of said roll's periphery in the fluid; a blade oriented with an edge in the proximity of said roll's periphery, and the width of said blade in a non-radial relationship to said roll; and controlling means continuously driven to cyclically displace the working edge of said blade toward and away from said fluid supply roll, thereby varying the fluid film

thickness on the periphery of said roll for periodic transfer to said fluid taking drum.

2. A fluid dispensing and apportioning means in accordance with claim 1 which also includes, in combination, a plurality of adjusting means distributed along the length of said blade; said adjusting means displacing lateral sections, or portions, of said blade toward or away from said fluid supply roll's periphery, thereby varying or modulating the fluid film's thickness laterally along the length of said roll.

3. A fluid dispensing and apportioning means consisting of an ink taking drum rotatably mounted and driven; a fluid trough with a fountain roll rotating therein wetting said roll with fluid in said trough; said fountain roll rotatably mounted and driven at a slow speed which is a constant ratio of speed to said drum, and with said roll disposed parallel to said drum and positioned with a small space separating the periphery of said roll from said drum; a regulating blade with a plurality of adjusting means distributed along the length of said blade; said blade made of a resilient material; said blade oriented with an edge to meter the fluid film on said fountain roll and said adjusting means adjustably positioning portions or lateral sections of said blade toward or away from said fluid fountain roll, thereby modulating the fluid film lateral thickness; an eccentric continuously driven at a rate proportional to the fluid taking drum's speed; said eccentric disposed parallel to the length of said regulating blade; a lever disposed with one end reacting with stationary framing, the other end acting on said regulating blade displacing it toward or away from said fountain roll, and the center fulcrum or pivot center coincident with the crank of said eccentric and pivotally mounted thereon; said lever driven by said eccentric, with the resulting excursions of the lever end contacting said regulating blade causing said blade to oscillate to and from the periphery of said roll; thereby dispensing laterally modulated fluid in cyclically recurring thickness suitable for transfer and acceptance by said fluid taking drum.

4. A fluid dispensing and apportioning means consisting of a fluid taking drum rotatably mounted and driven; an ink fountain roll disposed parallel to said drum with a small space separating the peripheries of said roll and said drum; said roll driven and rotatably mounted; an ink trough formed by said fountain roll and a regulating blade disposed along the length of said roll; said blade resiliently positionable relative to said fountain roll by differential levers; said levers controllably displaced by a plurality of adjusting means disposed along the length of said blade, each adjusting means cooperating with one lever to adjustably position a lateral section or portion of said blade; said plurality of levers mounted on an eccentric shaft and driven by said eccentric shaft to cyclically oscillate the working edge of aforesaid blade to and from said fountain roll; said eccentric shaft driven at a rate proportional to the speed of said fluid taking drum; thereby dispensing ink on the periphery of said fountain roll in laterally modulated quantities as required and in circumferentially varying ink film thicknesses suitable for periodic and cyclic transfer to and acceptance by the said fluid taking drum.

5. A fluid dispensing means comprising a fountain roll rotatably mounted and driven; a fluid trough disposed with the fluid therein wetting the periphery of said roll; a regulating blade to meter the fluid film being dispensed, said blade with its working edge cooperating with the roll's periphery forming a variable orifice predicated upon the relative proximity of the blade's edge to said roll surface; cyclic means to oscillate the working edge of said blade to and from the surface of said roll, thereby permitting the gradual and progressive passage of foreign matter suspended in said fluid to pass through said variable orifice.

6. A fluid dispensing and apportioning means which comprises, in combination, a fluid taking drum rotatably mounted and driven; a fluid supply roll rotatably mounted parallel to said drum with a small space separating the peripheries of said drum and said roll; said roll driven at a slow speed which is a constant ratio of speed to said drum; a regulating blade to meter the fluid film on said roll, said blade disposed along the length of said roll with a working edge in the proximity of the periphery of said roll; a plurality of adjusting means positioning lateral lengths or sections of said blade relative to said roll; a cyclically oscillating means driven at a rate proportional to the fluid taking drum and displacing said blade at right angles to the plurality of positions controlled by said plurality of adjusting means; thereby effecting a lateral modulation of the fluid film by the adjustable means and cyclically recurring variation in the fluid film's thickness by the normally disposed periodic oscillations of said blade.

7. A fluid dispensing and apportioning means comprising, in combination, a fluid taking means; a fluid supply roll rotatably mounted and driven; a fluid trough containing fluid and disposed about said fluid supply roll to wet the lower portion of said roll's surface; two blades each disposed along the length of said fluid supply roll with an edge in the proximity of the said roll's periphery and coacting with said roll's periphery to modulate the fluid thereon; said blades oriented with their width or minor axis at a non-radial relationship to said roll; one of said blades provided with a plurality of adjusting means to position portions of sections of said blade relative to said roll along the length of said roll; the second or other blade provided with a continuously recurring cyclic oscillating means displacing said second blade's working edge cyclically with respect to said roll; thereby providing segregated volumes of fluid on the periphery of said roll ready for transfer to the fluid taking means.

8. A fluid dispensing and apportioning means, comprising in combination, a fluid taking means; a fluid supply roll rotatably mounted and driven; a fluid trough containing fluid and disposed about said fluid supply roll to wet the periphery of said roll; two blades disposed along the length of said roll with an edge in the proximity of the roll's periphery and coacting with the roll's periphery to modulate the fluid thereon; one of said blades provided with a plurality of adjusting means to position portions or sections of said blade relative to said roll along the length of said roll; the second or other blade provided with a plurality of continuously recurring cyclic oscillating means distributed along the length of said blade and displacing portions or sections of said blade's working edge cyclically toward and away from said fluid supply roll's periphery thereby providing apportioned volumes of fluid on the periphery of said roll which is laterally modulated to the lateral requirements of the fluid taking means and circumferentially modulated to the running or cyclic circumferential requirements of the fluid taking means; said fluid volumes ready for transfer to the fluid taken means.

9. A fluid dispensing and apportioning means comprising, in combination, a fluid taking drum rotatably mounted and driven; a fluid supply roll rotatably mounted and driven; said fluid supply roll disposed parallel to said drum and positioned with a small space separating the peripheries of said roll and said drum; a fluid trough containing fluid to be apportioned and dispensed; said fluid supply roll disposed with respect to said trough to maintain a portion of the roll's periphery wet with said fluid; a blade oriented with an edge in the proximity of said roll's periphery and the width of said blade in a non-radial relationship to said roll; a plurality of control means cyclically driven in proportion to the fluid taking drum's operating speed and disposed along the length of said blade to vary the distance between said roll and the working edge of said blade, thereby varying the fluid film's thickness on said roll for transfer to said fluid taking drum.

10. A fluid apportioning means according to claim 9 and comprising, in combination therewith, adjusting means for displacing said blade toward and away from said fluid supply roll; said adjusting means individually and independently controlling each of the plurality of control means cyclically displacing said blade; whereby said adjusting and control means modulate and apportion the fluid film on said supply roll in recurring varying circumferential thicknesses which may not be uniform or uniformly varying during a period of said cycle but may conform to the fluid taking drum's instant recurring circumferential running requirements.

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