United States Patent

[11] **3,552,353**

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[45] Patented **Jan. 5, 1971**

[54] **APPARATUS FOR APPLYING HIGH VISCOSITY COATINGS**
9 Claims, 15 Drawing Figs.

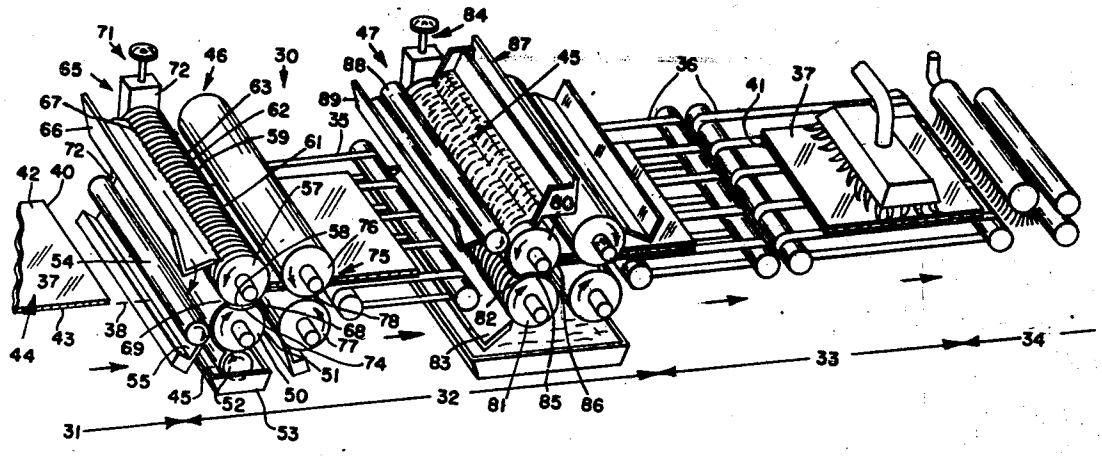
[52] **U.S. Cl.** **118/70,** 118/212, 118/249
[51] **Int. Cl.** **B05c 11/00**
[50] **Field of Search** ..... 118/70, 101, 202, 212, 227, 249, 262, 263, (Wax Digest), (Doctor's Digest)

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Primary Examiner—William I. Price
Assistant Examiner—Robert I. Smith
Attorney—Pearson & Pearson

ABSTRACT: An apparatus and method for high speed roll-coating application of high viscosity coatings on a succession of individual, advancing, flat, box blanks, especially such blanks of limp paper, without "wind-up" on the rolls and without "globbing" at the roll nip. A resilient rubber-coating applicator roll forms a coating nip with a hard faced backer roll and the applicator roll is arcuately deformed by backer roll pressure at the nip to avoid "wind-up" on the applicator roll while the hard face of the backer roll is covered with minute, closely-spaced recesses to avoid "wind-up" thereon while also carrying "globs" through the nip for disposal. The metering roll may also be recessed and form an arcuate depression in the metering nip for advantageous results.



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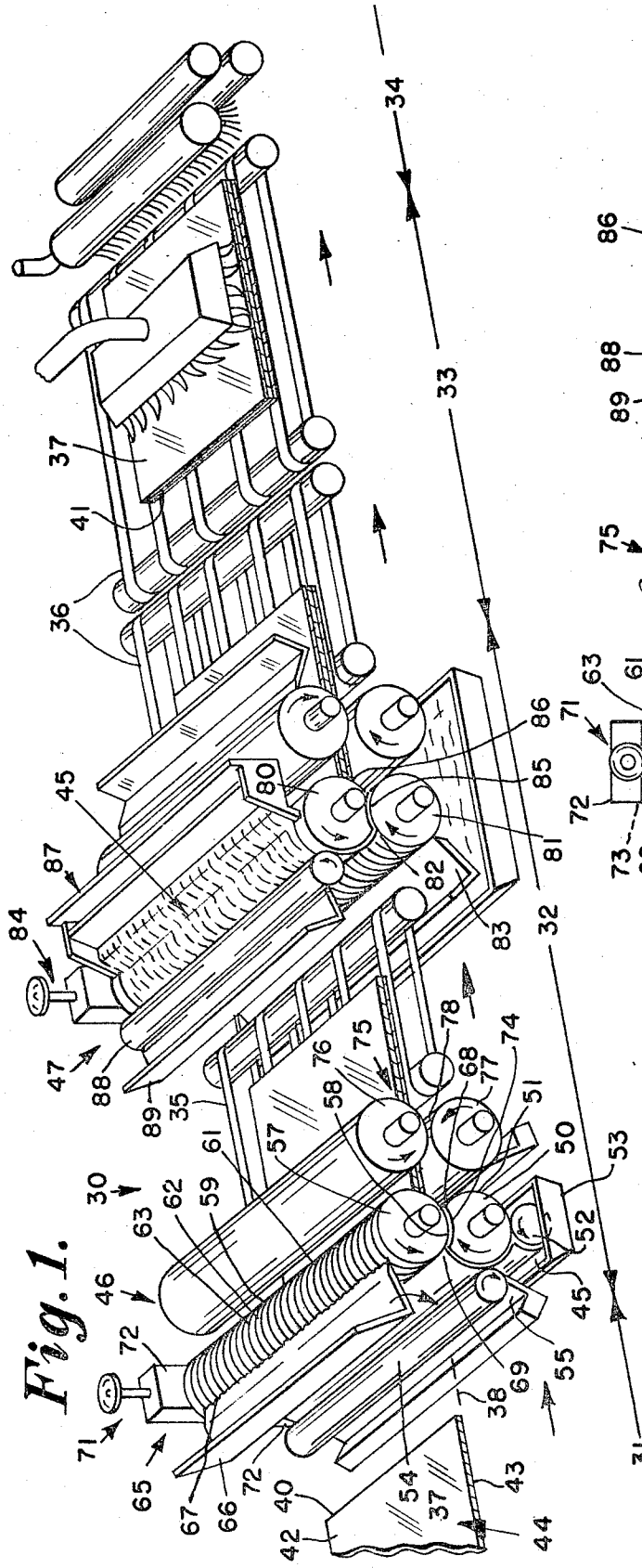


Fig. 1.

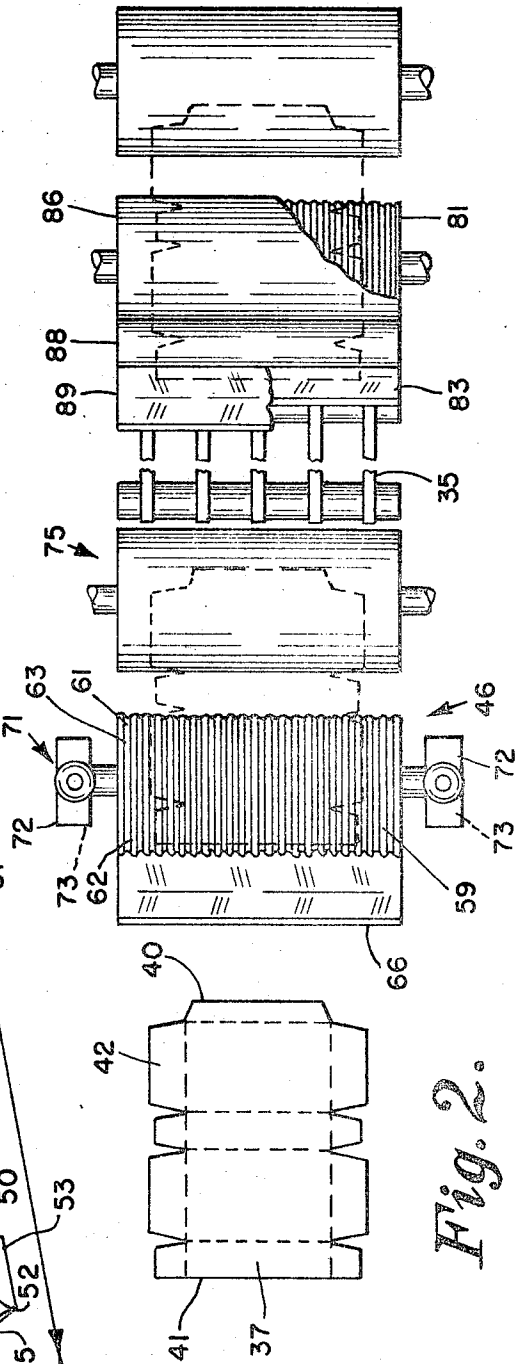


Fig. 2.

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Fig. 3.

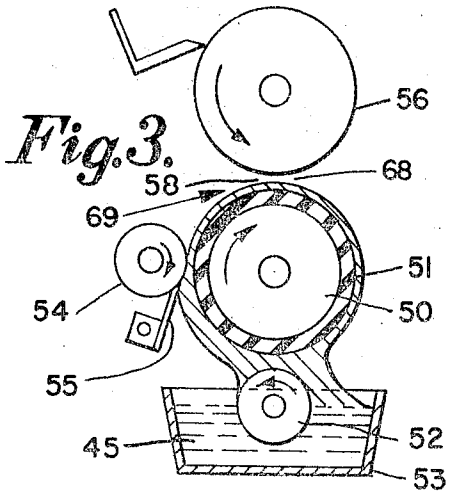


Fig. 5.

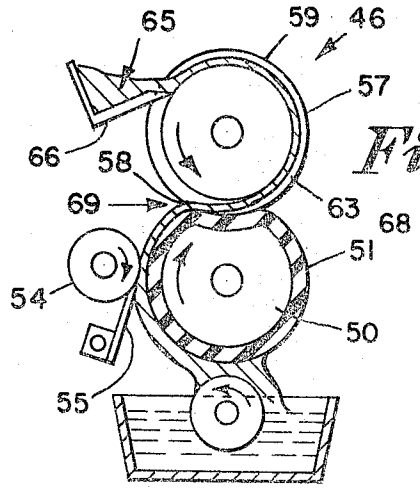
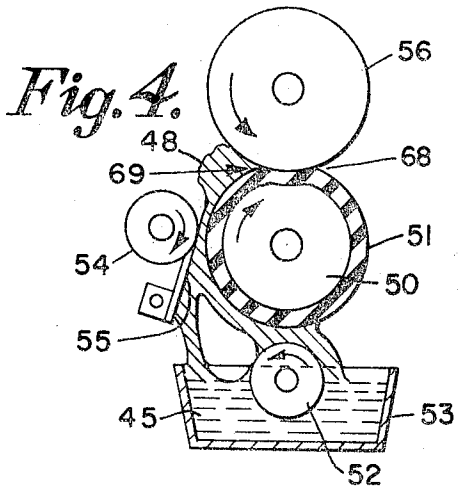


Fig. 4.



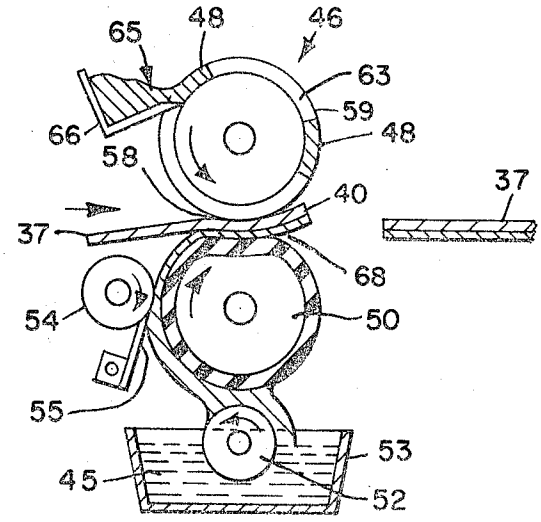


Fig. 6.

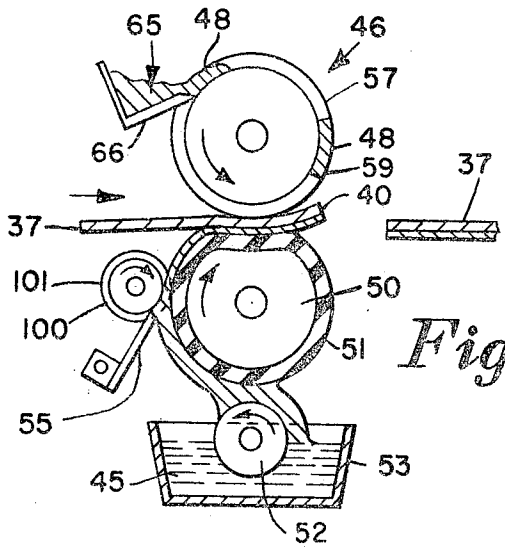


Fig. 7.

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Fig. 8.

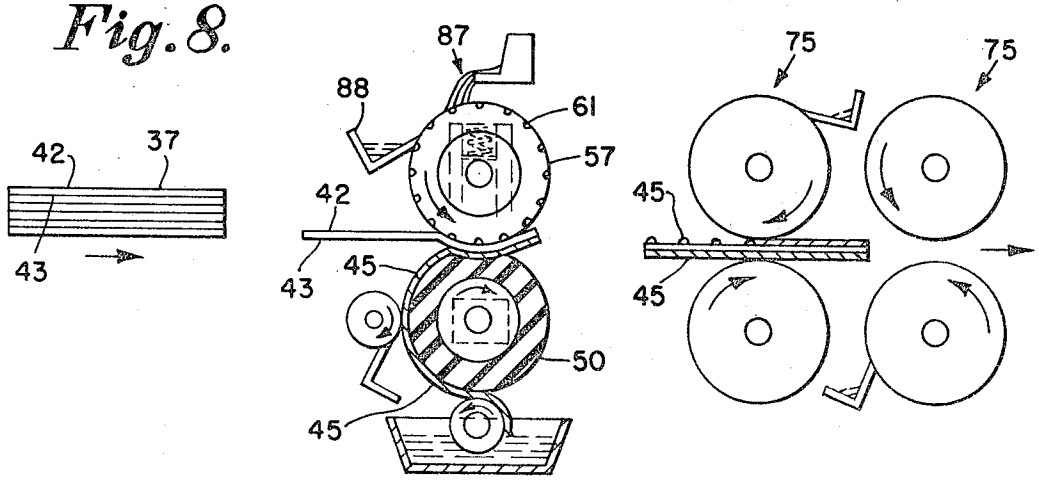


Fig. 9.

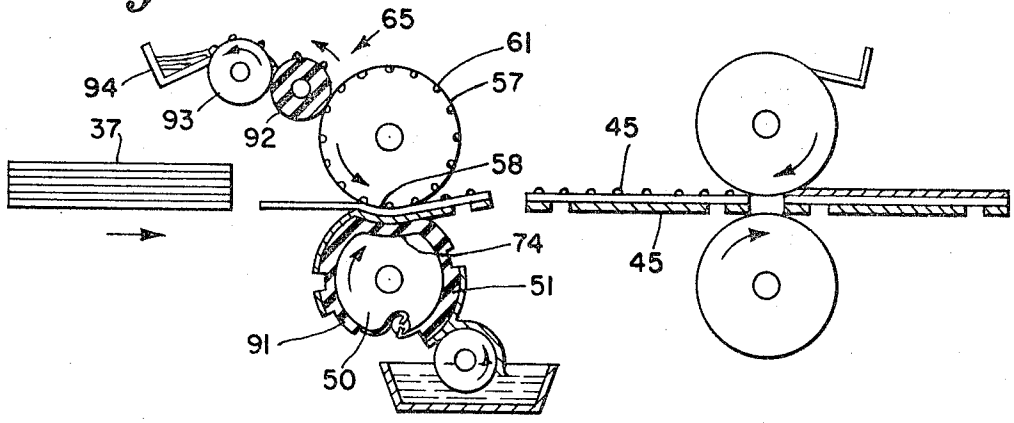
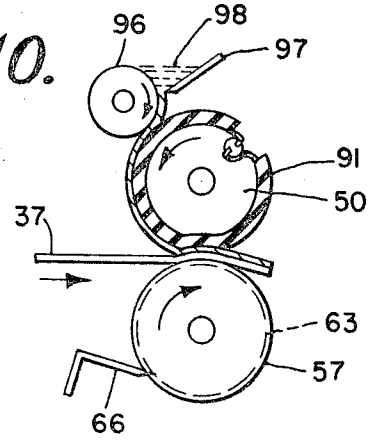


Fig. 10.



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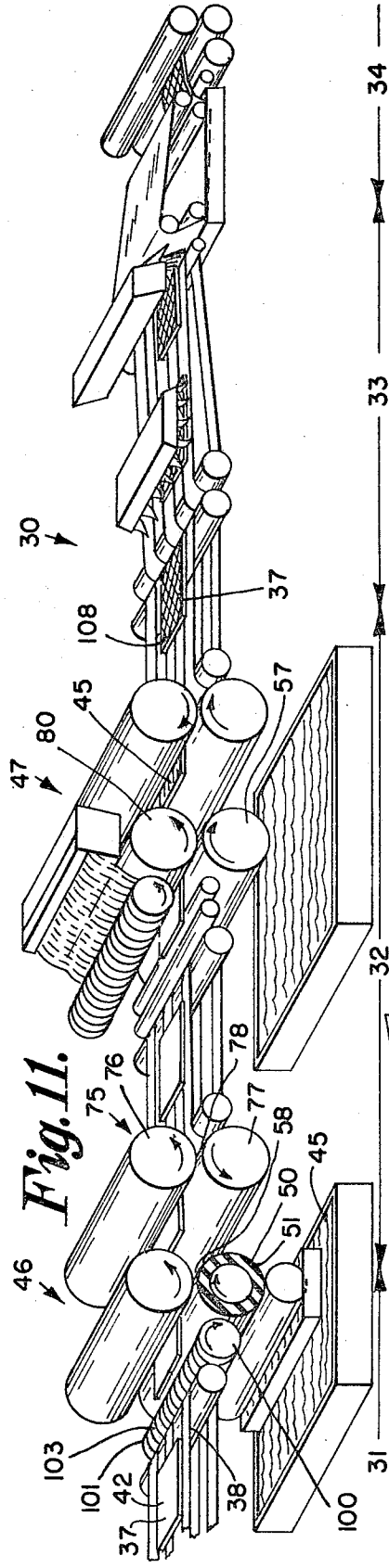


Fig. 11.

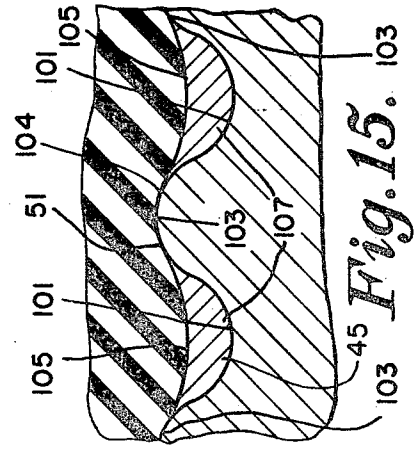


Fig. 15.

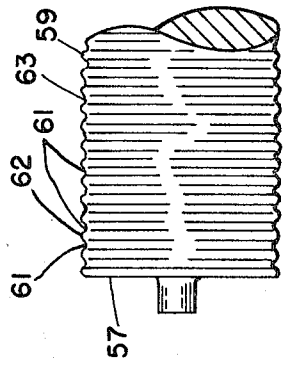


Fig. 13.

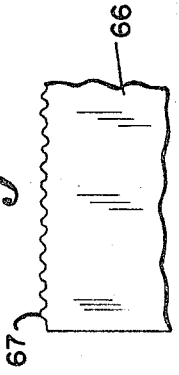


Fig. 14.

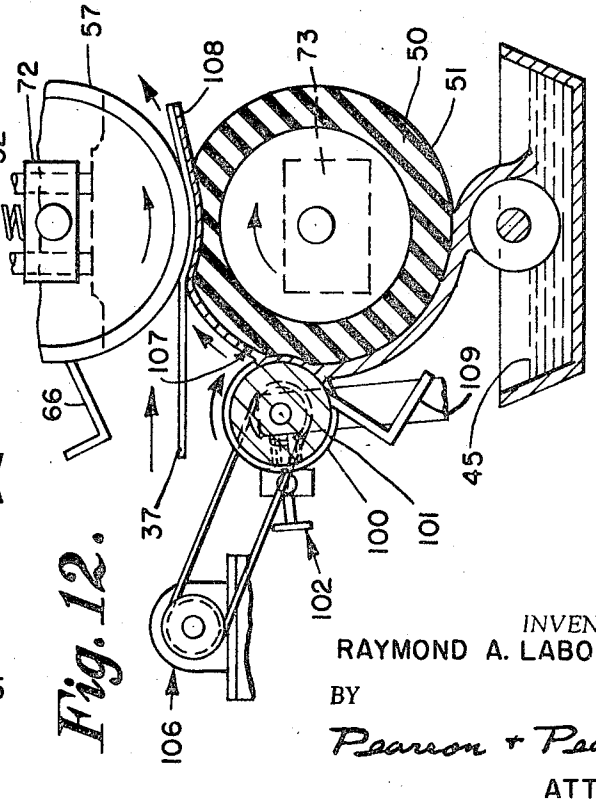


Fig. 12.

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APPARATUS FOR APPLYING HIGH VISCOSITY COATINGS

This invention relates to an improved apparatus for producing smooth wax polymer coatings on individual flat, folding paper box blanks or the like.

In the copending patent application of Raymond A. Labombarde, Frank J. Taranto, and Eugene A. Jakaitis, Ser. No. 479,150, filed Aug. 12, 1965, now abandoned, entitled "Wax Polymer Coating Method, Apparatus, And Product Thereof," there is disclosed a machine and process for handling, applying and smoothing coatings of high viscosity, ranging up to 5,000 centerpoises, and for obtaining a high gloss on such coatings.

It has been found that, unlike the coating of continuous webs, wherein the material to be coated can be pulled through the treatment zone, and unlike the coating of individual blanks advancing successively along a path with a low viscosity coating, wherein stripping and wraparound is not a problem, the coating of individual blanks of limp material with a high viscosity coating presents an unusually difficult problem.

The high viscosity, wax polymer, hot melt, coating composition used in this invention is substantially nonflowable at application temperatures and also tacky in nature. When such a coating piles up in the entrance of a coating nip, as may occur between successive blanks passing through the nip, the glob of tacky, viscous coating cannot get through the nip, and therefore tends to accumulate on the leading edge of the next successive blank, or to be deposited in a glob on the face of a blank.

This invention is of particular value in the coating of thin caliber paperboard such as .008 .012 inches in thickness. Where suitable pressure is required to squeeze the coating onto the board, the gap between the backup roll and the coating roll is so small, or close, as to cause a wringer roll action of the coating in the nip. The wringer roll, or coating backup action is further aggravated in the event of the very least "run out," or lack of symmetry or trueness of the nip rollers.

When the blanks are of limp material, and when the leading edge of a blank engages such a glob, the viscosity of the coating composition causes the leading edge to remain on the roll and the blank wraps itself around the roll. If the coating nip includes an applicator roll opposed by a backer roll, the limp blank may adhere to the glob and be carried around the backer roll, or, if there is no glob, the limp blank may fail to strip itself from the applicator roll and result in a wraparound, requiring a stop in the production line and probably causing a jam-up. If the coating nip is formed by two opposed applicator rolls, each applying a high viscosity coating to one of the opposite faces of the blanks, the problems are compounded, in that more pile up at the nip entrance may occur, and limp blanks may wrap around either applicator roll. However, with two opposed applicator rolls, the problem may be lessened to a certain extent in that the stickiness of one applicator roll may tend to offset the stickiness of the other applicator roll. In practice, to obtain and maintain a balance between the two nip rolls requires such delicate adjustment of both coating weight and type of finish of each face of the carton, that it is not completely satisfactory and hence not commercially acceptable.

In this invention, the coating nip is formed by an applicator roll having a soft resilient coating face and an opposite hard-faced roll, which may be a backer roll on another applicator roll. The hard-faced roll is pressed into the soft resilient face of the applicator roll to form an arcuate depression, and the hard-faced roll is provided with a multiplicity of closely-spaced, minute recesses which may be gravure, but which preferably are circumferential grooves and ribs, usually 60 to an inch. Coating removal means, such as a grooved doctor blade, or resilient-faced doctor roll, is operable on the hard-faced roll to partially, or preferably entirely, remove coating from the recesses. With this structure, any excess of high viscosity coating composition at the entrance of the coating nip is carried through the nip in the recesses, or grooves, of the hard-faced roll and scraped therefrom, thus preventing any pile up or formation of globs.

In addition, the recesses, or grooves, in the hard-faced roll form therebetween an unrecessed area of ribs, webs, or lands, which contains no coating and therefore has no tendency to adhere to a limp blank. On the other hand, the arcuate depression in the soft resilient face of the applicator roll, at the exit of the depression tends to guide the leading edge of a blank, already bowed upwardly in the nip, away from the coated face of the roll to force the leading edge to strip itself from the roll. Thus the leading edge is bowed away from the fully coated roll and subjected only to such adhesion as may be exerted by coating in the recesses of the hard-faced gravure roll, or to no adhesion at all from coating in the grooves of a grooved roll, and therefore is able to continue along the paper line, or blank path, without wrapping around either roll.

A gravure roll will not work well with low viscosity coatings because usually such low viscosity coatings, after the doctoring of the gravure roll, still not only fill the gravured recesses, but project slightly therefrom. Thus the gravure-type recessed roll has been found useful mainly with high viscosity coatings, while the circumferentially grooved roll, with its groove cleaning capability, has been found useful with both high and low viscosity coatings.

The narrow, closely spaced grooves and ribs used on the hard-faced grooved roll in the coating nip of this invention are preferably curved in cross section to form identical waves, or undulations. Such a hard-faced, recessed, roll has been found to be most advantageous as the reversely rotating metering roll used in the coating supply means which feeds the highly viscous coating to the applicator roll. As explained in the above-mentioned copending patent application, the wax polymer coating is circulated at a temperature of about 200° F. and the heated rolls are maintained at about 350° F. At such temperatures the heated metering rolls may tend to distort slightly, thereby producing a coating later which may vary in thickness. In this invention, by grooving the heated, hard-faced metering roll, in the same manner as the backer roll, a series of corresponding ribs and grooves of curved cross section are formed in the layer of coating composition on the soft, resilient face of the applicator roll. Upon reaching the coating nip, the nip pressure levels out the ribs and grooves into a coherent, smooth layer of uniform thickness for application to the blanks. By varying the speed of rotation of the grooved metering roll relative to the applicator roll, and varying the nip pressure therebetween, the configuration of the ribs and grooves of coating may be exactly controlled.

The principal object of the invention is to provide an apparatus and method for high glossing blanks of limp material with high viscosity coating compositions without pileup of excess coating in the entrance of the coating nip, and without wraparound of the blanks on the nip rolls.

Another object of the invention is to provide roll-coating apparatus for use with high viscosity wax polymer coatings in which individual and successive blanks may be passed through a coating nip while self-stripping the leading edges thereof from the viscous coating on the rolls.

Another object of this invention is to provide roll coating apparatus for coating blanks advancing individually and successively through coating roll nips, which eliminates the undesirable effects of the slightest "run out," or lack of trueness, of the rolls, as well as the undesirable effects of variations in caliber, or thickness, of the blanks, thereby achieving consistent high quality coatings under normally varying conditions.

A further object of this invention is to provide improved means for handling high viscosity coating compositions in the roll coating of individual, successive flat box blanks, wherein the rolls may be operated at temperatures lower than heretofore required for such high viscosity coatings, thereby lengthening the life of the rubber-covered rolls, permitting the use of less costly rubber on the rolls, and reducing the cost of operation. In the prior art, it has been necessary to continually

increase the operating temperatures of the rolls to thereby reduce the viscosity of the coating composition, such increased heat requiring more expensive, heat resistant rolls. This invention, by enabling lower operating temperatures, achieves less heat losses and reduces the consumption of power.

Other objects and advantages of the invention will be apparent from the claims, the description of the drawings, and from the drawings, in which

FIG. 1 is a somewhat diagrammatic, perspective view, from one side of a roll-coating machine constructed in accordance with the invention;

FIG. 2 is a plan view of the device shown in FIG. 1 with parts broken away;

FIG. 3 is an enlarged diagrammatic side elevation of a pair of conventional smooth-faced rolls having a clearance at the nip, when no blank is passing therethrough, to indicate that no tendency to glob, and no wringer roll action, is present;

FIG. 4 is a view similar to FIG. 3 and showing that when there is no nip clearance in the absence of a blank, one roll being pressed into the other, the globbing, or wringer roll effect occurs;

FIG. 5 is a view similar to FIG. 3 and showing that when there is no nip clearance, no blank in the nip and one roll, grooved as taught herein, is pressed into the other, the grooved roll of the invention eliminates globbing and wringer roll effect by permitting the coating to pass through the nip in the grooves to be removed by the grooved doctor blade;

FIG. 6 is a view similar to FIG. 5 and showing that the grooved roll structure of FIG. 5, when a blank is passing through the nip, causes all of the coating to be applied by the applicator roll, while the grooved roll carries away any coating glob which accumulated in the nip between the previous blank and the blank being coated;

FIG. 7 is a view similar to FIGS. 5 and 6, but showing the metering roll grooved in accordance with the invention herein;

FIG. 8 is a diagrammatic, side elevation of another embodiment of the invention in which the hard faced, recessed, roll is also an applicator roll;

FIG. 9 is a diagrammatic side elevation, showing another embodiment of the invention in which resilient faced doctor roll is used in place of a grooved doctor blade for removing excess coating from a gravured backer roll, the applicator roll being a pattern roll;

FIG. 10 is a view similar to FIG. 9 showing a patterned applicator roll and a grooved backer roll;

FIG. 11 is a diagrammatic, perspective view showing a grooved metering roll, operable on the applicator roll;

FIG. 12 is an enlarged side elevation of the grooved metering roll;

FIG. 13 is a fragmentary end elevation of a grooved roll of the invention;

FIG. 14 is a fragmentary end elevation of a grooved doctor blade of the invention; and

FIG. 15 is an enlarged diagrammatic fragmentary view of the ribs and grooves of coating formed on the applicator roll by the grooved metering roll of the invention.

As shown in FIGS. 1 and 11, and as explained in detail in the aforesaid copending patent application, a coating machine 30 of the type disclosed herein, includes a blank feed zone 31, roll-coating zone 32, which reverse rotating smoothing rolls, a flame polishing zone 33, and a quick chilling zone 34. There are suitable conveyors, such as 35 and 36, to support the individual blanks, or sheets, 37, and advance the same successively, in spaced-apart relationship, along the paper line, or path, 38. The apparatus includes suitable power means, coating circulation means, roll-heating means, and chilling means, not shown, all as are now well-known in the art, and commercially available as the "I.P.B.M. Co. Model GM" Coater made by The International Paper Box Machine Company of Nashua, New Hampshire.

Each flat box blank, such as 37, includes a leading edge 40, trailing edge 41, an upper face 42, and a lower face 43, plus the usual flaps, panels, tabs, and cutouts. It will be understood that, in passing through the roll-coating zone, the various free edges of each blank and its flaps or cutouts, variously affect the layer of coating on the coating roll in that the coating nip is continually and rapidly changing from a condition in which there is sheet material therein to a condition in which there is no material therein. The material of the blanks, such as the paperboard 44 may be stiff and relatively rigid, whether thick or thin, or it may be limp, whether thick or thin. The apparatus of the invention is designed to accurately and properly coat such material, whether stiff or limp, but particularly to handle limp blanks which, in conventional roll-coating machines, have tended to wrap around one nip roll or the other, especially with highly viscous wax polymer coatings such as 45. Such coatings are now well known, for example, "Mobil Cote" made by Mobil Oil Company of New York, New York, and may range up to 5,000 centerpoises and be substantially nonflowable at application temperature of about 225° F.

In the roll-coating zone 32 of the machine 30 of this invention, at least one roll-coating means 46, and preferably another roll-coating means 47, is provided for roll-applying a thin layer of the viscous wax polymer coating 45 on at least one face 42, and preferably the other face 43 of each of the blanks 37 advancing individually and successively along the path 38.

Roll-coating means 46 includes the coating applicator roll 50, provided with a soft, deformable, yieldable, resilient face 51 of rubber, having a durometer no greater than 70 and preferably about 35—40. The face 51 is of substantial thickness, not less than 3/16 inches of rubber to reduce excessive strains in the rubber when deflected as described herein. A layer of coating 45 is deposited on the yieldable, resilient surface 51 by a transfer roll 52 rotating in a tank 53 containing coating 45, the thickness of the layer on surface 51 being metered by the metering roll 54, which preferably reversely rotates relative to the forwardly rotating roll 50. A doctor blade 55 cleans the metering roll 54 of coating and all of the rolls 50, 52 and 54 are maintained at well above the coating application temperature of about 225° F. by hot oil circulating means which is now conventional and therefore not shown. Roll-coating means 46 also includes the backer roll 57, which is oppositely disposed to applicator roll 50 to form the coating nip 58 therewith, the backer roll 57 having a hard surface 59. Hard surface 59 contains a multiplicity of spaced recesses 61, separated by rounded ribs, webs or lands 62, the recesses preferably being in the form of closely spaced circumferentially extending rounded grooves 63, which are shallow and narrow to total about 60 to the inch. The unrecessed area of hard face 59 is approximately equal to the recessed area formed by grooves 63. Backer roll 57 preferably rotates forwardly, so that the meeting faces of rolls 50 and 57 tend to advance the blanks through the coating nip 58, and backer roll 57 is heated in the same manner as are the other heated rolls of the machine. Coating-removal means 65 is provided in the form of a doctor blade 66, having a grooved and ribbed edge 67, corresponding with, and mating with, the grooves 63 and ribs 62 of hard face 59. Blade 66 is mounted on machine 20 to engage surface 59 of backer roll 57 in rear of the exit 68 of coating nip 58 and in advance of the entrance 69 of coating nip 58. The edge 67 is therefore identically undulated in form to mate with the grooved face 59.

Blade 66 is V-shaped to form a trough, thereby permitting the excess coating scraped from the grooved face 59 to run off the ends for redeposit in the coating circulation system. It may be hollow and heated as part of the hot oil circulation system of machine 20, or may be heated by electric resistance units of a well known type, if desired.

By reason of the grooves 63, any excess viscous coating 45 tending to pile up at the entrance 69 of coating nip 58, as a glob, between successive blanks, and tending not to be carried through the nip on the leading edge 40 of a blank or be

smeared over the upper face 42 of a blank, may advance through the nip 58 in a groove of the backer roll, and then may be scraped off the roll 57 by blade 66. Thus pile-up at the entrance of the nip is avoided.

Pressure-applying means 71 is provided in the form of journal blocks 72 and 73 (FIG. 12) in which rolls 50 and 57 are journaled, the blocks being vertically slidable in suitable tracks and spring-biased toward each other, so that any desired nip pressure may be secured, all in a manner well known in the art. The rolls 50 and 57 are pressed together with sufficient pressure to cause the hard face 59 to create an arcuate depression 74 in the soft resilient face 51 of roll 50. While the bending or bowing of paperboard blanks during treatment is conventionally avoided in the art, I have found that the passage of paperboard blanks 37, whether stiff or limp, through the arcuate depression 74 does not disadvantageously affect them in view of the further treatment they receive in machine 20. It will be seen that a blank 37 entering nip 58 will not only be free of globs of excess coating but will have its leading edge portion 40 bowed downwardly at the entrance 69 while the lower face 43 receives the viscous coating 45 and while the grooved face 59 of backer roll 57 applies predetermined pressure on the upper face 42.

At the exit 68 of coating nip 58, instead of continuing to adhere to the viscous coating 45 on applicator roll 50 and failing to strip therefrom, the leading edge portion 40 is bowed upwardly away from face 51 and inherently strips itself away from the coating. At the same time, the leading edge 40 has not embedded itself in any glob of coating on the backer roll 57 because of the grooves 63, and any excess coating piled up at the entrance 69 has been received in the grooves, or has been pressed thereinto by nip pressure so that there is no substantial adhesion effect exerted on the upper face of the blank. The unrecessed area, or ribs, of roll 57 contain no adhesive at all, and the upwardly bowed leading edge 40 can thus strip itself from the backer roll 57 as well as from the coating covered applicator roll 50.

The blanks 37 then advance into the control of the smoothing roll means 75, which consists of the forwardly rotating chill roll 76 and reversely rotating, heated, smoothing roll 77, which form a nip 78 for not only smoothing the viscous coating but also tending to flatten the blanks free of any bow.

The other roll-coating means 47 in the coating zone 32 is similar to means 46 but adapted to coat the other face 42 of the blanks. As shown, means 47 includes the soft resilient-faced upper applicator roll 80, the grooved backer roll 81, forming a coating nip 82 therewith, and the grooved doctor blade 83, the pressure means 84 creating an arcuate depression 85 in applicator roll 80. As disclosed in the aforesaid patent application, the highly viscous, wax polymer coating 45 is deposited on the resilient face 86 of roll 80 by liquid curtain means 87, the deposited layer being metered by meter roll 88, and the meter roll cleaned by blade 89.

In FIG. 3, conventional roll-coating means is illustrated diagrammatically, to show a clearance between the coating applicator roll 50 and a conventional, smooth-faced backer roll 56, there being no blank in the nip 58. It will be seen that coating is not transferred to the backer roll 56 due to the nip clearance, so that the coating split tendency is reduced. The globbing, or wringer action, at the entrance 69 of the nip is avoided but wraparound on the applicator roll 50 may still occur while a blank is being coated in the nip 58.

As shown in FIG. 4, when the smooth-faced backer roll 56 and resilient faced roll 50 are pressed together to eliminate nip clearance and create an arcuate depression, the pressure being necessary and desirable in the handling of high viscosity coatings, a globbing and wringer action occurs in that the glob 48 accumulates in the nip entrance 69 and cannot pass through the nip.

In FIG. 5, however, one of the coating means such as 46 of the invention is illustrated, means 46 including the grooved backer roll 57, there being no blank in the nip 58 and the rolls being under pressure to form an arcuate depression in the resilient, deformable face 51. It will be noted that the coating 45 does not form a glob 48 at the nip entrance 69 because the coating is able to pass through the nip in the grooves 63 of the backer roll 57, to be removed from the grooves by the grooved coating-removal means 65.

In FIG. 6, the structure of FIG. 5 is shown with a blank passing through the nip 58, and receiving all of the coating applied thereto by the roll 50, so that no glob is formed. The portion 48 of coating 45, which was pressed into the grooves during the interval between blanks, is shown being carried around in the grooves to the removal means 65.

FIG. 7 is substantially identical with FIG. 6, except that it shows the provision of the grooved and ribbed hard face of the invention to the metering roll which meters the applicator roll 50, for a purpose to be explained hereinafter.

In FIG. 8, a coating device is shown in which both faces 42 and 43 of each blank 37 are coated at the same time. The applicator roll 50 applies a layer of coating 45 to the lower face 43, and the hard-faced backer roll 57 is gravured with recesses 61 to serve as a combined backer roll and applicator roll. Liquid curtain means 87 deposits a layer of coating 45 on roll 57, which is scraped by doctor blade 88 and then deposited on the upper face 42 of each blank at the nip. The smoothing roll means 75 smooths one coated face, and the second means 75 smooths the other coated face. When the hard-faced roll 57 is gravured for the purpose of eliminating globs, or pile-up, at the nip, the recesses 61 are relatively large, or coarse. When used for applying a coating, the recesses 61 are relatively small, or fine. When as in FIG. 8, the gravure recesses 61 are used for both applying a coating and eliminating nip pile-up, the recesses then fall between coarse and fine depending on the viscosity of the coating.

In FIG. 9, an embodiment is shown in which the applicator roll 50 is provided with a soft, resilient face 51, formed by a detachable patterned blanket 91 of soft rubber, of a type now well known in the art. The roll 50 is opposed by the hard-faced backer roll 57, having relatively coarse gravured recesses 61, and the rolls 50 and 57 are pressed together to form the arcuate depression 74. The coating removal means 65 may be a resilient faced, heated roll 92, which is in turn doctored by roll 93 and roll 93 is scraped by the doctor blade 94. Any excess coating at the entrance of the coating nip 58 is carried through the nip in the recesses 61 and removed from the recesses by the roll 92. The coating removal means 65 may also be a doctor blade, when high viscosity coatings are used, such coatings tending to be slightly scraped out of the gravure recesses so that the deposits remaining in each recess have a dished surface capable of receiving additional coating in passing through the nip.

In FIG. 10, another embodiment is shown, in which the backer roll 57 is provided with the grooves 63, scraped clean by the grooved blade 66 and the applicator roll 50 is sleeved with the soft, resilient pattern blanket 91 of rubber. The coating supply means includes the roll 96, scraped by a blade 97 and forming a nip reservoir 98 therewith.

In FIGS. 11—15, the heated applicator roll 50, with its soft resilient face 51 is shown, with a reversely rotating, metering roll 100, corresponding to roll 54, but having a multiplicity of circumferentially extending grooves 101, similar to grooves 63. A smooth-faced metering roll, heated to the temperature of the hot oil circulating system of machine 20, of about 350° F., in order to handle the viscous, wax polymer coating composition 45 applied at about 225° F., has been found difficult to maintain true and straight. Any slight distortion in such a metering roll may cause the coating applied to be more thick in the middle than at the ends.

In this invention, as shown diagrammatically in FIG. 12, by grooving the metering roll circumferentially and pressing it with variable, and predetermined, nip pressure by known means 102, similar to means 71, the narrow, closely spaced ribs 103 between grooves 101 form furrows 104 in the face 51, and the grooves 101 form ribs 105 in the face 51. By varying the speed of the reversely rotating metering roll 100, by the

variable speed means **106**, and adjusting the pressure means **102**, closely spaced, parallel ribs **107** of coating **45** are formed on roll **50**, all substantially identical in dimension, and preferably of undulated configuration, the ribs of coating **107** being flattened into a coherent, smooth layer **108** on the blanks **37**, by the pressure of coating nip **58**. As indicated in FIG. **15**, if nip pressure of the metering roll **100** is increased, the rubber of face **51** is forced into the grooves and there is less coating in the ribs **107**. If pressure is decreased there is less deformation of the rubber **51**, and the curved section grooves **101** are more nearly filled to capacity with coating **45**. A doctor blade **109**, having an undulated, grooved edge similar to edge **67**, is provided to clear the metering roll grooves of coating.

While I prefer to use a hard-faced backer roll **57** of metal, opposed by a rubber-faced applicator roll **50**, it will be apparent that so long as the backer roll is of a material hard enough to form an arcuate depression in the material of the applicator roll, the resulting structure will probably carry out the purpose of the invention.

I claim:

1. Apparatus for applying a high viscosity coating to a plurality of flat box blanks, while said blanks are advancing individually and successively along a path through a coating machine, said apparatus comprising:

roll-coating means mounted along said path, said means including a coating applicator roll having a resilient, deformable, coating face applying said coating to one face of said blank;

a backer roll mounted opposite said applicator roll, along said path, and forming a coating nip therewith, said backer roll having a hard circumferential face;

pressure-applying means operably connected to said applicator roll and backer roll, and continuously pressing said rolls together for causing said backer roll to deform the resilient face of said applicator roll in an arcuate depression at said nip in the absence of a blank therein;

a multiplicity of closely spaced, minute recesses in the hard face of said backer roll, extending over substantially the entire area thereof, said recesses receiving any excess coating piling up at the entrance of said nip, and carrying the same through said nip; and

coating removal means, operative on the said hard, recessed face of said backer roll for removing coating from said backer roll during rotation of said backer roll. prescribed

2. Apparatus as specified in claim 1, wherein:

said multiplicity of closely spaced, minute recesses are narrow, parallel circumferential grooves, the webs of the hard face therebetween constituting a multiplicity of closely spaced, narrow ribs or lands; and

said coating removal means is a doctor blade having an edge of groove and rib configuration substantially identical with, and mating with, the grooves and ribs of said face, for scraping out said grooves and removing said excess coating therefrom.

3. Apparatus as specified in claim 2, wherein said grooves and ribs on said backer roll and on said doctor blade are curved in cross section to form a series of identical rounded undulations, said undulations deforming the resilient face of said applicator roll, into corresponding undulations along said pressure nip.

4. Apparatus as specified in claim 1, wherein:

said backer roll is a gravure roll and said hard face includes a multiplicity of identical gravure-type pockets for receiving said coating; and

said coating-removal means includes a resilient-faced doctor member in contact with said hard face for removing coating from the pockets therein, whereby pile-up at said nip entrance is avoided, the absence of coating on the unrecessed area of said backer roll permits the leading edge of each blank to be strippable therefrom, and the said arcuate depression tends to direct the said leading edge away from said applicator roll in rear of said nip to strip the same therefrom.

5. Apparatus as specified in claim 4, plus coating-supply means supplying high viscosity coating to the hard, pocketed face of said gravure backing roll, in advance of said coating-removal means, to fill said recesses for deposit on the other face of said blanks, and roll means, including a nip, further along said path, for smoothing the said deposits on said other face.

6. Apparatus as specified in claim 1, wherein the resilient deformable coating face of said applicator roll has a durometer of less than 70 and in the range of about 35—40.

7. Apparatus as specified in claim 1, plus:

a metering roll having a surface formed with a multiplicity of closely spaced, narrow, parallel, circumferential grooves and ribs, forming a nip with the resilient face of said applicator roll;

variable speed means for rotating said metering roll reversely relative to the direction of rotation of said applicator roll; and

doctor blade means operable on said metering roll, for scraping out the grooves thereof in rear of said metering nip, whereby said grooved metering roll creates a ribbed deposit on said applicator roll which is flattened into uniform thickness at the said coating nip and the surface speed of said metering roll controls the height of said ribs and thickness of said uniform coating.

8. In roll-coating apparatus for applying a high viscosity, tacky coating to one face of a plurality of flat box blanks advancing individually and successively along a path the combination of:

a coating applicator roll having a resilient deformable coating face;

a backer roll having a hard face forming a pressure nip with said applicator roll face on said path;

a metering roll, having a finely grooved and ribbed face engaging said applicator roll face at a metering nip located in advance of said coating nip; and

pressure applying means, operably connected to said metering roll, for adjusting the nip pressure at said metering nip to control the arcuate deformation of the resilient face of said applicator roll by the hard-grooved face of said metering roll.

9. In roll-coating apparatus for applying a high viscosity, tacky coating to one face of a plurality of flat box blanks advancing individually and successively along a path, the combination of:

a coating applicator roll having a resilient, deformable, coating face;

a backer roll having a hard face formed with a multiplicity of fine, circumferential grooves and ribs, and forming a nip with the said applicator roll face on said path;

and pressure means operably connected to said applicator roll and backer roll, to cause said grooved backer roll face to form an arcuate depression in said resilient applicator roll face at said nip whereby said coating may pass through said nip in said grooves to avoid accumulation of excess coating at the entrance of said nip.