

April 21, 1959 H. Y. JENNINGS 2,883,303
METHOD AND APPARATUS FOR COATING PAPER WITH
AN AQUEOUS DISPERSION OF LATEX
Filed March 22, 1954 2 Sheets-Sheet 1

9 H. Y. JENNINGS 2
METHOD AND APPARATUS FOR COATING PAPER WITH
AN AQUEOUS DISPERSION OF LATEX

2,883,303

Filed March 22, 1954

2 Sheets-Sheet 1

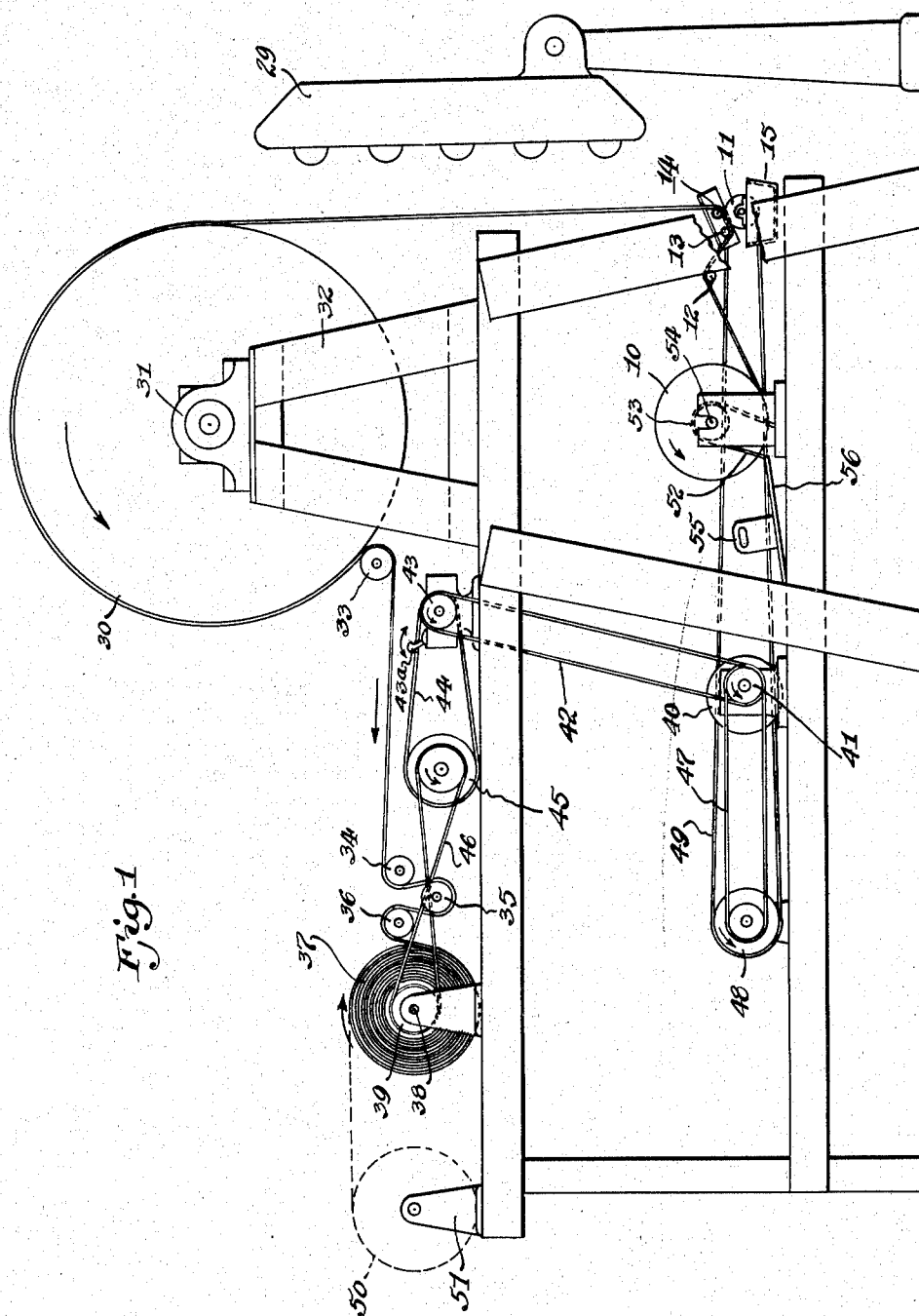


Fig. 1

INVENTOR.
BY *Harley Y. Jennings*
Barnes, Keselle, Laughlin & Risch
Attorneys.

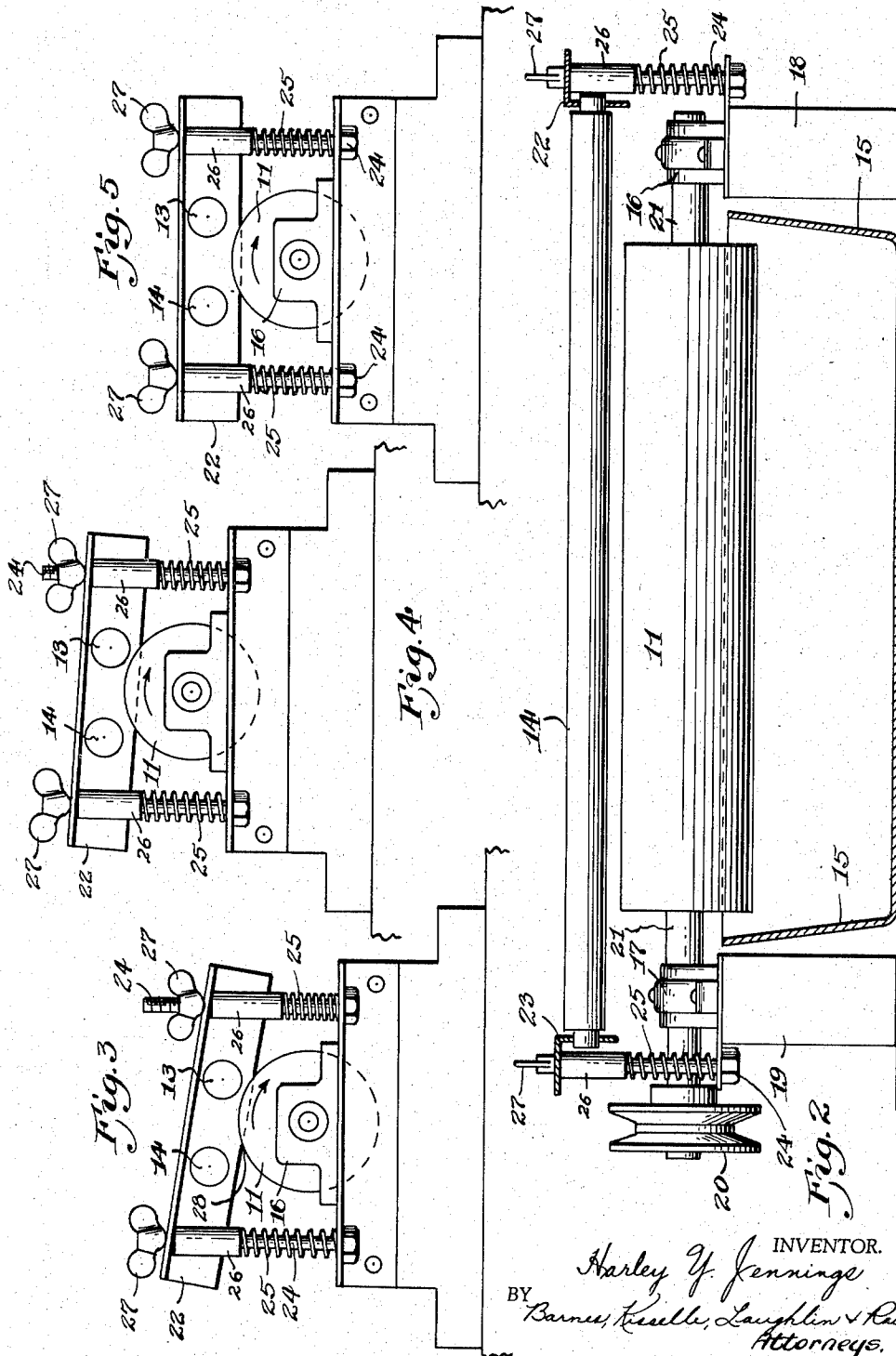
April 21, 1959

H. Y. JENNINGS
METHOD AND APPARATUS FOR COATING PAPER WITH
AN AQUEOUS DISPERSION OF LATEX

2,883,303

Filed March 22, 1954

2 Sheets-Sheet 2



INVENTOR.
Harley Y. Jennings
BY *Barnes, Kessell, Laughlin & Reich*
Attorneys.

1

2,883,303

METHOD AND APPARATUS FOR COATING PAPER WITH AN AQUEOUS DISPERSION OF LATEX

Harley Y. Jennings, Danville, Va., assignor, by mesne assignments, to Sherman Paper Products Corporation, Newton Upper Falls, Mass., a corporation of Massachusetts

Application March 22, 1954, Serial No. 417,773

3 Claims. (Cl. 117—111)

This invention relates to coated paper and to the method of making such paper.

More specifically, the invention relates to an apparatus for applying an aqueous dispersion of rubber in a uniform coating to a backing material and to the method and means for thereafter dispensing the rubber sheet thus formed from a roll and for otherwise using the coated sheet in a new and novel manner.

It is an object of the present invention to provide uncured rubber sheets deposited from an aqueous dispersion of rubber in a readily accessible and usable form. The present is in part an improvement over the invention described in Reissue Patent No. 21,065, granted May 2, 1939, and assigned to the assignee of the present invention. According to that patent, a rubber sheet or strip is dispensed from between two sheets or strips of paper by rupturing the paper and pulling out the rubber sheet under a tension sufficient to reduce the thickness of the rubber strip or sheet to the point where it will slide out freely from between the two protecting sheets.

According to the present invention, I have found a single sheet of paper may be coated on one side with rubber deposited from an aqueous dispersion, and that the paper may then be rolled into a tight roll, preferably although not necessarily, with the latex coating facing toward the center of the roll, from which roll the latex sheet may be dispensed as needed and as hereafter described.

Instead of dispensing the latex film or sheet from the roll and using it per se as a wrapping material, it may be desirable to cut off a piece of the latex-coated paper from the roll and wrap it around an article to be packaged, with the coated side adjacent the article, and with the edges of the paper pressed together around the article, whereby, because of the inherent self-sealing property of unvulcanized latex, the article will be enclosed in a self-sealed, dust-proof and moisture-proof package, which cannot easily be punctured. The latex film on the paper serves the double purpose of providing a self-sealing joint around the edges of the article and also acting as a temporary protective coating for the article. In addition, should the paper backing be ruptured, the latex film, because it is readily distortable and resilient, will continue to offer protection to the article in spite of the torn or ruptured paper.

In order to provide satisfactory latex-coated paper to be used as previously described, it is desirable that a selected type of paper be used and that the latex be applied to the paper in the manner herein described. The paper used should be of such composition that the dried latex film will adhere tenaciously to it when it is being unrolled, but it is also necessary that the back surface of the paper, that is the uncoated side, should be such that there will be substantially no adhesion between it and the latexed surface when the coated paper is being unrolled.

The latex should be applied in such a manner as to pro-

2

vide a smooth, continuous film when it is dried, and should be non-tacky, so that it will leave no deposit when it is removed from a surface to which it has been applied for protective purposes, such for example as a glass or enameled surface or a polished metal surface. Further, the latex film should be quite substantial and heavy; that is, it should be capable of being distorted or extended without rupturing. An important feature of my invention, therefore, is the provision of a laminated latex and paper sheet wherein the latex film is heavy or thick enough to distort and stretch even though the backing sheet of paper be torn or ruptured.

Other objects and advantages of the invention will be readily apparent from the following description and accompanying drawings herein:

Fig. 1 is a diagrammatic elevational view of a coating apparatus showing a method of applying latex film to a backing sheet.

Fig. 2 is a rear elevation on an enlarged scale of the coating roll and its cooperating parts and

Figs. 3, 4 and 5 are side elevations of the coating roll of Fig. 2 and showing different adjustments of the means for regulating the thickness of the applied latex coating.

Referring to Fig. 1, 10 designates a roll of backing material to be coated. In practicing my invention with paper as the backing material, I prefer to use a paper such as ordinary kraft paper which has been polished or supercalendered on one side only. The latex film is applied to the unpolished side, which is of ordinary texture, slightly porous and rough, so that the latex film will adhere firmly thereto. When the laminated paper is being unrolled, however, after the latex film has set, the latexed surface which contacts the polished or calendered back surface of the paper will readily separate therefrom without taking any paper particles or lint with it. Instead of using a paper supercalendered on one side by a mechanical polishing action, I may use a paper which has had one side filled with an agent such as starch or zein to give a substantially smooth non-porous polished surface.

Further, I have also found that other materials than paper may be used as the backing material. For example, if a transparent sheet is required through which wrapped articles may be viewed, Pliofilm, a rubber hydrochloride sheeting made by The Goodyear Tire and Rubber Company of Akron, Ohio, may be used. This material has been successfully coated with latex on the apparatus about to be described. Likewise I have successfully coated cellophane (preferably non-moisture proof) and cellulose acetate sheeting. In coating any of these transparent non-fibrous materials with latex it is advisable that a protective sheet of some material be wound into the roll in contact with the latexed surface after that surface has dried, so as to form an interliner between the latex-coated surface and the uncoated surface of the transparent sheeting. I have successfully used a starch-backed kraft paper as an interliner, with the starched surface disposed in contact with the latex surface, and find that the kraft interliner thus used can be readily stripped from the latexed surface, leaving the latex-coated transparent sheeting available for its intended use.

The paper travels from the roll 10 in a generally horizontal direction to the coating roll 11, first passing over a guide bar 12 and then under a pair of movable rolls 13 and 14 disposed adjacent and above the coating roll 11. The coating roll 11, which is preferably made of polished metal, dips into a trough 15 containing the latex coating bath. Roll 11 is mounted in bearings 16, 17 mounted on blocks 18 and 19 respectively. Roll 11 is positively driven through a pulley 20 rigidly attached to the portion 21 of roll 11 which extends through the

3

bearing 17 (Fig. 2). Rolls 13 and 14, extending parallel to and above coating roll 11 are freely rotatable in angle irons 22, 23. The angle irons 22 and 23 are in turn adjustably supported by pairs of bolts 24 extending through the horizontal flanges of the respective angle irons. The adjustment for the angle irons 22, 23 and the rolls 13 and 14 is obtained by means of springs 25 surrounding each bolt 24 and bearing against a slidable sleeve 26 which in turn bears against the under side of the horizontal flange of each angle iron. The position of each angle iron is determined by the adjusted position of thumb screws 27 provided on the ends of the respective bolts 24 above the horizontal flanges of each angle iron 13 and 14. Figs. 3, 4 and 5 illustrate various adjusted positions of the rolls 13 and 14, Fig. 3 being the preferred position for most conditions of operation.

There are three important factors with respect to this coating mechanism which cooperate to provide a smooth, uniform latex coating on the backing material.

(1) The coating roll 11 turns in the direction opposite that in which the material being coated is moving.

(2) The coating roll 11 is positively driven and rotates at a rate faster than the rate at which the backing material moves, preferably about twice as fast, and

(3) The position at which the backing material leaves the coating roll is substantially at a right angle to the horizontal position at which it contacts the roll 11 and is somewhat offcenter (to the left in Fig. 1 with respect to the vertical center line of the coating roll).

This arrangement of parts provides a pocket 28 formed in the angle between the vertically moving backing material and the coating roll (Fig. 3). Because of its relatively high speed and the direction in which the coating roll 11 moves, an excess of latex is maintained in the pocket 28, thus assuring an ample supply at all times and insuring a relatively heavy uniform coating. An additional feature of this arrangement, as has been shown by repeated operation, is that there is no coagulation of the latex around the roll as is common with other coating devices.

The concentration of the latex bath determines the thickness of the film to be deposited. I have found that concentrations of from 20% to 40% solids are satisfactory depending on the ultimate use to which the coated material is to be put. The latex bath may be pure latex or it may be compounded with suitable ingredients such as stabilizers, fillers, and deodorants. I have found that a compounded latex sold by American Anode, Inc. of Akron, Ohio, under the name Protex No. 11776 is particularly suited for paper coating purposes.

After being coated, the material may be passed adjacent a heating element 29, here shown as a bank of infra-red lamps. It then passes, with its coated side exposed, over a heated drum 30. The element 29 and drum 30 remove substantially all the free moisture from the coated material and the drum 30 also helps to smooth the material. The drum 30 turns freely in bearing blocks 31 mounted on suitable supports 32. The coated material then passes under guide roll 33, over guide roll 34, under guide roll 35, over guide roll 36 and is wound, with the coated side innermost, into a roll 37. The shaft 38 supporting roll 37 is positively driven from pulley 39 attached to shaft 38. The source of power is motor 40, pulley 41, belt 42, speed control mechanism 43, with operating lever 43a, belt 44, pulley 45, belt 46, and pulley 39. Motor 40 also drives coating roll 11 through belt 47, pulley 48, belt 49 and pulley 20.

When, as previously explained, it is desirable to use an interliner in connection with non-fibrous backing materials, such as Pliofilm, cellophane, or cellulose acetate, such an interliner may be conveniently applied from a roll of kraft paper, freely rotatable in supports 51 disposed adjacent the wind-up roll 37. This paper which is preferably polished or starch-filled on one side, is fed into the roll 37 with the filled surface contacting the

4

latex-coated side of the backing-sheet. Rotation of the roll 37 releases the paper from the roll 50 as required.

A brake comprising a flexible strap 52 extending around a brake drum 53 formed on the shaft 54 supporting roll 10, may be used to exert a drag on roll 10 and thus maintain the material on roll 10 taut as it is being released. The amount of drag may be regulated by weights 55 resting on a rigid member 56 attached to one end of strap 52.

The factors of time and temperature are most important in conditioning the latex-coated surface before the coated material is rolled. The main point is that substantially all the moisture should be removed before the coating material is rolled, but the heat applied, and the time the latexed surface is exposed to the air should be just short of that required to "cure" the latex. This leaves the rubber surface in such a condition that when it is unrolled, the latexed surface will be self-adherent when contacted with itself to form a homogeneous rubber mass which cannot be again separated to its original form. Generally speaking the heat applied should not exceed the boiling point of water, namely 212° F. although this should not be construed as a strict limitation, for the exact temperature will be determined by the nature of the latex compound used. Likewise, the time of exposure to the air before winding should be less than that required to "cure" the latex. The ordinary paper coating machine runs at a speed fast enough to prevent "curing" of the latex.

When the coated roll is completed, the latexed surface is protected from the atmosphere so that no further curing takes place, and when the sheet is unrolled the latexed surface is in such condition that when pressed upon itself the latex is self-sealing and forms a homogeneous body which cannot be separated from itself.

Obviously, the latex film may be of any desired thickness, determined by the concentration of the latex bath and the number of times the paper is run through the coating bath. It is necessary, however, that the applied rubber film be dried before the next film is applied.

The terms "latex," "aqueous dispersions of rubber," and "rubber," as used in the specification and claims are intended to cover both natural and synthetic material or combinations of natural and synthetic materials, as well as compounds or mixtures of natural or synthetic latices with other ingredients which may be added to impart stability, fluidity, viscosity and other desirable features of the coating bath, provided that the resultant film is non-tacky and has the property of self-adhesion.

Likewise, by the term "backing material" I mean any sheet material, fibrous or non-fibrous, such as paper, Pliofilm, cellophane or cellulose acetate, and by the term "paper" I mean any fibrous association capable of absorbing moisture.

This application is a continuation-in-part of my copending application Serial No. 156,421, filed April 17, 1950, now abandoned, which in turn was a continuation-in-part of my application Serial No. 475,629, filed February 12, 1943, now abandoned.

I claim:

1. The method of depositing a variable but predetermined coating of rubber on paper and storing the same in rolls whereby the paper and attached coating may be unrolled to present the rubber coating in condition to cohere to itself which comprises bringing the paper into contact with a coating roll which dips into an aqueous dispersion of latex and rotates in a direction opposite to that in which the paper is moving, depositing such aqueous dispersion of rubber on one side only of said paper in a uniform membrane of predetermined thickness by passing the material in circumferential area contact with the roll to such an extent that the membrane will have a uniform consistency and thickness, setting-up the membrane by the application of heat to a degree proportional to the thickness of the rubber applied to the extent that the coal

5

ing will temporarily cohere to itself but not adhere to other surfaces such as glass, enamel, metal and the back of the sheet, and rolling the resulting laminated sheet to exclude air and maintain the condition of the rubber as temporarily cohesive until it is dispensed by unrolling.

2. The method of depositing a variable but predetermined coating of rubber on paper and storing the same in rolls whereby the paper and attached coating may be unrolled to present the rubber coating in condition to cohere to itself which comprises bringing the paper into contact with a coating roll which dips into an aqueous dispersion of latex and rotates in a direction opposite to that in which the paper is moving, depositing such aqueous dispersion of rubber on one side only of said paper in a uniform coating of predetermined thickness by passing the material over said coating roll, controlling the thickness of said membrane by varying the reverse speed of said roll relative to said paper and by varying the circumferential area of said paper in contact with the roll without materially altering the friction between said paper and the roll, setting up the membrane by the application of heat to a degree empirically determined by the condition of the atmosphere and proportional to the thickness of the rubber applied to the extent that the coating will temporarily cohere to itself but not adhere to other surfaces such as glass, enamel, metal and the back of the sheet, and rolling the resulting laminated sheet to exclude air and maintain the condition of the rubber as temporarily cohesive until it is dispensed by unrolling.

3. An apparatus for coating a strip of paper with a layer of latex of predetermined thickness which comprises the combination of an applicator, a heating device and a wind-up roll, said applicator comprising a series of two small rolls and one larger roll in parallel relation, the centers of the rolls forming an inverted triangle in a cross-sectional plane with the small rolls at the base corners

6

and the large roll at the apex, means to position and adjust simultaneously, said small rolls relative to said large roll, whereby the axes of the small rolls overlie the large roll comprising parallel journal bars rotatably mounting said small rolls at the ends thereof, means at each end of said bars resiliently mounting the same for vertical adjustment and stop means selectively adjustable on said means to contact said bars whereby the angle of said bars and the relative vertical position of said small rolls may be varied to guide paper passing through said rolls in varying area surface contact with said large roll, depending on the relative vertical spacing of the small rolls, means to feed a supply of liquid latex to said large roll, said heating device comprising a bank of lights positioned to play on said paper as it leaves the applicator, and a heated roll interposed between said lights and said wind-up roll, said lights and heated roll being each adjustable in effective heat, whereby the condition of the applied latex as it approaches the windup roll may be pragmatically controlled.

References Cited in the file of this patent

UNITED STATES PATENTS

25	Re. 21,065	Copeman	May 2, 1939
	219,963	Mather	Sept. 23, 1879
	573,229	Metz	Dec. 15, 1915
	1,125,166	Pease	Jan. 19, 1915
	1,909,482	Barrett	May 16, 1933
30	2,320,513	Drummond	June 1, 1943
	2,325,798	Porter	Aug. 3, 1943
	2,432,074	Jennings	Dec. 2, 1947

FOREIGN PATENTS

35	478,167	Great Britain	Jan. 13, 1938
----	---------	---------------	---------------