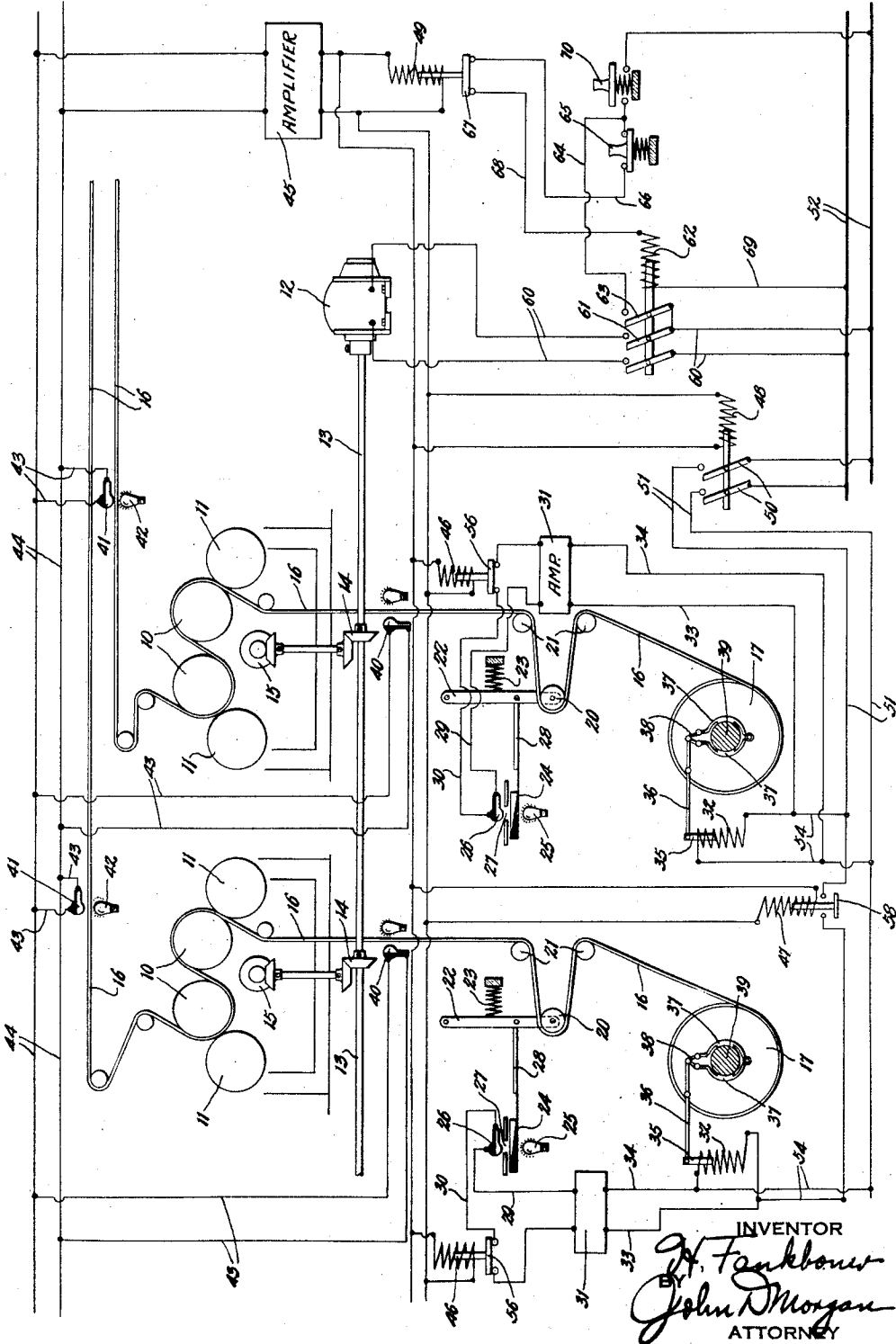


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PRINTING PRESS

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The present invention relates to printing presses and more particularly to a new and improved controlling mechanism for controlling the operation of the printing press, the rotation of the web rolls and the tension of the web fed therefrom by the web or webs fed to the press.

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, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawing, referred to herein and constituting a part hereof, illustrates one embodiment of the invention, and together with the description, serves to explain the principles of the invention.

The accompanying drawing diagrammatically illustrates one embodiment of the invention and shows the operative relationship of the various parts to each other.

The present invention has for its object the provision of a novel and improved controlling mechanism for controlling the tension of the web as it is fed to a printing press, as well as controlling the rotation of the web rolls and the driving means for the press. Another object is the provision of photo-electric control means by which the operation of the press and the rotation of the web rolls is stopped when a break occurs in a web. A further object of the invention is a provision of web tension controlling means in which a photo-electric cell is employed to vary and control the braking effort applied to a web roll.

In accordance with the present illustrative embodiment of the invention the printing press comprises a plurality of rotary printing couples, each adapted to perfect a web, which after being perfected, may be slit, associated, cut and folded as desired. Suitable driving means are provided and preferably comprise an electric motor geared to the printing couples, the power supplied to the motor being controlled by suitable switching mechanism held in circuit-closing position by a holding circuit. Means are provided for controlling the tension of the web fed to the printing couples and for this purpose electro-magnetically energized web roll brakes are provided and supplied with electric current under control of a photo-electric cell and a pilot roller. This control comprises a pilot roller moved by changes in the tension of the web and varying the amount

of light received by the photo-electric cell, thereby to vary the output of said cell. The output of the cell is preferably amplified and supplied to the brake energizing means so that the braking effort is varied in accordance with movements of the pilot roller. Means are also provided for interrupting the holding circuit thereby stopping the press-driving motor, and for applying the brakes to the web rolls with increased braking force to prevent excessive rotation of the web roll as the press is stopped. These means, in the illustrative embodiment, comprise a plurality of photo-electric cells and light sources, arranged so that the light is normally shielded from the cells by a web of paper, with the cells arranged in parallel and positioned at different points along the runs of the various webs. The output of these various photo-electric cells of the second group is supplied to an amplifier, the output of which is connected to interrupt the holding circuit of the motor. The amplified output of this second group of photo-electric cells also serves to interrupt the control of the web roll braking means previously described and to supply the web roll braking means with sufficient energy to bring the various web rolls quickly to rest.

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

Referring now in detail to the present embodiment of the invention as shown in the accompanying drawing, the printing press comprises a plurality of rotary perfecting printing couples of the type generally employed in printing newspapers. Each of these couples comprises a pair of impression cylinders 10 with their cooperating plate cylinders 11, geared together and driven from an electric motor 12 by means of main shaft 13 and bevel gears 14 and 15. Each of the couples is adapted to perfect a web of paper 16 fed from a web supply roll 17 and which after being printed by the plate cylinders 11 passes to a folding mechanism (not shown) where the webs from the several couples are slit, associated, cut and folded.

Photoelectric means are provided for controlling the tension of the webs as they are fed from the web rolls to the printing units, and these means are preferably individually controlled and serve to maintain the web tension substantially constant. As embodied, a pilot roller is provided for each of the printing couples and the running web 16 is looped over its respective pilot roller 20, between guide rollers 21. Pilot roller 20 is

mounted in pivoted arms 22 and resiliently urged to enlarge the loop by means of a compression spring 23. A wedge 24, increasing in opacity from one of its ends to the other and resembling a photometric wedge, is positioned between a light source 25 of substantially constant intensity and a photo-electric cell 26. A suitable aperture 27 is provided between the wedge 24 and the photo-electric cell 26 to limit the incident light solely to that radiated from the light source 25. Wedge 24 is slidable and connected with pilot roller supporting arms 22 by means of link 28, so that the wedge is moved back and forth in accordance with movements of the pilot roller and proportionately to the tension of the running web 16. When the web tension decreases, pilot roller 20 moves to the left, thereby increasing the amount of light received by the cell 26 from the light source 25, while an increase in web tension causes a corresponding decrease in the light received by the cell due to the greater opacity of the left-hand portion of wedge 24. Cell 26 is connected by conductors 29 and 30 with an amplifier 31 which serves to amplify the output of the cell to an extent sufficient to energize the web roll braking means, and the output of amplifier 31 is supplied directly to the solenoid 32 by means of conductors 33 and 34. Solenoid 32 cooperates with an armature 35 connected with lever 36 which, in turn, is connected with brake arms 37 by means of a toggle 38. As the output of cell 26 is increased by an increase in the amount of light transmitted by wedge 24, an increased amount of energy is supplied to the solenoid 32, thereby increasing the force with which the brake arms 37 are pressed against brake pulley 39 to cause a corresponding increase in the tension of the web.

Means are also provided for applying the web roll brakes with increased force sufficient to quickly stop rotation of the web rolls whenever a break occurs in any of the webs. These means are preferably so arranged and constructed that all of the web roll brakes controlling the webs for a single product are actuated simultaneously. As embodied, a plurality of photo-electric cells are provided along the run of each of the webs, and these cells are connected in parallel and control the supply of energy to all of the web roll brakes. This second group of photo-electric cells comprises the cells 40 positioned between the web roll supply and the printing units and the cells 41 positioned along the run of the webs and between the printing units and the associating and folding mechanism. Closely adjacent to each of the photo-electric cells 40, 41, but positioned on the opposite side of the web from said cells, are light sources 42, adapted to illuminate the photo-electric cell whenever the web breaks and is removed from its normal position between the cell and light source. Photo-electric cells 40 and 41 are connected by means of conductors 43 and 44 with an amplifying unit 45, the output of which is supplied to switch-actuating solenoids 46, 47, 48 and 49, and energizes these solenoids whenever the light is not shielded from all of the cells 40, 41 by means of the webs 16.

Solenoid 48, when energized, is adapted to close switch 50 by which current is supplied to the conductors 51 from mains 52, and conductors 51 are connected to the brake-energizing solenoids 32 by means of conductors 54. A solenoid 46 is provided for each of the web roll brake mechanisms and energizes its individual switch 56, connected in series between the photo-electric cell

26 and the corresponding amplifying unit 31, so that each time current is supplied to solenoids 32 from mains 52, the proportional and continuous control of the web roll brakes by cells 26 is interrupted. Between each pair of web roll controlling mechanisms is provided a switch 58, actuated by a solenoid 47 and normally held open, to prevent the energy from each amplifying unit 31 being supplied to any brake-operating solenoid except that one for the corresponding unit. The output of amplifier 45 energizes solenoid 47, thereby causing all of the solenoids 32 to be connected with the mains 52 through conductors 54, switch 58, conductors 51 and switch 50.

Means are also provided for interrupting the supply of power to the motor 12 whenever a break occurs in any of the webs. For this purpose, the power supplied to motor 12 from mains 52 through conductors 60 is controlled by means of a solenoid-actuated switch 61, biased to open and held in closed position by solenoid 62. Said switch 61 is provided with an additional pole 63, connected in the holding circuit, and comprising one of the conductors 64, normally closed push button 65, conductor 66, normally closed switch 67, conductor 68, solenoid 62 and conductor 69. Switch 67 is moved to open position by energizing solenoid 49, thereby interrupting the current normally supplied to the holding solenoid 62 and permitting switch 61 to move to open position. A starting push button 70 is provided connecting conductor 64 with one of the mains 52 and in parallel with switch arm 63, and a momentary closing of push button 70 energizes solenoid 62 to move the switch 61 to closed position in which it is held by current supplied to the stop button 65.

As will be seen from the foregoing detailed description of the invention, a break in any of the webs causes solenoids 46, 47, 48 and 49 to be energized, interrupting the normal continuous pilot roller control of the web tension, interconnecting all of the brake-operating solenoids 32 and supplying them with relatively heavy current from the mains 52, at the same time interrupting the supply of power to the motor 12 and thereby causing both the press and the web rolls to stop.

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. In a web controlling mechanism, the combination of means for rotatably supporting a web roll, an electrically energized brake for controlling the tension of said web, a pilot roller and photo-electric means controlled by the pilot roller and controlling the brake.

2. In a web controlling mechanism the combination of means for rotatably supporting a web roll, an electrically energized brake for controlling the tension of said web, a pilot roller, a light source, a photo-electric cell, means controlled by the pilot roller for varying the light falling on the cell from the light source in accordance with the web tension and means for controlling the energy supplied to the brake by the cell.

3. In a web controlling mechanism the combination of means for rotatably supporting a web roll, an electrically energized brake for controlling the tension of said web, a pilot roller, a light source, a photo-electric cell and means interposed between said source and cell and con-

trolled by the pilot roller for varying the light received by said cell in accordance with the web tension, said cell serving to vary the energy supplied to said brake.

5 4. In a web controlling mechanism the combination of means for rotatably supporting a web roll, an electrically energized brake for controlling the tension of said web, a pilot roller, a light source, a photo-electric cell, means interposed between said source and cell controlled by the pilot roller for varying the light received by said cell in accordance with the web tension and means for amplifying and supplying the output of said cell to the brake energizing means.

15 5. Web controlling mechanism including in combination means for rotatably supporting a web roll, a brake for controlling the rotation of the web roll, electrically-actuated means for operating the brake, a light source and a photo-electric cell on opposite sides of the web, a pilot roller, a second photo-electric cell, means for controlling the light received by said second cell in accordance with movements of the pilot roller, means for amplifying the output of said second cell and supplying it to the brake-operating means and means for alternatively energizing the brake under control of said first cell.

6. Web controlling mechanism for printing presses including in combination means for rotatably supporting the web roll, a brake for controlling the rotation of the web roll, electrically-actuated means for operating the brake, a press to which the web is supplied from said roll, an electric motor for driving the press, a holding circuit for controlling the motor, a pilot roller, a light source, a photo-electric cell, pilot roller controlled means for varying the amount of light received by said cell in accordance with variations in web tension, a plurality of other light sources and photo-electric cells adjacent said light sources and between which and said cells the web is passed to and through the press, means for amplifying the output of said first cell in supplying it to the brake-operating means, means for interrupting the holding circuit by the output of any of said second cells and means for alternatively energizing said brake under control of said second cells.

7. Web controlling mechanism for printing

presses including in combination means for rotatably supporting the web roll, a brake for controlling the rotation of the web roll, electrically-actuated means for operating the brake, a pilot roller, a light source, a photo-electric cell, pilot roller controlled means for varying the amount of light received by said cell in accordance with variations in web tension, a plurality of other light sources and photo-electric cells adjacent said light sources, and between which and said cells the web is passed to and through the press, means for amplifying the output of said first cell in supplying it to the brake-operating means, and means for alternatively energizing said brake under control of said second cells.

8. Web controlling mechanism for printing presses including in combination means for rotatably supporting the web roll, a brake for controlling the rotation of the web roll, electrically-actuated means for operating the brake, a press to which the web is supplied from said roll, an electric motor for driving the press, a holding circuit for controlling the motor, a pilot roller, a light source, a photo-electric cell, pilot roller controlled means for varying the amount of light received by said cell in accordance with variations in web tension, a plurality of other light sources and photo-electric cells adjacent said light sources, and between which and said cells the web is passed to and through the press, means for amplifying the output of said first cell in supplying it to the brake-operating means and means for interrupting the holding circuit by the output of any of said second cells.

9. Web controlling mechanism including in combination means for rotatably supporting a web roll, a brake for controlling the rotation of the web roll, electrically-actuated means for operating the brake, a pilot roller, a photo-electric cell, means for controlling the light received by said cell in accordance with movements of the pilot roller, means for amplifying the output of said cell and supplying it to the brake-operating means, a plurality of web detectors connected to said brake and means for alternatively energizing said brake upon actuation of any of said detectors.

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