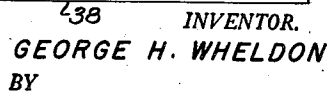


2,631,790

Filed Oct. 1, 1948



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2,631,790

WEB TENSIONING AND DRIVING
MECHANISM

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Application October 1, 1948, Serial No. 52,377

6 Claims. (Cl. 242-75)

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This invention relates to a web tensioning and driving mechanism. More particularly it relates to means for applying and maintaining proper tension to a web of newsprint being fed to a rotary press, and to stop the roll when the press motor is stopped and to drive the roll at a proper speed at all times, and to means for positively driving the roll at proper speed.

In supplying a web to a rotary printing press, such as a newspaper printing press, a roll of newsprint is supported upon a reel. It is a common practice to feed the web from the reel to the press by means of straps trained over rollers and driven at a speed which is governed by the speed of the press, such as to unwind the roll at a proper speed and to maintain a proper tension upon the web as it is fed to the press.

Such means of driving a roll of newsprint and tensioning the web as it comes off the roll, is disadvantageous for several reasons. Thus, it frequently happens that a roll is deformed in transit, and each time the deformed portion of the roll comes into contact with the tensioning and driving straps, tension is improperly applied to the web and a whipping action is imparted thereto. Also, the apparatus needed to adjust the straps is complicated and difficult to service.

It is an object of the present invention to provide an improved means of driving and tensioning a roll of newsprint or the like for the purpose of feeding a web to a rotary press.

It is a further object of the invention to provide driving and tensioning means for a roll of newsprint or the like, which means avoid the necessity of using straps.

It is a still further object of the invention to provide an improved means of stopping the roll when the press motor is stopped.

It is yet another object of the invention to provide a positive drive for a roll of newsprint or the like on a reel, which assures proper tension on the web.

These and other objects of the invention will be apparent from the ensuing description and the appended claims.

One form which the invention may assume is exemplified in the following description and illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a fragmentary view in elevation of the device of the invention.

Fig. 2 is a transverse section taken along the line 2-2 of Fig. 1 and showing also the electrical circuit for operating the device.

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Referring now to the drawings, there is shown fragmentarily a reel 10 of known type including a reel stand 11 having a shaft 12 journaled therein and extending between opposite posts of the stand. The reel is of well known construction and is shown, for example, in Wheldon et al, U. S. Patent No. 2,064,638, issued December 15, 1936, entitled "Web Tensioning Mechanism." Briefly, and as modified for purposes of the present invention, the reel comprises three pairs of radial arms 13 and 13a (of which only one pair is shown), the arm 13a being fixed to the shaft 12 so as to rotate therewith and the opposite arm 13 being rotatable on a sleeve 14 which in turn is rotatable on shaft 12. Arms 13 and 13a are connected together by a bar 13b to cause the arms to move in unison. To the sleeve 14 are secured gears 51 and 51a for a purpose explained hereinafter.

A roll 15 of newsprint wound upon a suitable core (not shown) is supported between each pair of arms by means of stubshafts 16 and spuds 17, the latter being inserted in the ends of the core. As also described in the above-mentioned patent, and as is well known in the art, the rolls mounted upon such a reel are unwound one at a time, and as a roll approaches exhaustion, a device known as a "flying paster" is employed to paste the end of a full roll to the web leaving the nearly exhausted roll, after which the new roll is brought into operative position.

In accordance with the present invention, there is provided at one end of each roll an hydraulic braking and tensioning mechanism generally designated as 20 and, at the opposite end, a drive mechanism generally designated as 21. These mechanisms are described in detail hereinafter. The hydraulic mechanism 20 is for the purpose of maintaining a proper, predetermined tension on the web, and to brake the roll and bring it quickly to a stop in the event that the press motor is stopped. The drive mechanism 21 is for the purpose of driving the roll at predetermined speed and to maintain proper tension on the web.

The hydraulic mechanism 20 comprises a plurality of radial vanes 25 secured to an extension 16a of one of the stub shafts 16, a fluid tight casing 26 secured to the arm 13a of the reel and enclosing the vanes 25, and a conduit 27 communicating with the casing 26 and providing a circuit for a liquid in the casing.

Disposed within the conduit 27 is a valve 28 supported upon a pivotal shaft 29 which extends outwardly of the conduit. Secured to the

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outer end of the shaft 29 is a lever 30 having a counterweight 31 secured thereto. The valve 28 is so disposed that fluid flowing through the circuit in the normal direction as indicated by the arrows, tends to open the valve whereas the counterweight tends to close the valve. A gauge 31a is also provided for measuring the hydraulic pressure in the conduit 27.

A solenoid 32 having leads 33 and 34 energized as and for a purpose described hereinafter, is also provided such solenoid having a plunger 35 secured to the lever 30 through the medium of a coil spring 36. Another solenoid 32a having leads 37 and 38, a plunger 35a and a coil spring 36a is also provided as and for a purpose described hereinafter and is similarly but oppositely connected to the lever 30 as illustrated.

It will be seen that, as the roll 14 is unwound, the shaft 16a, and with it the vanes 25, will rotate in a clockwise direction as viewed in Fig. 2, thus causing fluid to circulate through the circuit as indicated by the arrows, and that the tendency of the fluid will be to open the valve 28 whereas the tendency of the counterweight 31 will be to close the same. By appropriate adjustment of the counterweight, it is apparent that any desired degree of resistance may be opposed to the flow of fluid and thus any desired degree of braking of the roll 14 and tensioning of the web may be applied.

Referring now to Fig. 2, a main press motor 40 is shown, such motor providing the power to drive the press at high speed. As is well known, and as described in Hentschell and Wheldon Patent No. 1,929,114, issued October 3, 1933, entitled "Automatic Break Web Switch and Cutter," the press drive mechanism may also include an auxiliary motor 40a to start the press and to operate the same at slow speed while the web is being threaded through the press, and a contact assembly switch (not shown) for stepping up the speed of the press motor and of the press. The system described in the above-mentioned patent also includes means for automatically cutting the web when the press motor is stopped, such means being actuated by an E. M. F. generated by the press motor 40 when its main circuit has been broken. Details of this system will be found in the said patent and need not be repeated herein except for that portion of the press motor circuit illustrated in Fig. 2.

As there shown, the press motor 40 is provided with leads 41 and 42 which are energized by the main leads (not shown) of the press motor circuit, and it is also provided with a series field 43 and an armature 44. The motor is also provided with a field 45 which is constantly energized through leads 46 and 47. The motor 40 is also provided with a shunt circuit including the above-mentioned leads 33 and 34 and the solenoid 32 connected in shunt with the armature and series field winding of the motor 40. This circuit is controlled by a switch 48 which is normally closed but is kept open when the main circuit of the motor is closed. This is accomplished by means of a solenoid 49 which is energized by the motor circuit through leads 50 and 51. Solenoid 49 is of such capacity that it is operative when energized from main lines 41 and 42 to hold switch 48 in open position but is incapable of holding the switch in open position when supplied with the E. M. F. produced by the motor 40 after the main switch is open. As long as the main motor circuit is closed, the switch 48 is open, and, hence, the shunt circuit is broken

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and the solenoid 32 is de-energized. When, however, the main motor circuit is broken, the switch 48, hence also the shunt circuit, is closed.

It is apparent that when, for any reason, the main press motor circuit is broken, the armature 44 will continue to rotate for a brief period owing to its momentum, and that because of the field 45, the motor 40 will generate an E. M. F. By reason of the closing of switch 48 and of the press motor shunt circuit, the solenoid 32 will be energized. Accordingly, the lever 30 will be pivoted and the valve 28 urged to closed position, thus providing an extra braking action on the roll 15 to bring it quickly to a stop.

In summary, it will be seen that whenever the main switch is closed, solenoid 49, being energized by main line current, will hold switch 48 in open position so that solenoid 32 is de-energized. However, when the main switch is open, solenoid 49 will be de-energized from main line current and therefore switch 48 will close.

The continued rotation of motor 40 will produce an E. M. F. sufficient to energize and cause actuation of solenoid 32 to close valve 28. However, this E. M. F. produced by motor 40 is not sufficient to cause solenoid 49 to open switch 48 and therefore the switch remains closed until solenoid 49 is again supplied with main line current.

As stated, the auxiliary motor 40a is employed to operate the press at slow speed, as when the web is being threaded through the press. During such an operation it is desirable to relieve tension upon the web, which can be accomplished manually by means of the lever 30 or by adjusting the counter-weight 31. Preferably, however, automatic means of relieving such tension is provided.

Such automatic means is provided by the solenoid 32a, which is energized in the manner now to be described. The auxiliary motor 40a is energized through leads 52 and 53 and a series field 54. As shown, the solenoid 32a is in circuit with the auxiliary motor through the leads 37 and 38. When, therefore, the auxiliary motor 40a is energized, the solenoid 32a is also energized and its plunger acts on the lever 30 to open the valve 28, thus relieving tension on the web.

Referring again to Fig. 1, the driving mechanism 21 comprises a drive shaft 55 driven by the press motor and having a bevel pinion 56 secured thereto, a bevel gear 57 secured to the sleeve 14 and in mesh with the pinion 56, and a double bevel gear 57a secured to the other end of the sleeve 14 as shown. A splined shaft 58 and a screw shaft 59 are also provided, being arranged in parallelism and journaled in bearing brackets 60 supported by the arm 13 as illustrated. The shaft 58 is operatively connected with the double bevel gear 57a by means of a bevel pinion 61 and a clutch 62 having an operating lever 63, and the shaft 59 is similarly connected by means of a bevel pinion 64 and a clutch 65 having an operating lever 66. A half nut 67 is also provided, such nut being normally in threaded engagement with the screw shaft 59 and having forked arms 68 which receive and are slidable along the splined shaft 58. Disposed between and journaled in the arms 68 and keyed to the splined shaft 58 is a friction roller 69 engaging a friction plate 70, secured to the adjacent spud 16.

It will be seen that, as the press operates at, say, normal printing speed, the friction roller 69 will be rotated at a constant angular velocity and

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that it will be fed inwardly and uniformly from the periphery of the friction plate 70 toward the center of the roll 15. The rotary speed of the friction roller relatively to the speed of the press is determined by the gear ratio between the shafts 55 and 58 and will be constant for any given press speed. The pitch of the screw shaft 59 is such that the friction roller is fed inwardly at the same rate as the rate of diminution of diameter of the roll 15. When the roller 69 has been fed inwardly to its limit or as far as desired, the half nut 67 is lifted free of the shaft 59 and the roller is pushed back to its starting position.

It is thus apparent that a means has been provided of constantly adjusting the angular velocity of the roll 15 to accommodate the same not only to various press speeds but also to the diameter of the roll. Thus, assuming operation at constant press speed, obviously as the roll is exhausted and the diameter decreases, if it is driven at the same angular velocity the linear velocity of the web unwinding from the roll will decrease and greater tension will be applied to the web until finally the web would break. In prior devices for adjusting the angular speed of the roll, straps have been used which travel at the linear speed of the press. The attendant disadvantages have been discussed hereinabove, and these disadvantages are in large measure obviated by the drive mechanism described.

It will be noted that the mechanical connection between the drive shaft 55 and the shafts 58 and 59 is such as not to interfere with rotation of the reel. Thus, when it is desired to rotate the reel 120° so as to bring a full roll up to normal operating position, this may be done without interrupting the driving connection between the shafts 55 and 58. It will also be noted that a clutch is provided for each of the shafts 58 and 59, and, therefore, that an idle pair of shafts 58, 59 may be disengaged and inactivated by means of the clutch levers 63 and 66. Also, just before pasting the end of a full roll to the web of a nearly exhausted roll, the full roll may be brought up to press speed by engaging its clutches 62 and 65.

It will therefore be apparent that means have been provided for controlling the operation of a reel for feeding a web to a high speed rotary press, and that such means maintain a proper, predetermined tension on the roll, brake the roll and bring it quickly to a stop when the circuit of the press motor is opened and provide a variable drive for the roll which ensures uniform linear speed of the web at any press speed and regardless of the diameter of the roll.

While I have shown the preferred form of my invention, it is to be understood that various changes may be made in its construction by those skilled in the art without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a press assembly comprising a rotary press, an electric motor for operating the press, a main circuit for said motor and a rotatable reel for supporting a roll of newsprint or the like for the press, the improvement which comprises means for braking said roll, electrical means for actuating said braking means and a circuit for said electrical means, said circuit including said motor and being energized by the

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momentum of said motor when its main circuit has been broken.

2. A press assembly comprising a rotary press, a motor for operating said press, said motor having a main circuit for energizing and driving the motor and a shunt circuit which is energized by the motor when the main circuit is broken, a rotatable reel for supporting a roll of newsprint or the like, means for braking the roll and electrical means included in said shunt circuit for actuating said braking means when said main circuit is broken.

3. A press assembly comprising: a rotary press; a motor for operating said press, said motor having a constantly energized field, a main circuit connected to a source of power and the motor, a shunt circuit for the motor; a rotatable reel for supporting a roll of newsprint or the like; means for braking said reel; and electrical means for actuating said braking means, said electrical means being included in said shunt circuit and being energized by current generated in said circuit by the momentum of said motor in said field when said main circuit is broken.

4. A press assembly comprising: a rotary press; a motor for operating said press, said motor having a constantly energized field, a main circuit connected to a source of power and the motor, a shunt circuit for the motor; a rotatable reel for supporting a roll of newsprint or the like; means for braking said reel; and a solenoid for actuating said braking means, said solenoid being included in said shunt circuit and being energized by current generated in said circuit by the momentum of said motor in said field when said main circuit is broken.

5. A press assembly comprising: a rotary press, a motor for operating said press, said motor having a main circuit for energizing and driving the motor and a shunt circuit which is energized by the motor when the main circuit is broken; a rotatable reel for supporting a roll of newsprint or the like; hydraulic means for braking the roll; and electrical means included in said shunt circuit for actuating said hydraulic means when said main circuit is broken.

6. A press assembly comprising a main motor for operating the press at high speed and having a main circuit and a shunt circuit which is energized by said motor when said main circuit is broken, an auxiliary motor for operating the press at low speed and having a circuit, a rotatable reel for supporting a roll of newsprint or the like, means for braking said reel, electrical means energized by said shunt circuit for actuating said braking means, and electrical means energized by said auxiliary motor circuit for opposing said braking means.

GEORGE H. WHELDON.

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