March 17, 1931. C. B. COTTRELL, 3D 1,796,832

TENSION CONTROLLING MEANS FOR TRAVELING OFFSET WEBS

Filed March 21, 1930

Fig. 1.

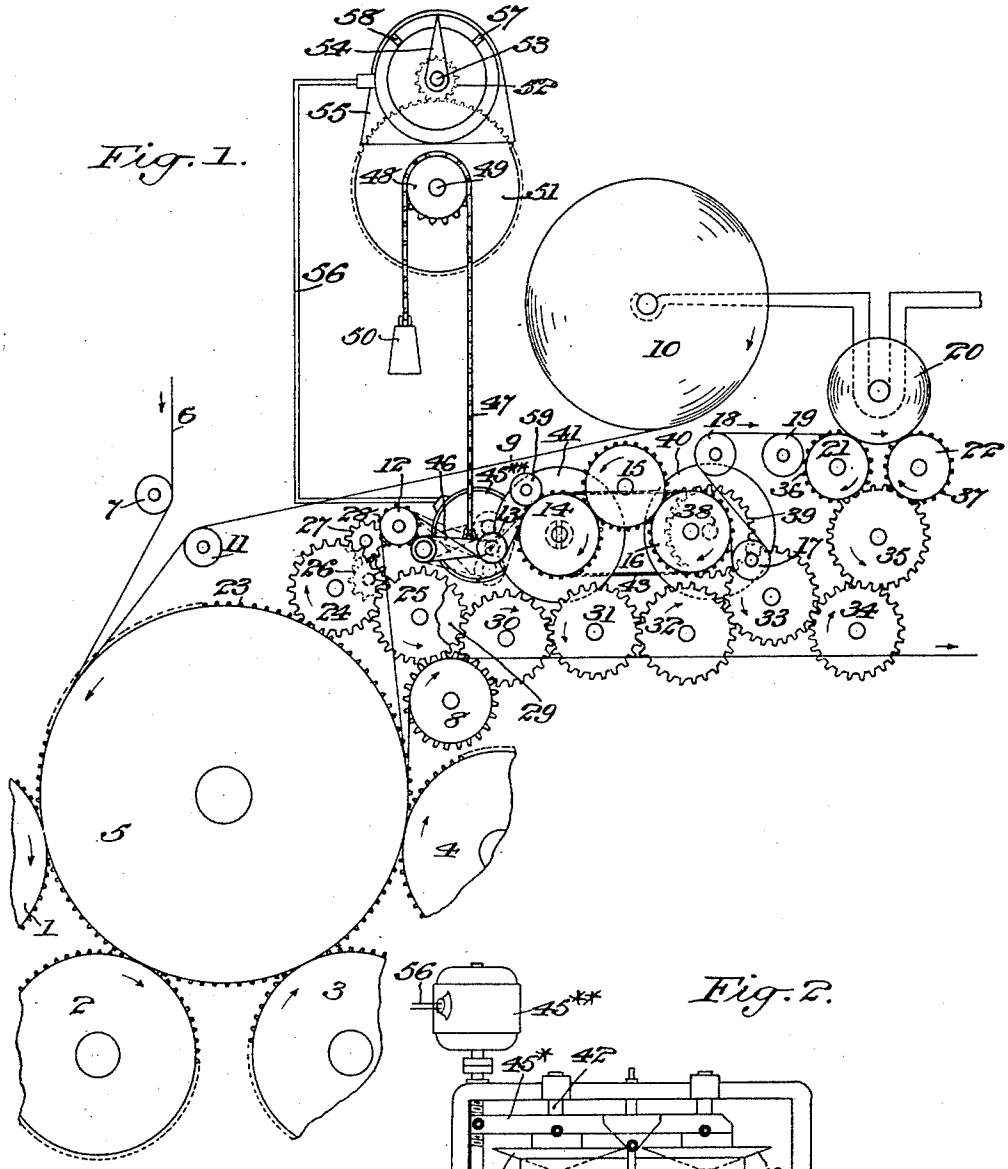
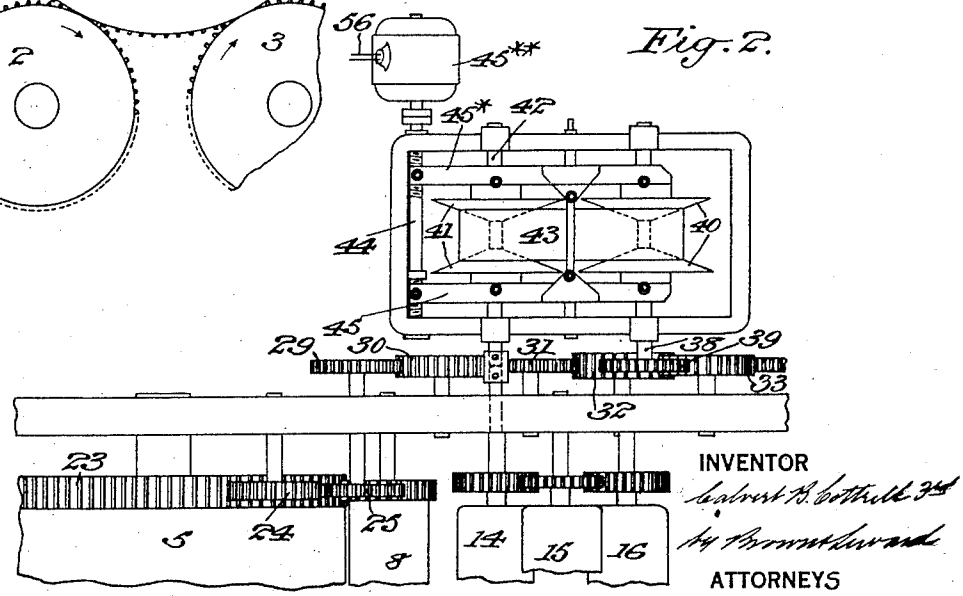


Fig. 2.



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TENSION-CONTROLLING MEANS FOR TRAVELING OFFSET WEBS

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In rotary multicolor web perfecting printing presses where a traveling offset web is passed around the impression cylinder of the second printing unit under the printed web, it has been difficult to obtain clean and sharp printing.

If this tension on the offset web, necessary to the proper rewinding thereof, be eliminated where the offset web is in contact with the impression cylinder, the offset web and the printed web will travel together around the impression cylinder, thereby ensuring clean and sharp printing by the second printing unit.

The object of my invention is to accomplish this result by providing automatic means for maintaining a predetermined amount of slack in and tension on the offset web between the impression cylinder of the second printing unit of the printing press and the tension control rolls of the offset web tension controlling mechanism for the rewinding mechanism.

The means which I have shown for accomplishing this result includes a variable speed drive for the offset web tension controlling mechanism and a normally inactive reversible motor for intermittently operating the variable speed drive; which motor is started in either direction and stopped by a controller in the motor circuit, which controller is operated by a web slack roller as the roller rises or drops, due to the lessening or lengthening of the slack in the offset web between the printing unit and the offset web tension controlling mechanism.

In practice, the travel of the printed web per cylinder revolution varies with the different forms used on the form cylinders, thus making it practically impossible to properly proportion the tension control rolls of the offset web controlling mechanism so that they will travel with the offset web under all conditions. It is to prevent this variation from disturbing the travel of the offset web on the impression cylinder that I interpose the means for automatically maintaining a predetermined amount of slack in and tension on the offset web between the impression cylinder of the second printing unit and the said tension control rolls.

A practical embodiment of my invention is represented in the accompanying drawings, in which

Fig. 1 represents a diagrammatic side elevation of that portion of a multicolor web perfecting printing press which embodies my invention; and

Fig. 2 represents a detail top plan view, showing the variable speed drive unit for the offset web tension controlling mechanism.

The form and impression cylinders of the second printing unit are denoted by 1, 2, 3, 4 and 5, which cylinders are driven in the usual manner.

The traveling printed web is denoted by 6 and it is shown as being led around the idler roll 7 to and around the impression cylinder 5 and from thence around the printed web guide roller 8.

The traveling offset web is denoted by 9 and it is shown as leading from its supply roll 10 over the idler roll 11 to and around the impression cylinder 5 and under the printed web 6. From thence the offset web is shown as passing around the positively driven guide roll 12 and under the web slack roller 13 where the slack in the web is formed, and to and around the positively driven tension control rolls 14, 15, 16 of the offset web tension controlling mechanism. From thence the offset web passes around the idler rolls 17, 18 and 19 to the take-up roll 20 which rests upon and is driven by the rewinding rolls 21, 22 of the offset web rewinding mechanism.

The guide roll 12 is shown as being driven from the impression cylinder gear 23 at substantially the surface speed of the impression cylinder, through the train of gears 24, 25, 26, 27, 28.

The offset web rewinding rolls 21, 22 are shown as driven at a slightly greater surface speed than the impression cylinder so as to exert a slip feed effect on the offset web to ensure its tight winding on the take-up roll 20 under the control of the tension control rolls 14, 15, 16 of the offset web tension controlling mechanism. In the present instance

these rewinding rolls 21, 22 are shown as being driven from the gear 29 on the shaft of the gear 25, through a train of gears 30 to 37 inclusive.

A variable speed drive of any well known or approved form is provided for driving the offset web tension control rolls 14, 15, 16 of the offset web tension controlling mechanism, the variable speed drive represented herein being the well known "Reeves" drive in which the shaft 38 is driven at a constant speed by the meshing of its gear 39 with the gear 33 of the train of gears leading from the second printing unit to the offset web rewinding mechanism. The shiftable cone pulleys 40 on the constant speed shaft 38 drive the shiftable cone pulleys 41 on the shaft 42 which is coupled to the shaft of the tension roll 14, through the usual belt 43.

The automatic means which I have provided for varying the speed of the shaft 42 comprises a normally inactive screw shaft 44, connected in the usual manner by the oppositely working levers 45, 45* for shifting the cone pulleys 40 and 41. This normally inactive screw shaft 44 is provided with a normally inactive reversible motor 45**, the starting and stopping of which is controlled by the undue lessening or lengthening of the slack in the offset web between the second printing unit and the web tension controlling mechanism, as will hereinafter appear.

A predetermined amount of slack in the offset web between the impression cylinder of the second printing unit and the tension control rolls 14, 15, 16 of the offset web tension controlling mechanism is automatically maintained by starting the normally inactive motor 45 in either direction and thereafter stopping the same, to increase or diminish the surface speed of the said tension control rolls as follows:

The offset web slack roller 13 is mounted in a rocking support 46, to which support one end of a sprocket chain 47 is attached, which chain passes over a sprocket 48 on the shaft 49 and is provided at its other end with a weight 50 for substantially counter-balancing the weight of the slack roller 13 and its rocking support. A gear 51 is fast on the shaft 49 and meshes with a pinion 52 fast on the shaft 53 which carries the arm 54 of a controller 55, which is located in the electric circuit, denoted by 56 of the motor 45. This arm 54 is normally maintained, by the requisite amount of slack in the offset web 9, in a neutral position. As the slack in the web decreases, the arm 54 will swing in a direction to finally engage the contact 57, to drive the motor 45 momentarily in a direction to reduce the surface speed of the web tension control rolls 14, 15, 16 and cause the web slack to increase. As the slack in the offset web increases, the controller arm 54 will swing in a direction to finally engage the contact 58, to drive the motor 45 momentarily in the opposite direction to increase the surface speed of the web tension control rolls and cause the web slack to decrease.

The predetermined tension is maintained on the offset web slack between the second printing unit and the web tension controlling mechanism as follows:

A roll 59 bears on the offset web as it passes over the first tension control roll 14, with sufficient pressure to eliminate any slippage of the web as it passes through the web tension controlling mechanism. As the only tension exerted on the web slack is formed by the pressure of the web slack roller 13 thereon, this tension can be easily regulated by increasing or diminishing the effect of the counterbalanced weight 50 on the said roller.

From the above description it will be seen that a predetermined amount of slack and tension may be automatically maintained in and on the offset web at all times, thereby ensuring clean and sharp printing in the second printing unit.

It is evident that various changes may be resorted to in the construction, form and arrangement of the several parts without departing from the spirit and scope of my invention, and hence I do not intend to limit myself to the particular embodiment herein shown and described, but what I claim is:—

1. In a multicolor web perfecting printing press, a printing unit, a traveling offset web, its rewinding mechanism, a web tension controlling mechanism, and a variable speed drive therefor driven from the printing unit and controlled by variations in the amount of slack in the offset web between the printing unit and web tension controlling mechanism.

2. In a multicolor web perfecting printing press, a printing unit, a traveling offset web, its rewinding mechanism driven from the printing unit, a web tension controlling mechanism, and a variable speed drive therefor driven from the printing unit and controlled by variations in the amount of slack in the offset web between the printing unit and web tension controlling mechanism.

3. In a multicolor web perfecting printing press, a printing unit, a traveling offset web, its rewinding mechanism, a web tension controlling mechanism, a variable speed drive therefor driven from the printing unit, and automatic means controlling the variable speed drive for maintaining a predetermined amount of web slack and tension thereon between the printing unit and the tension controlling mechanism.

4. In a multicolor web perfecting printing press, a printing unit, a traveling offset web, its rewinding mechanism, a web tension controlling mechanism, a variable speed drive therefor driven from the printing unit, and

automatic means controlling the variable speed drive for maintaining a predetermined amount of web slack and tension thereon between the printing unit and the tension controlling mechanism, said automatic means including a normally inactive motor for said drive.

5. In a multicolor web perfecting printing press, a printing unit, a traveling offset web, its rewinding mechanism, a web tension controlling mechanism, a variable speed drive therefor driven from the printing unit, and automatic means controlling the variable speed drive for maintaining a predetermined amount of web slack and tension thereon between the printing unit and the tension controlling mechanism, said automatic means including a normally inactive motor for said drive and also including a web slack roller for indirectly causing the starting and stopping of the motor.

6. In a multicolor web perfecting printing press, a printing unit, a traveling offset web, its rewinding mechanism, a web tension controlling mechanism, a variable speed drive therefor driven from the printing unit, and automatic means controlling the variable speed drive for maintaining a predetermined amount of web slack and tension thereon between the printing unit and the tension controlling mechanism, said automatic means including a normally inactive motor for said drive and also including a web slack roller and a controller in the motor circuit operated by the roller for starting and stopping the motor.

7. In a multicolor web perfecting printing press, a printing unit, a traveling offset web, its rewinding mechanism, a web tension controlling mechanism, a variable speed drive therefor, a normally inactive motor for said drive, and web slack controlled means for automatically maintaining, through said motor, a predetermined amount of slack in and tension on the web between the printing unit and tension controlling mechanism.

8. In a multicolor web perfecting printing press, a printing unit, a traveling offset web, its rewinding mechanism, a web tension controlling mechanism, a variable speed drive therefor; a normally inactive motor for said drive, and web slack controlled means for automatically maintaining, through said motor, a predetermined amount of slack in and tension on the web between the printing unit and tension controlling mechanism, said means including a web slack roller.

9. In a multicolor web perfecting printing press, a printing unit, a traveling offset web, its rewinding mechanism, a web tension controlling mechanism, a variable speed drive therefor, a normally inactive motor for said drive, and web slack controlled means for automatically maintaining, through said motor, a predetermined amount of slack in and tension on the web between the printing unit and tension controlling mechanism, said means including a web slack roller and also including a controller in the motor circuit, operated by the roller for starting and stopping the motor.

10. In a multicolor web perfecting printing press, a printing unit, a traveling offset web, its rewinding mechanism, a train of gears connecting the printing unit and rewinding mechanism, a web tension controlling mechanism, a variable speed drive unit connecting said train of gears with the web tension controlling mechanism, a normally inactive motor for said unit, and web slack controlled means for automatically maintaining, through said motor, a predetermined amount of slack in and tension on the offset web between the printing unit and tension controlling mechanism.

11. In a multicolor web perfecting printing press, a printing unit, a traveling offset web, its rewinding mechanism, a train of gears connecting the printing unit and rewinding mechanism, a web tension controlling mechanism, a variable speed drive unit connecting said train of gears with the web tension controlling mechanism, a normally inactive motor for said unit, and web slack controlled means for automatically maintaining, through said motor, a predetermined amount of slack in and tension on the offset web between the printing unit and tension controlling mechanism, said means including a web slack roller.

12. In a multicolor web perfecting printing press, a printing unit, a traveling offset web, its rewinding mechanism, a train of gears connecting the printing unit and rewinding mechanism, a web tension controlling mechanism, a variable speed drive unit connecting said train of gears with the web tension controlling mechanism, a normally inactive motor for said unit, and web slack controlled means for automatically maintaining, through said motor, a predetermined amount of slack in and tension on the offset web between the printing unit and tension controlling mechanism, said means including a web slack roller and also including a controller in the motor circuit, operated by the roller, for starting and stopping the motor.

In testimony, that I claim the foregoing as my invention, I have signed my name this 14th day of March, 1930.

CALVERT B. COTTRELL, 3RD.