

Aug. 24, 1943.

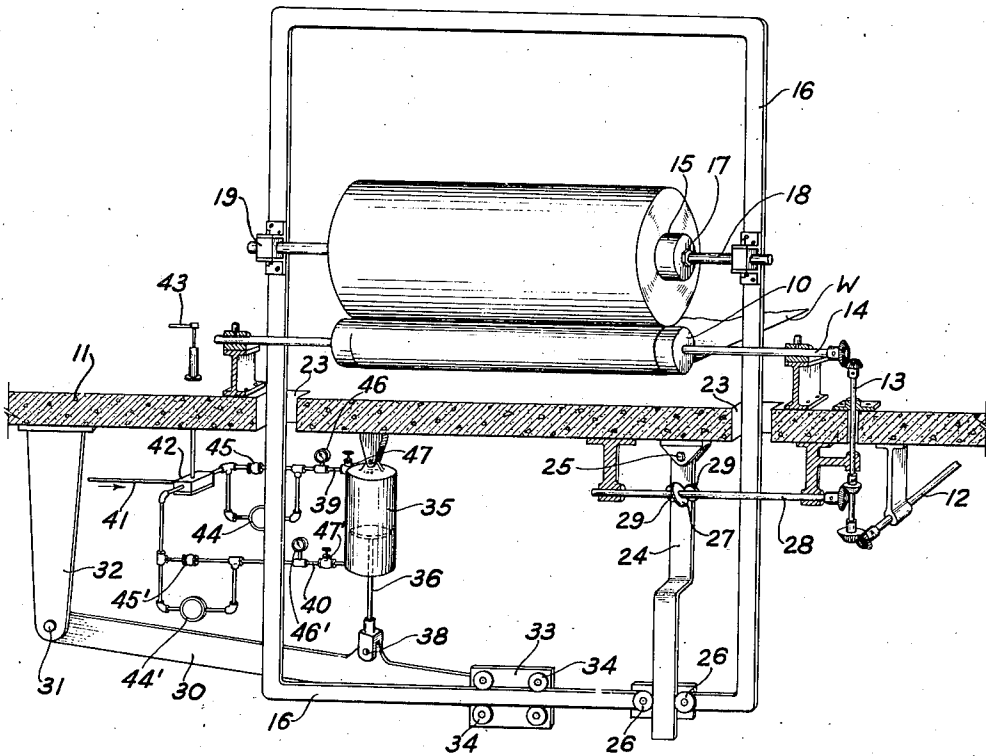
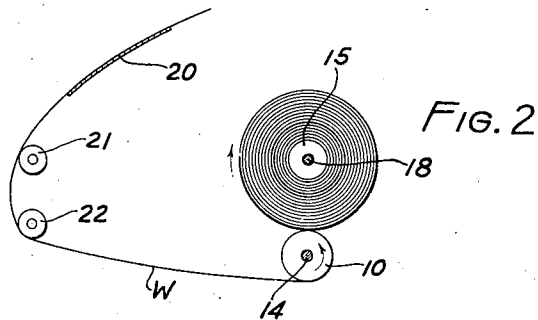
C. P. VOGEL

2,327,832

WEB WINDING APPARATUS

Filed Dec. 30, 1941

FIG. 1



CARL P. VOGEL
INVENTOR

BY *Newton M. Perdue*
Carl P. Vogels
ATTORNEYS

UNITED STATES PATENT OFFICE

2,327,832

WEB WINDING APPARATUS

Carl P. Vogel, Rochester, N. Y., assignor to Eastman Kodak Company, Rochester, N. Y., a corporation of New Jersey

Application December 30, 1941, Serial No. 424,931

4 Claims. (Cl. 242—65)

The present invention relates to winding machines, and particularly to a winding mechanism adapted for winding up a coated web of material, and in which the wind-up roll is driven by being maintained in rolling contact with a driving cylinder.

It is common practice in winding up a web of coated paper to have the wind-up roll driven by being maintained in rolling contact with a driving cylinder. It is also well known in the art in winding coated paper to continually rock the wind-up roll longitudinally of the driving cylinder during the winding operation. The purpose of this rocking action is to pound the edges of the wind-up roll of paper against the driving cylinder so that they will not split due to back-coating along the edges, or due to thick edges, and to assist in baggy paper being wound without the formation of winding buckles.

It has been found that in the winding of a roll of paper by means of a rolling contact upon a driving cylinder, an unevenly and loosely wound roll is often obtained at the start of the winding operation due to slippage between the paper and the driving cylinder, as the weight of the roll is insufficient to maintain satisfactory rolling contact. However, as the weight of the roll gradually becomes greater, slippage decreases, until finally it becomes negligible. At the other extreme, as the wind-up roll becomes excessively large, the weight becomes such that the paper is held so tightly against the driving cylinder that winding buckles are often formed.

It has been found that these noted effects can be overcome by forcing the wind-up roll against the driving cylinder during the time the weight of the wind-up roll is insufficient to prevent slippage between the paper and the driving cylinder, and jacking up the wind-up roll to decrease the pressure between the driving cylinder and the wind-up roll when the weight of the roll becomes excessive. It is imperative with certain kinds of paper, e. g., paper which is to be coated with a sensitive emulsion for photographic purposes, that all forms of foreign matter, including dirt, dust, metal particles, and grease, be prevented from coming in contact with the paper. For example, it has been found that microscopic pieces of iron on a paper used for photographic purposes will cause comparatively large stains and blemishes on the finally processed paper, and which stains and blemishes cannot be removed. Therefore, it is desirable that the rocking and jacking mechanism for the wind-up roll be so arranged and located relative to the web of paper

that dirt or iron filings due to the operations of each will not fall onto the paper during the wind-up operation.

Therefore, one object of the present invention is the provision of a winding mechanism whereby the wind-up roll is simultaneously rocked and wound, and at the same time the pressure between the wind-up roll and the driving cylinder is capable of being varied, in accordance with the size of the wind-up roll, by a fluid operating means.

A further object is the provision of a winding mechanism of the type set forth in which the rocking and jacking mechanism for the wind-up roll is so arranged and located relative to the web being wound that dirt, grease, and iron particles incident to their operations cannot come in contact with the web.

And yet another object is the provision in a winding mechanism of the type set forth of a fluid operated means for moving the wind-up roll vertically of the driving cylinder, and by means of which the wind-up roll may be held in contact with the driving cylinder at the start of the winding operation by fluid pressure, or by means of which the fluid pressure may be neutralized when the wind-up roll is of such size that the slippage becomes negligible, or by means of which the contact pressure of the wind-up roll against the driving cylinder may be partially neutralized when the size of the wind-up roll becomes excessive.

And still another object is the provision of a wind-up roll rocking and jacking mechanism which is simple and efficient in operation, and is so arranged and located as to leave the wind-up roll readily accessible for necessary manipulation and interchanging of rolls.

The novel features that I consider characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its methods of operation, together with additional objects and advantages thereof, will best be understood from the following description of specific embodiments when read in connection with the accompanying drawing in which:

Fig. 1 is a perspective view of a web wind-up mechanism constructed in accordance with the preferred embodiment of the present invention, and

Fig. 2 is a diagrammatic end view of the wind-up roll and driving cylinder showing the path of the web to be wound from a suitable source of supply.

Like reference characters refer to corresponding parts throughout the drawing.

Referring now to the drawing, the winding mechanism comprises a driving cylinder 10 rotatably supported in parallel spaced relation to the floor 11 of the building. The driving cylinder is adapted to be constantly driven from any prime mover, not shown, through driving means including line shaft 12, vertical shaft 13, and shaft 14 integral with the cylinder, each of the shafts being operatively connected together, as by bevel gears, as shown. The web W is adapted to be wound upon a roll 15 which is held rigidly to a movable supporting frame 16 by means of collars 17, a shaft 18, and the removable bearings 19. The web W is directed from any source of supply over a guide plate 20 and a pair of guide rollers 21 and 22 to the under side of the driving cylinder 10 and around which it passes with a substantially 180-degree wrap to the take-up roll, see Fig. 2. The source of supply of the web is not important to the present invention, but by way of example it might be stated that the supply could be a festoon drying machine into which a paper is fed for drying purposes after being coated with a material, such as blanc fixe.

The supporting frame 16 is rectangular in shape and passes through openings 23 in the floor 11 for purposes hereinafter fully set forth. It will be noted that the openings 23 in the floor are substantially wider than the parts of the supporting frame passing therethrough, and this is to permit the supporting frame to rock transversely as will be clearly set forth below. As will be obvious from the drawing, the supporting frame 16 is free to move vertically of the driving cylinder and is normally supported by the wind-up roll resting on the top of the driving cylinder, this rolling contact being the sole means of rotating the wind-up roll.

When winding the web, the wind-up roll is constantly rocked longitudinally of the driving cylinder by the action of the pivoted, oscillated, jogger arm 24 upon the supporting frame 16. The jogger arm 24 is pivoted at one end 25 to a bracket anchored to the under side of the floor and the other end thereof extends between two rollers 26 mounted in spaced relation on the bottom cross arm of the supporting frame. The jogger arm 24 may be constantly oscillated by any suitable eccentric mechanism operated from the driving mechanism of the driving cylinder so that the frame will be rocked at all times during the winding operation. By way of a specific embodiment of a mechanism which might be used, I have shown a cam 27 mounted on a drive shaft 28 directly connected to the driving mechanism of the driving cylinder, engaging two spaced lugs 29 on the jogger arm. It is pointed out that with this mechanism for rocking the wind-up roll, all mechanically cooperating parts which might tend to discharge foreign material such as iron, grease, etc., are located below the web being wound so that there is no chance of foreign matter emanating from this source coming in contact with the web. As was pointed out above, the purpose of this rocking action of the wind-up roll longitudinally of the driving cylinder is to pound the edges of the wind-up roll against the driving cylinder so that they will not split due to back coating along the edges and to reduce the thick edges, as well as to allow baggy paper to

be wound without the formation of winding buckles.

As pointed out above, in the winding of paper by means of a rocking action upon a driving cylinder, an unevenly and loosely wound roll is often obtained at the start of the winding operation due to slippage between the paper and the driving cylinder, as the weight of the roll is insufficient to maintain satisfactory driving contact. However, as the weight of the roll gradually increases, slippage decreases until finally it becomes negligible. At the other extreme, as the wind-up roll of paper becomes excessively large, its weight becomes such that the paper is held so tightly against the driving cylinder that winding buckles are often formed.

It is, therefore, the object of the present invention to provide means for increasing the pressure between the wind-up roll and the driving cylinder at the start of the winding operation when the wind-up roll is too light; for permitting the weight of the wind-up roll and frame to determine the contact pressure with the driving cylinder when the weight of the roll is within limits to do this satisfactorily; and for partially neutralizing the contact pressure when the wind-up roll becomes excessively large. To this end, the pressure arm 30 is pivoted at one end 31 to a support 32 fixed, and extending downwardly from, the under side of the floor 11. The other end of the pressure arm 30 terminates in a plate 33 on which are rotatably mounted four rollers 34 engaging opposite edges of the bottom cross arm of the supporting frame 16, as shown in Fig. 1. The pressure arm 30 is adapted to be raised and lowered by the action of the piston in a double-acting fluid operated cylinder 35 supported from the under side of the floor. The piston rod 36 is pivotally connected to the pressure arm 30 at 38 and the fluid operating cylinder 35 is pivotally supported to the under side of the floor to account for the arcuate movement of the pressure arm 30 in raising and lowering the frame vertically so that the piston of the cylinder will operate with a straight thrust under all positions of adjustment of the pressure arm.

Fluid under pressure, compressed air, steam, oil, etc., can be admitted to the top or bottom of the fluid operated cylinder 35 through the feed lines 39 and 40, respectively, and one section of each of these feed lines, preferably that immediately adjacent the cylinder, should be flexible to permit the cylinder to pivot by the necessary amount about its pivotal mounting. The admission of fluid to the two feed lines 39 and 40 from the main feed line 41, is controlled by a manually operated three-way valve 42, of well-known construction, and capable of being adjusted by a hand lever 43 located above the floor. The valve 42 is such that when the hand lever 43 is thrown in one direction air will be admitted to line 39 to force the piston downwardly and pull the wind-up roll down against the driving cylinder to increase the pressure of contact between the two during the time winding is being started. In the neutral position of the hand lever the valve should exhaust both feed lines 39 and 40 so that no pressure other than the weight of the wind-up roll plus the weight of the supporting frame effects the contact between the wind-up roll and the driving cylinder. This condition exists when the wind-up roll is sufficiently large that the force of gravity gives a desired pressure contact between the same and the driving cylinder. In the

other position of the hand lever the valve should permit the air, or fluid, to enter line 40 and cause the piston to pull upwardly on the pressure arm 30 and partially neutralize the pressure caused by the weight of the wind-up roll and the supporting frame when the size of the roll becomes so large that it causes an excessive contact pressure between the wind-up roll and the driving cylinder.

Each feed line 39 and 40 may include a pressure regulator 44, 44' for regulating the pressure in two lines in accordance with conditions found suitable in practice with webs of different materials and wound at different winding speeds. The pressure for which the valves are regulated may be indicated by the pressure gages 46, 46' in the respective lines. Check valves 45 and 45' are placed in branches of the respective feed lines 39 and 40 to permit the lines to be exhausted without necessitating the fluid to pass backwards thru the pressure regulators and to cause the incoming fluid to pass thru the pressure regulators. Valve 47, 47' are placed in the respective feed lines 39 and 40 so that the speed of introduction of the fluid into the cylinder 35 can be varied as desired.

One skilled in the art will readily appreciate the fact that the wind-up roll rocking and jacking mechanisms are such that the two can operate simultaneously without the movement of the wind-up roll induced by one affecting, in any way, the movement of the wind-up roll induced by the other. Furthermore, the particular arrangement of the rocking and jacking mechanisms for the wind-up roll insures against foreign material incident to the operation of the same coming in contact with the web, in addition to leaving the wind-up roll readily accessible for inspection and replacement with an empty roll.

I have also found that a more tightly and more evenly wound roll, free from winding buckles, results in the manipulation of the contact pressure between the wind-up roll and the driving cylinder in accordance with the variation of the change in size of the roll.

This is true even in cases where the jogging mechanism is not used in conjunction with the pressure regulating mechanism as set forth above. The jogging action of the roll is beneficial in winding paper which has a tendency to be baggy for the reason that it tends to stretch the bags out of the paper at the point of wind-up and thereby overcomes winding buckles that would result from the presence of such baggy portions in the web. However, in winding up a previously calendered paper which is smooth and has no bags in it which would tend to cause winding buckles, it is not necessary to jog the wind-up roll during the winding action. It is desirable, however, to obtain a tight, even, wind-up roll to vary the contact pressure between the wind-up roll and the driving cylinder in the manner set forth. This fact is pointed out to show that the invention is not limited to the combined use of the jacking and jogging mechanisms, but covers the use of a jacking mechanism of the type set forth even when no jogging mechanism is used or required.

The particular mechanism herein set forth for readily manipulating the contact pressure between the wind-up roll and the driving cylinder is one which is simple to operate from the standpoint of physical exertion on the part of the operator, and is one in which a desired and known pressure can be readily obtained and du-

plicated at any desired time without requiring special attention of the operator. The fact that the desired pressure applied to the wind-up roll by the fluid operating means prevails, after once being initiated, without attention of the operator, makes it possible for the operator to spend more time inspecting the web being wound. Furthermore, this jacking mechanism provides a vertical support for the frame at all times to prevent the same from dropping down on the top of the driving cylinder and injuring the cylinder or the operator at the time a full wind-up roll is being removed from the machine and is being replaced by an empty roll. It will be obvious that if there was no jacking means for the frame 16, then when a full wind-up roll was removed from the frame, there would be nothing to prevent the frame from dropping downwardly against the driving cylinder.

Although I have shown and described certain specific embodiments of my invention, I am fully aware that many modifications thereof are possible. My invention, therefore, is not to be limited to the precise details of construction shown and described but is intended to cover all modifications coming within the scope of the appended claims.

Having thus described my invention, what I claim is new and desire to secure by Letters Patent of the United States is:

1. In a web winding machine the combination with a driving cylinder, a wind-up roll for the web disposed above said driving cylinder and in rolling contact with the same to be rotated thereby, a supporting frame rotatably supporting said wind-up roll and adapted to move vertically, and rock longitudinally, relative to the axis of said driving cylinder to move the wind-up roll vertically, and rock the same longitudinally, relative to the driving cylinder while the wind-up roll is being rotated by the driving cylinder, means for continually rocking said supporting frame during the time the web is being wound on the wind-up roll, and fluid operated means acting on said supporting frame below the wind-up roll and adapted to move said wind-up roll vertically relative to said driving cylinder for varying the amount of pressure between the two in accordance with the change in size of the wind-up roll.

2. In a web winding machine the combination with a driving cylinder, a wind-up roll for the web disposed above said driving cylinder and in rolling contact with the same to be rotated thereby, a supporting frame rotatably supporting said wind-up roll and adapted to move vertically, and rock longitudinally, relative to the axis of said driving cylinder to move the wind-up roll vertically, and rock the same longitudinally, relative to the driving cylinder while the wind-up roll is being rotated by the driving cylinder, means for continually rocking said supporting frame during the time the web is being wound on the wind-up roll, a fluid operated cylinder the piston of which is operatively connected to the supporting frame at a point below the wind-up roll so as to move the frame and wind-up roller vertically relative to said driving cylinder, and manually operated means for controlling the introduction of a fluid under pressure into said cylinder to vary the amount of pressure between the driving cylinder and the wind-up roll in accordance with the change in size of the wind-up roll.

3. In a web winding machine the combination with a driving cylinder, a wind-up roll for the web disposed above said driving cylinder and in

rolling contact with the same to be rotated thereby, a supporting frame rotatably supporting said wind-up roll and adapted to move vertically, and rock longitudinally, relative to the axis of said driving cylinder to move the wind-up roll vertically, and rock the same longitudinally, relative to the driving cylinder while the wind-up roll is being rotated by the driving cylinder, means for continually rocking said supporting frame during the time the web is being wound on the wind-up roll, and including a pivoted jogger arm operatively connected to said supporting frame at a point below the path of the web, an eccentric for oscillating said jogger arm about its pivot, said eccentric being connected to the driving mechanism for the driving cylinder, and fluid operated means acting on said supporting frame below the path of the web and adapted to move said wind-up roll vertically relative to said driving cylinder for varying the amount of pressure between the two in accordance with the change in size of the wind-up roll.

4. In a web winding machine the combination with a driving cylinder, a wind-up roll for the web disposed above said driving cylinder and in rolling contact with the same to be rotated thereby, a supporting frame rotatably supporting said wind-up roll and adapted to move vertically, and

rock longitudinally, relative to the axis of said driving cylinder to move the wind-up roll vertically, and rock the same longitudinally, relative to the driving cylinder while the wind-up roll is being rotated by the driving cylinder, means for continually rocking said supporting frame during the time the web is being wound on the wind-up roll, and including a pivoted jogger arm operatively connected to said supporting frame at a point below the path of the web, an eccentric for oscillating said jogger arm about its pivot, said eccentric being connected to the driving mechanism for the driving cylinder, and fluid operated means acting on said supporting frame below the path of the web and adapted to move said wind-up roll vertically relative to said driving cylinder for varying the amount of pressure between the two in accordance with the change in size of the wind-up roll, said fluid operating means including a pivoted arm operatively connected at one end to said supporting frame at a point below the path of the web, a double acting fluid operated cylinder the piston of which is connected to said arm to move the frame vertically of the driving cylinder, and manually operated means for controlling the introduction of a fluid under pressure into said cylinder.

CARL P. VOGEL.