

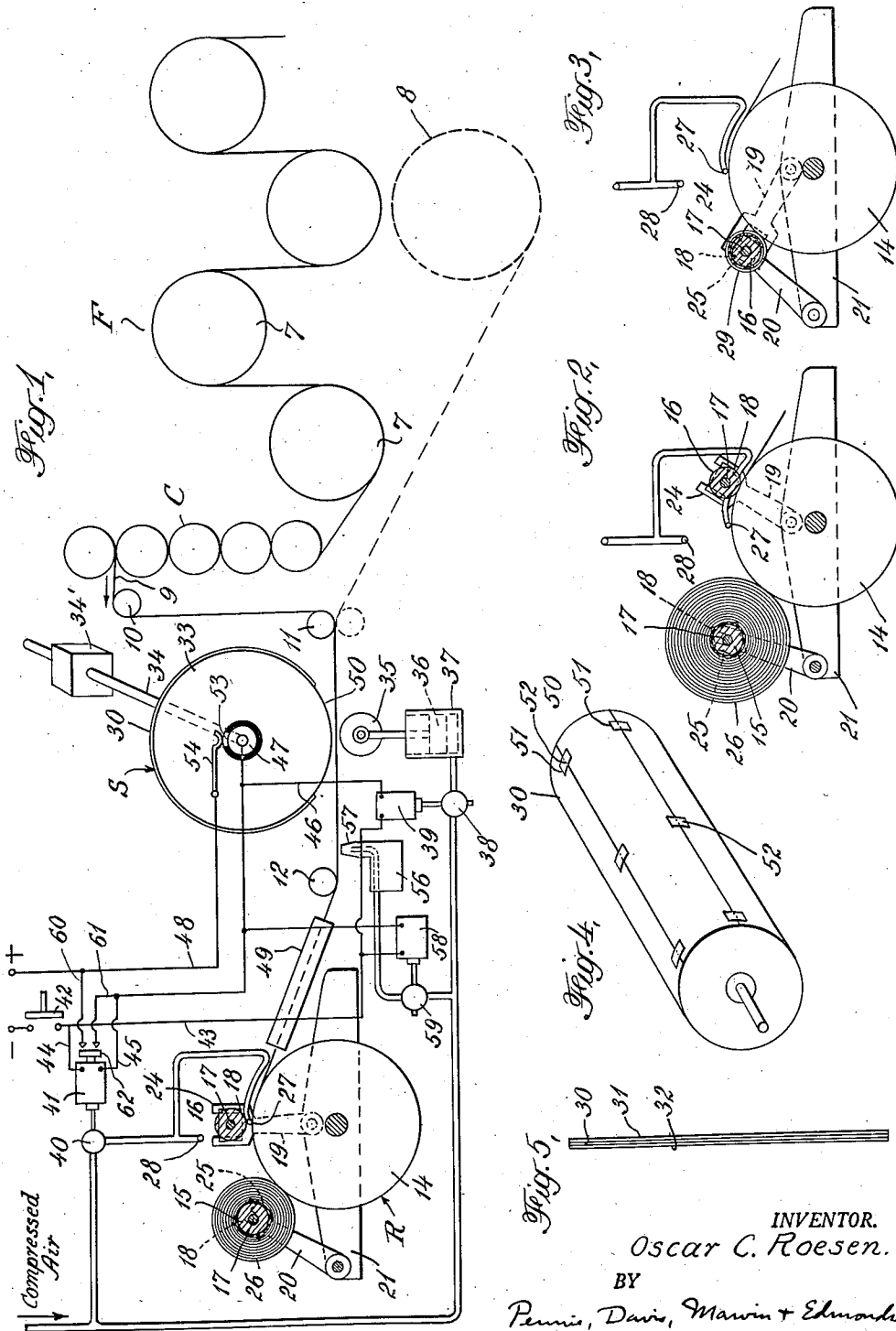
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APPARATUS FOR THE APPLICATION OF PREPARED ADHESIVE TO WEBS

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APPARATUS FOR THE APPLICATION OF
PREPARED ADHESIVE TO WEBS

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This invention relates to the application of coatings to webs of paper or like flexible sheet material, and more particularly concerns apparatus for use in the application of prepared adhesive and other coatings to the surfaces of such webs while continuously winding them into rolls for use by web-consuming apparatus.

One operation in which my invention is useful is the application of adhesive coatings, and in certain cases adhesive-repellent coatings, to an area of paper or other web which lies at or adjacent the central core end of the web on a web roll. I have heretofore devised a method and apparatus for splicing the web running from an expiring web roll to the leading end of the web on a new roll which involves the application of an adhesive, and, in some cases an adhesive repellent, to areas adjacent the inner or core end of the web on the roll. The method and apparatus so devised are described in detail in my copending application Serial No. 403,515, filed July 22, 1941, now Patent No. 2,320,656. In accordance with the invention disclosed in that application, layers of a special self-sticking adhesive are located respectively at the outer or leading end of the web and at or adjacent the inner or core end of the web on each roll. The self-sticking adhesive layers must be applied in liquid form and thereafter dried until their surfaces do not adhere to an uncoated web surface. The outer or leading end adhesive layer may be readily applied to the new web roll after it is wound up, either by applying the adhesive directly to the web on the roll and drying it thereon, or by splicing to the leading end of such web a short section carrying the desired adhesive layer. The complementary adhesive layer at or adjacent the inner or core end of the web on the roll obviously cannot be applied after the roll is wound up, and the application and drying of this material or of other coatings while the roll is being wound sometimes presents difficulties.

Paper web rolls are customarily formed by winding the web emerging from the calender or other final finishing device of a paper making machine or the web from a large parent roll onto suitable cores, the web being severed when each roll reaches the desired size and the severed end of the web being started on a new core without interrupting the continuous and rapid movement of the web. It is essential to convenient handling and economic production that the web move continuously to the winding device and that its speed of travel be maintained uniform throughout the

winding operations and while the web is shifted from a completed roll to a new core.

In accordance with the present invention, the self-sticking adhesive layer or other similar coating to be applied in liquid form and dried before winding the roll, is applied to and dried on thin sheets of paper or like material, and improved apparatus is employed to secure one of these sheets to the web surface as it travels at a high velocity to the roll winding device. The invention also contemplates the provision of a control mechanism that acts to correlate the application of the prepared coating-carrying sheet with the starting of a new roll so that the coating is disposed at or adjacent the inner or core end of the web on each roll.

Other objects, advantages and characteristic features of the invention will be pointed out or will become apparent as the description of the disclosed embodiment thereof progresses.

This application is a division of my copending application Serial No. 414,274, filed October 9, 1941, entitled "Application of prepared adhesive to webs."

In describing the invention in detail, reference will be made to the accompanying drawing in which a typical embodiment thereof has been illustrated. In the drawing;

Fig. 1 is a diagrammatic and simplified elevation of apparatus suitable for applying coatings to a web during the winding thereof into rolls in accordance with the invention;

Figs. 2 and 3 are simplified elevations, showing the roll-winding mechanism in different operating positions;

Fig. 4 is a perspective view of the cylinder employed to apply the prepared coating-carrying sheet to the web; and

Fig. 5 is an edge view of a coating-carrying sheet.

The present invention contemplates the application of a prepared coated sheet to at least one surface of a rapidly moving web running to a roll winding device and the synchronization of the application of such coating with the transfer of the web from a completed roll to the core of a new roll in such fashion that the section of the web bearing the coated sheet lies at or adjacent the inner or core end of the web on the roll. When the coating comprises an adhesive, the prepared sheet is preferably applied to that surface of the web which becomes the inner surface of each turn of the wound roll. In certain cases, an adhesive repellent is applied to the web surface opposite that bearing the adhesive, the repellent

coating preferably extending slightly beyond the adhesive coating toward the core end of the web on each roll for a purpose hereinafter explained.

The web 9 of paper or other flexible sheet material to which the coated sheets are applied may be supplied from a paper-making machine generally indicated at F in Fig. 1, or from a large parent roll 8. I have illustrated at 7 the usual drying drums of the paper-making machine F which may be of the Fourdrinier type. The paper web 9 is continuously formed in a known manner by the machine, and is dried on the drums 7 from which it passes to the usual calender C where its surface is finished.

The rapidly moving web 9 issuing from the calender C or from the parent roll 8 is guided by suitable rollers, 10, 11 and 12, past an adhesive sheet applying device designated S and to be described, to a roll winding device designated R. The device R may take any suitable form and generally is so designed that it winds the web 9 into a succession of web rolls of the desired size, severing the web running to a substantially completed roll and starting the severed end on a core to start the winding of a new roll without interrupting or retarding the rapid continuous movement of the web. Various forms of web roll winding devices for accomplishing these functions are known, and any of such known forms may be used within the scope of the present invention.

The winding device R illustrated is of the type generally termed a "Pope rewinder" and since its construction and operation are well known, it will be but generally described herein. The details of such a device are set forth in the Pope Patent No. 1,248,542. As illustrated in Figs. 1, 2 and 3, the device R includes an under roll 14 which is suitably driven at a speed such that its peripheral velocity is equal to or slightly greater than the velocity at which the web 9 is delivered to the winding device. The under roll 14 cooperates with two core rolls 15 and 16 to wind rolls of web successively thereon. Each core roll 15 and 16 has journals 17 extending through journal boxes 18. Two separately movable frames are provided for the core rolls, a starting frame comprising the arms 19 pivoted at a point above the axis of the under roll 14 and a running frame comprising a pair of arms 20 pivotally supported in the bed frame 21 at one side of the under roll 14. The arms 19 have bifurcated ends 24 constructed to receive the journal boxes 18, and the arms 20 have recesses 25 for receiving and engaging the core roll journals 17 as shown in Fig. 3.

In operation, while a web roll 26 is being wound on one of the core rolls 15 whose journals 17 are carried by the running frame arms 20, a second core roll 16 is placed in the starting frame arms 19 and disposed in the ready position as shown in Fig. 1 with the core surface out of contact with the web passed over the under roll 14. When the web roll 26 has reached the required size, the arms 19 are swung back to the starting position (Fig. 2) so that the core roll 16 engages the moving web backed by the under roll 14 and the core is accelerated to web speed by such engagement. The web is then severed at a point between the core 16 and the completed roll 26, preferably by a blast of compressed air issuing from a nozzle 27 and directed beneath the edge of the web carried on the under roll 14, and this air blast, aided if necessary by air from an auxiliary nozzle 28 extending transversely of the web,

starts the severed web end around the rotating core 16 and so initiates the winding of a new roll 29. The wound roll 26 on the core 15 is then removed and the starting frame arms 19 are swung in the direction of web travel to the transfer position (Fig. 3) in which the journals 17 of the core 16 rest in the recesses 25 of the running frame arms 20. As the new roll 29 builds up, the journal boxes 18 are lifted from the bifurcated ends 24 of the starting frame arms 19 whereupon these arms are swung back to the ready position (Fig. 1) to receive a new core in preparation for the next web transfer operation, thus completing the cycle.

The device S acts to apply to the web 9 a prepared sheet 30 (Fig. 5) carrying an applied and dried coating 31 on the surface thereof which becomes the exposed surface when the sheet is secured to the web. The sheet may be formed of any thin flexible material such as thin paper, thin transparent sheets of degenerated cellulose or cellulose derivatives or the like. The coating 31 may comprise any coating material which is applied in liquid form and dried. The invention is particularly applicable to the preparation of paper web rolls for use in printing presses, and in such application, the coating 31 preferably comprises a self-sticking adhesive such as a rubber cement. Such materials are described in detail in my Patent No. 2,320,656, referred to above. As there explained, the self-sticking adhesives have the property of adhering tenaciously to a paper or other web when applied thereto in liquid form, but when dried, do not adhere to an uncoated web surface. After the self-sticking adhesive is applied and dried, it coheres tenaciously with a similarly applied and dried coating.

The coating 31 may be applied to the sheet 30 in any desired manner as by spraying or by wiping from a blade, roller or the like. The applied coating is dried on the sheet by exposure to heated air currents or in any other known fashion. A tacky adhesive 32, which may comprise rosin glue, paste or the like, is applied to a part or all of the surface of the sheet 30 which engages the web 9. The tacky adhesive may be applied before the sheet is placed on the applying device S or afterward.

Referring now to the sheet applying device S, it includes a large diameter light-weight cylinder 33 rotatably mounted with its cylindrical surface adjacent one surface of the web 9 and its axis extending transversely of the path of web travel. The cylinder 33 is preferably driven at a speed such that its peripheral velocity equals or substantially equals the web speed, and this may be accomplished by a driving connection, diagrammatically illustrated at 34, between the cylinder shaft and a driven web engaging part of the paper machine or the drive for the parent roll 8. A clutch or the like, illustrated at 34', is preferably included in the driving connection for the cylinder 33.

The web 9, guided by the idler rollers 11 and 12, is normally spaced from the surface of the cylinder 33 as shown and a movable press roller 35 engages the surface of the web opposite the cylinder 33. The roller 35 is suitably rotatably mounted and is movable upward to press the web 9 onto the surface of the cylinder 33. This may be accomplished as illustrated by rotatably mounting the roller 35 in a vertically movable frame carried or propelled by a piston 36 in a fluid pressure cylinder 37. The operation of the piston 36 is governed by a solenoid operated valve

38 which when opened by energization of its solenoid 39 admits compressed air or other pressure fluid from a suitable source to the cylinder 37 and so lifts the piston 36 and the pressing roller 35 with the result that the web 9 is pressed against the cylinder 33. Upon de-energization of the solenoid 39, the valve 38 cuts off the fluid pressure and vents the cylinder 37 so that the roller 35 drops and the web 9 is retracted from the cylinder 33.

Compressed air is supplied to the nozzles 27 and 28 of the winding device R under control of a valve 40 operated by a solenoid 41 which opens the valve when energized. The solenoids 39 and 41 may be simultaneously energized from a circuit running from a source of energy illustrated by the positive and negative signs, through a manually operable push button switch 42, wires 43, 44, 45 and 46, a timing switch 47 controlled by the angular position of the cylinder 33, and a wire 48.

While the web 9 is travelling to a roll such as the roll 26 on the winding device R, the cylinder 33 is stopped by opening the clutch in its driving connection and a sheet 30, prepared as explained above, is removably secured to the cylinder surface in the manner to be described. The surface of the sheet 30 that engages the cylinder surface carries the dried coating 31, which may be a self-sticking adhesive. The sheet 30 is preferably approximately as wide as the web 9, and is of sufficient length to form a coating extending along the required length of web. The circumference of the cylinder 33 is appreciably greater than the length of the sheet 30 so that a portion of the cylinder surface is left bare as shown at 50. The sheet may be removably secured to the surface of the cylinder 33 by any known suitable means. In the disclosed embodiment, each end of the sheet 30 is secured to the cylinder by frangible gummed tabs 51, but a weak adhesive between the under surface of the sheet and the cylinder surface may be used if desired. The opposite ends of the tabs 51 illustrated are respectively stuck to the outer surface of the sheet ends and the adjacent cylinder surface, and a weakened portion such as a line of perforations 52 separates the tab ends so that the tabs tear along this line and release the sheet from the cylinder when the sheet is stuck to the web 9. Frangible tabs of this type are described in detail in U. S. Patent No. 1,996,497.

The timing switch 47 is arranged to close the circuit between the wires 46 and 48 only when the bare section 50 of the cylinder 33 is opposite the pressing roller 35. As shown, this may be accomplished by providing a conducting segment 53, electrically connected through the roll shaft or otherwise to the wires 45 and 46 and engaged by a stationary contact 54 connected to the wire 48. The sector 53 is diametrically opposite the bare section 50 of the cylinder 33 and is of equal angular extent thereto.

With a prepared sheet 30 removably secured to the cylinder 33, the driving connection for the cylinder is established and the cylinder is accelerated to web speed. When the roll 26 has reached the desired size, the operator closes the push button switch 42 and holds it for an interval. As soon as the bare section 50 of the cylinder surface is tangent to the moving web 9, the timing switch 47 closes and the solenoids 39 and 41 are energized. Energization of the solenoid 39 results in upward movement of the pressing roller 35 whereby the web 9 is firmly pressed against

the bare surface of the cylinder 33. Energization of the solenoid 41 severs the web 9 on the winding device R and transfers the severed end thereof to a new core 16 to start winding a new roll as explained above, and closes a holding circuit across the timing switch 47 through the wires 60 and 61 and the contacts 62 which are closed upon energization of the solenoid 41. As the cylinder 33 rotates, the outer surface of the sheet 30 carrying the tacky adhesive 32 is pressed on and stuck to the web 9, the frangible tabs 51 are broken and the sheet 30 peels off the cylinder 33 and travels along with the web. This places the coated sheet adjacent the inner or core end of the web forming the roll wound on the core 16. The described operation may be repeated each time the web is transferred to a new core to start winding a new roll.

If necessary or desirable, the tacky adhesive 32 may be dried by hot air or other known means acting in a stationary drier 49 surrounding the web between the sheet-applying device S and the winding device R.

A web carrying a dried coating of the self-sticking adhesive referred to above may be wound into a roll without adherence between the coated surface and the uncoated surface of the superposed layers. Since adhesives and coatings other than the described self-sticking adhesive might be used, and in any case to positively insure against adherence between adjacent roll layers, it is frequently advisable to apply a repellent coating to the opposite surface of the web 9 from that carrying the prepared dried coating. The repellent may comprise an adhesive repellent such as paraffin or any other suitable wax or wax-like composition, and it is preferably applied in solution and dried by the drier 49. Since the coating on the sheet 30 is applied to the web surface which becomes the inner surface of each layer on the roll, the repellent coating must cover the opposite web surface over a length of web extending beyond the adhesive coating toward the core end of the web on each roll, the lead of the repellent coating being at least sufficient to form one turn on the roll. With this arrangement, the entire surface of the roll is covered with web bearing the repellent before the prepared coated sheet on the inner web surface is wound thereon.

The repellent coating, when used, may be applied by sticking a prepared sheet carrying the repellent to the under surface of the web 9 by a device identical with the prepared coating sheet applying device S described above. It is generally simpler however to spray the repellent onto the under surface of the web 9 as illustrated from a reservoir 56 through a spray nozzle 57 under control of a solenoid 58 which when energized opens a valve 59 and supplies compressed air to the nozzle 57. The solenoid 58 is connected as shown in parallel with the solenoids 39 and 41 and accordingly is energized simultaneously therewith. The nozzle 57 is spaced ahead of the cylinder 33 a distance sufficient to provide the required lead of the repellent coating over the adhesive-carrying sheet 30, for the purpose explained above.

From the foregoing description it will be seen that by employing the present invention, a prepared and dried coating of adhesive or other material may be applied to a moving web surface in predetermined relation to the core end of a web roll during winding of the roll and without interrupting or retarding either the production

or feeding of the web for the winding operation.
I claim:

1. In apparatus of the character described, in combination, a web source, a roll-winding device receiving a continuously moving web from said source and including means operable to transfer the moving web from a finished roll to a core to start winding a new roll, means for carrying a flexible sheet with a prepared coating thereon comprising a rotatable cylinder disposed transversely of the path of travel of the web running to said winding device and having its cylindrical surface parallel to and adjacent the web, means for rotating said cylinder at such a speed that its peripheral velocity is substantially equal to the web speed and means controlled in accordance with the angular position of said cylinder for simultaneously pressing the moving web and the surface of said cylinder together and operating said web-transferring means of said roll-winding device.

2. In apparatus of the character described, in combination, a web source, a roll-winding device receiving a continuously moving web from said source and including means operable to transfer the moving web from a finished roll to a core to start winding a new roll, means for carrying a flexible sheet with a prepared coating thereon comprising a rotatable cylinder having its axis extending transversely of the moving web and its cylindrical surface parallel to and adjacent one surface of the web at a predetermined point in the path of travel of the web, means for rotat-

ing said cylinder at a speed such that its peripheral velocity is substantially equal to the speed of the web, means for applying a coating to the other surface of the web and means for simultaneously pressing the moving web and the surface of the cylinder together, operating said coating-applying means and operating said web transferring means of said roll-winding device.

3. In apparatus of the character described, in combination, a web source, a roll-winding device receiving a continuously moving web from said source and including means operable to transfer the moving web from a finished roll to a core to start winding a new roll, means for carrying a flexible sheet with a prepared coating thereon comprising a rotatable cylinder having its axis extending transversely of the moving web and its cylindrical surface parallel to and adjacent one surface of the web at a predetermined point in the path of travel of the web, means for rotating said cylinder at a speed such that its peripheral velocity is substantially equal to the speed of the web, stationary means adjacent the other surface of the web and disposed in advance of said cylinder in the direction of web travel for applying a coating to said other surface of the web, and means for pressing the moving web and the surface of said cylinder together and simultaneously operating said coating-applying means and operating said web-transferring means of said roll-winding device.

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