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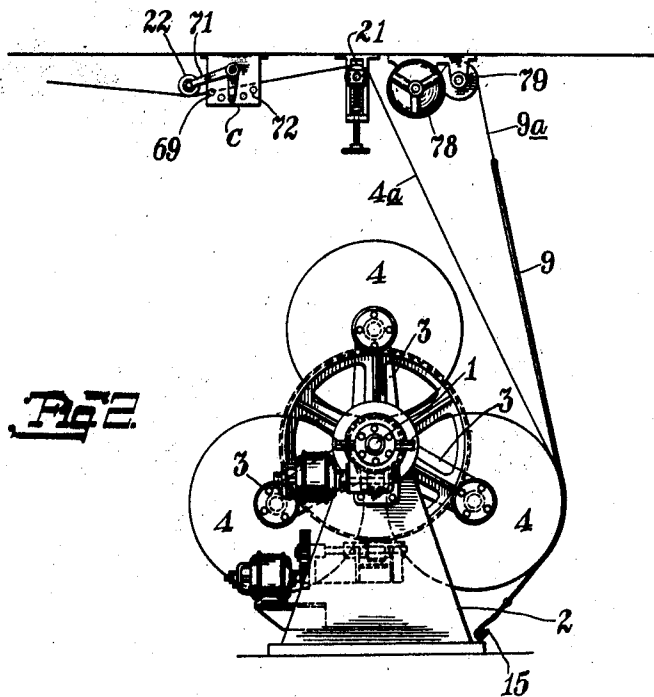
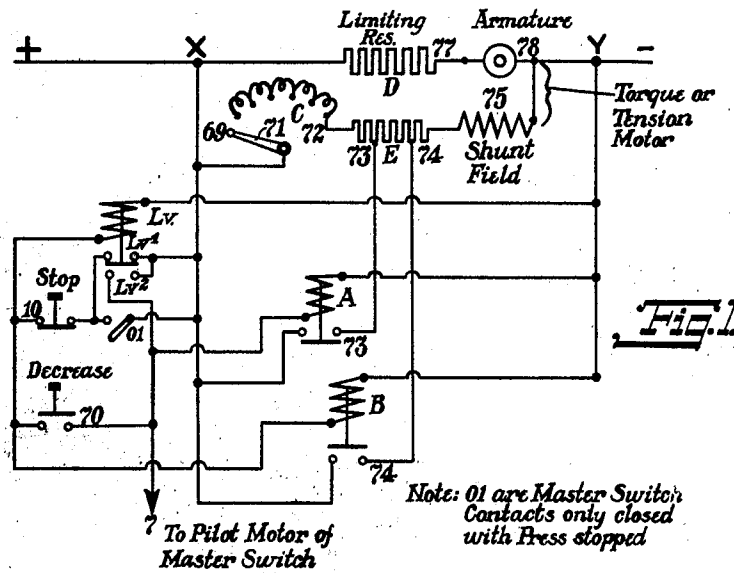
A. J. CLINE ET AL

1,618,975

WEB TENSION EQUIPMENT FOR PRINTING PRESSES

Filed March 20, 1926

2 Sheets-Sheet 1



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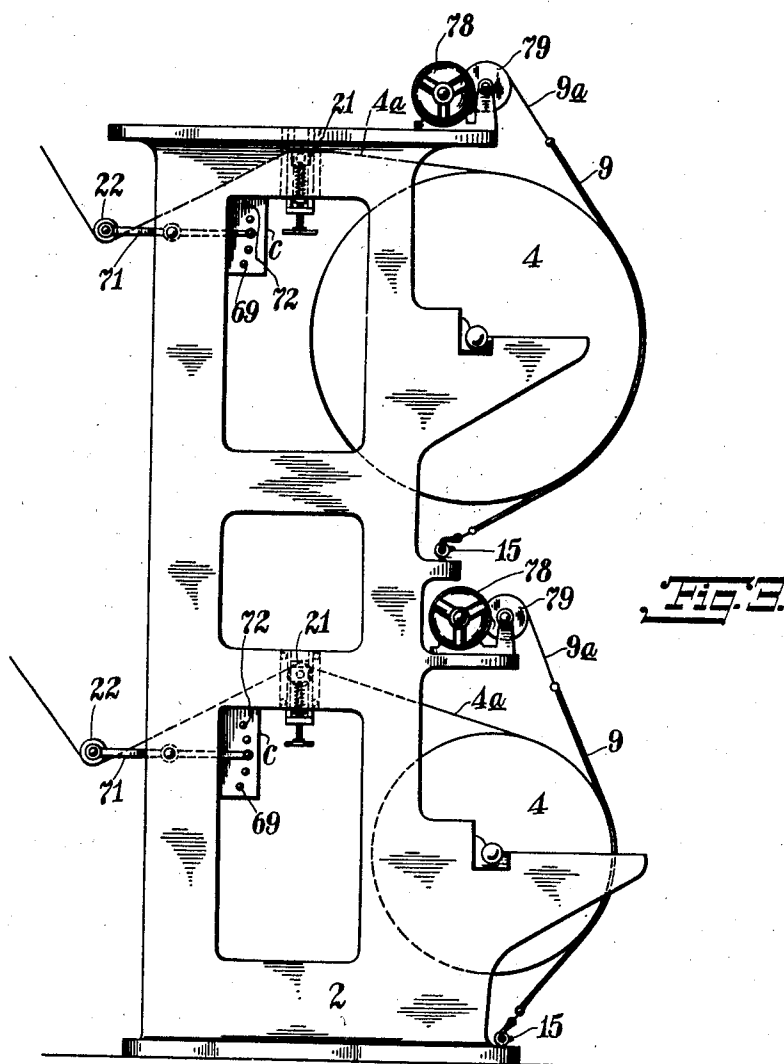
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UNITED STATES PATENT OFFICE.

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WEB-TENSION EQUIPMENT FOR PRINTING PRESSES.

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While the preferred embodiment of our invention is shown as used in connection with printing presses, it will be obvious that the nature of our control devices is such that they may be applied to other moving bodies requiring frictional control of speed.

In United States Letters Patents Nos. 1,550,241 and 1,550,242, issued August 18, 1925, the broad invention is disclosed of the control of web-tension on printing presses through the use of frictional straps or aprons pressed against the moving surface of the web roll from which web paper is being drawn to the press; in the second of such patents the invention was disclosed of broad means for automatically controlling the speed of the web roll when the press is slowed down or subject to an emergency stop. The present invention also contemplates the use of friction straps or aprons and discloses an improvement upon the specific devices shown in the above named patents, being a specific and improved means for carrying such inventions into effect.

Our invention is designed for use particularly in connection with high speed printing presses such as are utilized in the printing of newspapers, whether such presses be of the unit type or the decker type. With the unit type of machine it is customary to use a roll stand carrying a plurality of rolls of paper, which may be brought successively into use to supply web paper to the press; with such rotatable roll stand it is possible to effect a so-called flying paster without stopping the press, the web from the fresh roll being pasted to the moving web of the expiring roll when such roll is nearly exhausted. In the decker type of press it is more usual to employ a single roll of web paper for each deck, although roll-stands are at times used in connection therewith. In the attached figures, illustrating the preferred form of our invention, we have shown such invention applied both with and without rotatable roll stands; in such drawings, like reference letters are applied to similar features of construction throughout. In the drawings, Fig. 1 represents a diagrammatic or schematic arrangement of circuits and instrumentalities by which our invention may be carried into effect; Fig. 2 shows our in-

vention applied to a unit type of press; Fig. 3 shows such invention applied to a decker type of press with two decks and a separate control for each deck.

Referring first to Fig. 2, there will be seen illustrated a roll stand 2 carrying on the shaft 1 a three-arm spider 3, each arm of such spider carrying a roll 4 of web paper. In such Fig. 2 the lower right hand roll is having its web 4^a drawn to press and the rotation of such roll is controlled by the strap or apron 9 which is held at its lower end by the fixture 15, while its upper end is connected directly or by the continuation 9^a to and around a drum 79, or other form of lever, suitably supported above the roll stand, such roller 79 being geared or otherwise connected to a torque or tension motor 78. Such motor is preferably a direct current, shunt-wound motor which may have a resistance in series with its armature to limit the amount of current which shall flow through such armature, while either the shunt-field or armature circuit is controlled by one or more resistances. When an alternating current motor is used the control may be effected by reactances, as will be apparent. The torque of a motor depends on the armature current and the magnetic flux from field-poles to armature; therefore, the regulation of the torque of our tension motor may be varied by varying the field-strength or the armature current or both, according to the preference of the designers. For purposes of illustration we have herein shown a shunt-wound motor with control in the shunt field circuit. Therefore, with the control applied as indicated in Fig. 2, any increase in field strength will increase the pull on the apron 9 through the effort of the motor to roll up the extension 9^a of the apron upon the drum 79. In such Fig. 2, we have shown a rheostat C which may be understood as placed in series with the shunt field winding of the motor 78. The regulating arm of such rheostat C is connected to a roller 22, resting upon the upper surface of the web sheet 4^a, such roller 22 rising or falling according to variations in the tension on the web sheet and thereby varying the position of the contact arm 71 of such rheostat C back and forth between the limits 69 and 72 of such rheostat. In this manner we

have one automatic feature, tending to assist in maintaining a certain standard of tension upon the apron 9. It is to be understood, however, that if it be desired to rely upon hand regulation for the maintenance of such a standard of running tension, such automatic device C²² may have substituted for it an ordinary hand-operated rheostat, connected to the motor, however, in a similar manner, or, where the voltage is correct, C²² may be entirely omitted.

Fig. 3 illustrates a portion of a decker type of press, two rolls of web paper 4 being illustrated, one for each of two decks. The web sheet 4^a from each of these rolls passes over a roller 21 suitably supported, and then under a movable roller 22, similar to the roller 22 shown in Fig. 2, and likewise connected to the movable arm of a rheostat C, so connected to the motor 78 that any lessening of tension of the web sheet 4^a will result in a dropping of the end of the arm 71 carrying the roller 22 and cutting out more or less of the resistance of the rheostat C, tending to increase the torque or tension of the motor 78 upon the drum 79 and thence to the apron 9.

In connection with Fig. 2 and Fig. 3, we have spoken of the apron 9 as being a single apron, and the singular form of noun is used in the claims, but it is to be understood that plurality of such straps or aprons may be employed as the user may find best suited to the character of the article being controlled. It sometimes happens that rolls of paper are so irregular in shape that a single wide strap or apron 9 would tend to give an irregular contact and that a plurality of narrower straps or aprons could be used to better effect. However, this is merely a matter of engineering choice on the part of the designer or user of our invention.

We have not shown in Fig. 2 or Fig. 3 the rheostats by means of which an automatic increase in tension or torque may be secured from the motor 78 when the press is reduced in speed or suddenly stopped. For the purposes of such Fig. 2 and Fig. 3, however, it will be understood that such resistances are merely resistances additional to the resistances of rheostat C, being in series therewith and with the shunt field of the motor 78; as already noted, this additional feature may be put in the armature circuit. It is also to be understood that in connection with such supplementary resistances, means shall be employed controlled preferably by the action of the press operator pushing upon his control buttons for decreasing the press speed or for giving an emergency stop to the press. Fig. 1 shows the schematic arrangement of the preferred form of our control, without burdening the diagram with more than the essentials of the main control of press speed applicable to our improvement.

There are several well known motor drives for printing presses, involving one or more driving motors, usually of different sizes, with elaborate means for starting and stopping such main driving motors and increasing or decreasing their speed. It is common to have the solenoids and other control features of such a control system mounted upon a control panel, the various commutations of circuits being secured through a master switch on such panel, the traveling contact arm of such master switch being moved back and forth by a pilot motor or solenoid connected therewith. It will be understood that when the press is to be started a starting button is pushed by the press-man, resulting in the starting of the pilot motor and the moving of the contact arm of the master switch across a series of commutating contact blocks which effects a gradual acceleration of the main driving motors of the press. Similarly, when the speed of the press is to be reduced, another or "decrease" button is pushed, resulting in a reversal of the pilot motor and a sweeping back of the contact arm of the master switch to gradually reduce the speed of the main driving motors and finally stop them. There is usually, also, another button, which permits the press-man to "inch" the main driving motor along by intermittent steps so as to secure a movement of the press which may be desirable when the press is being prepared for service. There is usually another button known as the "stop" button which when pressed, cuts the current from the main driving motor and applies a brake, while at the same time the master switch goes to the "off" position.

As the web-rolls of paper weigh a ton, more or less, and are normally operated at speeds which will supply approximately 1200 feet of web paper to the press per minute, such web rolls have a high momentum. When the press speed is decreased, or the press is brought to a sudden stop, there is the natural tendency for the press or press room to be flooded with paper from the over-running roll, unless controlled by efficient means. Our invention discloses an improved manner of securing the control of such web rolls when the press speed is to be decreased or the press is to be stopped, and Fig. 1 shows the essential elements of such apparatus. In such Fig. 1, we have a torque or tension motor with an armature 78 and a shunt field 75. In series with the armature 78 is a resistance 77 for limiting the amount of current normally passing through such armature which, it will be understood, belongs to the motor applying tension to the aprons 9 of Figs. 2 and 3. In series with the shunt field 75 of this tension motor are two sets of rheostats, C and E; rheostat C may be either hand operated or automatically controlled, as already de-

scribed. Its purpose is to limit or control the torque or tension of the motor during the ordinary or normal operation of the press. The supplementary rheostat E is of such value that when a portion of it only is utilized—the balance of its resistance and all of the resistance of the rheostat C being short circuited—the strength of the shunt-field is such as to increase the torque or tension of the motor, and therefore of the apron, to a degree which will prevent the web sheet 4^a from over-running when the speed of the press is being decreased. Likewise, when a still less resistance of the rheostat E is utilized—all the balance thereof and the whole resistance of rheostat C being short circuited—the strength of the field of the motor shall be so increased as to prevent the web sheet 4^a from over-running when the press is suddenly stopped. Fig. 1 shows how we prefer to effect this set of conditions, this being only an exemplification of our invention, which we do not wish to limit to this specific form.

The armature 78 is shown across the line from X to Y, with the limiting resistance 77 in series with it. The shunt field 75 is also shown as across the line, having in series with it resistances C and E; this shunt field circuit may be introduced by moving the rheostat handle 71 from the idle contact 69 to the active contacts of the rheostat C. On this diagram are contacts O¹ representing master switch contacts which are only closed when the press is stopped and the master switch arm has been brought to the "off" position. It will be noted from this diagram that when the contacts O¹ are closed, one of the results is to actuate the coil of the low voltage relay LV by way of the "stop" push button. One effect of energizing the coil of the low voltage relay LV is to close the upper contacts LV¹ of the low voltage switch and establish connection to the "stop" button with independence of the master switch contacts O¹. The normally closed "stop" button furnishes current to the winding of the switch B, as shown, the effect of this normal energizing of the coil B being to open its switch contacts 74' which extend from the positive side of the line (X) to a selected point 74 on the rheostat E. Regarding this circuit it will be seen that when the "stop" button is pressed, to open the circuit to 10, the coil B will be de-energized and the switch B will be closed, sending positive current from X to 74 on rheostat E. The effect of this is to short circuit all of the rheostat C and all of the resistance of rheostat E from the rheostat C to the point 74; this action results in a large increase in current through the shunt field circuit, increasing the torque of the motor and applying a much greater tension upon the apron 9 which presses

against the active roll of web paper, preventing an over-running of the roll and a consequent flooding of the room or press with paper.

Fig. 1 also shows a second push button (marked "decrease"), the pressure of which closes the contacts at 70 and not only actuates the pilot motor to swing the master switch arm back towards the "off" position by way of the line 7, but also energizes the coil of the switch A. This causes the switch A to close at the contacts 73', establishing a circuit from X to the selected point 73 of the rheostat E, short circuiting the rheostat C and so much of the resistance of rheostat E as lies between C and the point 73; the effect of this is to increase the current flow through the shunt field of the torque motor, causing the torque to be increased and the tension or pull upon the apron 9 to be increased to such a degree as will prevent the active web roll from over-running while the speed of the press is being reduced. When the "stop" button is actuated, the circuit through the low voltage relay LV is broken, resulting in the opening of the upper contacts LV¹ of the low voltage relay LV and the closing of the lower contacts LV² thereof; this puts positive current from X to the line 7 running to the pilot motor for the master switch and acts to bring the switch arm of the master switch back to the "off" position. This guarantees that although the stop button may be only pressed instantaneously, it nevertheless acts to de-energize the low voltage relay and energize the pilot motor to bring the switch arm back to the "off" position. This means that the press may not be again started until the master contacts are closed at O¹. It will also be seen that whenever the press stops, either by the action of the "stop" button or as the final effect of actuating the "decrease" button, the short circuiting of the resistances in rheostats C and E by the switches A and B is removed and the normal running tension set by arm 71 of rheostat C is re-established. It will also be recognized that if all tension is to be removed from the apron 9—as may be desired when a new roll of web paper is to be inserted—all that is necessary is to open the shunt-field circuit by moving the arm 71 to the "open" contact 69 (by hand or electrically, or otherwise, the precise means not being essential to the practice of our invention) of the rheostat C, or some other switch placed in that circuit for the purpose may be opened; when it is desired to re-establish the normal running tension on the apron 9, all that is necessary is to close such switch and re-establish the desired shunt field conditions.

What we claim is the following:

1. A web-tension equipment for printing

presses comprising a strap or friction apron pressing against the surface of a web-roll of paper from which web is to be drawn to press, a tension motor acting upon the apron to supply a continuous strain thereto for applying a braking force upon the surface of the web-roll, and means for regulating the tension applied by the motor.

2. A web-tension equipment for printing presses comprising a strap or friction apron pressing against the surface of a web-roll of paper from which web is to be drawn to press, a tension motor connected to such strap or apron and serving to apply a continuous braking force on the surface of the web-roll, and means under the control of the pressman for determining the normal standard of tension to be applied through the motor.

3. A variable braking device for a rotating member of continually changing diameter, comprising a friction belt engaging the surface of such member and a tension motor actuating the friction belt to maintain a normal retarding effort irrespective of the changing diameter of the rotary member.

4. A variable braking device for a rotating member of continually changing diameter, comprising a friction belt engaging the surface of such member, a tension motor actuating the friction belt to maintain a normal retarding effort irrespective of the changing diameter of the rotary member and means for adjusting such retarding effort.

5. A variable braking device for a rotating member of continually changing diameter comprising a friction belt engaging the surface of such member, a tension motor actuating the friction belt to maintain a normal retarding effort irrespective of the changing diameter of the rotary member, and means for increasing the tension of the friction belt when the rotating member is to be decelerated or brought to a stop.

6. A web-tension equipment for printing presses comprising a strap or friction apron pressing against the surface of a web-roll of paper from which web is to be drawn to the press, a rotatable drum to which such strap or friction apron is attached, a tension motor connected to such drum and continuously tending to rotate the same, thereby putting the strap or friction apron under stress to apply a braking force on the surface of the web-roll, and means for regulating the tension applied by the motor.

7. A web-tension equipment for printing presses comprising a strap or friction apron pressing against the surface of a web-roll of paper from which the web is to be drawn to the press, a rotatable drum to which such strap or friction apron is attached, a tension motor connected to such drum and con-

tinuously tending to rotate the same, thereby putting the strap or friction apron under stress to apply a braking force on the surface of the web-roll, and automatic means for regulating the tension applied by the motor.

8. A web-tension equipment for printing presses comprising a strap or friction apron pressing against the surface of a web-roll of paper from which web is to be drawn to the press, a rotatable drum to which such strap or friction apron is attached, a tension motor connected to such drum and continuously tending to rotate the same, thereby putting the strap or friction apron under stress to apply a braking force on the surface of the web-roll, means for setting the standard of tension to be secured during normal operation of the press, and means for regulating the amount of tension when the press is to be stopped.

9. A web-tension equipment for printing presses comprising a strap or friction apron pressing against the surface of a web-roll of paper from which web is to be drawn to the press, a rotatable drum to which such strap or friction apron is attached, a tension motor connected to such drum and continuously tending to rotate the same, thereby putting the strap or friction apron under stress to apply a braking force on the surface of the web-roll, means for setting the standard of tension to be secured during normal operation of the press, means for regulating the amount of tension when the speed of the press is reduced and further means for still further regulating the amount of tension when the press is to be stopped.

10. A web-tension equipment for printing presses comprising a strap or friction apron pressing against the surface of a web-roll of paper from which web is to be drawn to the press, a rotatable drum to which such strap or friction apron is attached, a tension motor connected to such drum and continuously tending to rotate the same, thereby putting the strap or friction apron under stress to apply a braking force on the surface of the web-roll, means for automatically regulating the tension of the motor for the maintenance of a desired standard during the normal operation of the press, and means for increasing the amount of tension to be applied by the motor when the press is to be stopped.

11. A web-tension equipment for printing presses comprising a strap or friction apron pressing against the surface of a web-roll of paper from which web is to be drawn to the press, a rotatable drum to which such strap or friction apron is attached, a tension motor connected to such drum and continuously tending to rotate the same, thereby putting the strap or friction apron under stress to ap-

ply a braking force on the surface of the web-roll, means for automatically regulating the tension of the motor for the maintenance of a desired standard during the normal operation of the press, automatic means for increasing the amount of tension when the speed of the press is reduced and further automatic means for still further regulating the amount of tension when the press is to be stopped.

12. A web-tension equipment for printing presses comprising a strap or friction apron pressing against the surface of a web-roll of paper from which web is to be drawn to the press, a rotatable drum to which such strap or friction apron is attached, a tension motor connected to such drum and continuously tending to rotate the same, thereby putting the strap or friction apron under stress to apply a braking force on the surface of the web-roll, guiding rollers around which the web passes on its way to press, a pivoted roller pressing against the web and responding to variations in the tautness of such web, and means controlled by such pivoted roller for regulating the tension applied by the motor during the normal operation of the press.

13. A web-tension equipment for printing presses comprising a strap or friction apron pressing against the surface of a web-roll of paper from which web is to be drawn to the press, a rotatable drum to which such strap or friction apron is attached, a tension motor connected to such drum and continuously tending to rotate the same, thereby putting the strap or friction apron under stress to apply a braking force on the surface of the web-roll, guiding rollers around which the web passes on its way to press, a pivoted roller pressing against the web and responding to variations in the tautness of such web, and a rheostat controlled by such pivoted roller for regulating the tension applied by the motor during the normal operation of the press.

14. A web-tension equipment for printing presses comprising a strap or friction apron pressing against the surface of a web-roll of paper from which web is to be drawn to the press, a rotatable drum to which such strap or friction apron is attached, a tension motor connected to such drum and continuously tending to rotate the same, thereby putting the strap or friction apron under stress to apply a braking force on the surface of the web-roll guiding rollers around which the web passes on its way to press, a pivoted roller pressing against the web and responding to variations in the tautness of such web, and a rheostat in the circuit of an element of the tension motor controlled by such pivoted roller for regulating the

torque exerted by the motor during the normal operation of the press.

15. A web-tension equipment for printing presses comprising electric motors for driving the press, a master switch for regulating the speed of such motors, a pilot motive-device for driving the arm of the master switch to increase or decrease the press-speed, means for actuating the pilot motive-device, a strap or friction apron contacting with the surface of the web roll from which web paper is being drawn to the press, a roller to which such strap or apron is attached, a tension motor connected to such roller and continuously tending to hold the strap or apron under stress, resistance in the circuit of an element of such motor, means for adjusting a part of such resistance to maintain a normal state of tension on the strap or apron, a switch for short-circuiting a part of the resistance to regulate the torque of the motor when the press-speed is diminished, means for actuating such switch when the press-speed is to be diminished, a second switch for short-circuiting more of the resistance, and means for actuating such second switch when the press is to be stopped.

16. In a web-roll control mechanism for printing presses, the combination of a web-roll support, a friction belt engaging the surface of a roll carried by the support, said belt being secured at one end, a rotatable drum over which passes the other end of the belt, a motor to rotate such drum and means for controlling the motor to increase the tension of the belt when the press is to be stopped.

17. Means for automatically preventing the over-running of the web-sheet in a printing press, comprising a web-roll support, a friction belt engaging the surface of a roll carried by the support, said belt being secured at one end, a rotatable drum over which passes the other end of the belt, a motor to rotate such drum and means connected with the control circuits of the press to cause the motor to increase the belt tension through the rotation of the drum when such circuits are set to decelerate the press.

18. In a web-roll control mechanism for printing presses, the combination of a web-roll support, a friction belt engaging the surface of a roll carried by the support, said belt being secured at one end and arranged to be taken up at the other end, a drum over which the belt passes and means for rotating the drum to cause an increased pressure of the belt on the roll surface when the press is to be stopped.

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