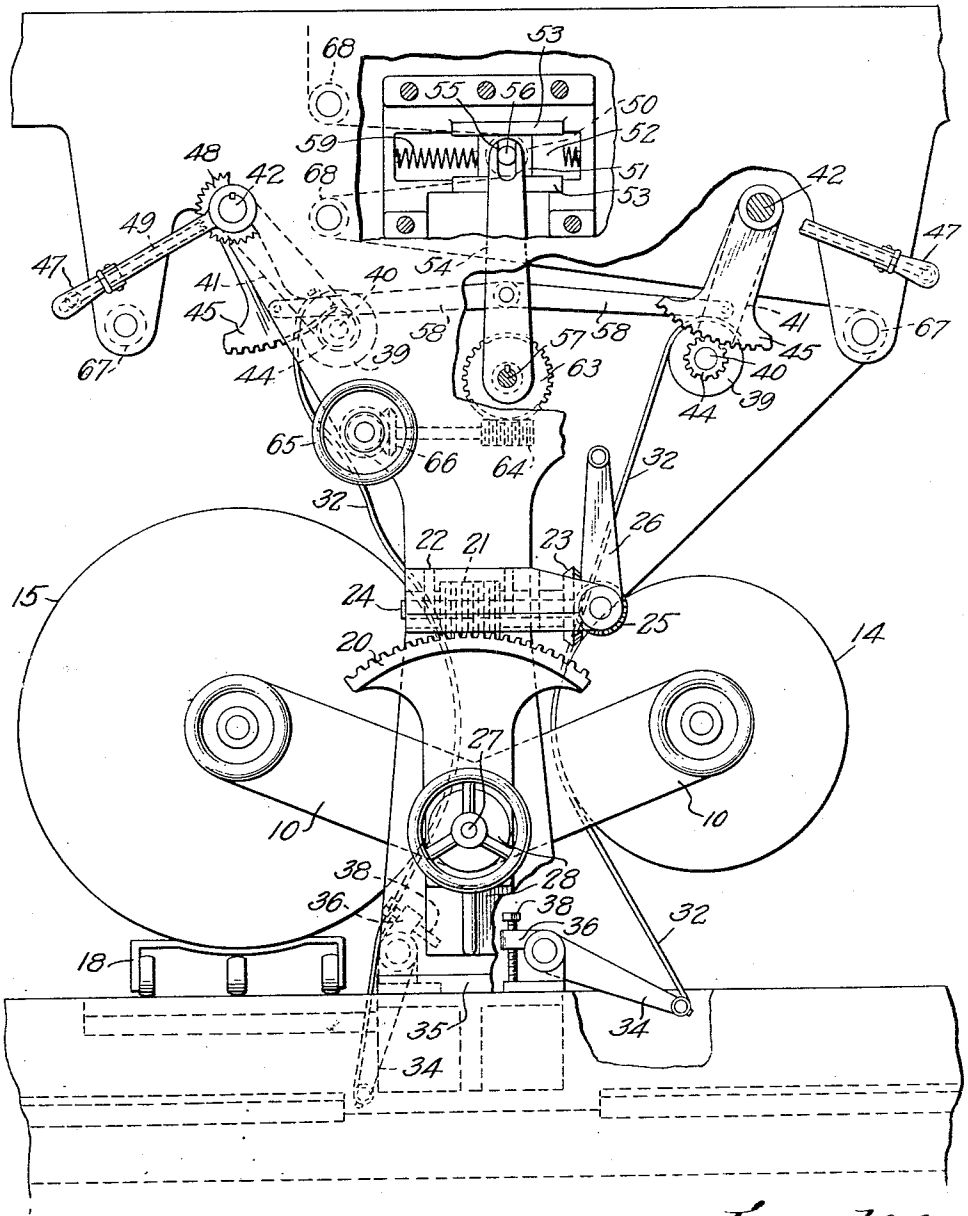
May 31, 1932. E. J. SMITH 1,860,962

WEB CONTROLLING APPARATUS

Filed Jan. 23, 1930 2 Sheets-Sheet 1

Fig. 1



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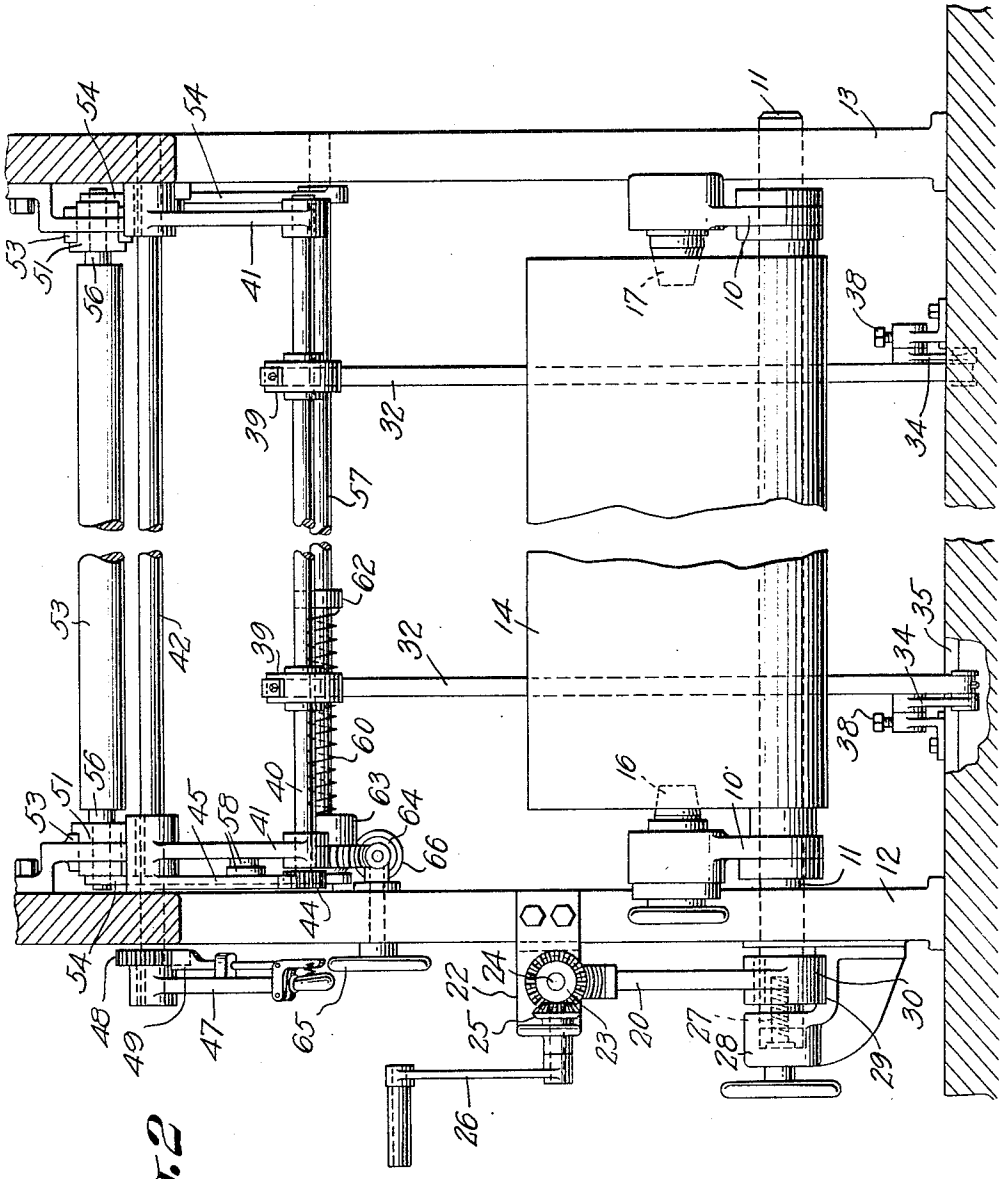


Fig. 2

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UNITED STATES PATENT OFFICE

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WEB CONTROLLING APPARATUS

Application filed January 23, 1930. Serial No. 422,763.

The present invention relates to web controlling apparatus and more particularly to an improved web controlling apparatus for use in connection with high speed rotary printing machines.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, construction, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:—

Fig. 1 is an end elevation, with certain parts broken away, of the present preferred embodiment of web controlling apparatus and illustrating the present invention; and

Fig. 2 is a side elevation, looking from the right of Fig. 1, with certain parts broken away.

The present invention provides a web controlling mechanism for tensioning the web as it is drawn from a web roll and fed to a printing press, and has for its particular object the provision of a simple, reliable web controlling mechanism which will not interfere with the operation of replenishing the web rolls as they become exhausted. Another object of the present invention is the provision of a web controlling mechanism producing a substantially constant predetermined web tension, regardless of the diameter of the web roll and yet permitting the constant tension to be readily varied to meet different press operating conditions.

According to the present preferred embodiment, illustrating the invention there is provided a web roll support for rotatably supporting the relatively large and heavy rolls of paper commonly used to supply the printing press, and means are provided for raising and lowering the web roll support, as well as for holding the web roll support in any desired position, thereby enabling the web roll to be lifted from a truck into running position. For tensioning the web as it is drawn from the web roll by the printing press, there are preferably provided a plurality of flexible friction members or belts, rigidly secured at their lower ends directly beneath the web roll, and fastened at their upper ends to movable rollers above the web roll. Means are provided for pressing the flexible belts into contact with the web roll and for maintaining the belts in contact with the periphery of the web roll, and in the present embodiment there is provided a pilot roller moved by the tension of the web drawn from the web roll for winding the flexible belts on the belt rollers to maintain the pressure between the belts and the web roll substantially constant and thereby maintain constant the tension of the web. Other means are preferably provided for manually moving the rollers and for winding the belts on the rollers to maintain the belts in contact with the web roll as the web roll wears down, and enabling the belts to be loosened when the web roll is to be replaced. In the embodied form, the pilot roller is preferably provided with means for varying the force with which it opposes the action of the web tension in moving the pilot roller, and for this purpose there is preferably provided a variably tensionable spring by which the tension normally maintained on the web can be varied to suit the different operating conditions of the press.

It will be understood that the foregoing general description, and the following detail description as well, are exemplary and explanatory of the invention but are not restrictive thereof.

Referring now in detail to the accompanying drawings showing the present preferred embodiment and illustrative of the present invention, the web roll supporting means preferably comprise a pair of supporting arms 10 slidably keyed to a supporting shaft 11 extending from one side frame 12 of the press to the other side frame 13. Support-

ing arms 10 preferably extend on each side of the supporting shaft 11 to support an active and a reserve web roll, 14 and 15 respectively, and at their ends are provided with short spindles 16 and 17, rotatably journaled in suitable bearings near the ends of the arms 10, each pair of spindles being adapted to engage a web roll at either end of its axial aperture. Arms 10 are preferably slidable along their supporting shaft 11 to accommodate web rolls of different widths, and are securely held in the desired position by any suitable means, such as set screws, or the like.

For facilitating the replenishment of web rolls as they become exhausted, the supporting shaft 11 and arms 10 carried thereby, are preferably angularly movable to raise and lower the web rolls, thereby enabling web rolls to be lifted from the truck 18 on which they are brought to the supporting mechanism, as needed. These means preferably comprise a segmental worm gear 20, rigidly fastened to one end of the supporting shaft 11 and movable therewith, the segment meshing with a worm 21 rotatably journaled in a bracket 22 mounted on the upright side frame 12. For turning the worm to angularly move the web roll supporting arms, there is provided a bevel gear 23 meshing with bevel gear 25 fixed to the worm shaft 24 and movable therewith, and handle 26 is provided connected with the bevel gear 25 for manually turning the worm. The worm and worm gear also serve to lock and hold the web roll supporting arms in any desired position.

Preferably, and as embodied, one of the rotatable spindles 16 for each web roll is axially movable to allow the stub of an exhausted web roll to be removed and replaced by a fresh web roll, and other means are preferably provided for holding the spindle in engagement with the axial aperture of the web roll while the web roll is actively supported. The details of these parts are not shown, as they form no part of the present invention, and they may be of any convenient or suitable construction.

For registering the web with the cylinders of the printing press the web roll supporting arms are preferably movable axially of the web roll, and in the present embodiment, the supporting shaft 11 is slidably mounted in its journals in the side frames 12 and 13 and is moved to and held in any desired position by means of threaded shaft 27, which cooperated with an internally threaded portion of the shaft 11, while shaft 27 is held against axial movement in its supporting bracket 28. Directly beneath segmental worm gear 20 is provided a channel 29 in which the lower part 30 of the worm segment rotates, and which holds the segmental worm gear against axial movement, permitting it to slide on the supporting shaft 11 as the shaft is axially moved.

The web tensioning means in accordance with the present invention preferably comprises a plurality of flexible friction members, or belts 32, adapted to bear against the periphery of the web roll and to be maintained in contact therewith. These belts are preferably suitably spaced apart along the web rolls and are secured at their lower ends to anchoring arms 34, pivotally mounted on the rigid base 35 and extending beneath the web roll for a considerable distance. Anchoring arms 34 are each provided with an inwardly extending portion 36, in which is threadedly secured a bolt 38 cooperating with the base 35 to limit the upward movement of the arms and belts. The upper ends of the flexible belts 32 are firmly attached to the periphery of individual rollers 39 and adapted to be wound thereon.

For tensioning the web and maintaining the tension substantially constant regardless of the diameter of the web roll, means are provided for maintaining the flexible belts in frictional contact with the periphery of the web roll and for pressing them into contact therewith with a definite and predetermined, although easily variable pressure. As embodied, for each web roll there are provided a plurality of rollers 39 fixed to a shaft 40 directly above and parallel with the axis of the corresponding web roll, the shafts being rotatably journaled in pairs of depending arms 41, oscillatably supported by means of shafts 42 extending from one side frame to the other. The upper ends of the belts are fastened to their individual rollers and can be wound thereon to press the belts into contact with the periphery of the web roll and to maintain them in contact therewith, and the individual rollers are preferably alined with the pivoted anchoring arms 34 to which the lower ends of the belts are attached. At one end of each roller shaft there is provided a small pinion 44 meshing with a segmental gear 45 concentric with its corresponding shaft 42 and freely rotatable thereon so that relative movement between the roller and segmental gear 45 causes the belts 32 to be wound or unwound on the belt roller 39.

For winding the belts on belt roller 39 for maintaining the belts in contact with the periphery of the web roll as the web roll wears down, means are provided for moving the segmental gear 45 relatively to the pinion 44 and roller 39 thereby rotating roller 39, and means are also preferably provided for holding the gear 45 in any desired position. These means also permit the belts 32 to be unwound from the rollers when the web roll is to be changed. As embodied, there is provided a manually operable handle 47, securely fastened at one end of each of the

shafts 42 on which the segmental gears 45 are mounted, and movement of the handle 47 causes the corresponding pinion 44 and roller 39 to be moved relatively to the segmental gear 45. Means are also provided for holding each handle 47, and consequently arms 41 in any desired position, and as embodied, there is provided a latch plate 48 concentric with each shaft 42 and securely fastened to the press frame 12, and engaged by the releasable latch bar 49, carried by the handles 47, thereby permitting the handles to be moved to and held in any of several different positions.

As shown in the present illustrative embodiment, the anchoring arms 34 for the lower ends of the belts 32, and the rollers 39 to which the upper ends of the belts are fastened are preferably so positioned, and the distance through which the rollers move and the direction of their movement is such that the angle measuring the arc of the area of contact between the belts 32 and the periphery of the web roll remains substantially constant regardless of the diameter of the web roll.

For controlling the tension of the web drawn from the web roll by maintaining the pressure between the belts and the web roll substantially uniform and constant, means are preferably provided for controlling the pressure between the belts and the web roll in accordance with the tension of the web drawn from the web roll, and for this purpose, there is provided a pilot roller adapted to be moved by the tension of the web and connected with the belt rollers to move the belt rollers and wind or unwind the belts thereon to produce the desired pressure and tension. As embodied, the pilot roller 50 is mounted above the web rolls and rotatably journalled in bearing blocks 51 at either end of the pilot roller, the journal blocks being slidably mounted in guideways 52 formed between the guides 53 mounted on the inside of the press frames 12 and 13 for maintaining the pilot roller parallel to the web rolls, and for transmitting motion of the pilot roller to the belt rollers to vary the pressure between the belts and the web roll, there is provided an arm 54 at either end of the pilot roller, and provided with a forked end 55 to receive an end of the pilot roller shaft 56. Arms 54 are supported on a shaft 57 rotatably mounted in the side frames of the press and extending therebetween, and are preferably keyed to the shaft 57 to prevent relative movement between them. One of the arms 54 is preferably connected with the arms 41 by which the belt rollers 39 are rotatably supported, and for this purpose, links 58 are pivotally connected with the gears 45 and one of the arms 54, so that movement of the pilot roller 50 causes a corresponding movement of the arms 41 and the belt rollers 39 relatively to the segmental gears 45, thereby winding or unwinding the belts 32 on their respective belt rollers, to vary the pressure between the belts and the web rolls, and maintain the tension of the web uniform.

For varying the normally uniform tension of the web and for supplying the pilot roller with the force necessary to oppose the tension of the web, variably tensionable spring means are preferably provided for moving the pilot against the tension of the web. As embodied, a relatively long compression spring 59 is provided at each end of the pilot roller, and in addition a helical spring 60 surrounds the shaft 57 on which the pilot roller arms 54 are mounted, the spring 60 being connected with the shaft 54 by means of collar 62 to which one end of the spring is fastened, while the other end of the spring is secured to a worm gear 63 rotatably mounted on the shaft 57. For initially tensioning the helical spring and for varying the tension thereof to vary the normally uniform tension of the web, a worm 64 is mounted on the side frame 12 of the press, meshing with worm gear 63, and connected with hand wheel 65 rotatably mounted in the side frame of the press, by means of bevel gears 66. As hand wheel 65 is turned, the tension of the spring 60 is varied accordingly, and the worm and worm gear hold the spring at the desired tension. In passing to the press, the web is guided from the web roll, over one of the guide rollers 67 to guide rollers 68 between which it is looped over pilot roller 53.

In operation, the web in passing to the printing press is looped around the pilot roller 50 so that the pilot roller is moved in accordance with changes in the web tension. When a new web roll has been placed in position, handle 47 is moved down, swinging arms 41 inwardly and revolving the corresponding pinion 44 and roller 39 to take up slack in belt 32 and bring the belts into contact with the periphery of the web roll, and is preferably pulled down to a slightly greater extent in order to centrally position the pilot roller. As the web is drawn off, pilot roller moves back and forth, and by reason of links 58 similarly moves gears 45, which are coaxial but independently movable with respect to arms 41. Movement of gears 45 causes the belts to wind or unwind on rollers 39, thereby maintaining the web tension constant. As the web roll wears down, the belts may be maintained in contact with the web rolls by periodically moving the handles 47 and arms 41.

In case the web breaks, or the press is stopped, the pilot roller 50 quickly moves to the right (Figure 1) winding the belts on their rollers 39, thereby greatly increasing the pressure between the belts and the web

roll and quickly stopping further rotation of the active web roll.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. Web controlling mechanism including in combination a web roll support, flexible friction belts for tensioning the web drawn from the web roll, manually operated means for periodically taking up the slack in the friction belts as the web roll wears down and a pilot roller for controlling the friction belts and the tension of the web in the intervals between manual operation of the belts.

2. Web controlling mechanism including in combination a web roll support, friction belts for tensioning the web drawn from the web roll, manually operable means for periodically moving the belts to maintain them in contact with the web roll, and a pilot roller moved by the tension of the web for continuously controlling the pressure between the belts and web roll for maintaining the tension of the web constant.

3. Web controlling mechanism including in combination a web roll support, friction belts for tensioning the web drawn from the web roll, manually operable means for periodically moving the belts to maintain them in contact with the web roll, and a pilot roller moved by the tension of the web and by the manually operable means for continuously controlling the pressure between the belts and web roll for maintaining the tension of the web constant.

4. Web controlling mechanism including in combination a web roll support, friction belts for tensioning the web drawn from the web roll, rollers on which the belts may be wound to move them and maintain them in contact with the web roll, a pilot roller moved by the tension of the web for winding the belts on the rollers, and manually operated means for moving the rollers and pilot roller as the web roll wears down to maintain the pressure between the belts and web roll always under control of the pilot roller and the web substantially constant.

5. Web controlling mechanism including in combination a web roll support, friction belts for tensioning the web drawn from the web roll, rollers on which the belts may be wound to maintain them in contact with the web roll, a pilot roller moved by the tension of the web for winding the belts on the rollers and manually operated means for periodically moving the rollers to move the pilot roller and mantain the web tension constant and under control of the pilot roller.

6. Web controlling mechanism including in combination a web roll support, friction belts for tensioning the web drawn from the web roll, rollers on which the belts may be wound, to maintain them in contact with the web roll, a pilot roller moved by the tension of the web for winding the belts on the rollers, manually operated means for periodically moving the rollers, said means cooperating to maintain the web tension substantially constant.

7. Web controlling mechanism including in combination a web roll support, friction belts for tensioning the web drawn from the web roll, rollers on which the belts may be wound to maintain them in contact with the web roll, a gear segment for rotating the rollers, and manual means and a pilot roller for moving the rollers relative to the gear segment.

8. Web controlling mechanism including in combination a web roll support, friction belts for tensioning the web drawn from the web roll, rollers on which the belts may be wound to maintain them in contact with the web roll, manual means and means controlled by the tension of the web for moving the rollers and a gear for rotating the rollers as the rollers are moved.

9. Web controlling mechanism including in combination a web roll support, friction belts for tensioning the web drawn from the web roll, rollers on which the belts may be wound to maintain them in contact with the web roll, manually operated means for maintaining the belts in contact with the web roll, and a pilot roller moved by the tension of the web and by the belts for maintaining uniform the tension of the web.

10. Web controlling mechanism including in combination a web roll support, friction belts for tensioning the web drawn from the web roll, rollers on which the belts may be wound, a pair of arms by which said rollers are oscillatably mounted, gearing for rotating said rollers as they are oscillated, a spring pressed pilot roller moved by the tension of the web and connected with the rollers for moving the rollers relatively to the gearing for maintaining the web tension uniform and a manually operated lever for moving the pilot roller relatively to the gearing for maintaining the belts in contact with the web roll.

In testimony whereof, I have signed my name to this specification.

ERNEST JAMES SMITH.